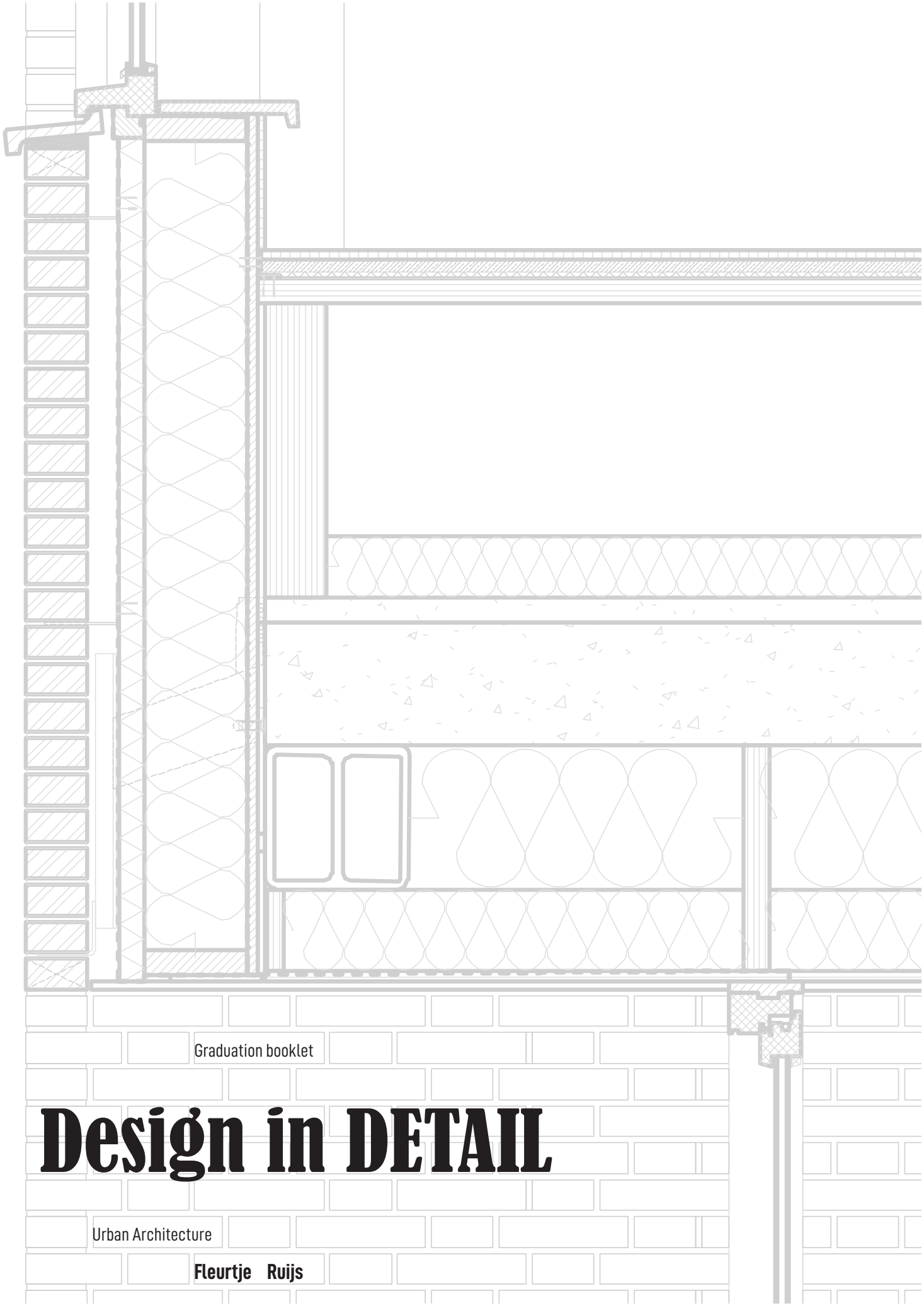


Graduation booklet

Design in DETAIL

Urban Architecture

Fleurtje Ruijs

Index

1. Summary

Currently at the location there is not a lot of green. The molenpoort covers almost every square meter in the area and covers it with a black roof. Made for the cars and not for people or other species. In the cities we deal with the problem of 'urban heat Island' effect. Because all the pavements and stone we use in our cities, they warm up. And a difference of 3 degrees can occur.

To prevent this problem or in this case solve it, green can help. In the green areas water can infiltrate into the earth, what can evaporate on a warm day. Next to this the shadow and the evaporation of trees can also play a positive role in the micro climate of an area.

For a new urban design there is more space created for green. Not only on ground level, but also the roof are covered with green. If this is not the case than there are solar panel. The roofs that are accessible are green and the upper roofs are covered in solar panels. The main project has a lot of roof that is accessible and doesn't have enough space left for the solar panels to cover the need of electricity. The urban plan is in that way designed that in total there will be enough electricity. So on the other building there will be more panels added to compensate for the lacking panels of my main project.

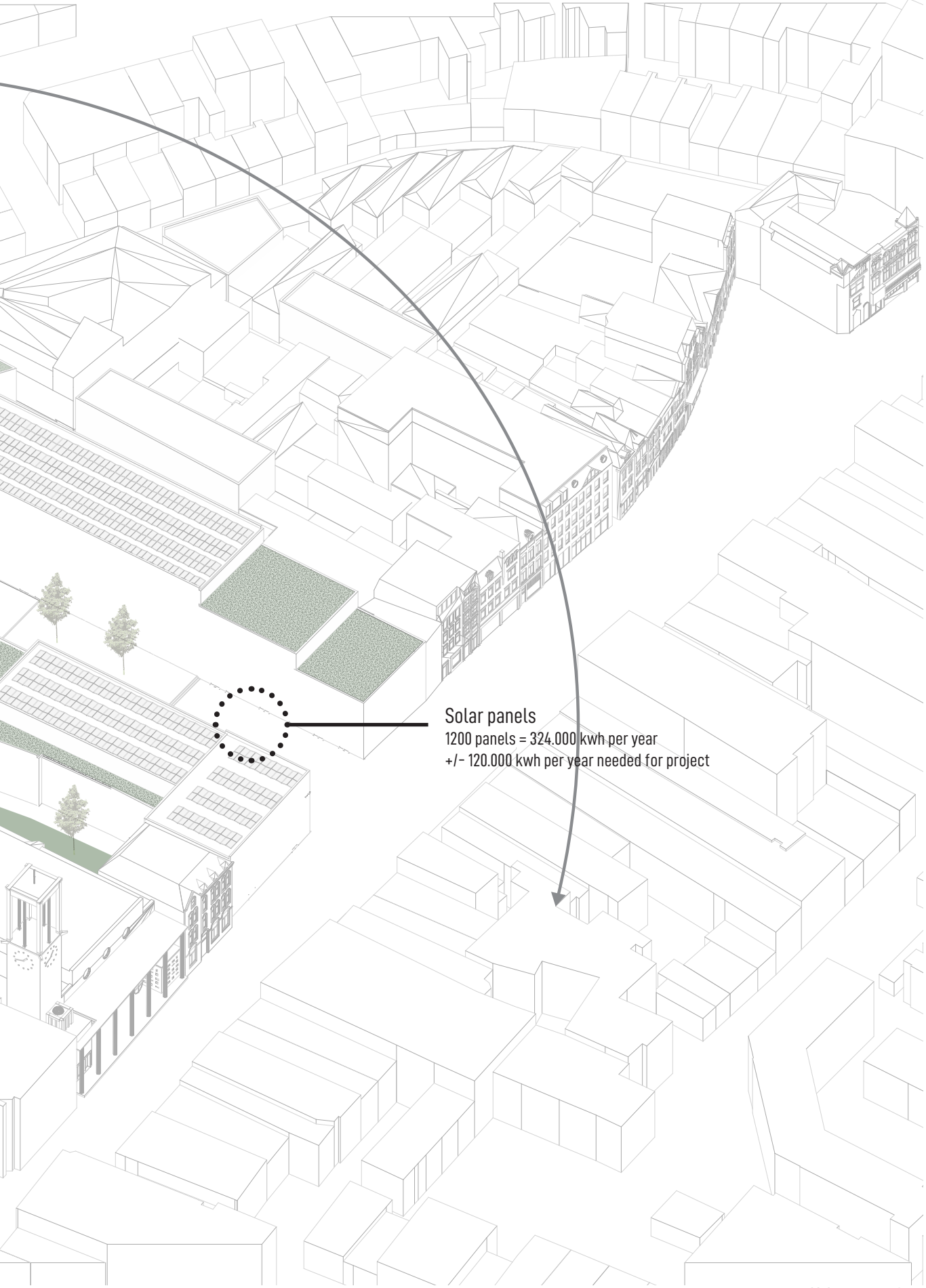
For this project I use a heat and cold recovery system. Later this is shown in a diagram.

To prevent overheating in the building it self, also measurements are taken. The windows on the south and west facade have active shading. On the south side of the building are multiple trees and plants that are covering parts of the facade. The main materialisation of the building are reused bricks. But to decrease the mass of the facade there will be a mix with hollow bricks.

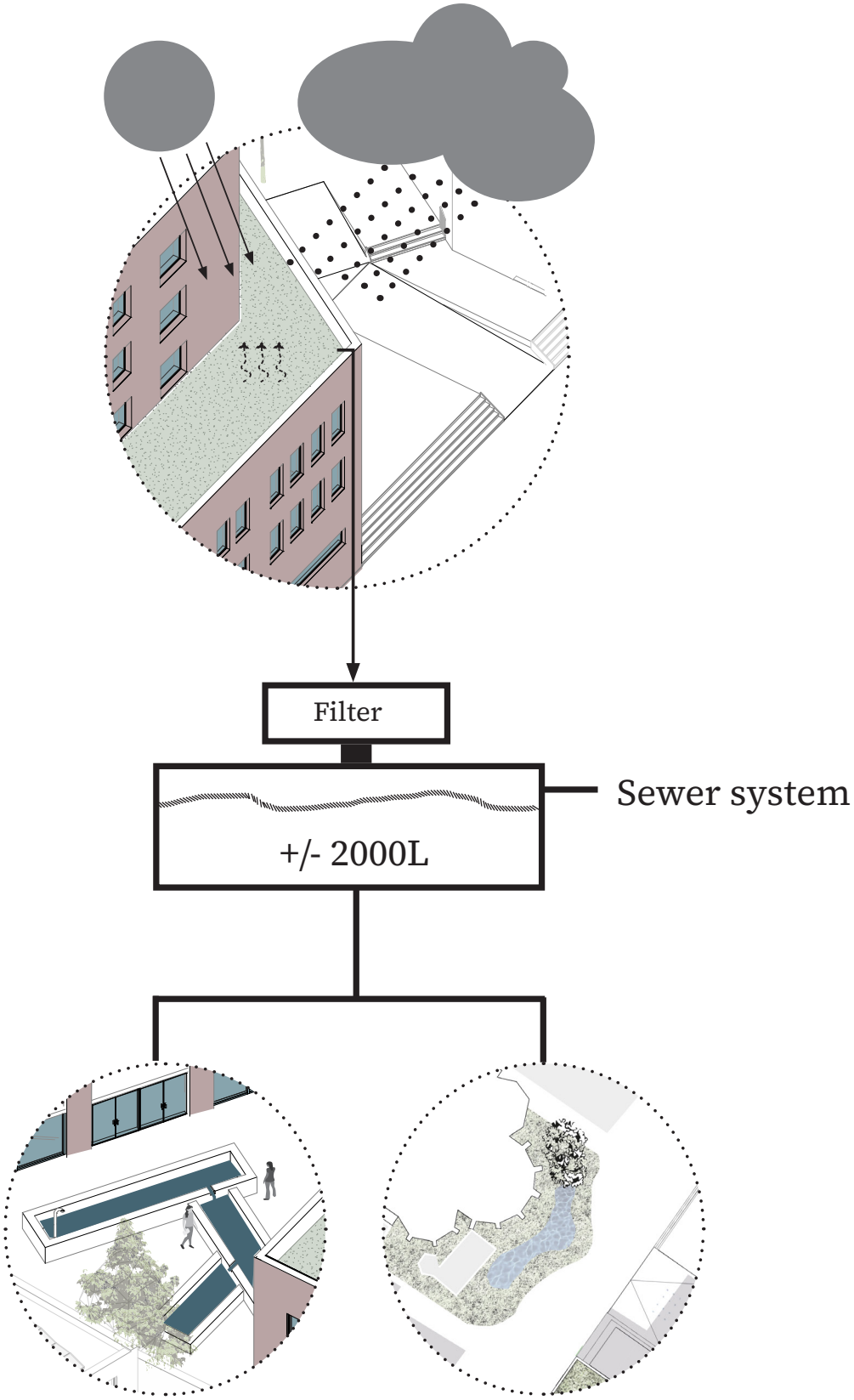
The main concept of ventilation is natural. I belief that for housing a base of natural ventilation is better for the people that will live their. Of course this is less sustainable, because you than don't have the option to recover the heat out of the air. Natural air will come in the building via a ventilation grill and/ or windows. Mechanically the air will be extracted.

The construction of the building will be partly a reused concrete structure. The existing foundation will be reinforced. And on top there will be a wooden light weight structure. To support the existing construction there will be a steel construction surrounding it.

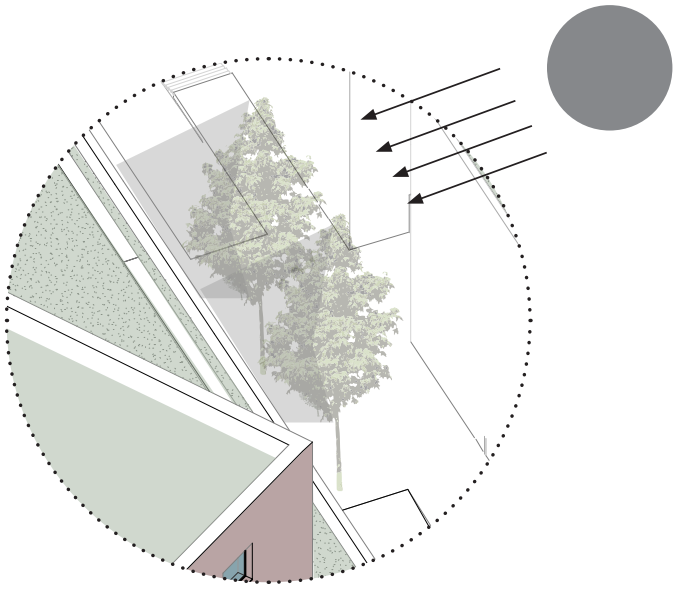
2. Urban setting

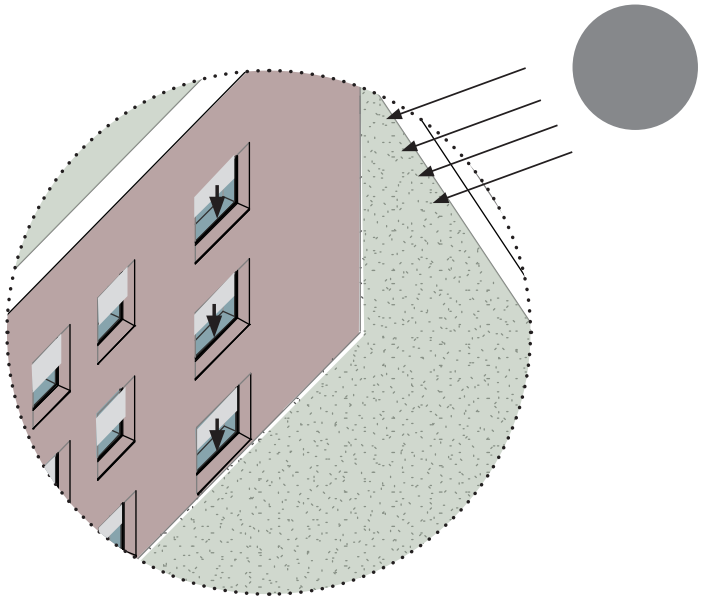


Urban overview



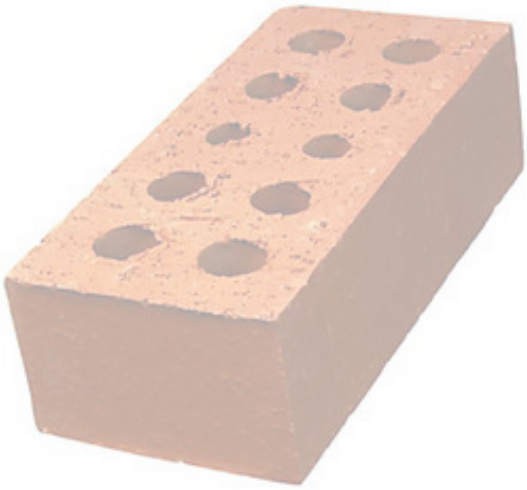
There is not enough roof to harvest enough water to flush the toilets. That is why this design is focused on getting the water back in 'nature'. By letting the water evaporate by the fountain. Or really water the green roofs and the other gardens





Climate-active bricks

Studies show that the colour of the brick and also the density of the brick has a big influence of the temperature of the facade. The surface temperature of the different types show different heating potentials as well as varying evaporation behaviour. The study concludes that a red brick with holes is the coolest option. This is because of the lower density. Because of the holes the brick has a bigger surface, thus a bigger absorption capacity. Therefore this brick has the strongest evaporation cooling. (Source: Sigmund, B. (11/07/2019) Climate-active brick facades. DETAIL)



Mix of bricks

To prevent overheating of the facades there will be a mix of bricks. on the north facade there will be used more ‘normal’ bricks. And the other facades will get a mix of the hollow brick. With using this brick the overheating will not be completely solve, but will help. Together with the trees, plants and the shadow of the surrounding building I think the overheating of the facade will be a lot less.

