‘Refuge’ Opkamer

by

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Department: Architecture
Programme: Architecture, Urbanism and Building Sciences

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Graduation committee: Daniel Hall

This thesis is confidential and cannot be made public until ……..(**day month year).**

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TU Delft

25-10-2017 KM

Keywords:
Refuge
Countryside
Polder
Rammed earth
Timber construction
Groningen

Abstract

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Refuge ‘Opkamer’

An architectural palimpsest of experiences and materials in a developing landscape.

Technologies & Aesthetics
Final presentation 01/07/2024
Babette van Tilborg

research question

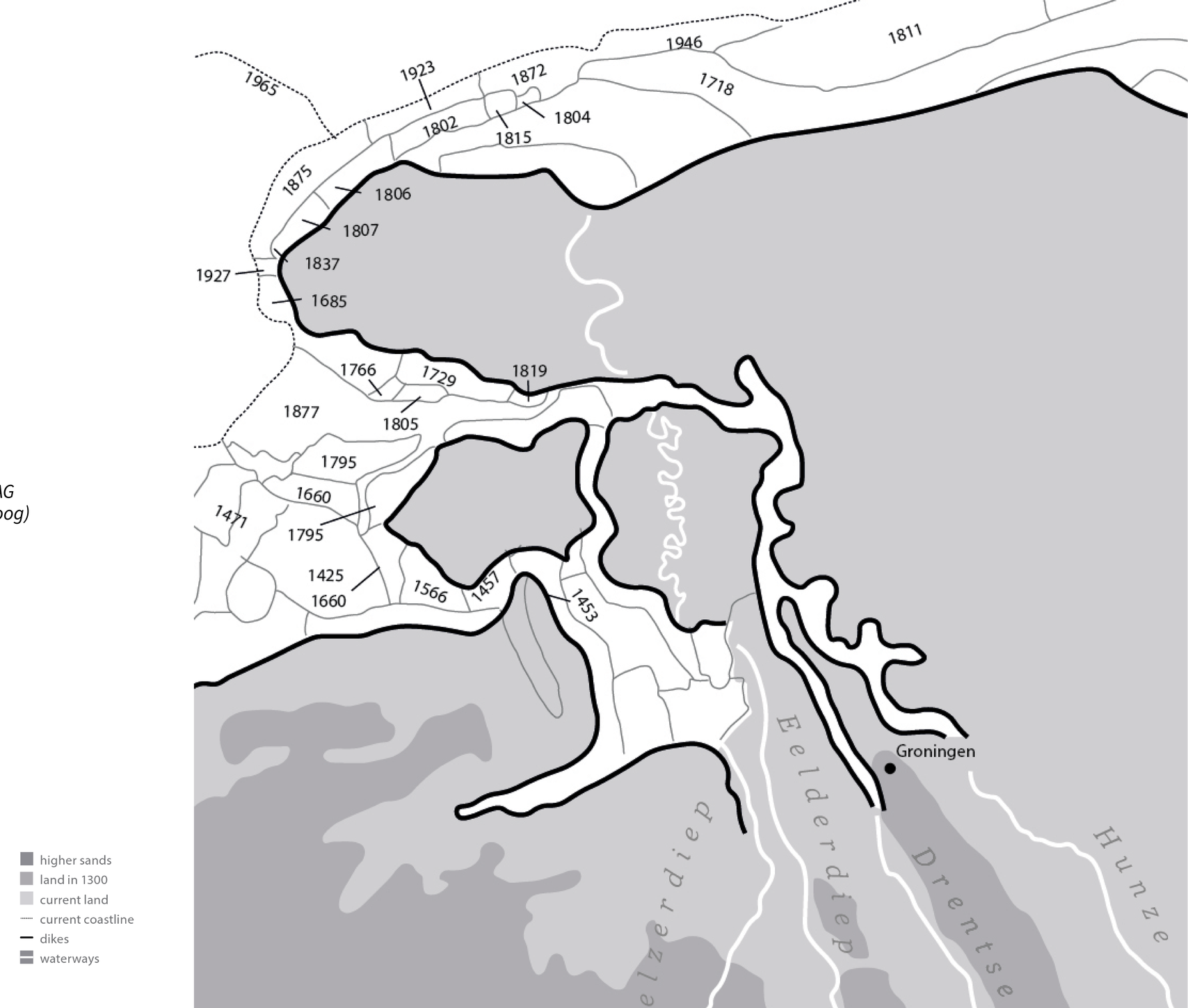
How can architecture express layers of experience and materiality?

Geological context
water shaped the area



Geological context
reclamed land from 14th century onwards

MIDDAG
(mid-oog)



Process of draining water through time



0 Middagster Riet (river)



800 AC Kiefsloot (sea-arm)



1400 AC Aduardiep (canal)



2020

in a 100 years we will need to deal differently with this drained area.

To tackle rising sea level and salination,
a rising ground water level and soil
subsidence as a consequence of drainage,
nature will follow its own course.

Water will rise and old/new waterways come to existence.



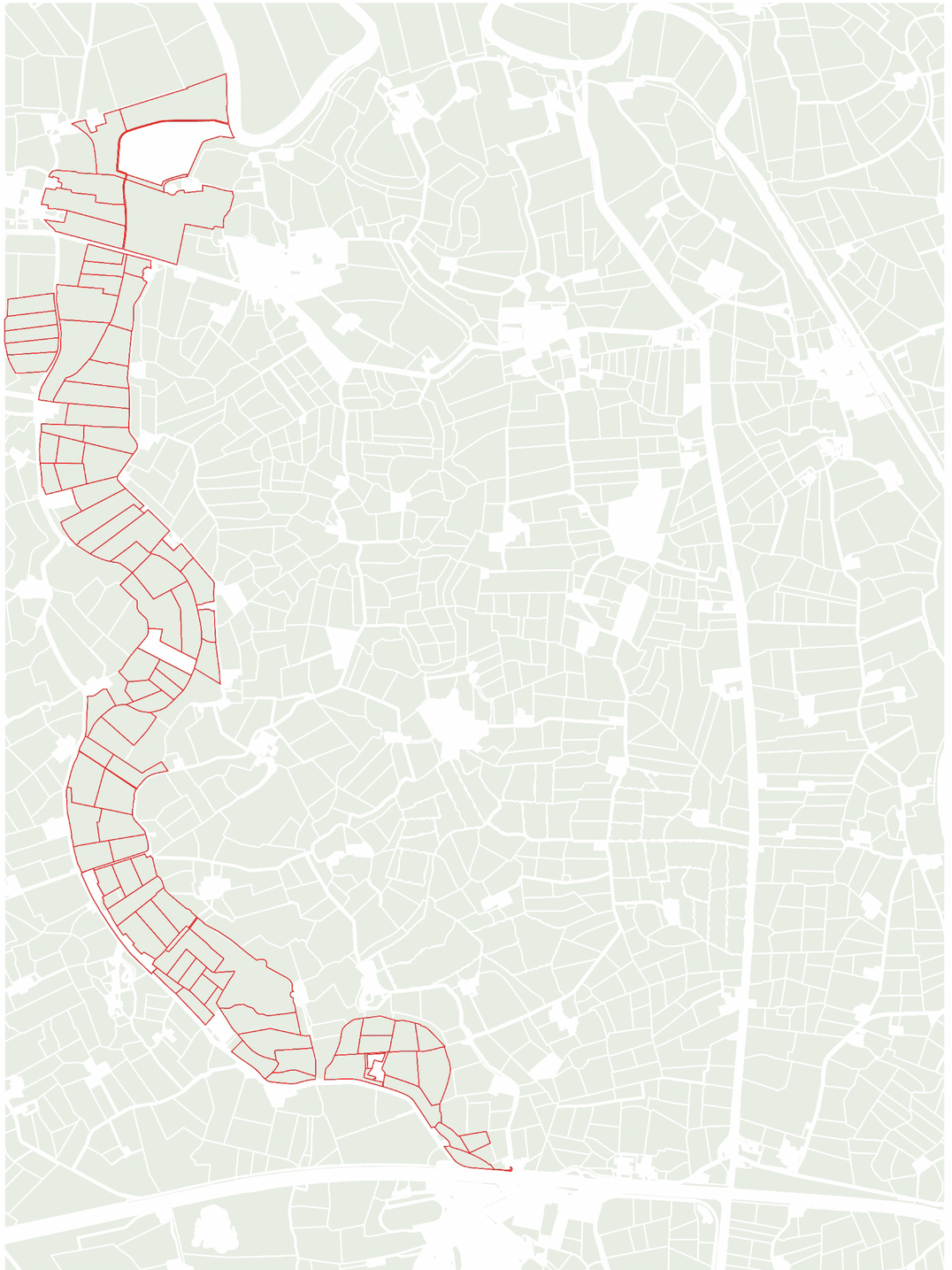
the current low-laying parcelisation is the result of the history of the old waterways



Kiefsloot
Middagster Riet
Aduardiep

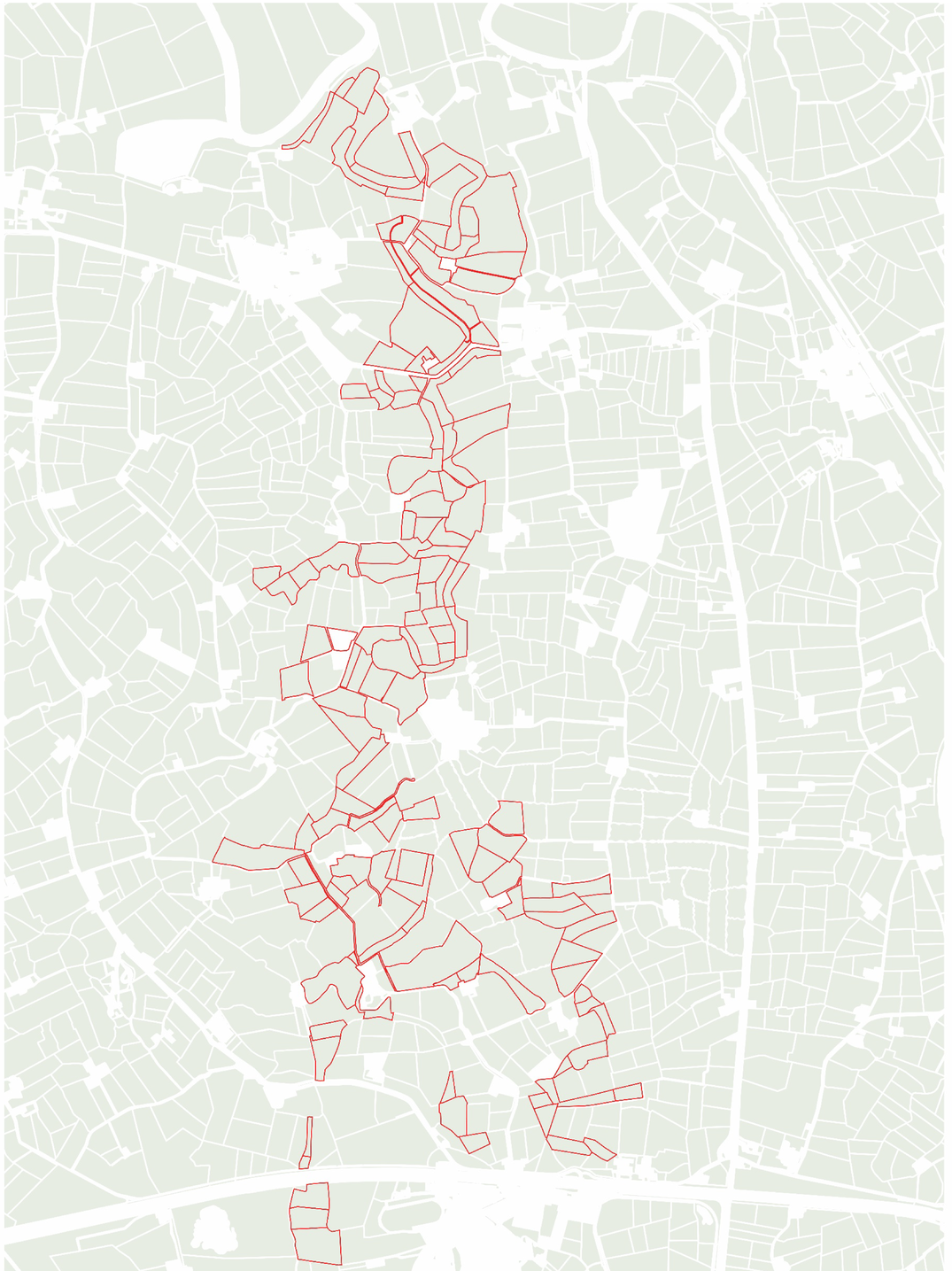
resulting parcellisation

Kiefsloot
Middagster Riet
Aduardiep



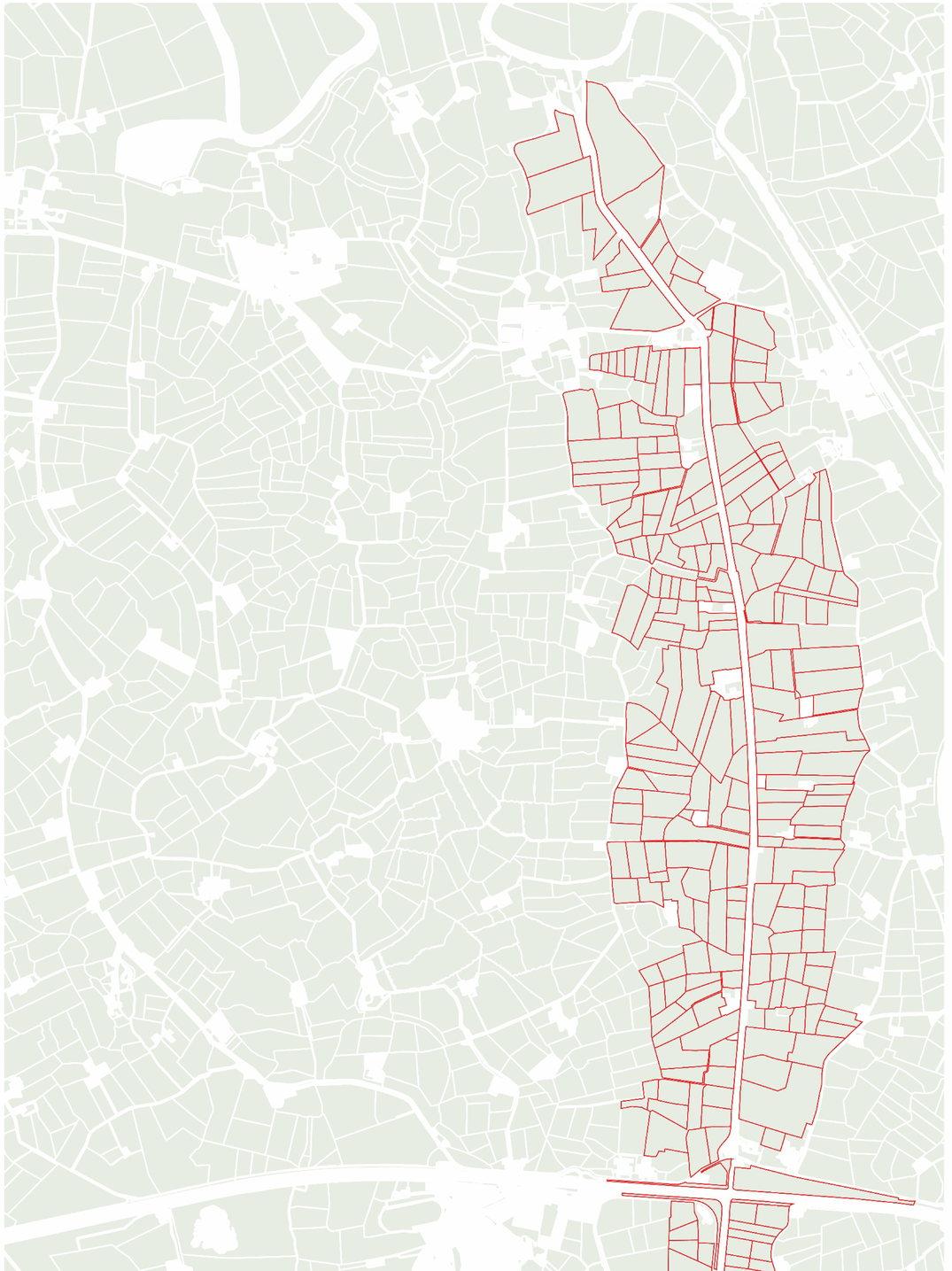
resulting parcellisation

Kiefsloot
Middagster Riet
Aduardiep



resulting parcellisation

Kiefsloot
Middagster Riet
Aduardiep



layering as a method

Kiefsloot
Middagster Riet
Aduardiep



expectation of the landscape

irregular block parcellation



ditches follow the former Middagster Riet
(Google earth 2023)

subtle heigt difference shaped by the water



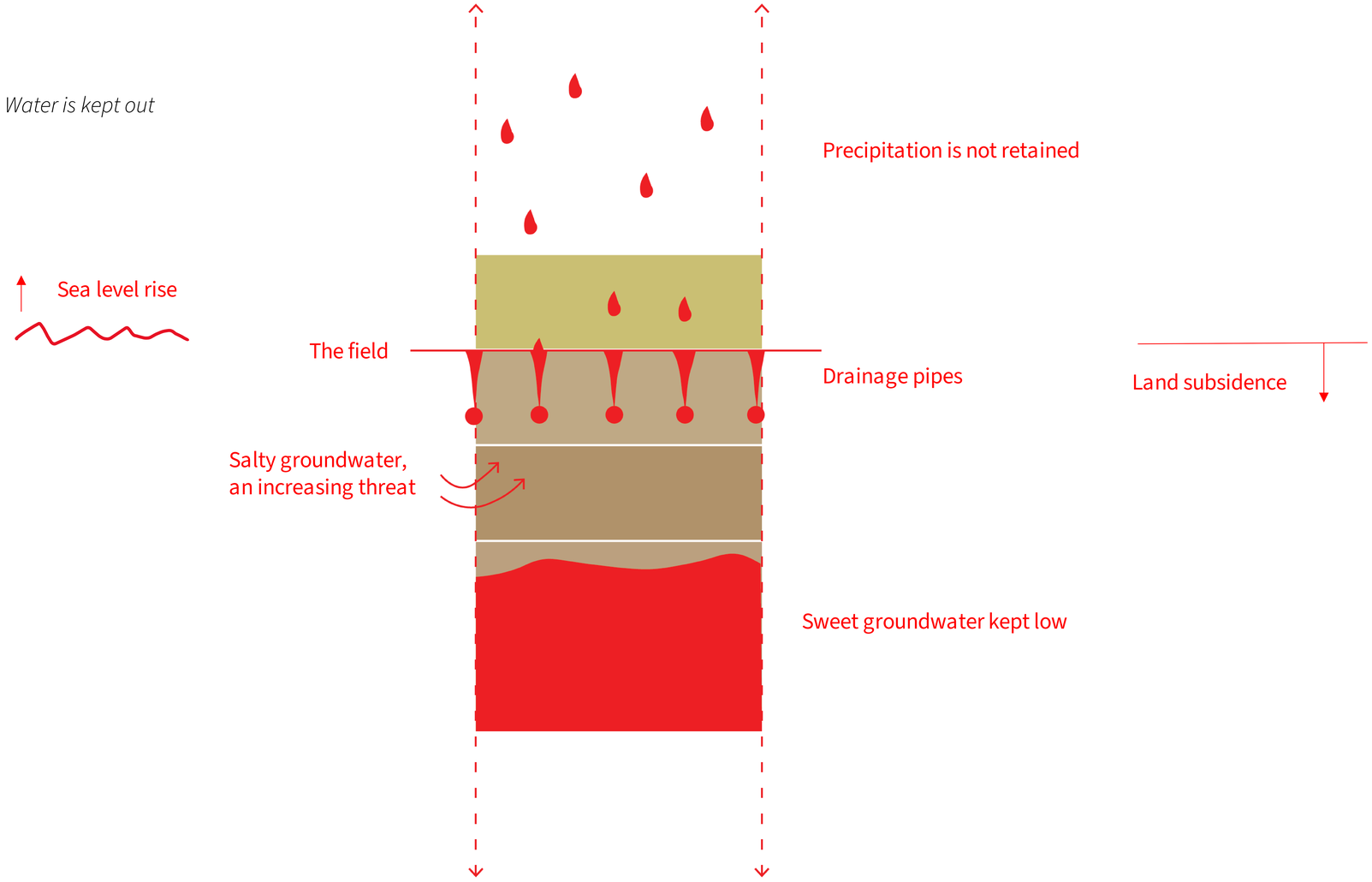
Middag
Johan Dijkstra, 1924

The formation of this landscape is layered, what can we see of it?

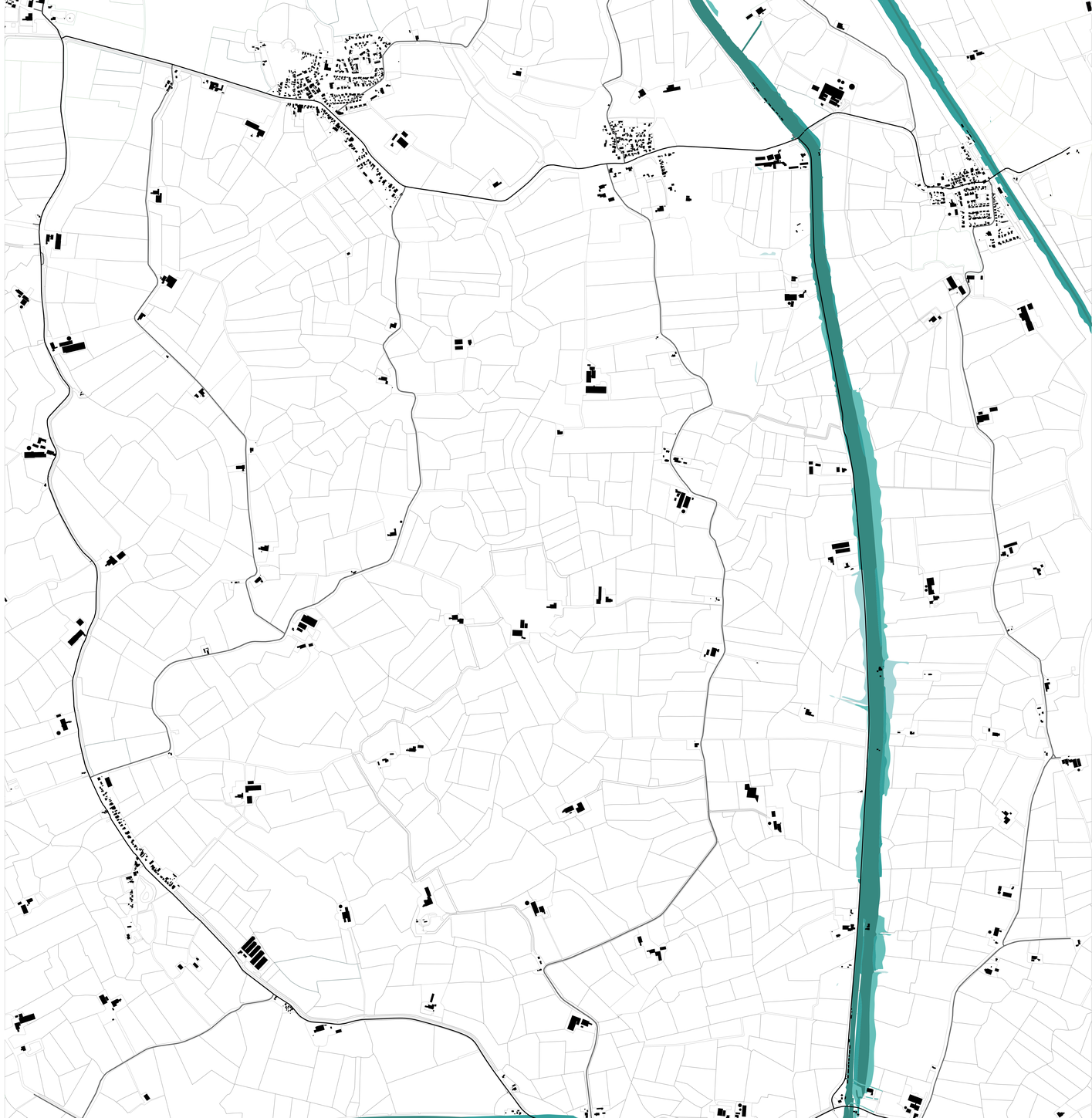
1. layers of experience
productive, inaccesible landscape



Production processes hinder natural development



Together with this production aspect comes an inaccesibility.



PUBLIC ROADS

Inaccesibility of the landscape



***PRIVATE** ROADS*

The future water presence will disrupt the current parcelisation and inaccesibility



This results in the opportunity to explore this new landscape.

Earlier I designed a walking network, giving acces to the mentioned private roads thourgh new transversal connections through the landscape.

Why walking?



walking through the Reitdiep
with Zef Hemel
professor Revitalisation of the Countryside (RUG&TUD)

EXCURSION: WALKING WORKSHOP



Design principles

walking through Groningen as a method for planning

‘Walking is a way to travel through time, to read the landscape, how it was and how it will be.’

↓

allow us to experience the landscape across its transformations

‘What is a landscape only to look at? It only comes to existence when walked through.’

