

Ecological Urban Farm

MSc 4 Heritage Architecture | Hembrug



Introduction

Introduction of Hembrug terrain

Analysis of the assemble plots in the wood

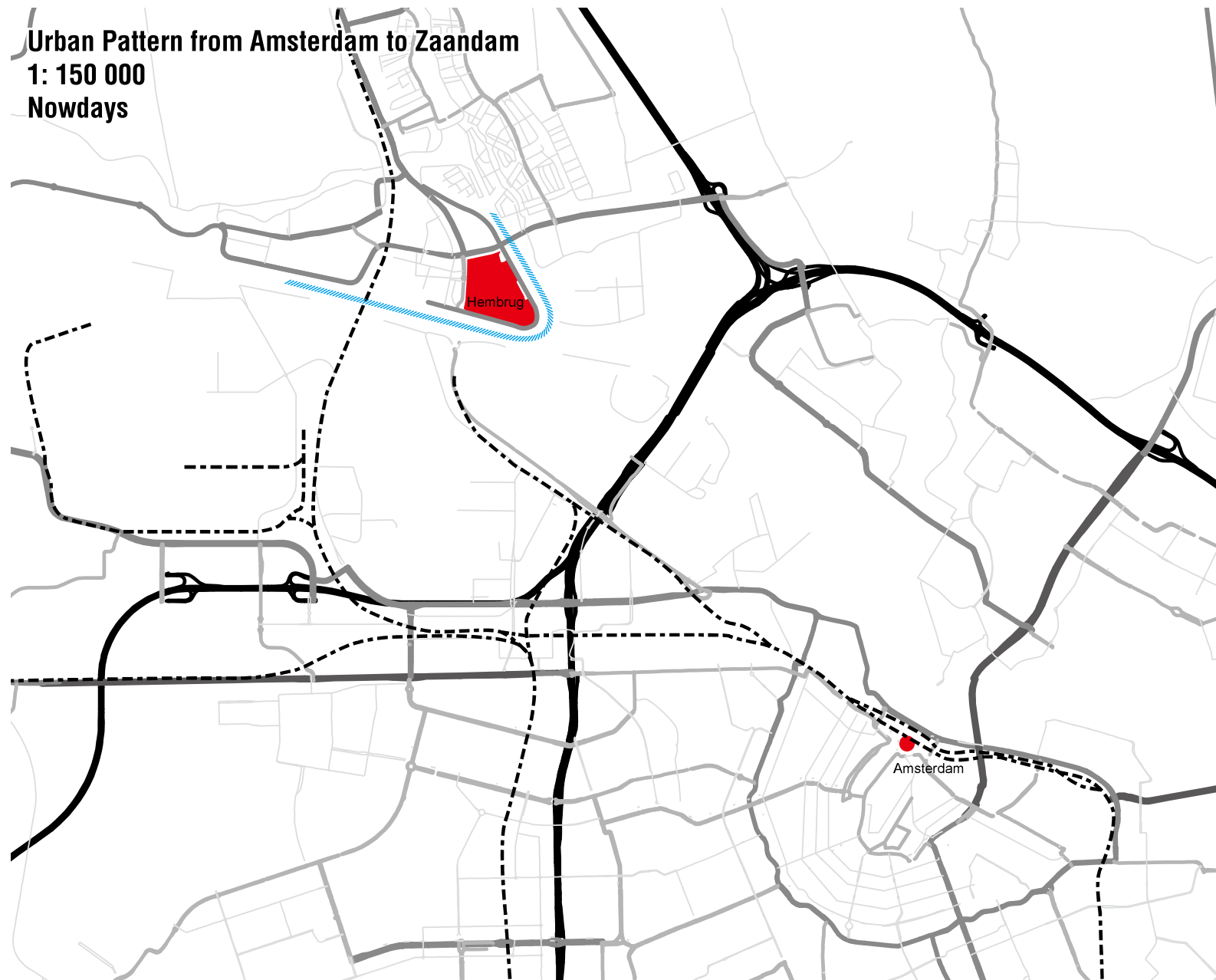
Program proposal

Design illustration

Reflection

Hembrug

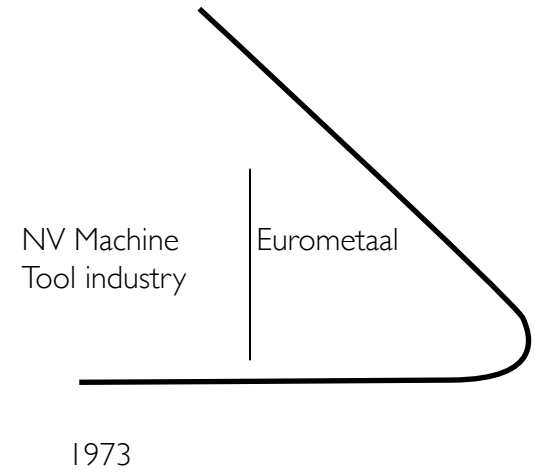
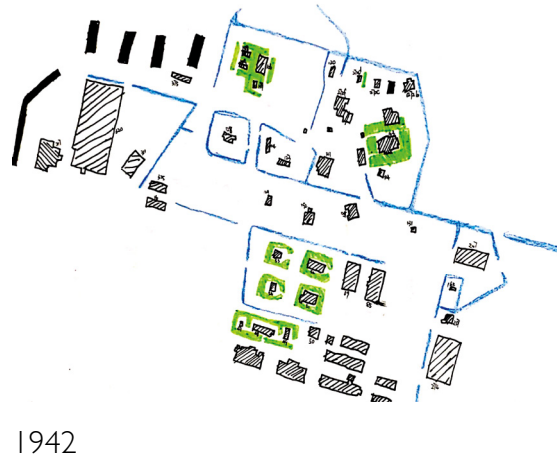
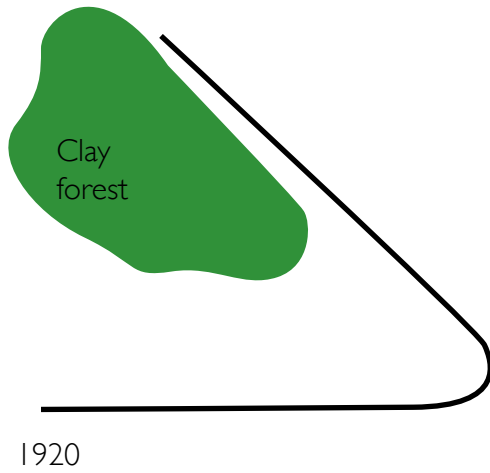
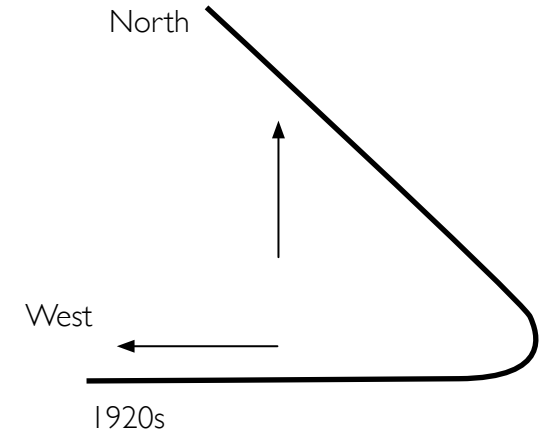
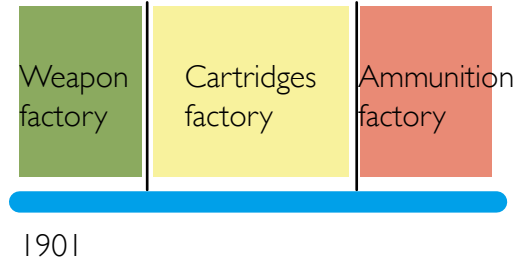
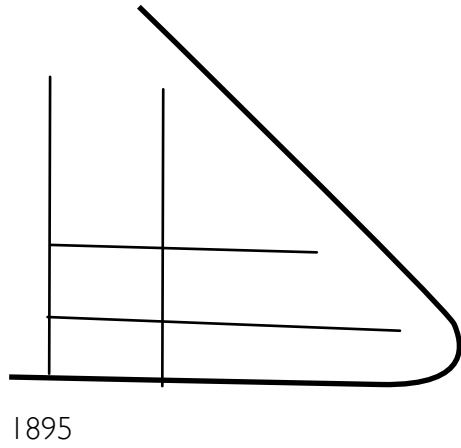
Hembrug- location



Hembrug- old days



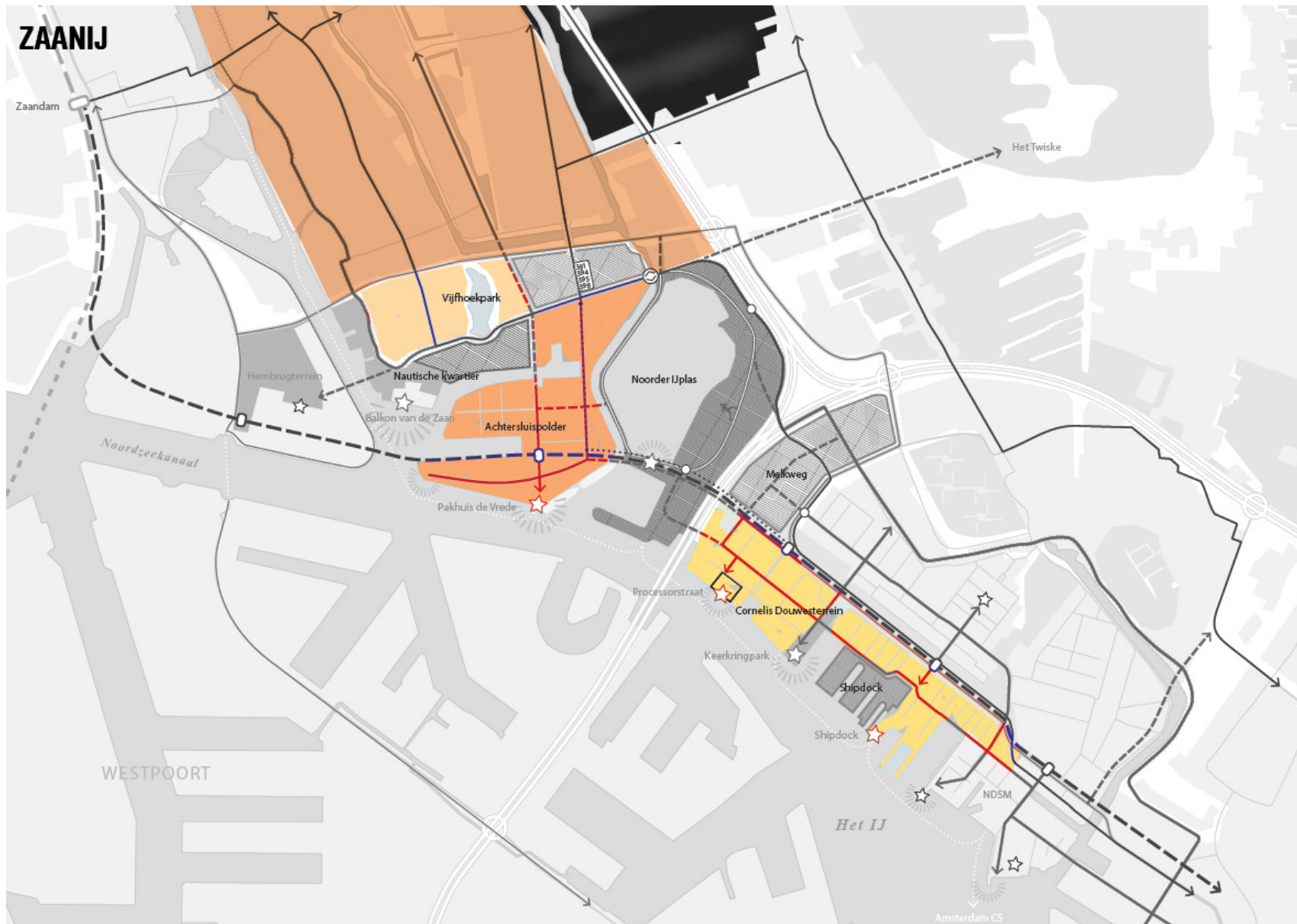
Hembrug- timeline



Hembrug- nowadays

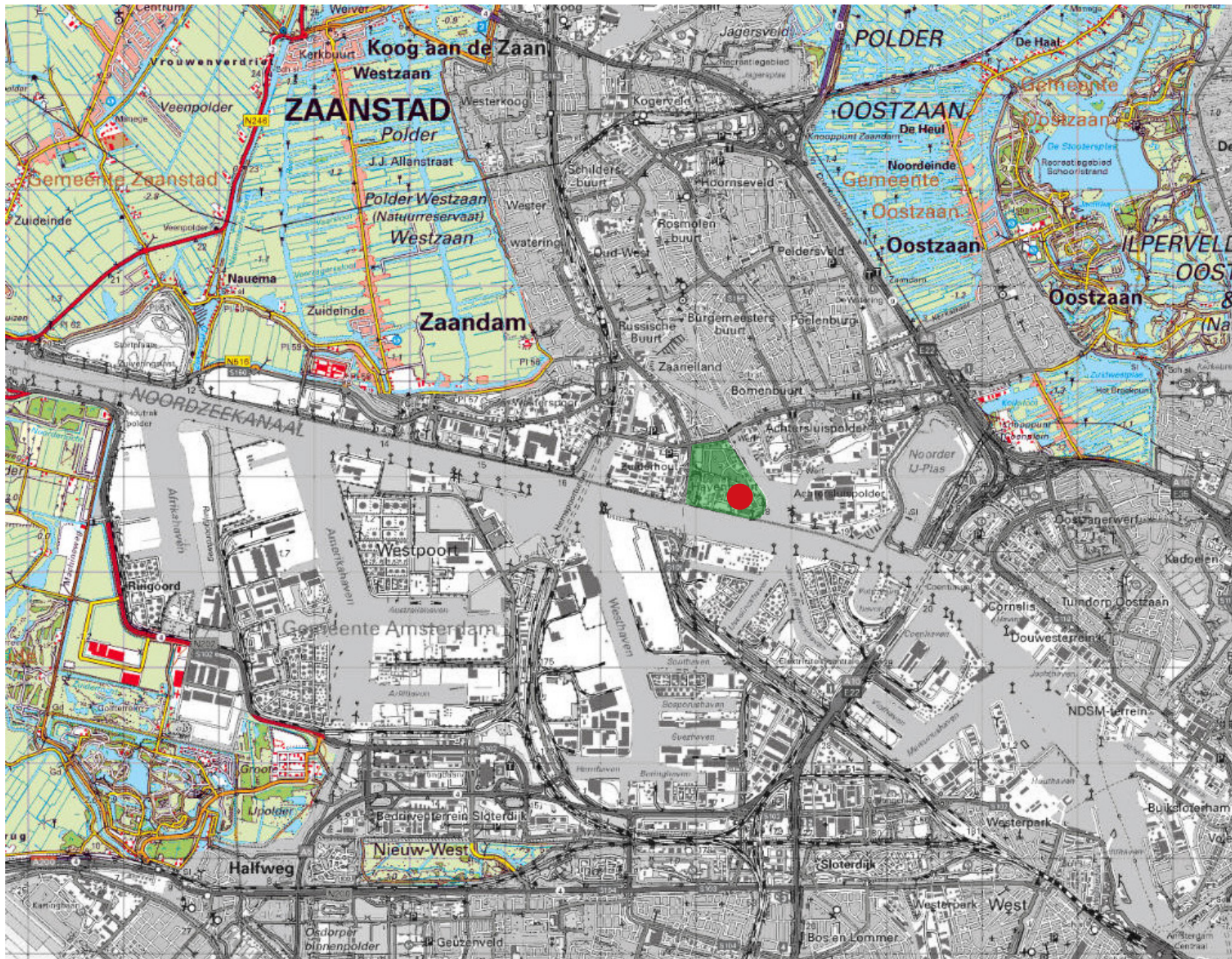


Hembrug- future



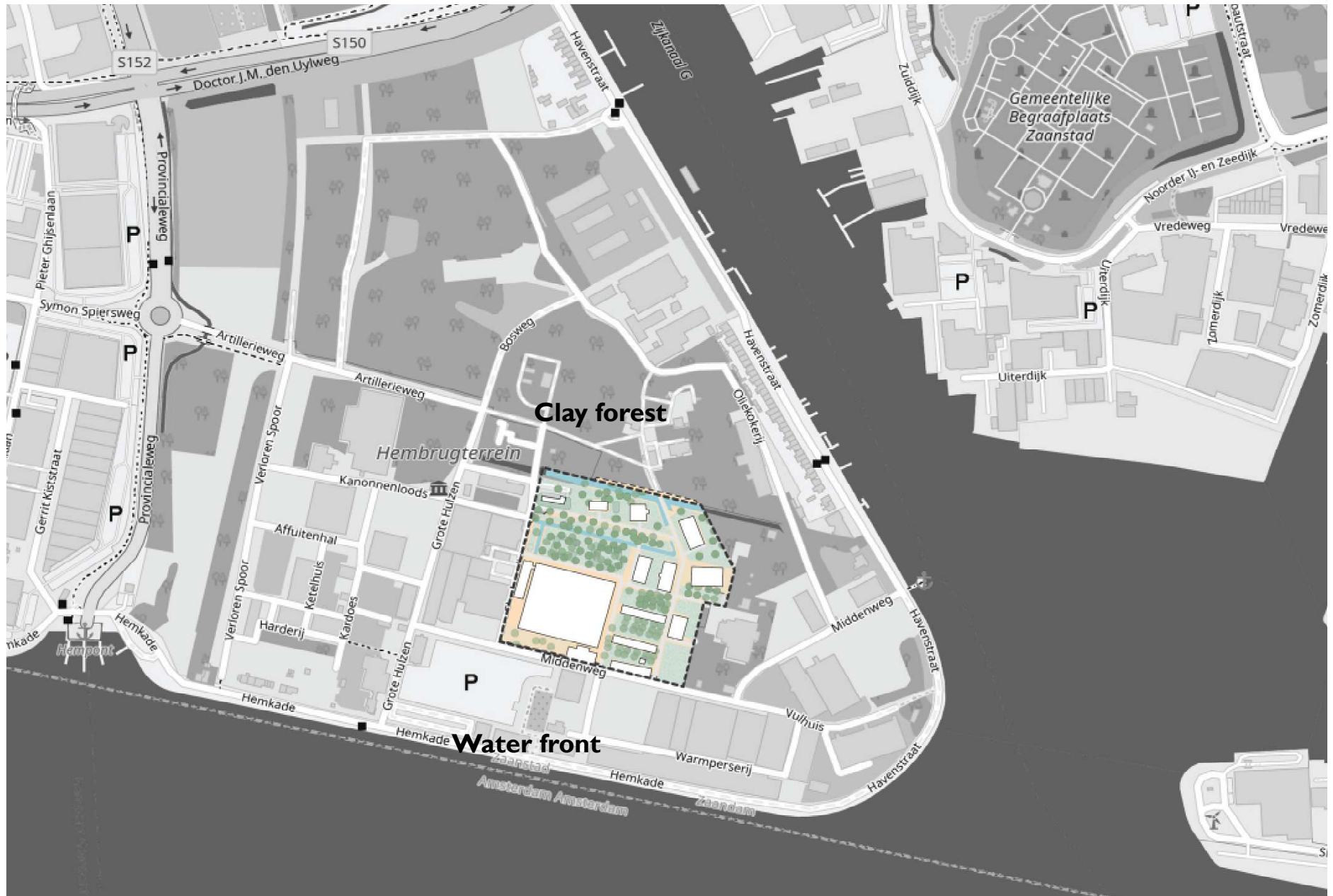
Colored place are with the function of living or working while living

Hembrug- greenery

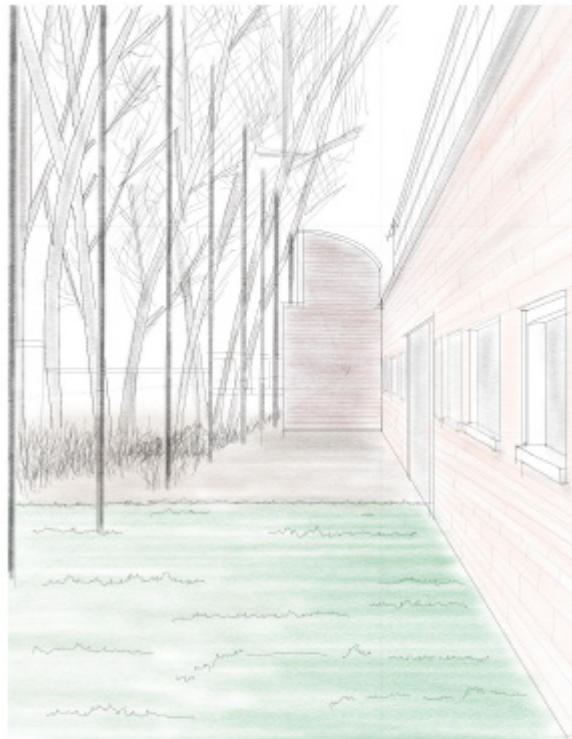
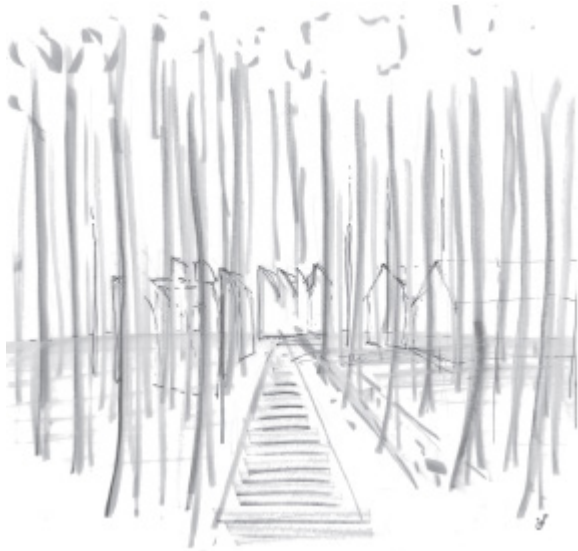


Plots in the wood

Plots in the wood



Plots in the wood

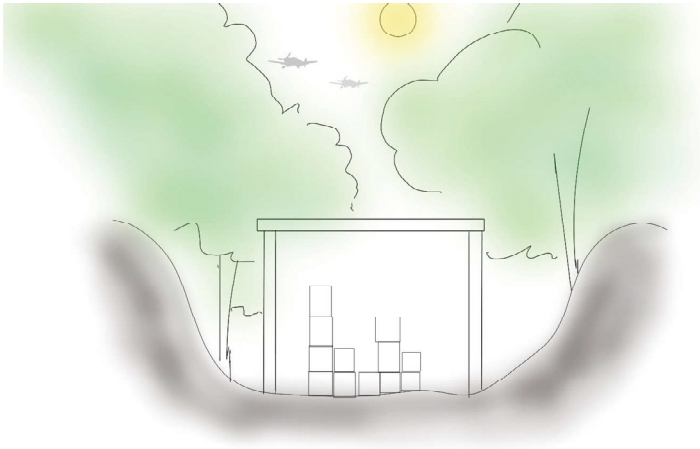


Sketches made by the group of the impression on site

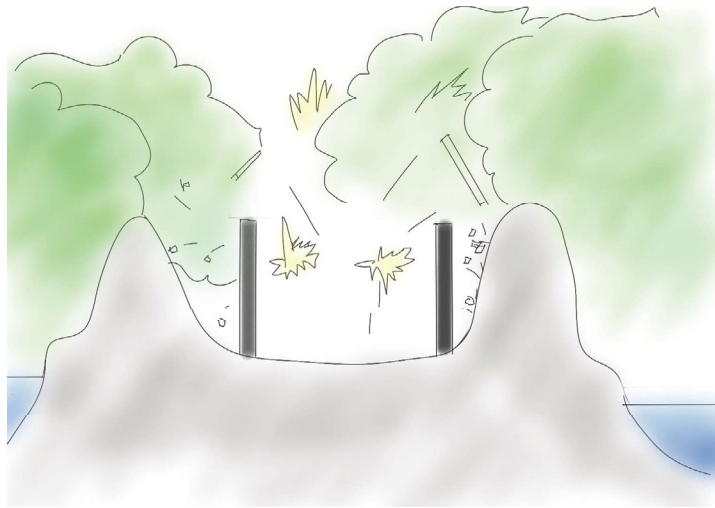
Plots in the wood

Why the ammunition production site have such kind of layout which provides an atmosphere close to nature?

