

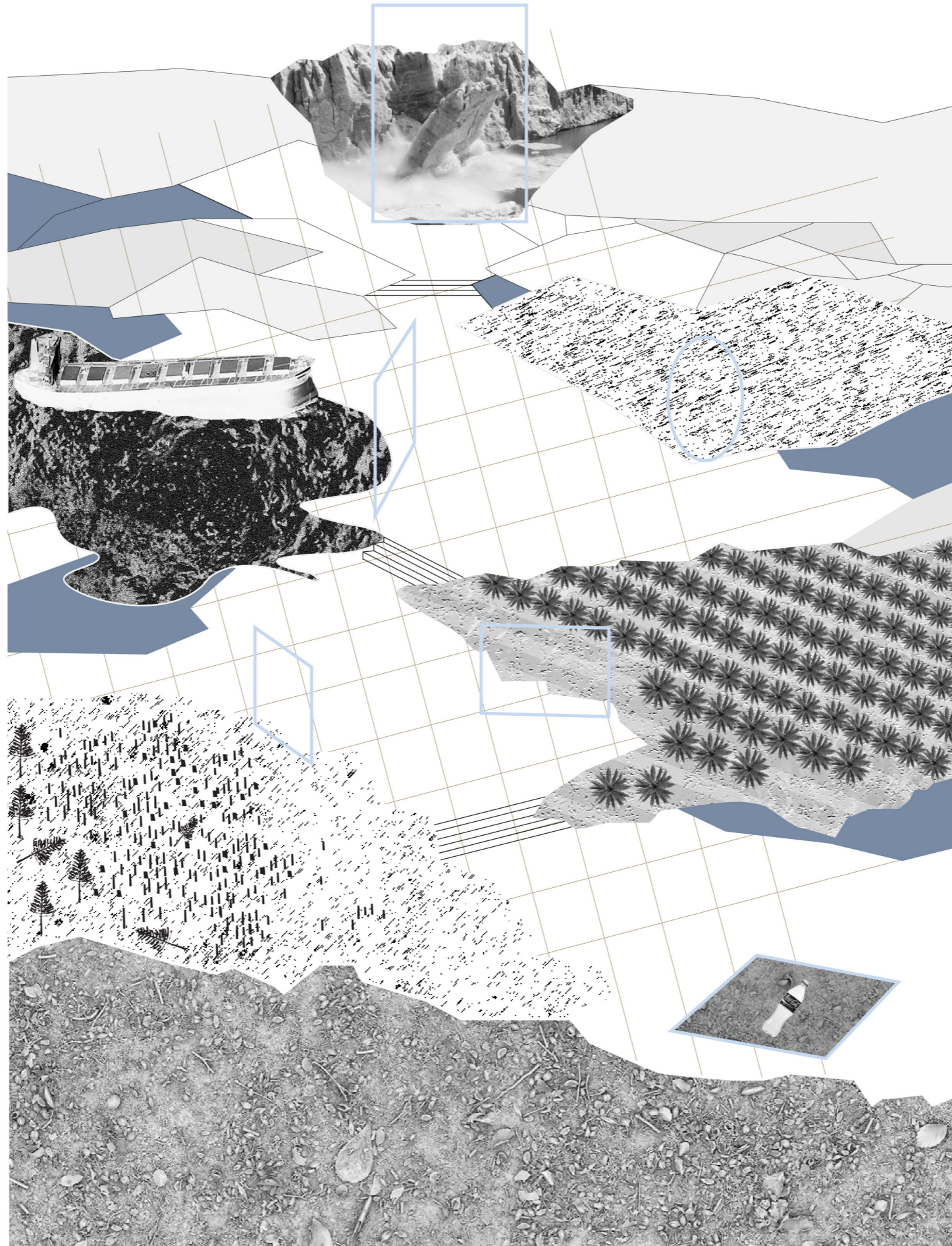
## Environmental Activism in the Museum: Art and architecture displaying change

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5134021

**Research & Concept**  
Programme organization  
Final Design  
Climate  
Structure  
Detail  
Views

# Design Manifesto

## Spotlight on the Environment



# Design Manifesto

## The end of neutrality

**Museums are** **trusted** institutions

expressions of the **community**

a bridge between **science** and **culture**

**evidence** base on knowlege

seed banks of **sustainable** living practices

**creative** environments

**free** to choose and act

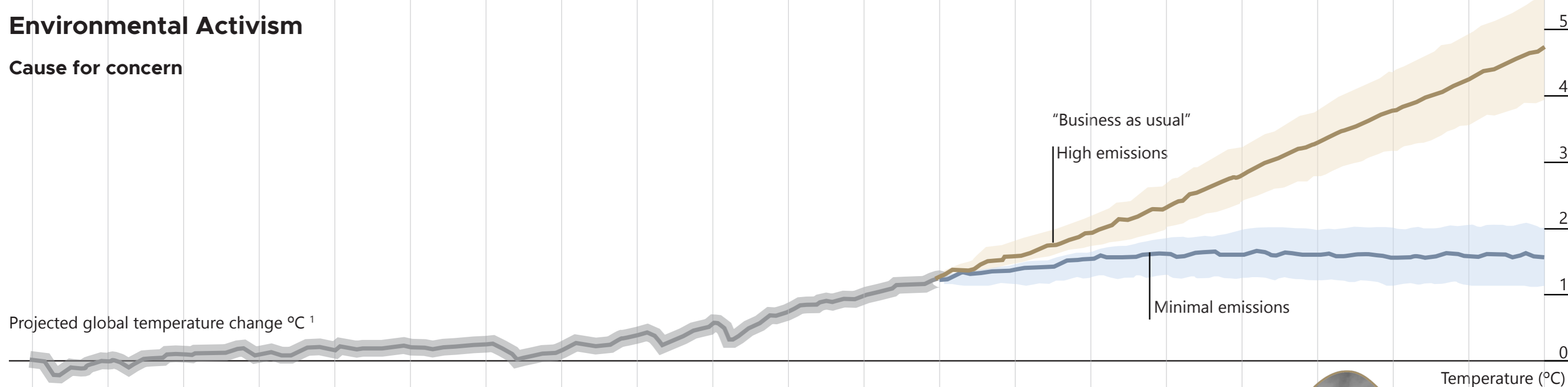
*“These gifts must now be put to work in combating the specter of climate change and its impact on the biosphere.”*

*Robert R. Janes,  
The End of Neutrality: a Modest Manifesto*

# Environmental Activism

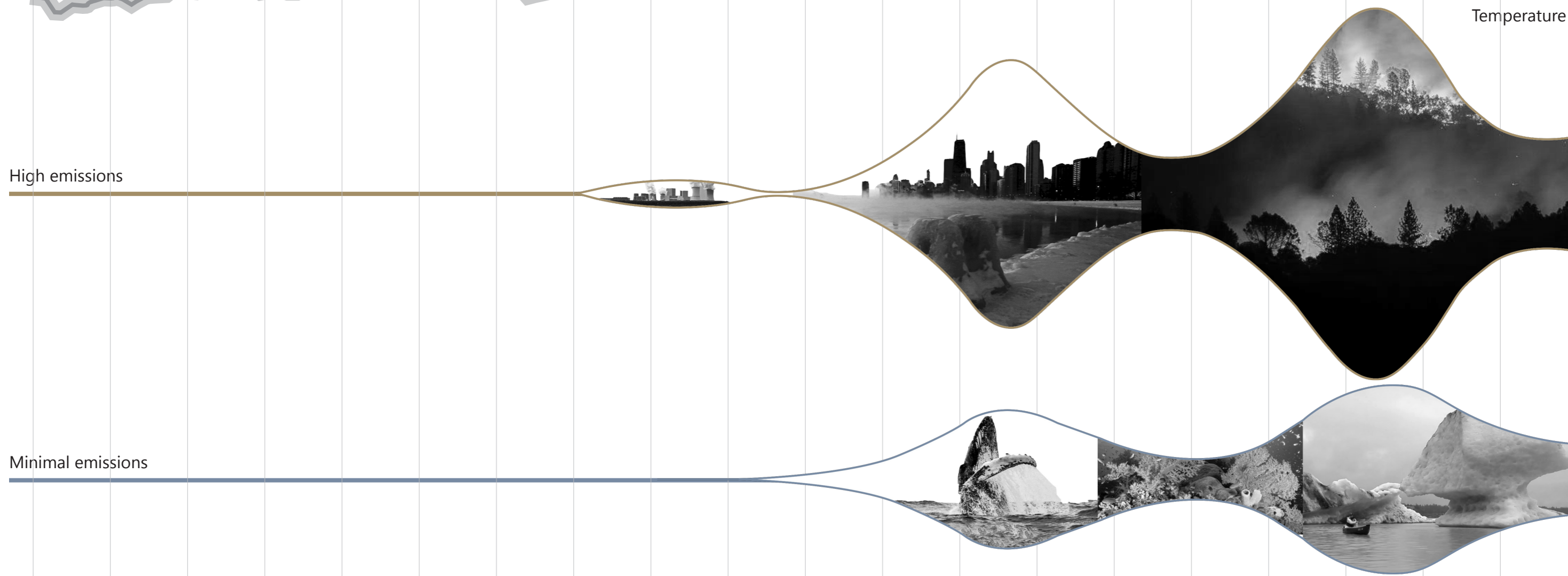
Cause for concern

Projected global temperature change °C <sup>1</sup>



High emissions

Minimal emissions



1900 1920 1940 1960 1980 2000 2020 2040 2060 2080 2100

Source:  
<sup>1</sup>IPCC AR5  
<sup>2</sup>NOAA

# Hyperobjects

## Engaging the audience

### Paradox knowing vs believing

The scientific data and reports on the environmental crisis do not correspond to the everyday experience of the majority of the population preventing them from taking action



### Hyperobject

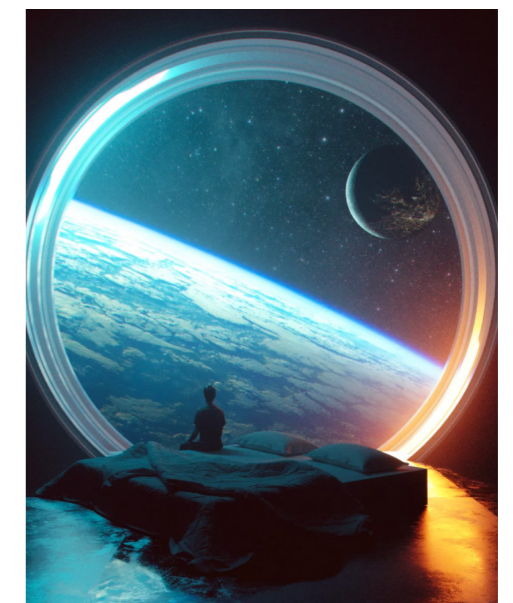
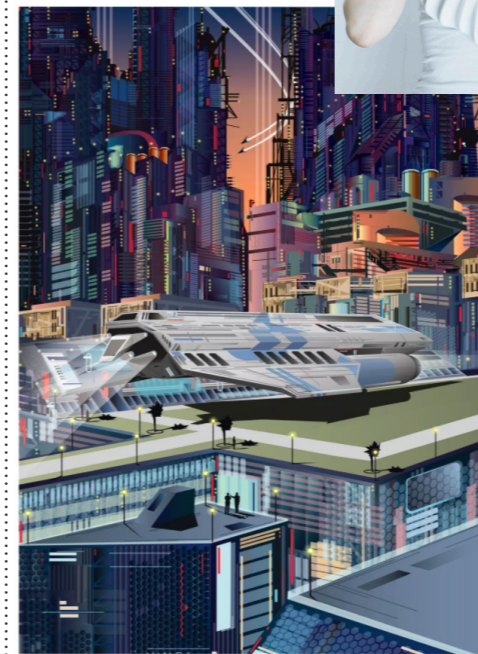
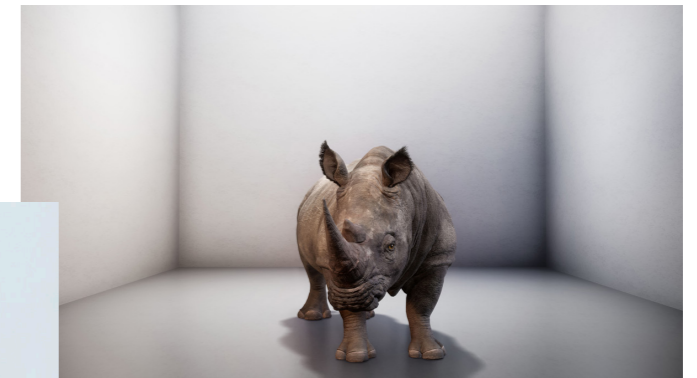
definition

a term coined by philosopher and ecologist Timothy Morton used to describe objects that are so massively distributed in time and space as to transcend spatiotemporal specificity

ie. global warming

# Environmental Art

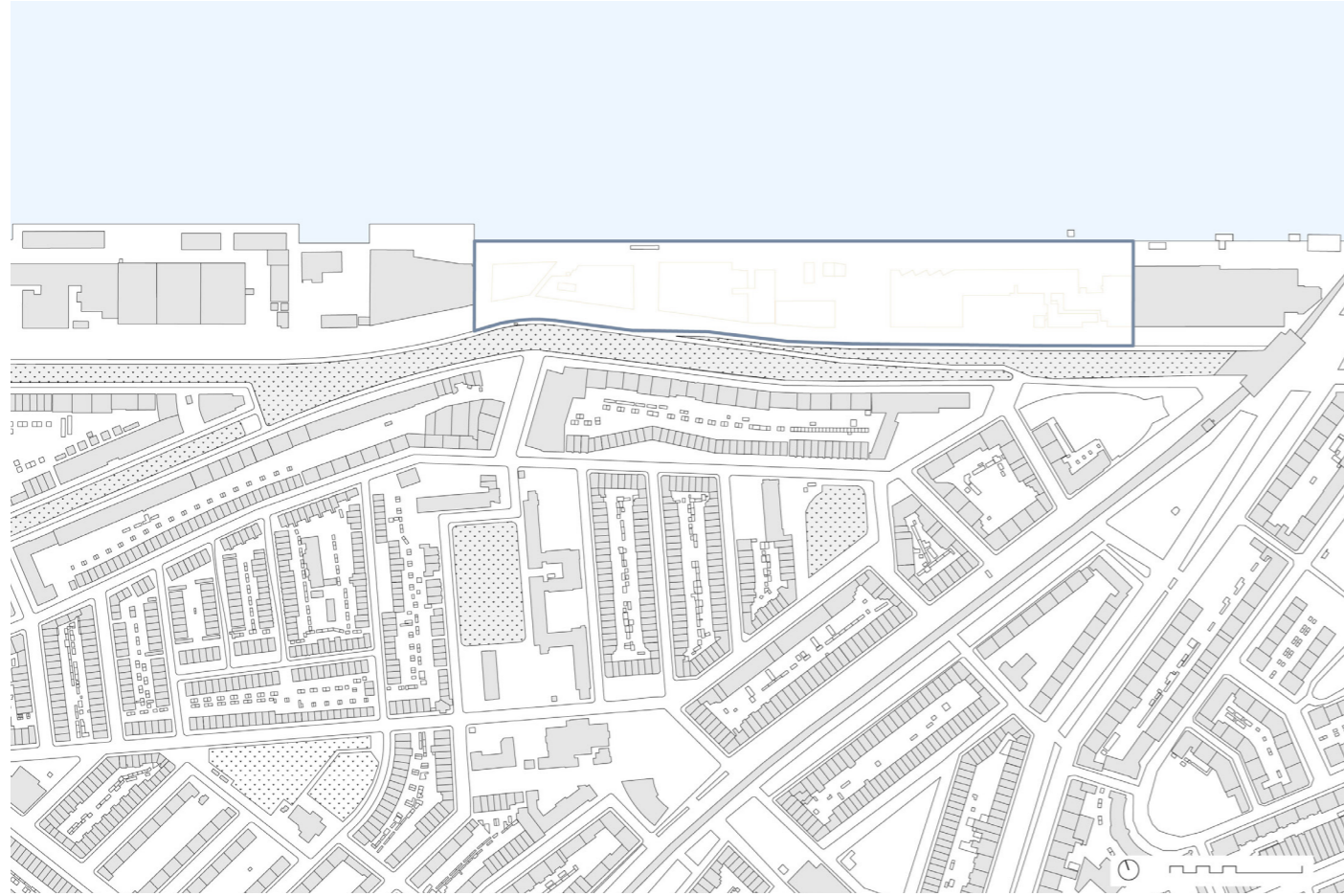
## Different perspectives



Past/current events

Future Visions

# Site Conditions







**(re)introduce nature to the site**

the site sits outside the dyke, unprotected from possible flooding. The design aims to give the area back to nature allowing plants and vegetation to grow as a way to highlight this vulnerability