↓

not seperate us from the landscape

‘Subtle height differences in the terrain inform you about the making of the landscape

↓

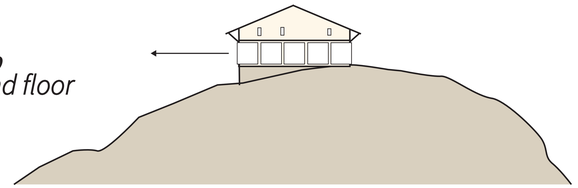
expose its layers

the architecture should

Along this walking path, a refuge will accomodate the hikers



the Alpine Refuge



closed top
open ground floor

Hut Lagazoui
Switserland

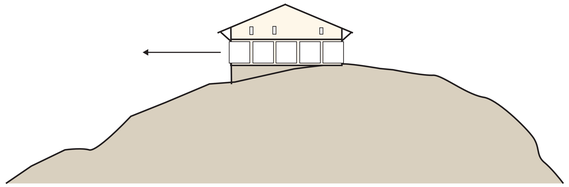


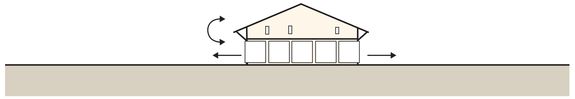


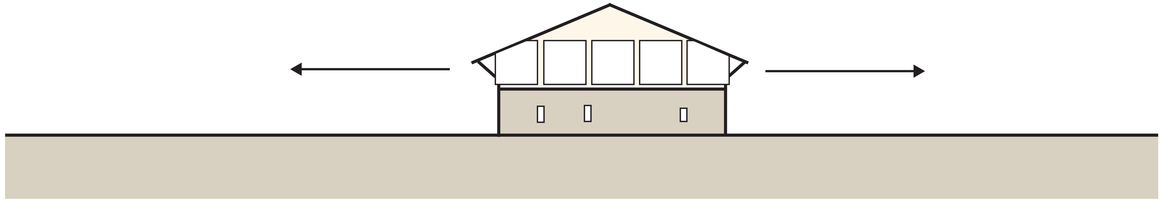


images retrieved from https://lagazuoi.it/EN/Discover-Services-page23-Lagazuoi-refuge

turn it around
to expierence the landscape of Groningen







filigree material for the communal space room (requires more openings)

solid construction material for the bedrooms (require less openings)

I will elaborate on the design, after I have described my research on materiality.

2. layers of materiality
extracting and building with earth





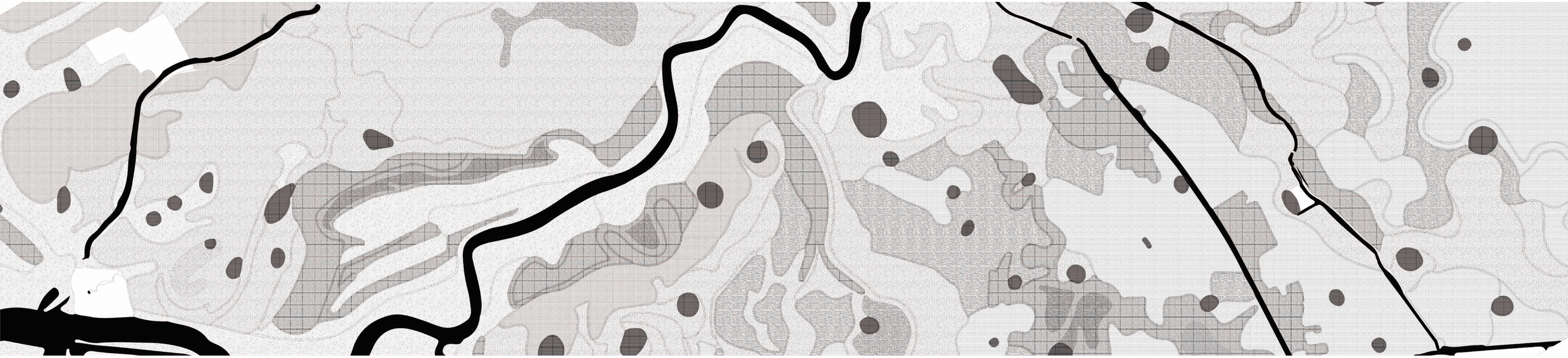
INTO THE REITDIEP

extracting and collecting earth samples



Earth Auger
120 cm deep
20 cm
biomaterial

Geological Map
variety in soil



nature of the clay	*normal clay*	*normal clay*	*crunchy clay*	*crunchy clay*	*normal clay*	*crunchy clay*	*no data*	*crunchy clay*	*normal clay*	*crunchy clay*	*normal clay*	*crunchy clay*
construction condition	*light clay*	*heavy sand*	*clay*	*light sand*	*light sand*	*clay*	*clay*	*sand and heavy clay*	*light clay*	*heavy clay*	*clay*	*heavy clay*
limescale progression	*calcarous*	*calcarous*	*low in lime*	*low in lime*	*low in lime*	*low in lime*	*low in lime*	*low in lime*	*calcarous*	*low in lime*	*low in lime*	*low in lime*
landform	*salt marsh wall*	*residual channel*	*salt marsh wall*	*plain of tidal estuary deposits*	*plain of tidal deposits*	*plain of tidal deposits*	*plains created by excavation*	*plain of tidal deposits*	*tidal estuary ridge*	*plain of tidal estuary deposits*	*residual channel*	*plain of tidal estuary deposits*
0	*clay weakly humus*	*clay very silty*	*clay very silty*					*clay moderately silty*	*clay*		*clay moderately silty*	*clay moderately humus*
-30cm		*sand very fine*	*sand*					*clay weakly silty*				
-60cm	*clay*			*clay weakly silty*	*clay moderately silty*	*clay weakly silty*	*clay*			*clay very silty*		*clay weakly silty*
-90cm		*clay very silty*	*clay very silty*					*clay moderately silty*	*clay very silty*		*clay weakly silty*	
-120cm	*sand*						*clay weakly silty*					*clay moderately silty*
	clay very sandy	*clay*										

extraction locations
for maximal variety



01 *02* *03* *04* *05* *06* *07* *08* *09* *10* *11* *12* *13*

vegetation and soil work together
palimpsest of material



01 02 03 04 05 06 07 08 09 10 11 12 13

processing
plants- lake pigment method



plants- lake pigment method



clay/soil- drying, grinding, filtration

blurring the boundary in between the surface and the subsoil



Design principles

into the Reitdiep

the architecture should

vegetation is a continuation of the subsoil, but with a completely different language

↓

have distinct elements with their own tectonic

smelling and feeling a material activates emotion

↓

stimulate sensorial engagement

human activity transforms the soil composition irreversibly

↓

be part of circular processes

WORKSHOP: BUILDING WITH EARTH
BC materials, Brussels







testing different
earth mixes
moisture levels
ramming techniques (varying pressure)

raw earth
construction elements



rammed earth column



rammed earth wall



compressed earth block

Design principles

earth workshop

building with earth implies larger dimensioning than modern, conventional buildign materials

↓

earth will weather from rain and wind

↓

earth can be extracted and used on site

↓

the architecture should

express permanence through its massiveness

embrace but control its weathering

place the subsoil above ground so that it is visible

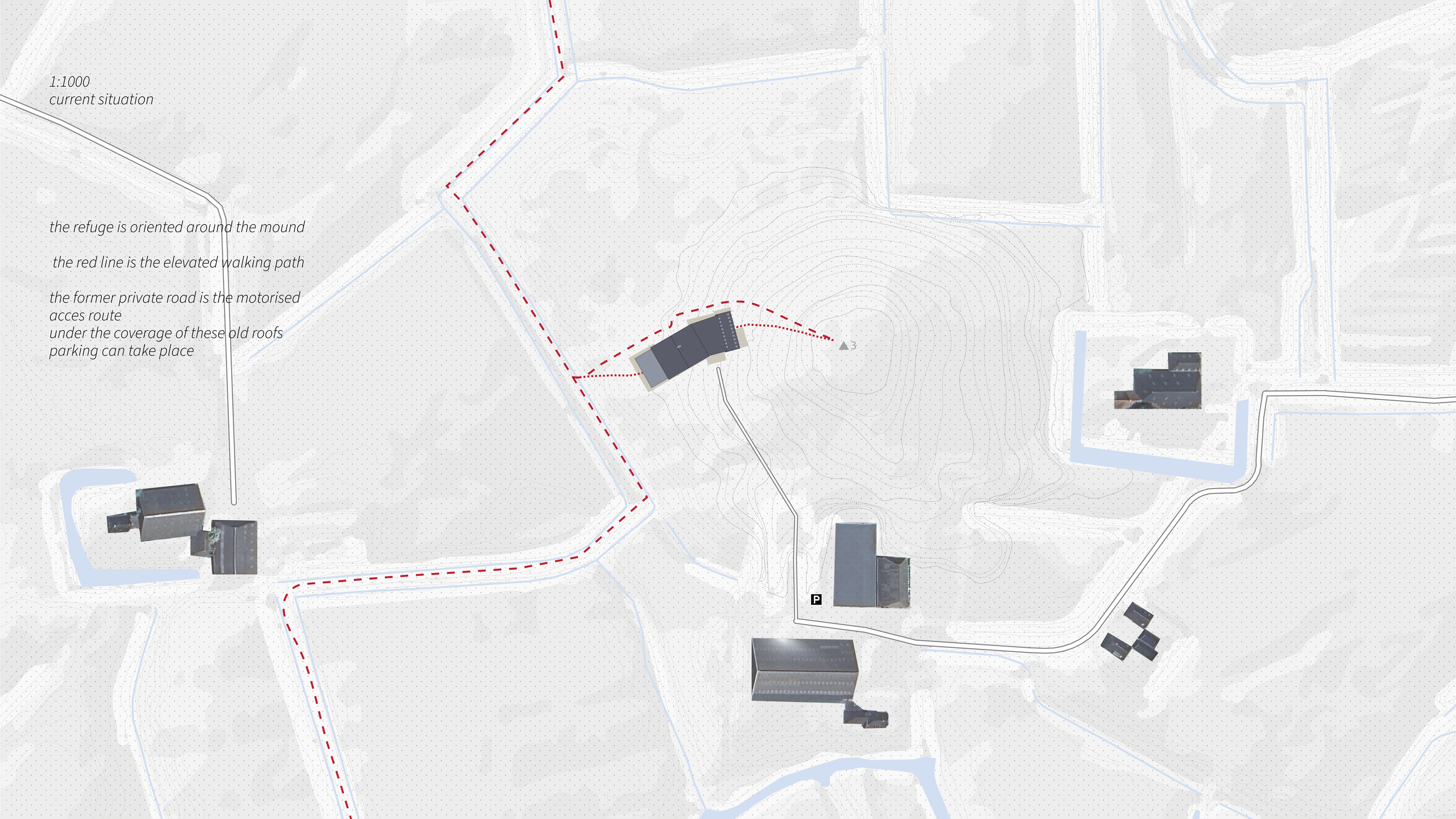
the architecture should:	***express continuity***	***be a haptic experience***	***be a palimpsest***
walking as a method for planning	*allow us to experience the landscape across its transformations*	*not seperate us from the landscape*	*expose its layers*
Into the Reitdiep, earth extraction	*have distinct elements with their own tectonic*	*stimulate sensorial engagement*	*be part of circular processes*
building with earth	*express permanence through its massiveness*	*embrace but control its weathering*	*place the subsoil above ground so that it is visible*

1:1000
current situation

the refuge is oriented around the mound

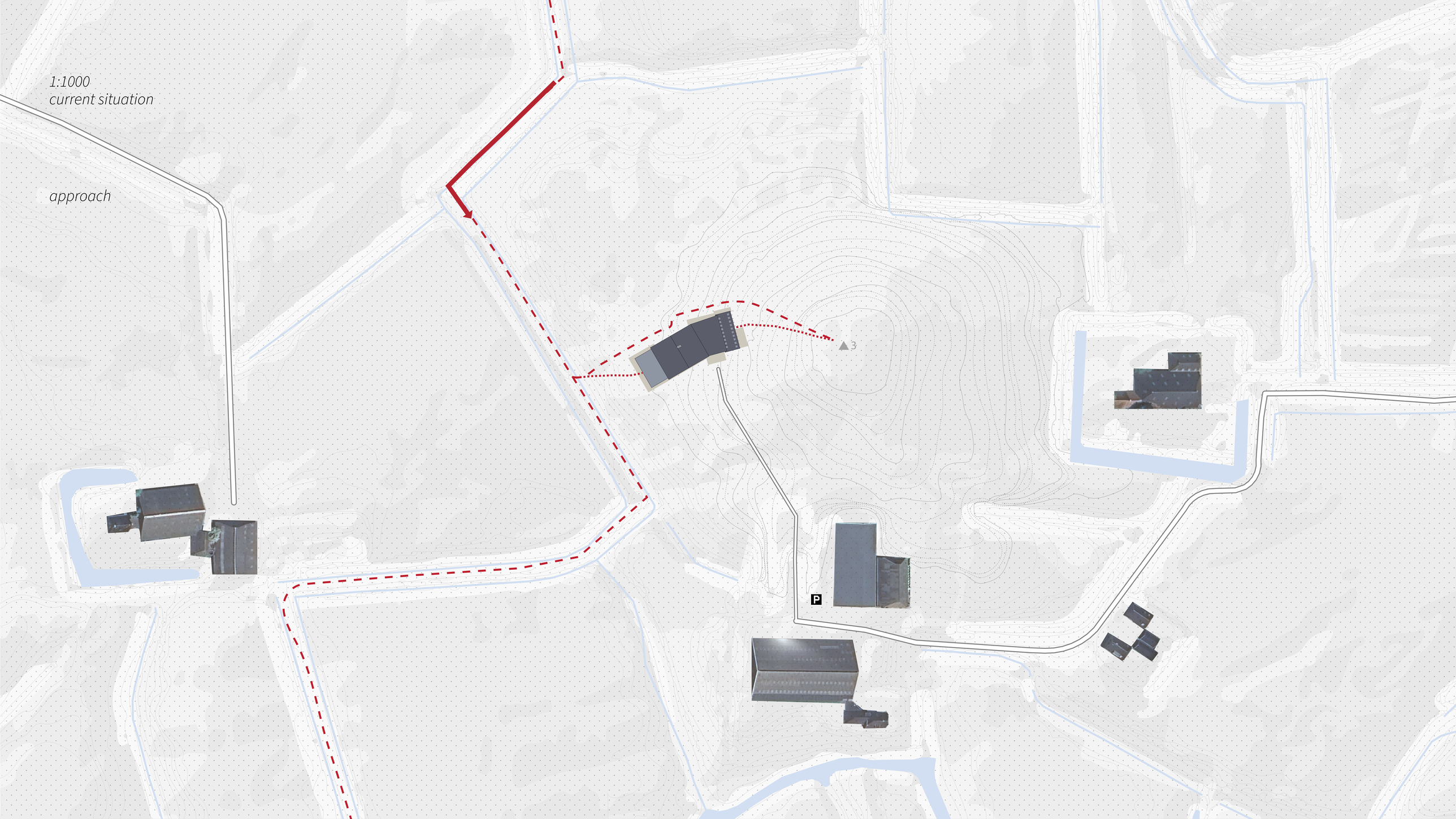
the red line is the elevated walking path

the former private road is the motorised acces route
under the coverage of these old roofs parking can take place



1:1000
current situation

approach





horizontal distinction in materials highlight the topography of the mound

the roofs create 4 different spaces, varying in height and thus in material

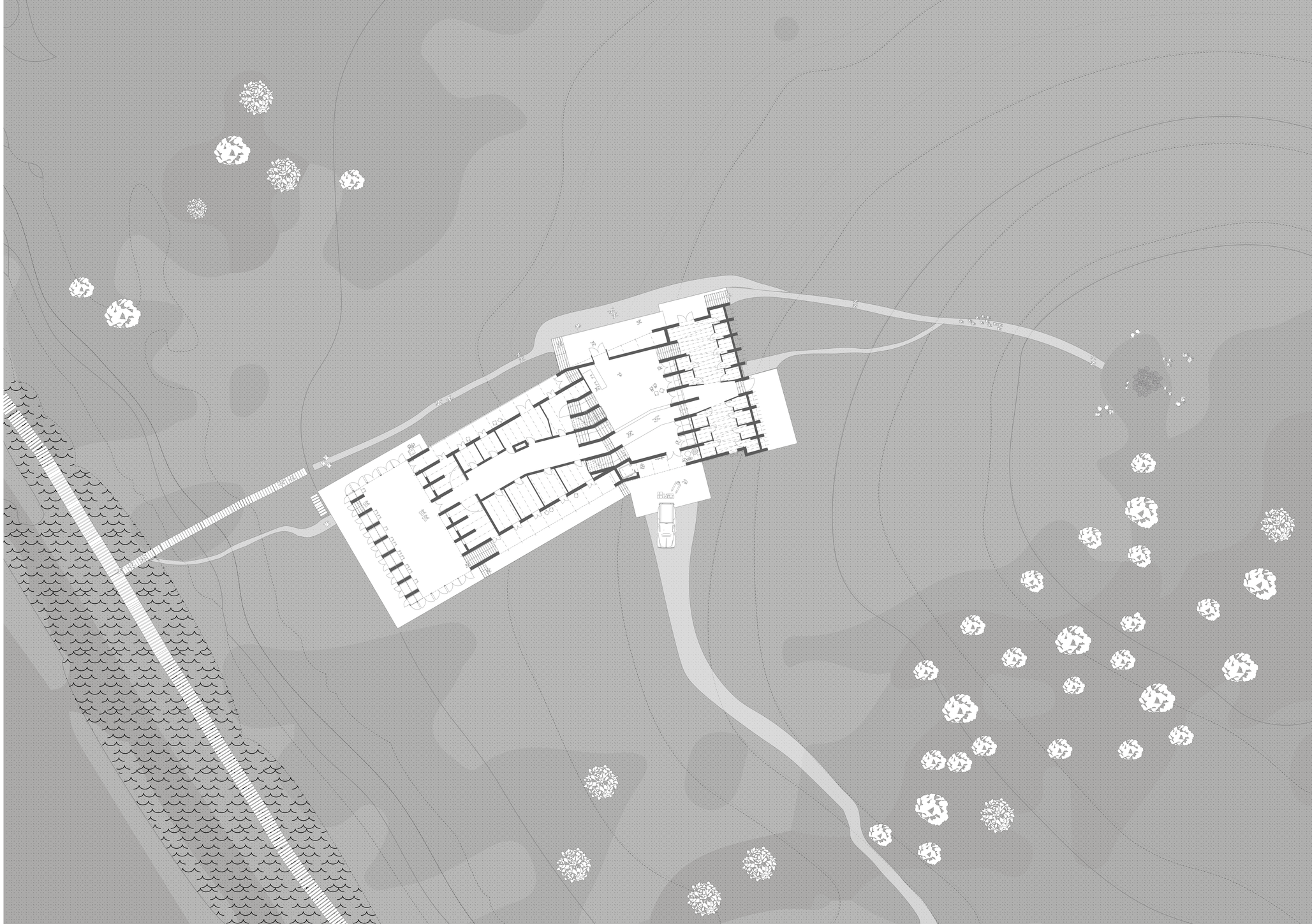
covered outdoor space makes it tempting to shield from the wind

the entrance is clearly visible on a platform

1:500
current water level

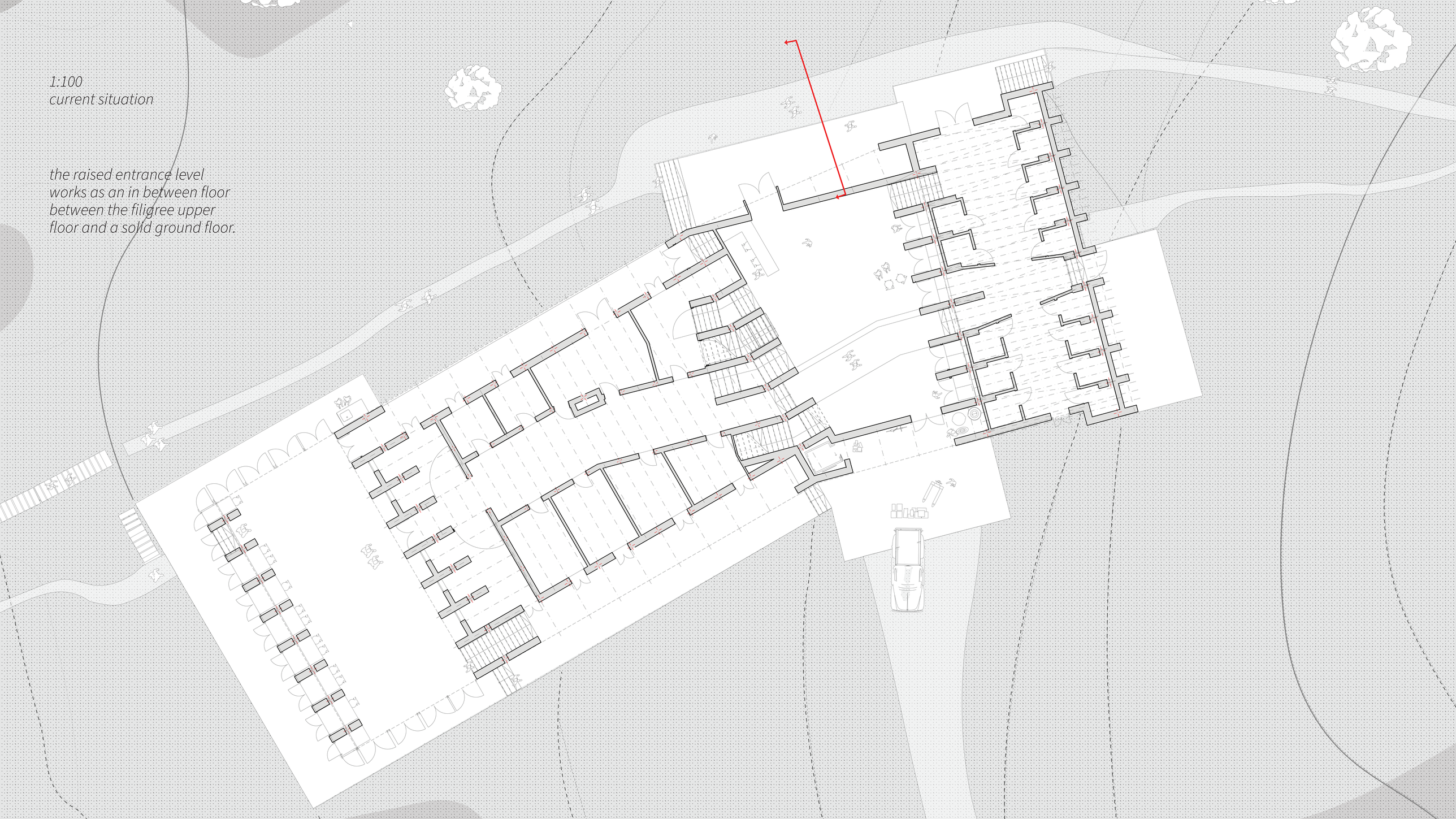
the refuge as an embedded path to the top of the mound

along this path, niches define the view



1:100
current situation

the raised entrance level
works as an in between floor
between the filigree upper
floor and a solid ground floor.



Entrance, outside approach

horizontal layers

overhanging first floor provides ***protection***

platform creates a treshold space



1:100
current situation

the raised entrance level
works as an in between floor
between the filigree upper
floor and a solid ground floor.