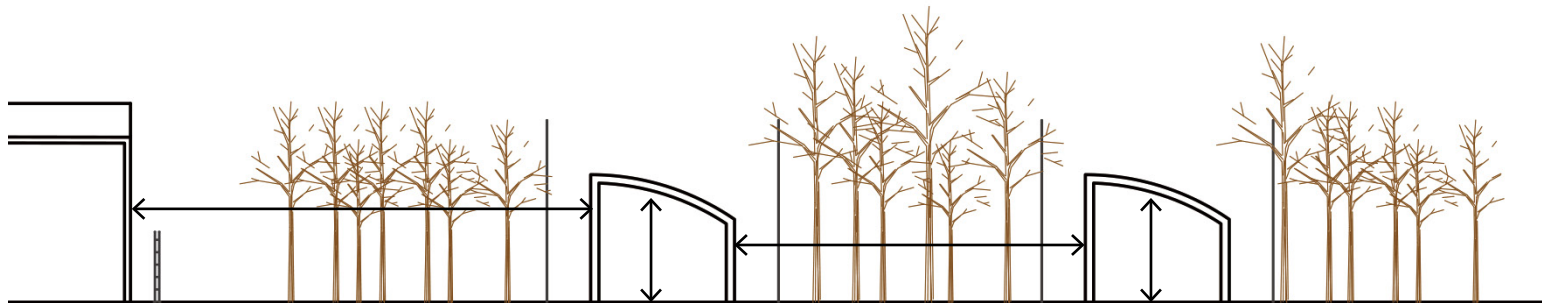
Plots in the wood



Trees give camouflage and shading to the buildings

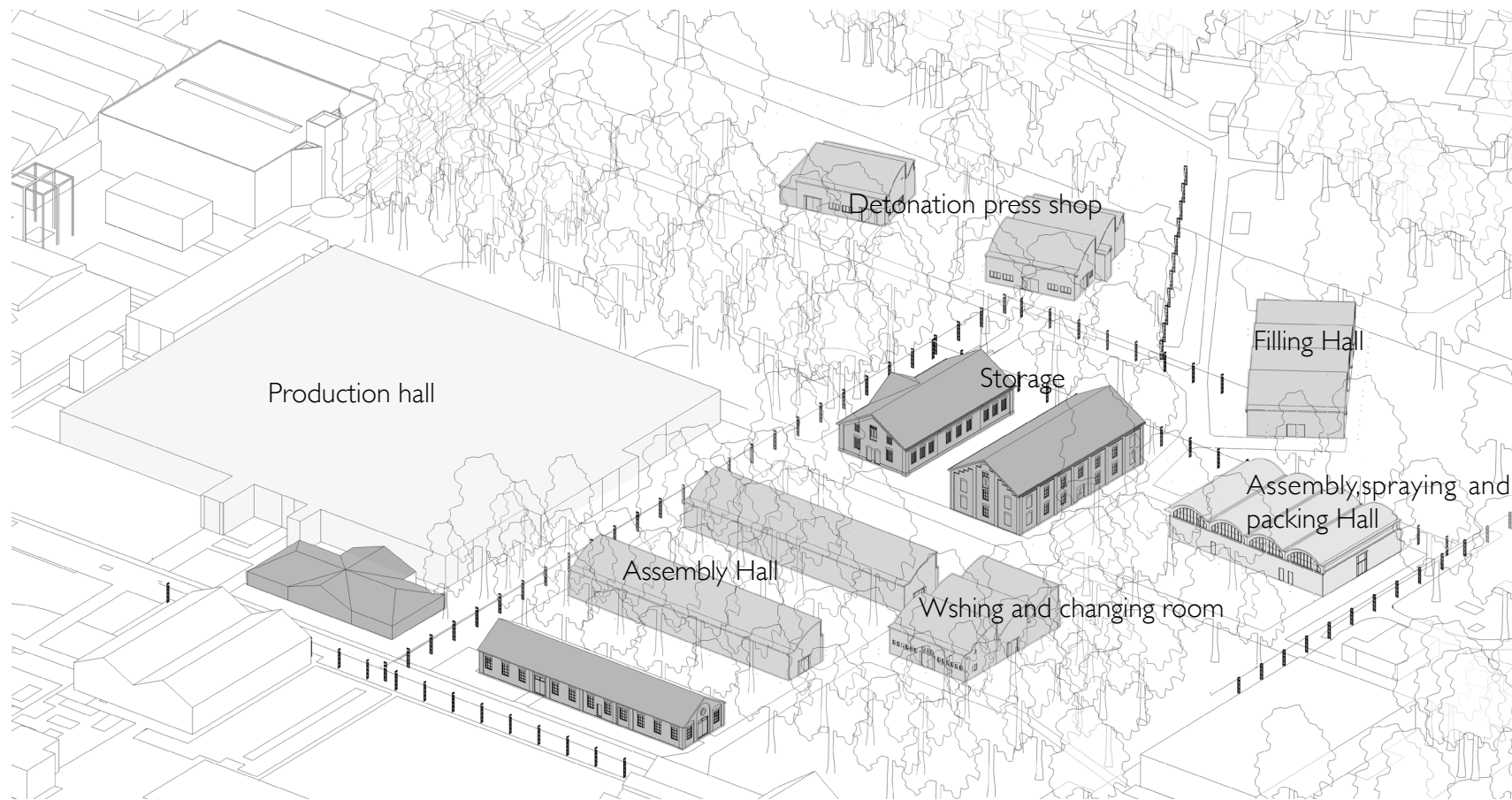


Ditches and earthen walls act as buffer if there was an explosion

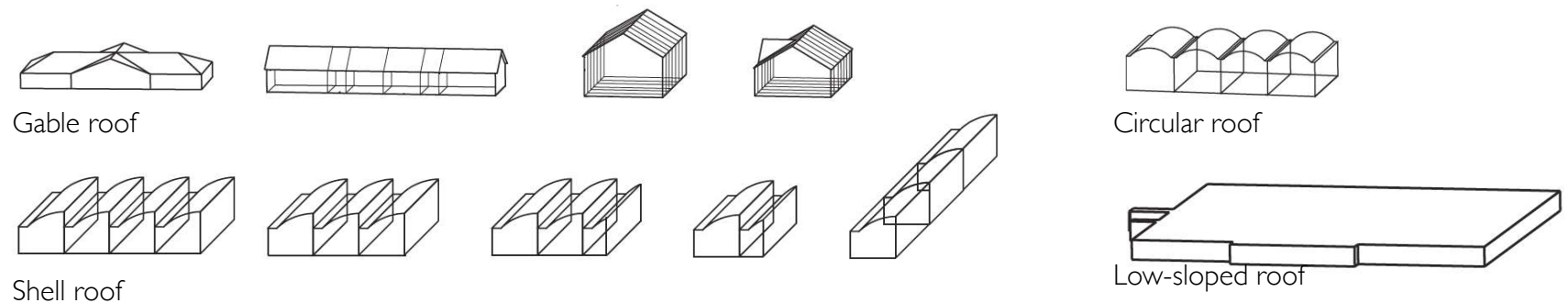


Large distance and small buildings are to reduce damage once there is an explosion

Plots in the wood - typologies



- 1895-1905
- 1950
- 1990



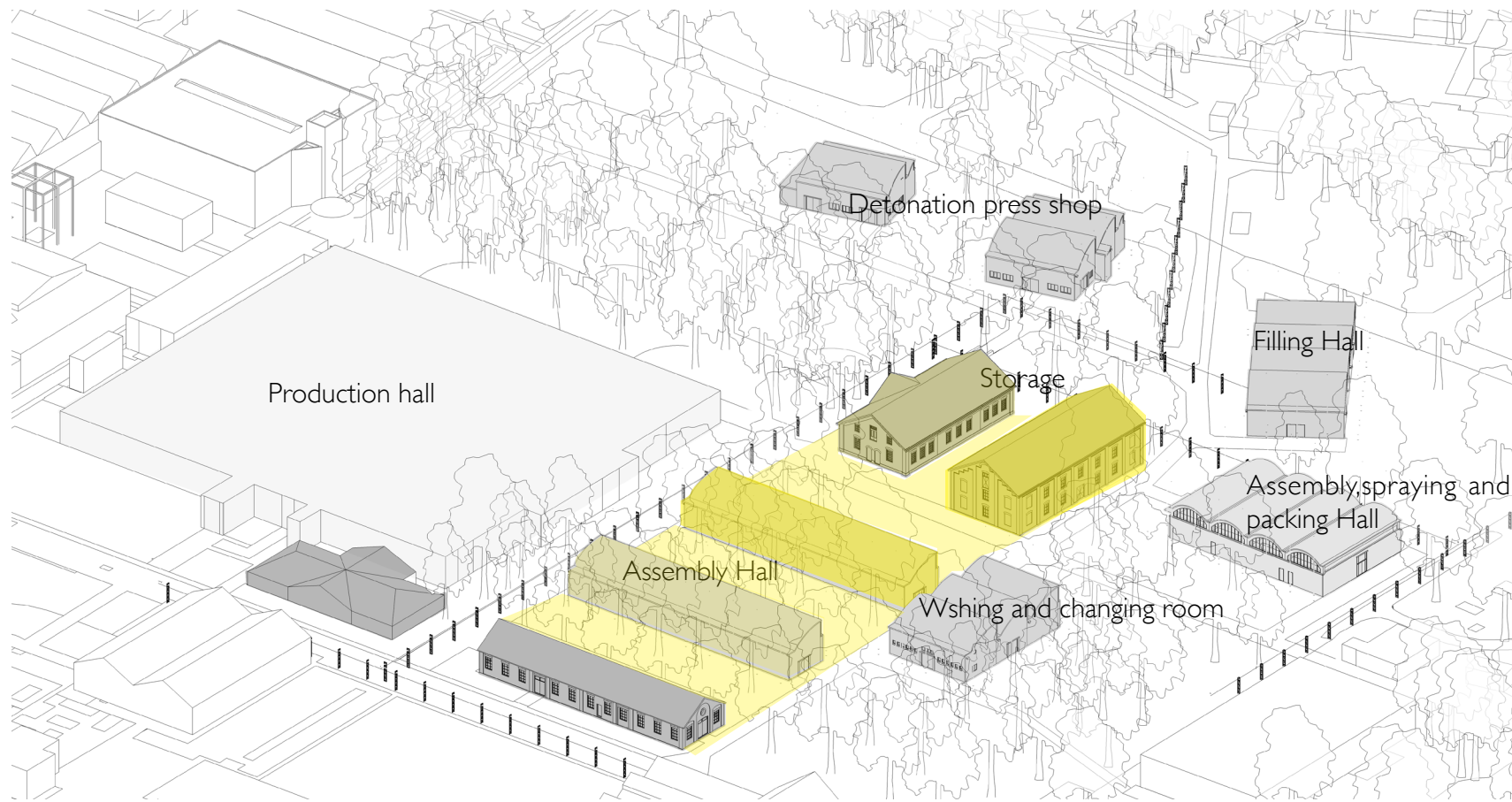
Gable roof

Shell roof

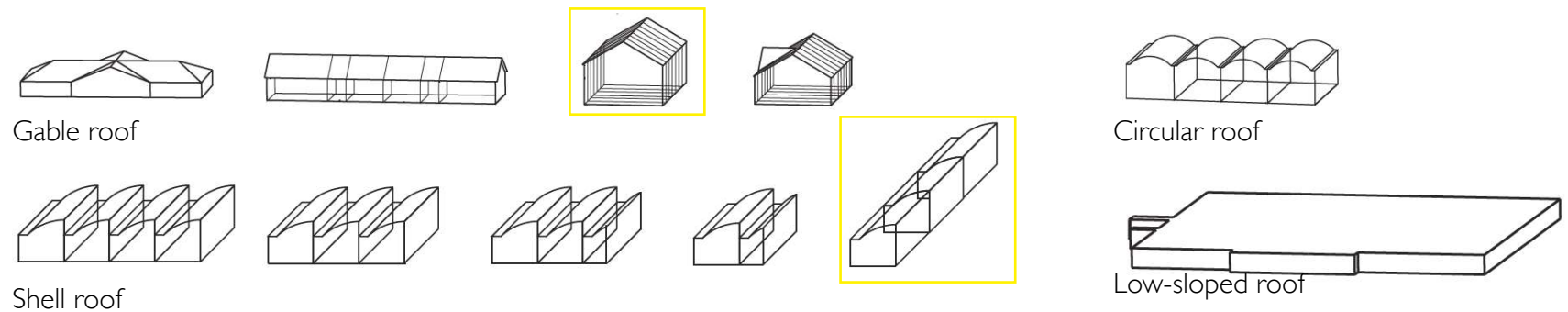
Circular roof

Low-sloped roof

Plots in the wood - typologies



- 1895-1095
- 1950
- 1990

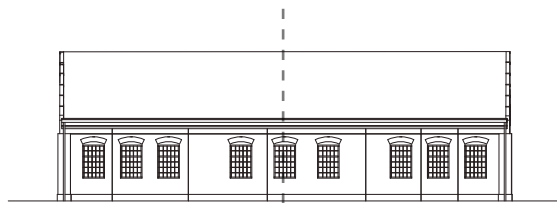


Plots in the wood - farmhouse

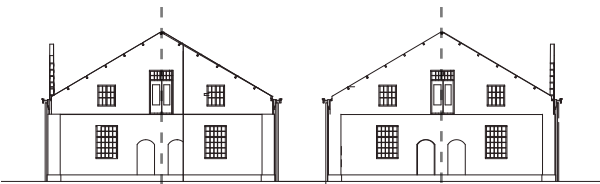
BUILDING 69 'Kleine Boerderij'



East facade



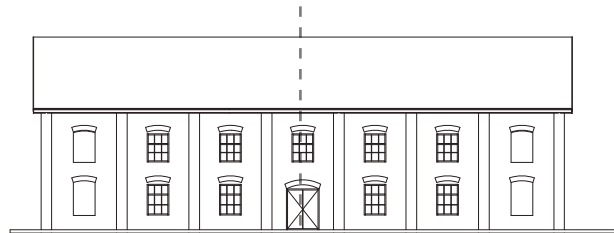
West facade



South facade

North facade

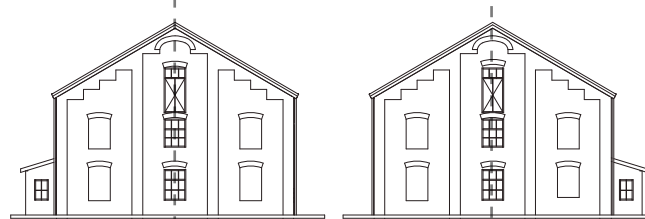
BUILDING 85 'Grote Boerderij'



East facade



West facade

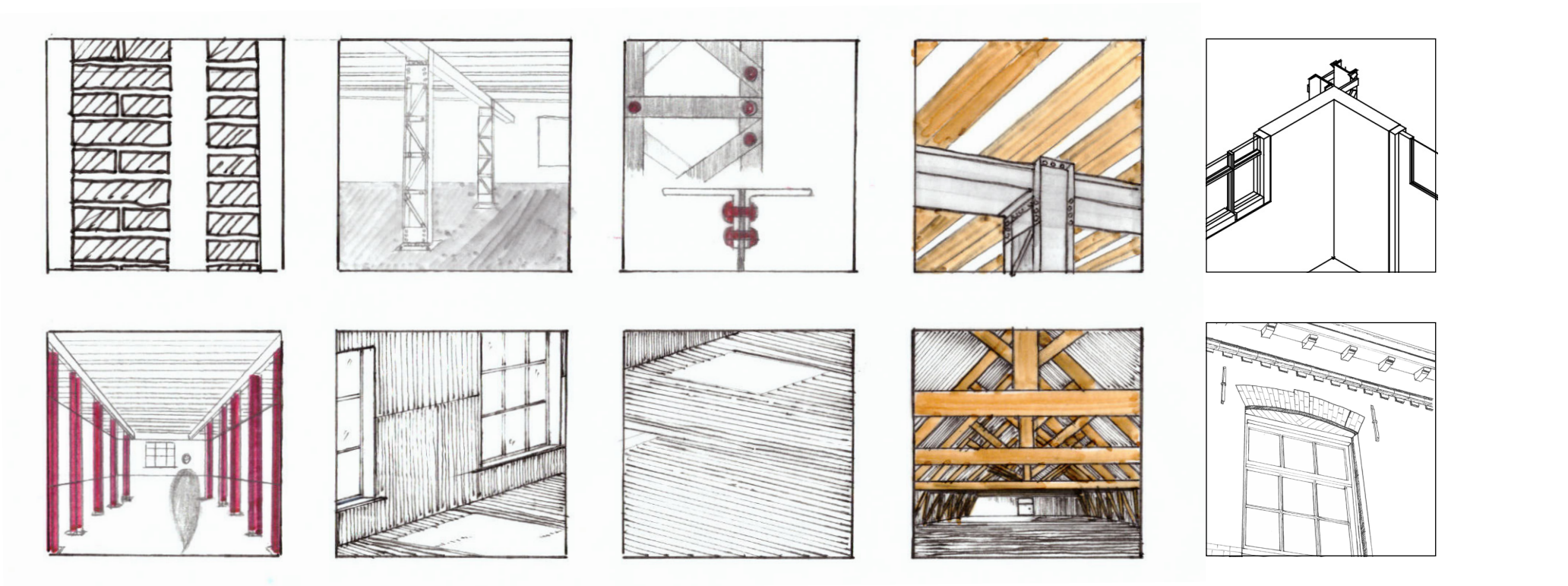
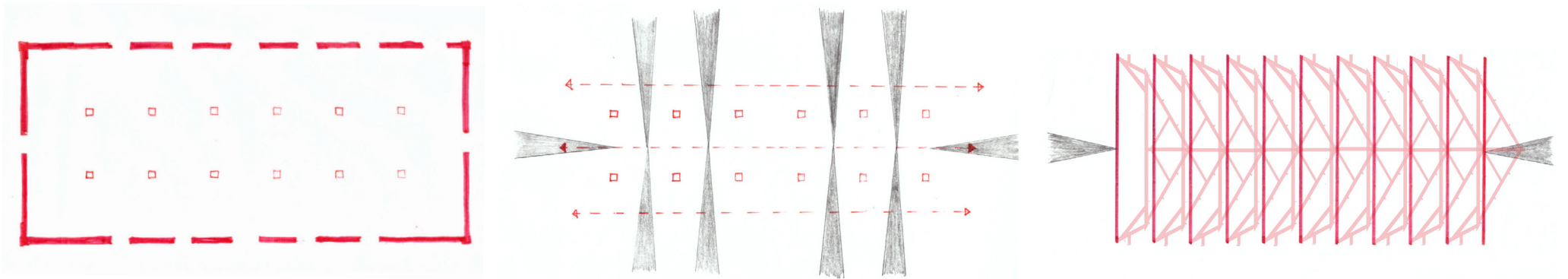


South facade

North facade

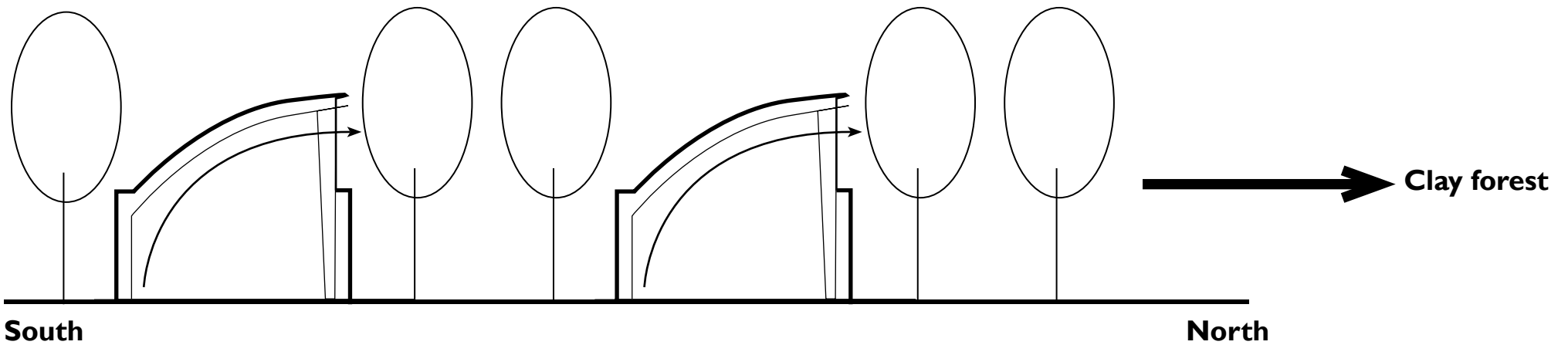
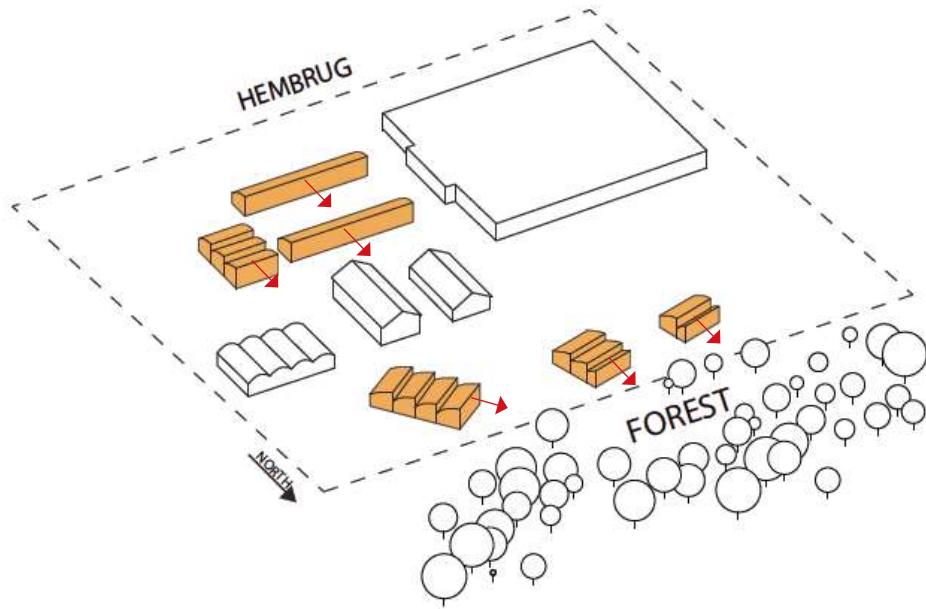