**provide an experience of climate change through extreme weather**

heavier rainfalls/ strong winds/ heat waves are expected to become more frequent events due to climate change and will be used to actively shape and alter the design over time

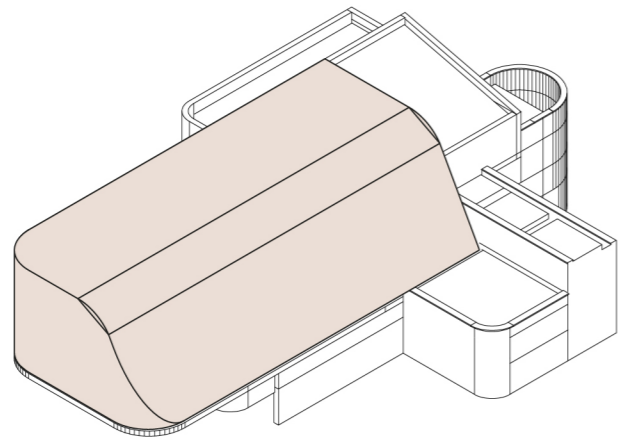


**emphasize the change of conditions through deliberate decay**

From a designed to a wild state, the museum is left to alter and degrade according to the changing weather conditions unless maintenance is performed

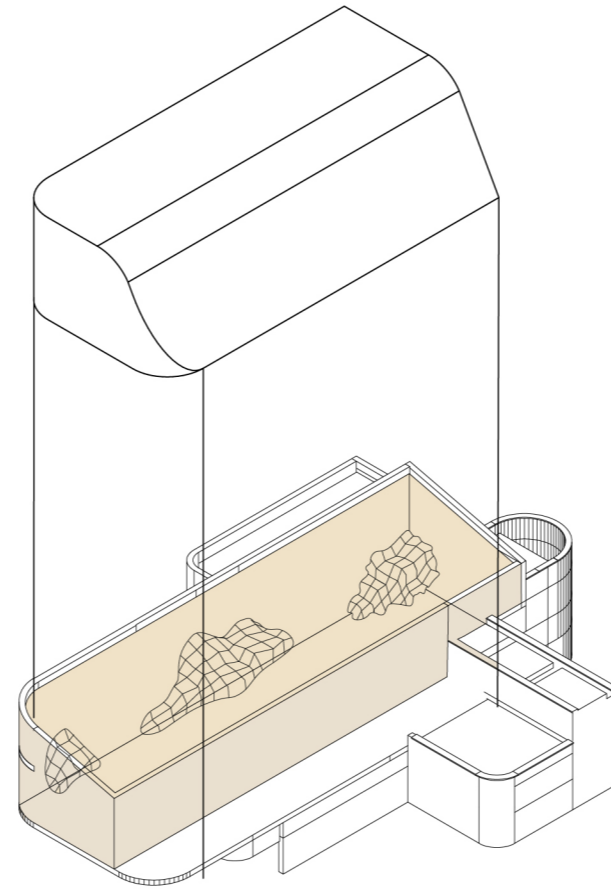
# Multiplicity Concept

## Displaying change



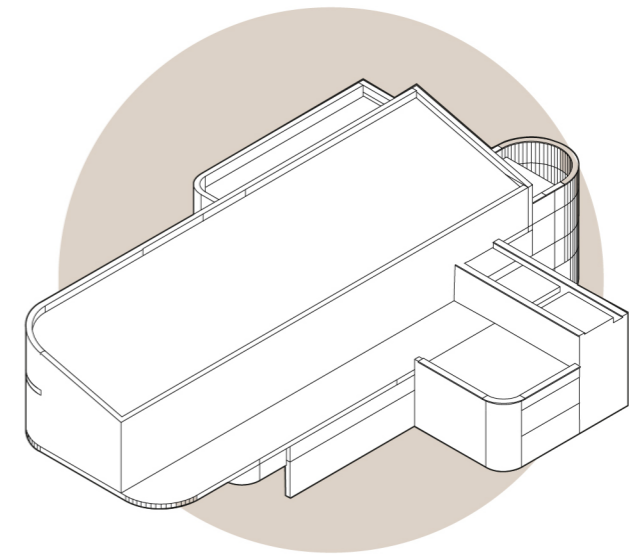
### Responsive Design

Museum responds to changes  
in the environment through  
erosion



### Simulation

Exhibition rooms simulate  
erosion and highlight ongoing  
issues



### Change over time

Everchanging conditions  
provide a multitude of  
experience

## Material research

### Displaying change



# Material research

## Local materials



Aggregate

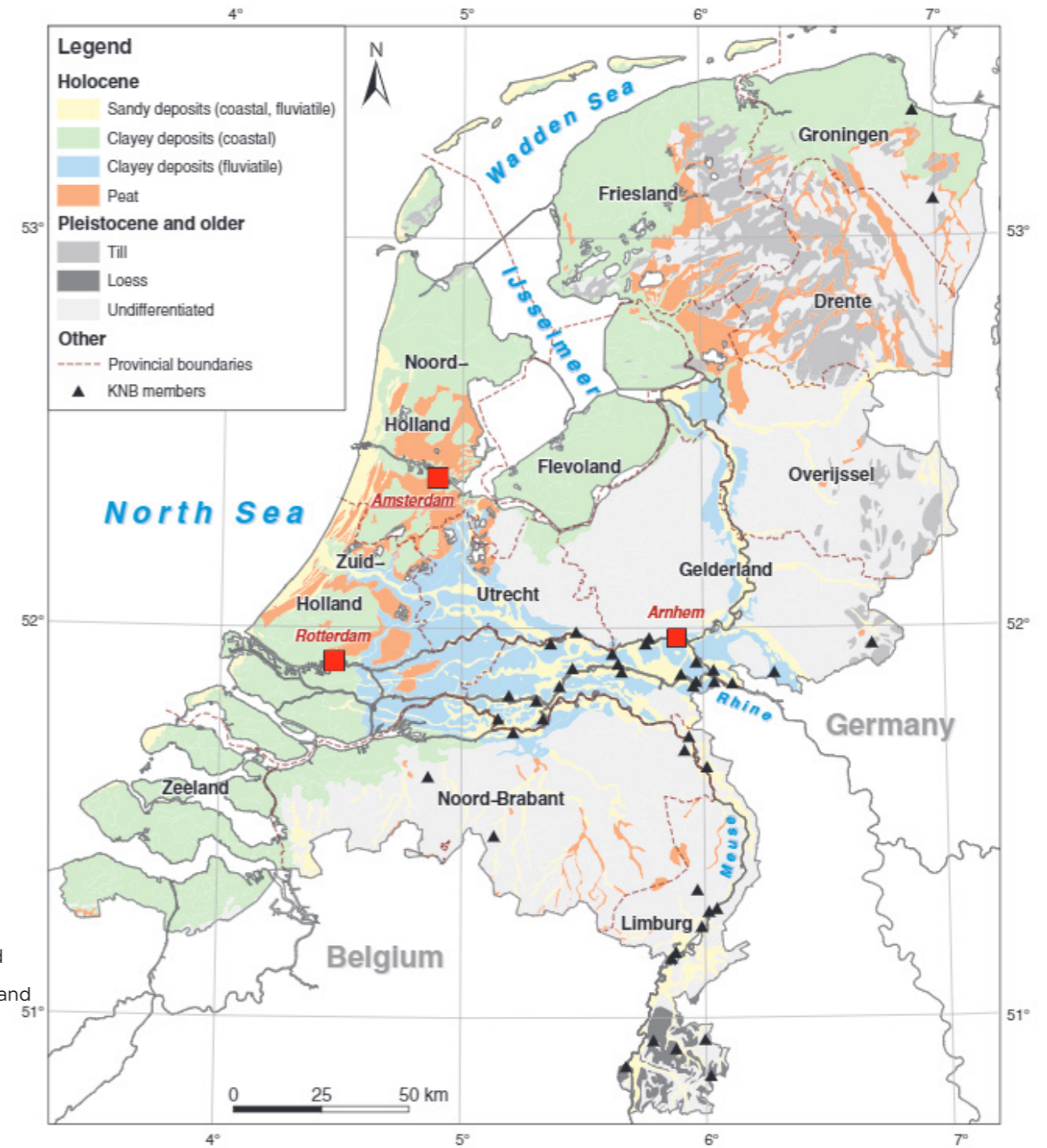
Clay rich subsoil

Flax straw

Clay slip

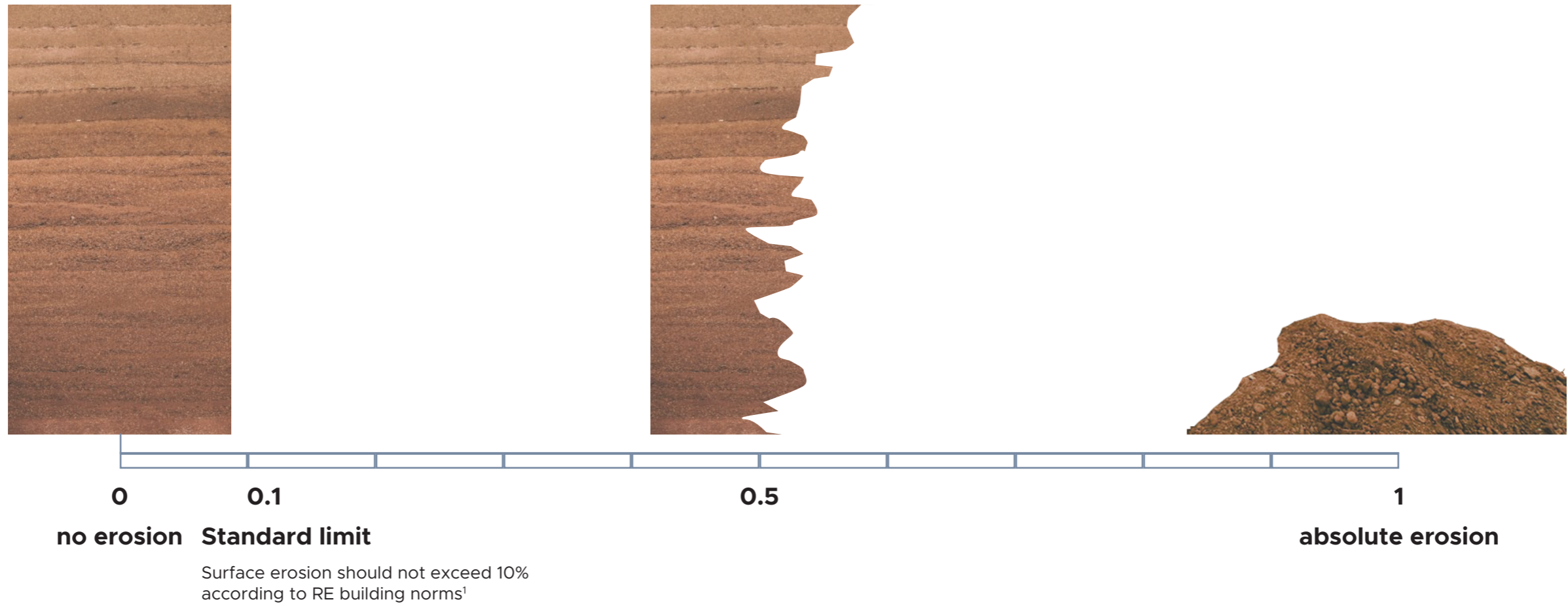
Hemp shiv

- Very deep fine sand
- Very deep coarse sand
- Very deep rich in silt
- Gravel
- Moderately deep fine sand
- Moderately deep coarse sand
- Moderately deep silt
- Shallow fine sand
- Shallow coarse sand



# Erosion measurement

## Classifying stages of erosion



Typical outdoor conditions



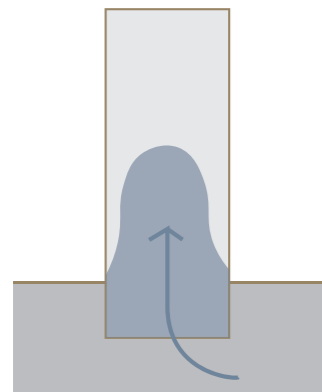
More frequent water exposure



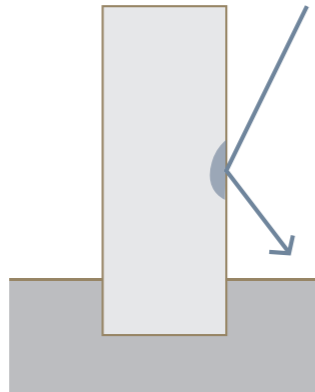
Time for a typical Rammed Earth wall to decay