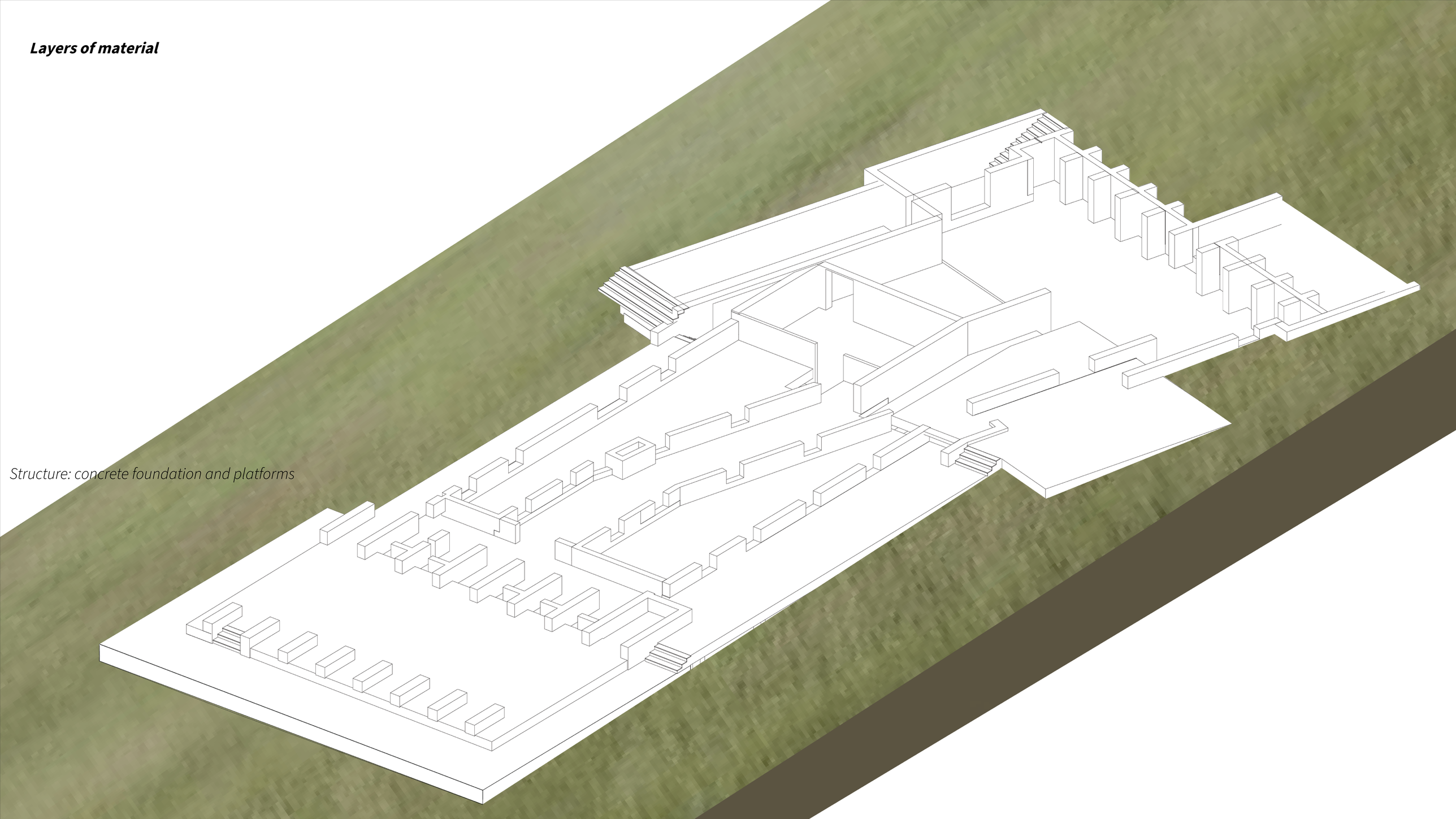
Entrance

solid rammed earth walls through wich a filigree sturcutre sprouts

this is where the under and upper world of the building come together

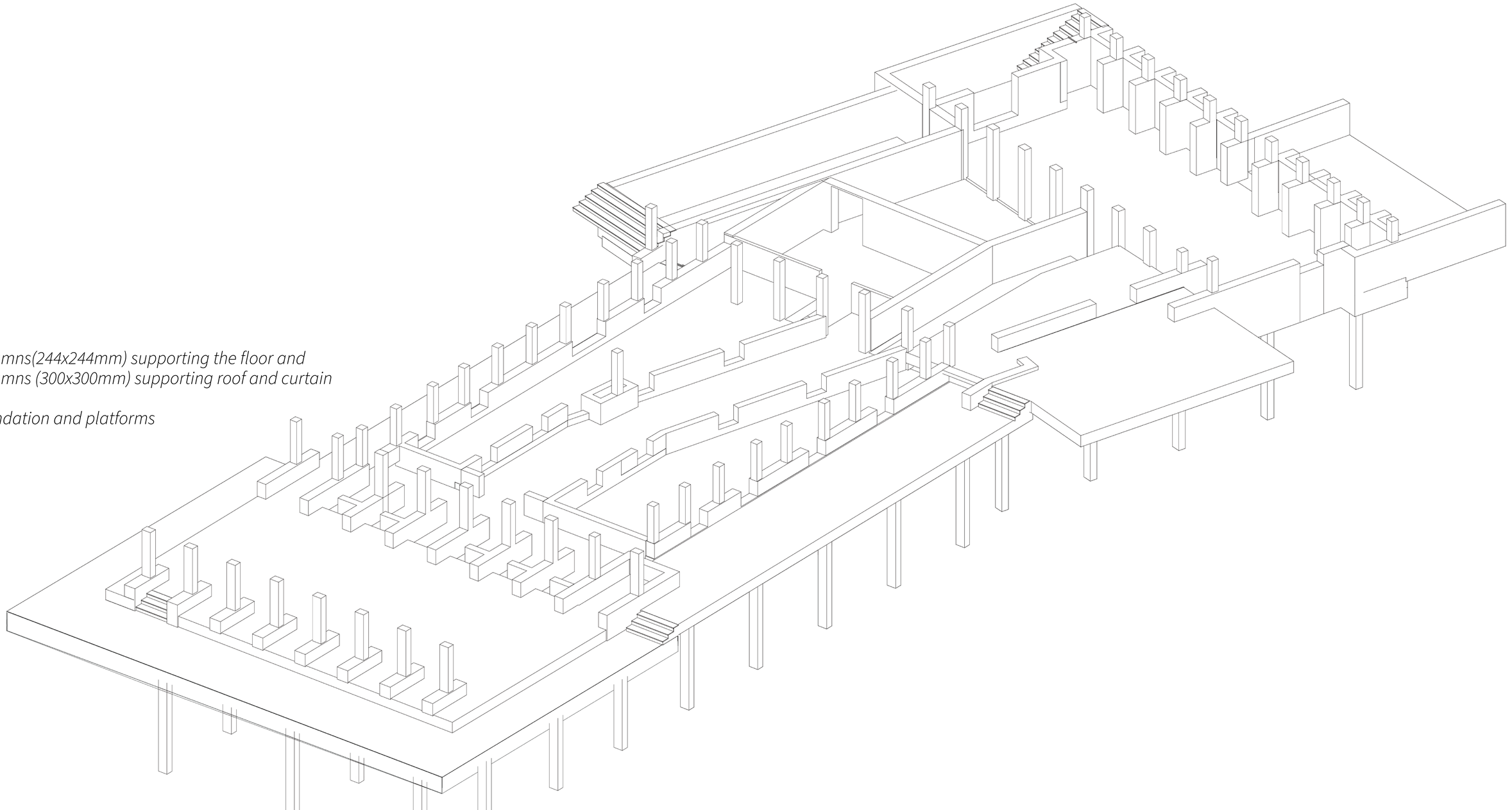


Layers of material

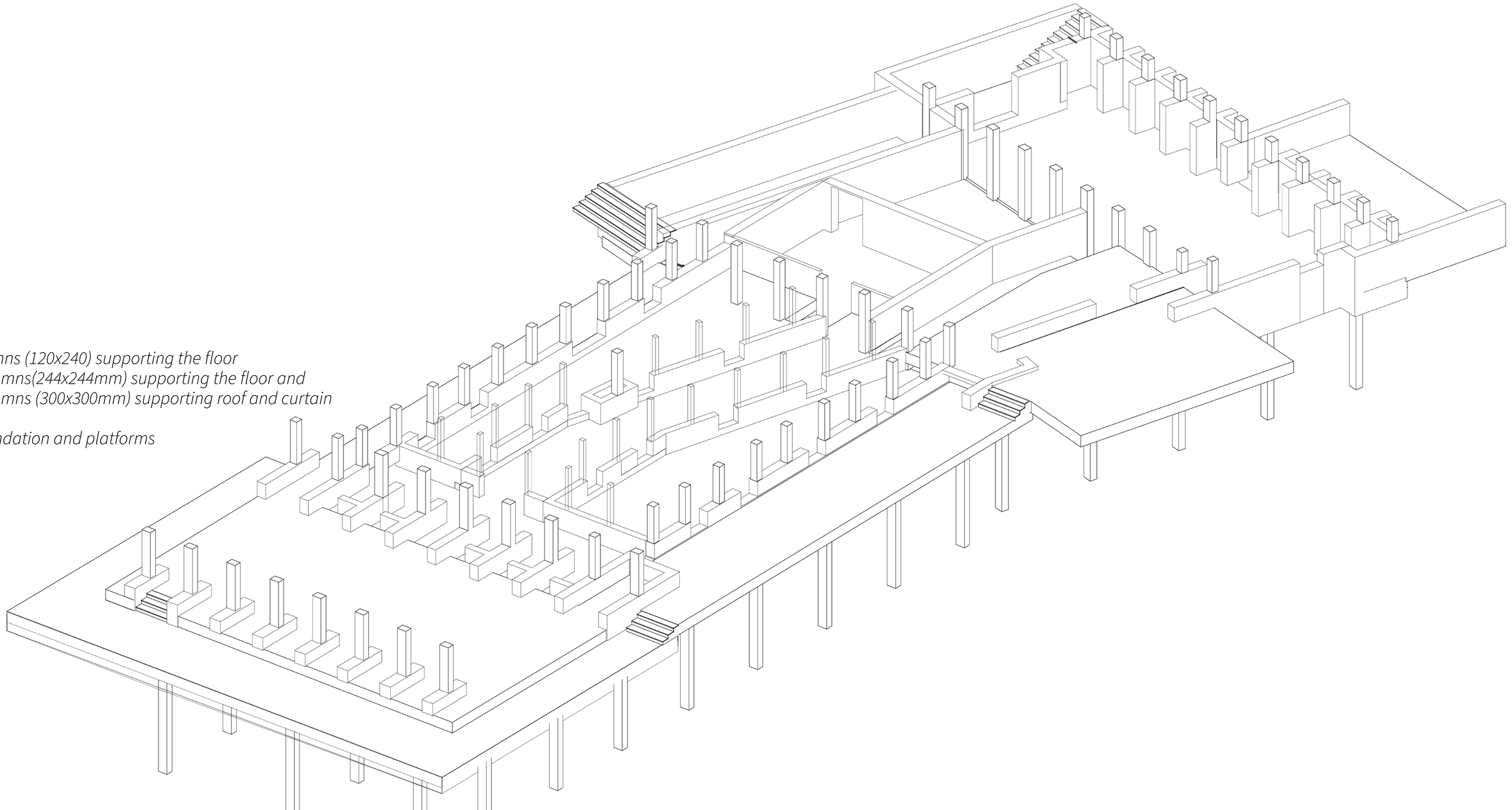


Structure: concrete foundation and platforms

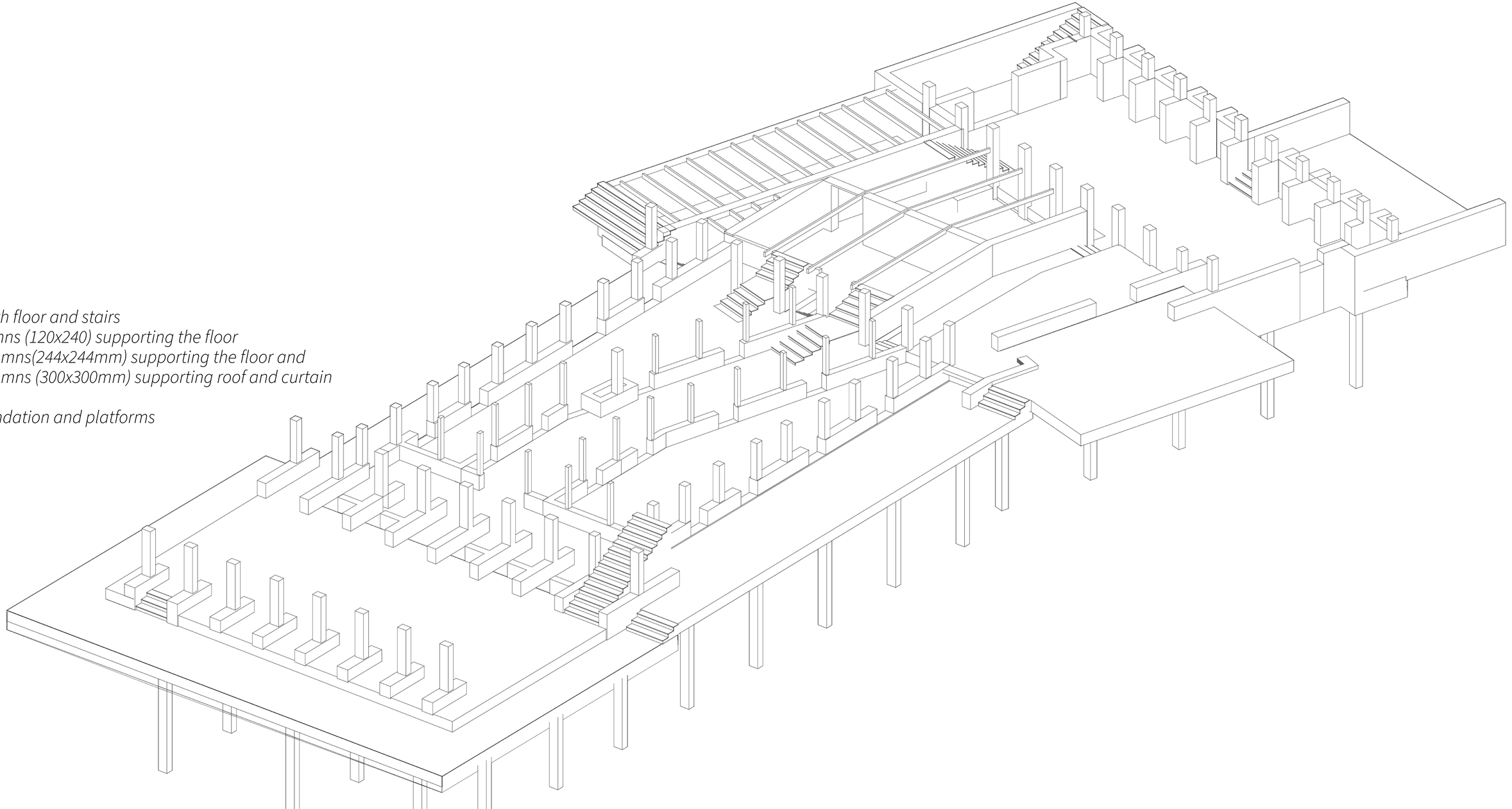
Structure:
concrete columns(244x244mm) supporting the floor and
concrete columns (300x300mm) supporting roof and curtain wall facade
concrete foundation and platforms



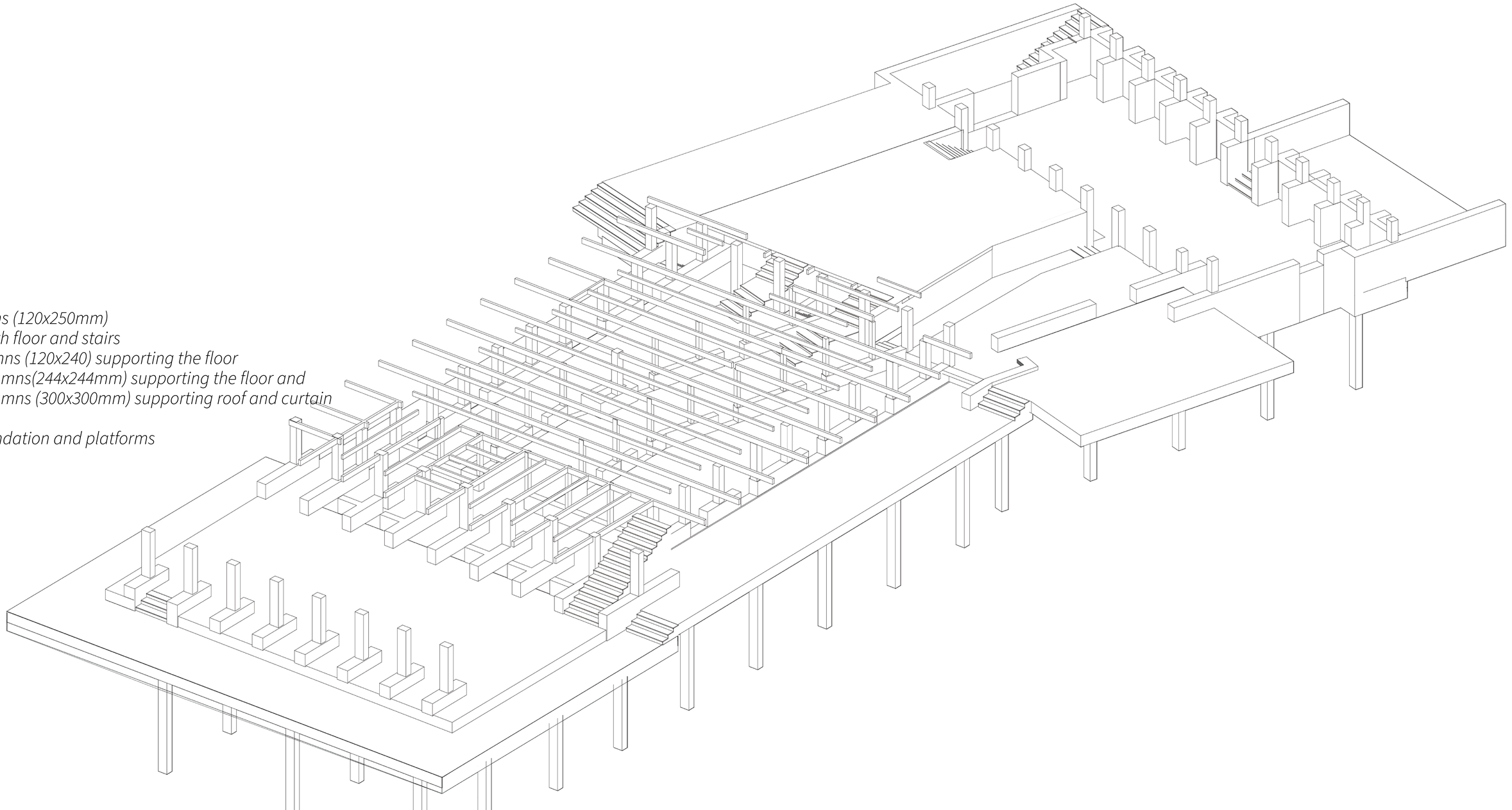
Structure:
glulam columns (120x240) supporting the floor
concrete columns(244x244mm) supporting the floor and
concrete columns (300x300mm) supporting roof and curtain wall facade
concrete foundation and platforms



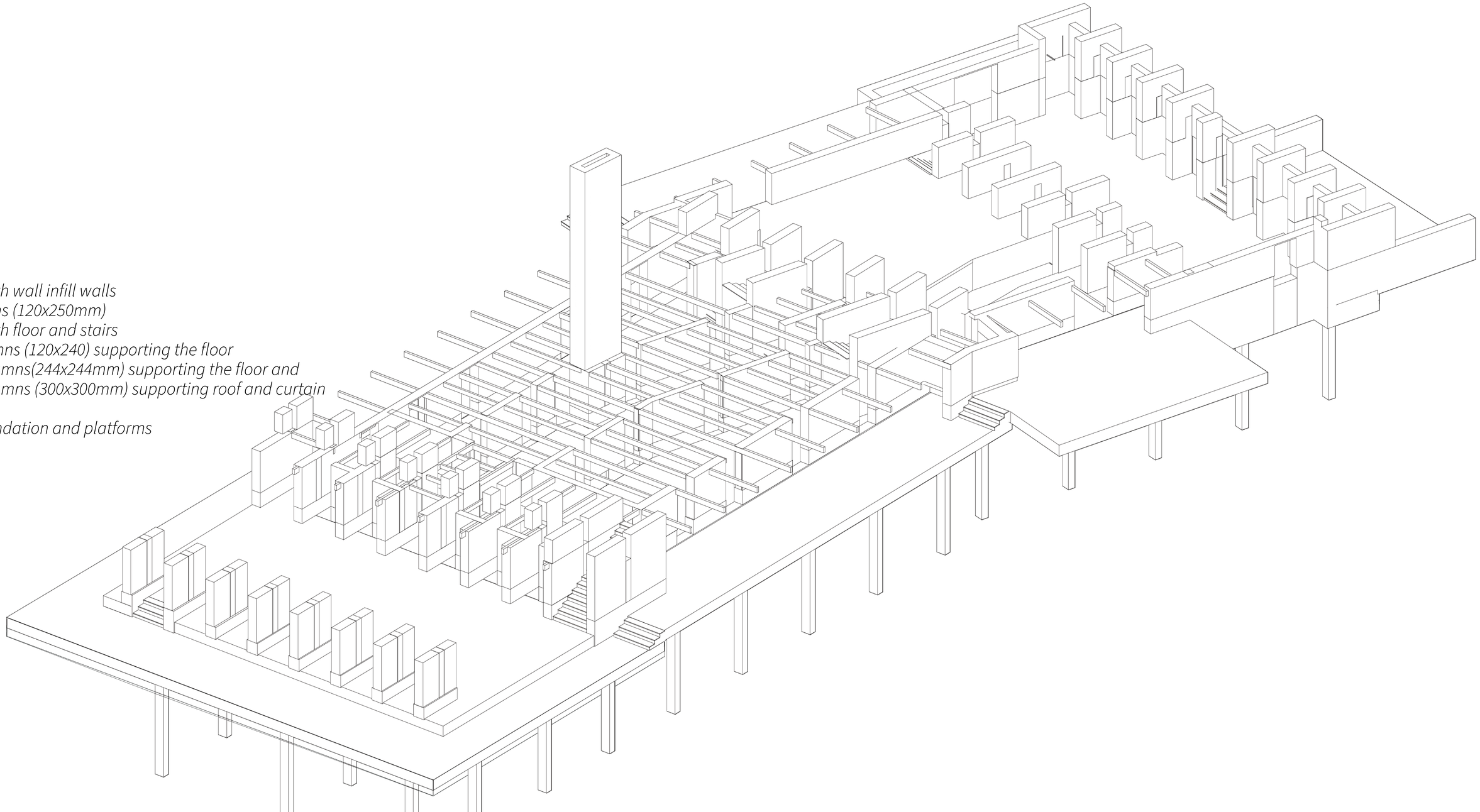
Structure:
rammed earth floor and stairs
glulam columns (120x240) supporting the floor
concrete columns(244x244mm) supporting the floor and
concrete columns (300x300mm) supporting roof and curtain wall facade
concrete foundation and platforms



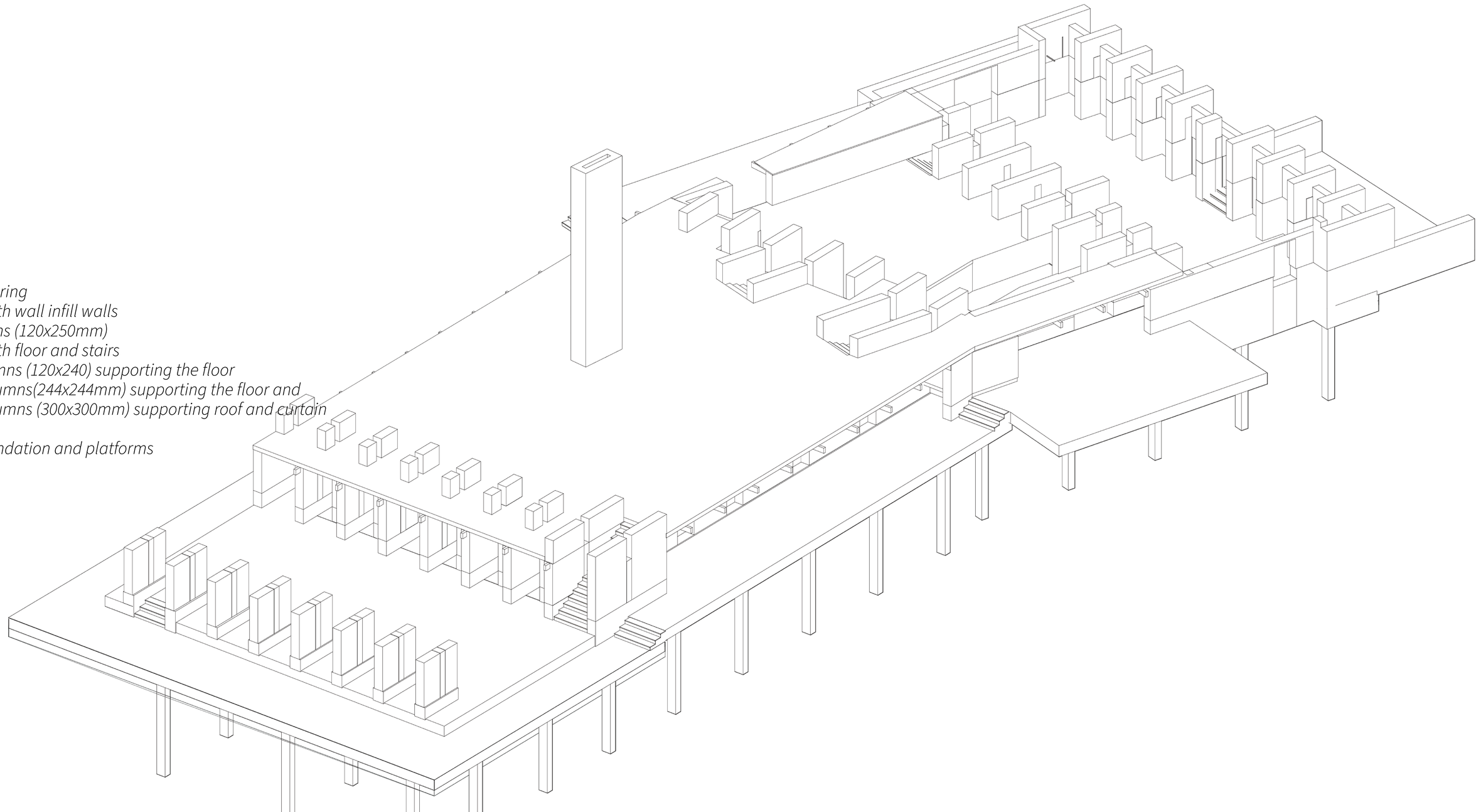
Structure:
glulam beams (120x250mm)
rammed earth floor and stairs
glulam columns (120x240) supporting the floor
concrete columns(244x244mm) supporting the floor and
concrete columns (300x300mm) supporting roof and curtain wall facade
concrete foundation and platforms