Plots in the wood - farmhouse



Characteristics valued of bigger farmhouse

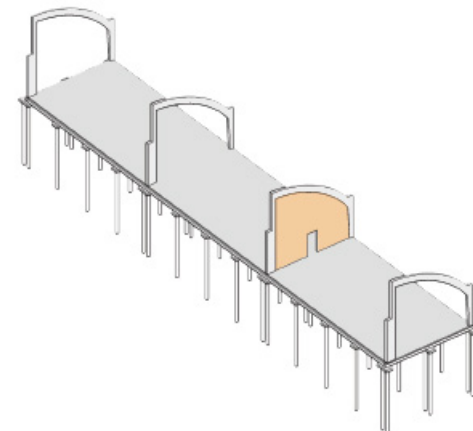
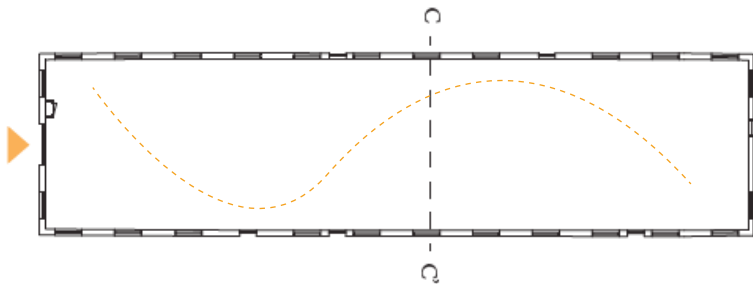
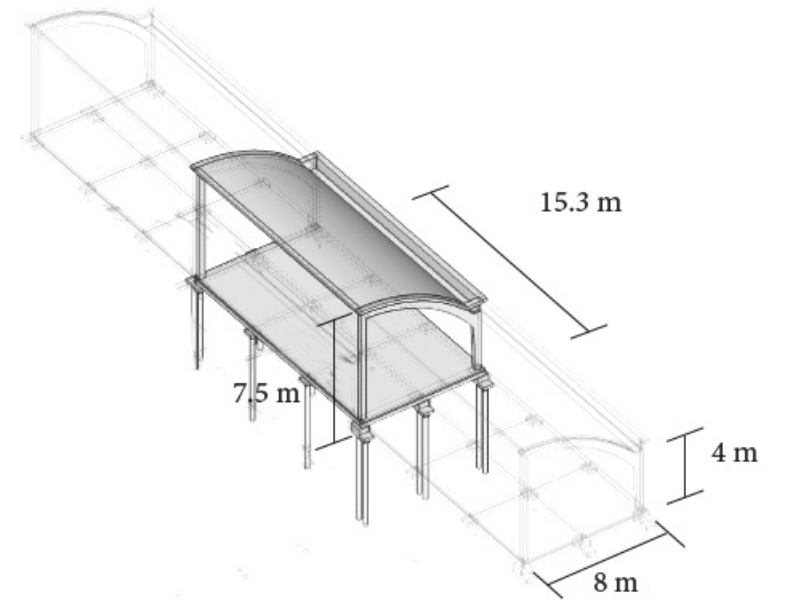
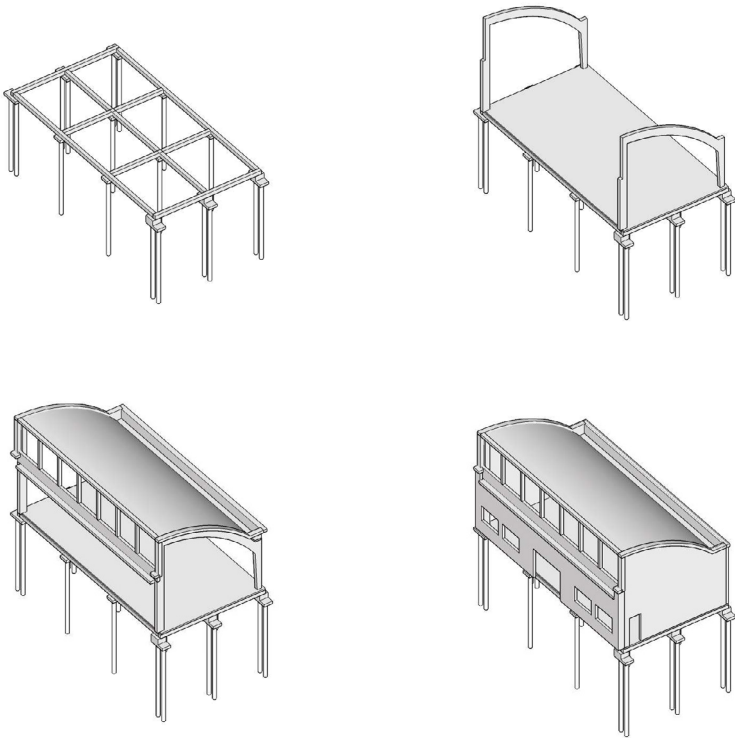
Plots in the wood - shell roof building



Plots in the wood - shell roof building



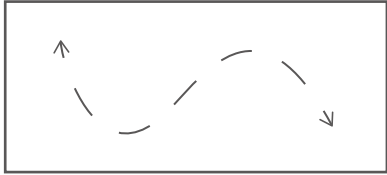
Plots in the wood - shell roof building



Plots in the wood - shell roof building



Plots in the wood - conclusion of the building characteristics



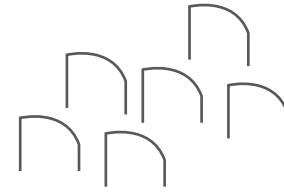
Open floor plan

Use value



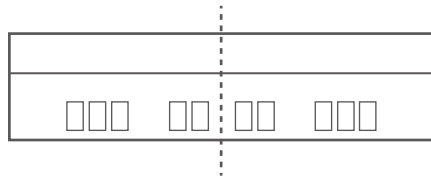
Columns define the space

Historical value



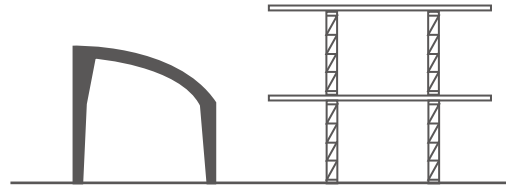
Modularity

Historical values



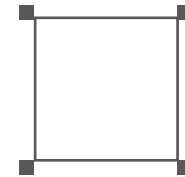
Symmetrical facades

Aesthetic value



Efficient structure

Use value
Age value



Exposure of structures

Non intended value

Program Proposal

Research question

How can the design be approached to make it more close to nature with expressing a transition from labour to ease? And how can the design keep a balance between nature participation and human participation to encourage a better living?

Program proposal



Etude model:

It is an abstraction of the plots in the wood which also combines the idea in the Chinese drawing called floating wine cup in winding river “曲水流觞”. It shows the activities brings people together in nature and people are having fun and looking forward to a well-being life.



Urban Farm

Organic food growth
Public participation in visiting, learning and experiencing

Natural resources in Hembrug can be preserved.
Urban agriculture also saves energy and provide neighbours with fresh food.

Ecological farming
Healthy lifestyle advocacy

The urban farm do contributes to sustainability and improved urban lifestyle to be more healthy. It also educates the community to see nature as an integral part of urban life. It serves as public community in which innovators with sustainable and healthy ideas.



AIR



WATER



NOURISHMENT



LIGHT



FITNESS

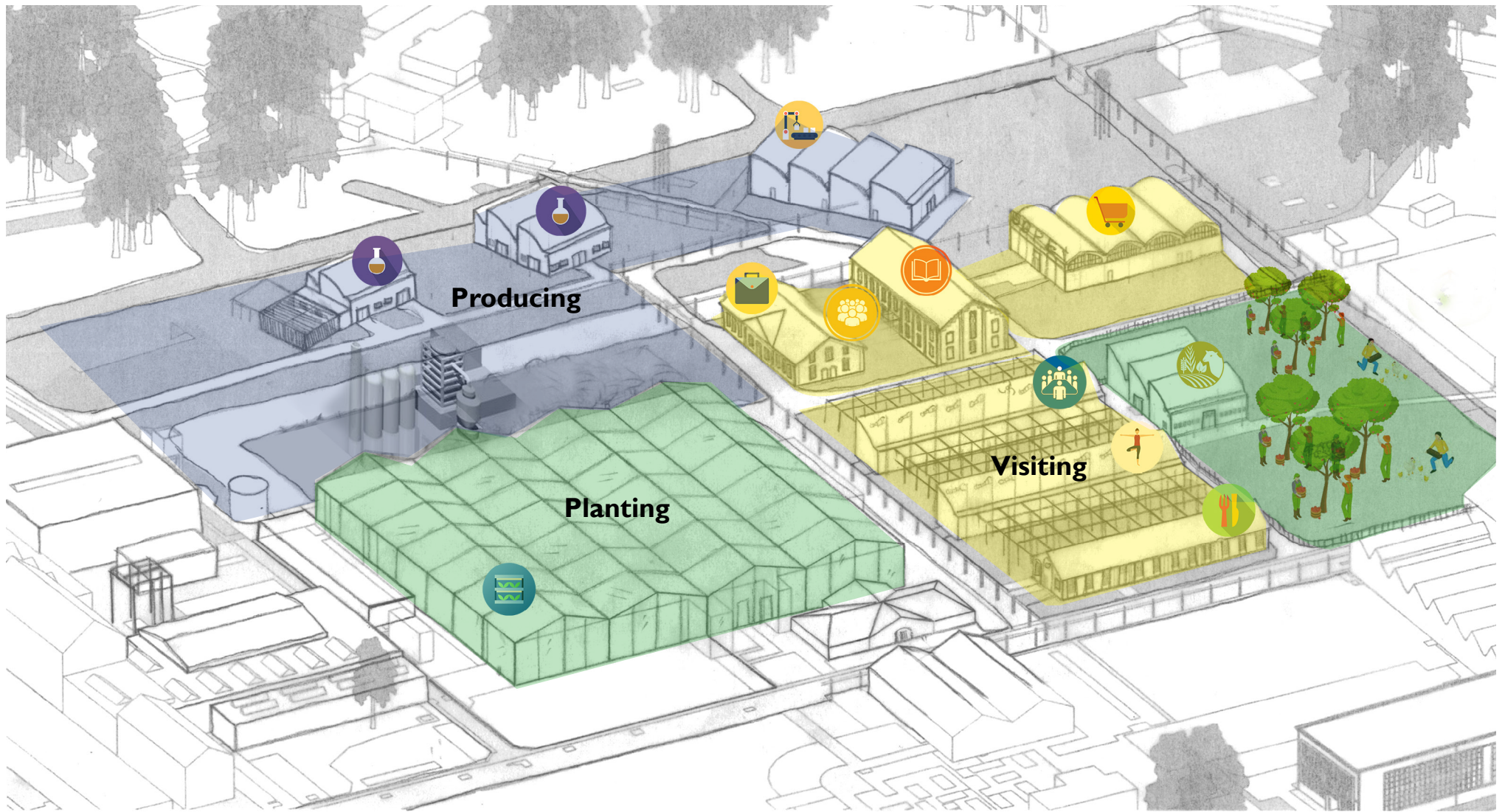


COMFORT

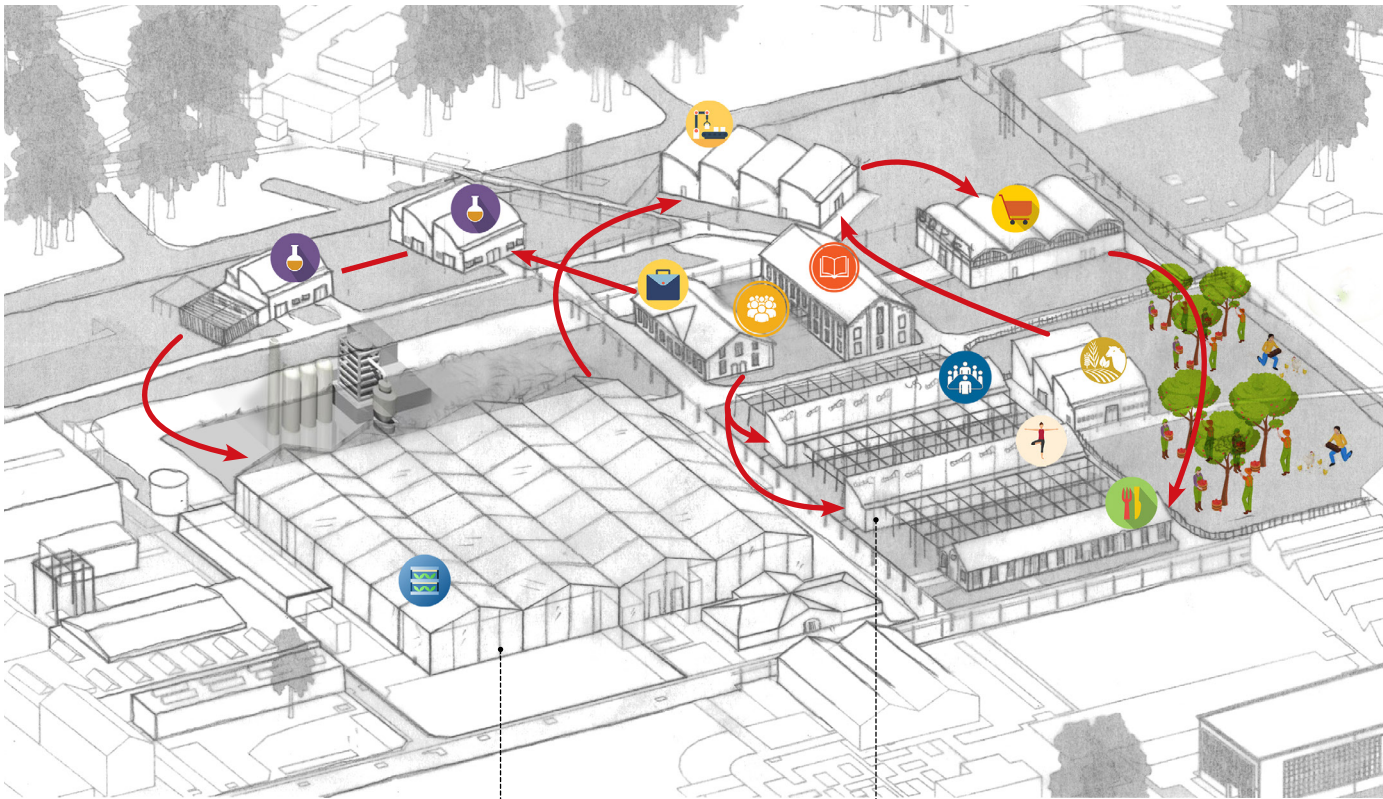


MIND

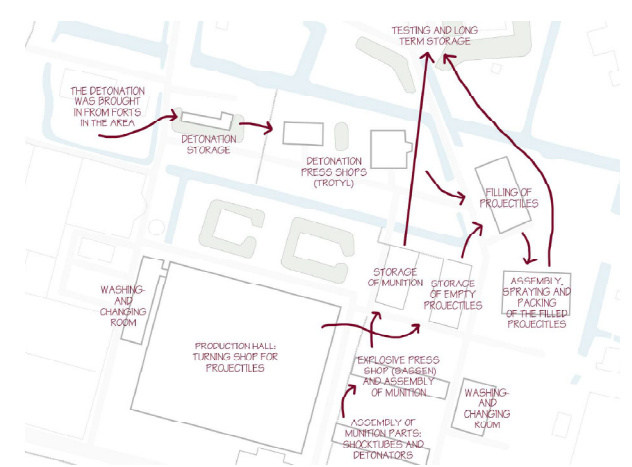
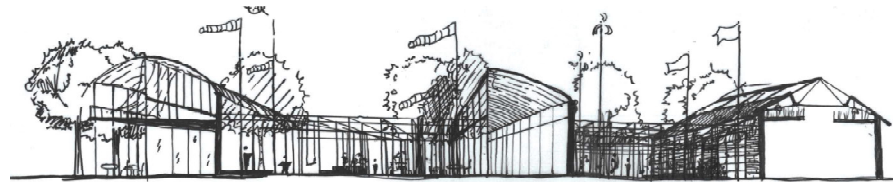
Program proposal



Program proposal

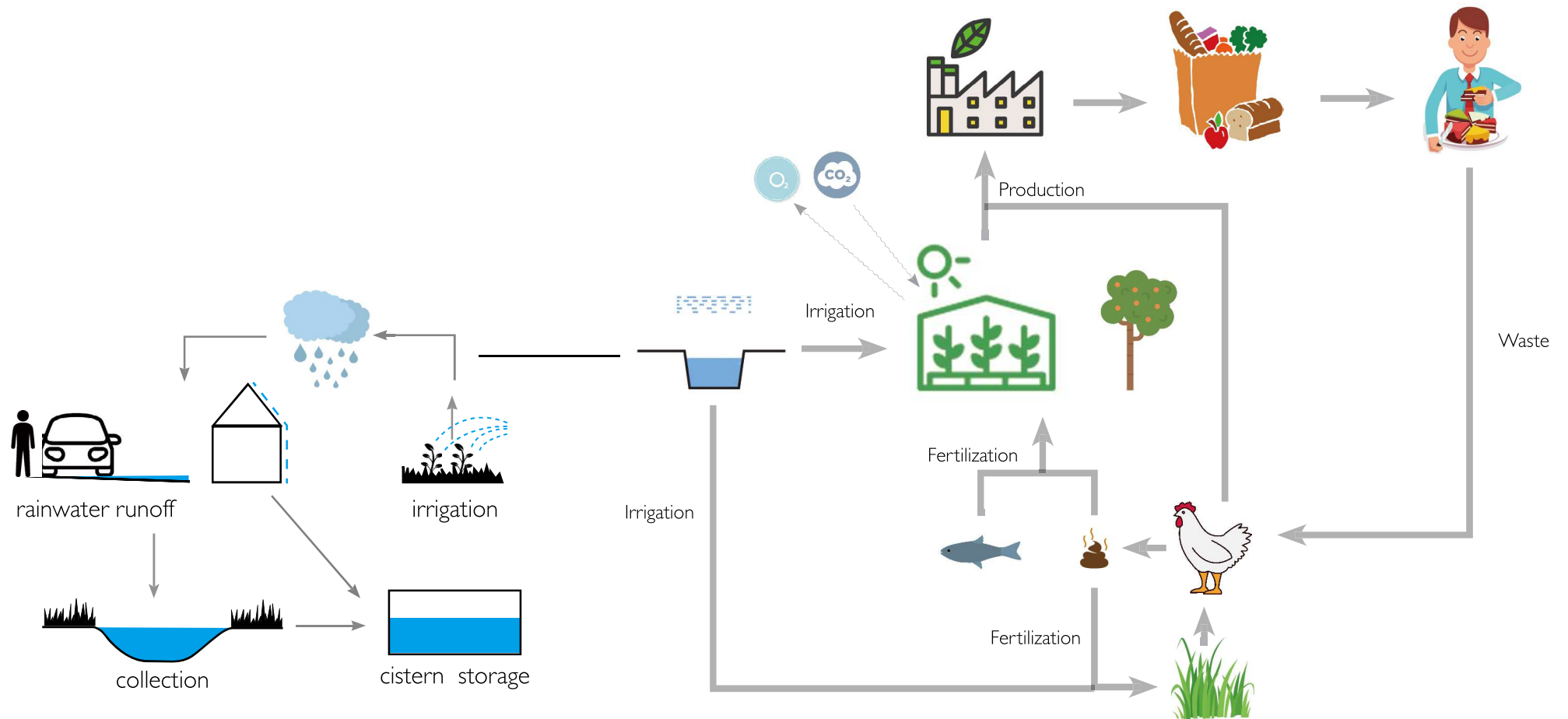


New production line

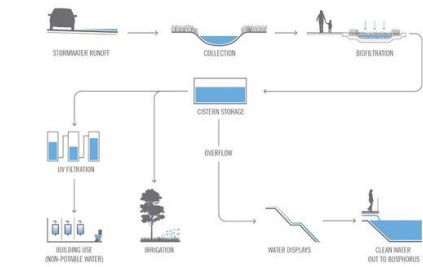
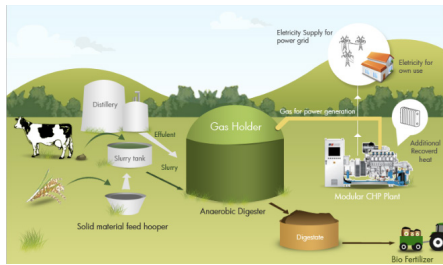


Old production line

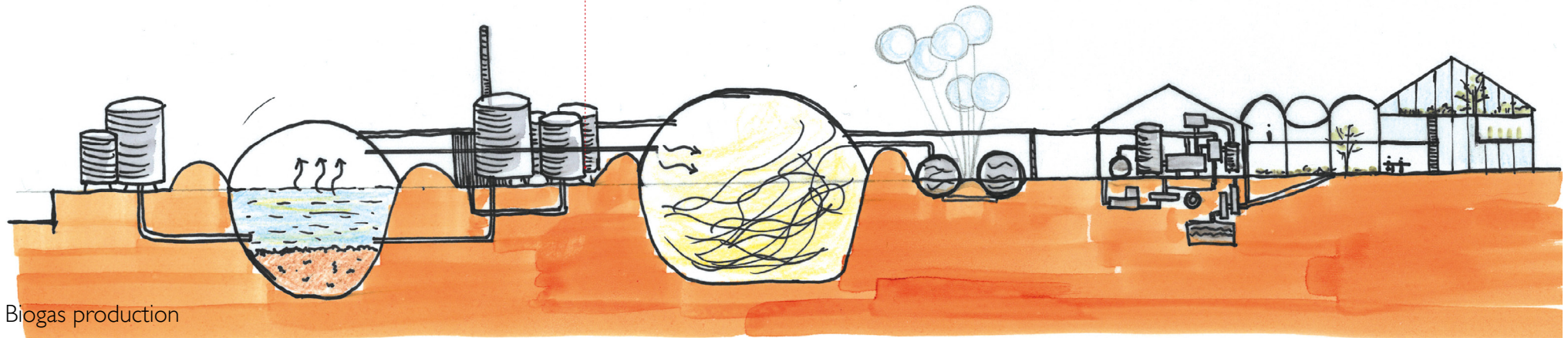
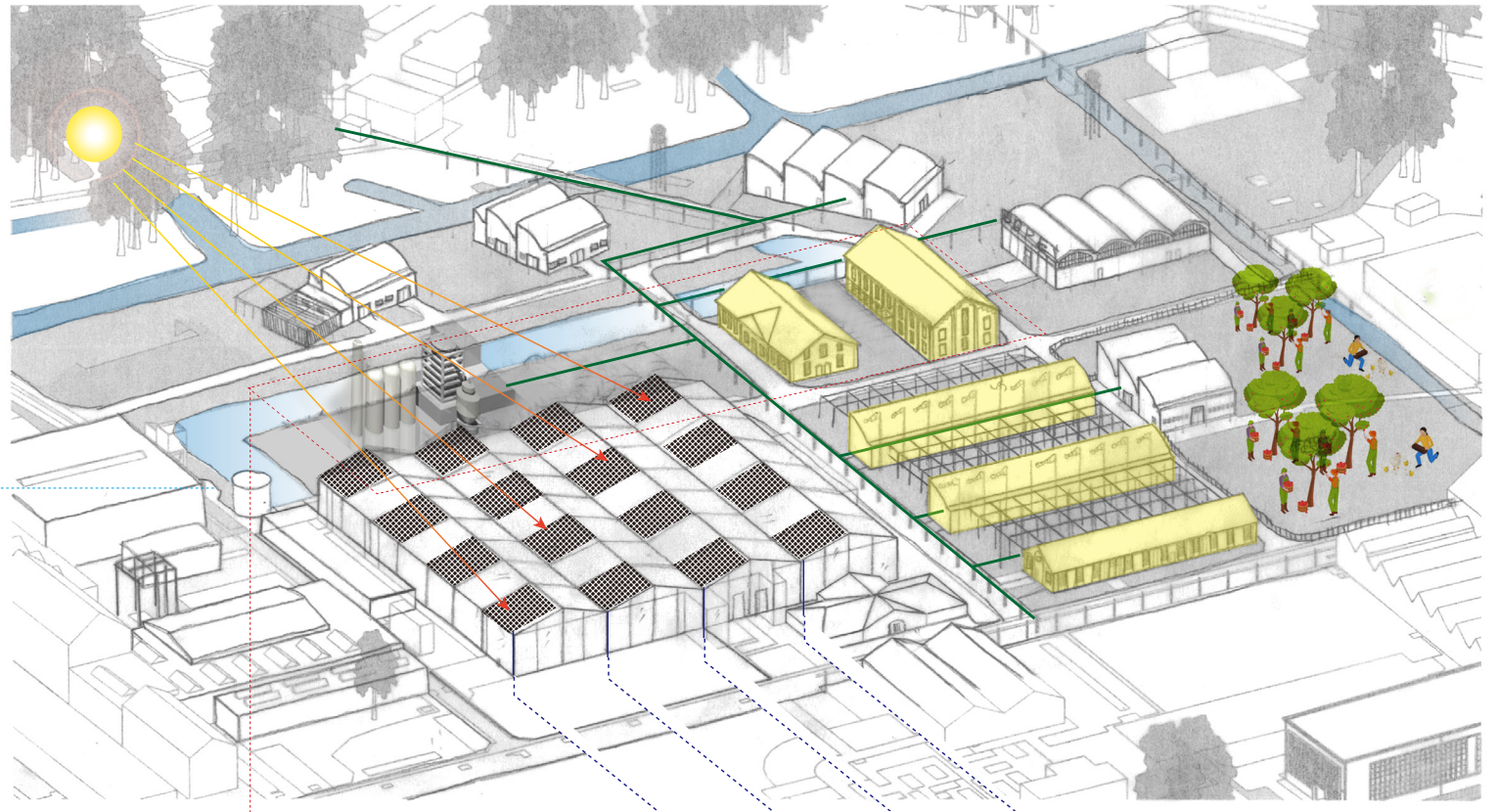
Program proposal- sustainability strategies



Program proposal- sustainability strategies



Rain water collection



Biogas production

Program proposal- sustainability strategies

A local inventor has come up with a way, in land-scarce Singapore, to increase the supply of leafy vegetables.
Infographics Journalist FADZIL HAMZAH shows you how

YOU could call it a veggie-go-round. And it is the brainchild of local inventor Jack Ng, 46, of privately-owned E3 Engineering.