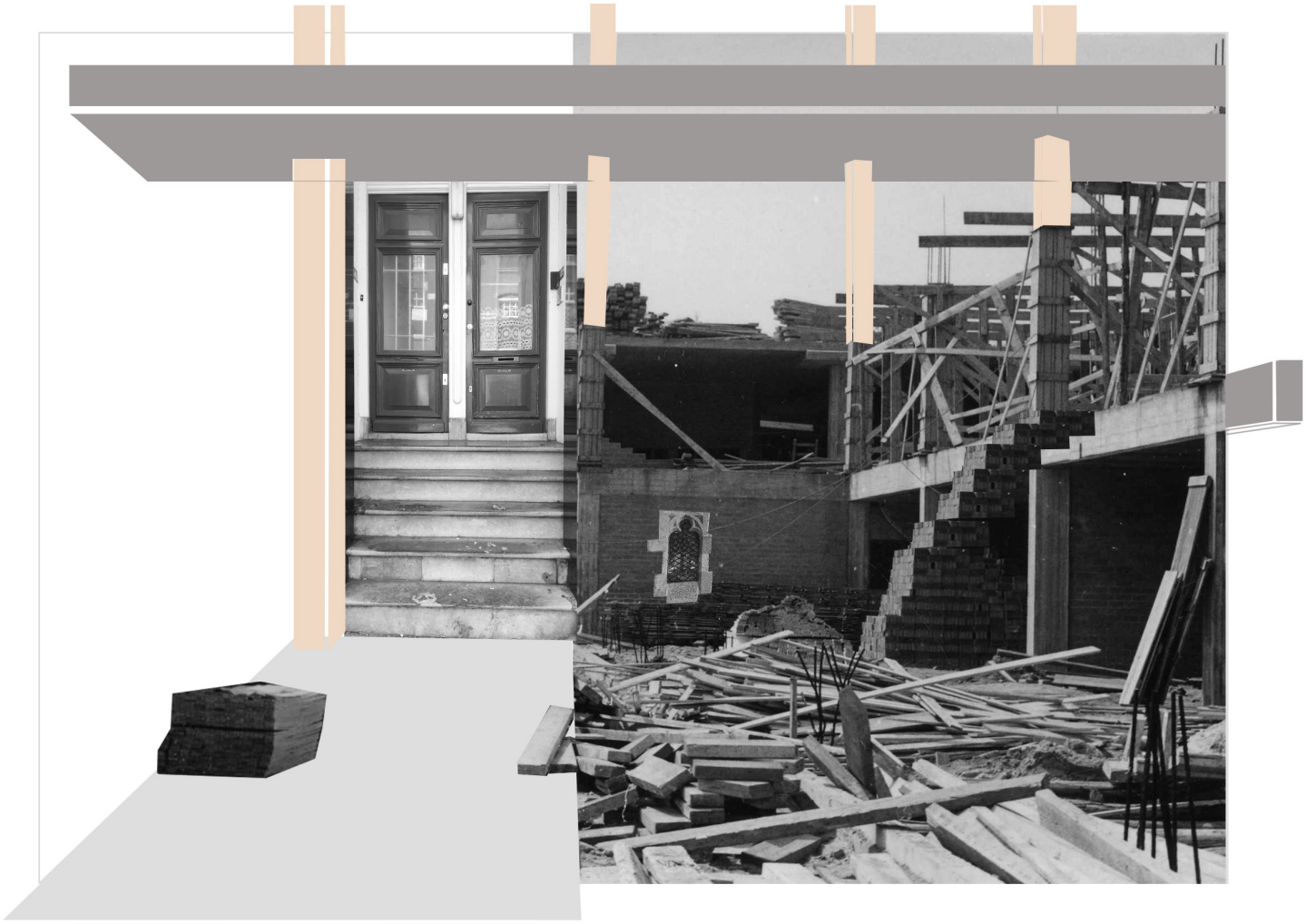
Reclaimed brick

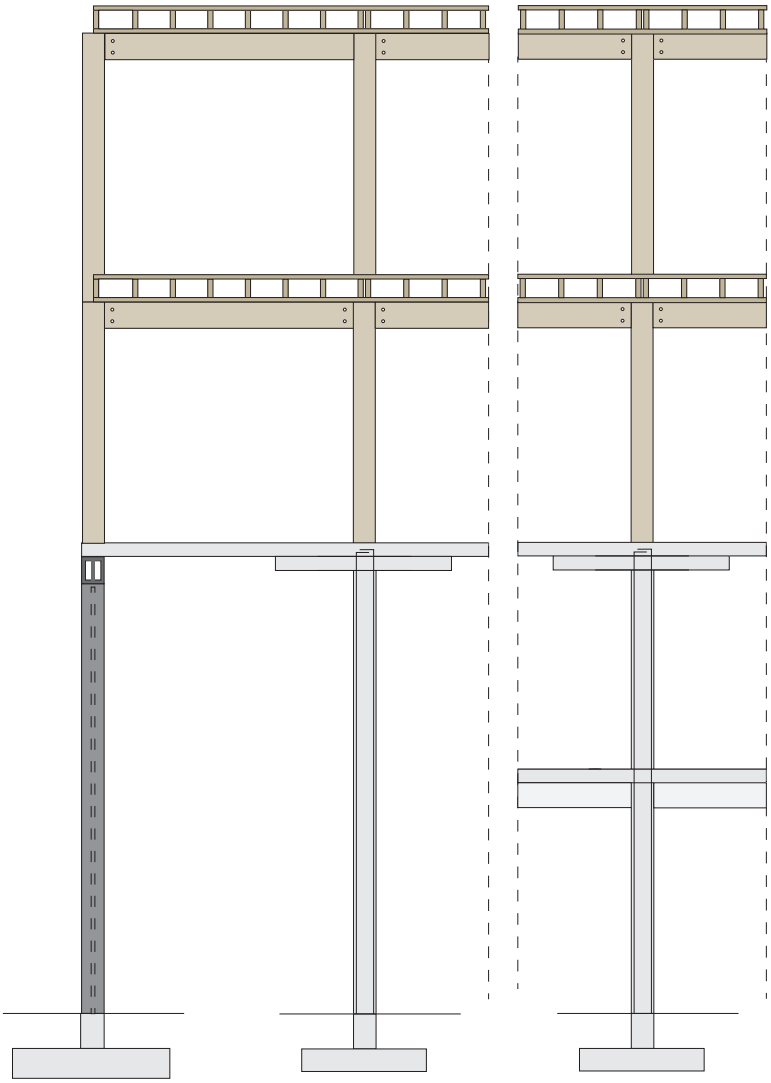
There are a lot of bricks in The Netherlands and a lot of buildings that are torn down have the brick as waist. In Nijmegen the brick is a big part of the material culture and therefore I want to use this material as the main materialisation of the building. Because of sustainability reason and also architectural, I will use reclaimed bricks.

There are a lot of businesses that sell used bricks and have them already cleaned of the mortar. At **Opalis.eu/nl** you can find those.

Location of different businesses that sell used bricks. Source: https://opalis.eu/nl/handelaars/kaart?

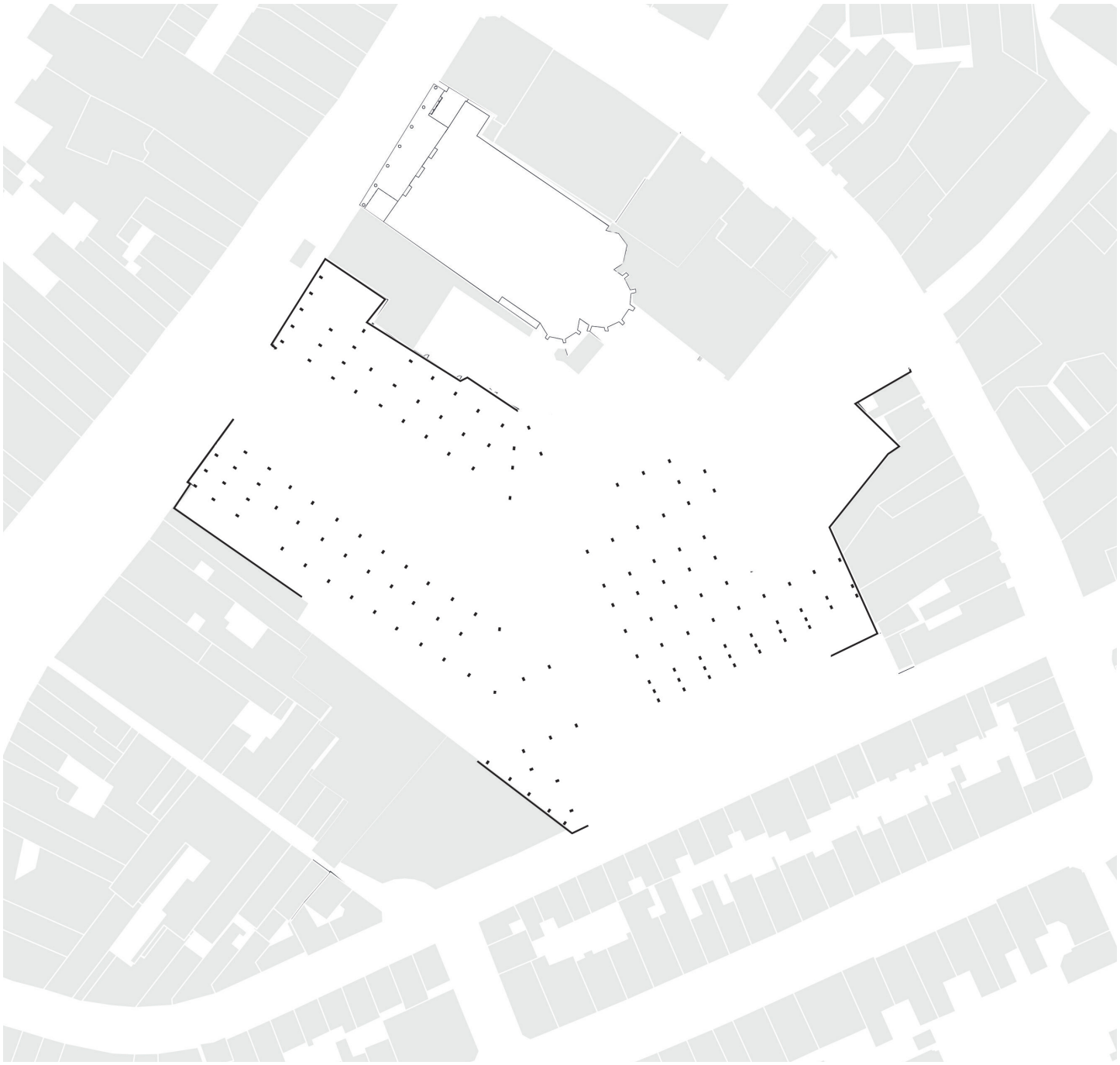
3. Construction



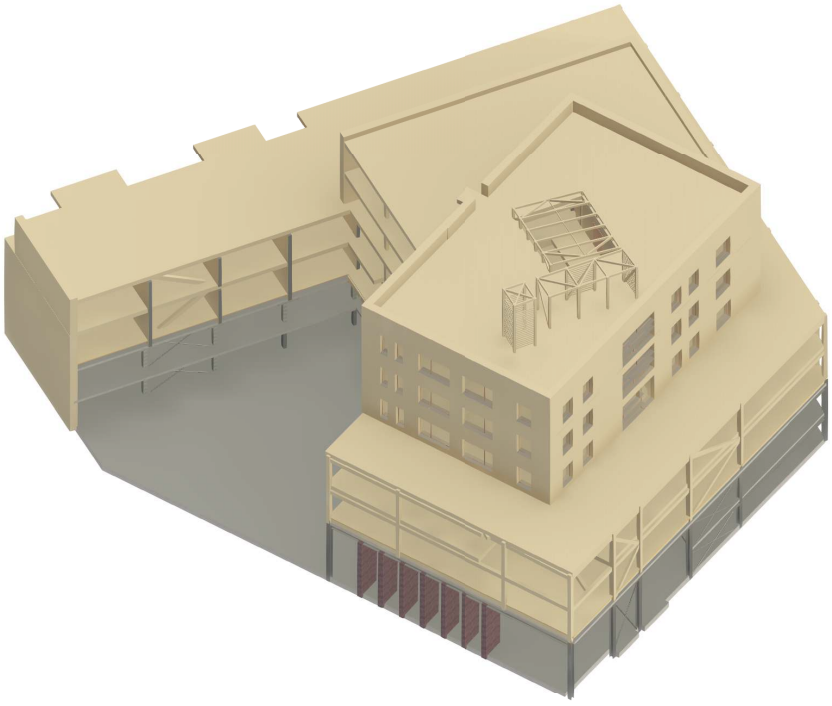


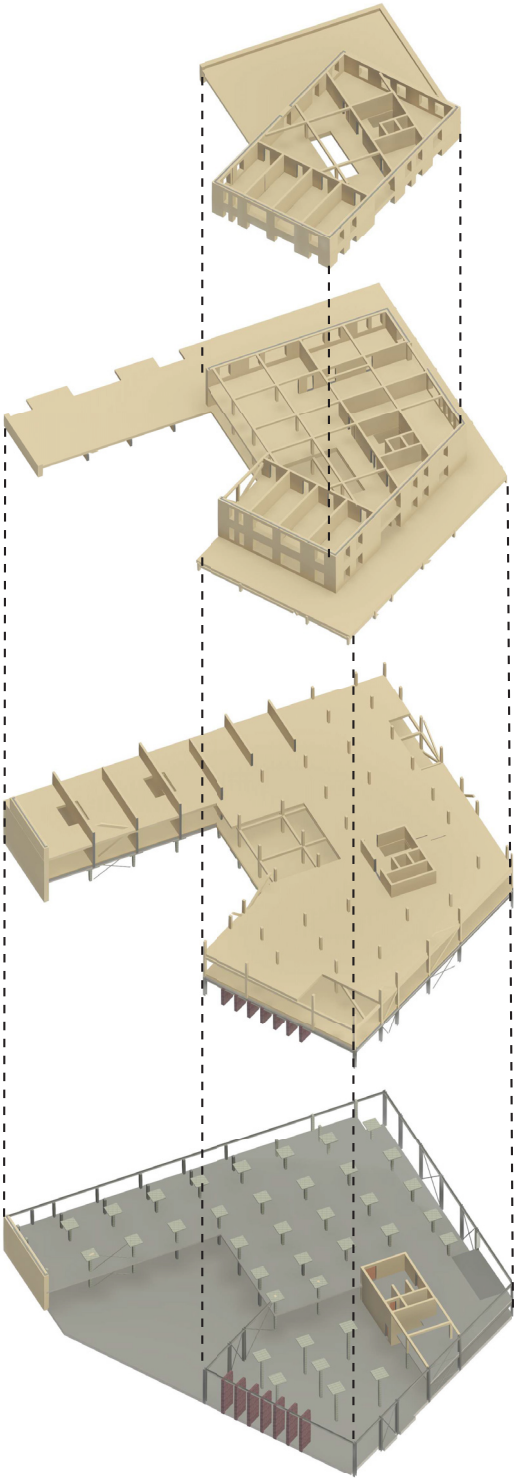
The construction is partly concrete with steel support and on top a wooden frame with a kerto ripa floor (a wooden hollow core slap). The floors are not only stiff in one direction but because of extra cross grinders they are stiff in both directions. The build-up of the floors will be later discussed in the chapter of the details.

Existing floorplan of the Molenpoort mall

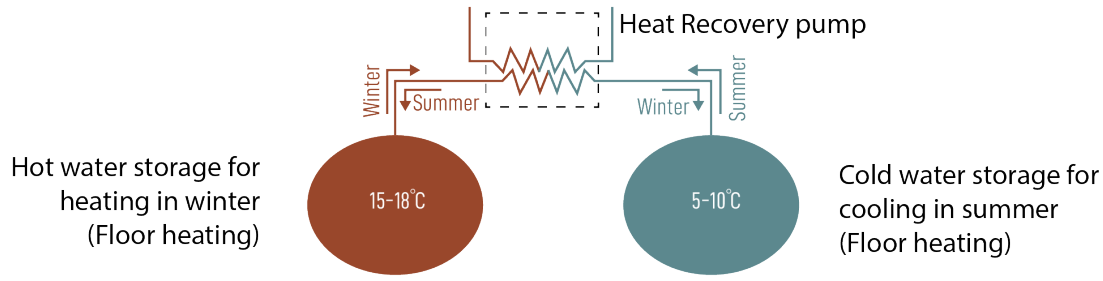


Demolition plan for new urban design





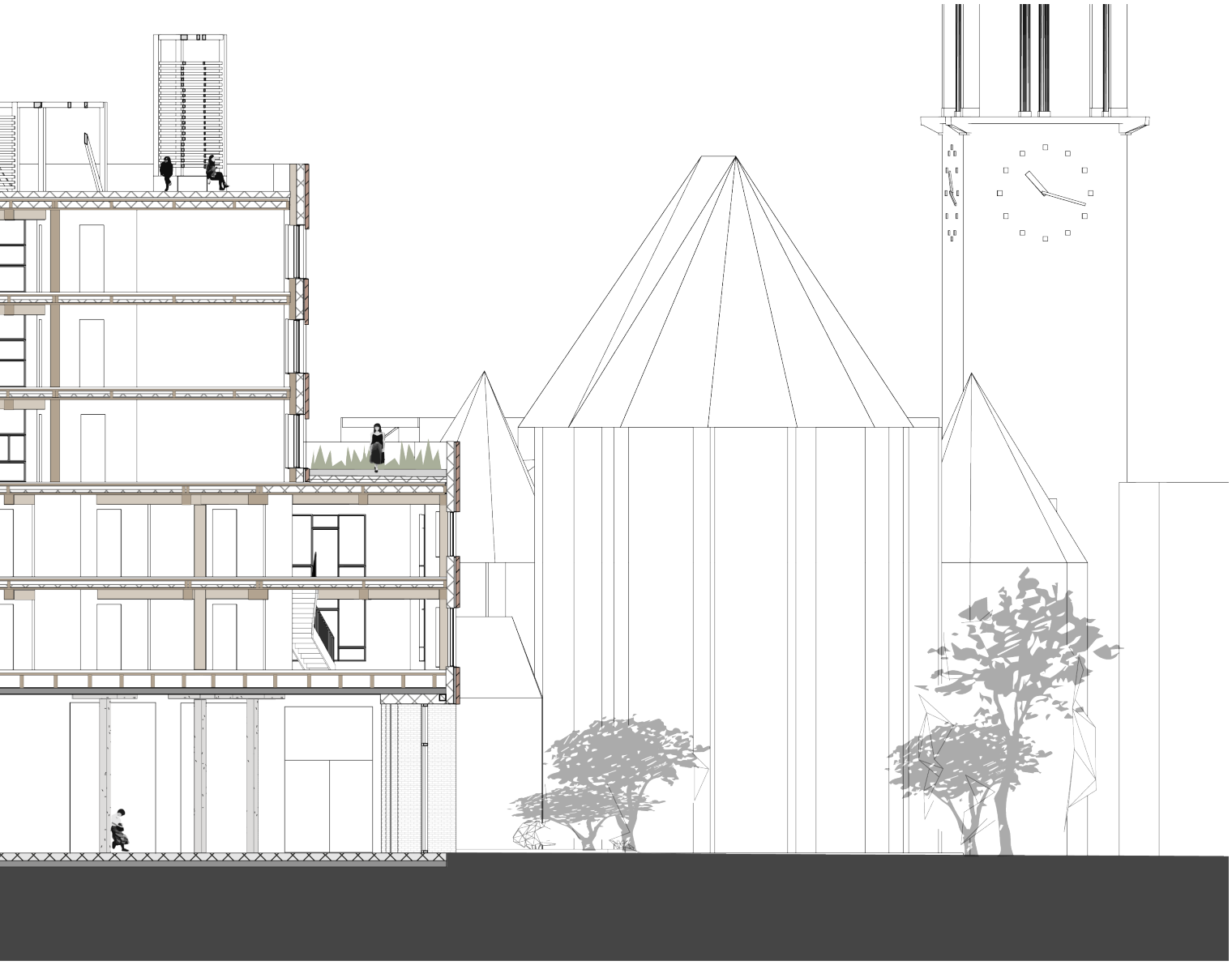
3. Heating, Cooling and ventilation



Hot water storage for heating in winter (Floor heating)