# Material Research

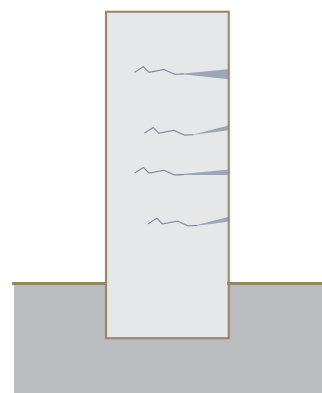
## Water exposure test



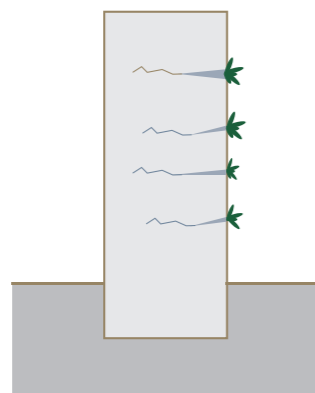
water infiltration from the ground



surface erosion from rainfall/ rain splash



freeze thaw due to moisture in wall



damage from abrasion, plants, insects

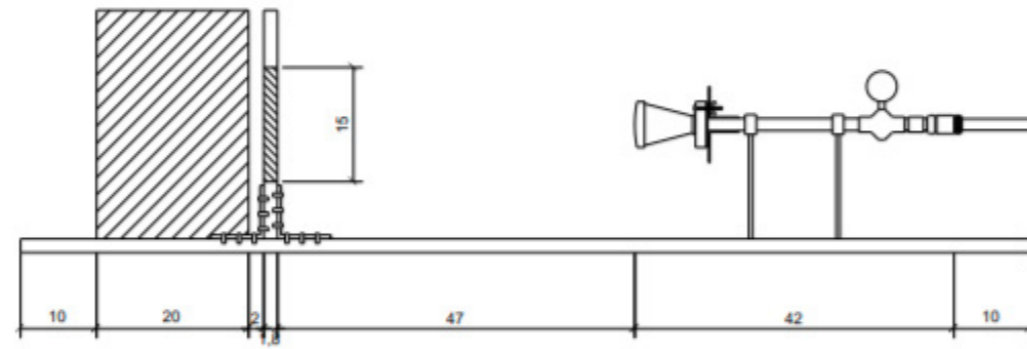


Fig. 6. The scheme of the constructed research stand

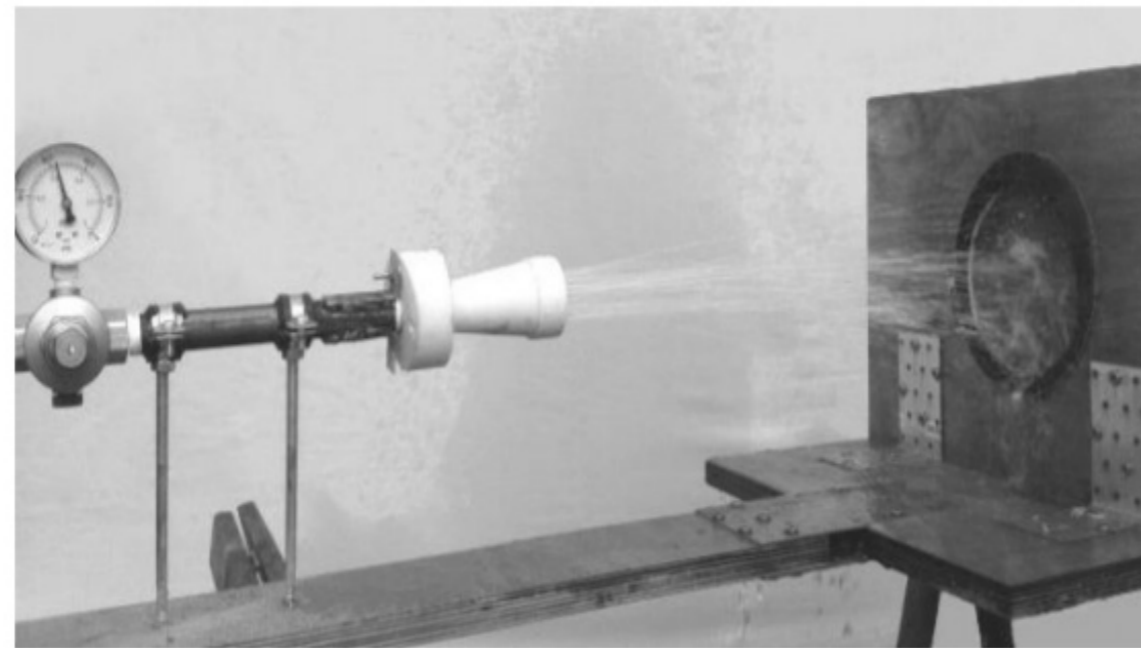
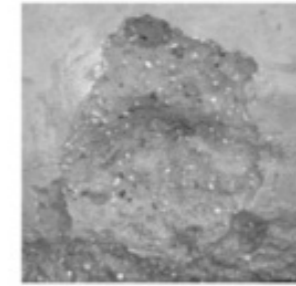
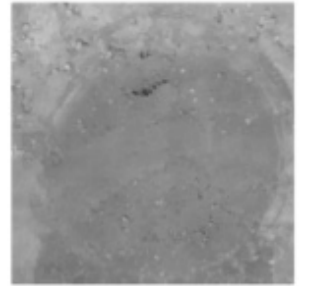


Fig.7. Sample testing

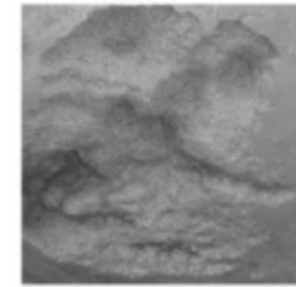
613 0% cement



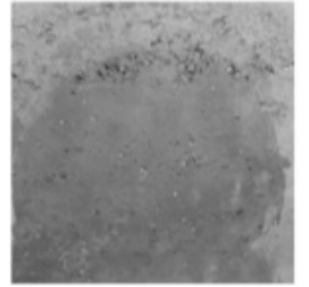
433 6% cement



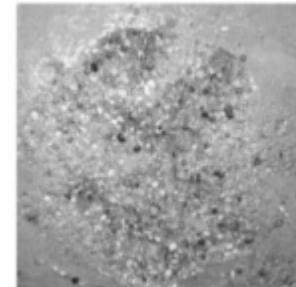
703 0% cement



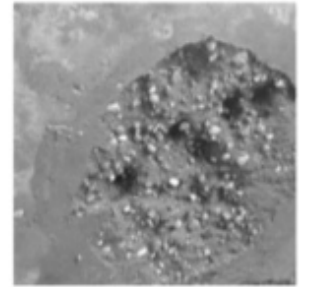
523 6% cement



433 0% cement

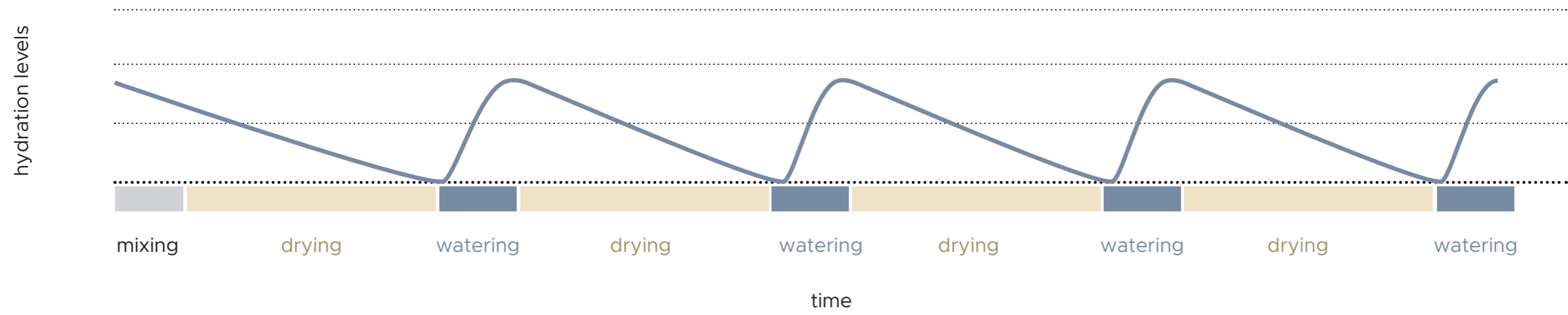


523 0% cement



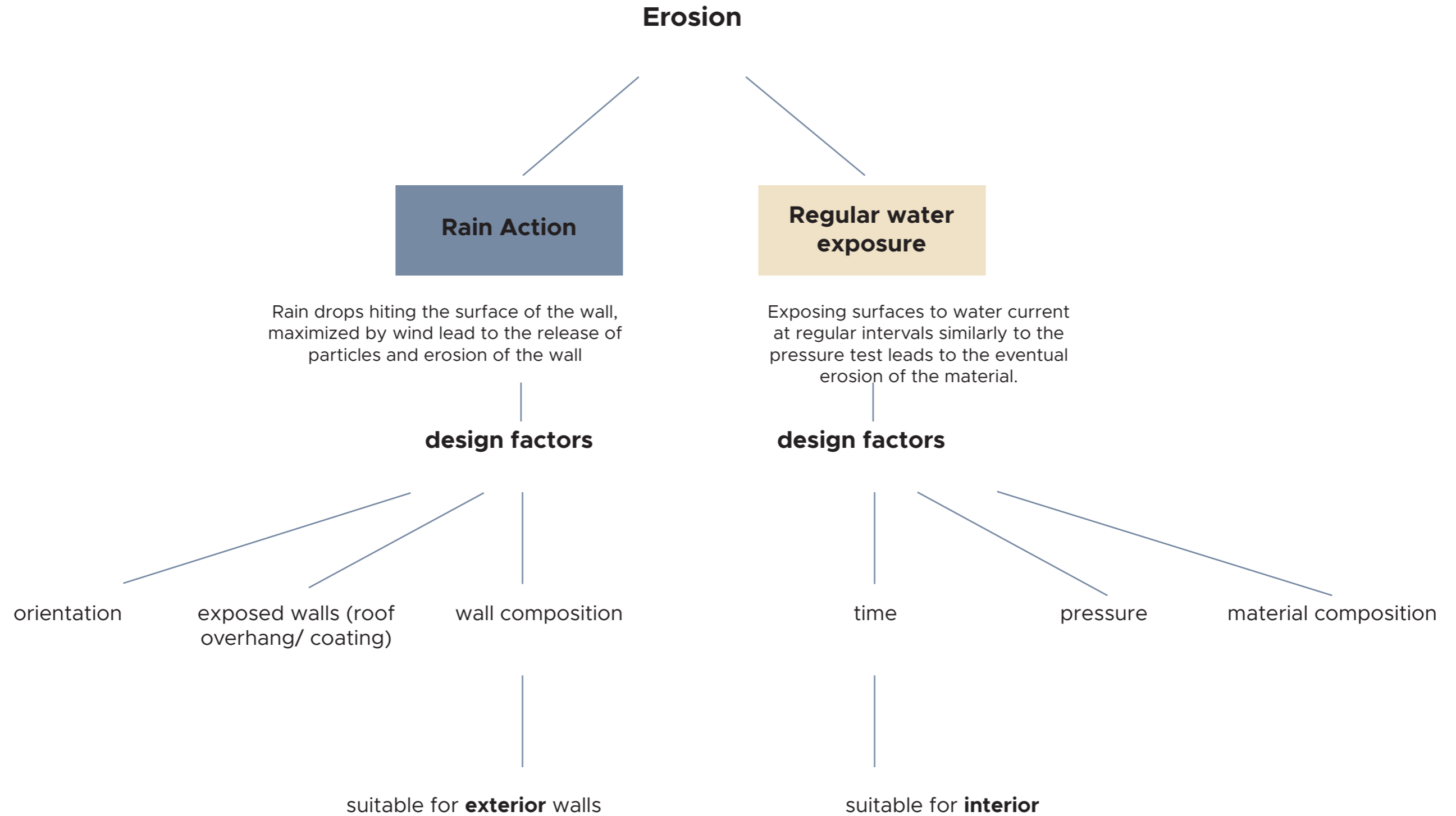
# Material Research

## Test layout



# Erosion Principles

## Controlled decay





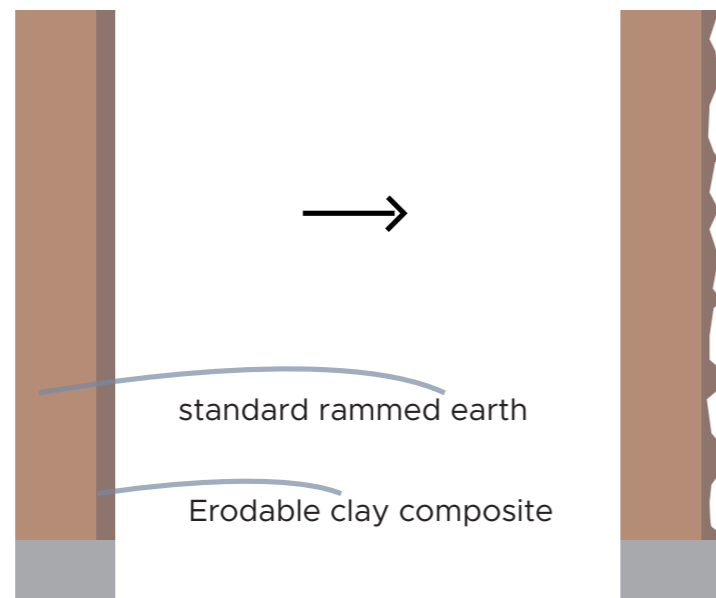
# Erosion Concept

Controlled decay

## Erosion

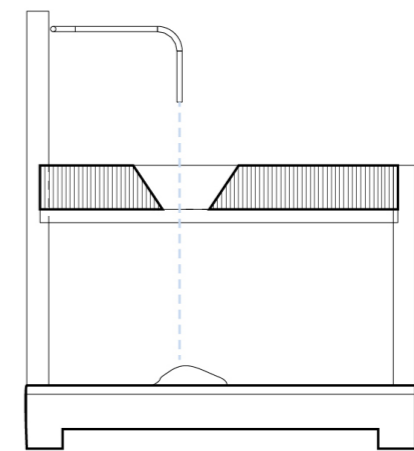
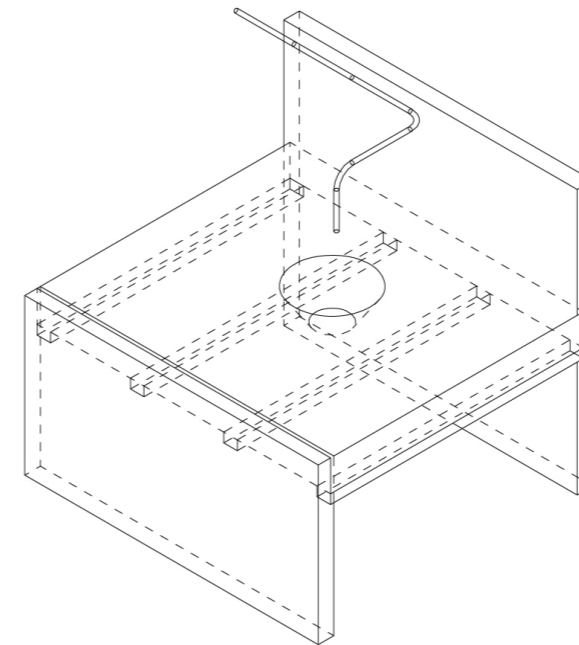
Rain Action