With the help of the Agri-Food and Veterinary Authority (AVFA), he has come up with a solution to make vegetable farming yield five times more produce than it normally can with the same amount of land.

He has done this with minimal resources by coming up with vertical contraptions known as tower farms. The six metre tall structures are energy-efficient as they are easy and cheap to maintain.

The tower uses only 1kW of electricity per hour for its water pump which distributes 1kg of water to raise 22 racks.

It costs \$10,000 to set up one tower.

The prototype farm, which consists of 19 towers, occupies 1,000 sq m of land at Sembawang Research Centre.

National Development Minister Mah Bow Tan, who visited the farm at its launch on Jan 26, was pleased at the prospect of spreading the idea to all the local vegetable farms.

"Growing leafy vegetables tends to be very land intensive so innovative systems like this can improve the productivity of local farms," Mr Mah said.

Mr Ng has started a company called Sky Greens. The \$4 million project aims to produce vegetables on a commercial scale by year-end and to market vertical farming.

1 Rainwater and recycled water collected in overhead tank

2 Water is directed into the water pulley system which is used to rotate the racks in the tower

3 The patented Water Pulley System taps on flowing water and gravity to rotate the racks

4 The water is then recycled to provide power to the generator

5 Water is redirected into the reservoir using a pump, powered by the generator

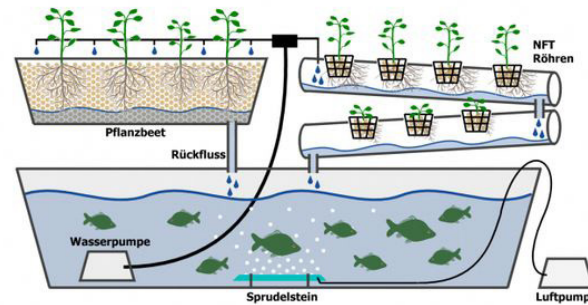
6 Back-up electric power kicks in on drier days when water flow decreases due to heat and rapid evaporation

7 Five towers using harvest

One tower produces the same harvest as 25 sq m of farm land
 100 towers produce as much harvest as farmed the size of a football field

Racks rotate 3 times to get a total of 2 hours of sunlight each day

Micro-sprinklers water the plants 3 times each day as racks rotate

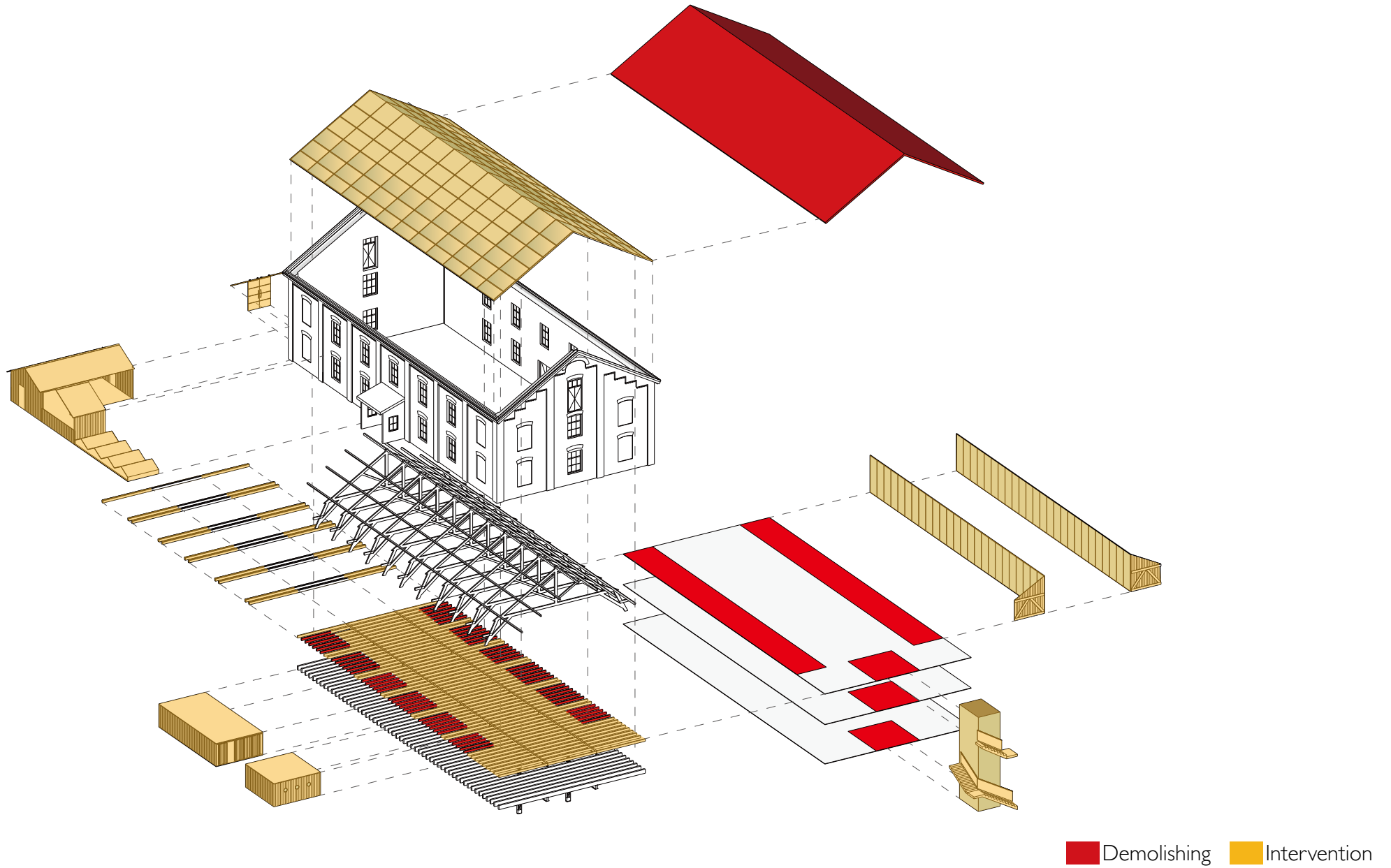


Vertical planting and Water Saving Irrigation

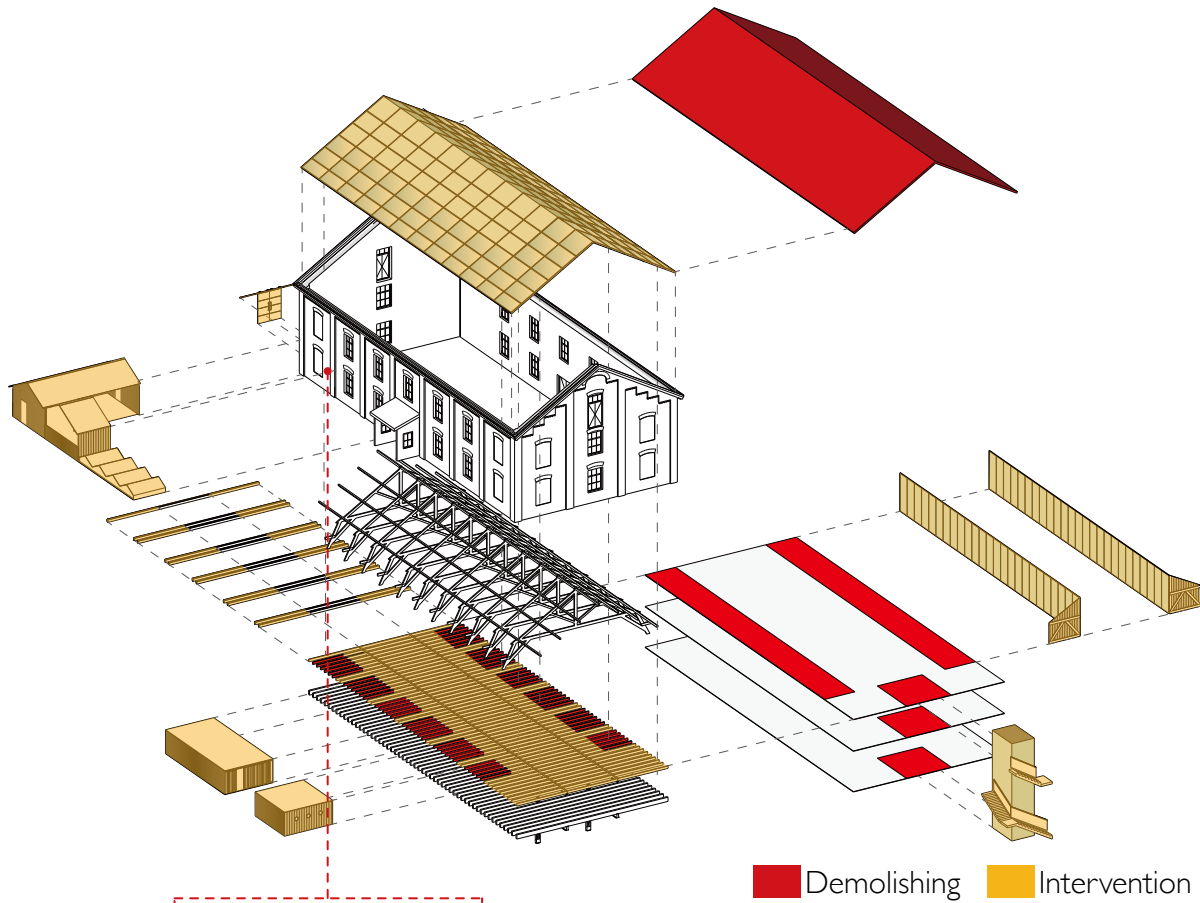
The sustainability strategies were taken both on program and architectural design.

Design Illustration

Design illustration - big farmhouse

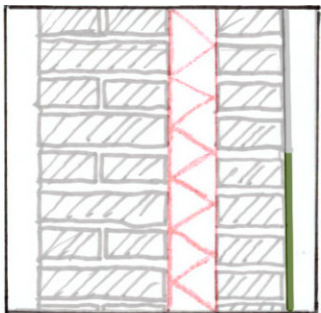
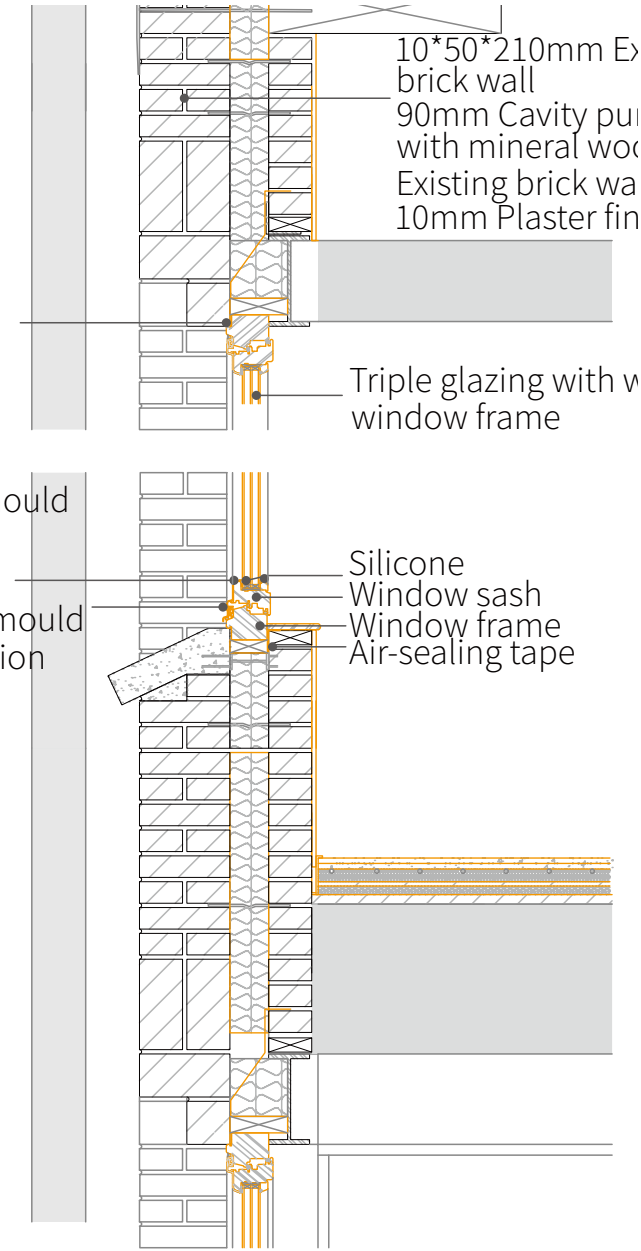


Design illustration - big farmhouse

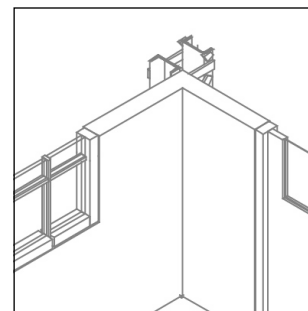
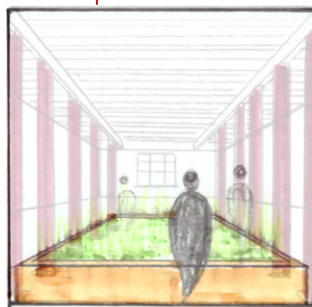
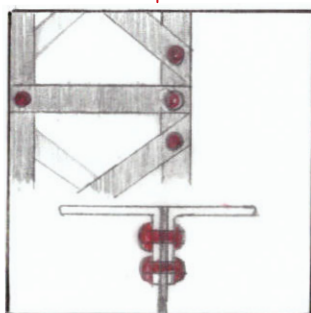
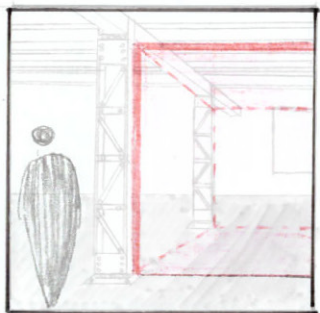
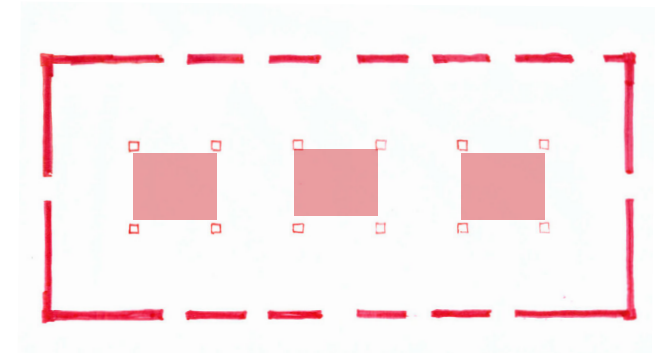
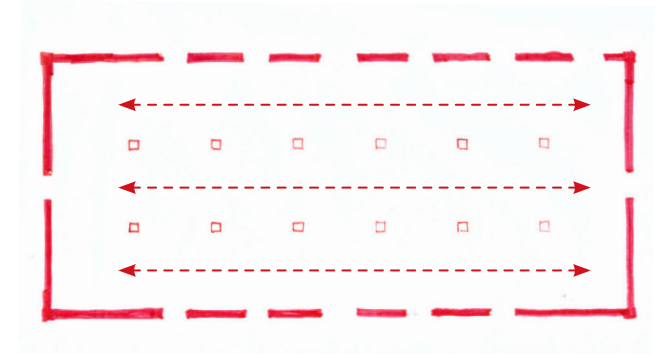
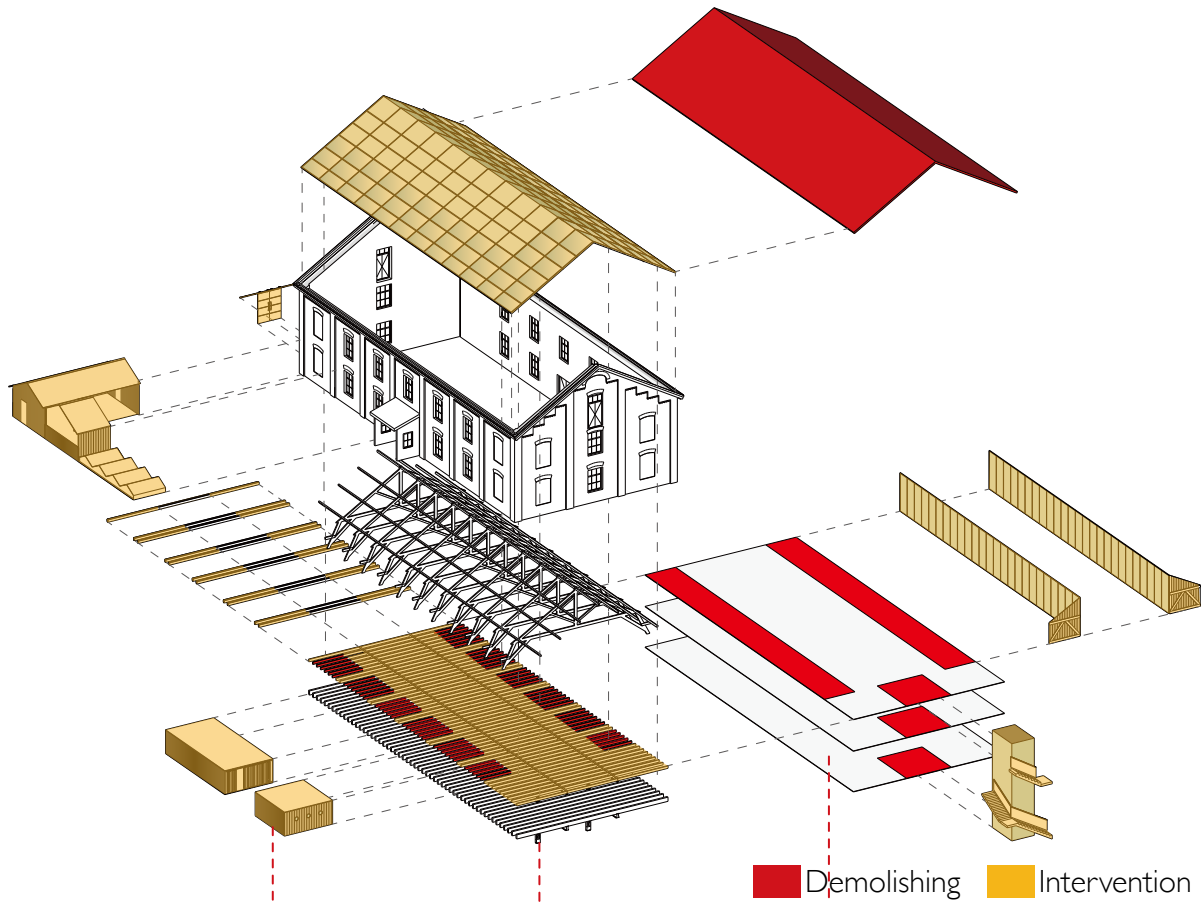


Foam gasket at trim perimeter

Aluminum wing drip mould protects wood against moisture
 Aluminum frame drip mould with increased ventilation chamber