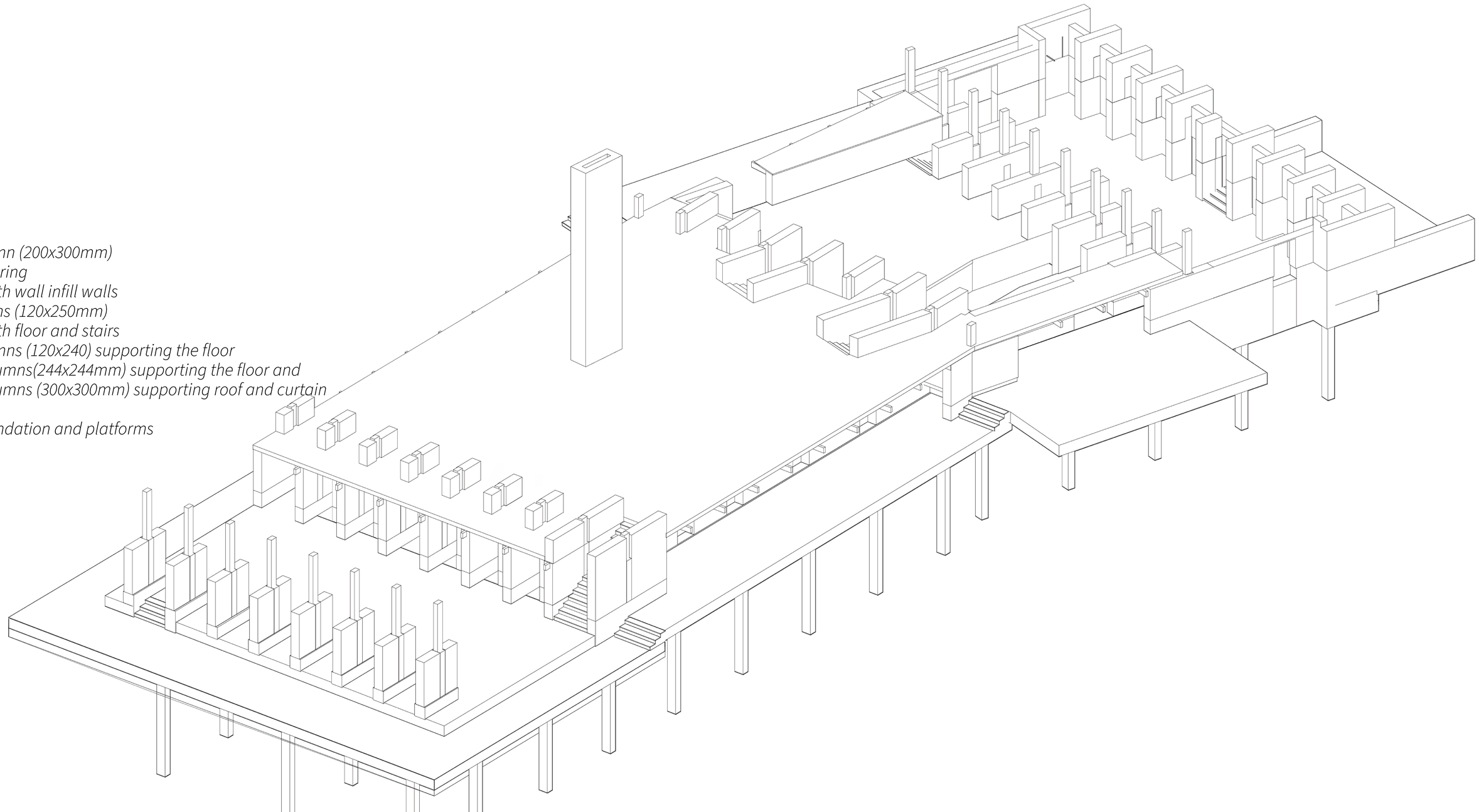
Structure:
rammed earth wall infill walls
glulam beams (120x250mm)
rammed earth floor and stairs
glulam columns (120x240) supporting the floor
concrete columns(244x244mm) supporting the floor and
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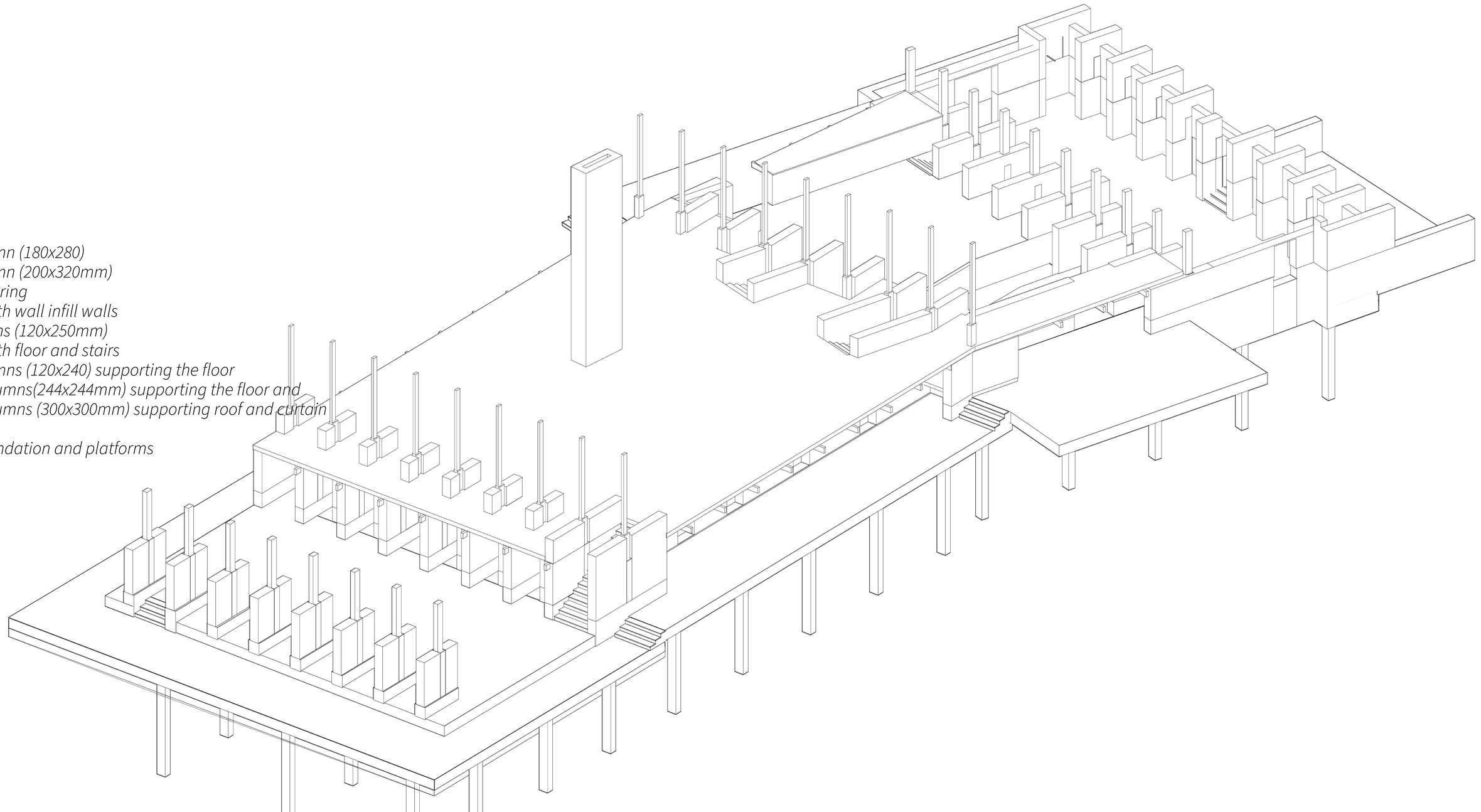
Structure:
plywood flooring
rammed earth wall infill walls
glulam beams (120x250mm)
rammed earth floor and stairs
glulam columns (120x240) supporting the floor
concrete columns(244x244mm) supporting the floor and
concrete columns (300x300mm) supporting roof and curtain
wall facade
concrete foundation and platforms



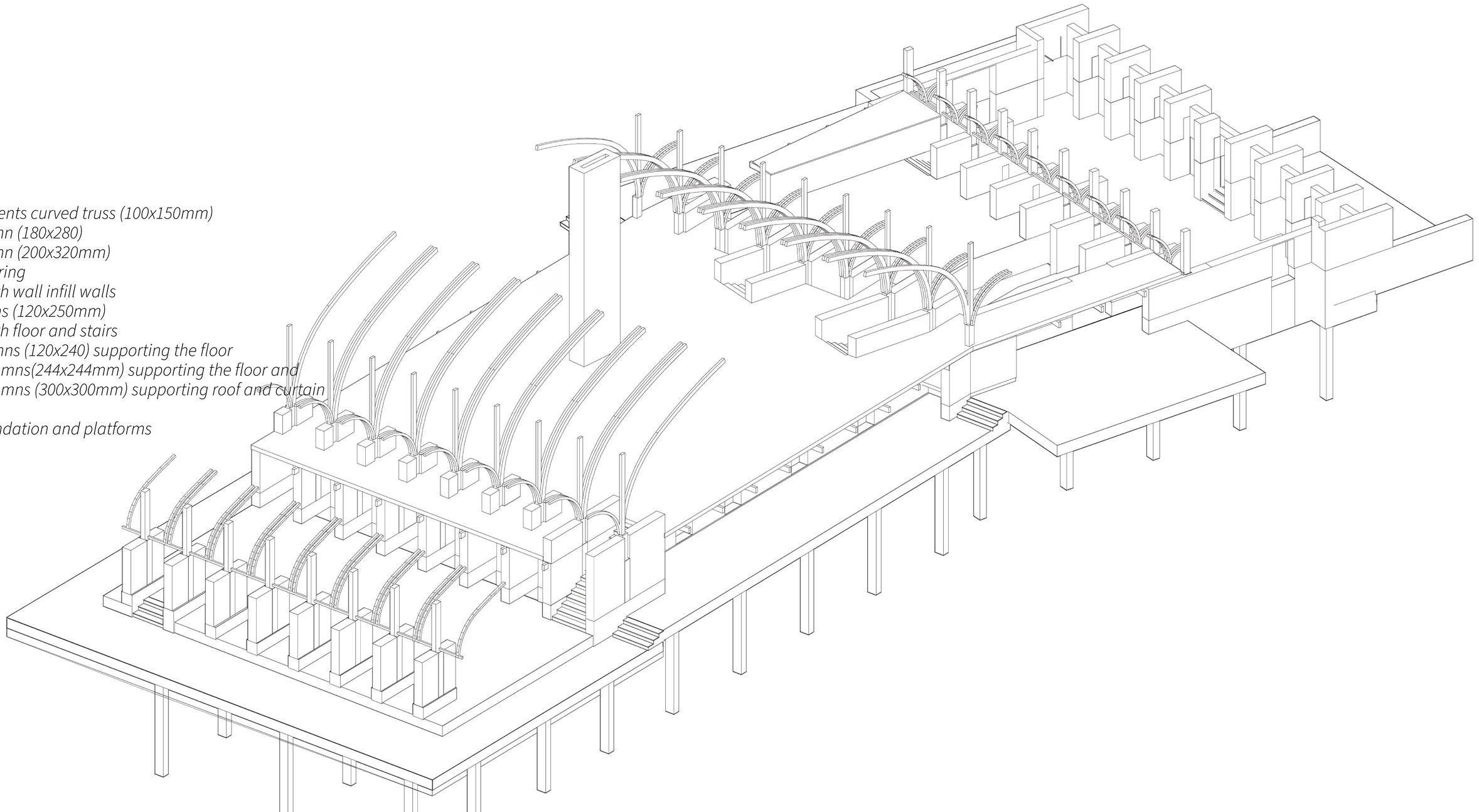
Structure:
glulam column (200x300mm)
plywood flooring
rammed earth wall infill walls
glulam beams (120x250mm)
rammed earth floor and stairs
glulam columns (120x240) supporting the floor
concrete columns(244x244mm) supporting the floor and
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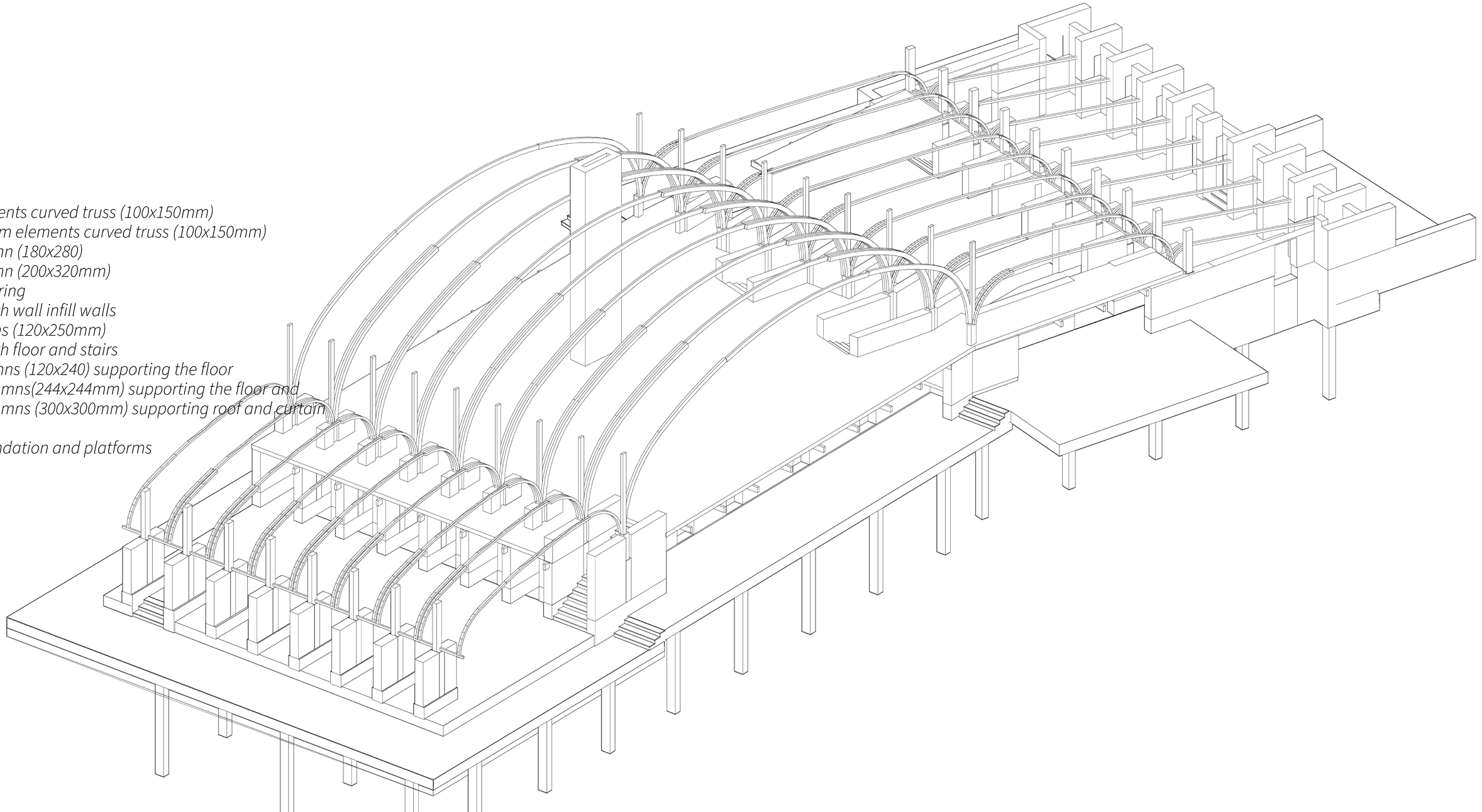
Structure:
glulam column (180x280)
glulam column (200x320mm)
plywood flooring
rammed earth wall infill walls
glulam beams (120x250mm)
rammed earth floor and stairs
glulam columns (120x240) supporting the floor
concrete columns(244x244mm) supporting the floor and
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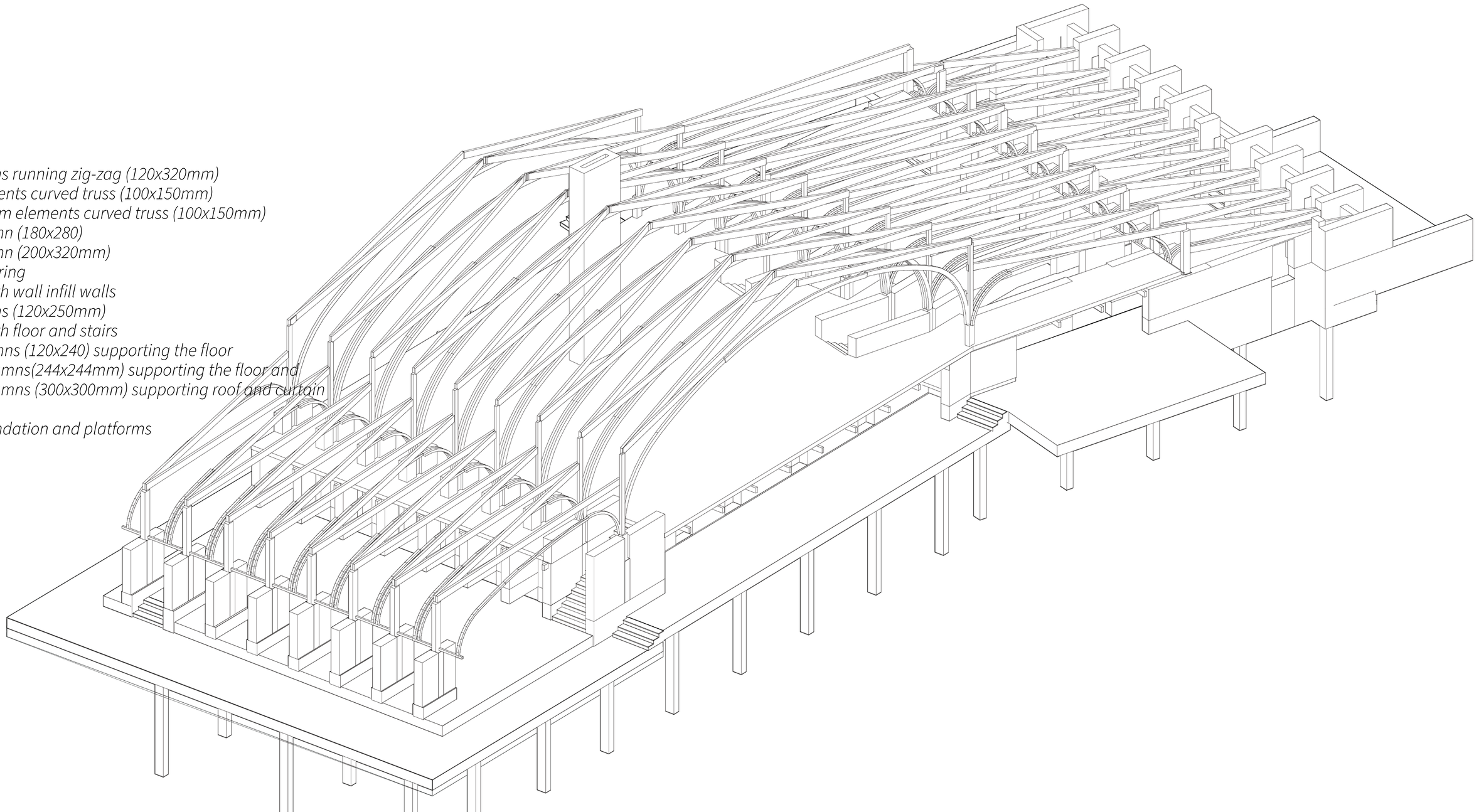
Structure:
bottom elements curved truss (100x150mm)
glulam column (180x280)
glulam column (200x320mm)
plywood flooring
rammed earth wall infill walls
glulam beams (120x250mm)
rammed earth floor and stairs
glulam columns (120x240) supporting the floor
concrete columns(244x244mm) supporting the floor and
concrete columns (300x300mm) supporting roof and curtain
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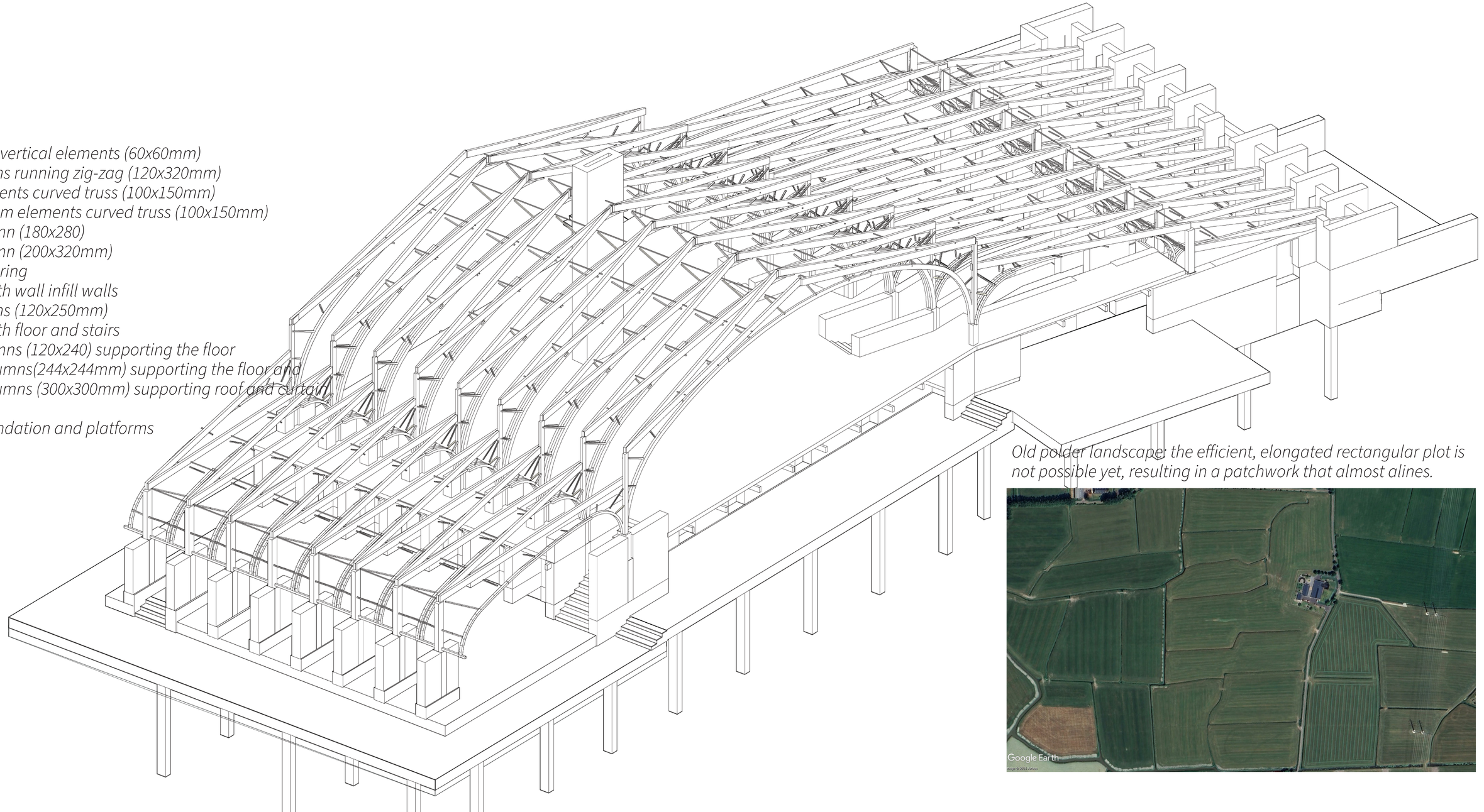
Structure:
bottom elements curved truss (100x150mm)
double bottom elements curved truss (100x150mm)
glulam column (180x280)
glulam column (200x320mm)
plywood flooring
rammed earth wall infill walls
glulam beams (120x250mm)
rammed earth floor and stairs
glulam columns (120x240) supporting the floor
concrete columns(244x244mm) supporting the floor and
concrete columns (300x300mm) supporting roof and curtain
wall facade
concrete foundation and platforms



Structure:
glulam beams running zig-zag (120x320mm)
bottom elements curved truss (100x150mm)
double bottom elements curved truss (100x150mm)
glulam column (180x280)
glulam column (200x320mm)
plywood flooring
rammed earth wall infill walls
glulam beams (120x250mm)
rammed earth floor and stairs
glulam columns (120x240) supporting the floor
concrete columns(244x244mm) supporting the floor and
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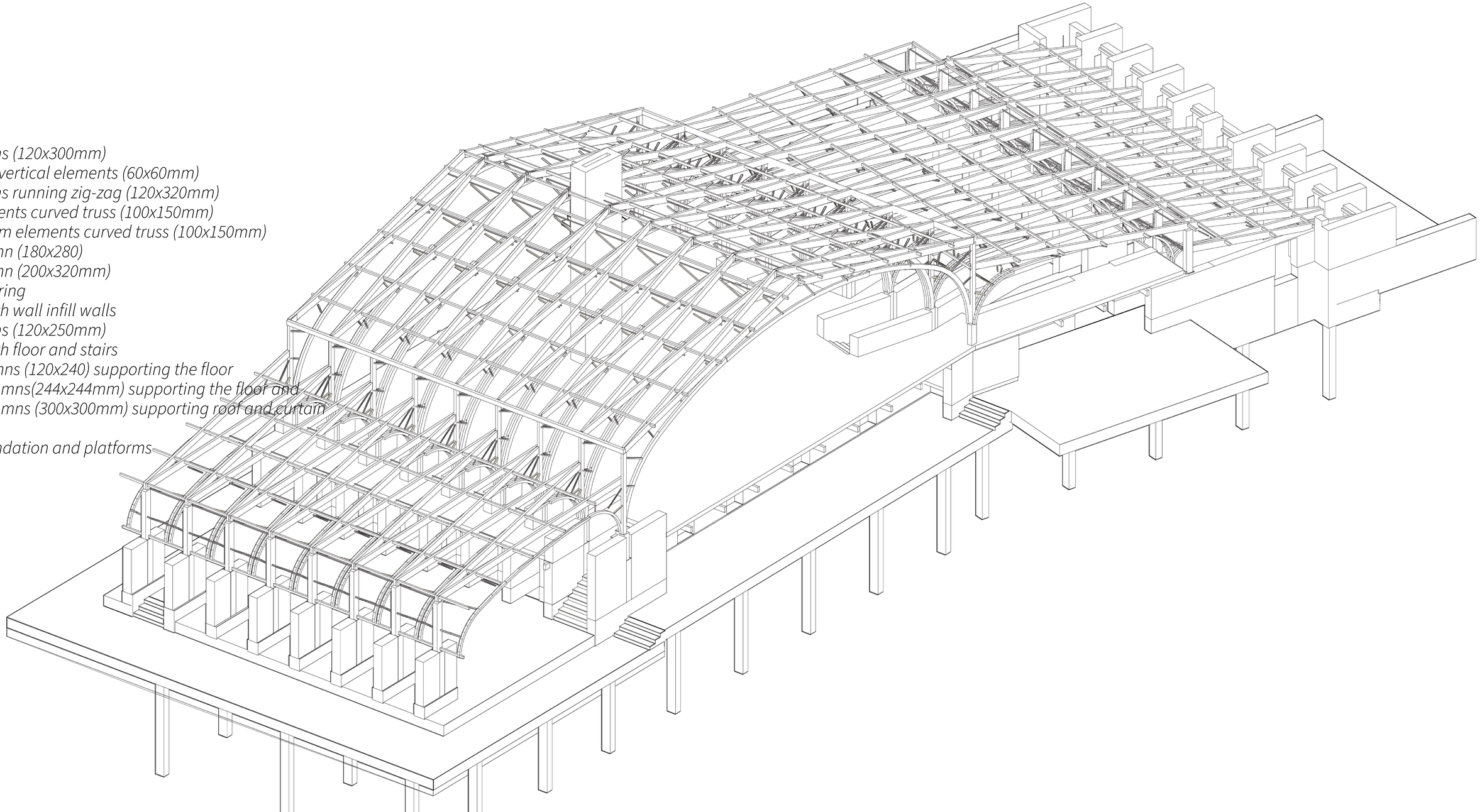