Regular water exposure



### Exterior Walls

A hybrid wall made up of typical rammed earth coated with a layer of composite clay which erodes at a faster rate



### Interior Simulation

In order to simulate erosion in closed spaces a system of water pipes will be laid out and water will regularly fall on the surfaces meant to erode

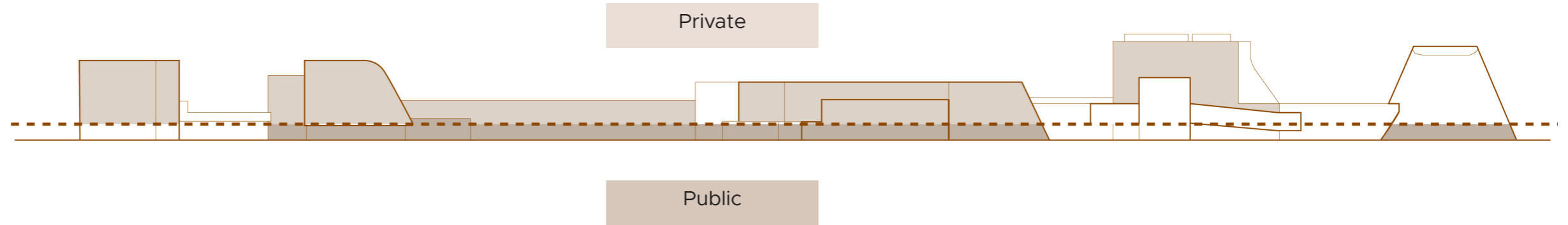
Research & Concept  
**Programme organization**  
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# Programme organization

## Concept

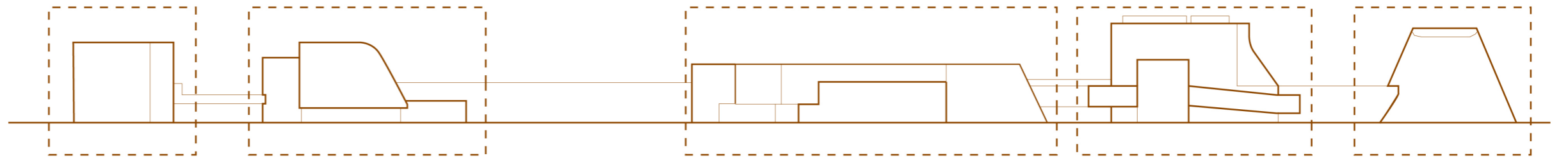
### 1 Public/ Private division

Clear distinction between ticketed areas & freely accessible areas with the public functions located on the ground floor to be more engaging with the community



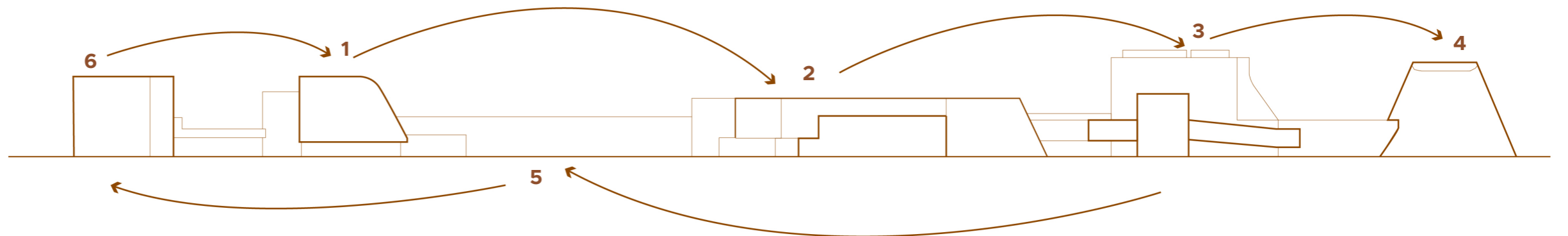
### 2 Modules

The program is divided into distinct modules, each expressing a different function and providing a unique experience.



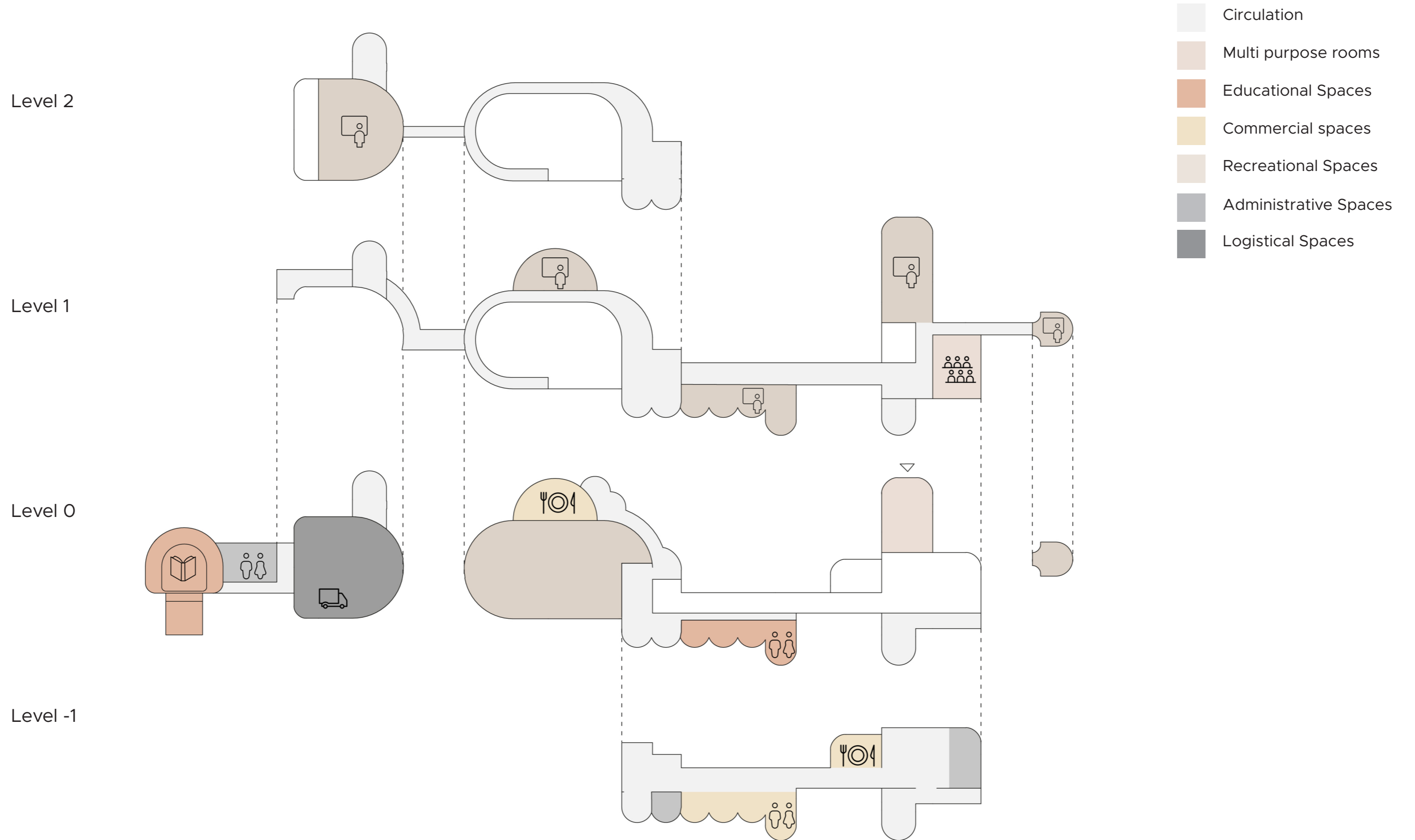
### 3 Singular path

The interior layout was designed as a continuous path with an evolving narrative in mind. The sequence of spaces aims to tell a story about the current environmental circumstances and to create a unique experience for the viewer.