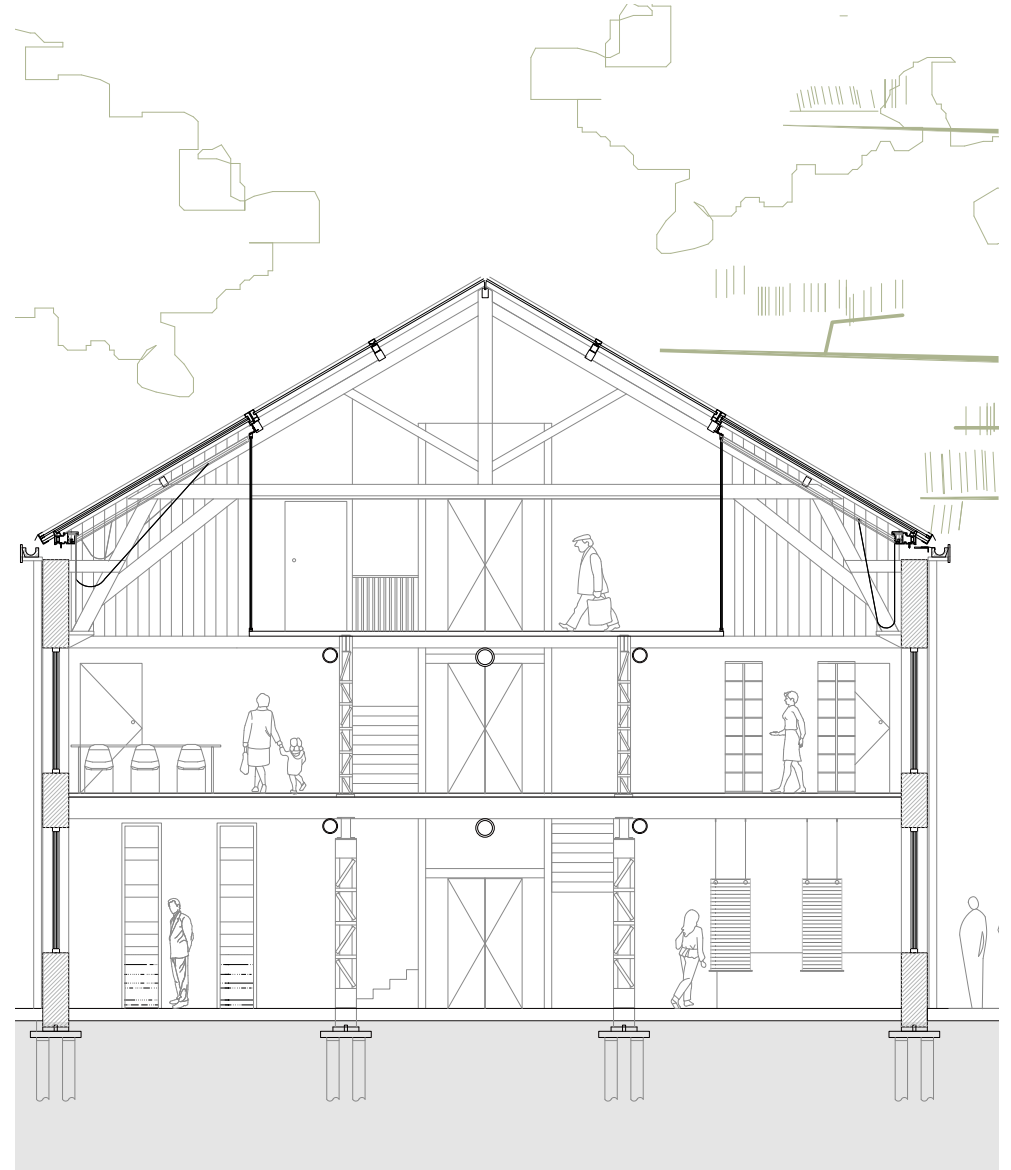
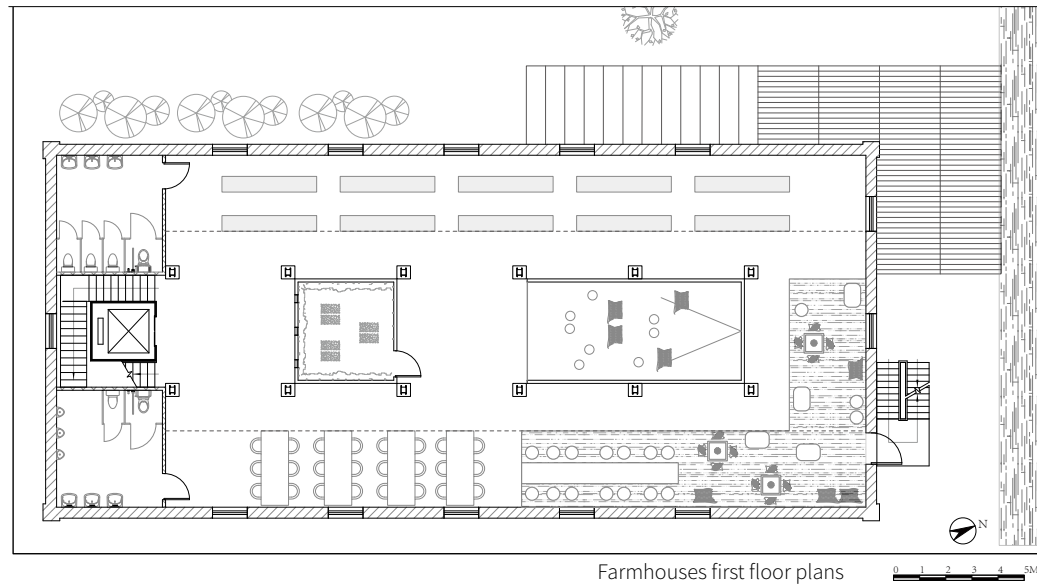
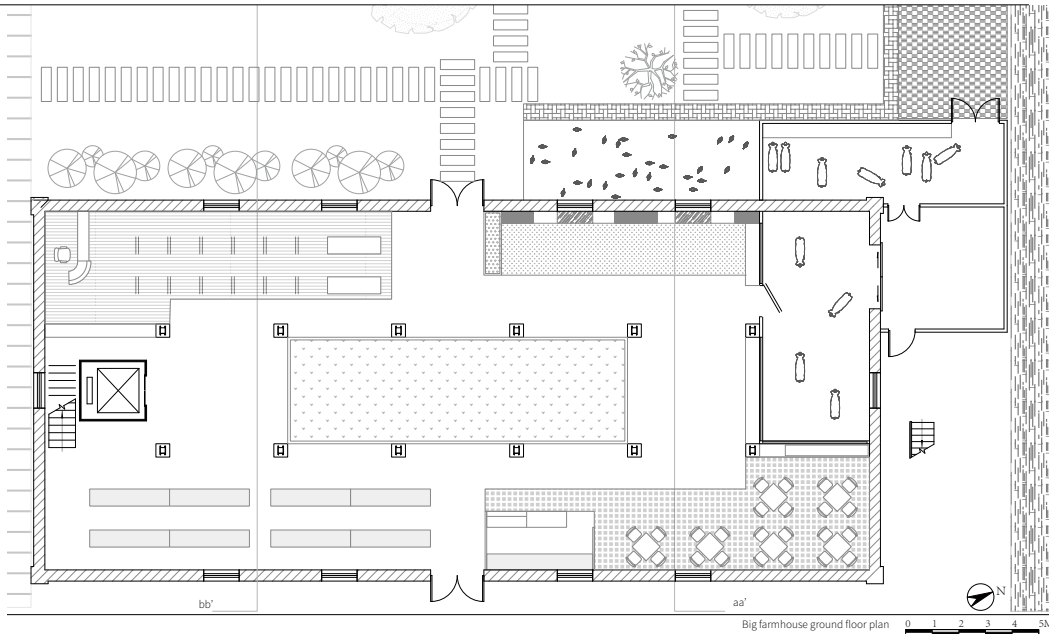


Design illustration - big farmhouse



Visitors can have an impressive vision to the monumental structure, when they move in around.

Design illustration - big farmhouse



The visitors are able to reach each floor through the glass elevator which goes up and down at one end of the open floor plan, while experiencing the building to the fullest.

Design illustration - big farmhouse



Design illustration - big farmhouse



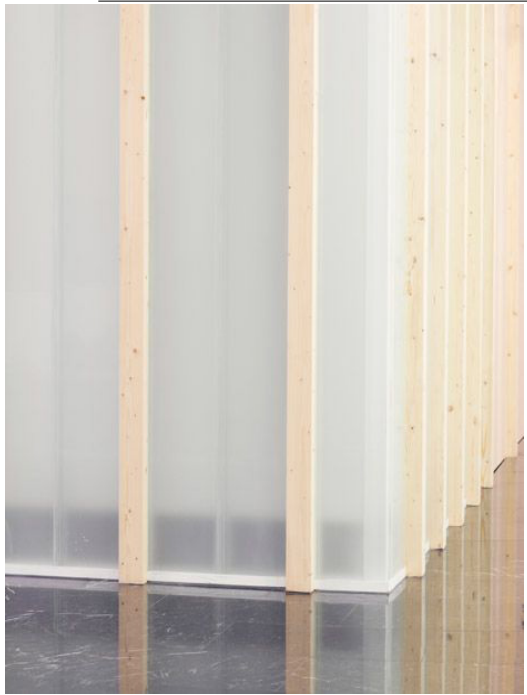
Design illustration - big farmhouse



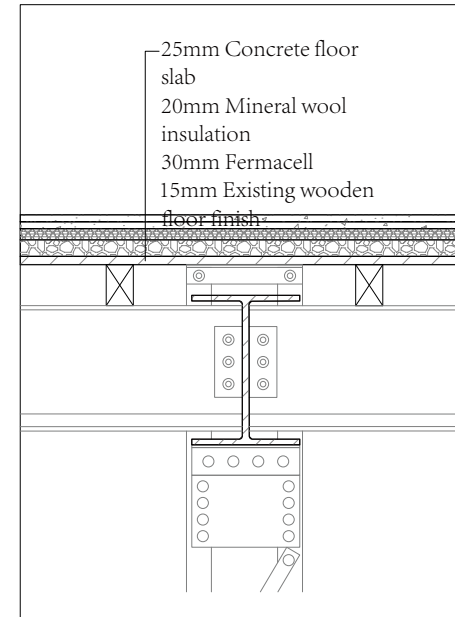
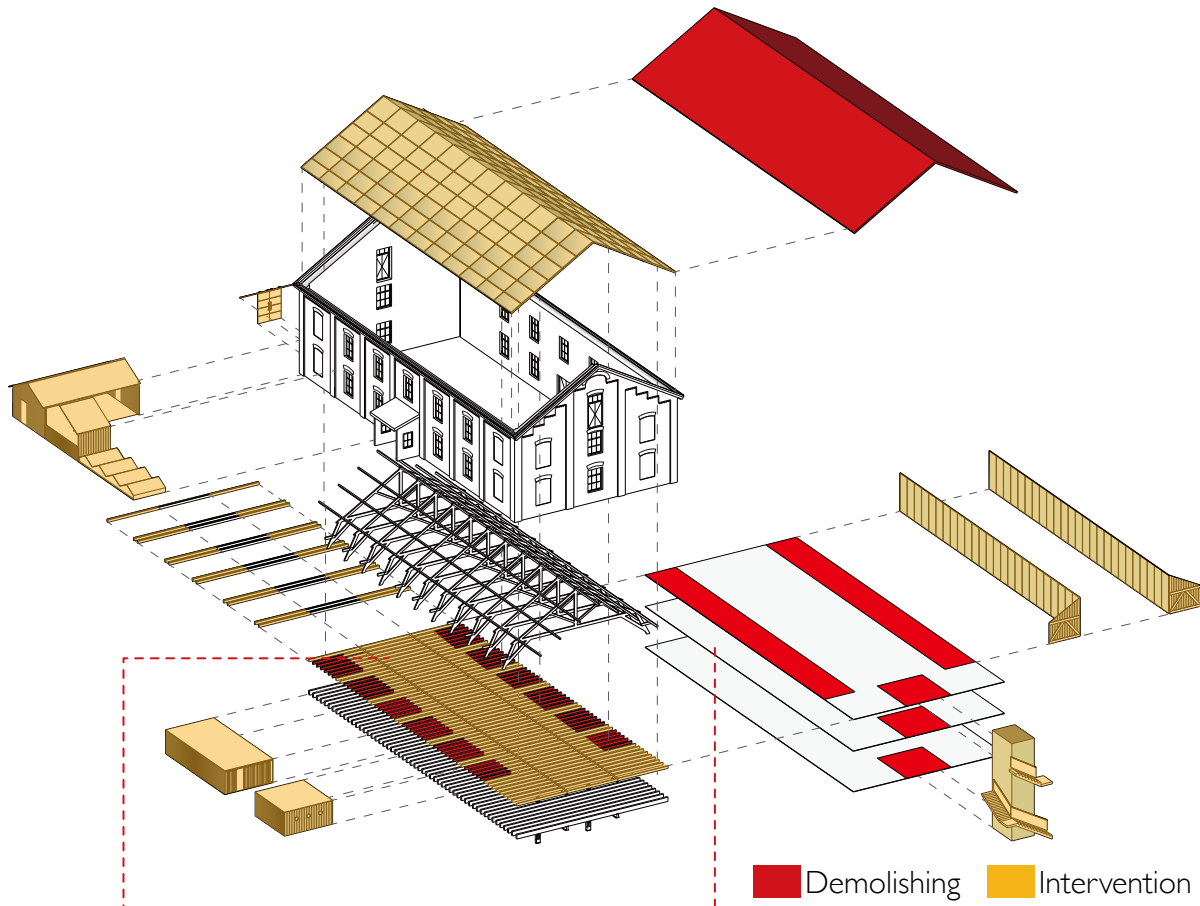
Design illustration - big farmhouse



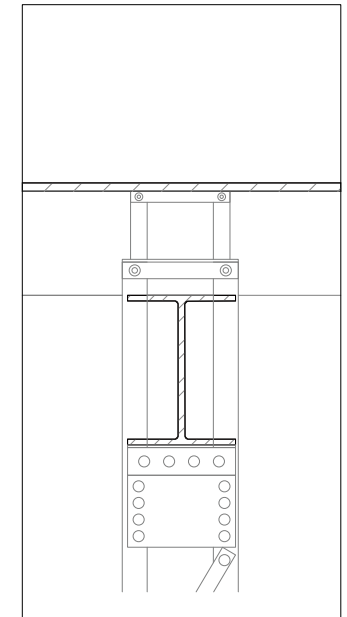
Design illustration - big farmhouse



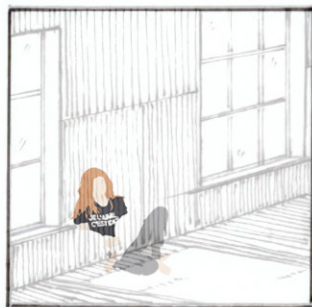
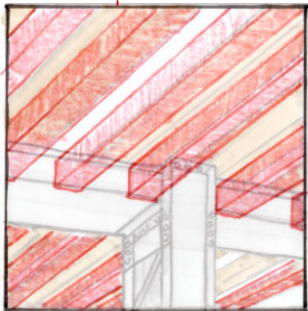
Design illustration - big farmhouse



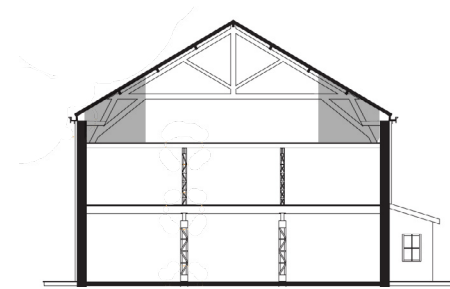
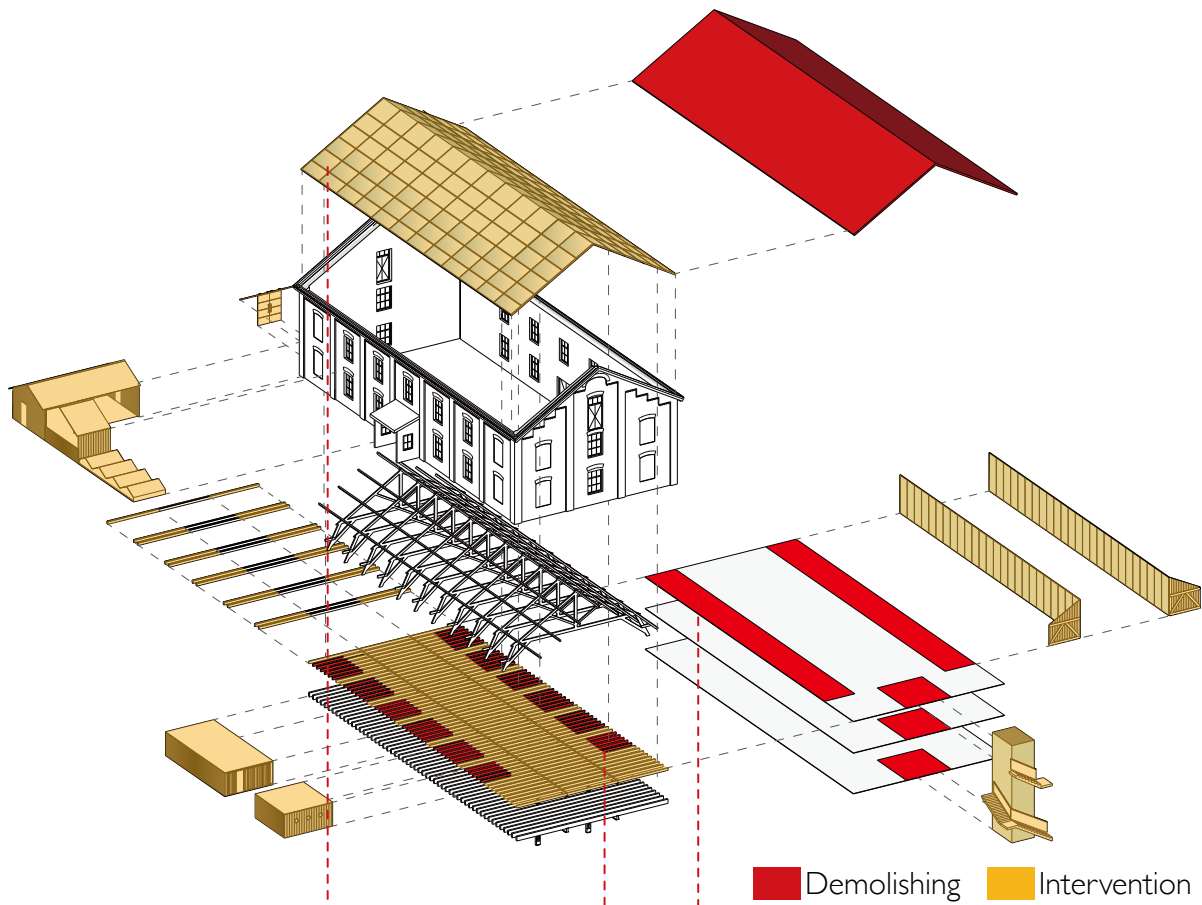
New



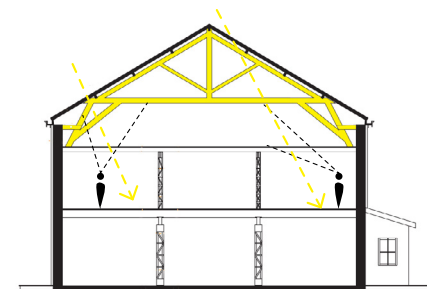
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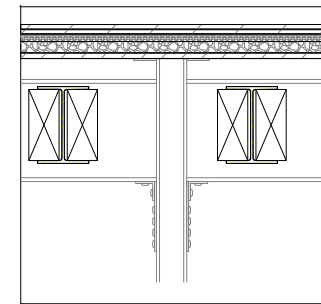
Design illustration - big farmhouse



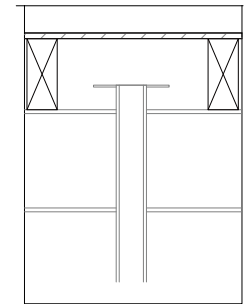
These space are almost useless.



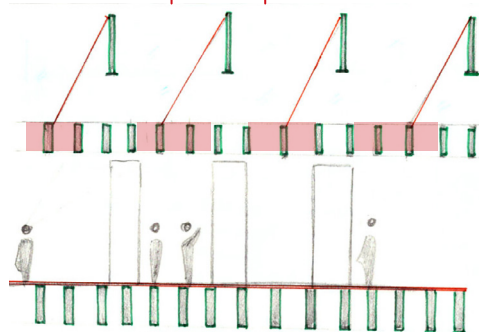
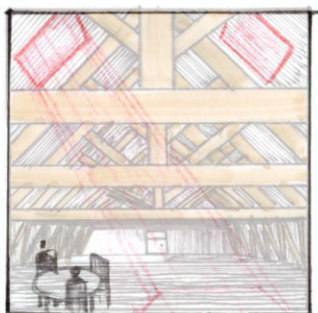
Opened up make day light in.
Roof truss can be seen.
Visitors can see what's on top.



New



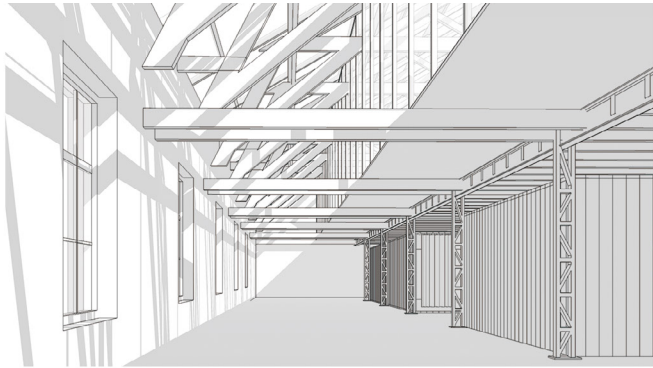
Old



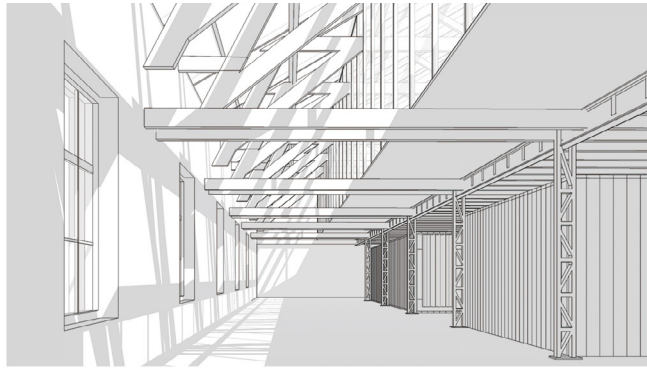
Design illustration - big farmhouse



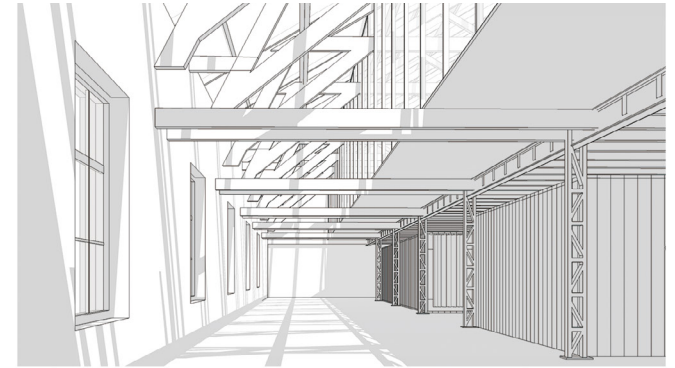
Design illustration - big farmhouse-solar test



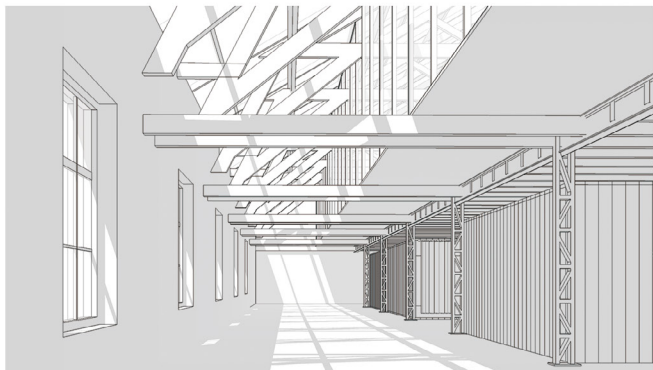
8:00 a.m.