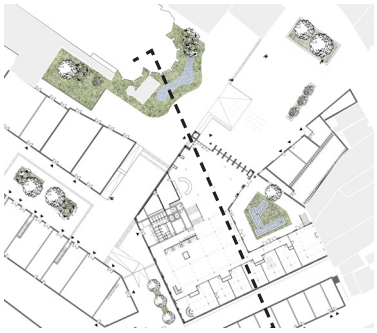
Cold water storage for cooling in summer (Floor heating)

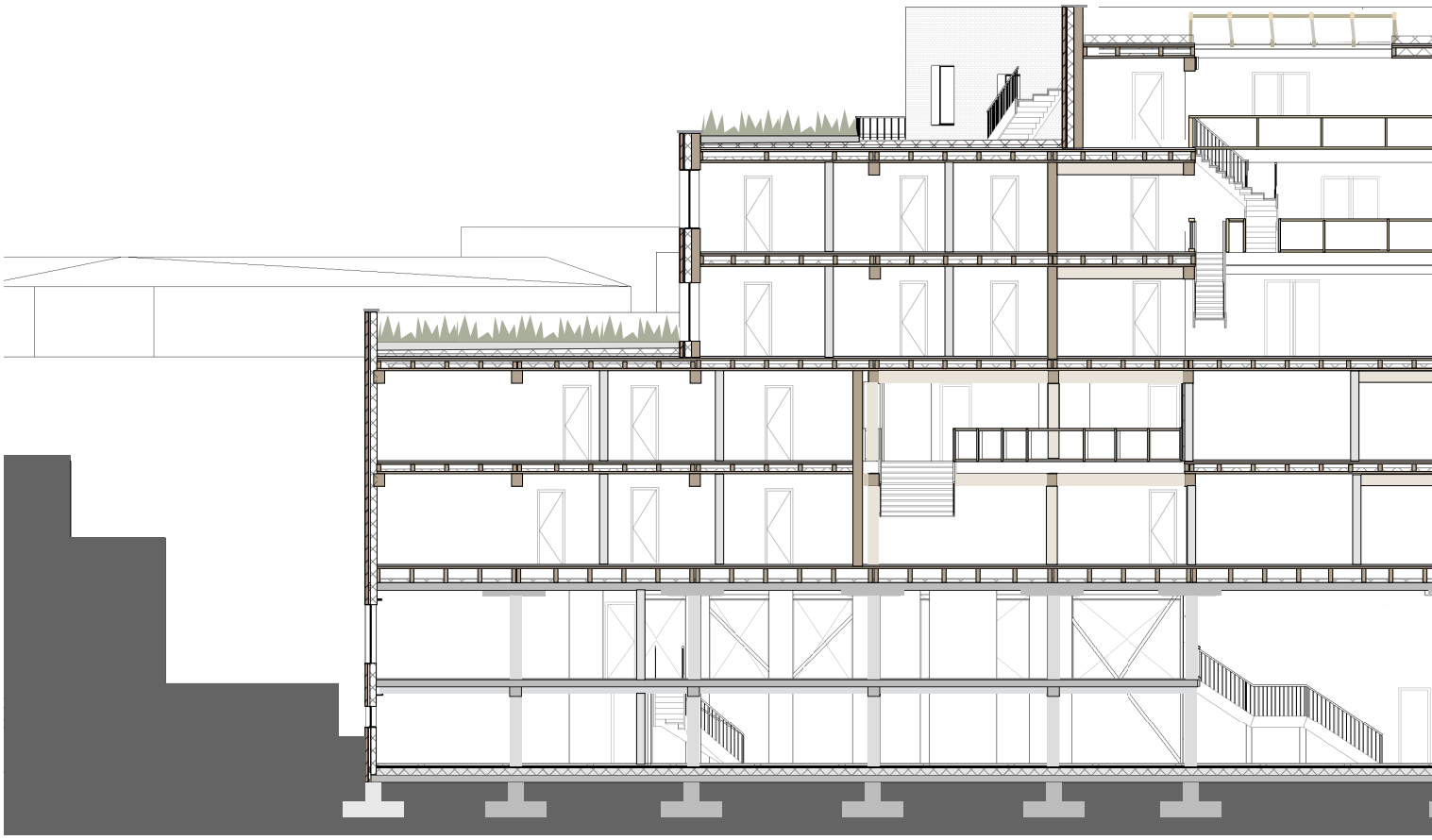
0 2 4 6 8
M



The building is heated and cooled in a combination of floor heating and low temperature radiators. The ground floor, first floor and the shared spaces are heated by floor. The houses, apartments and studio's have radiators in every room, so they can easily adjust the temperature in every room.

Section A_climate





0 2 4 6 8
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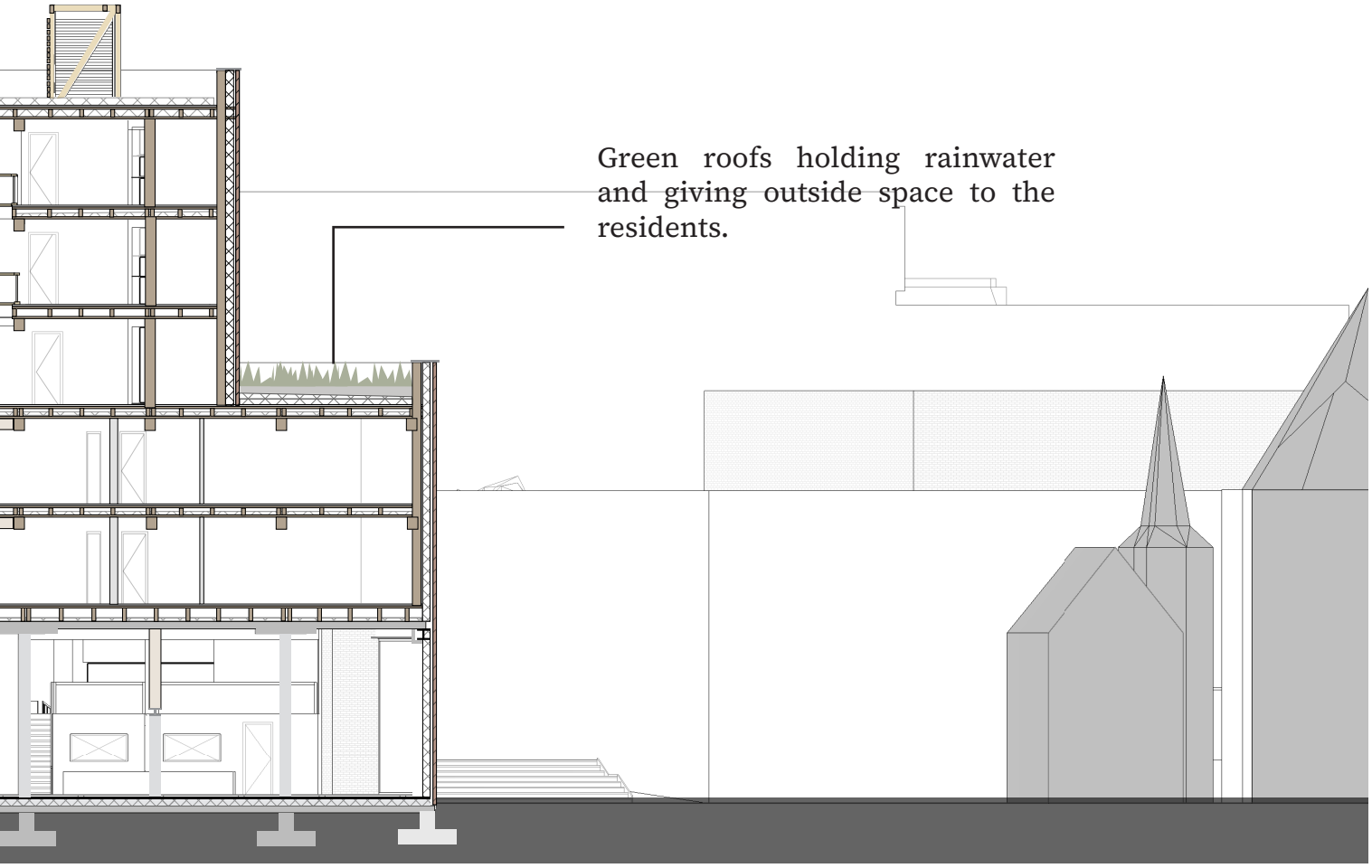
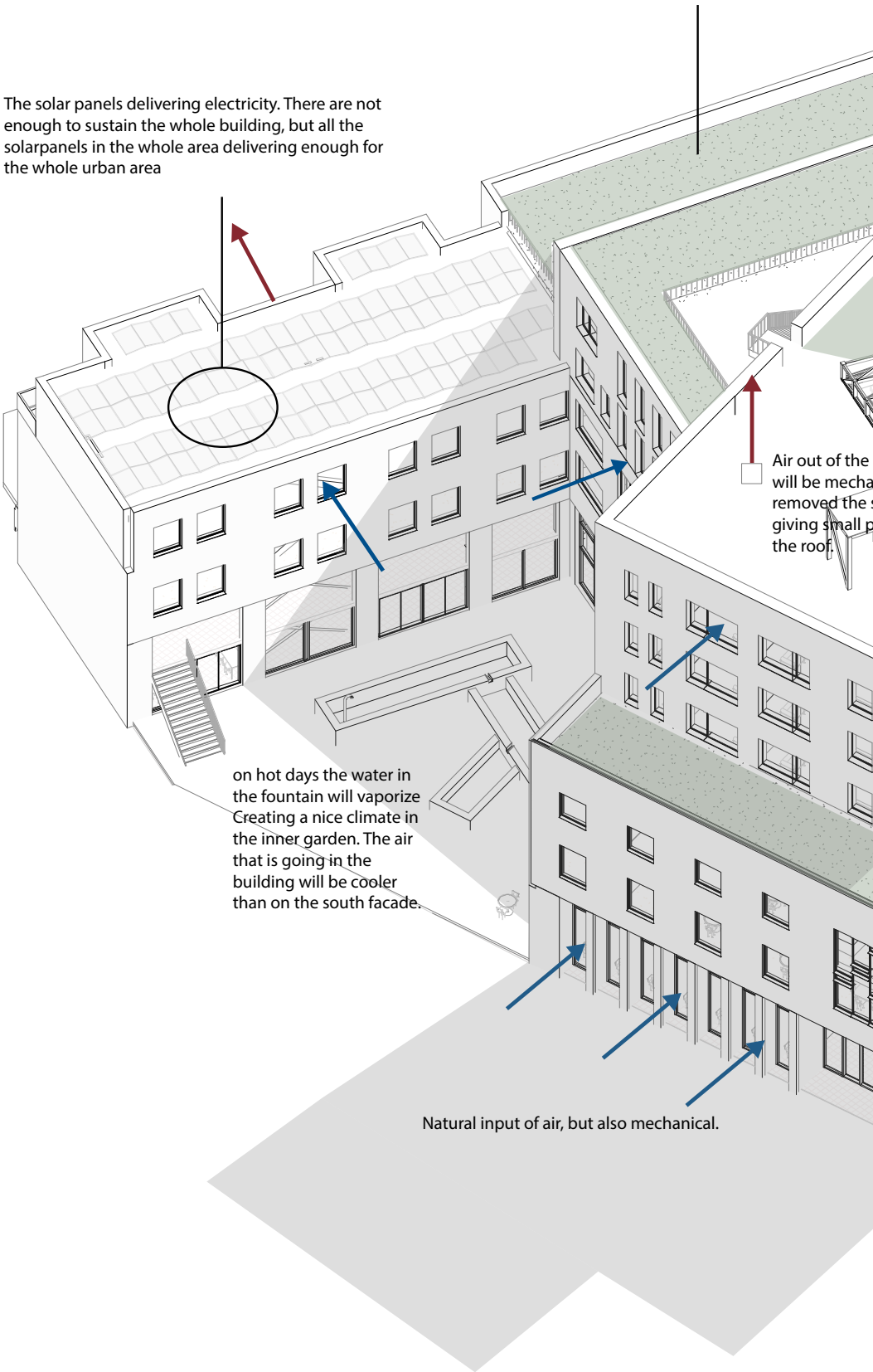


Section b_climate

Green roofs helping for biodiversity, holding rainwater and giving a outside space for the residents

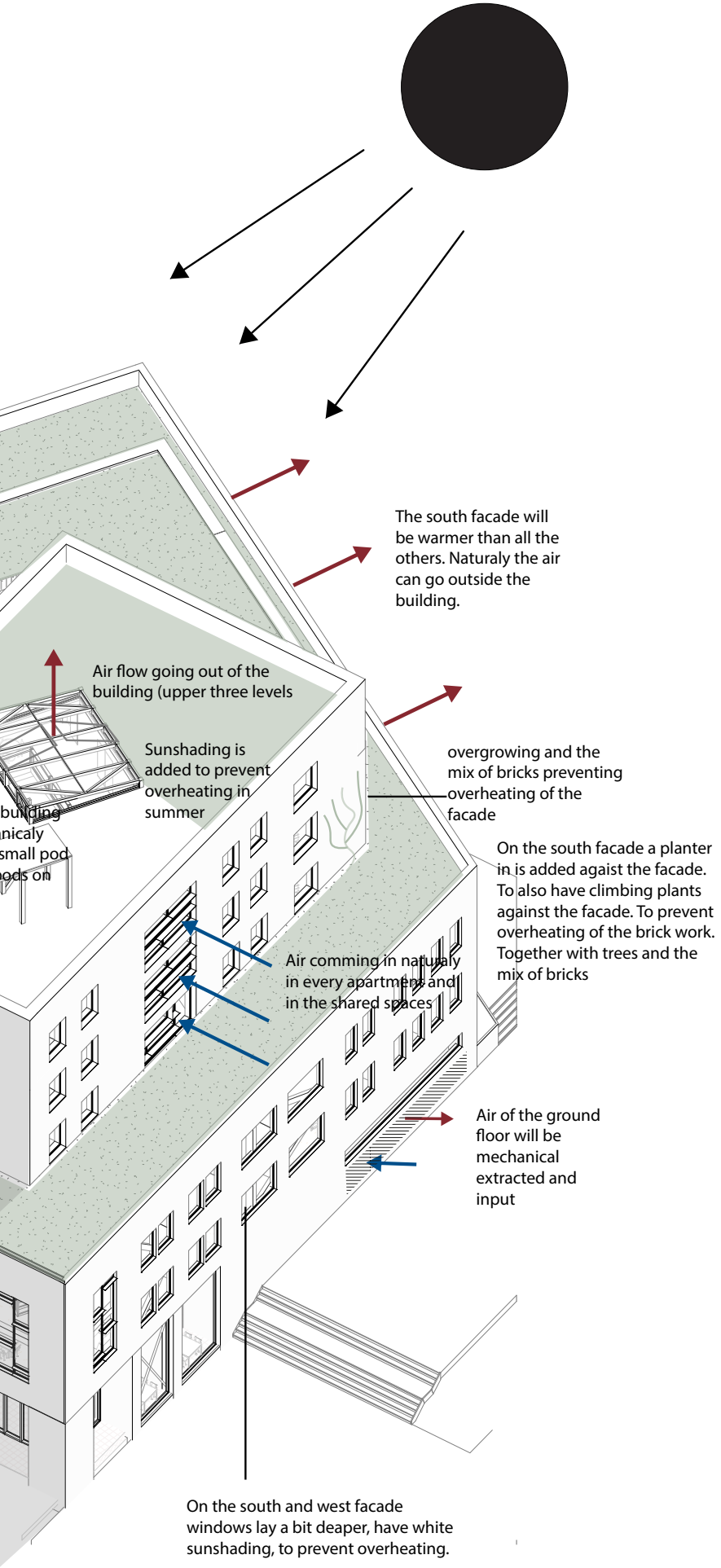
The solar panels delivering electricity. There are not enough to sustain the whole building, but all the solarpanels in the whole area delivering enough for the whole urban area