Structure:
glulam truss vertical elements (60x60mm)
glulam beams running zig-zag (120x320mm)
bottom elements curved truss (100x150mm)
double bottom elements curved truss (100x150mm)
glulam column (180x280)
glulam column (200x320mm)
plywood flooring
rammed earth wall infill walls
glulam beams (120x250mm)
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glulam columns (120x240) supporting the floor
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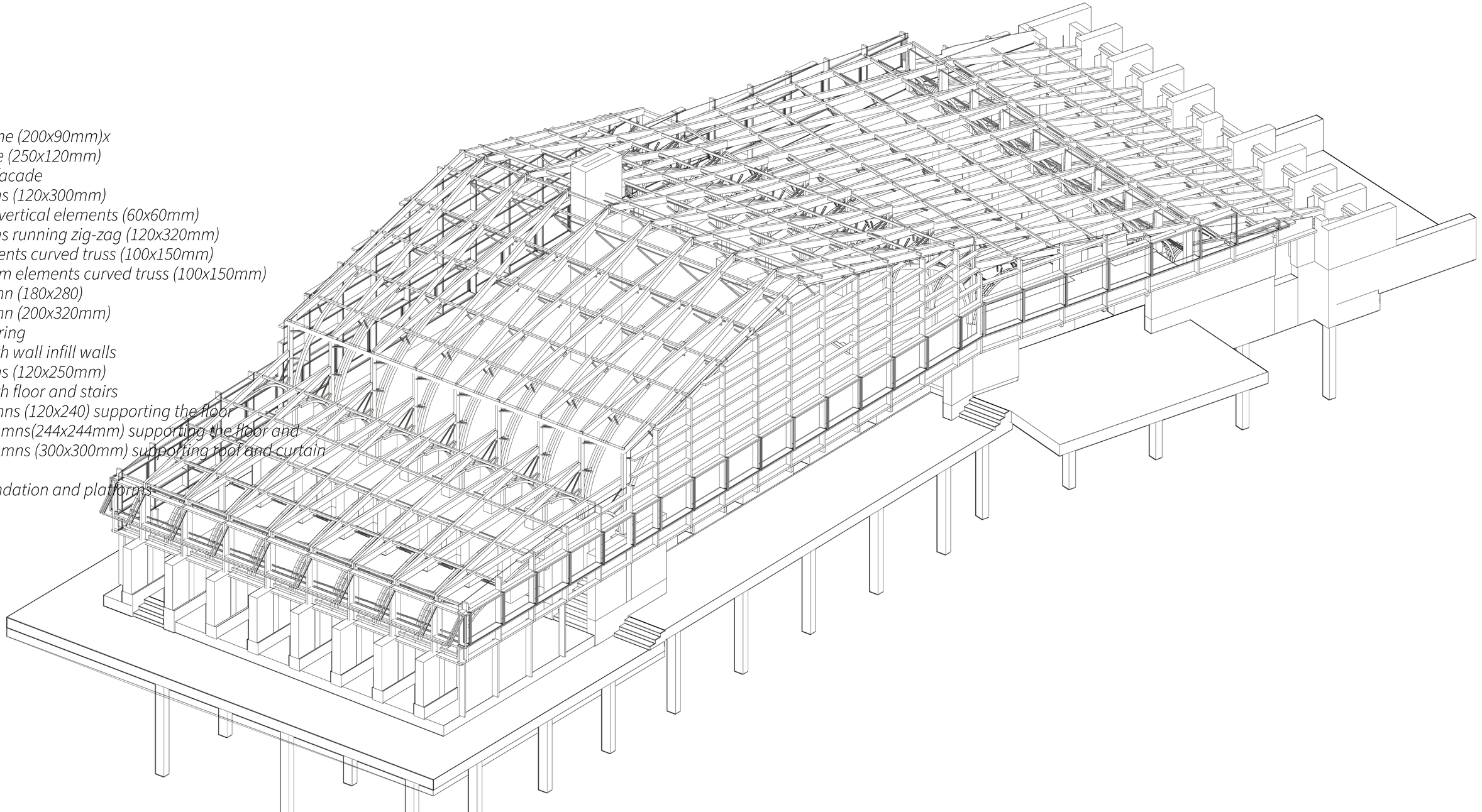


Old polder landscape: the efficient, elongated rectangular plot is not possible yet, resulting in a patchwork that almost alines.

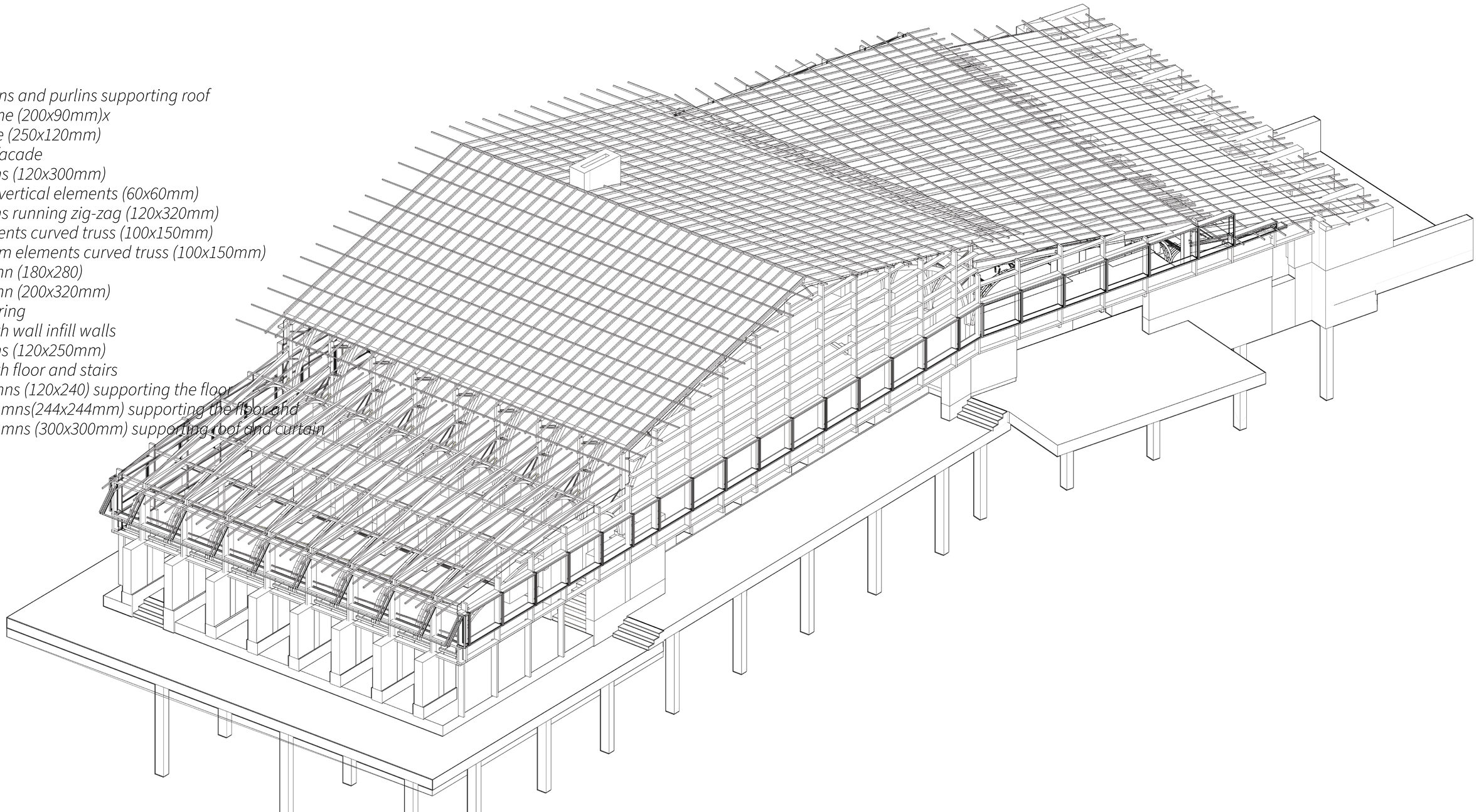
Structure:
glulam purlins (120x300mm)
glulam truss vertical elements (60x60mm)
glulam beams running zig-zag (120x320mm)
bottom elements curved truss (100x150mm)
double bottom elements curved truss (100x150mm)
glulam column (180x280)
glulam column (200x320mm)
plywood flooring
rammed earth wall infill walls
glulam beams (120x250mm)
rammed earth floor and stairs
glulam columns (120x240) supporting the floor
concrete columns(244x244mm) supporting the floor and
concrete columns (300x300mm) supporting roof and curtain
wall facade
concrete foundation and platforms



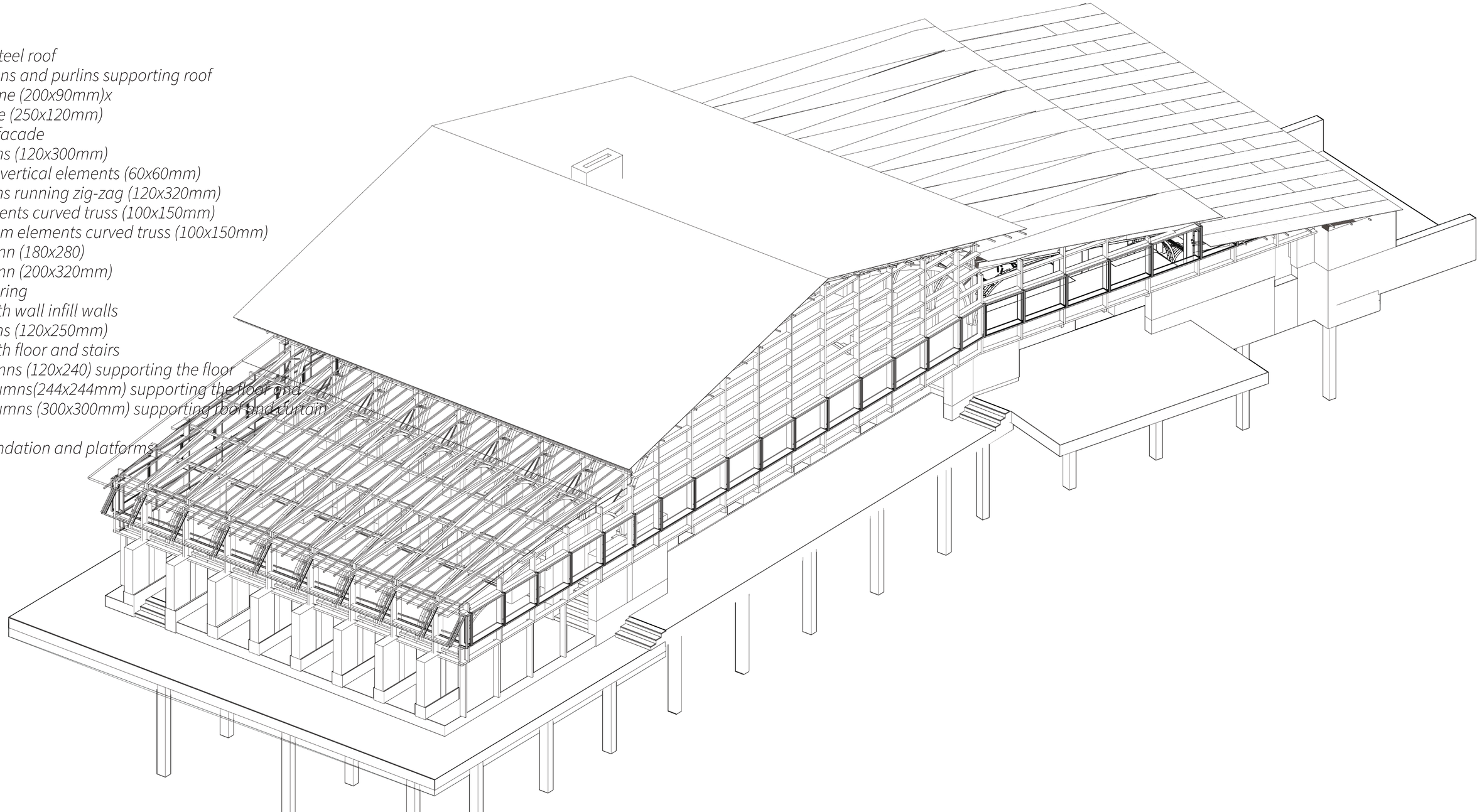
Structure:
Transom frame (200x90mm)x
Mullion frame (250x120mm)
curtain wall facade
glulam purlins (120x300mm)
glulam truss vertical elements (60x60mm)
glulam beams running zig-zag (120x320mm)
bottom elements curved truss (100x150mm)
double bottom elements curved truss (100x150mm)
glulam column (180x280)
glulam column (200x320mm)
plywood flooring
rammed earth wall infill walls
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rammed earth floor and stairs
glulam columns (120x240) supporting the floor
concrete columns(244x244mm) supporting the floor and
concrete columns (300x300mm) supporting roof and curtain
wall facade
concrete foundation and platforms



Structure:
glulam battens and purlins supporting roof
Transom frame (200x90mm)x
Mullion frame (250x120mm)
curtain wall facade
glulam purlins (120x300mm)
glulam truss vertical elements (60x60mm)
glulam beams running zig-zag (120x320mm)
bottom elements curved truss (100x150mm)
double bottom elements curved truss (100x150mm)
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glulam column (200x320mm)
plywood flooring
rammed earth wall infill walls
glulam beams (120x250mm)
rammed earth floor and stairs
glulam columns (120x240) supporting the floor
concrete columns(244x244mm) supporting the floor and
concrete columns (300x300mm) supporting roof and curtain
wall facade

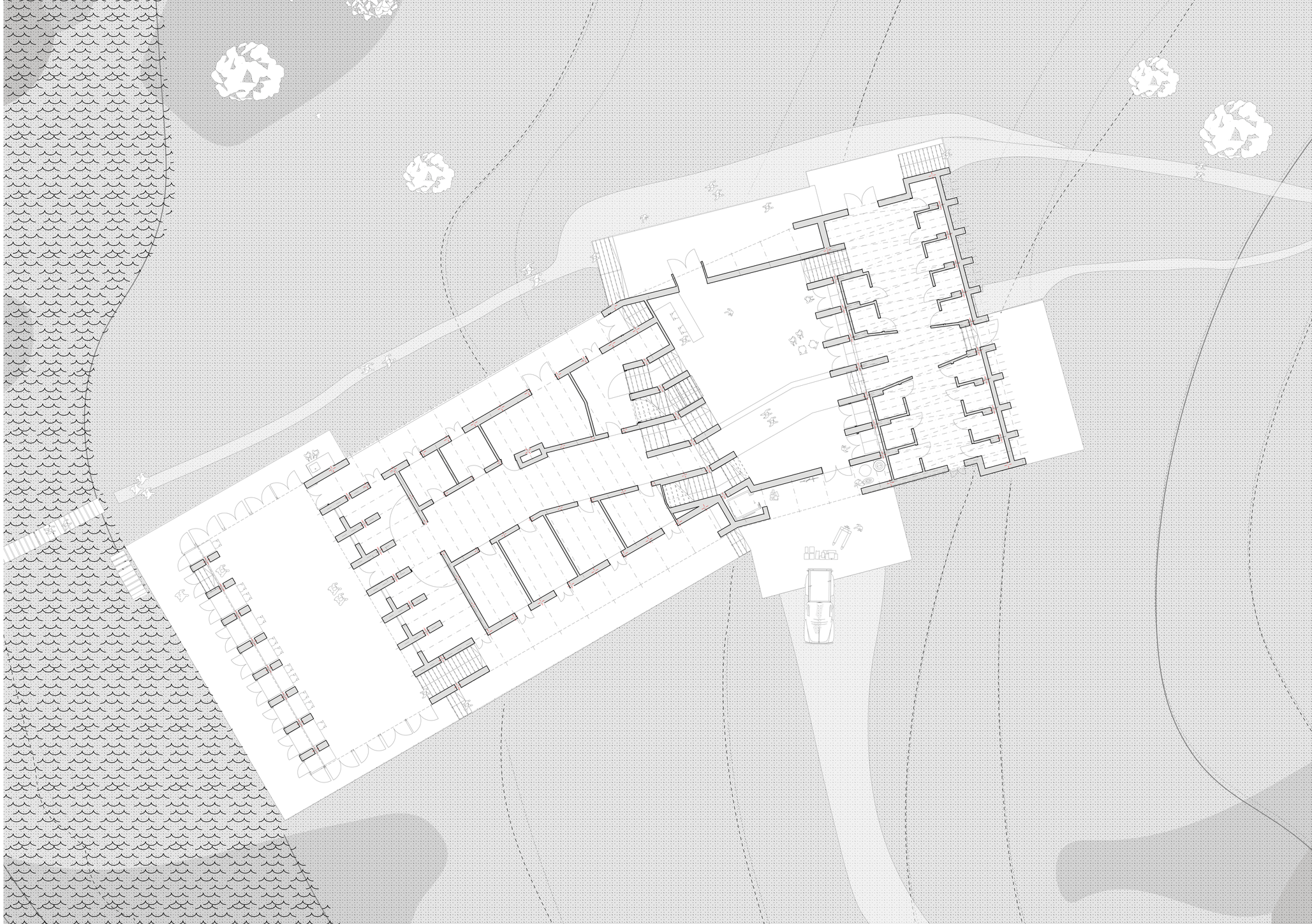


Structure:
corrugated steel roof
glulam battens and purlins supporting roof
Transom frame (200x90mm)x
Mullion frame (250x120mm)
curtain wall facade
glulam purlins (120x300mm)
glulam truss vertical elements (60x60mm)
glulam beams running zig-zag (120x320mm)
bottom elements curved truss (100x150mm)
double bottom elements curved truss (100x150mm)
glulam column (180x280)
glulam column (200x320mm)
plywood flooring
rammed earth wall infill walls
glulam beams (120x250mm)
rammed earth floor and stairs
glulam columns (120x240) supporting the floor
concrete columns(244x244mm) supporting the floor and
concrete columns (300x300mm) supporting roof and curtain
wall facade
concrete foundation and platforms



1:100
entrance level +o,5

Shoeroom
Supplies



1:100
ground floor 0

bedrooms

3 x 9m^2	*12 people*
5x 4m^2	*10 people*
3x ~ 18 m^2	*36 people*
1x 24 m^2	*2 people (or more)*
1x 14 m^2	*1 person (ward)*

outdoor niches in summer
~10 people

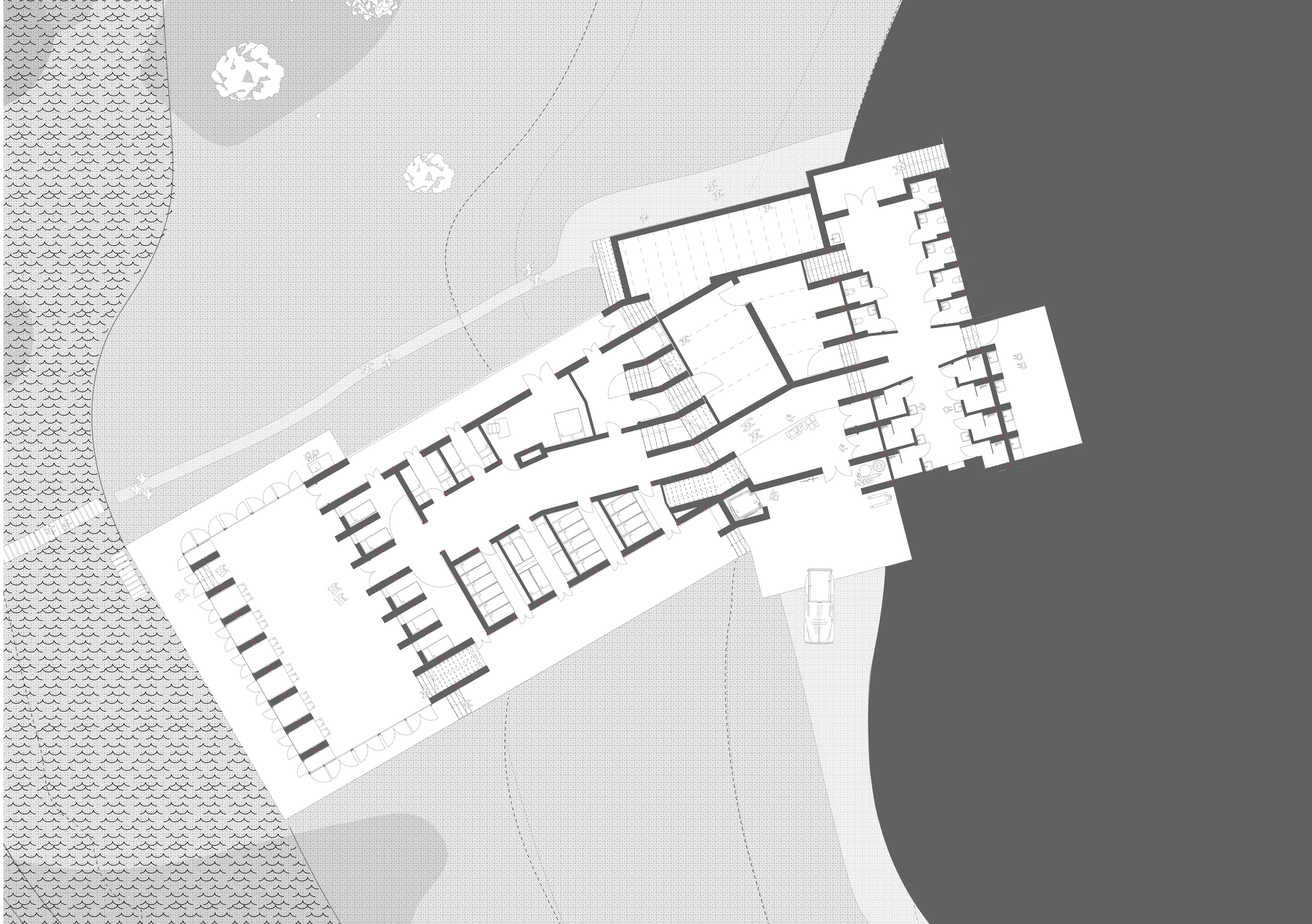
camping around the refuge in
peak season max 20 people

sanitary (70m^2)

7x toilet
7x shower
extra sinks in outdoor space

basement (80m ^2)

installations
storage
laundry room



impression greenhouse

framing the landscape

protected from the wind



possibility to create extra sleeping places



1:100
ground floor 0

bedrooms

3 x 9m^2	*12 people*
5x 4m^2	*10 people*
3x ~ 18 m^2	*36 people*
1x 24 m^2	*2 people (or more)*
1x 14 m^2	*1 person (ward)*

outdoor niches in summer
~10 people

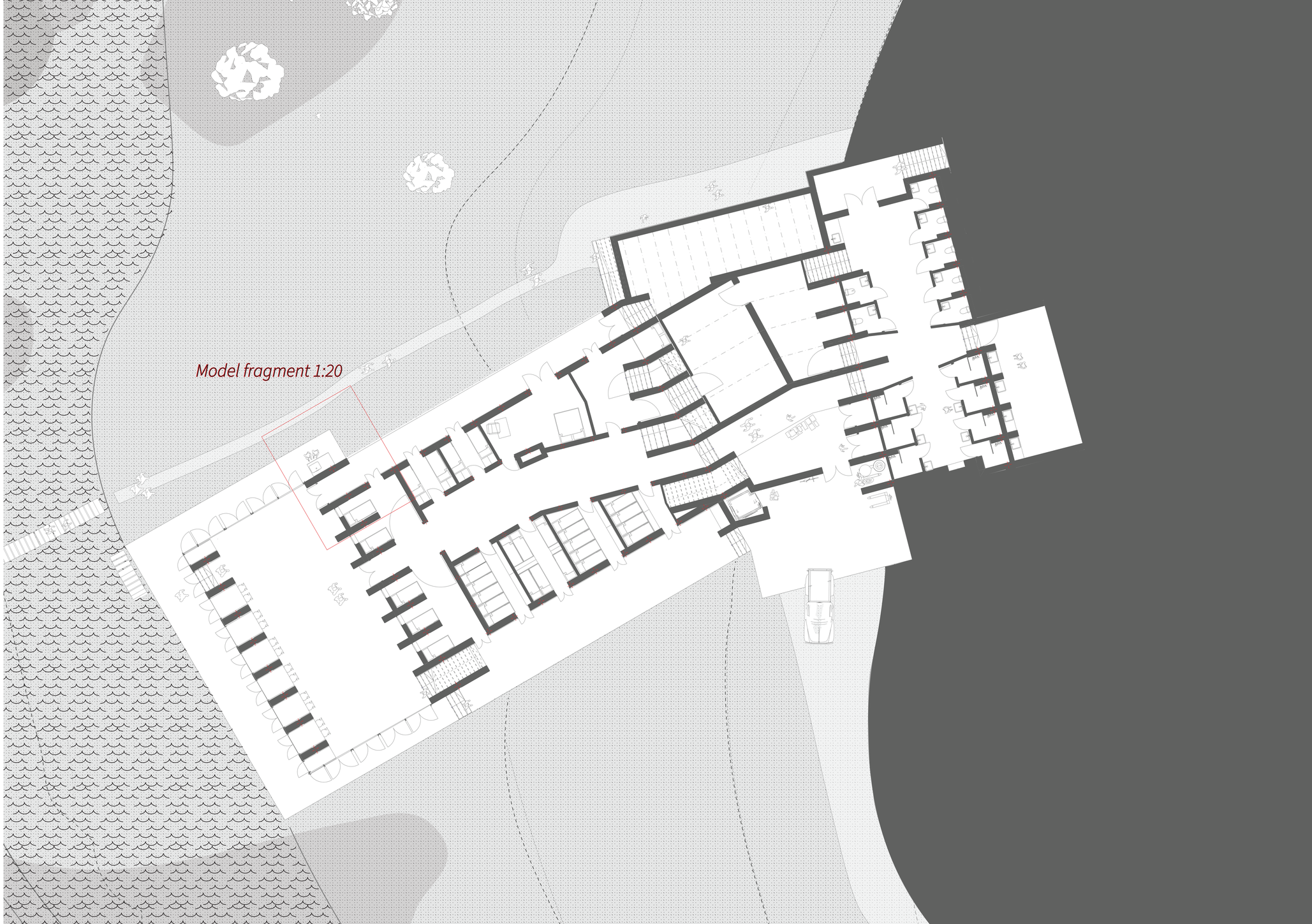
camping around the refuge in
peak season max 20 people

sanitary (70m^2)