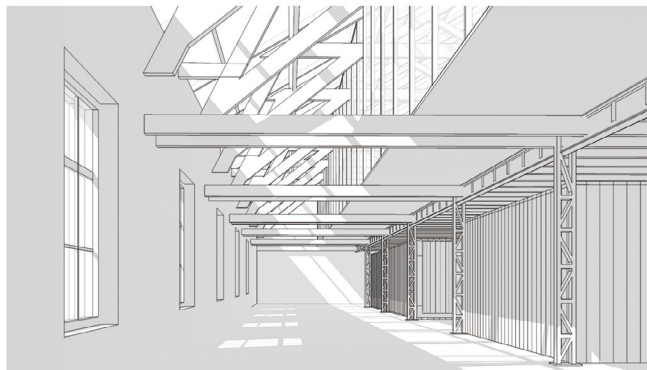
10:30 a.m.



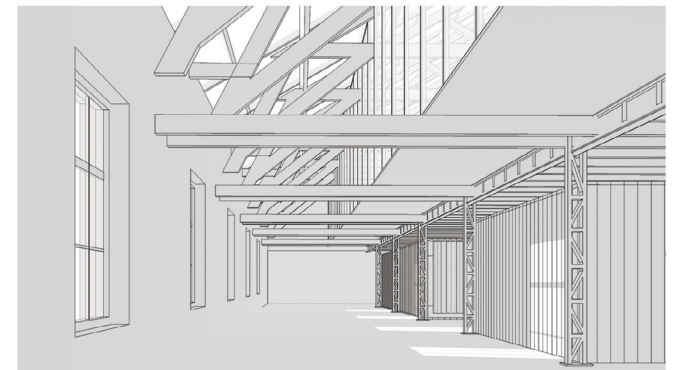
12:00 a.m.



13:30 p.m.



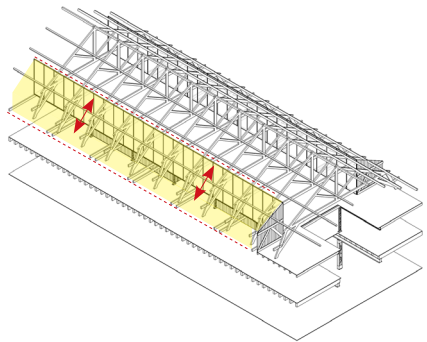
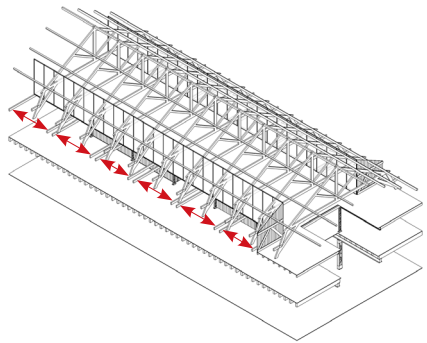
15:00 p.m.



18:00 p.m.

Direct sun light comes from east, west and top. Only at noon, the radiation from top is fierce.
The radiation from east and west are low and has already be partly blocked by the wall and tall trees.

Design illustration - big farmhouse

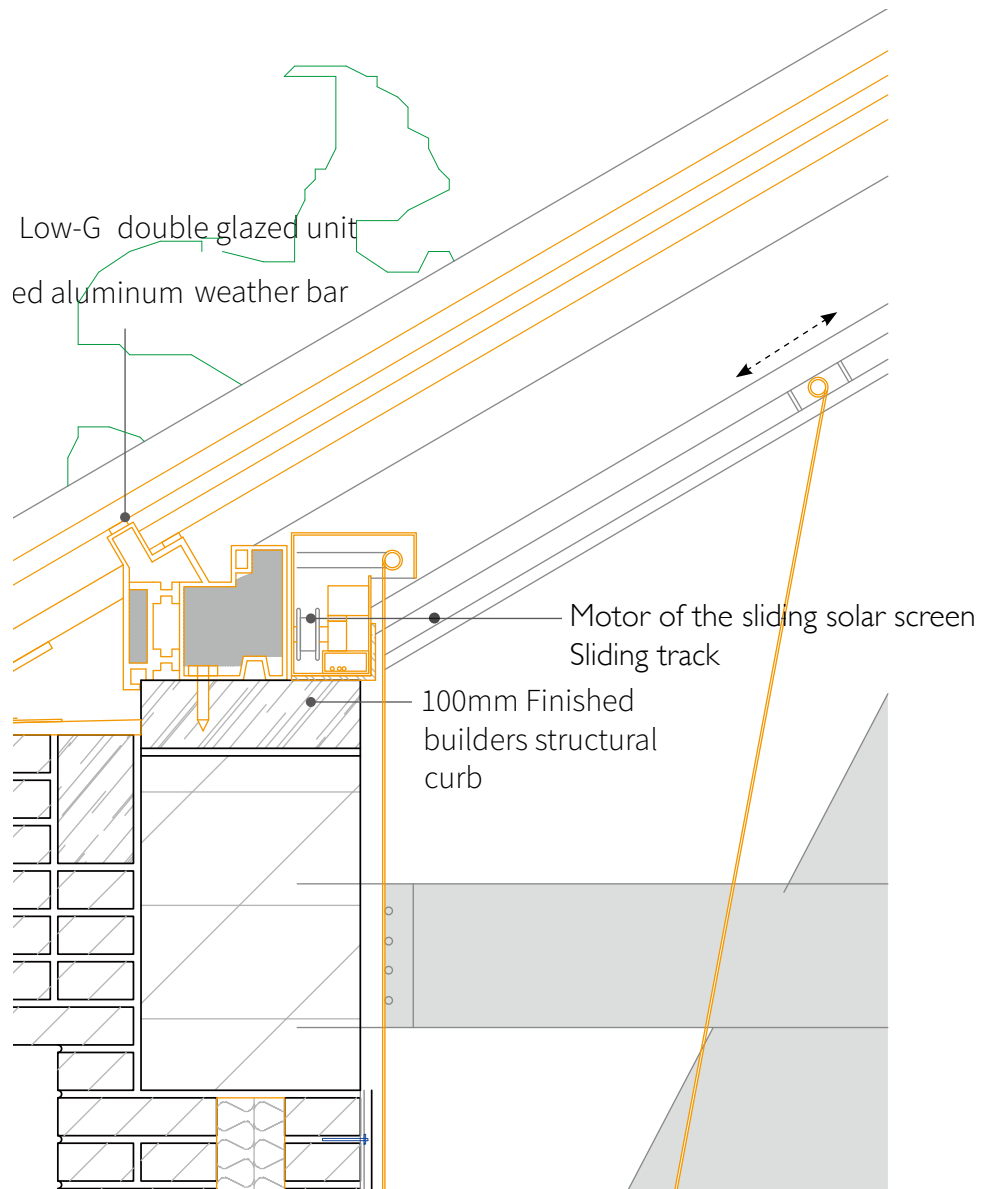


The sliding screen also avoid blocking the view to the roof truss and filling in the void space in between the beams.

When the screens moves away, the hanging-down part will not exceeded the height of the beam in the lower floor.



Design illustration - big farmhouse



Design illustration - big farmhouse

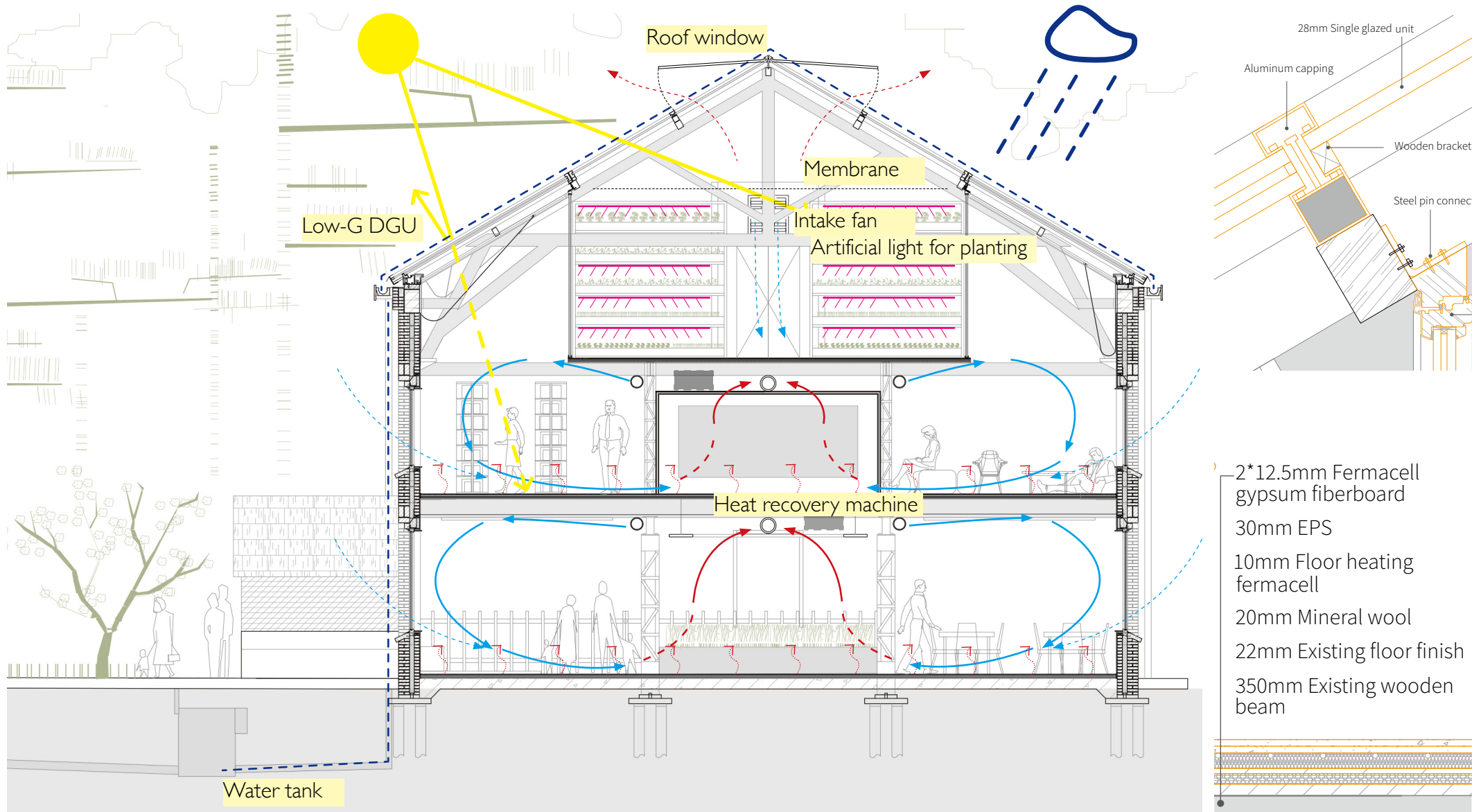


West elevation

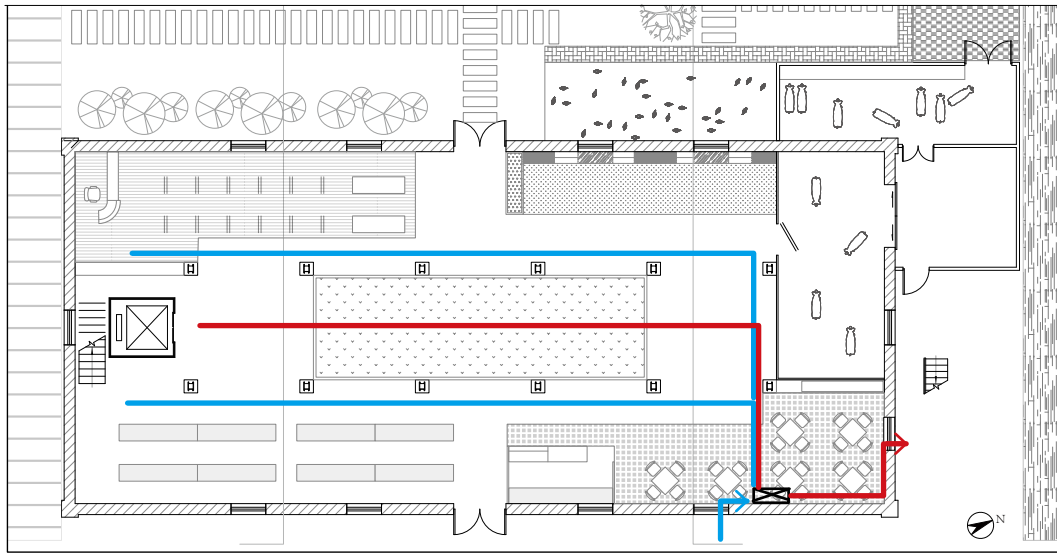


Section bb'

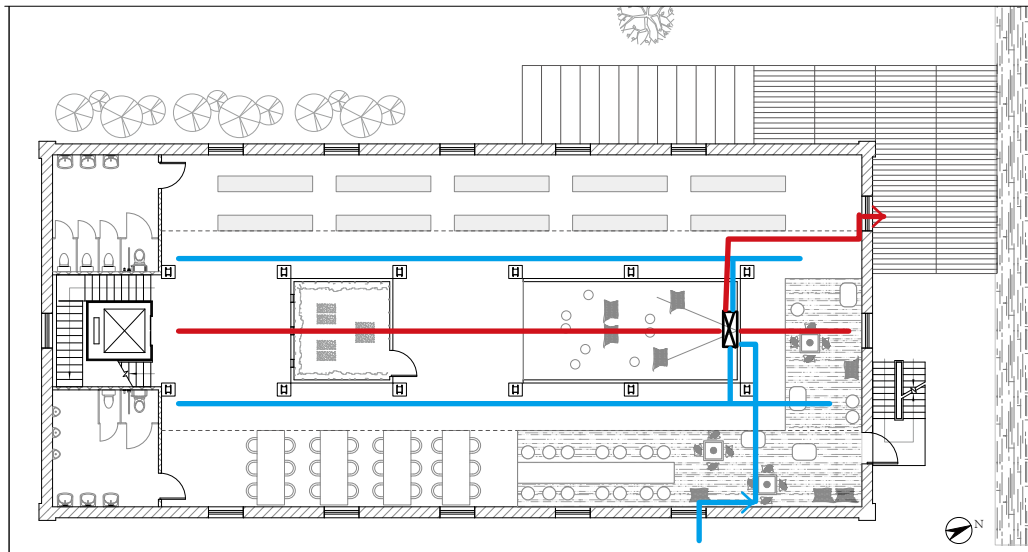
Design illustration - big farmhouse- climate strategy



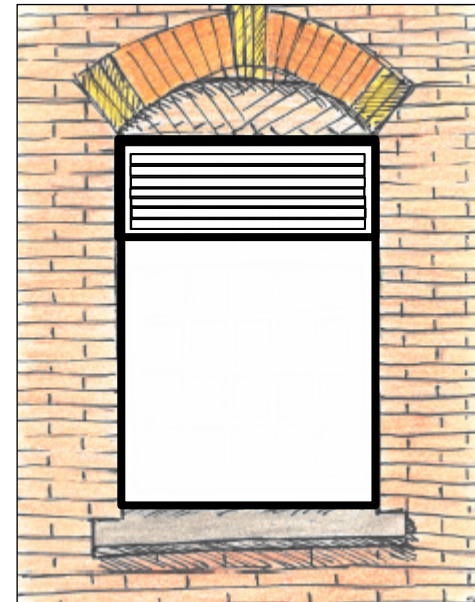
Design illustration - big farmhouse- climate strategy



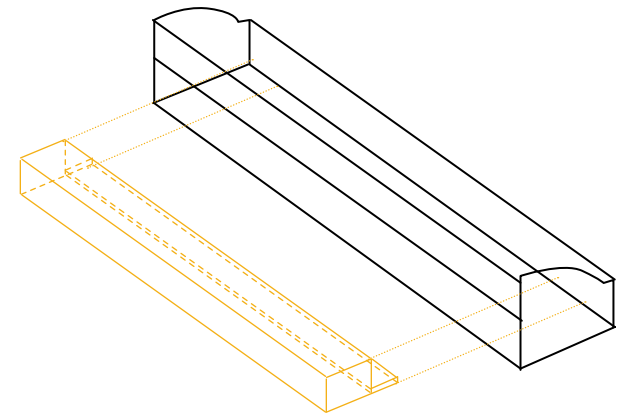
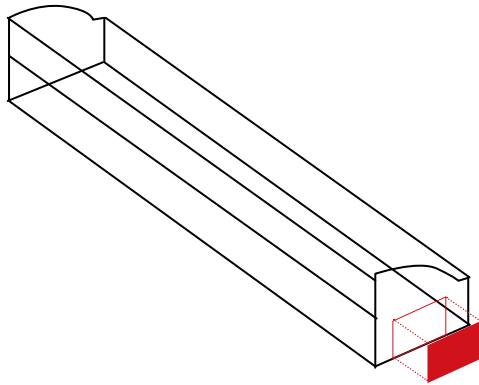
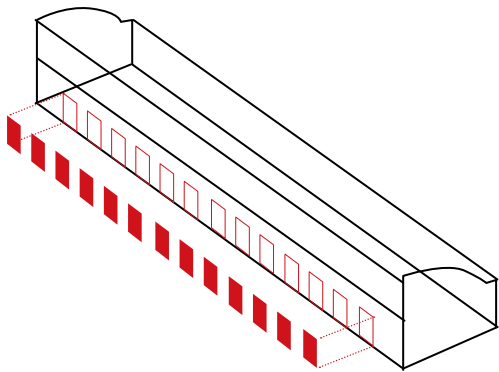
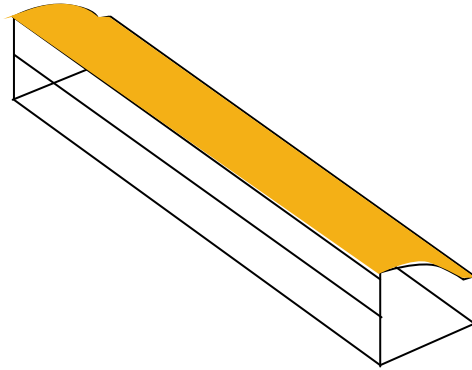
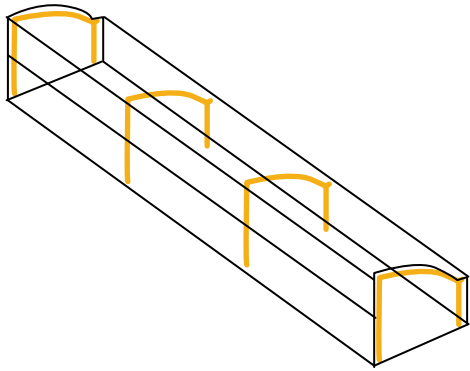
Farmhouses ground floor plans 0 1 2 3 4 5M



Farmhouses first floor plans 0 1 2 3 4 5M

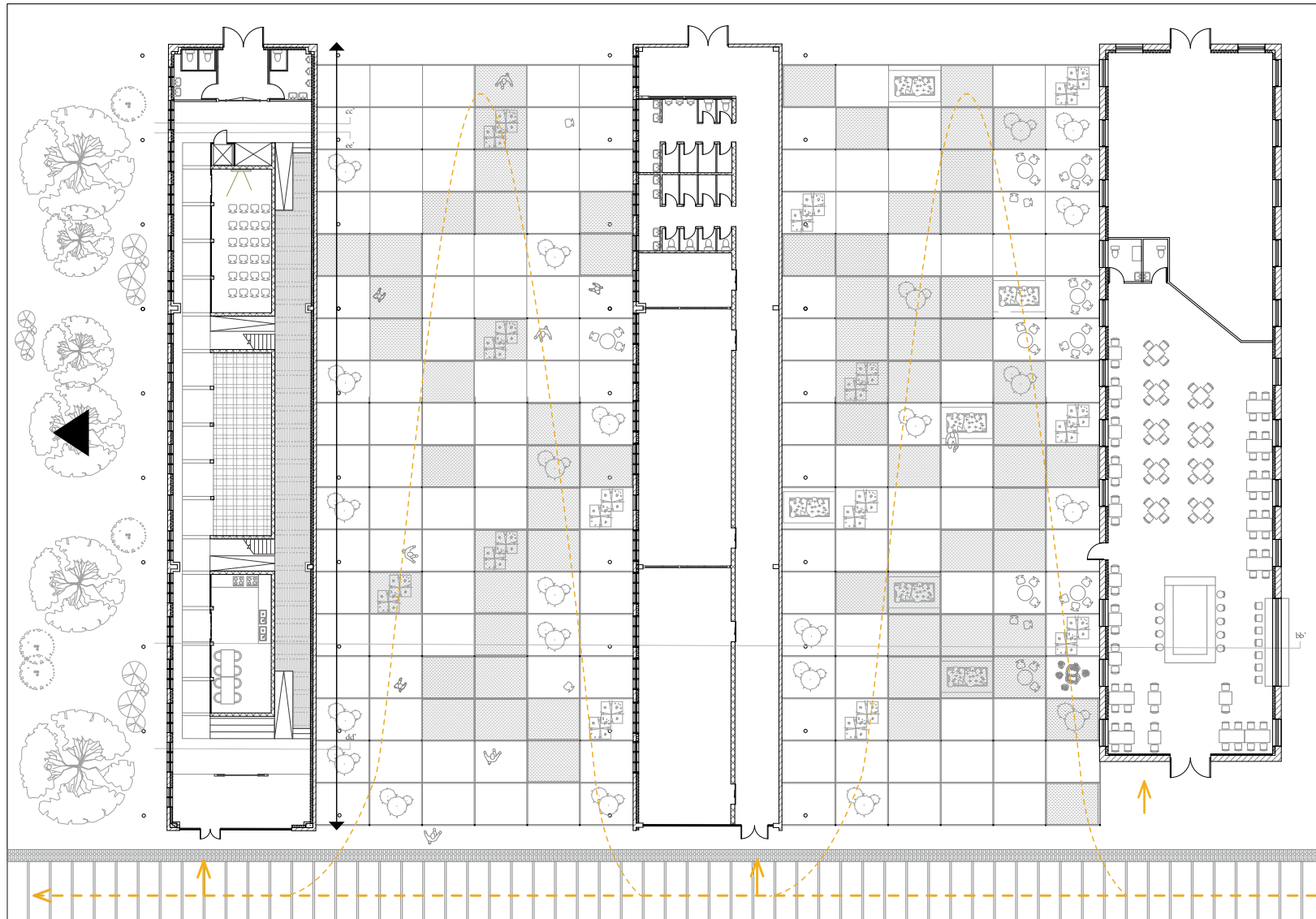
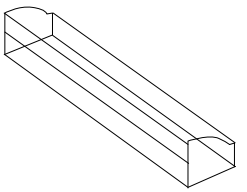