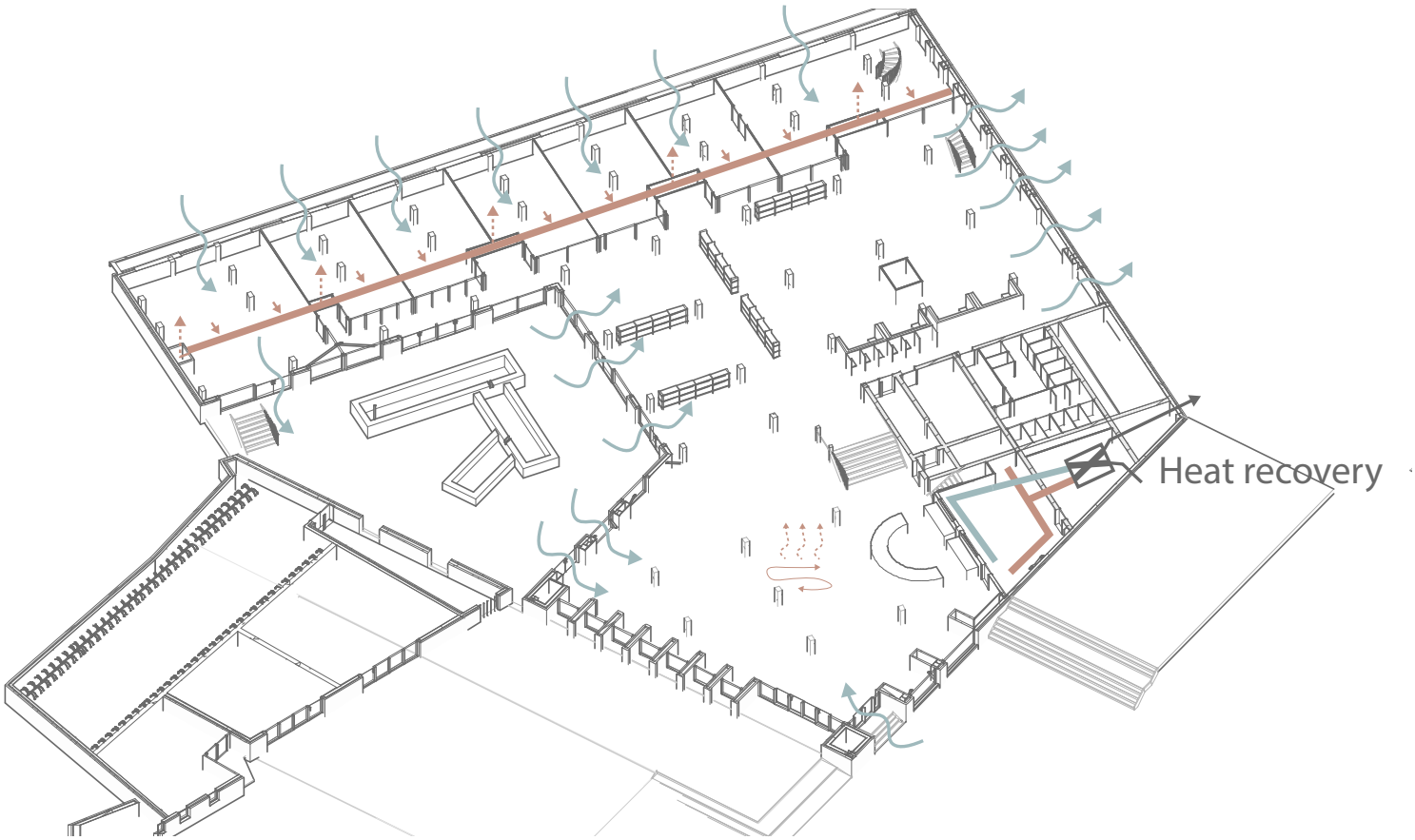


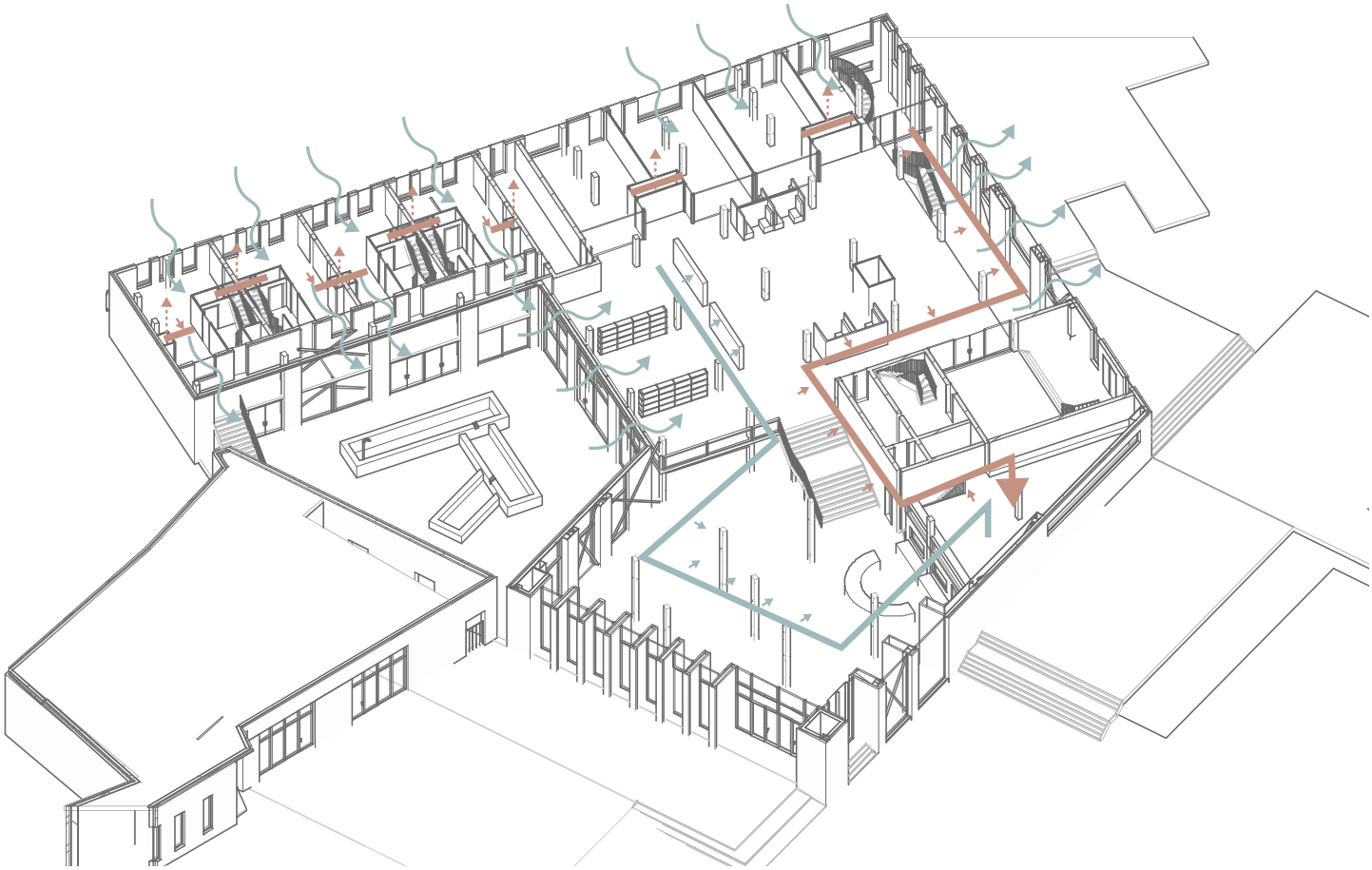
Air out of the
will be mecha
removed the
giving small p
the roof.

on hot days the water in the fountain will vaporize Creating a nice climate in the inner garden. The air that is going in the building will be cooler than on the south facade.

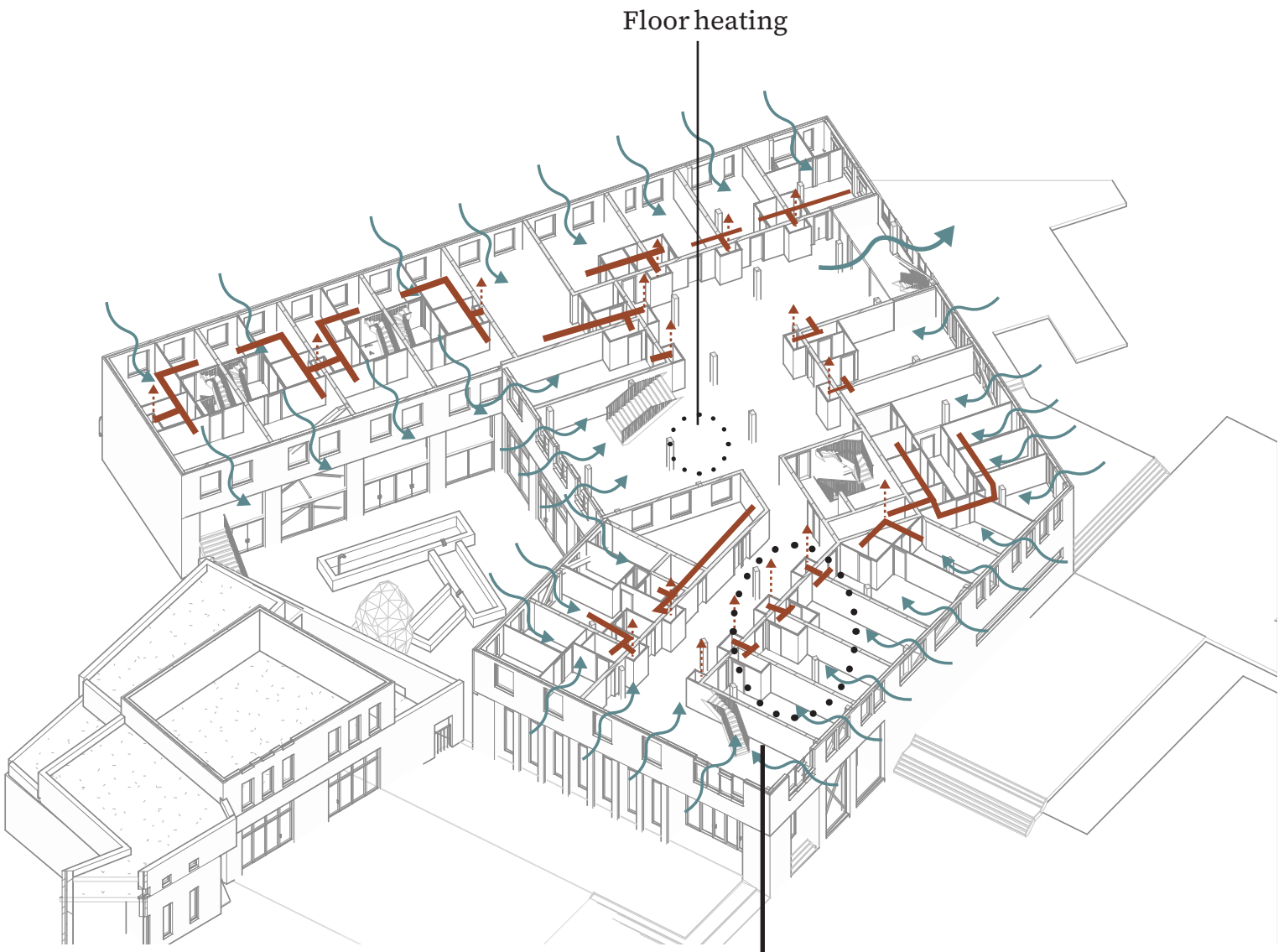
Natural input of air, but also mechanical.

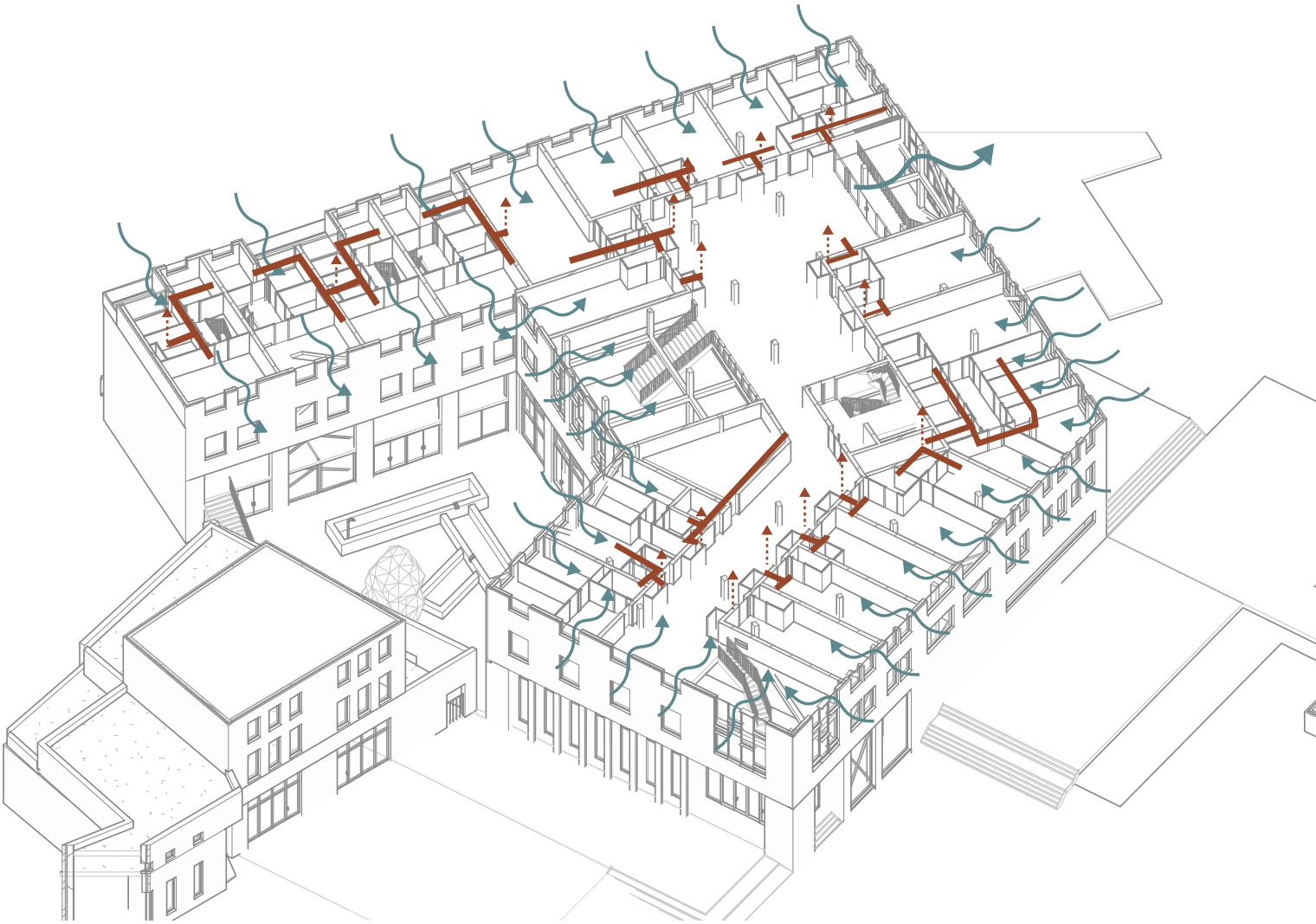

The south facade will be warmer than all the others. Naturaly the air can go outside the building.
Air flow going out of the building (upper three levels
Sunshading is added to prevent overheating in summer
overgrowing and the mix of bricks preventing overheating of the facade
On the south facade a planter in is added agaist the facade. To also have climbing plants against the facade. To prevent overheating of the brick work. Together with trees and the mix of bricks
Air comming in naturaly in every apartment and in the shared spaces
Air of the ground floor will be mechanical extracted and input
On the south and west facade windows lay a bit deaper, have white sunshading, to prevent overheating.