7x toilet
7x shower
extra sinks in outdoor space

basement (80m ^2)

installations
storage
laundry room



1:100
ground floor 0

bedrooms

3 x 9m^2	*12 people*
5x 4m^2	*10 people*
3x ~ 18 m^2	*36 people*
1x 24 m^2	*2 people (or more)*
1x 14 m^2	*1 person (ward)*

outdoor niches in summer
~10 people

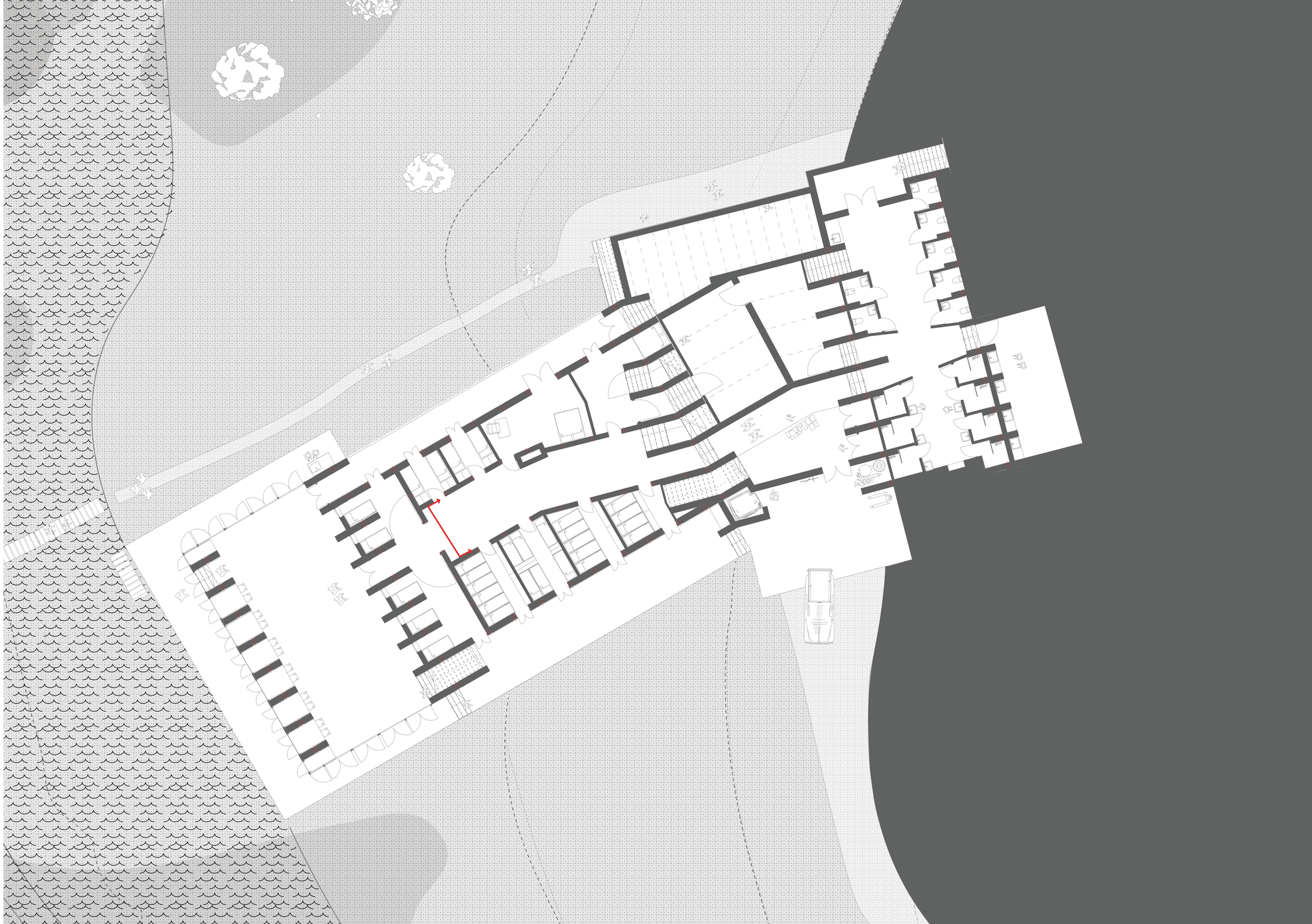
camping around the refuge in
peak season max 20 people

sanitary (70m^2)

7x toilet
7x shower
extra sinks in outdoor space

basement (80m ^2)

installations
storage
laundry room



hallway to bedrooms

dug out earth from the sight is rendered
visible above ground and expresses a timeless robustness

wooden beams on top of the thick rammed earth walls hint at a different world above..

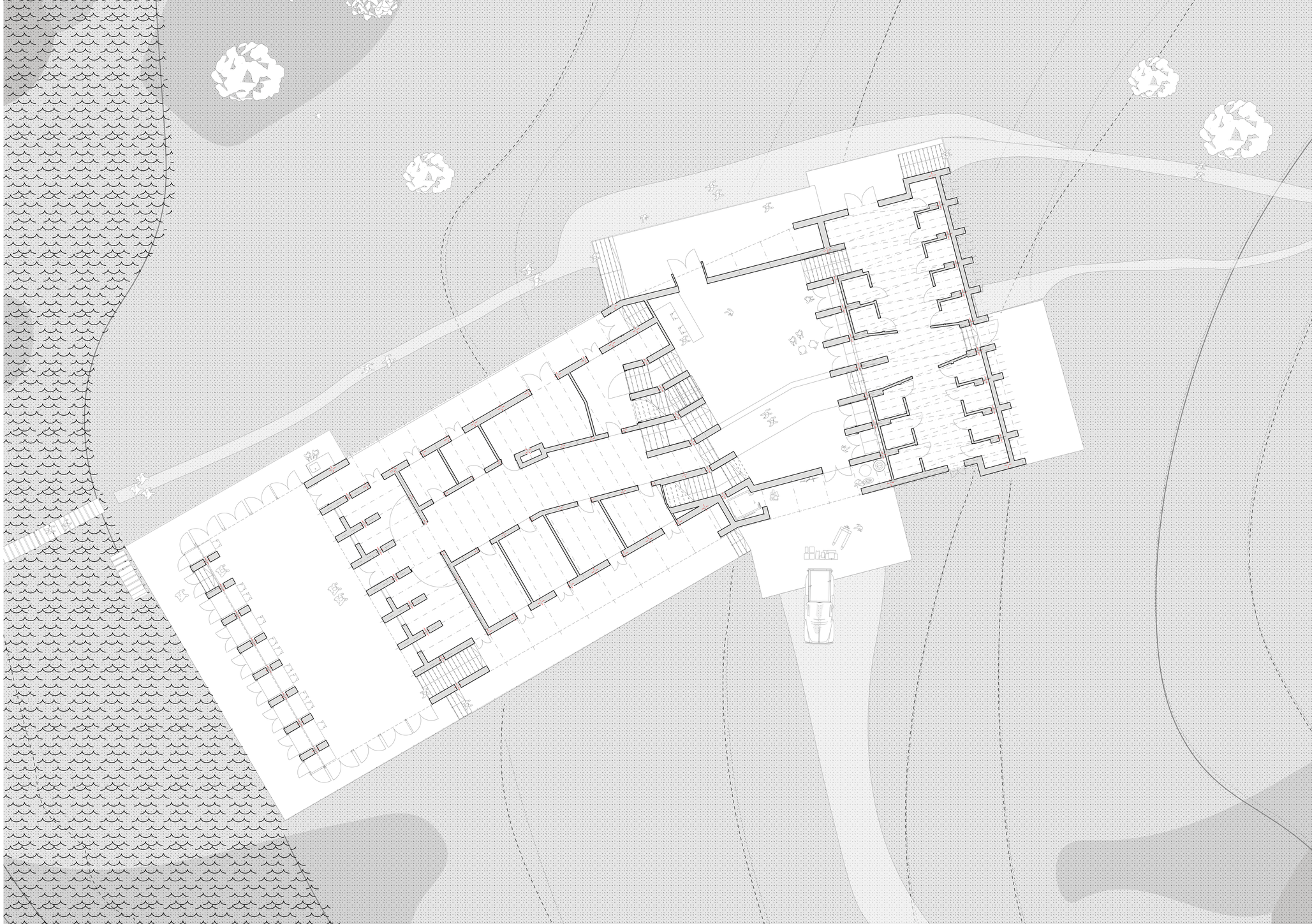
the top of the mount is visible through the door in the back

take the stairs up back to the entrance level



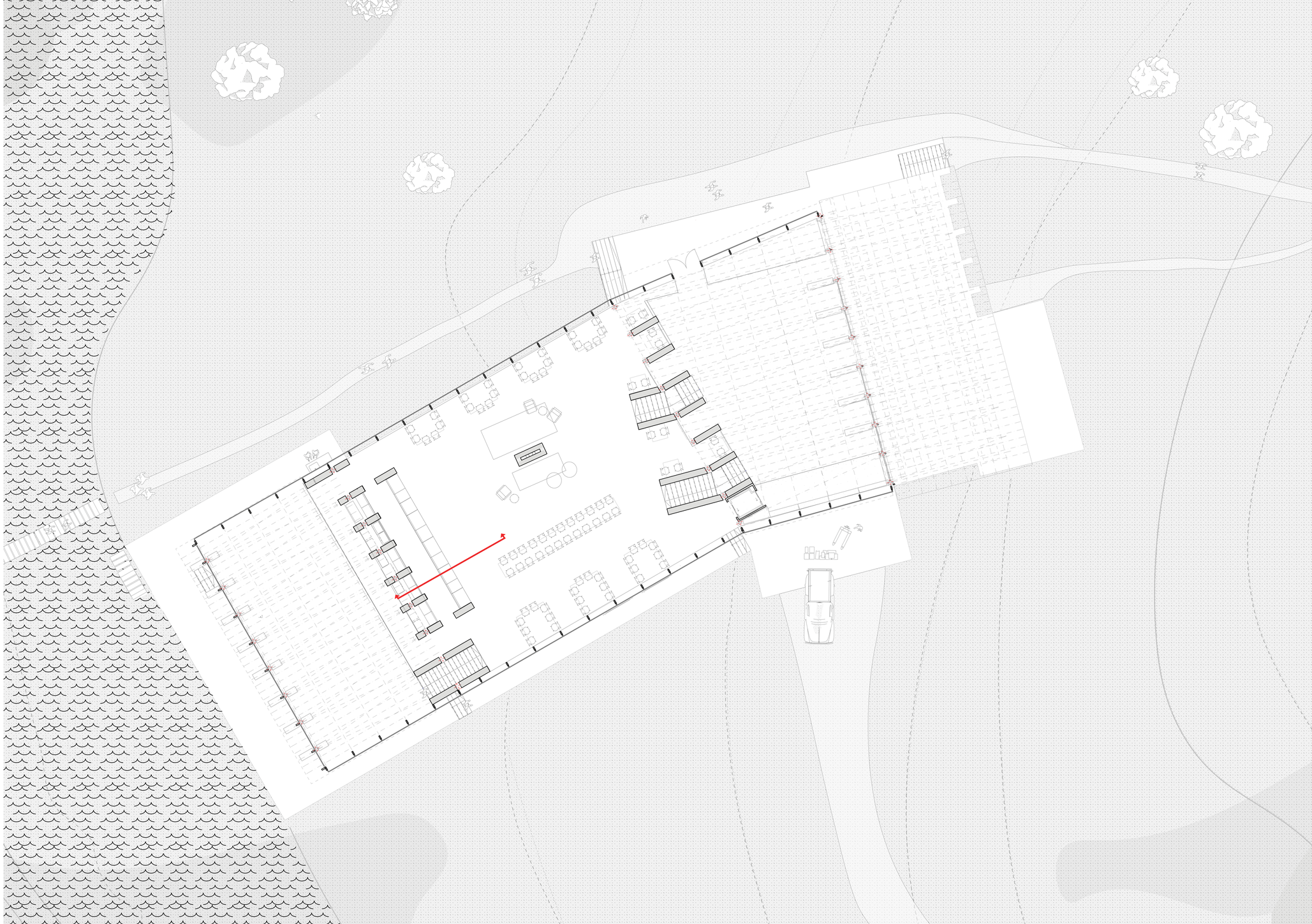
1:100
entrance level +0,5

one staircase for guests and
one for supplies (or elevator)



1:100
top level +1

one open living space
looking through the roof structure
into the other volumes



kitchen

when the shutters are open the buildings can be looked through in transversal direction

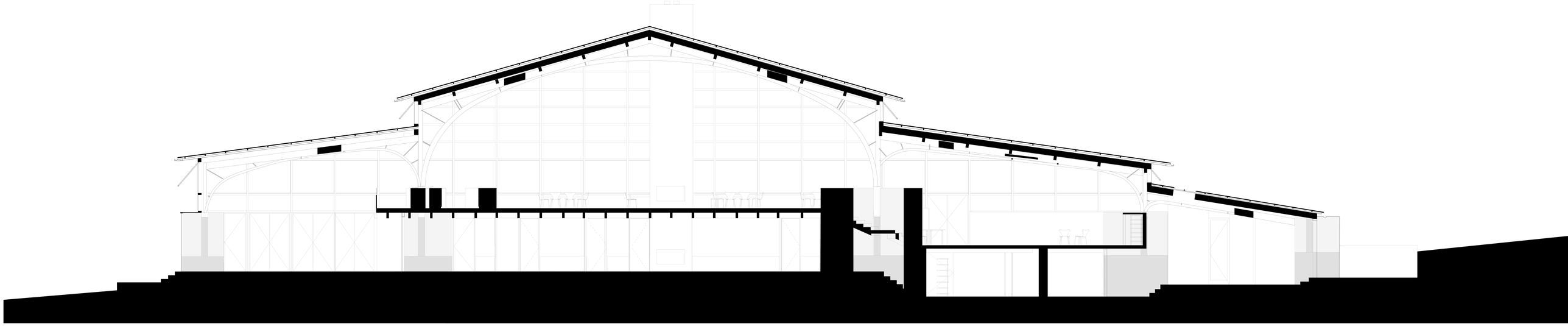
where two trusses come together, a treshold space is created

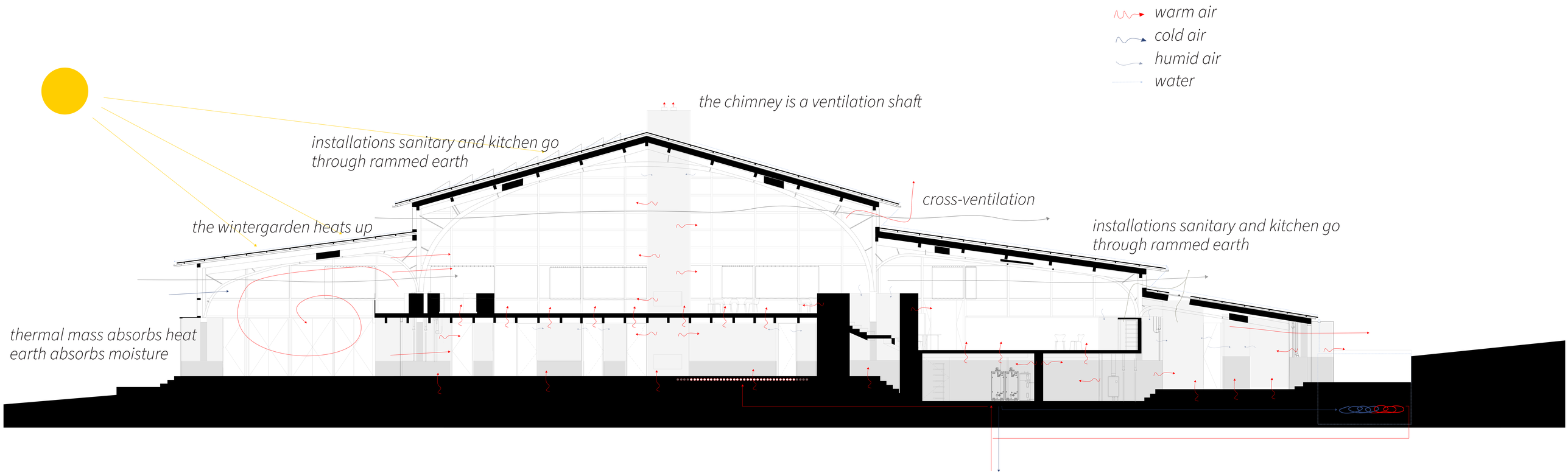


Section BB
1:100

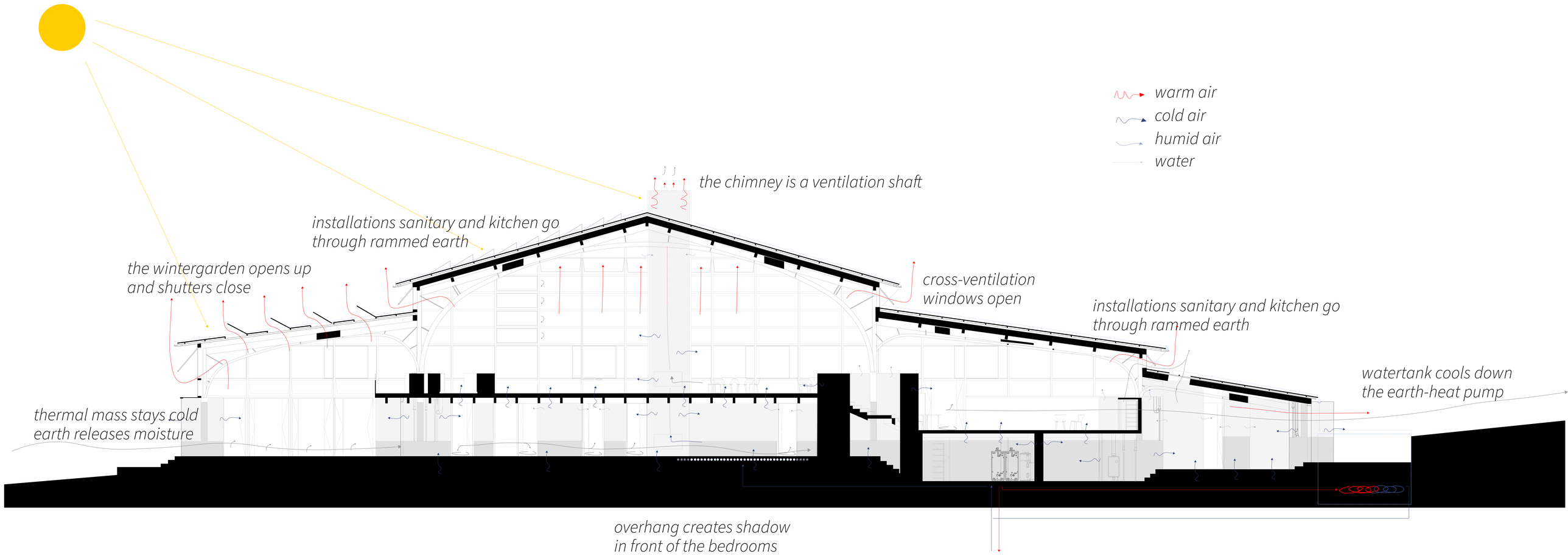
subtle height differences
create a ground floor that
sometimes lifts itself just
above the soil and other
times sinks in

the treshold space the trusses
create is used to move
between the levels





1:100 climate diagram, winter situation

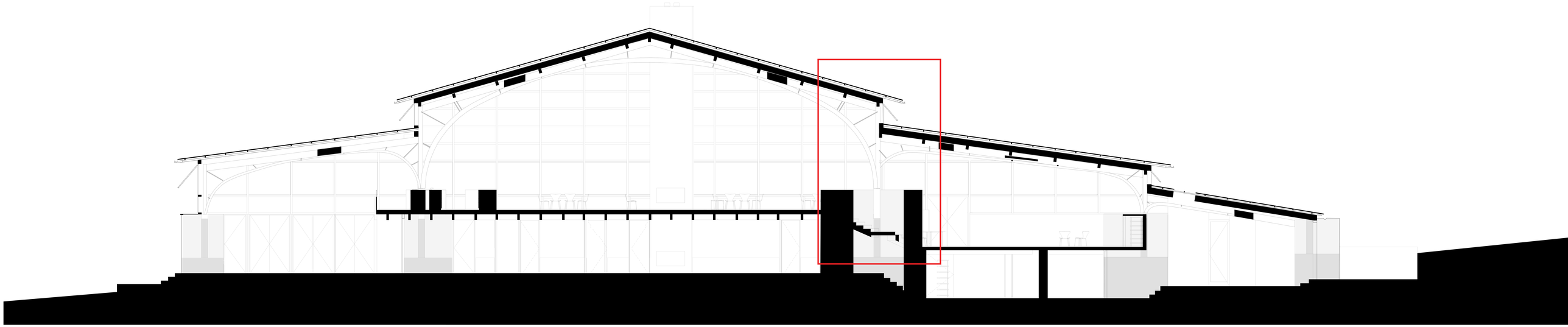


1:100 climate diagram, summer situation

Section BB
1:100

subtle height differences
create a ground floor that
sometimes lifts itself just
above the soil and other
times sinks in

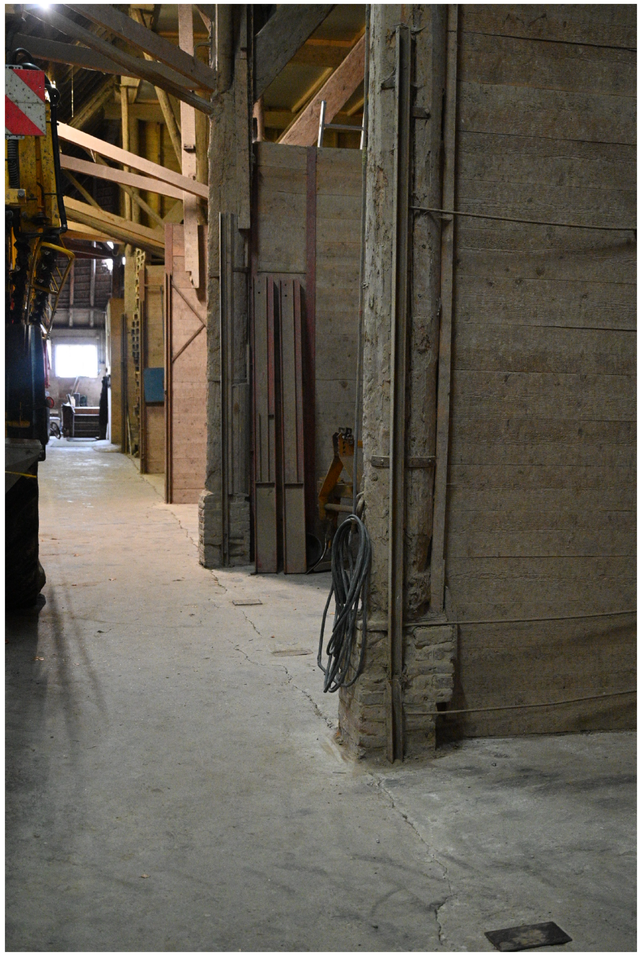
the treshold space the trusses
create is used to move
between the levels



EXCURSION TO SEED POTATO FARM
Fam . Bos, Saaksum

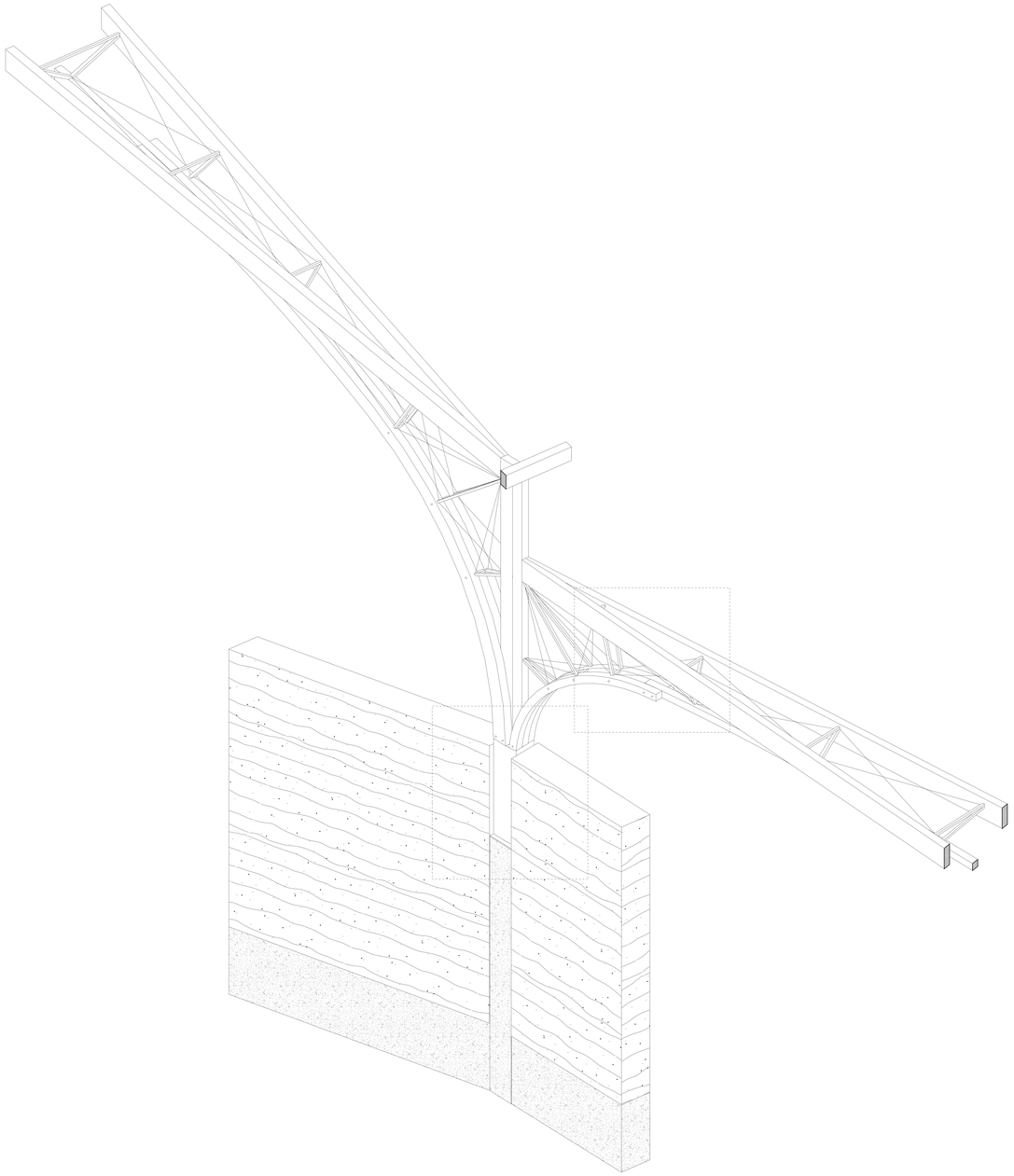
barn constructed in 16th century



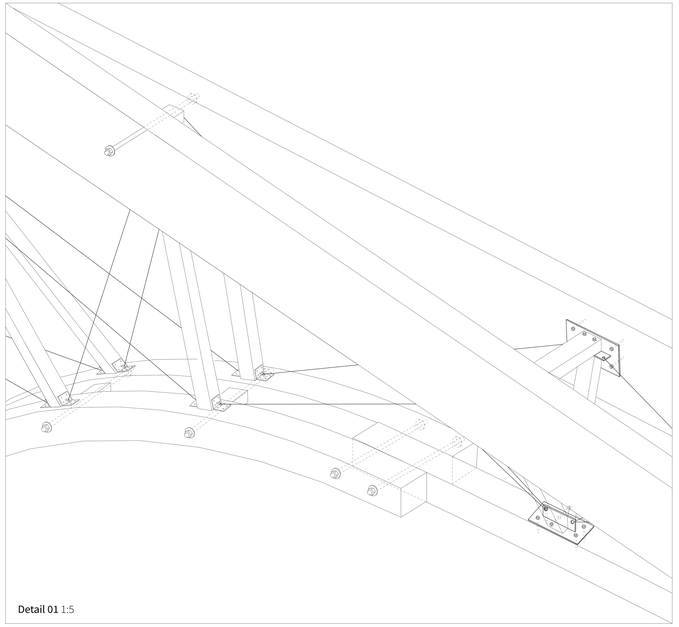



transformative materials-
can wood take a little bit of steel's lightness?