Design illustration - shell roof building



Demolishing and intervention diagram

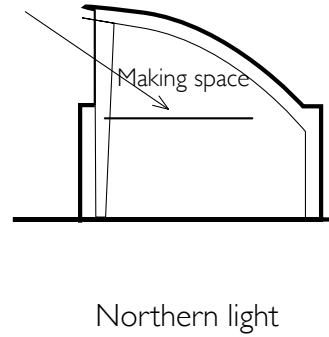
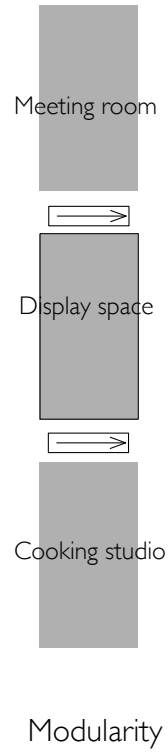
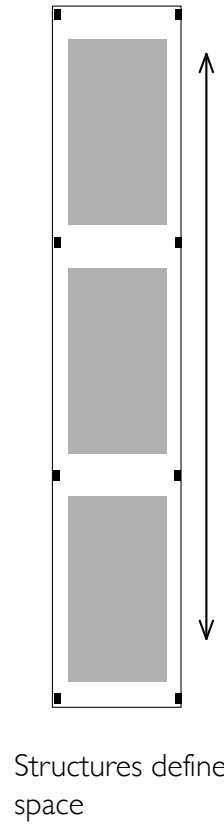
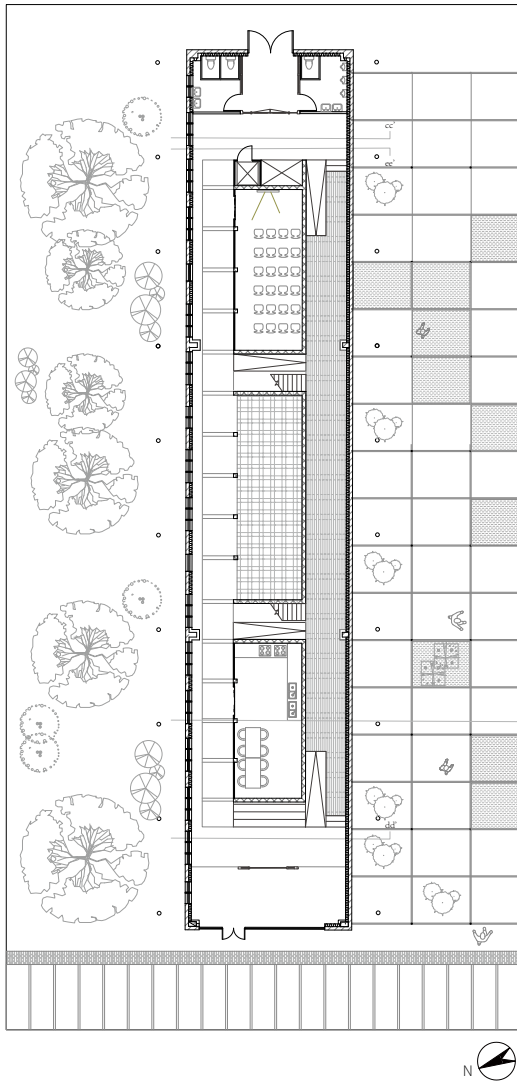
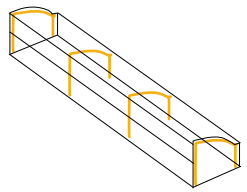
Design illustration - shell roof building



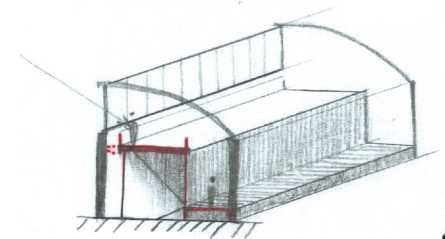
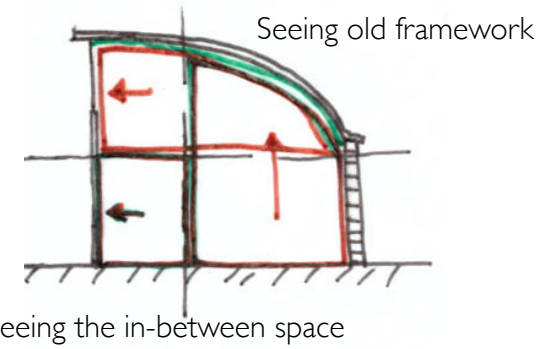
Ground floor plans of the workshop, studio and restaurant



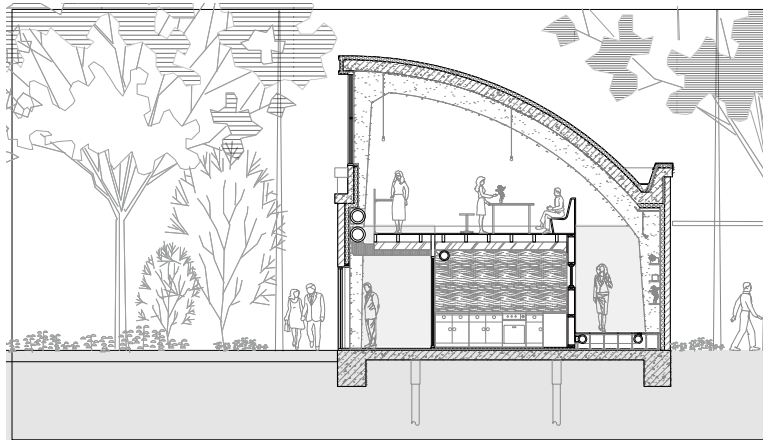
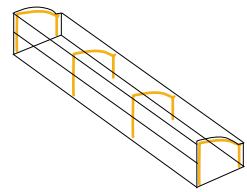
Design illustration - shell roof building- renovation



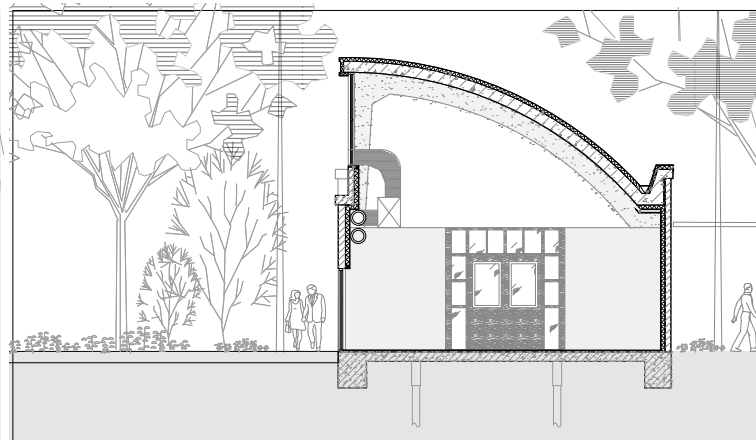
Using northern light



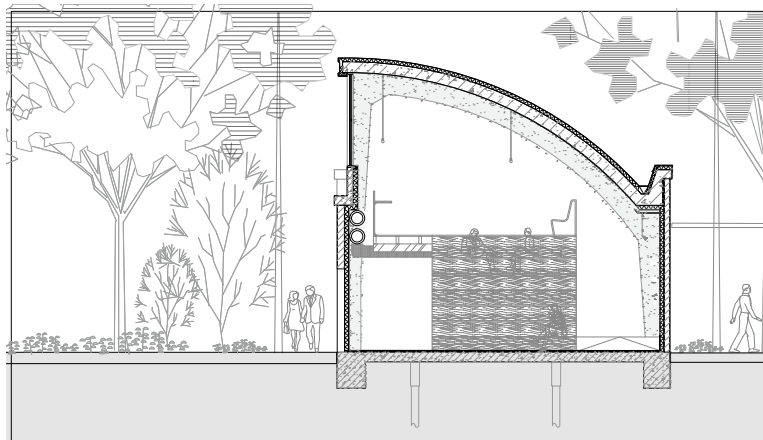
Design illustration - shell roof building



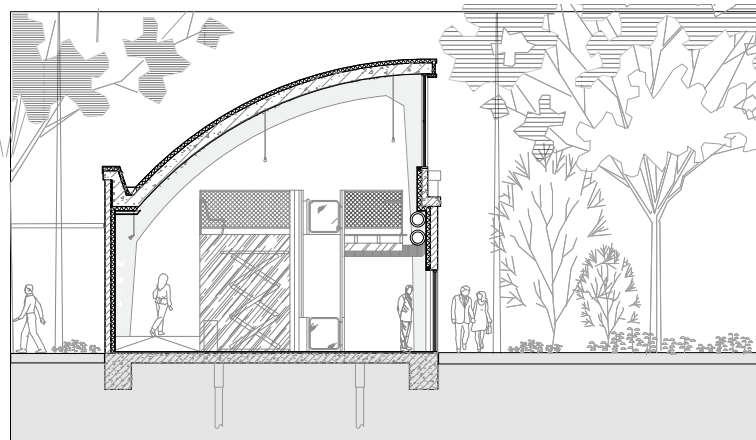
Section bb'



Section cc'



Section dd'

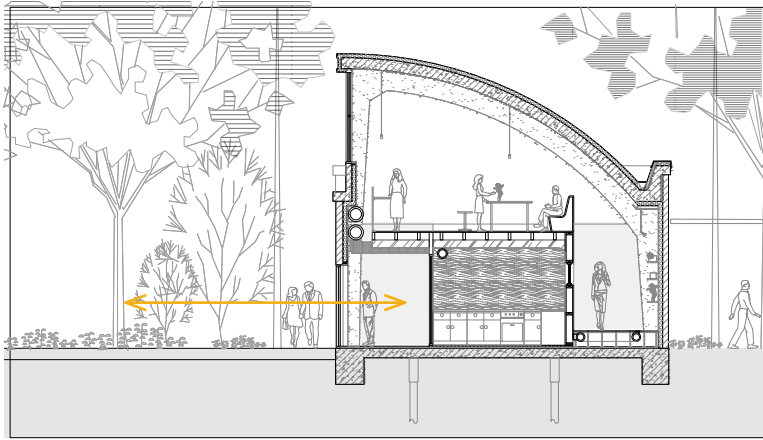
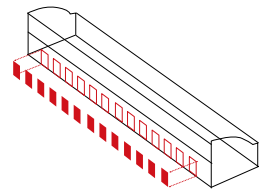


Section ee'

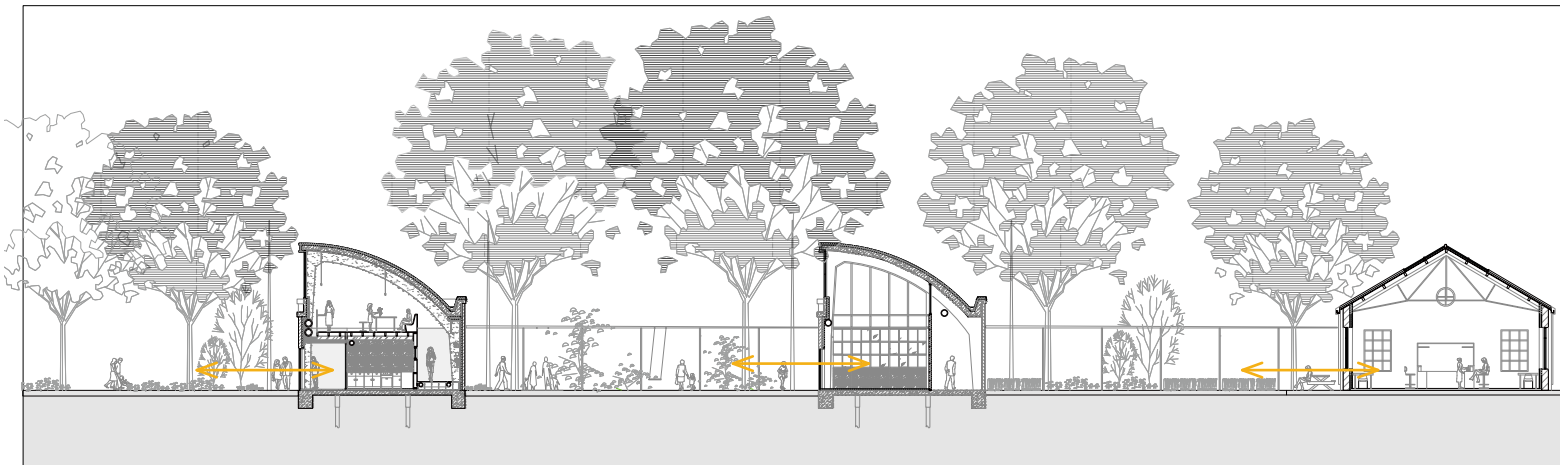
When proceed in the building, different uses and different views come across in the linear movement, just like the different processes take place on the assembly line.

There is no dead end. Visitors can always easily get into the place they want.

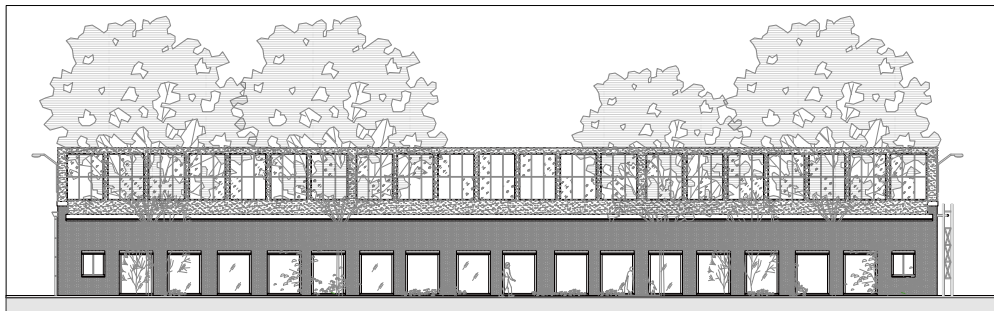
Design illustration - shell roof building



Section bb'



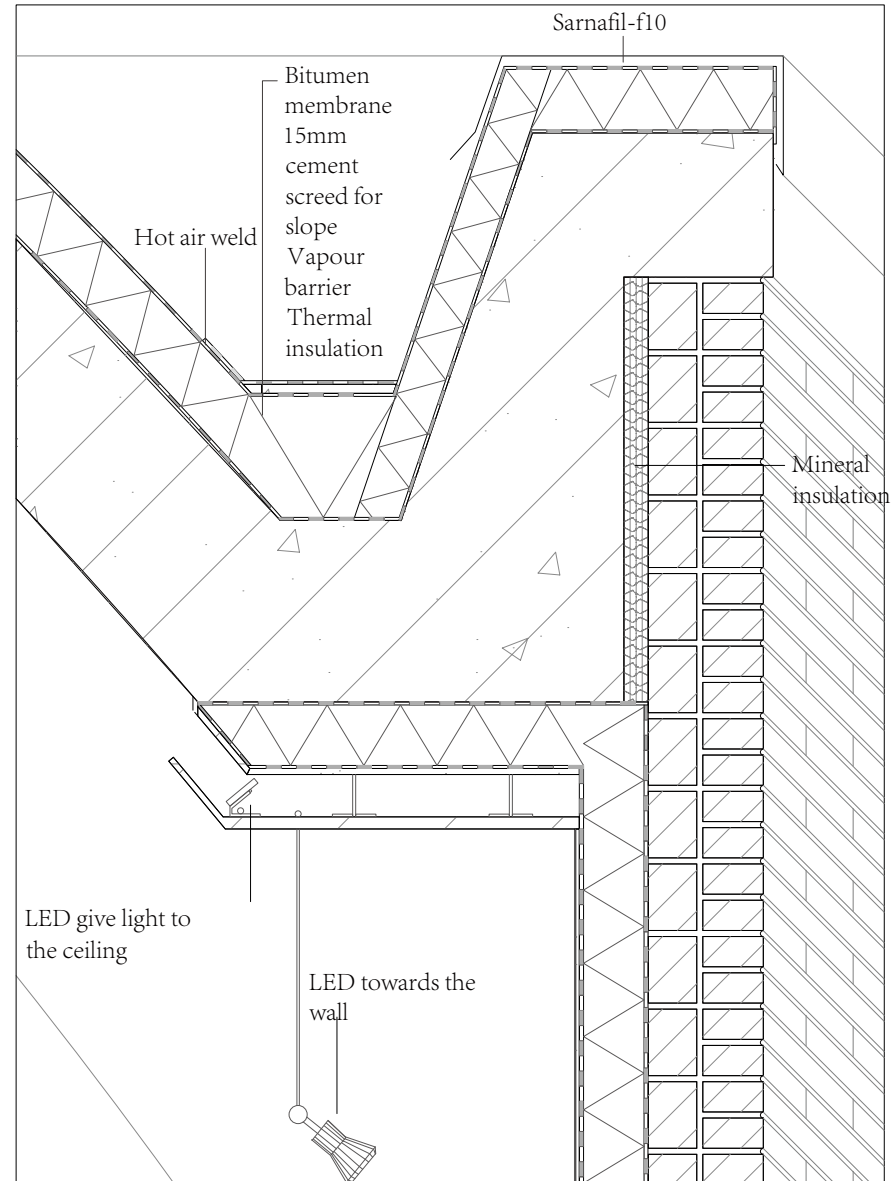
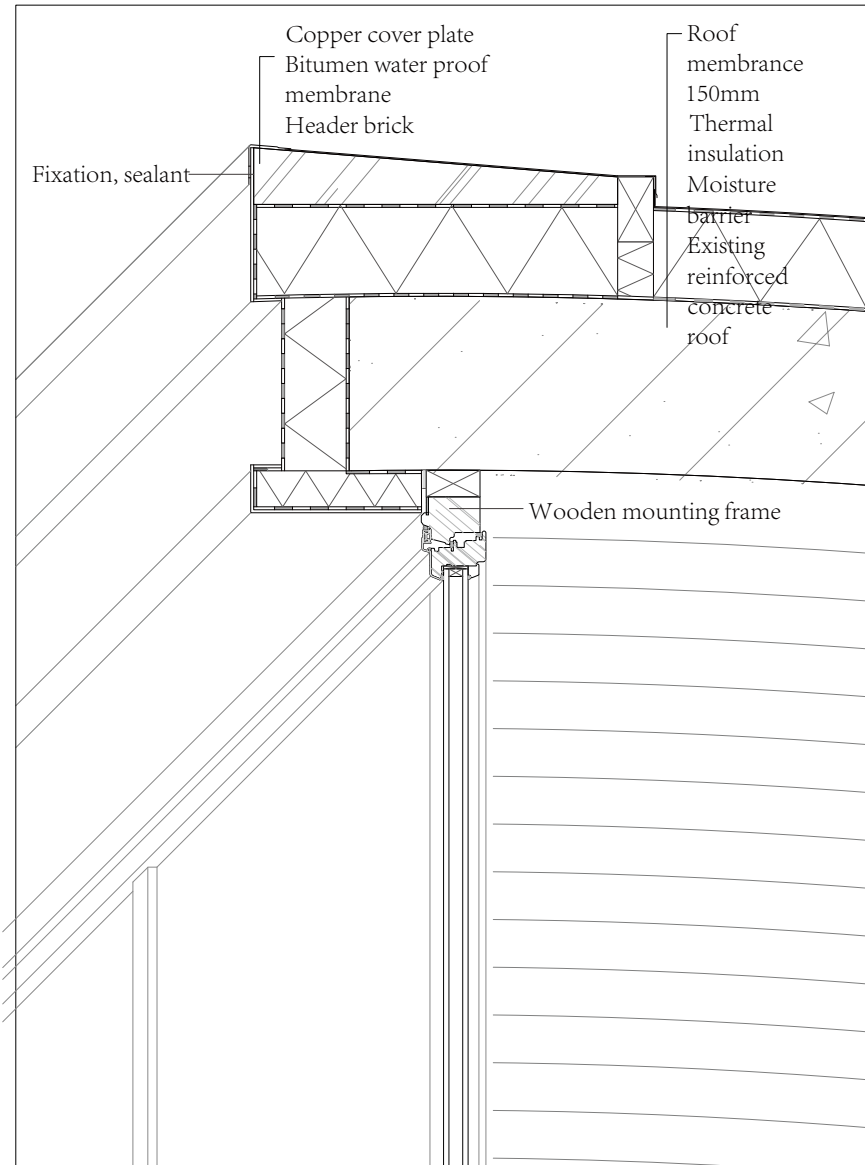
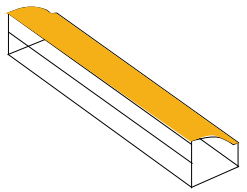
Sections of the Workshop and studio



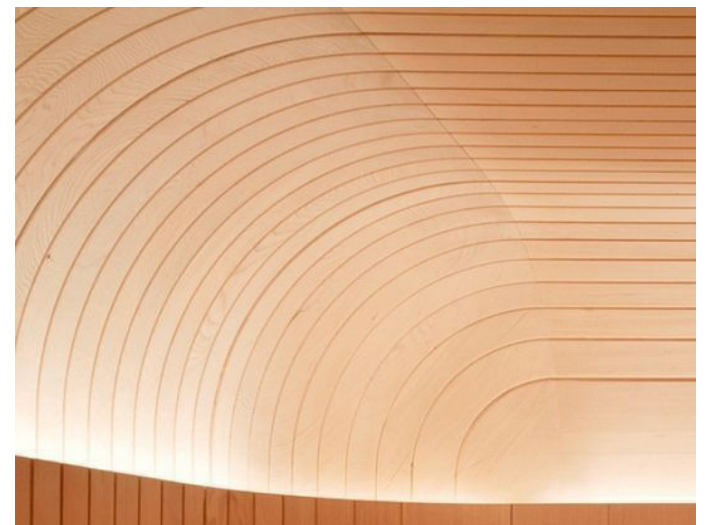
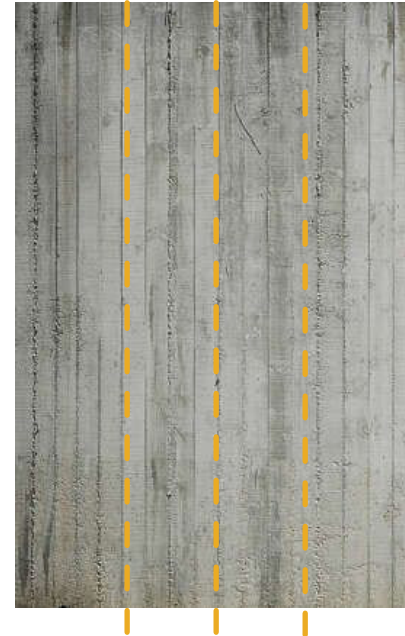
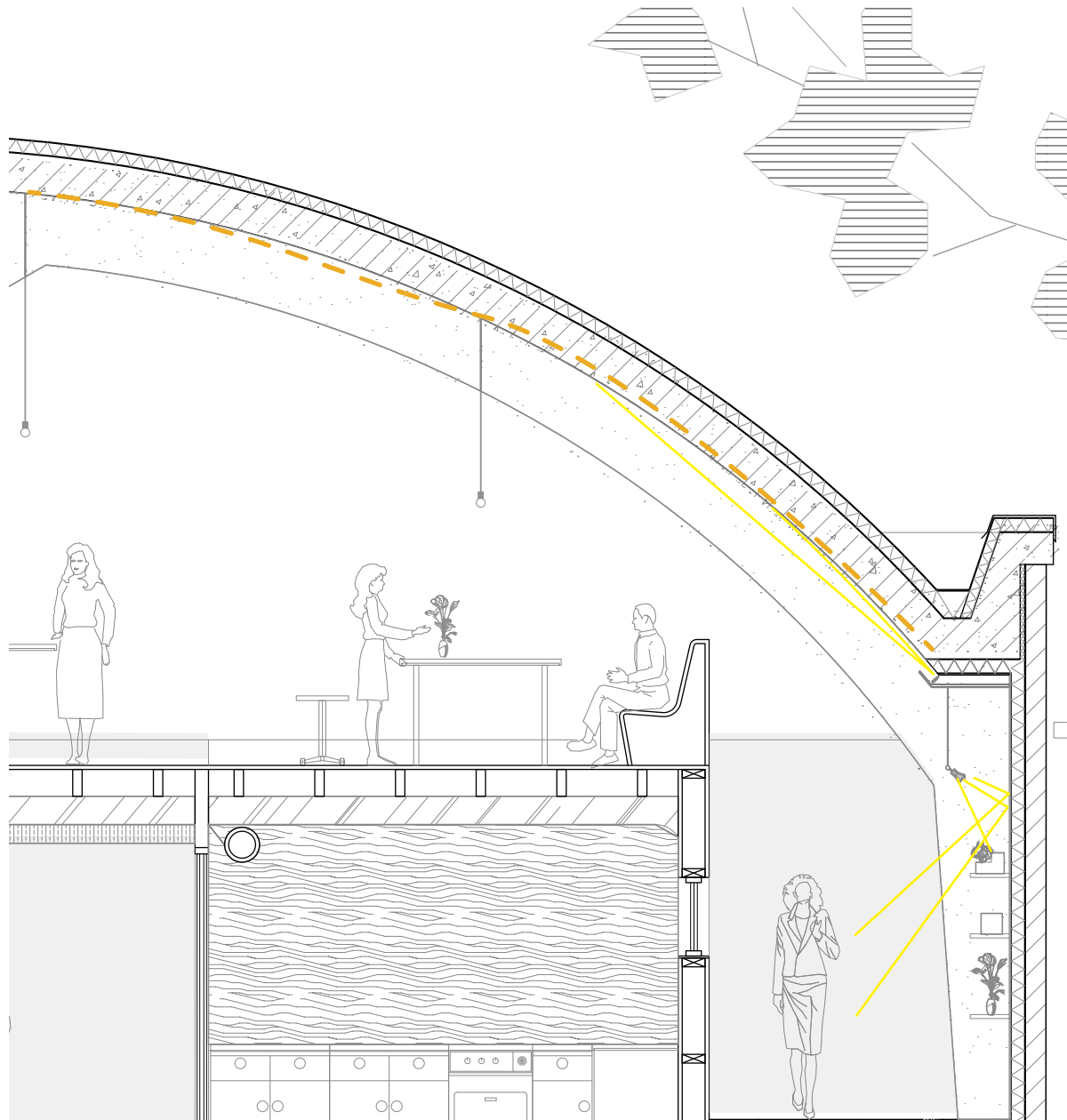
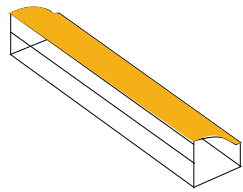
New North Elevation
Scale: 1:200

The opening up brings the shell roof building into its context. The design of the in-between spaces establishes the relationship between inside and outside. It also fulfills the idea of making the design more close to nature.