Heat recovery

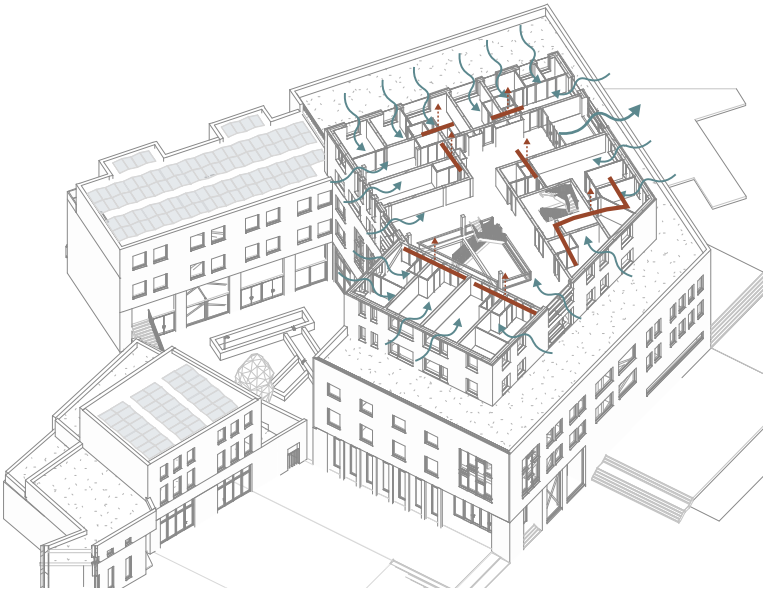


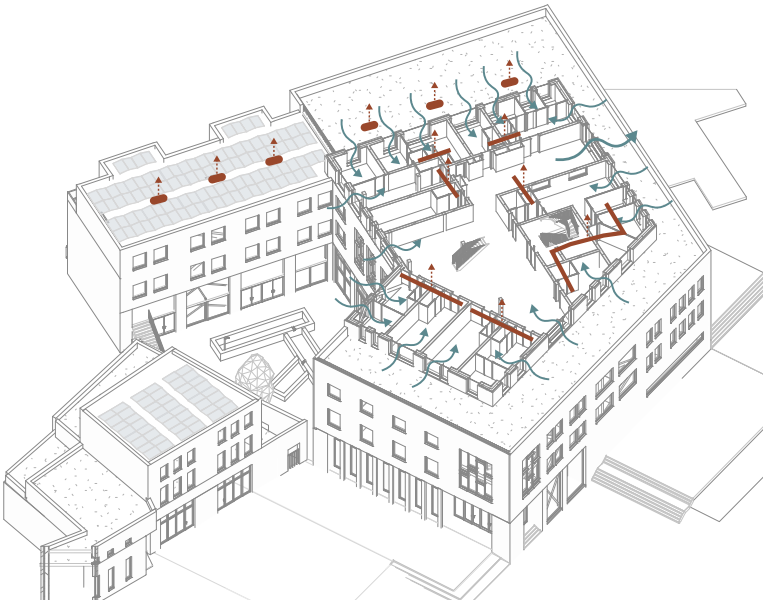
Ventilation in detail 00+01

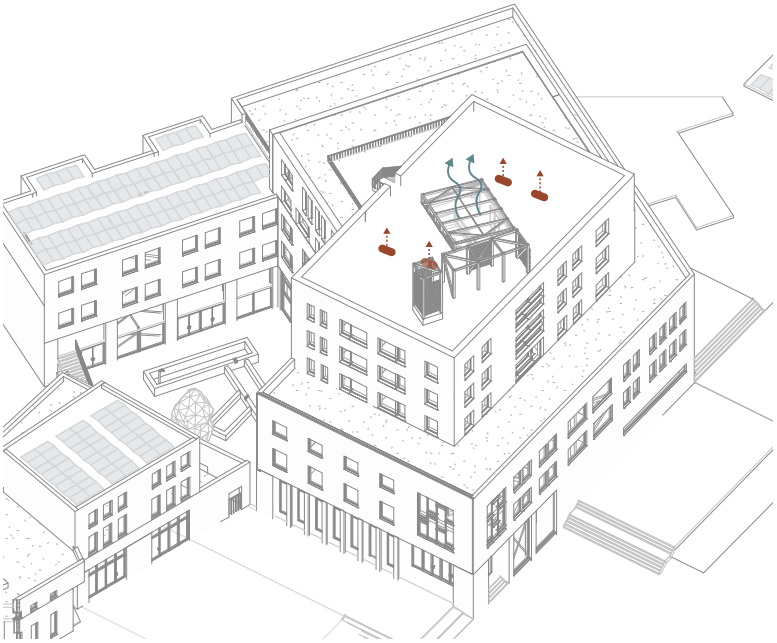

Floor heating
Heating: low temperature radiator

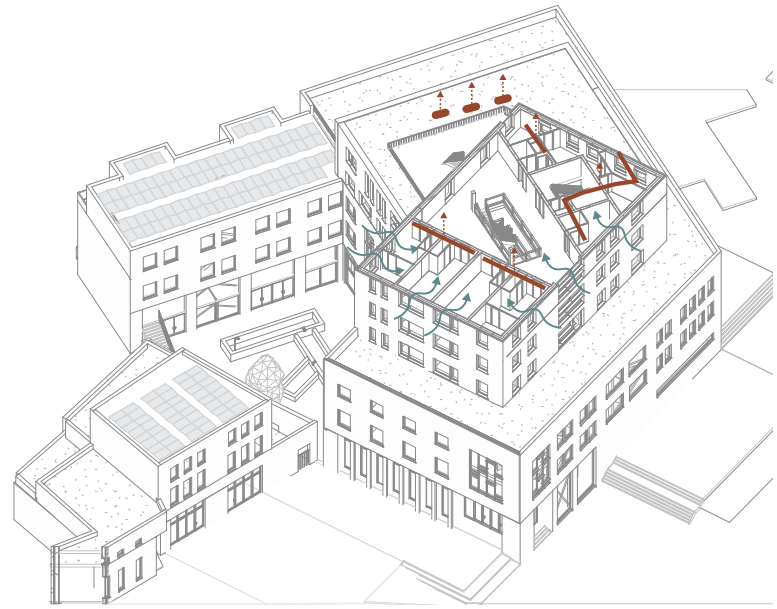


Ventilation in detail 02+03









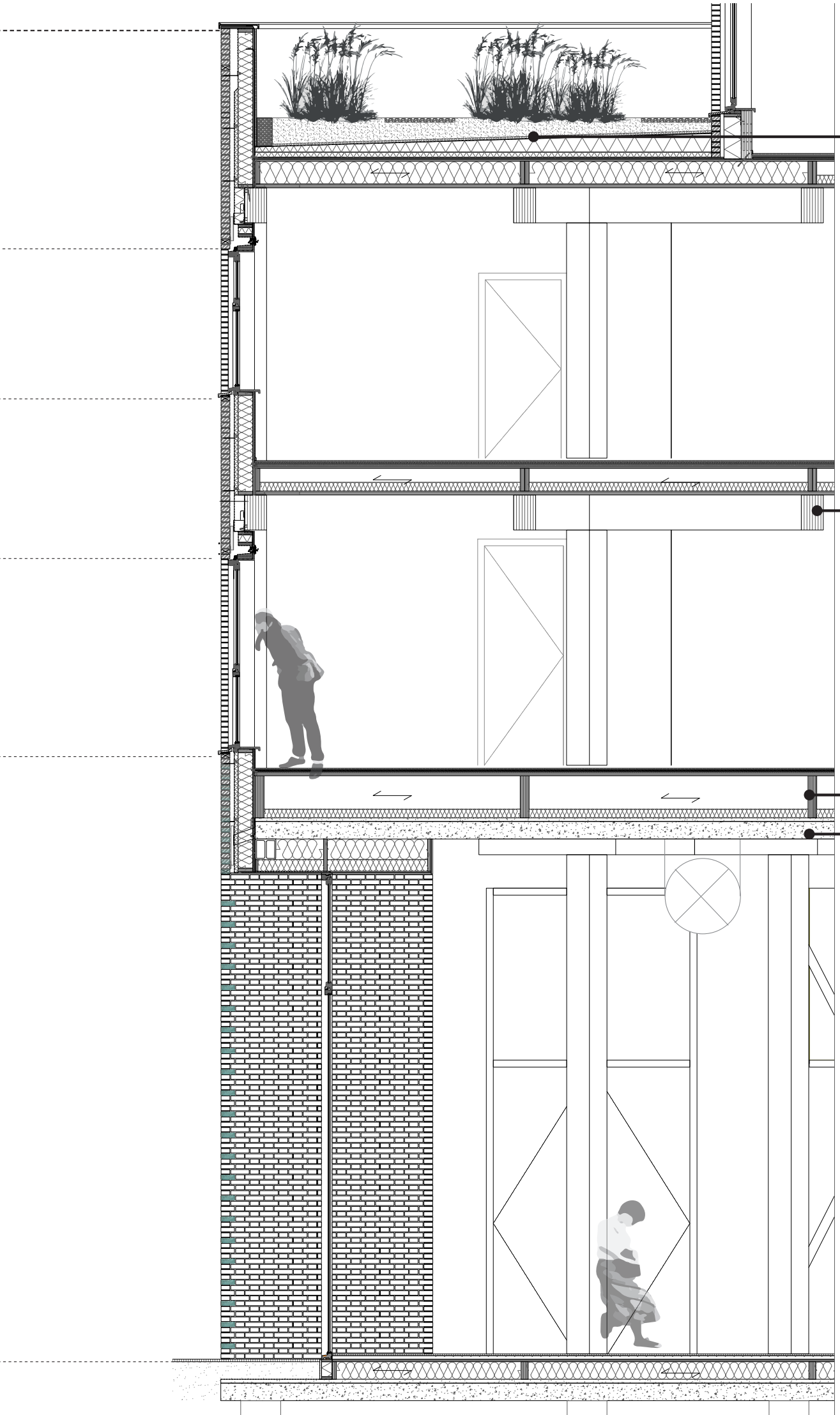
Ventilation in detail 04+05+06

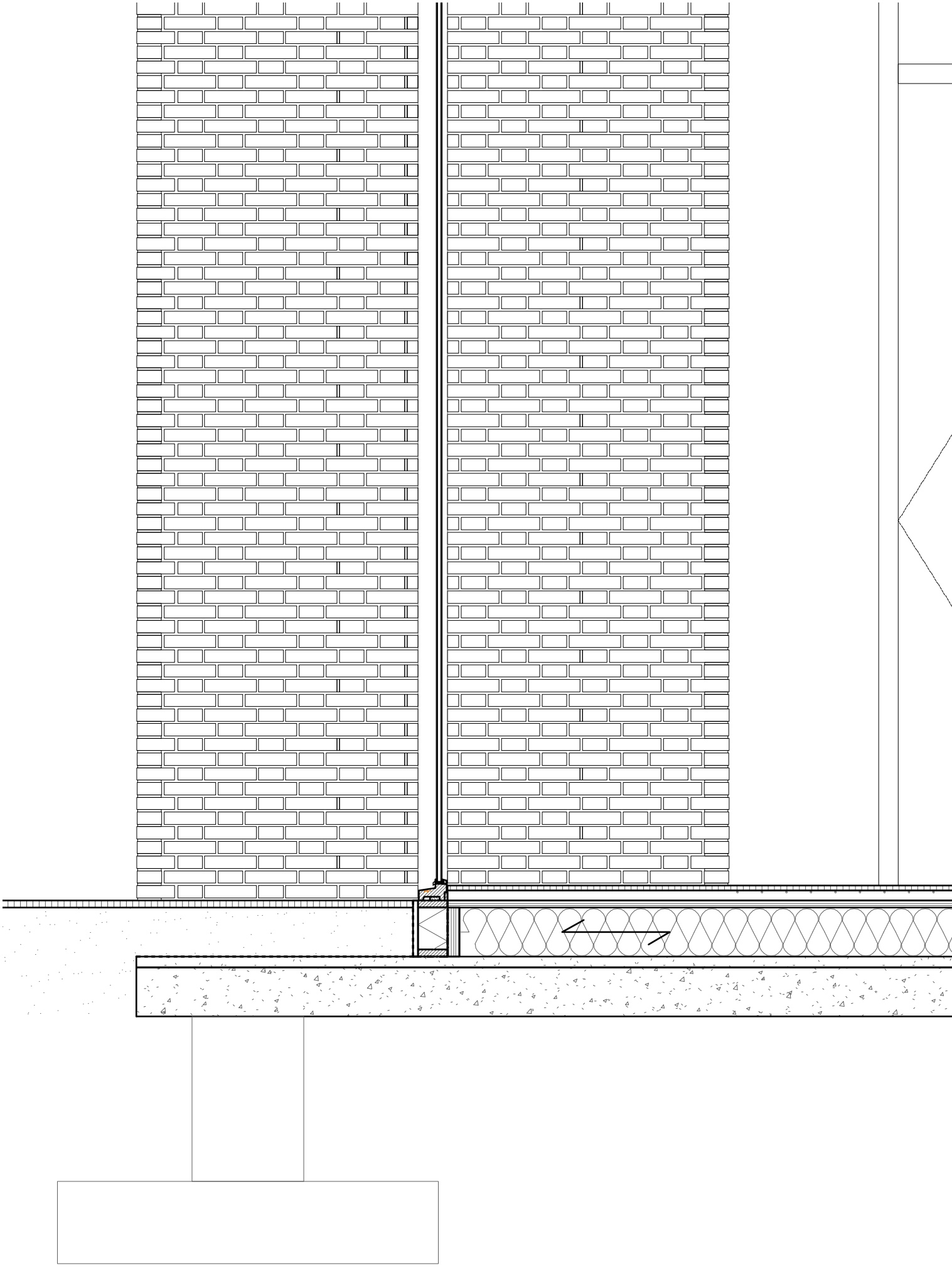
3. Facade in detail

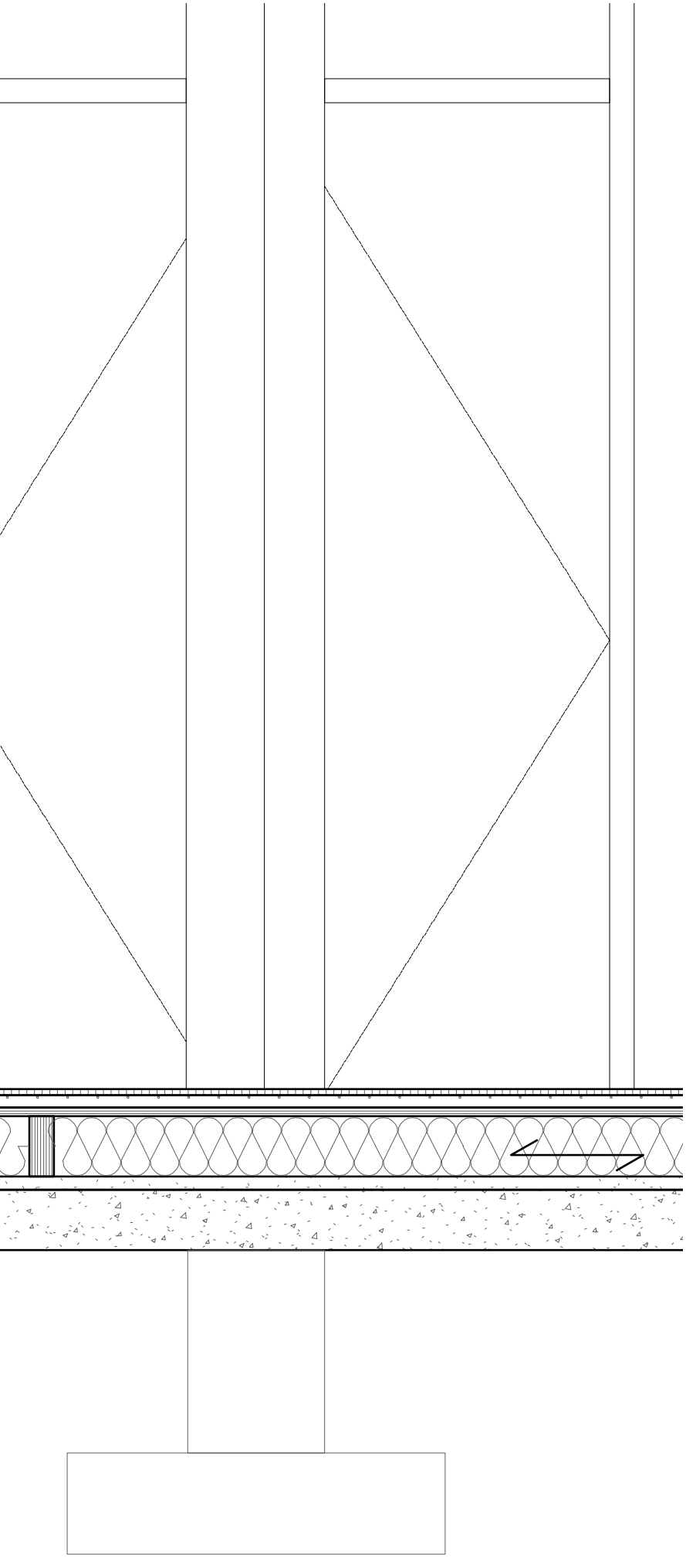
The façades are a mix of sizes of windows. Sometimes it can maybe look like that there are not enough m^2 of windows. But the sizes are carefully selected for the spaces that are behind. Every room/studio space has the right amount of window. In the shared spaces big windows are added, to get a lot of air and light in the building. Because of the inner garden there is enough facade to make give all the rooms a window.

In this chapter the front façades are explained in detail. This detail is on the north side of the building and doesn't have sun shading. There are ventilation grills to have the natural ventilation. Next to this there are also parts of windows that can be opened.