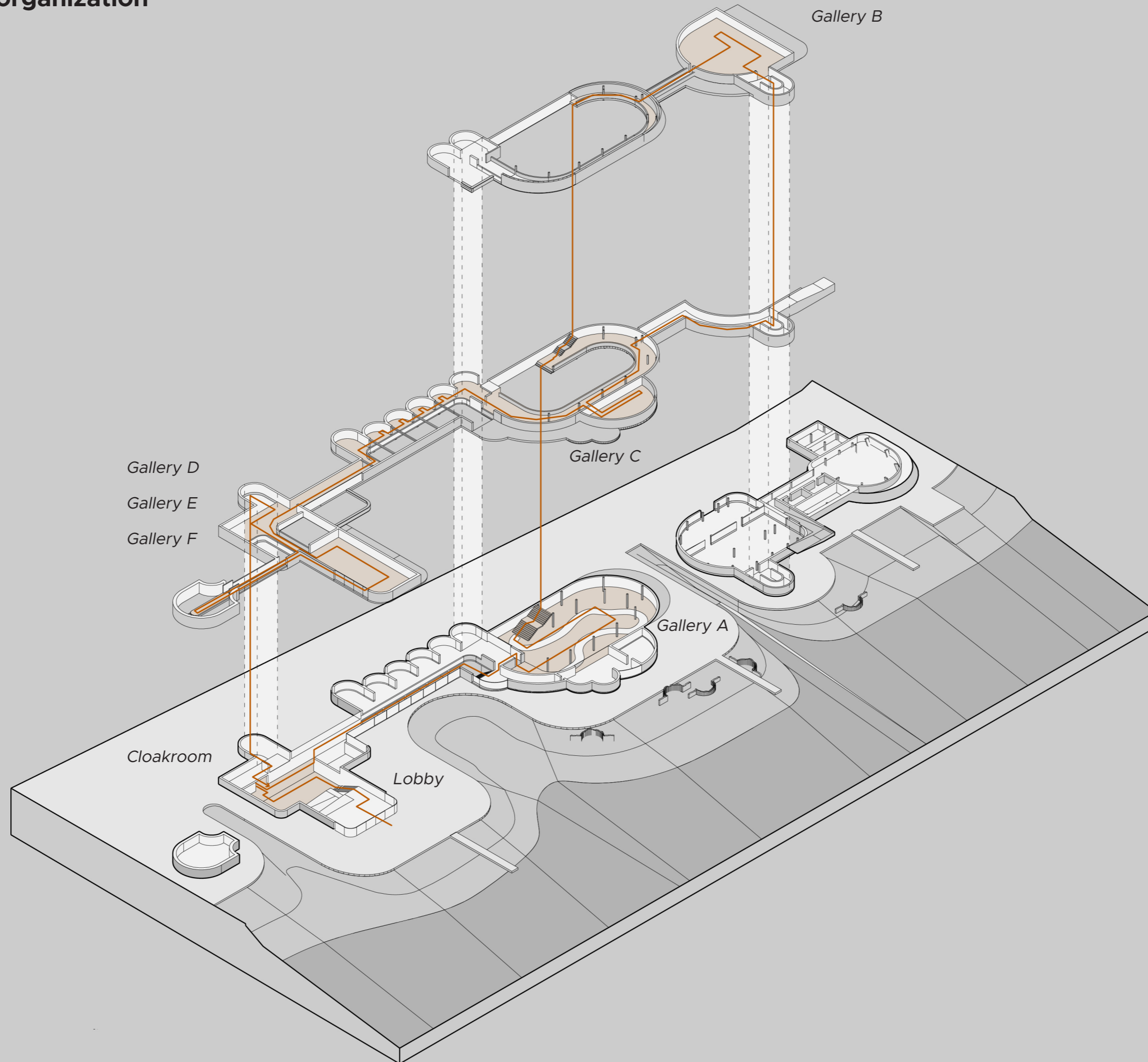
# Programme organization

## Breakdown



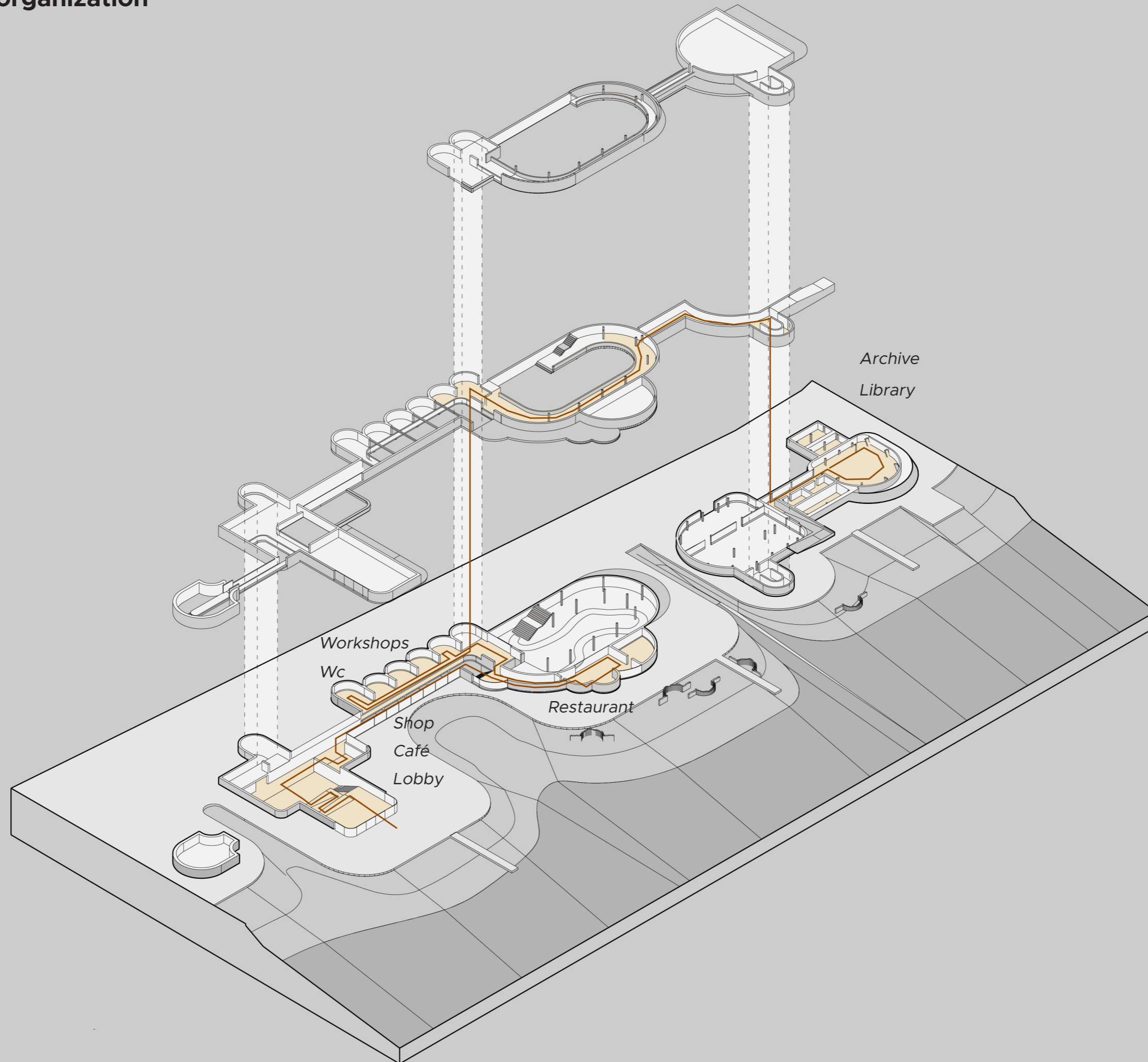
# Programme organization

## Visitors path



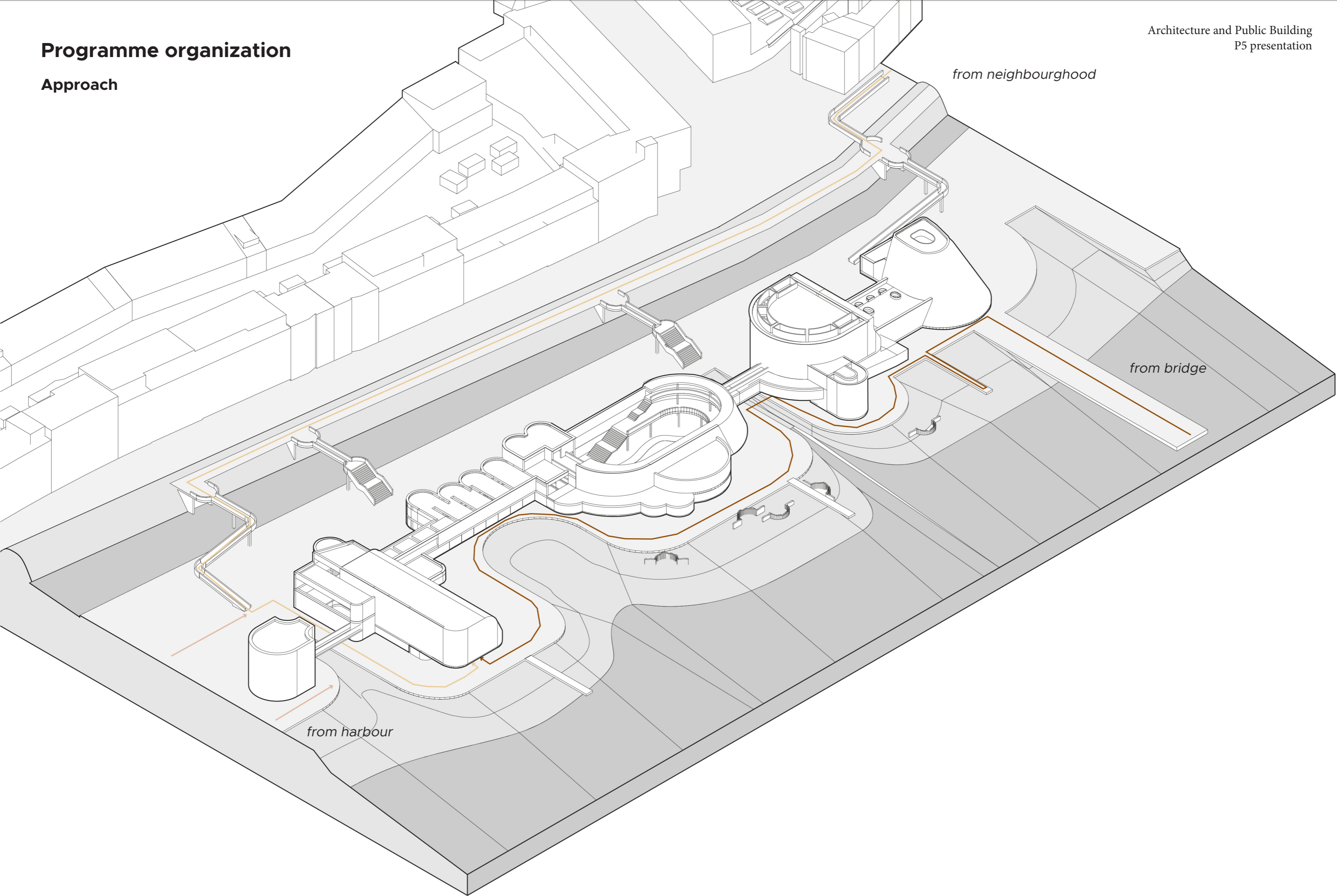
# Programme organization

## Visitors path 2



# Programme organization

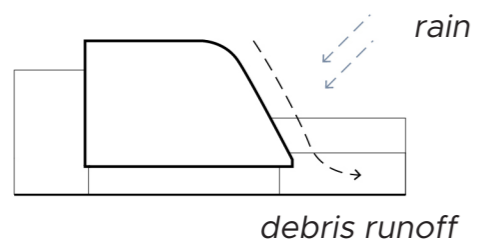
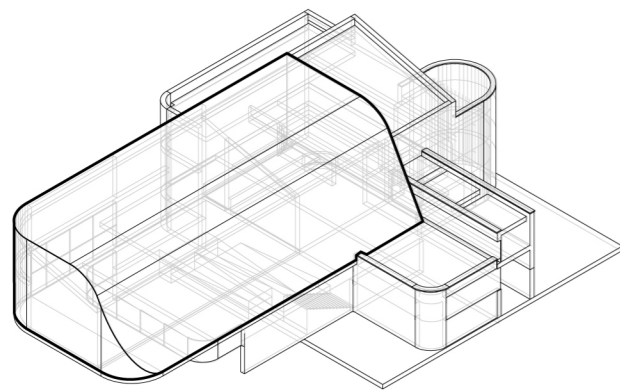
## Approach



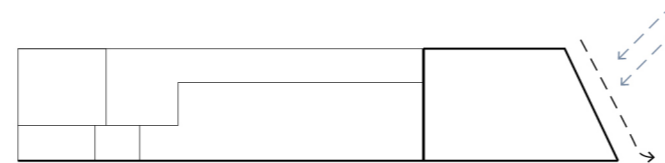
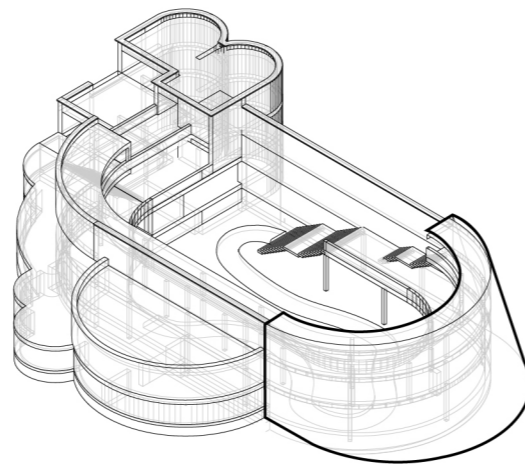
# Programme organization

## Form and function

- 1 Orientation  
Erodable volumes face NW,  
prevailing wind direction to maximize  
exposure to water & accelerate  
erosion process

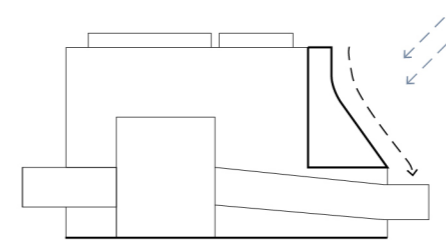
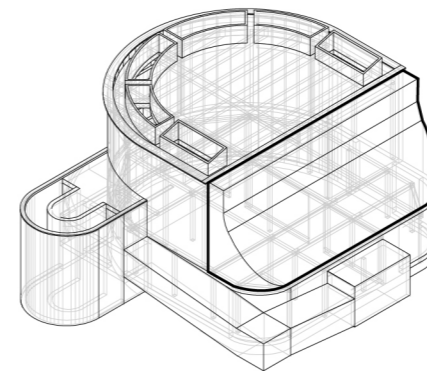


- 2 Runoff  
Sloped surfaces designed to  
disperse the particles released from  
the exposure to the elements

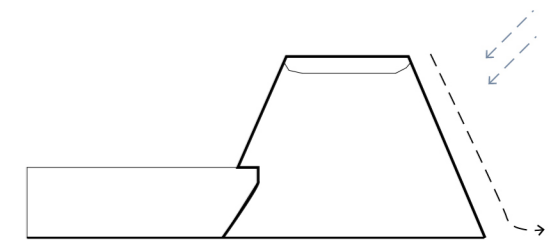
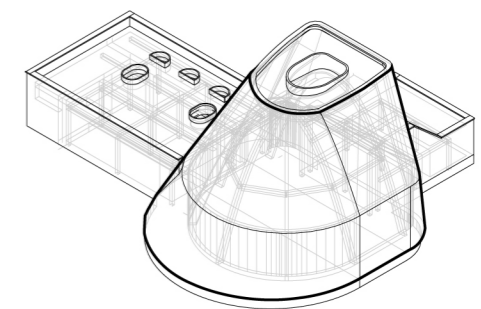


Erodable clay composite

- 3 Contrast  
The curved erodable elements are  
juxtaposed with more linear forms  
highlighting the ongoing erosion  
process



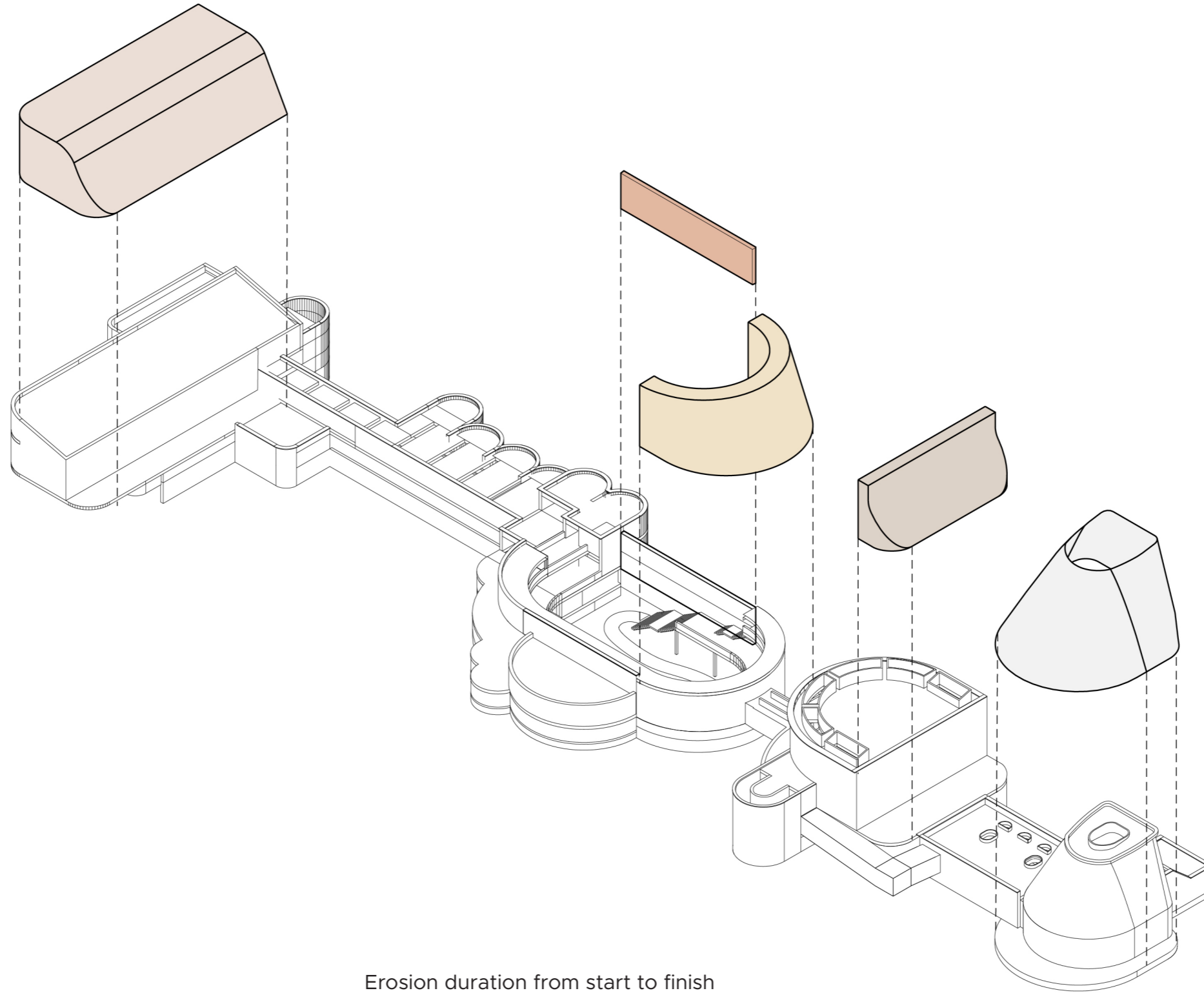
- 4 Expression  
Concept of erosion is translated into  
expressive curved elements which  
slowly evolve into debris over time