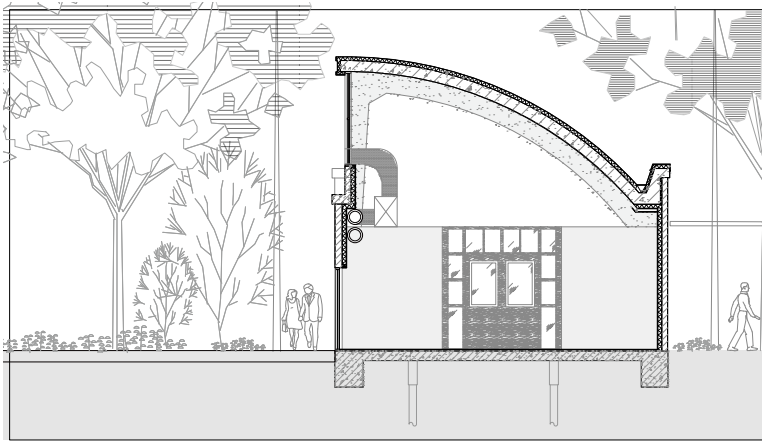
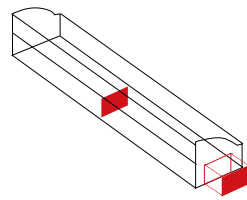
Design illustration - shell roof building-



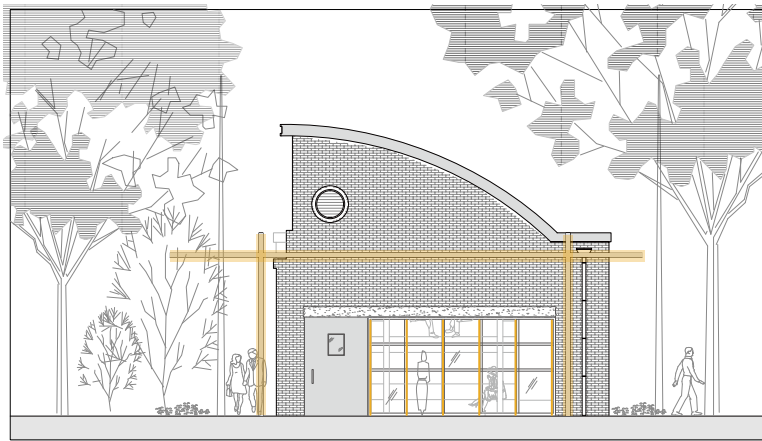
Design illustration - shell roof building- spirit



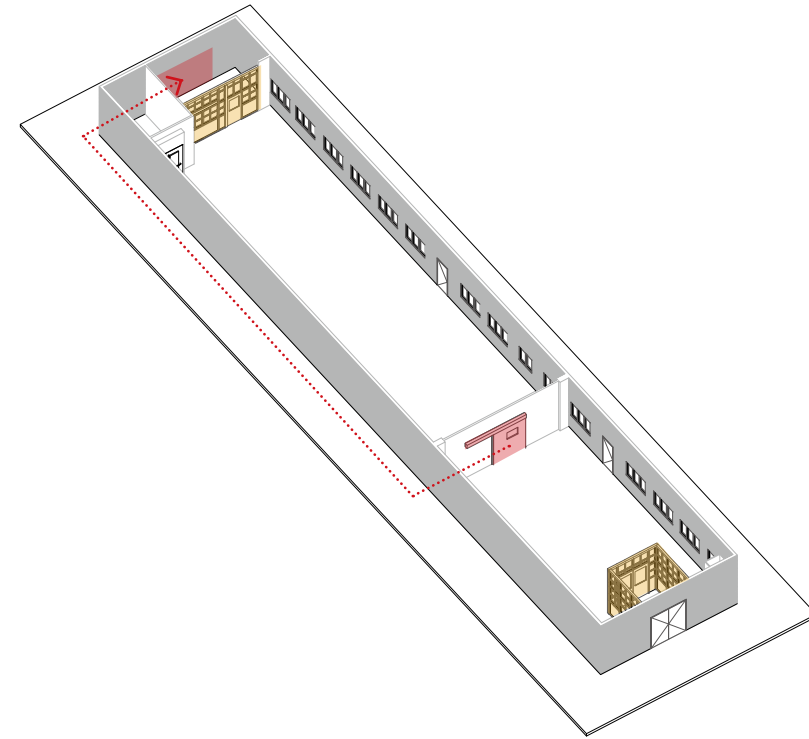
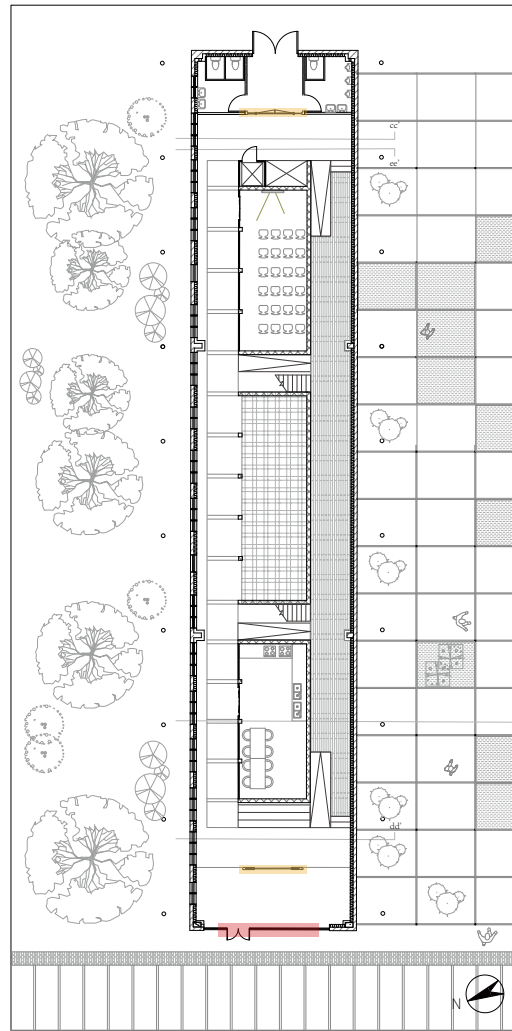
Design illustration - shell roof building-reuse



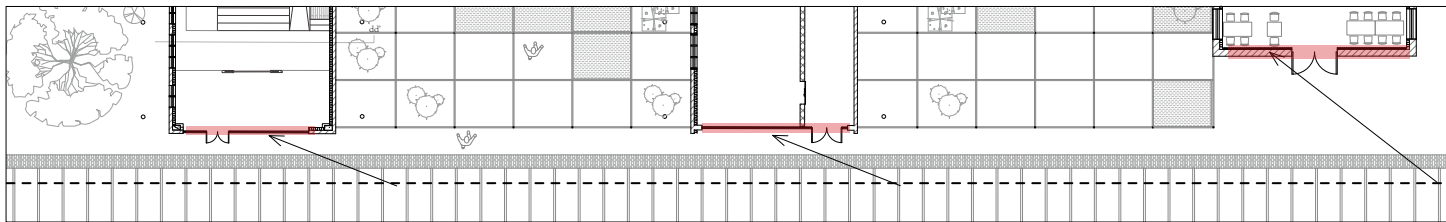
Section cc'



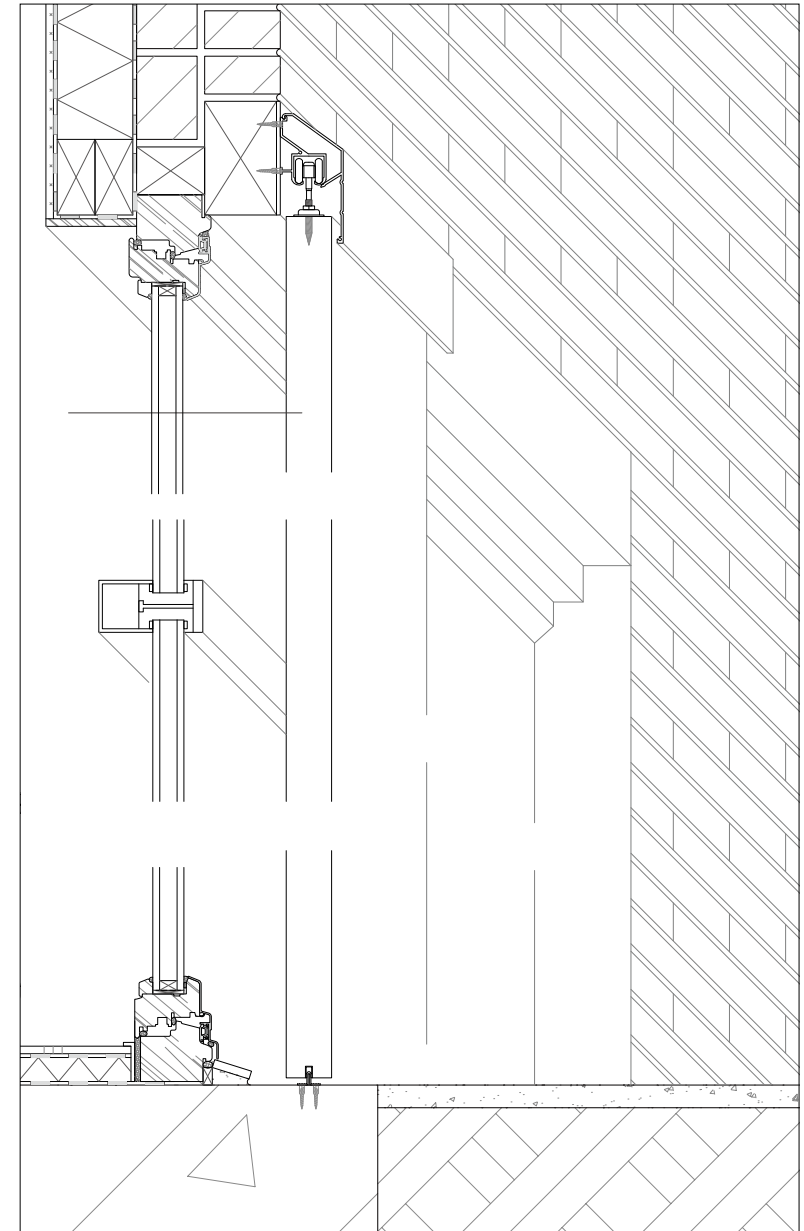
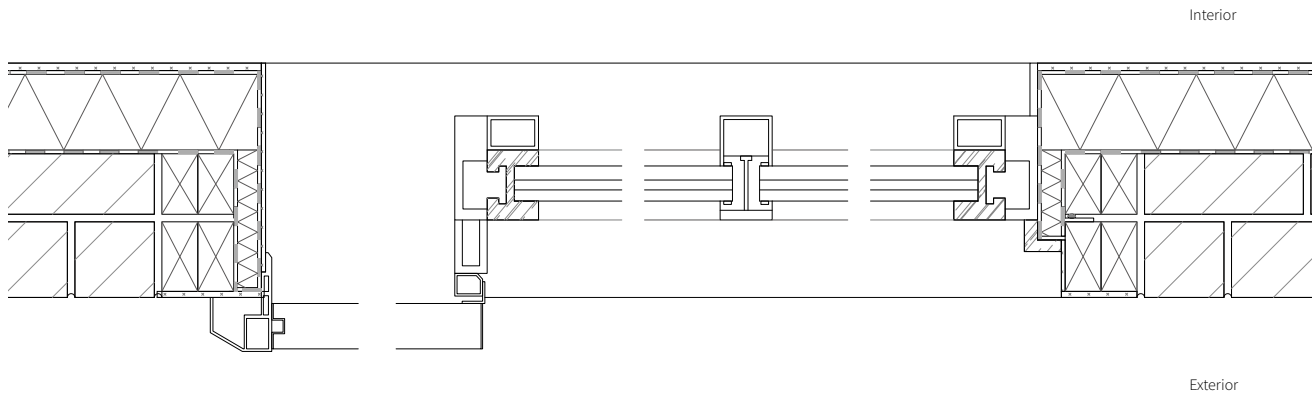
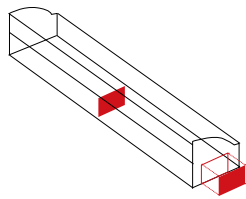
West Elevation



Juxtaposition of new and old emphasize the old feature

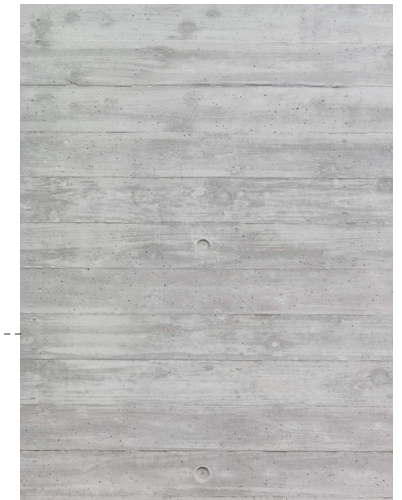
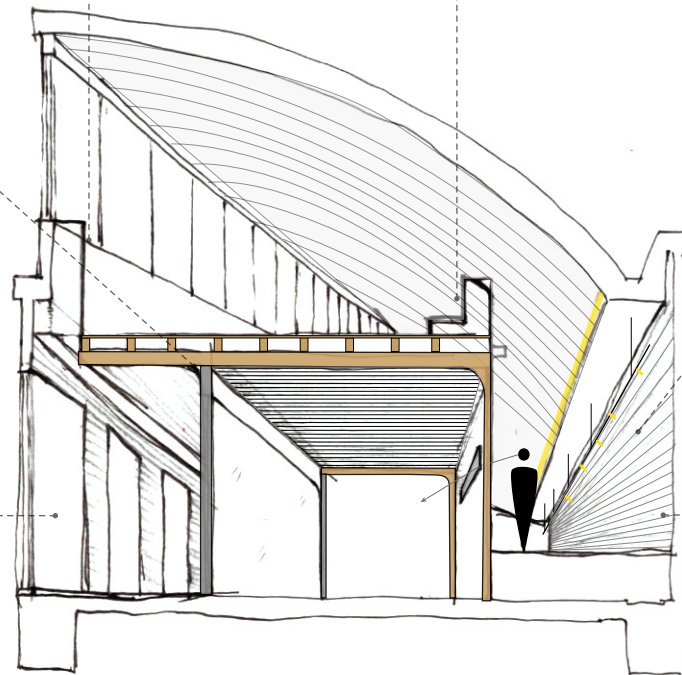
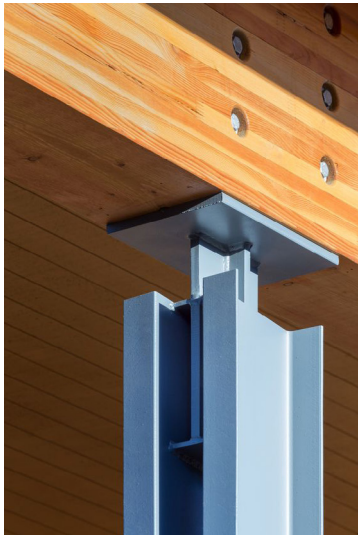
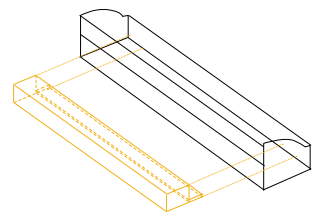


Design illustration - shell roof building

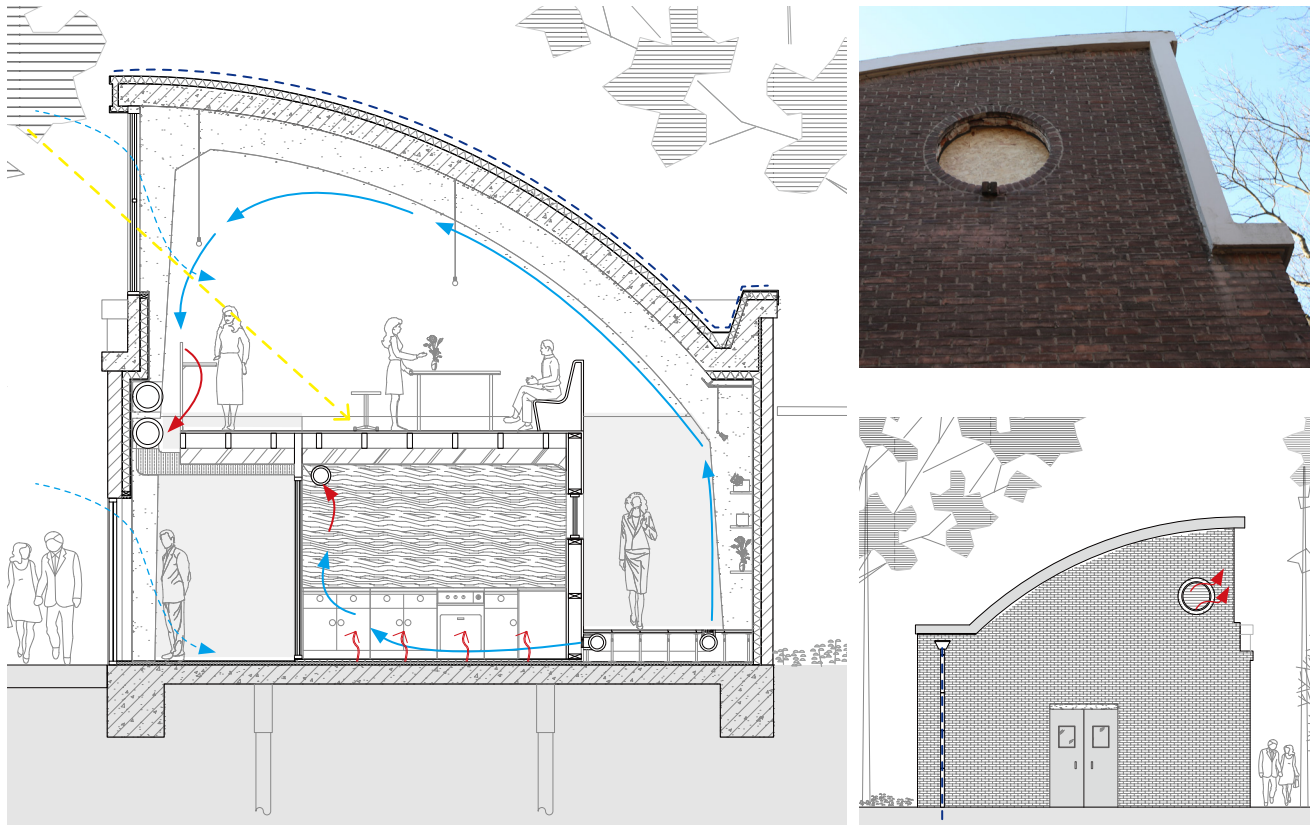


Detail of the sliding door

Design illustration - shell roof building- infill

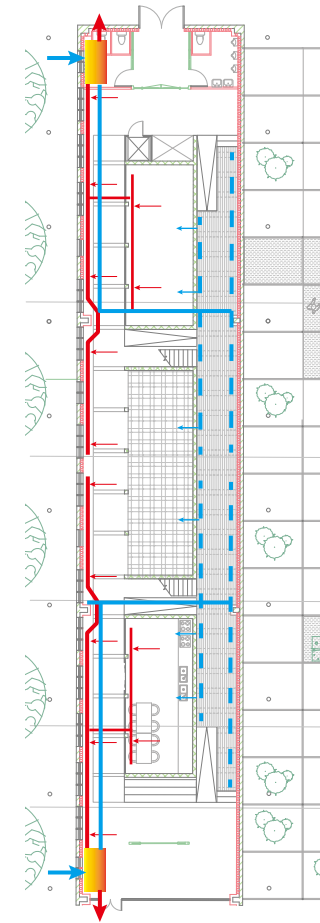


Design illustration - shell roof building- climate strategy



Two ventilation machines are located in each side of the building, otherwise the pipes will be larger in such long building.

The heat recovery ventilation machine supposed to take 1.6*1.6*0.8m space.

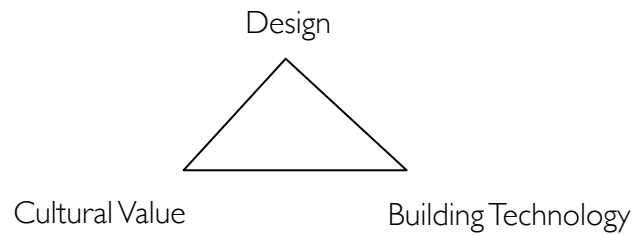


Workshop building

Reflection

The one-year graduation studio establish a good collaboration of design and research, which enables good inter-support.

Systematic and professional acknowledge of heritage design has been achieved.



<Designing from heritage> and <reduce, reuse, recycle> give directions to the design

A complete understanding of the interdisciplinary approach in architecture design.

Always questioning

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