Drawn at scale 1:20


Space for sewer
system/air ducts
Existing concrete stru

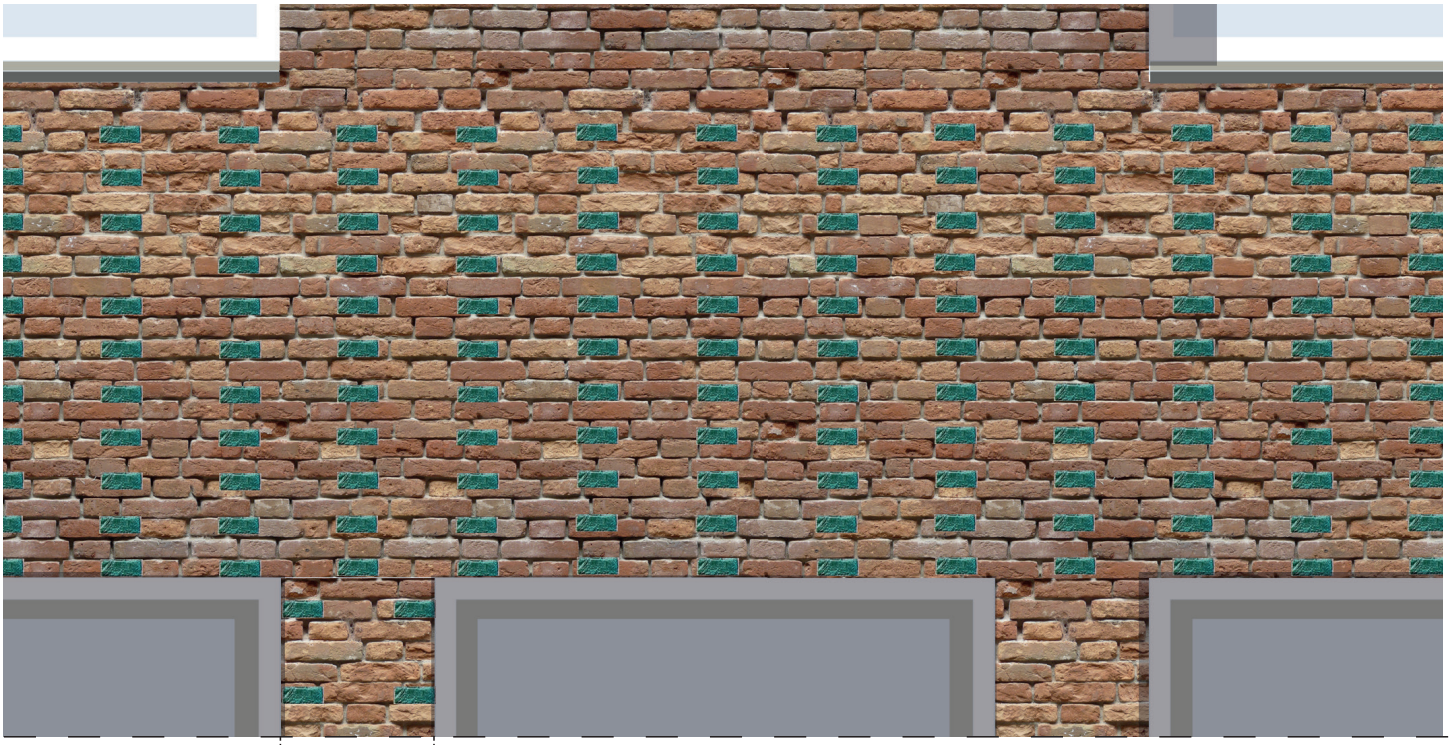




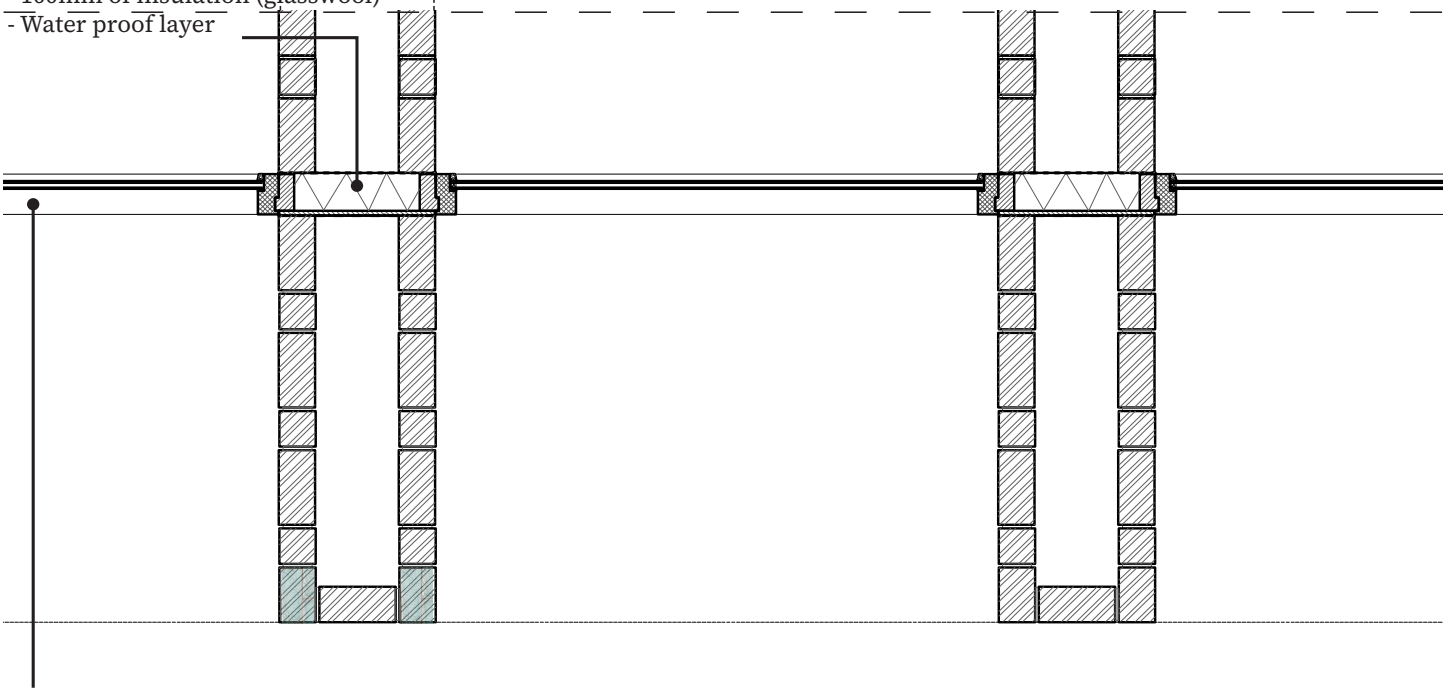
20mm tile flooring
50mm concrete + floor heating
30mm clt
200mm insulation with framing 100x200
250mm existing concrete floor

Foundation poles existing and new

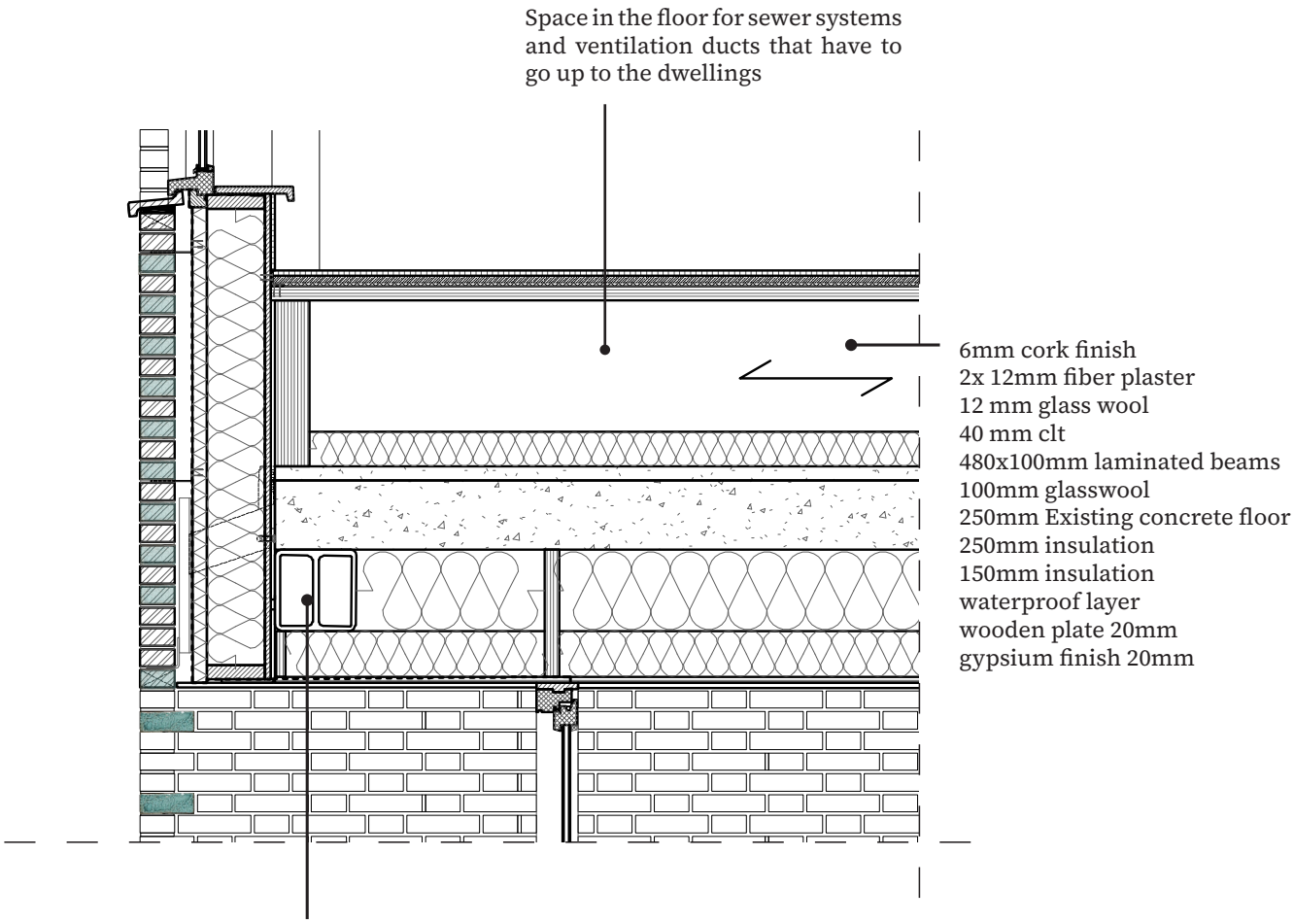
Drawn at scale 1:20



-Water proof (open for vaporizing) layer
- 100mm of insulation (glasswool)
- Water proof layer



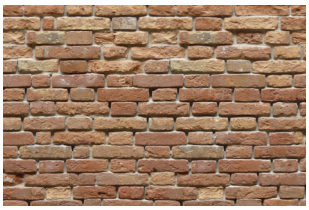
Wooden window frame with HR++ glass



Steel beam that is carrying the concrete floor and spans over the brick walls

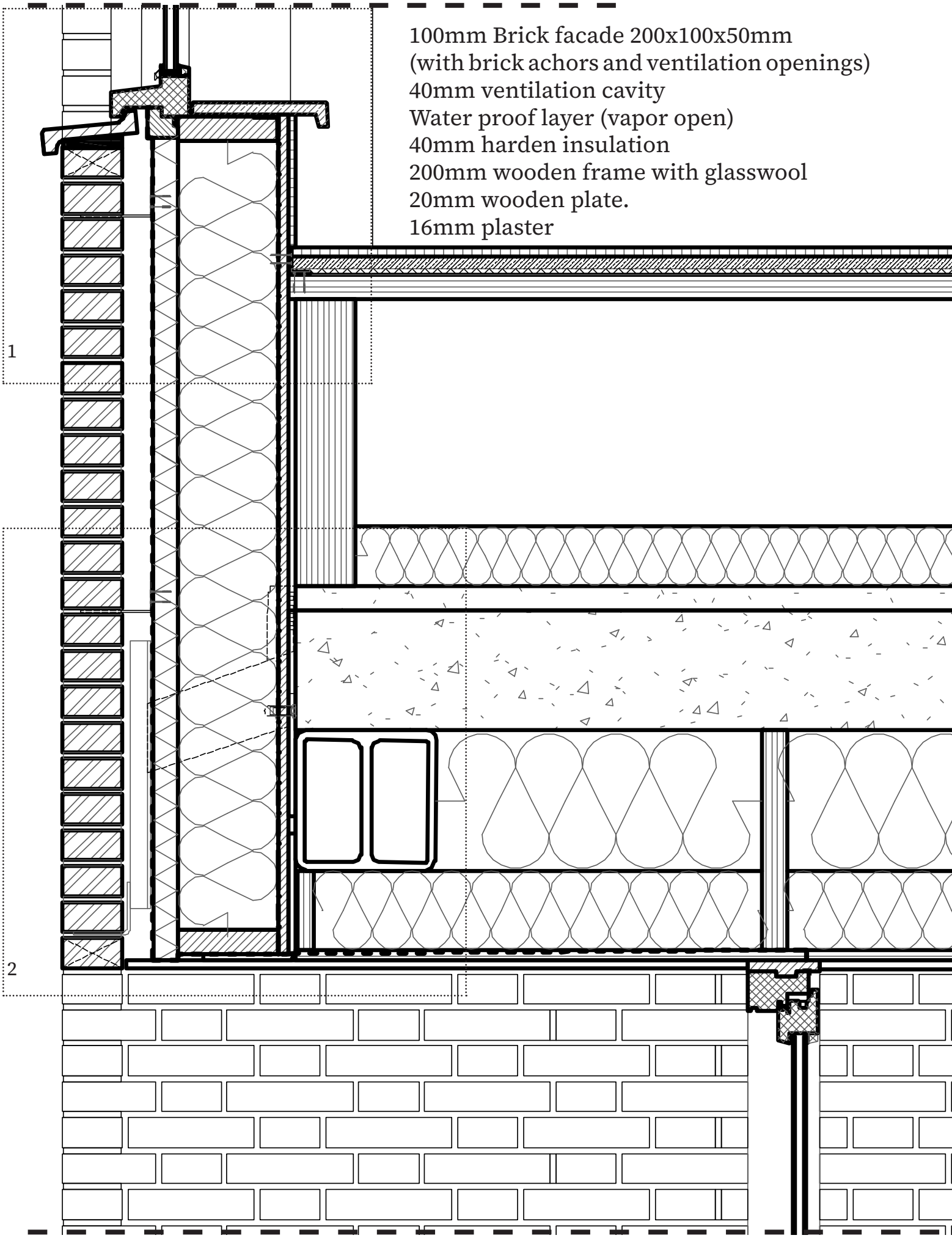
Glazed bricks

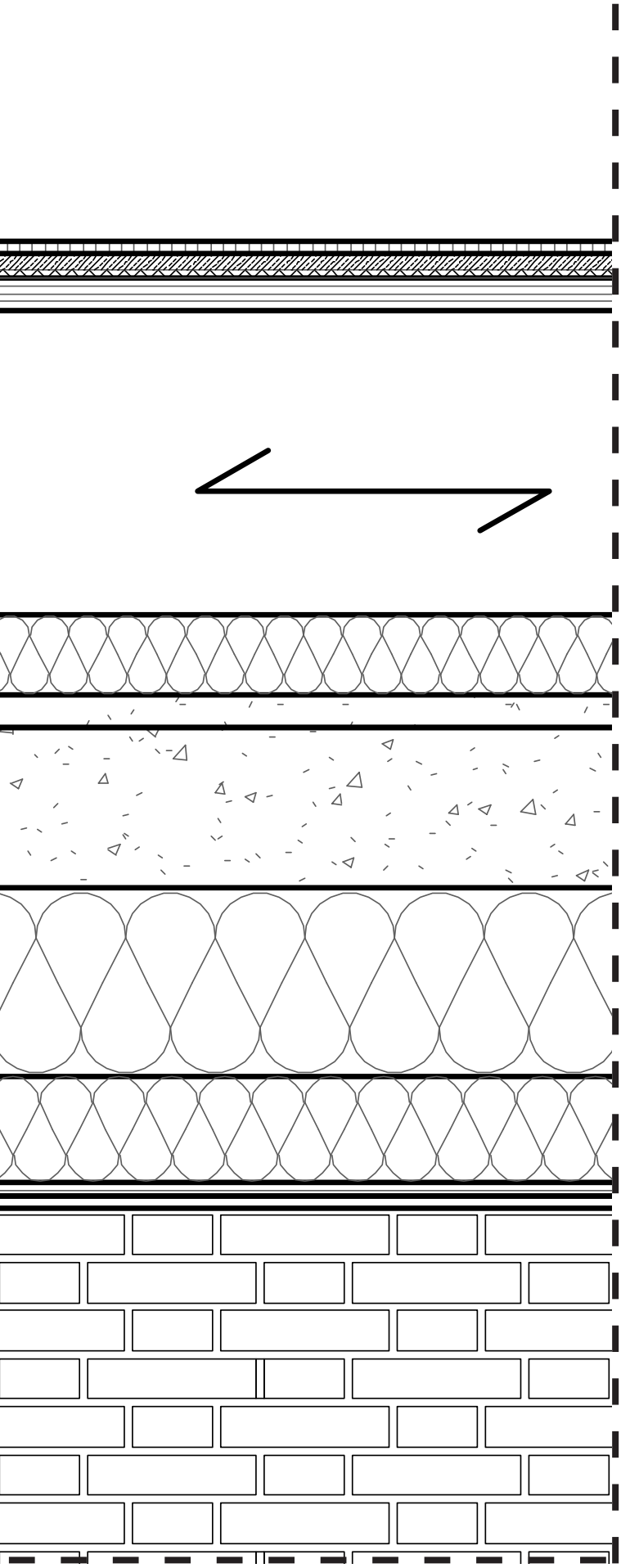
+



Reused brick

Drawn on scale 1:5


100mm Brick facade 200x100x50mm
(with brick achors and ventilation openings)
40mm ventilation cavity
Water proof layer (vapor open)
40mm harden insulation
200mm wooden frame with glasswool
20mm wooden plate.
16mm plaster
1
2