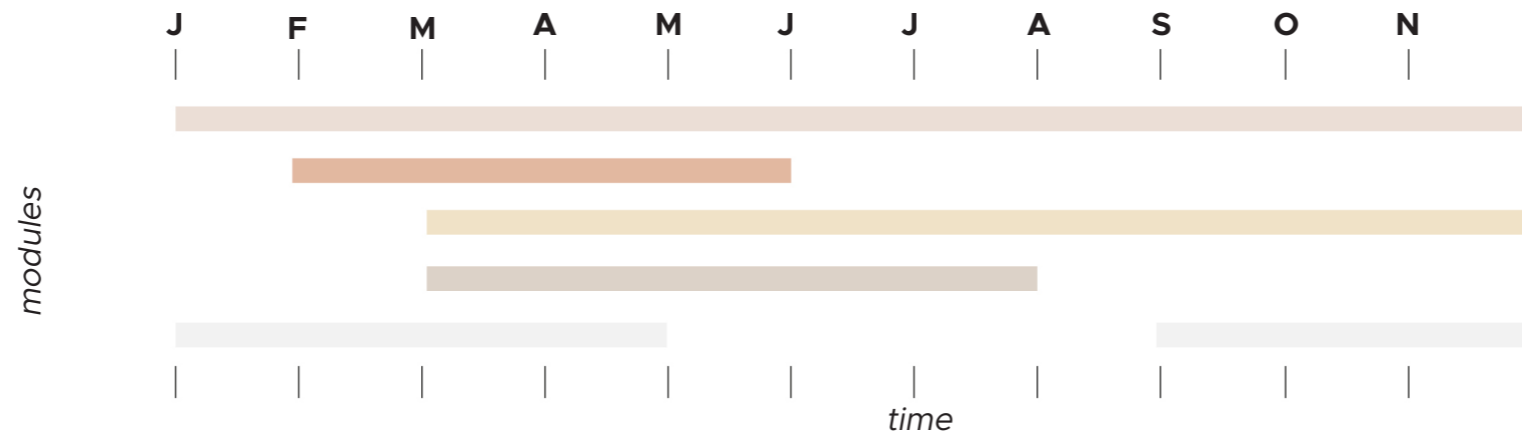


# Programme organization

## Erosion Stages



Erosion duration from start to finish



Research & Concept  
Program organization

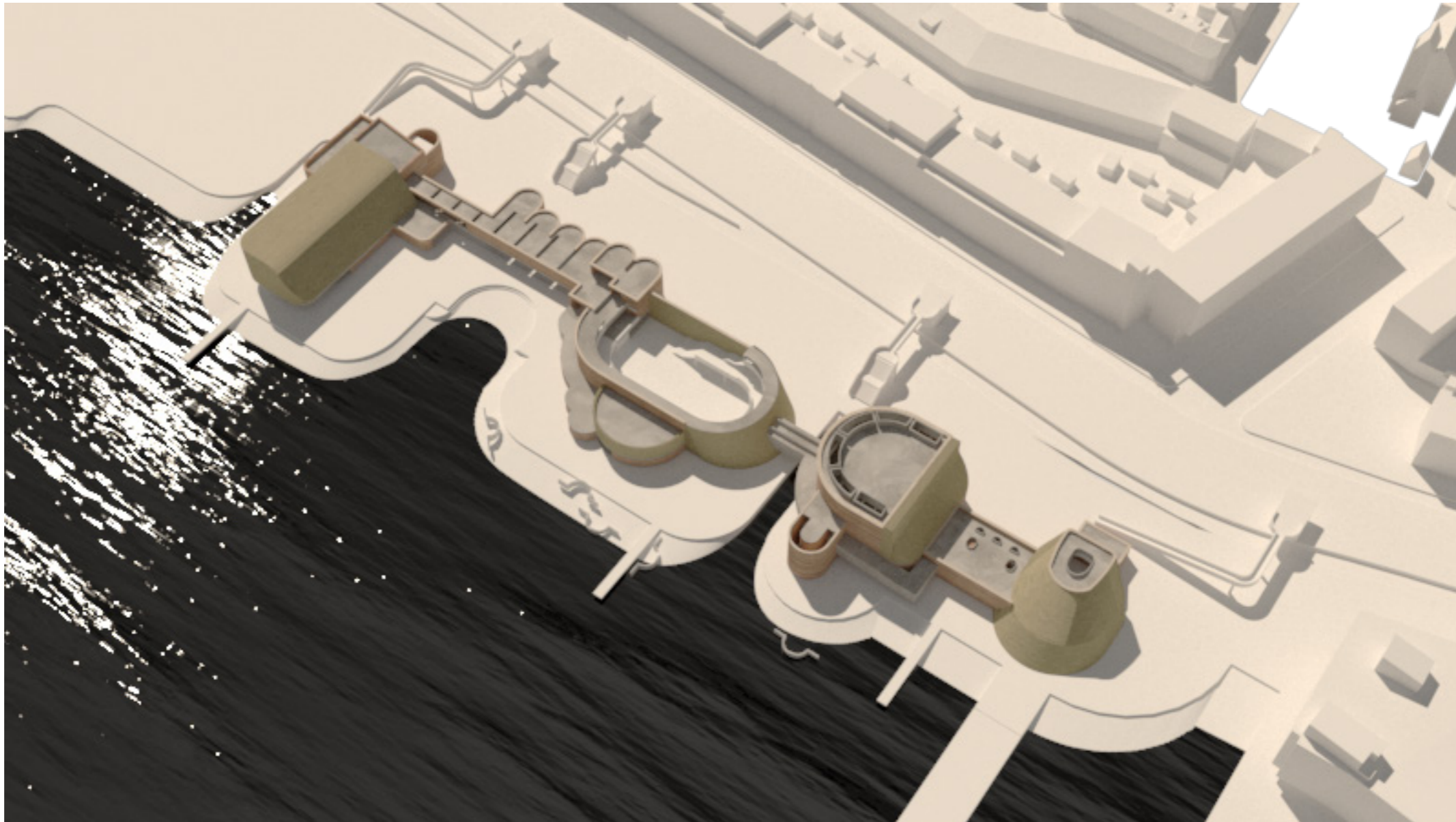
**Final Design**

Climate

Structure

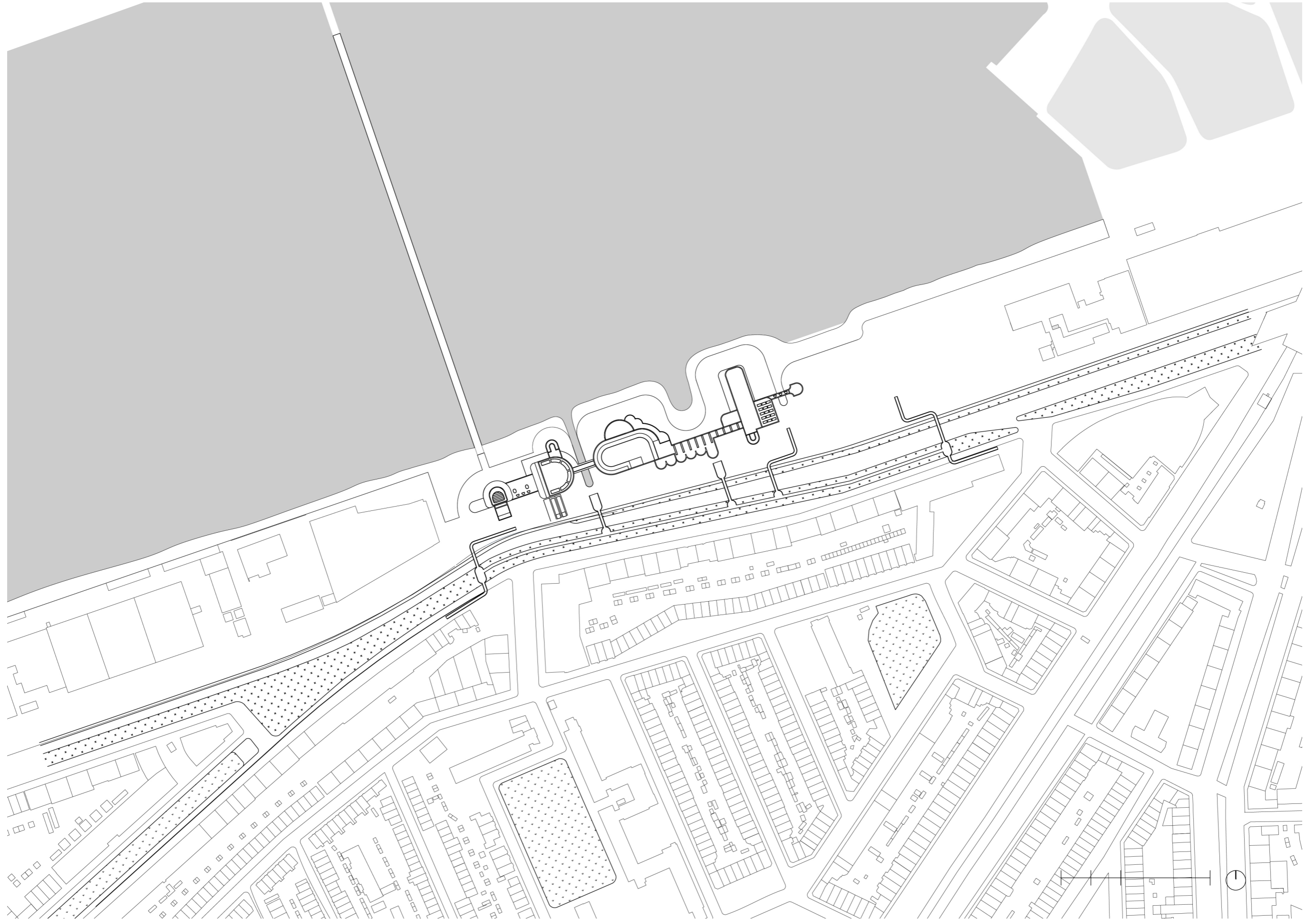
Detail

Views



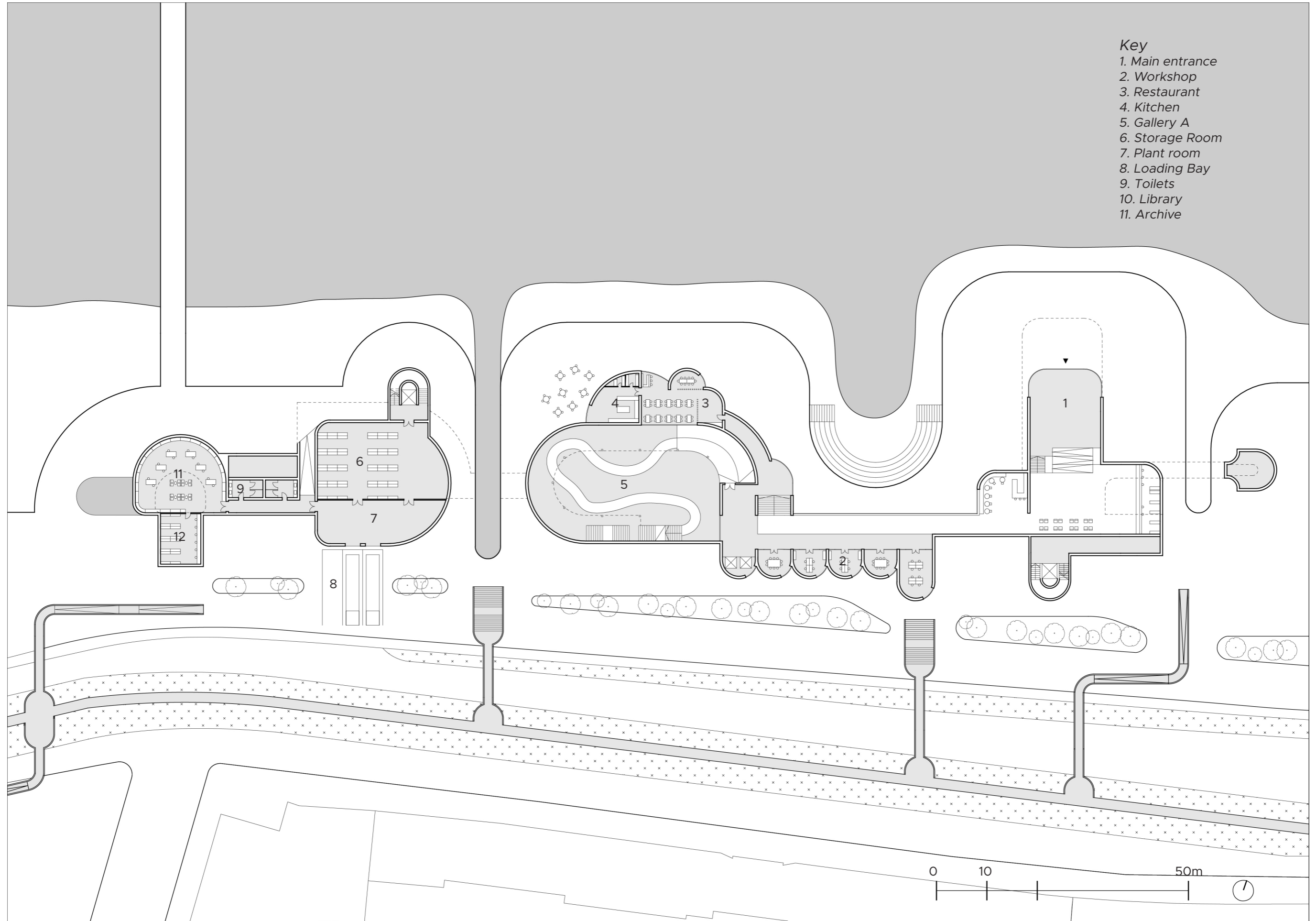
# Design

Site Plan 1:1000



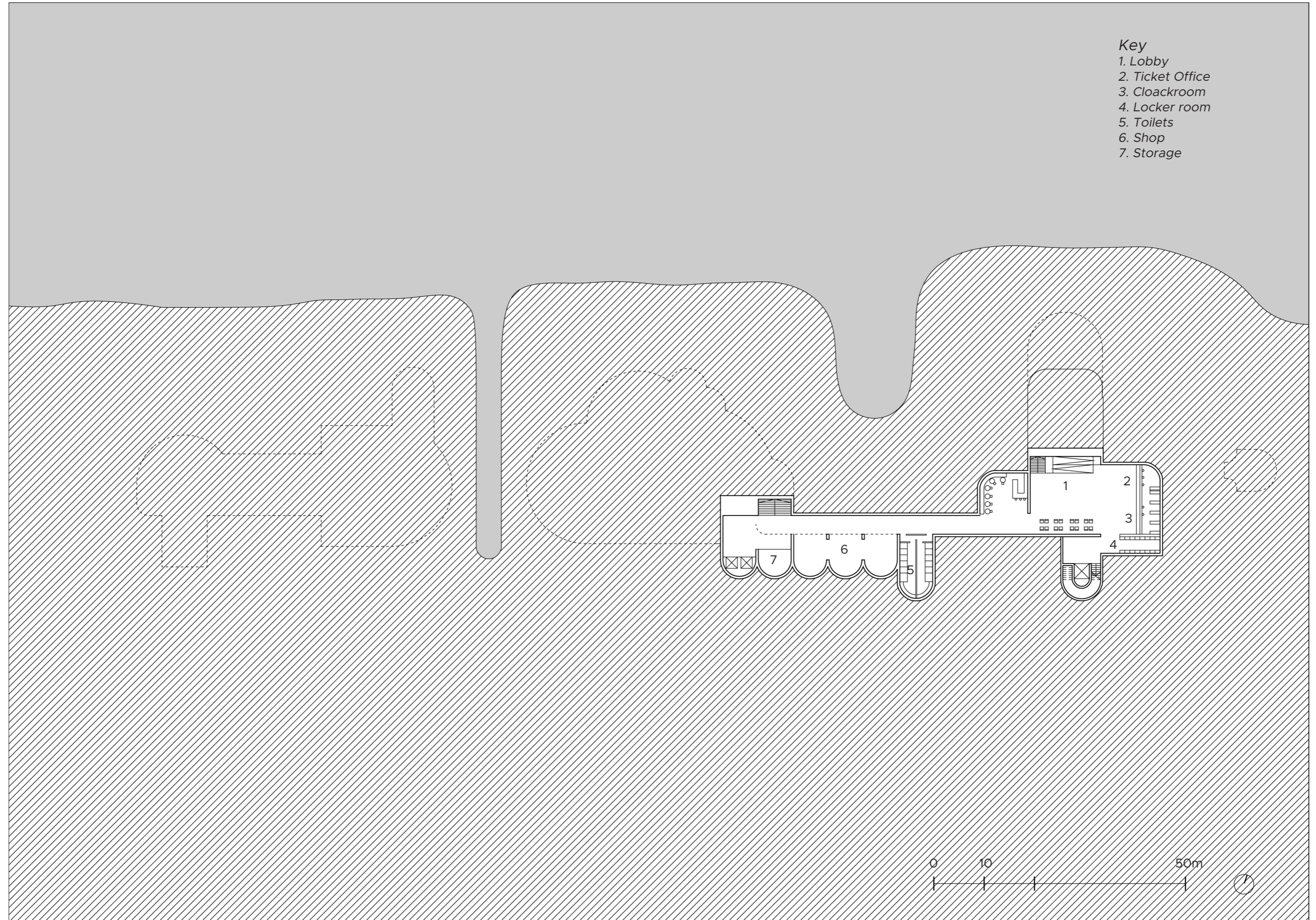
# Design

## Ground Floor 1:200



# Design

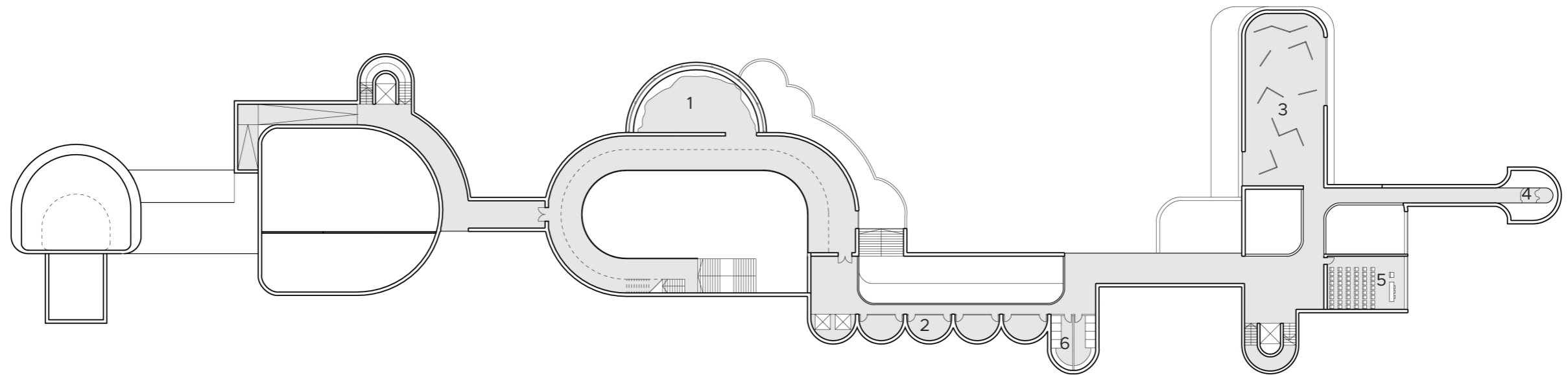
-1 Floor 1:200



# Design

First Floor 1:200

- Key
- 1. Gallery C
  - 2. Gallery D
  - 3. Gallery E
  - 4. Gallery F
  - 5. Lecture Room
  - 6. Toilets