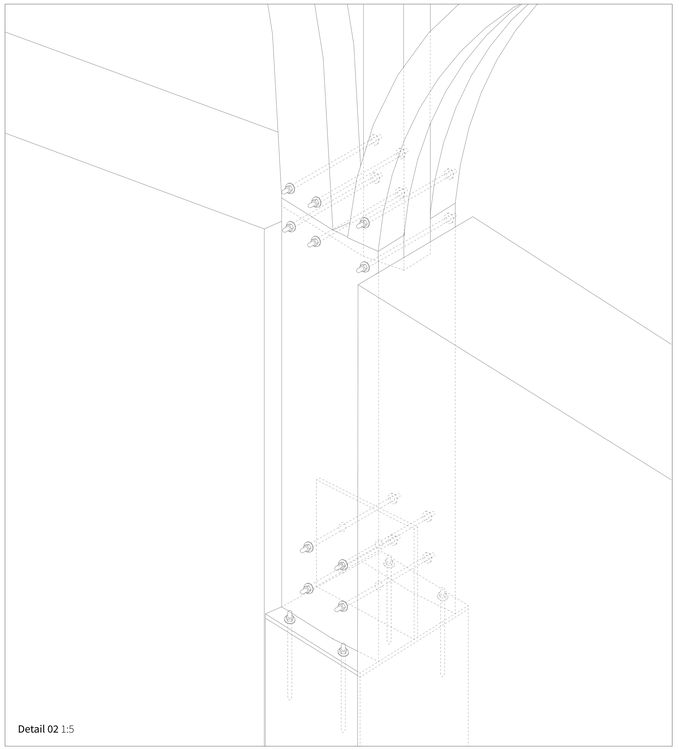
Truss fragment
1:5



Truss Section 1:20



Detail 01 1:5

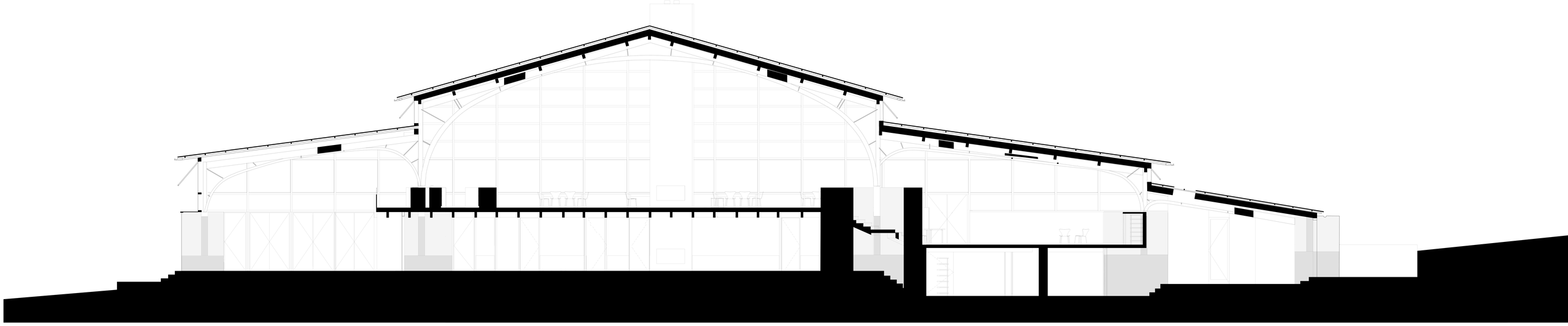


Detail 02 1:5

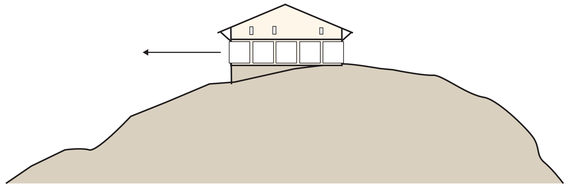
while the groundfloor is more grounded the upper level is more adaptive to the landscape conditions

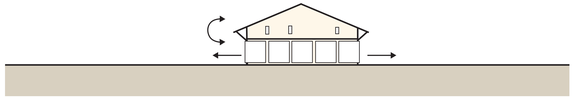
Section BB
1:100

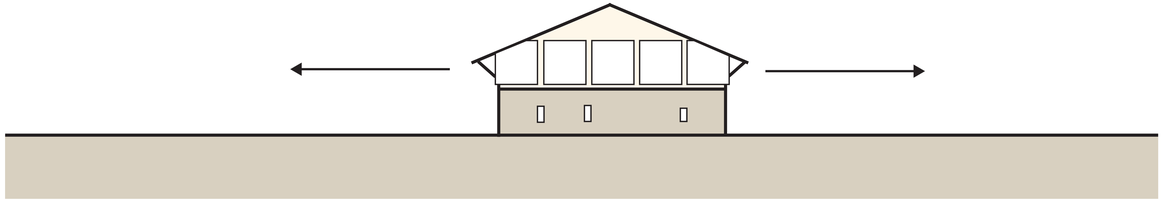
the open living space rises
above the landscape



turn it around
to expierence the landscape of Groningen







filigree material for the communal space room (requires more openings)

solid construction material for the bedrooms (require less openings)

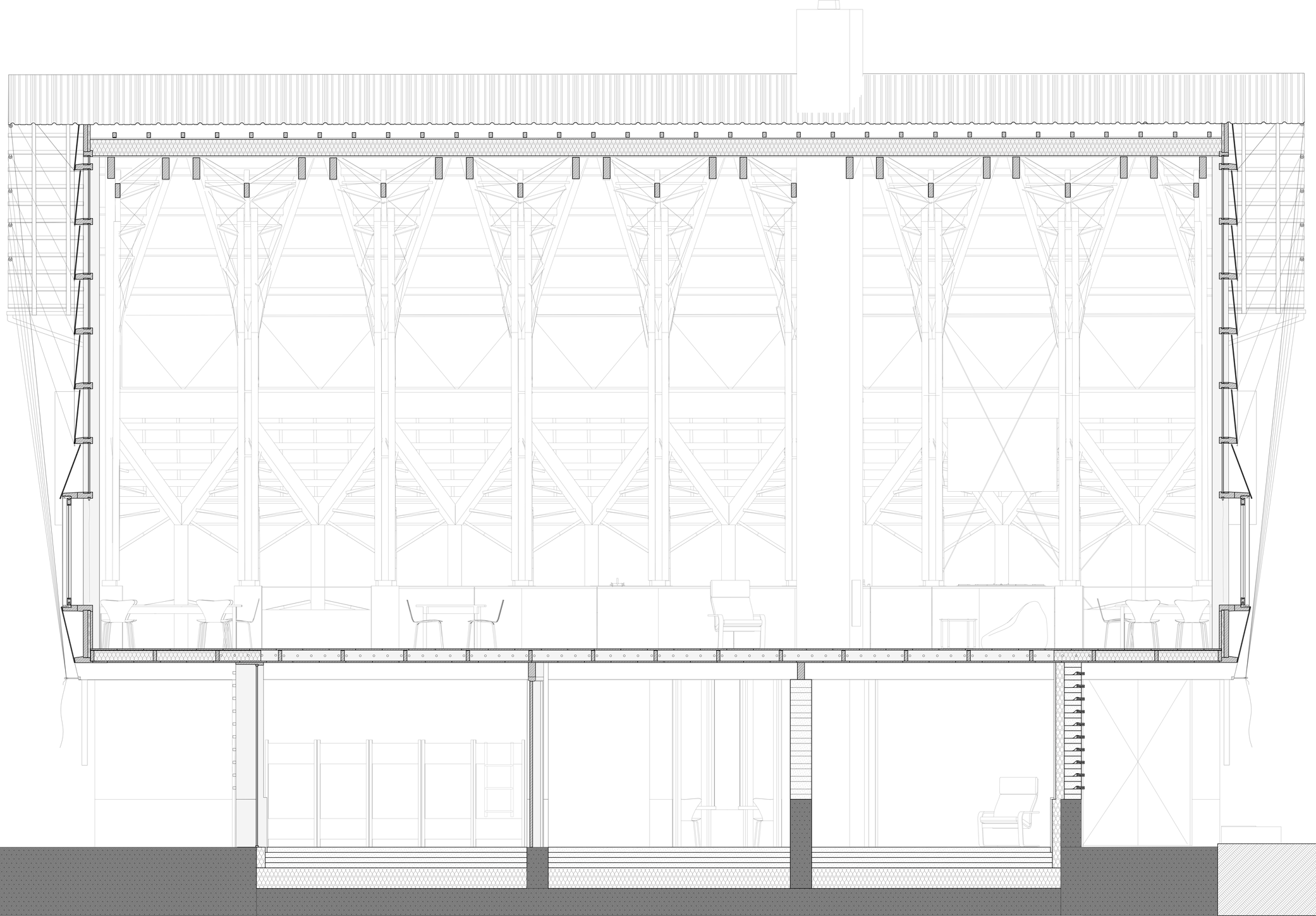
I will elaborate on the design, after I have described my research on materiality.

phenomenon ‘Opkamer’
Oude Pekela (Groningen)

The ‘lifted room’ is the chiquest room of the house,
besides when the water rises, it stays dry.
The staircase is on the inside of the house.



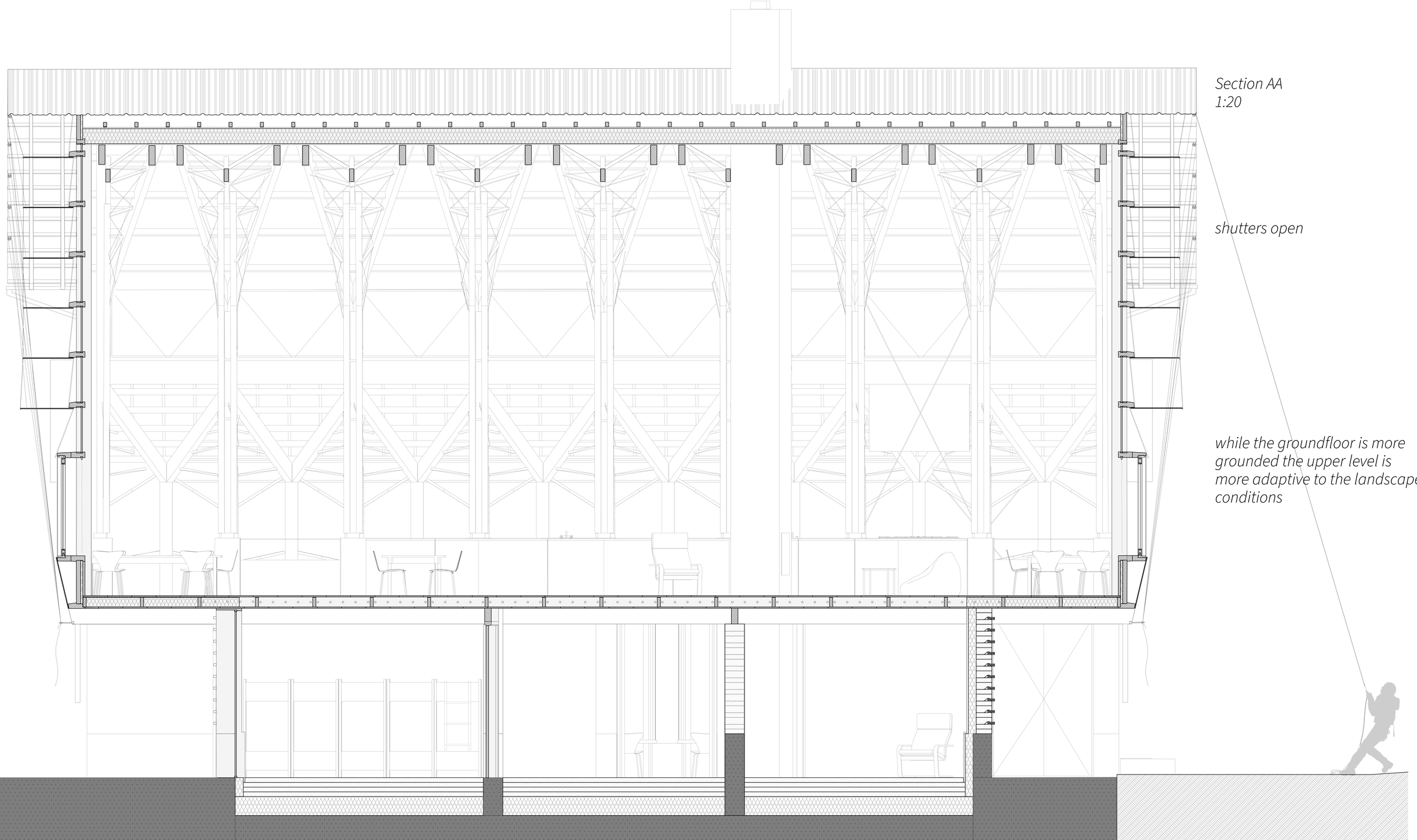




Section AA
1:20

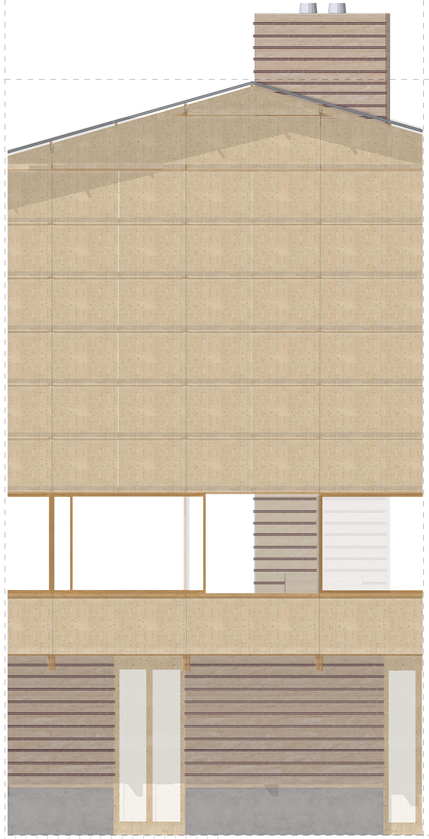
shutters closed

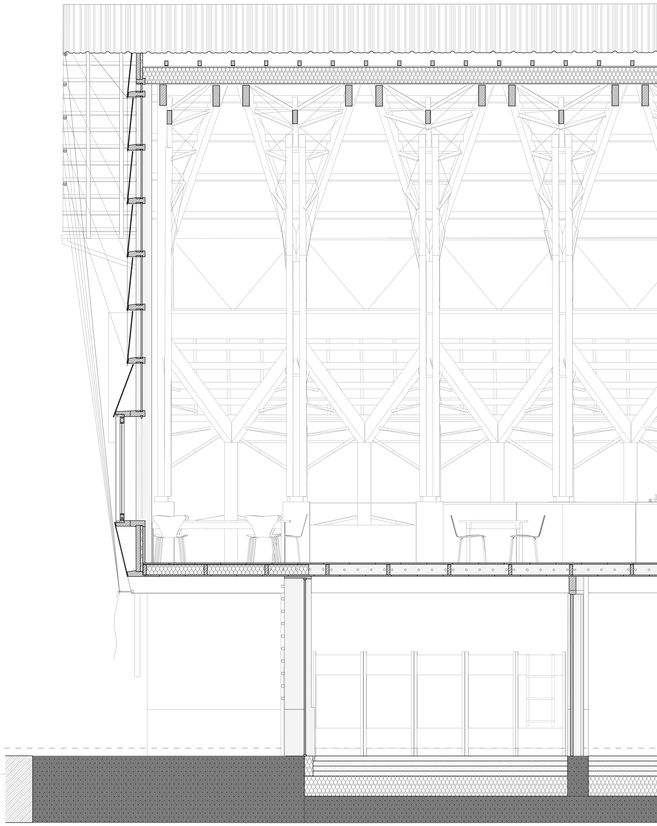
discover horizontal layers

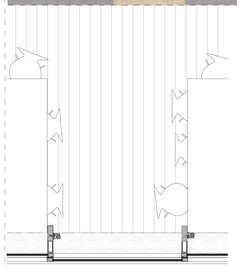

Section AA
1:20
shutters open
while the groundfloor is more grounded the upper level is more adaptive to the landscape conditions

Combination drawing 1:20

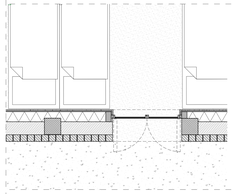
ground and top floor have a different relationship with the outside.





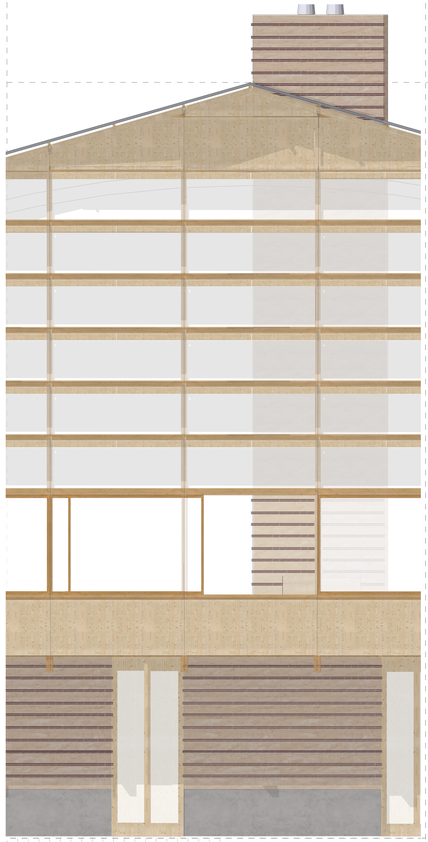


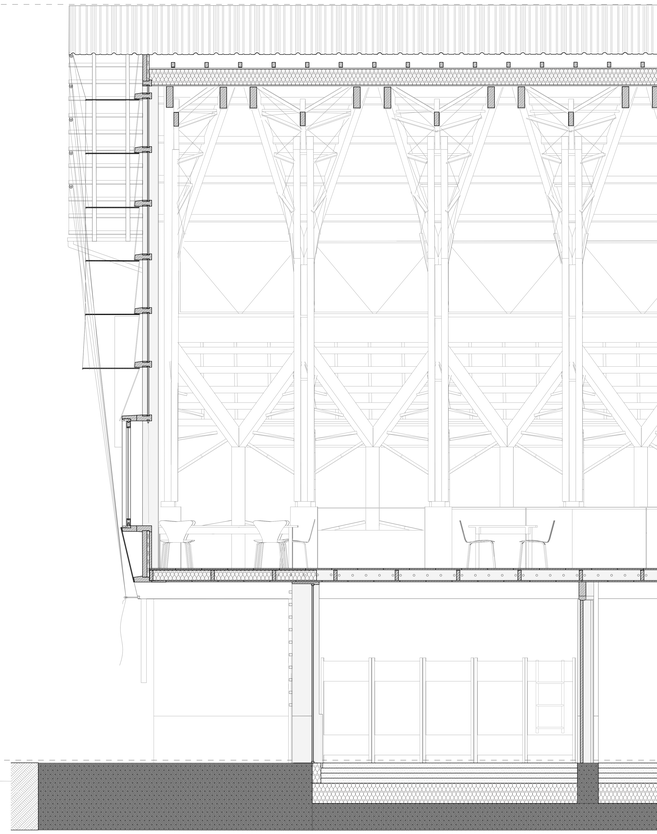
horizontal section, top floor
1:20
(see AA)

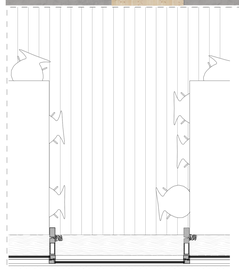


horizontal section, groundfloor
1:20
(see AA)

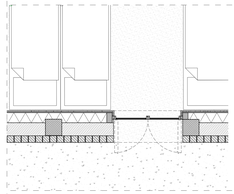
Combination drawing 1:20







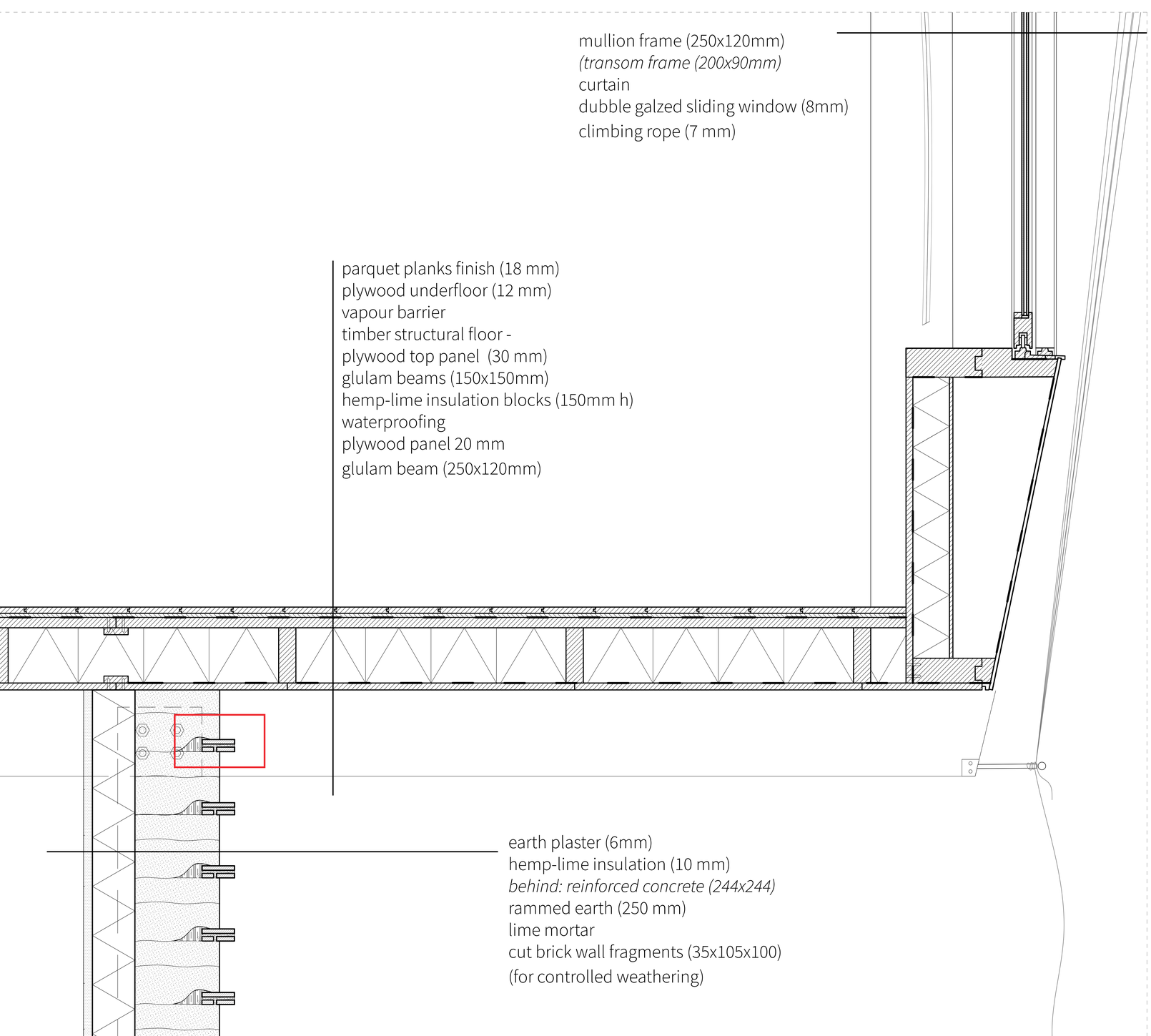
horizontal section, top floor
1:20
(see AA)



horizontal section, groundfloor
1:20
(see AA)

mullion frame (250x120mm)
(transom frame (200x90mm)
curtain
dubble galzed sliding window (8mm)
climbing rope (7 mm)

parquet planks finish (18 mm)
plywood underfloor (12 mm)
vapour barrier
timber structural floor -
plywood top panel (30 mm)
glulam beams (150x150mm)
hemp-lime insulation blocks (150mm h)
waterproofing
plywood panel 20 mm
glulam beam (250x120mm)