6mm cork finish
2x 12mm fiber plaster
12 mm glass wool
40 mm clt

480x100mm laminated beams

100mm glasswool

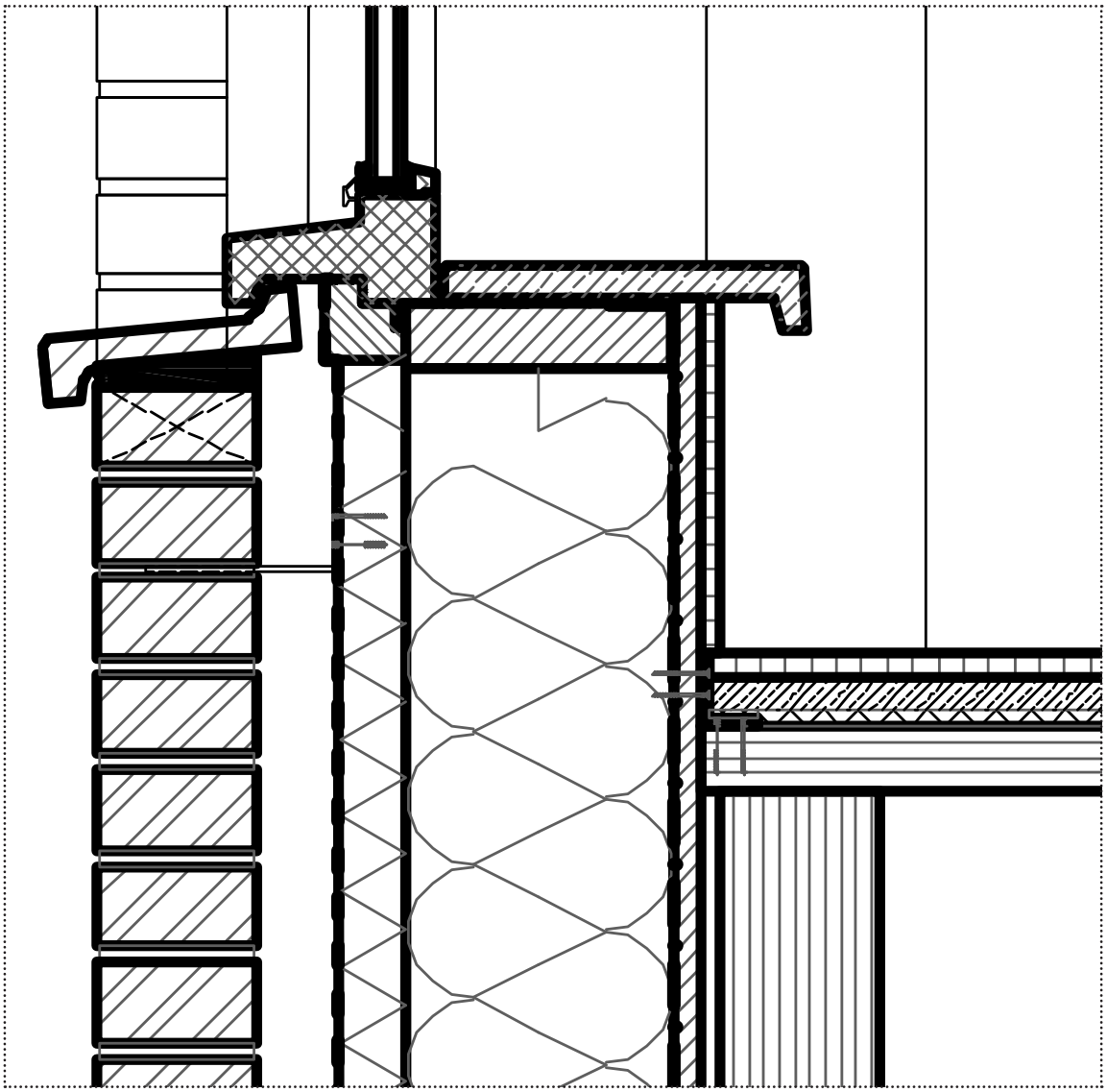
250mm Existing concrete floor

250mm insulation

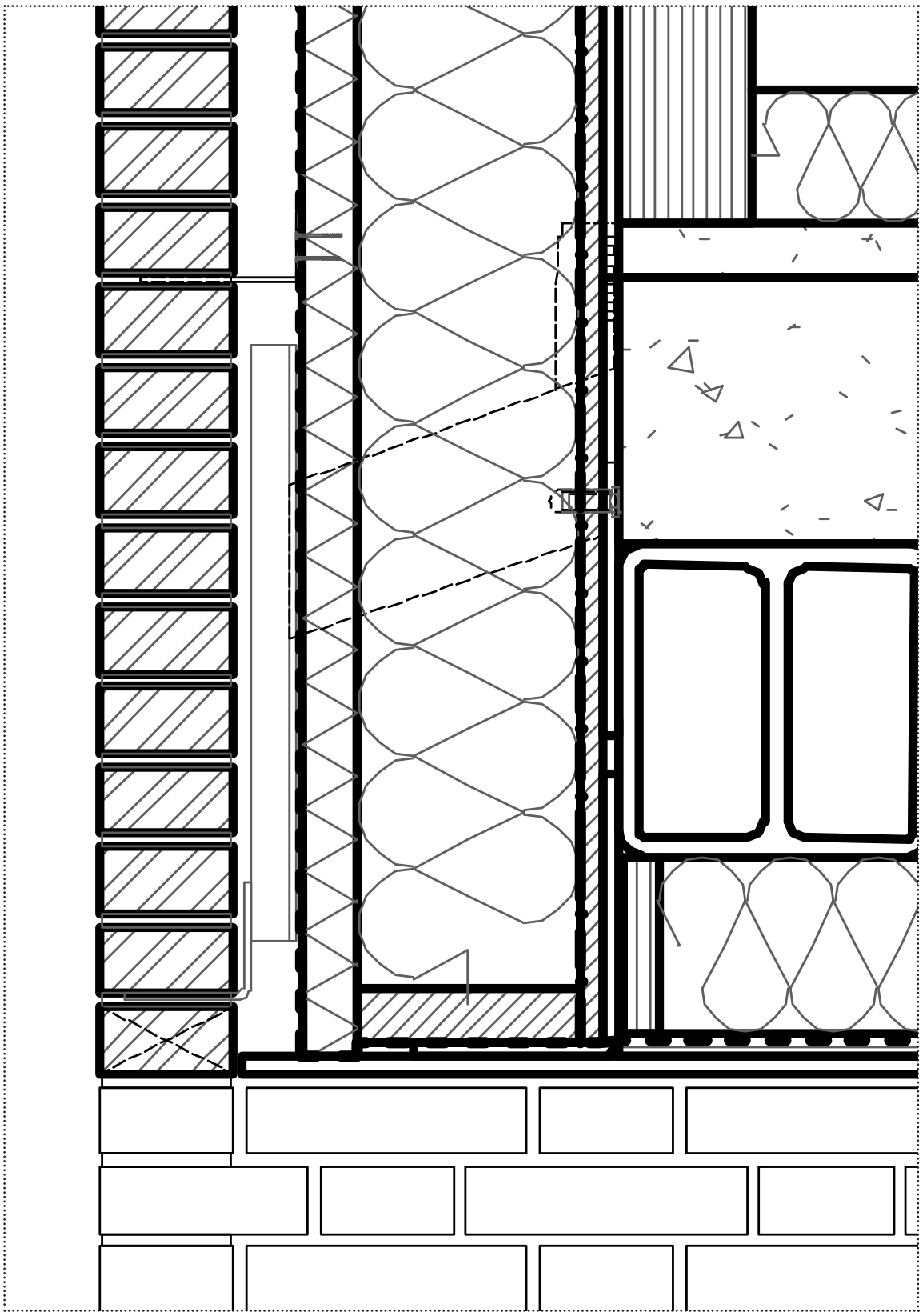
150mm insulation

waterproof layer
wooden plate 20mm
gypsum finish 20mm

Drawn on scale 1:5

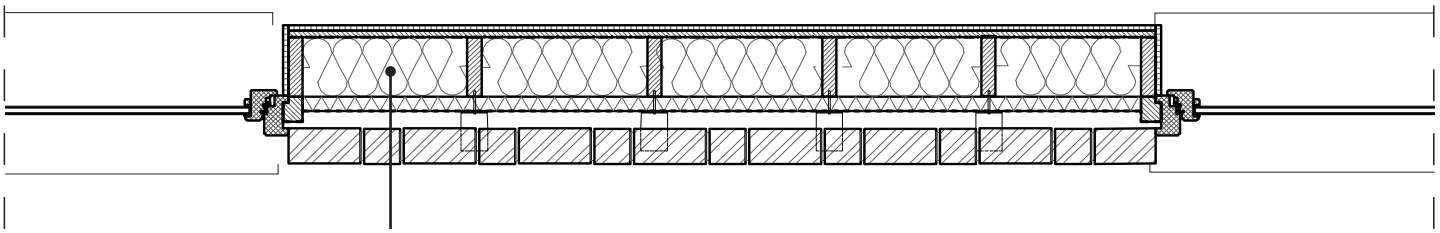


Achors that hold the brick facade at his place



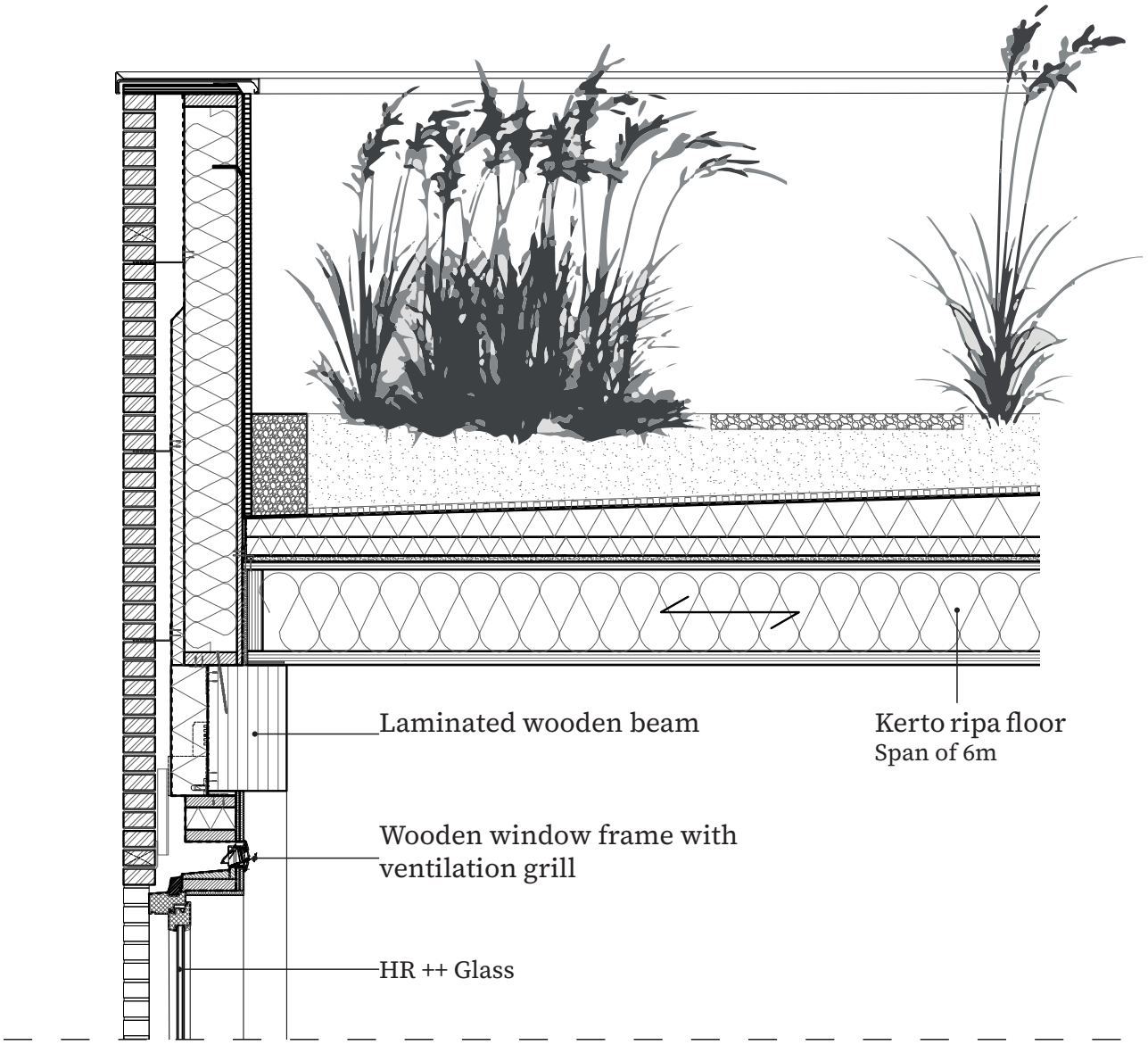
Rail that supports the brick facade.

Drawn on scale 1:5

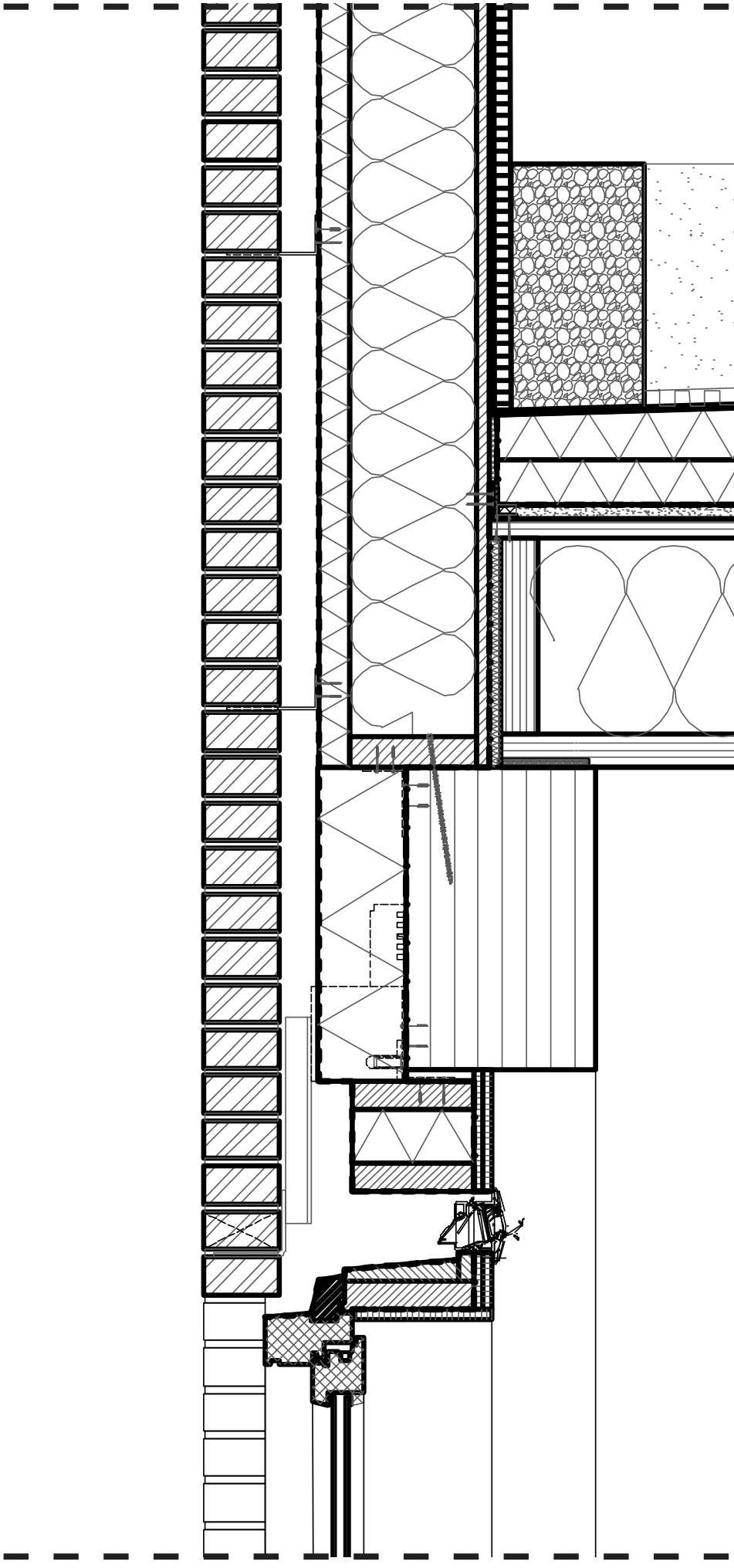


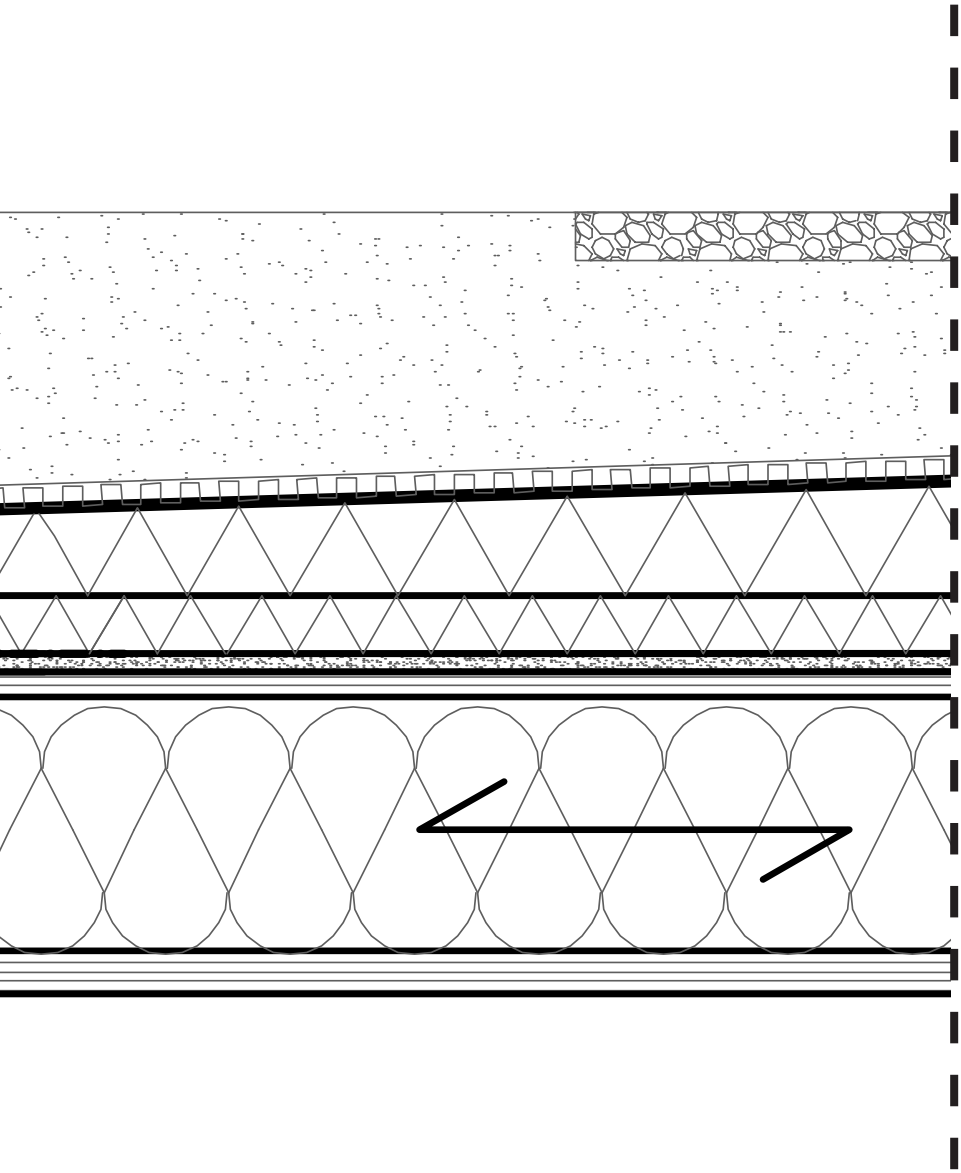
16mm plaster
18mm wooden plate
Water proof layer
200mm wooden frame with glass wool
40mm hard insulation
Water proof layer (vapour open)
40mm ventilation cavity
100mm brickwork