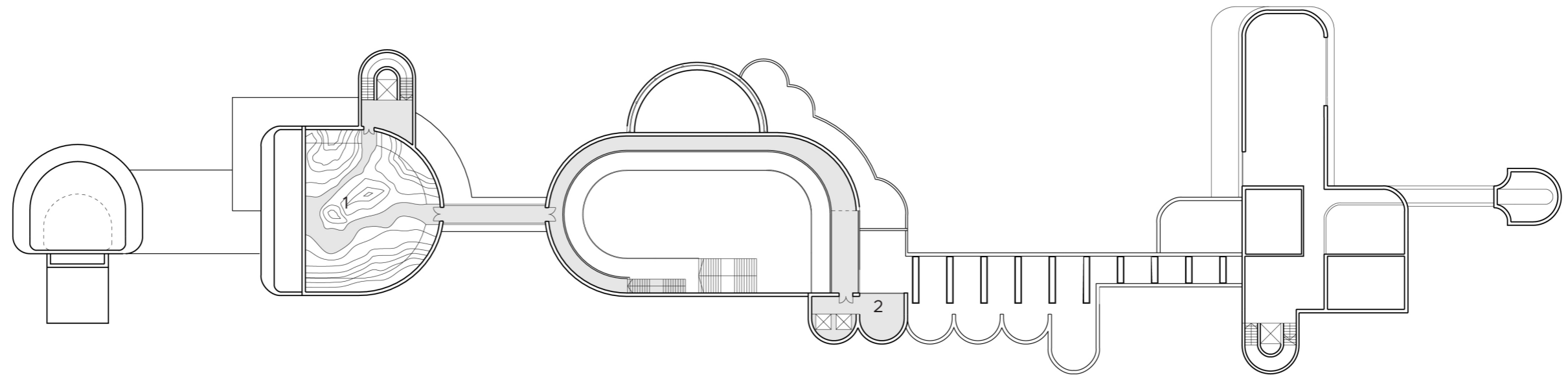
0 10 50m



# Design

## Second Floor 1:200

Key  
1. Gallery B  
2. Storage



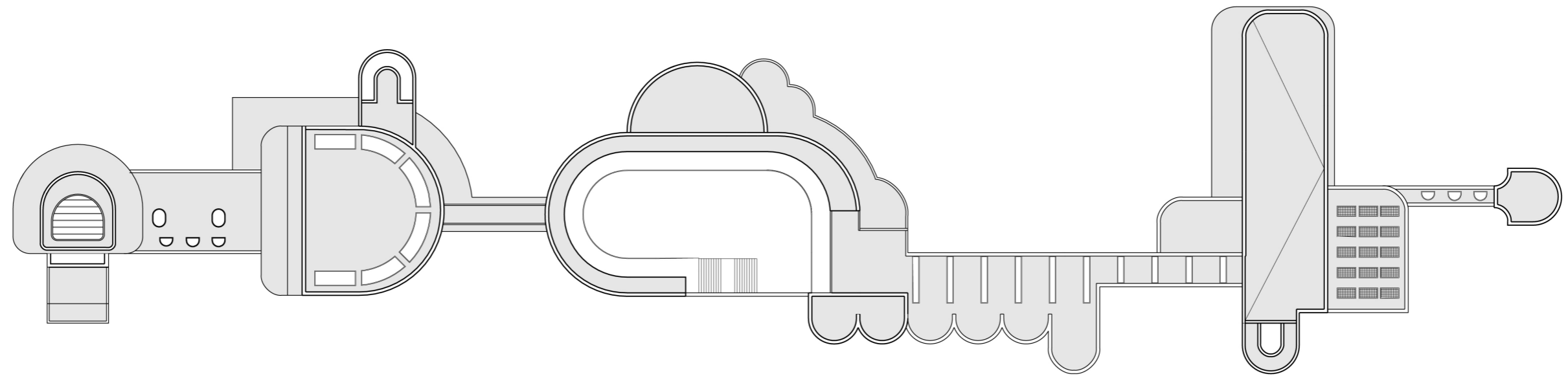
0 10 50m





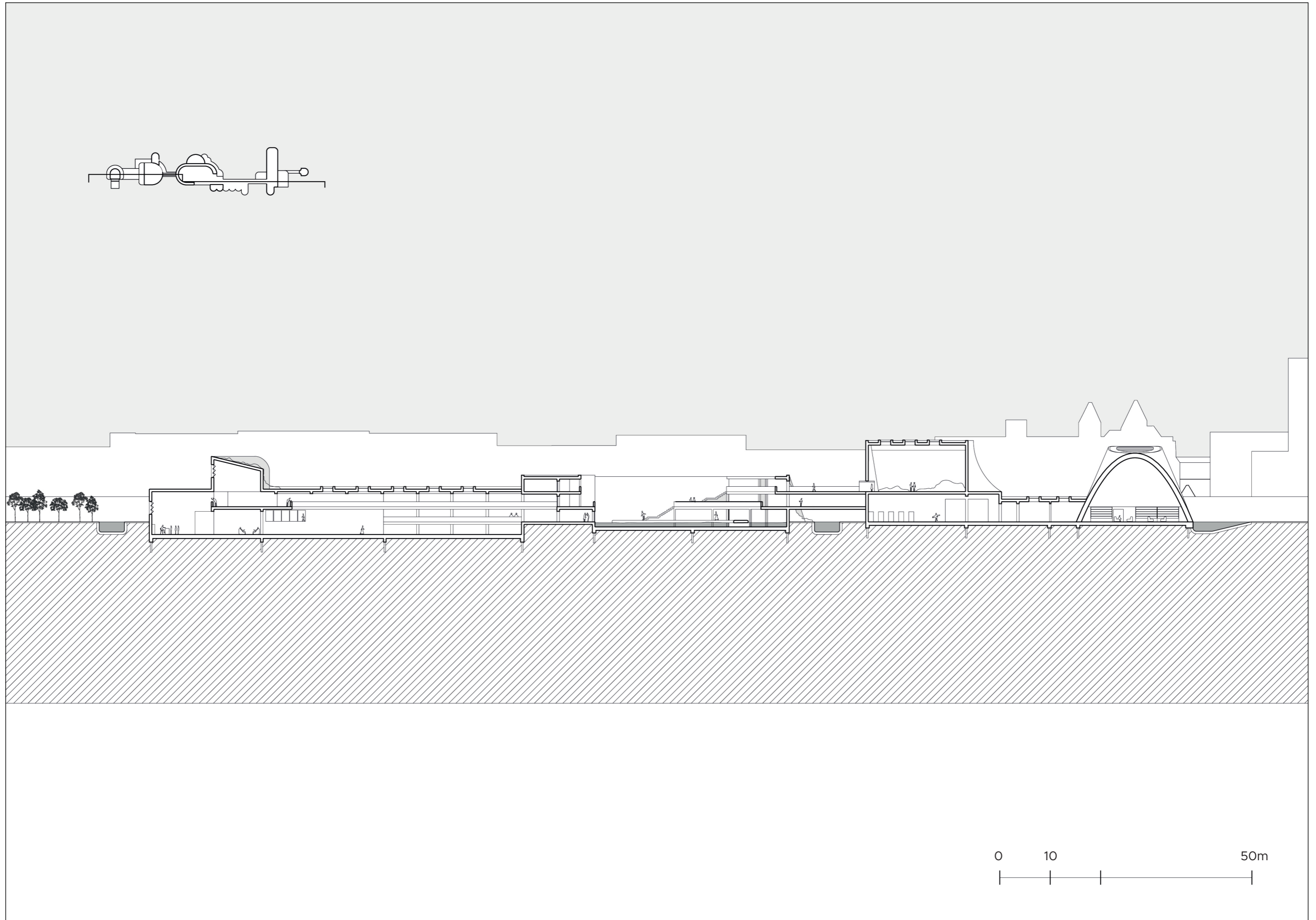
# Design

## Roof Plan 1:200



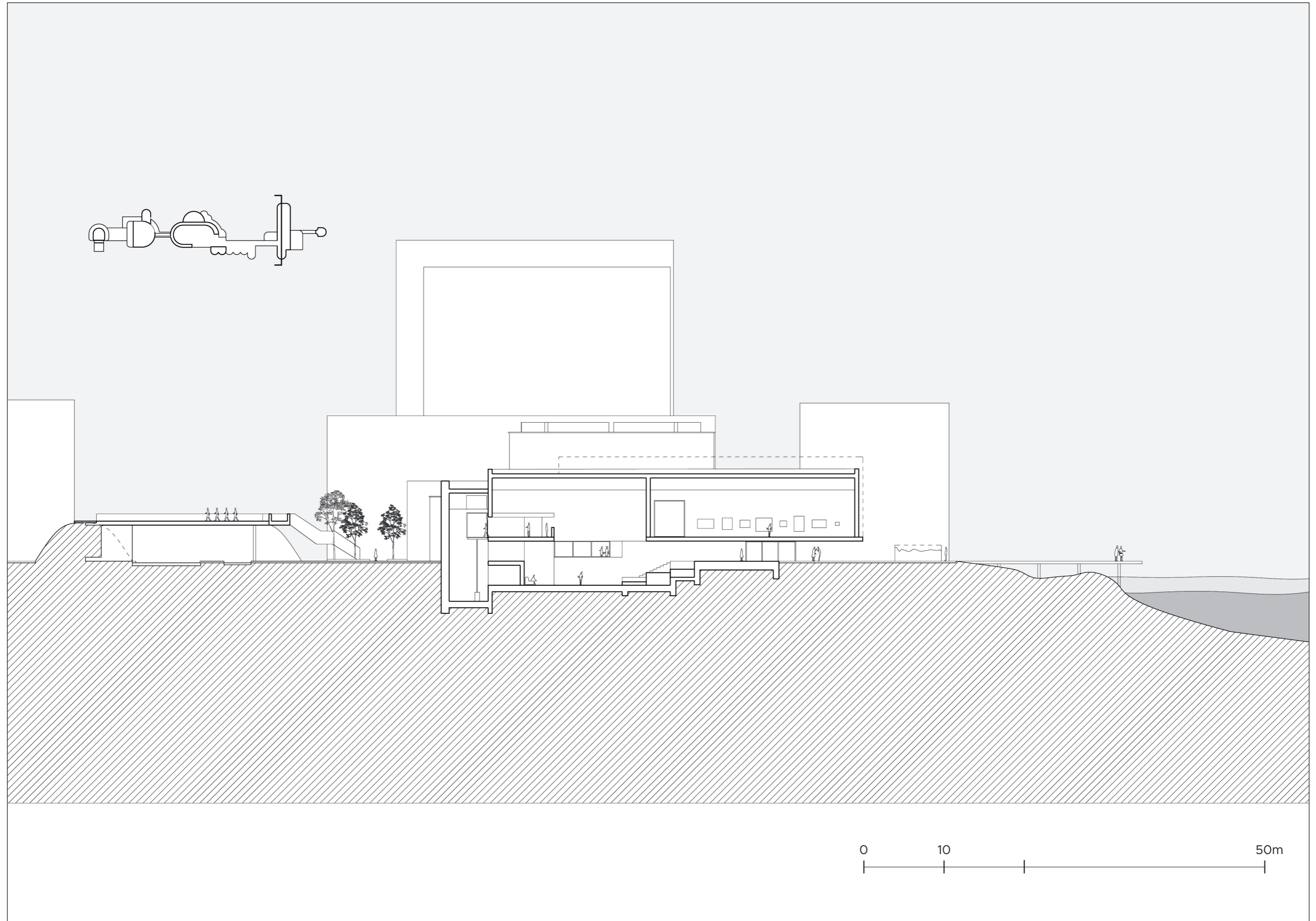
# Design

## Long Section 1:200



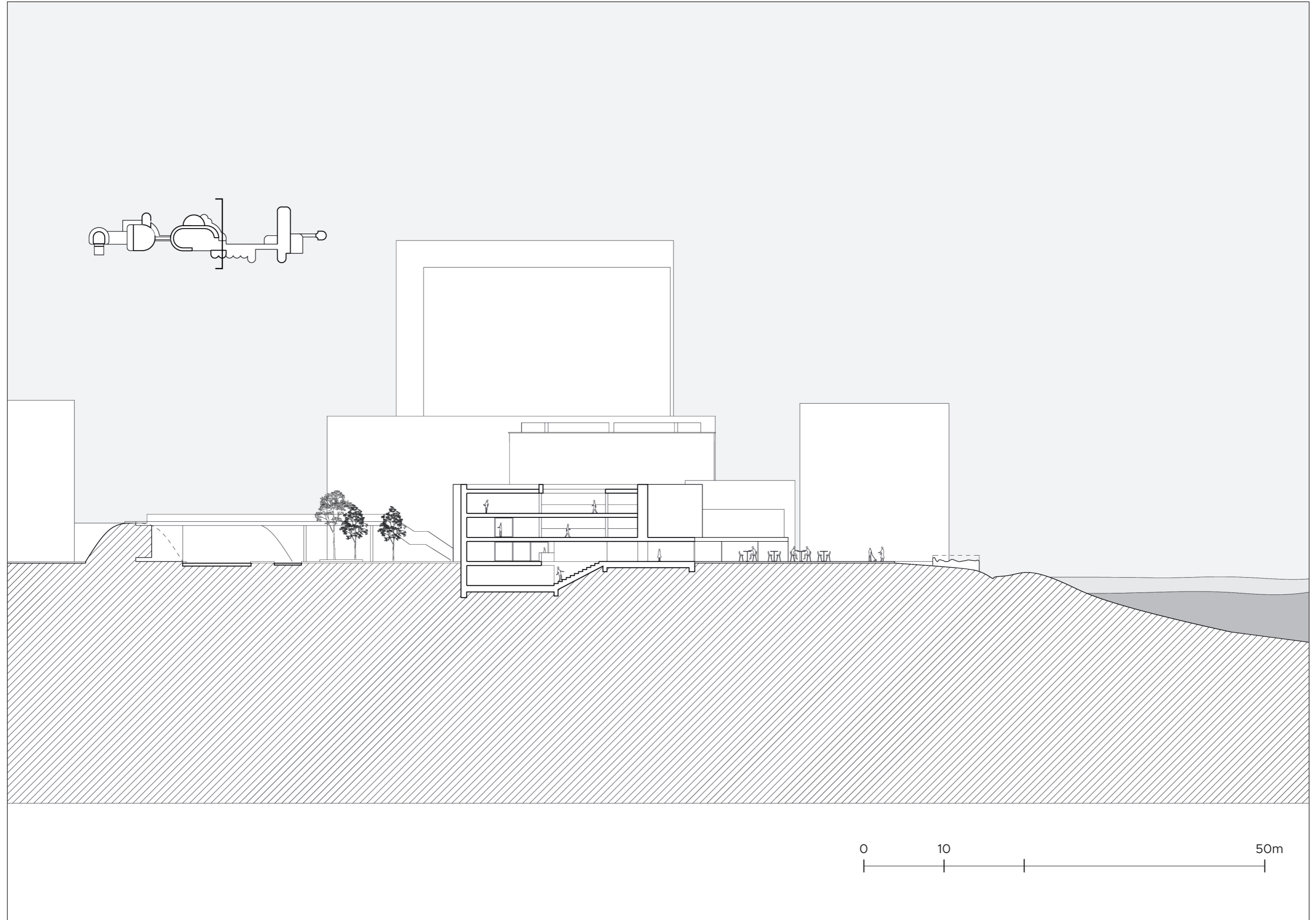
# Design

## Short Section A 1:200



# Design

## Short Section A 1:200



# Design

North Elevation 1:200