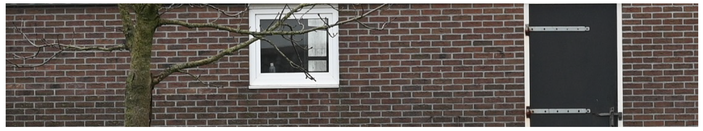


earth plaster (6mm)
hemp-lime insulation (10 mm)
behind: reinforced concrete (244x244)
rammed earth (250 mm)
lime mortar
cut brick wall fragments (35x105x100)
(for controlled weathering)

detail 00, section
1:10
(see AA)



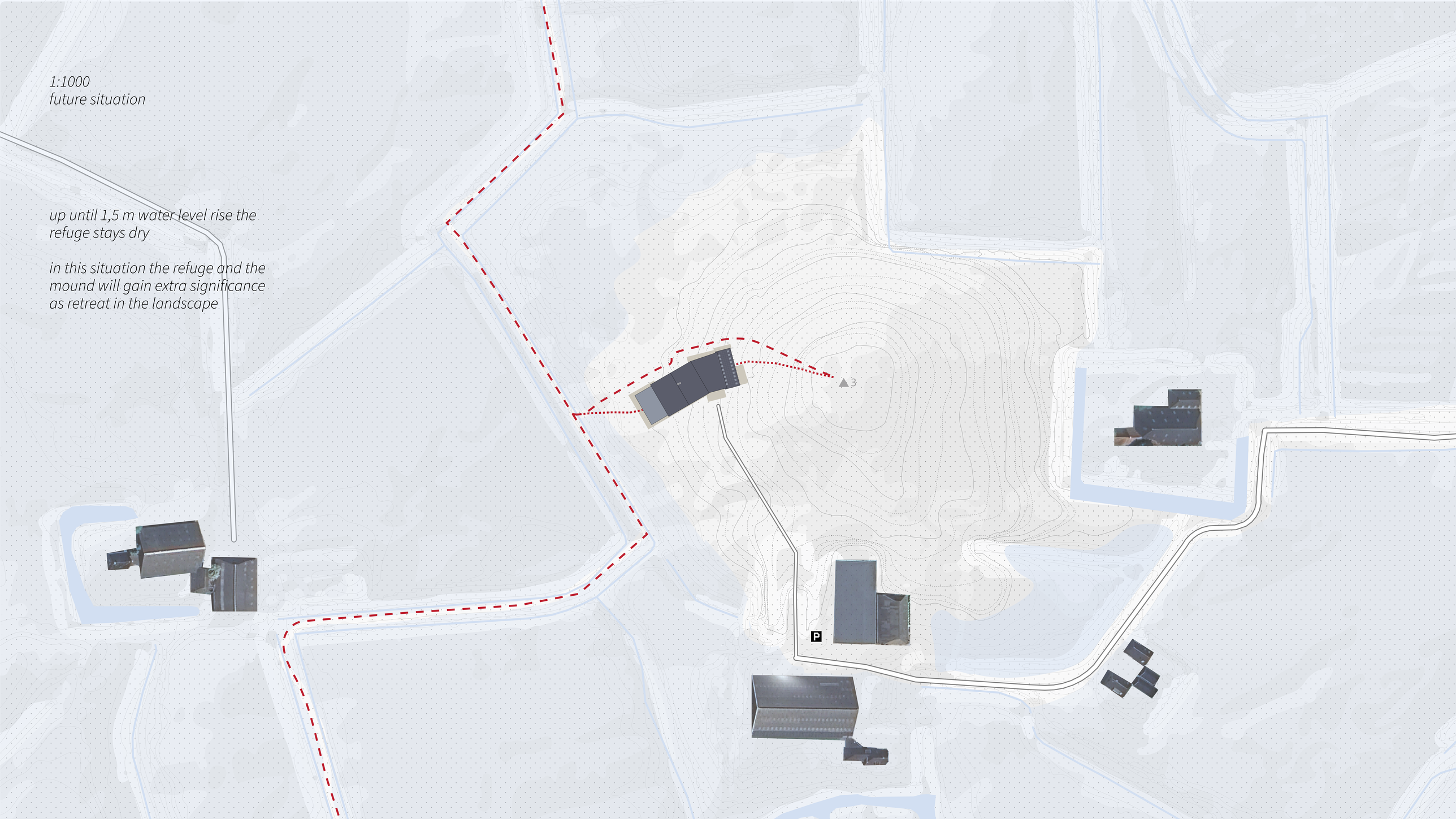
Beswerd, diary farm
wall is more cement than brick



1:1000
future situation

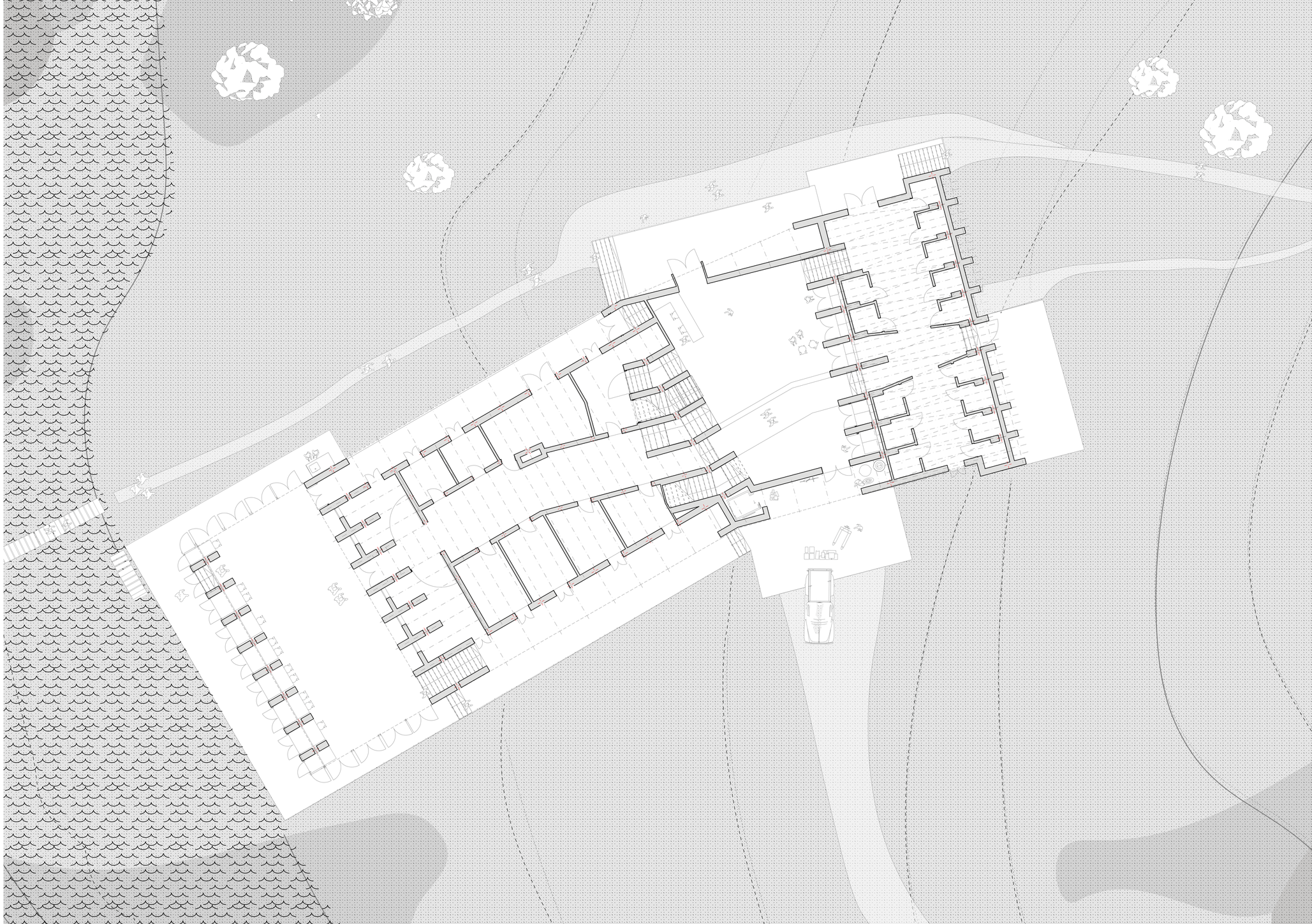
up until 1,5 m water level rise the refuge stays dry

in this situation the refuge and the mound will gain extra significance as retreat in the landscape



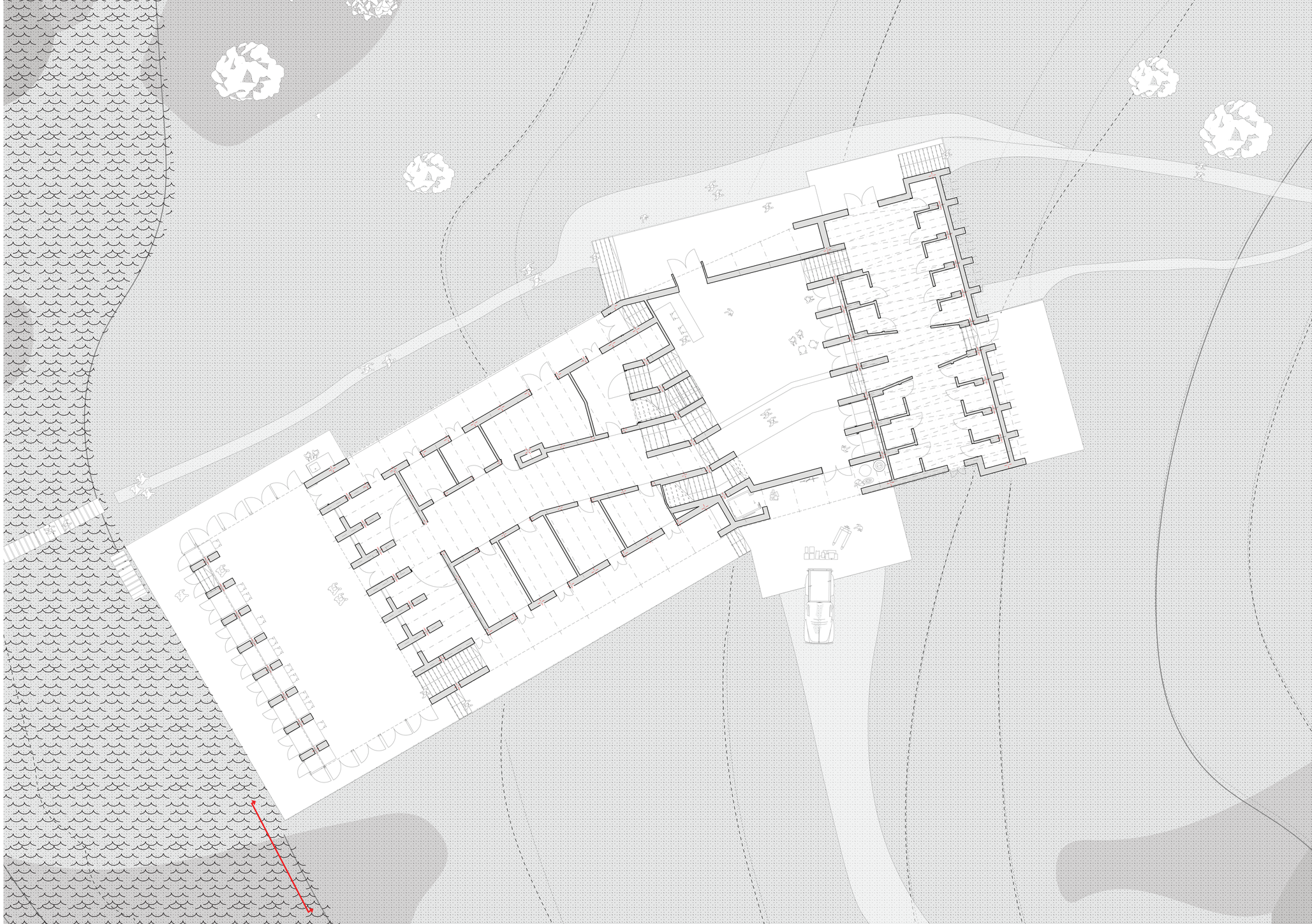
Entrance
1:100

in more than 100 years...



Entrance
1:100

in more than 100 years...



South facade

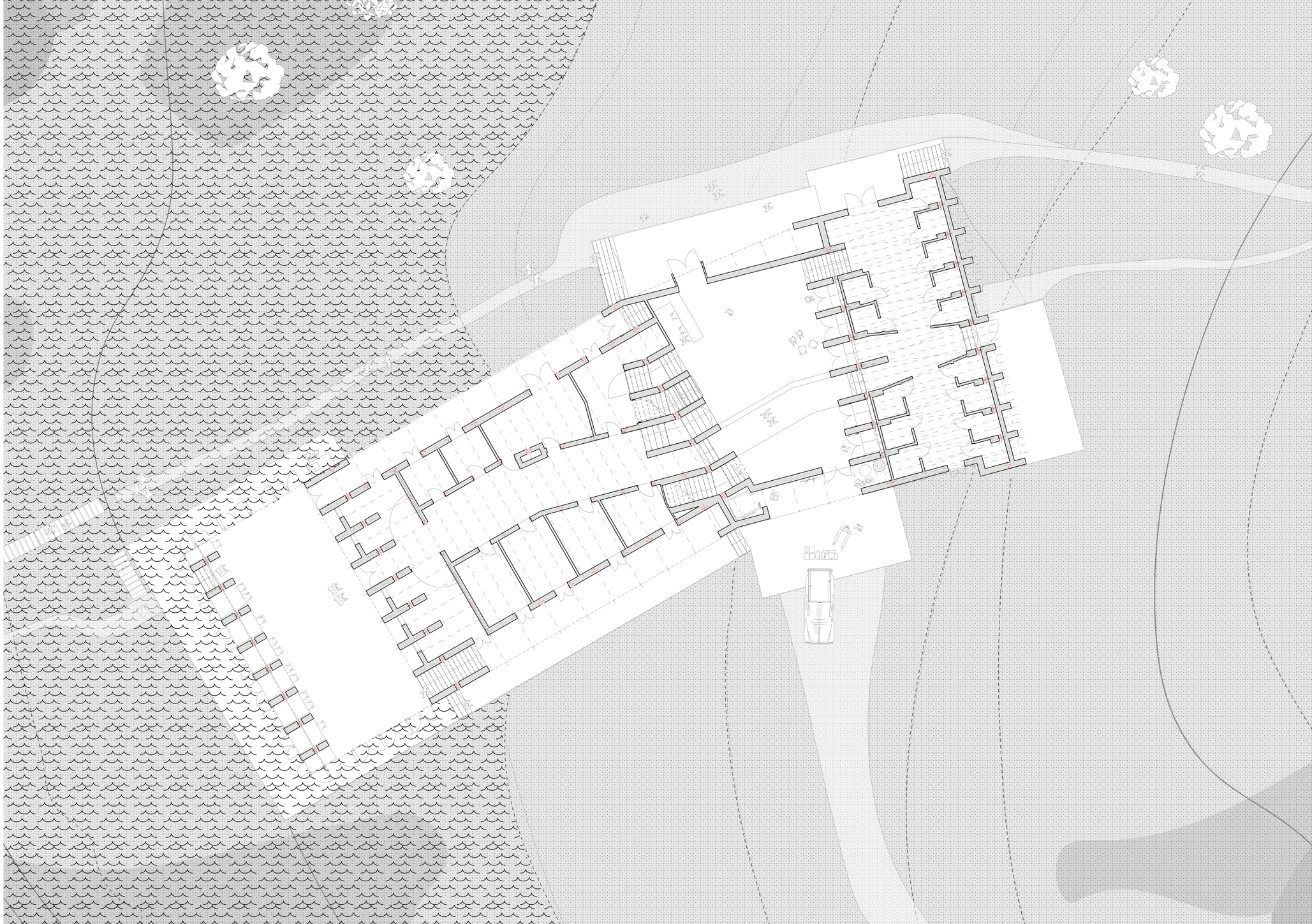
Greenhouse, supply road

stages of water



Entrance
1:100

in more than 100 years...

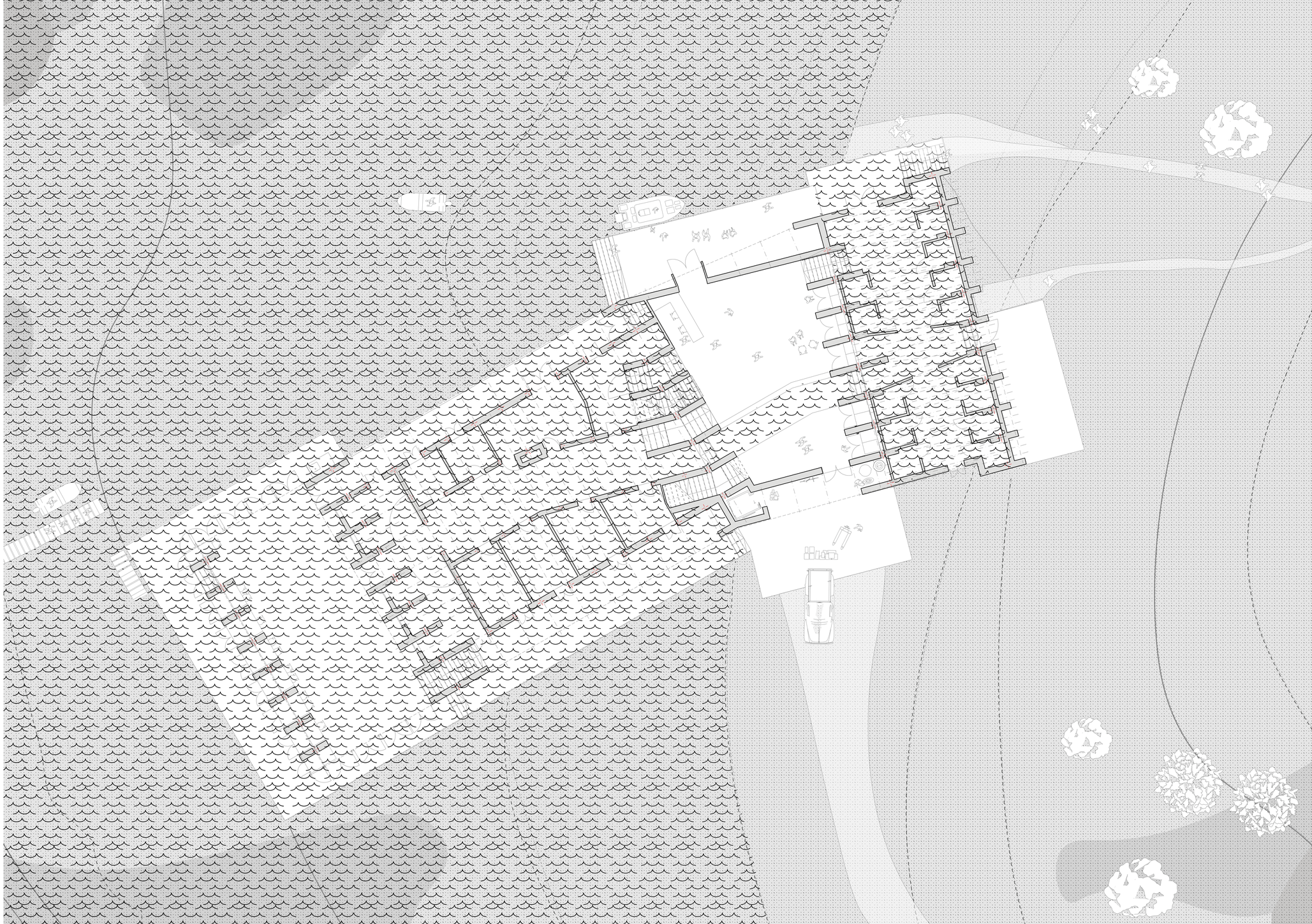


Entrance
1:100

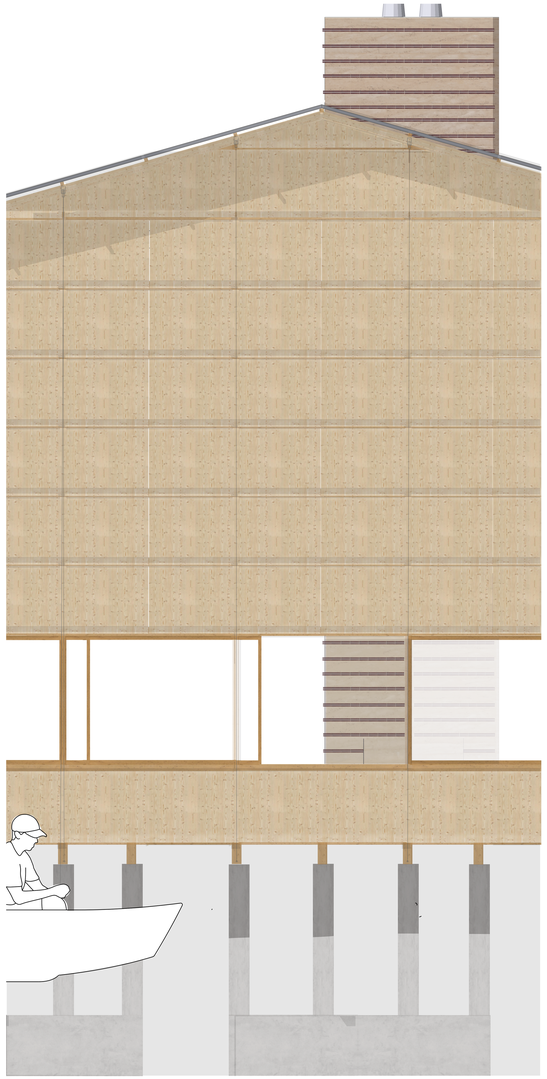
in more than 100 years...

the earth walls on the groundfloor wash away (as well as the hemp insulation)

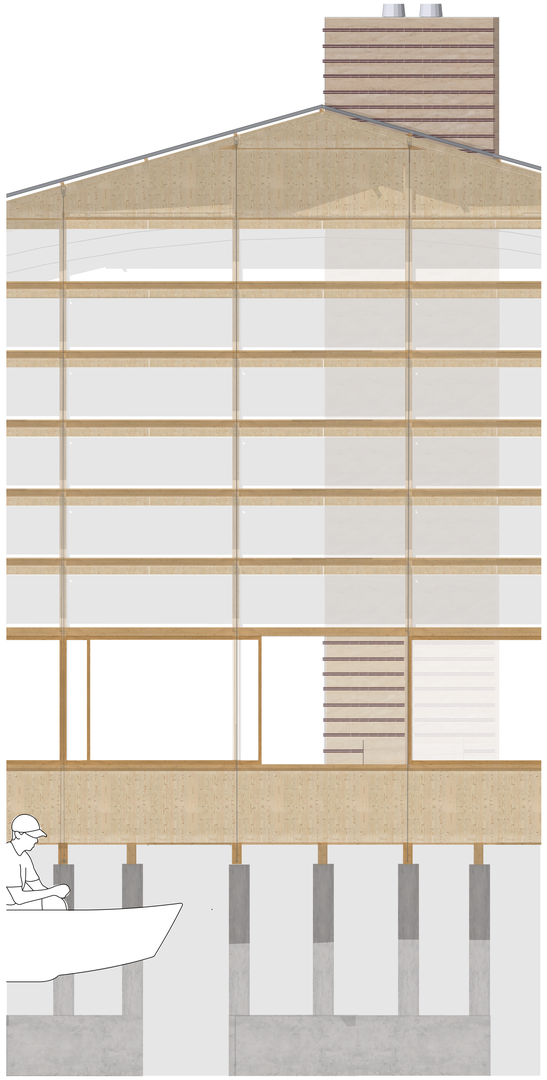
the entrance level stays above, accessing the top floor is without problem



Fragment, façade closed
1:20
in more than 100 years..

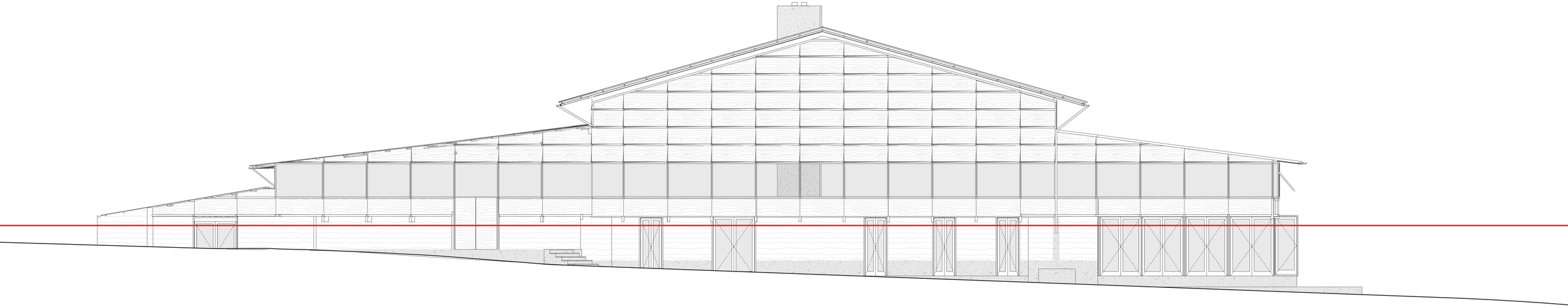


Fragment, façade open
1:20
in more than 100 years..



Section BB
1:100

the rammed earth fades,
the first floor stays



current situation



future scenario





Thankyou for listening!



i am looking forward to many walks and refuge visitis.