Steel roof profile



Drawn on scale 1:5





300/200mm soil

Anti-root layer
30mm drainage
Waterproof layer

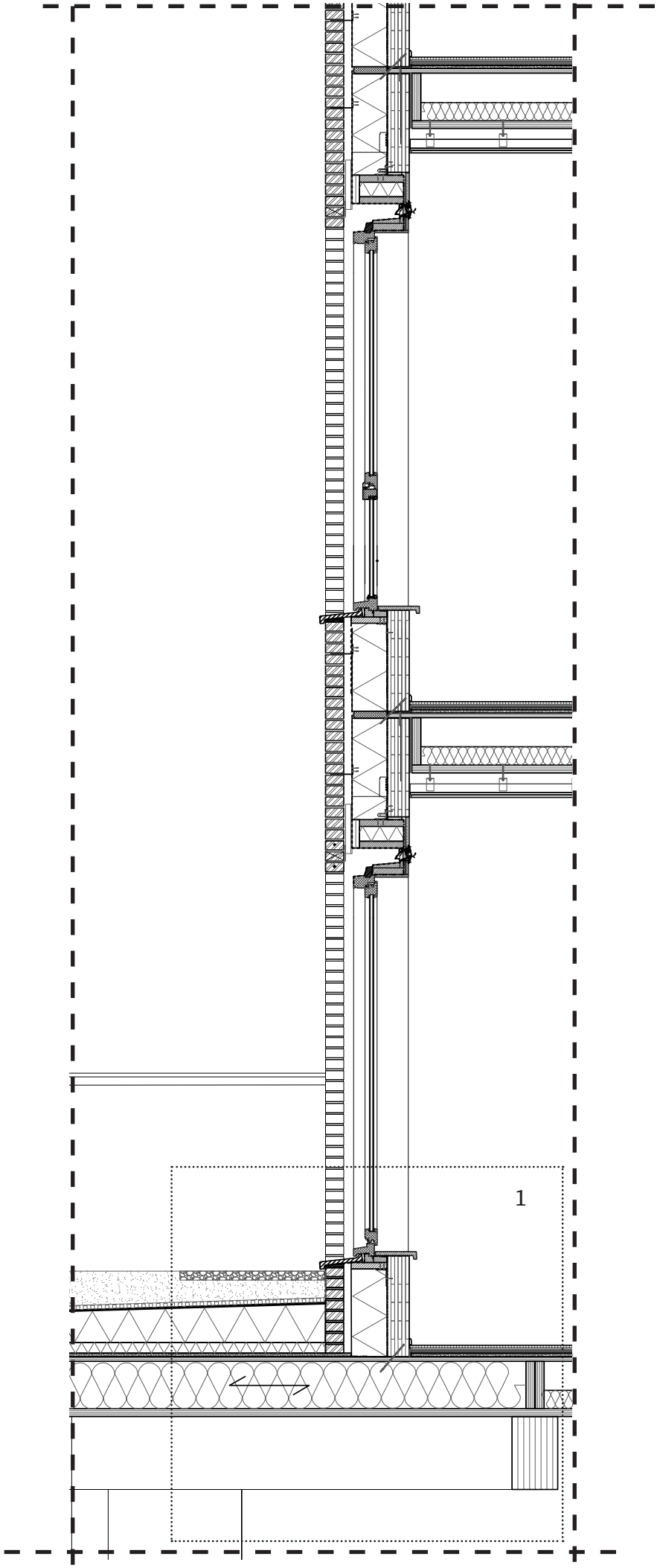
300/150mm hard insulation with slope

150mm hard insulation
Waterproof layer
30 mm clt

100x300 laminated wooden beams, glass wool

45mm clt

Drawn on scale 1:5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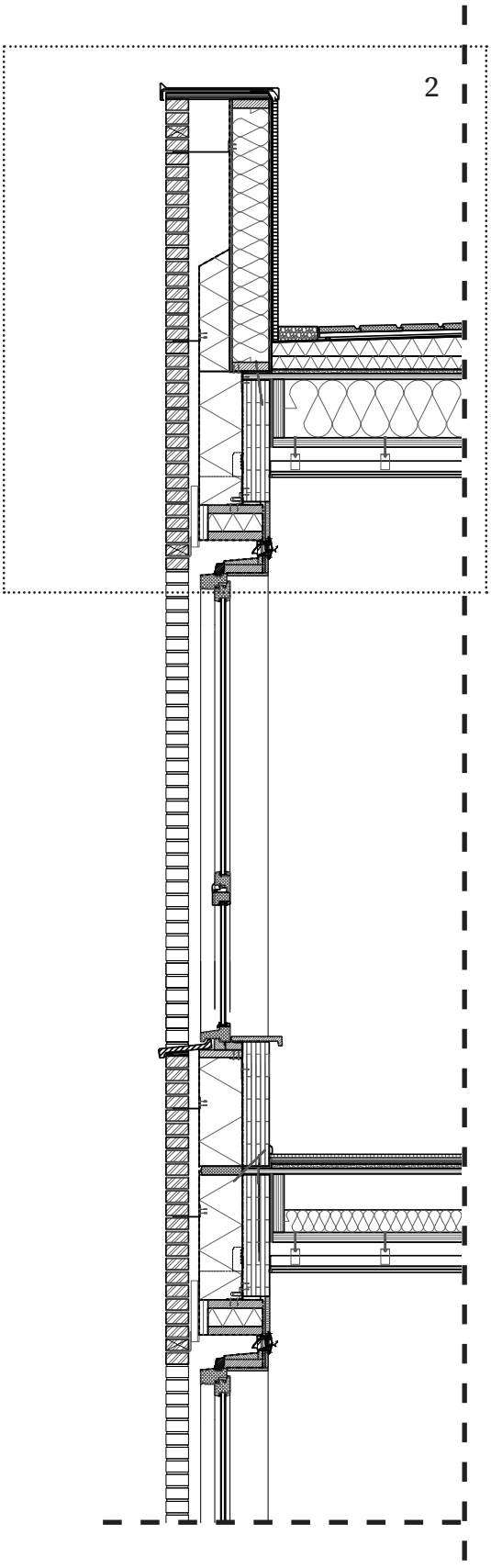
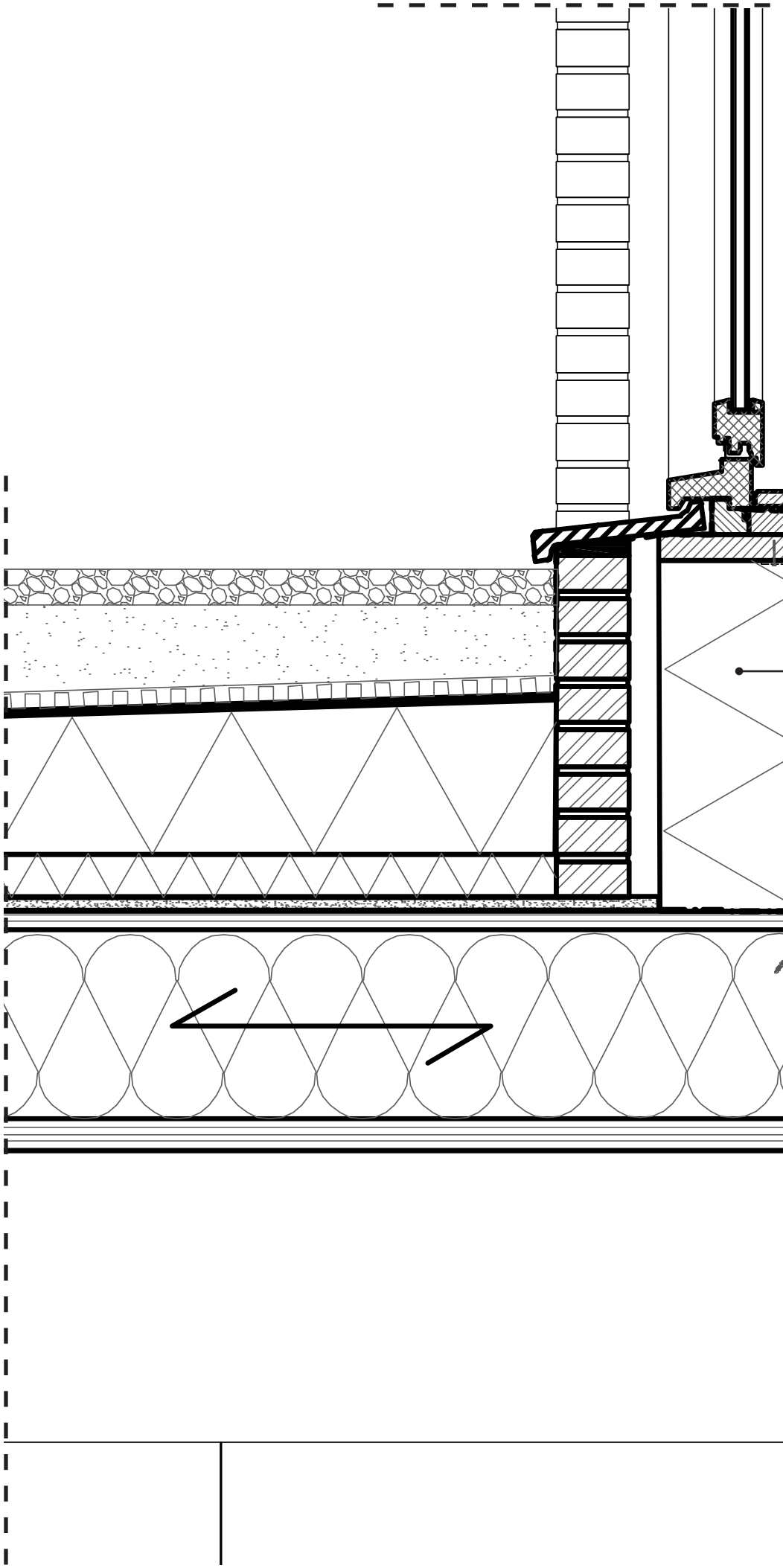
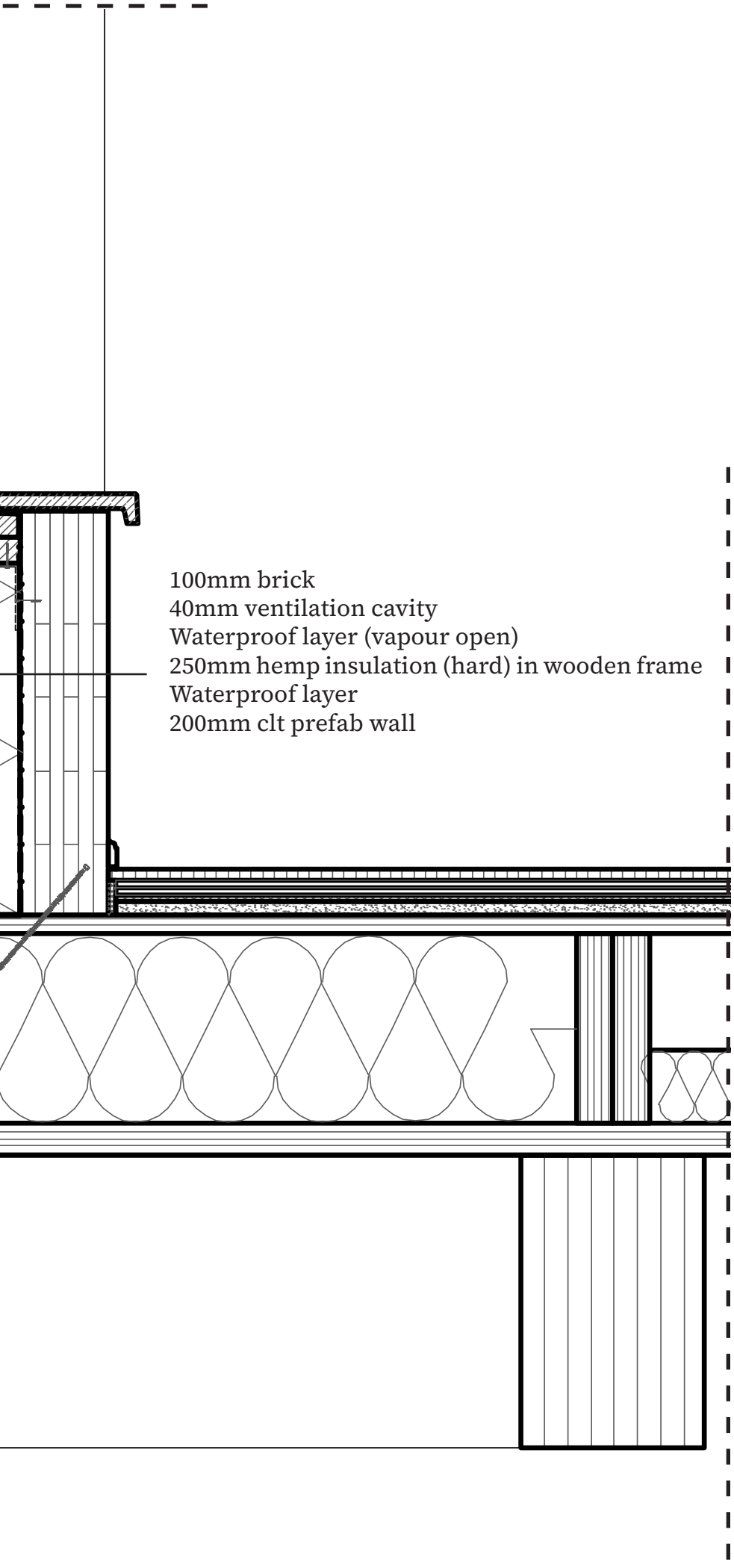


Drawn on scale 1:20

Facade in detail

1


300/200mm soil
Anti-root layer
30mm drainage
Waterproof layer
300/150mm hard insulation with slope
150mm hard insulation
Waterproof layer
30 mm clt
100x300 laminated wooden beams, glass wool
45mm clt



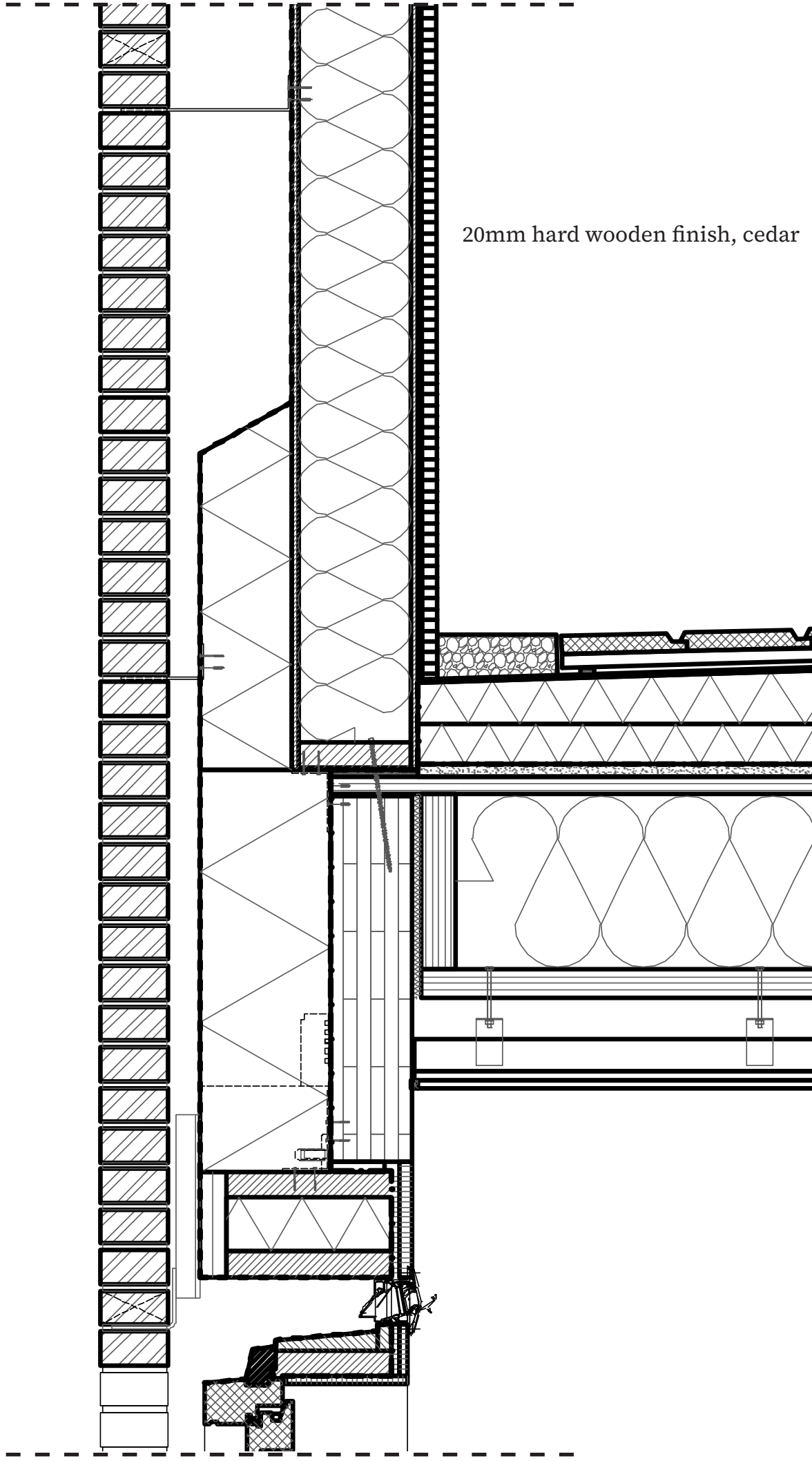
100mm brick
40mm ventilation cavity
Waterproof layer (vapour open)
250mm hemp insulation (hard) in wooden frame
Waterproof layer
200mm clt prefab wall

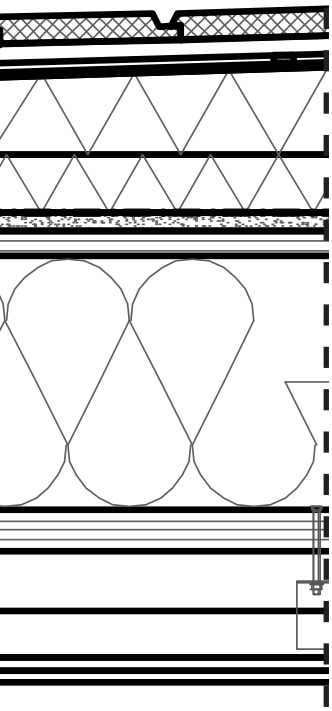
6mm cork finish
2x 12mm fiber plaster
12 mm glass wool
30mm sand in honeycomb structure

300mm kerto ripa floor:
- Insulation for noise
- Space for ventilation ducts (up to 250mm)
- Space for electricity

Laminated wooden beam
300x400mm

Drawn on scale 1:5


20mm hard wooden finish, cedar



30mm hard wooden flooring (cedar wood)
20mm hard wooden frame
15mm rubber blocks
Waterproof layer
300/150mm hard insulation with slope

150mm hard insulation

Waterproof layer
30 mm clt

100x300 laminated wooden beams, glass wool

45mm clt

Lowered ceiling for lamps and ducts.

Drawn on scale 1:5