South Elevation 1:200



# Design

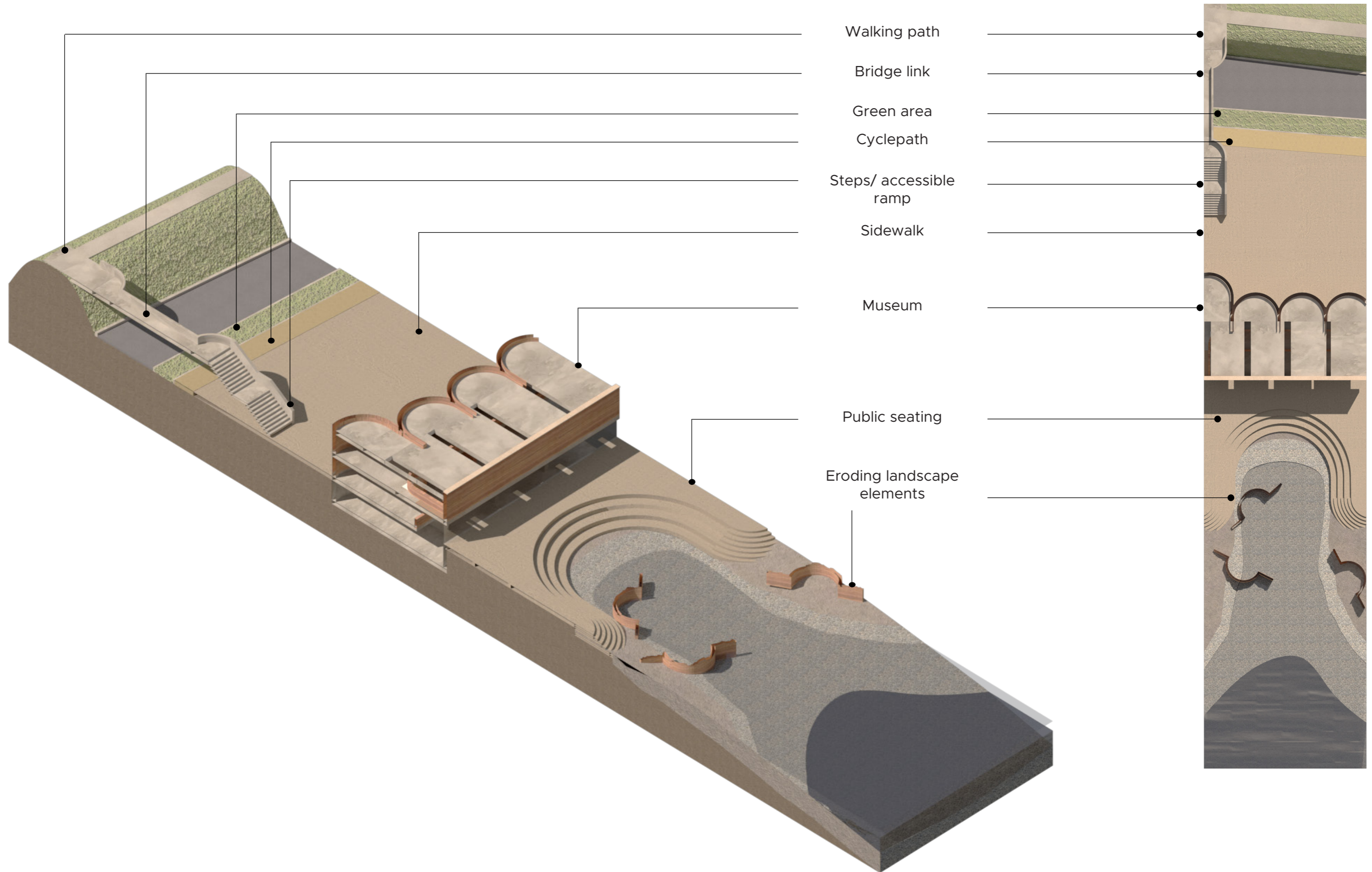
East Elevation 1:200



South Elevation 1:200

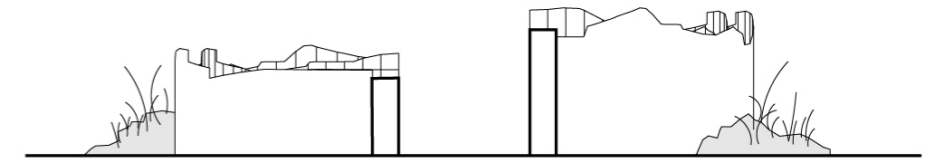
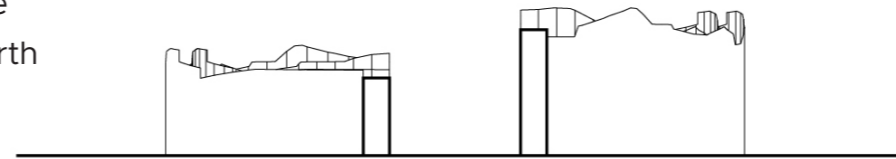
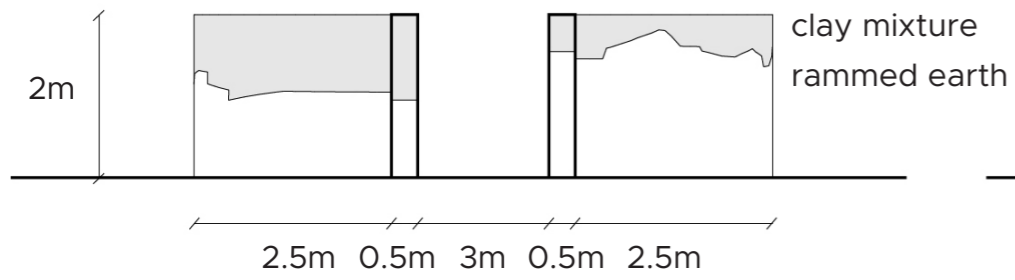
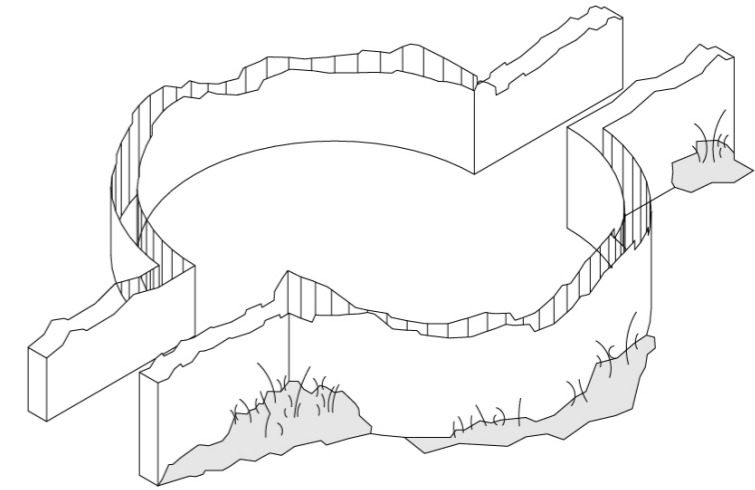
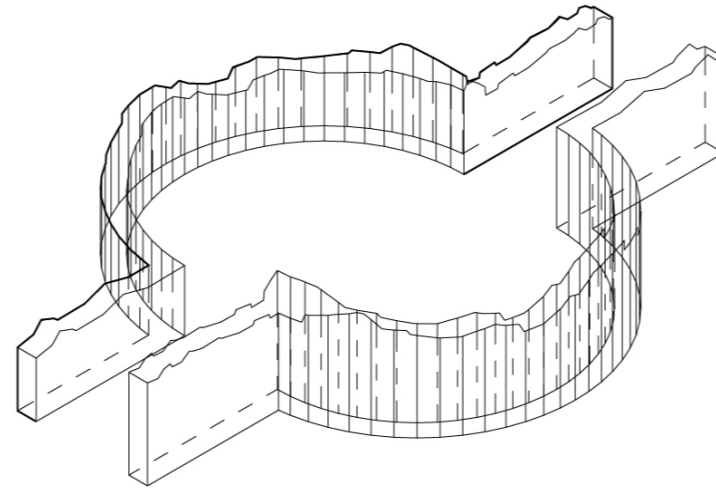
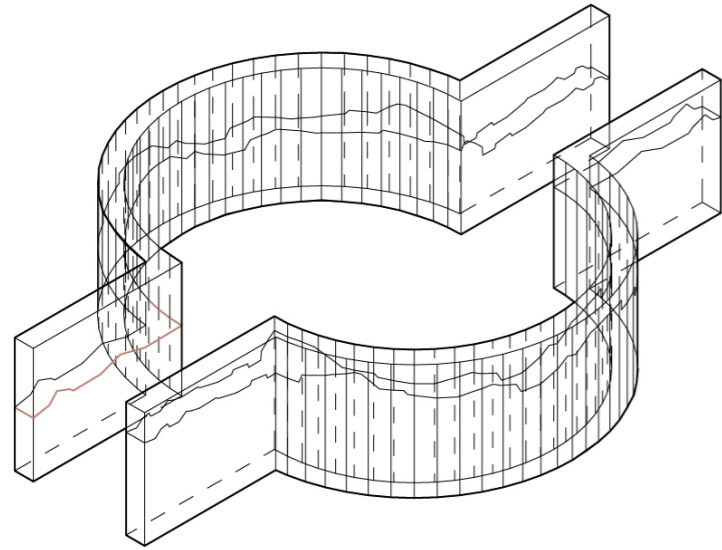


# Landscape Strategy



# Erosion Process

Landscape/ sculpture garden/ ruins

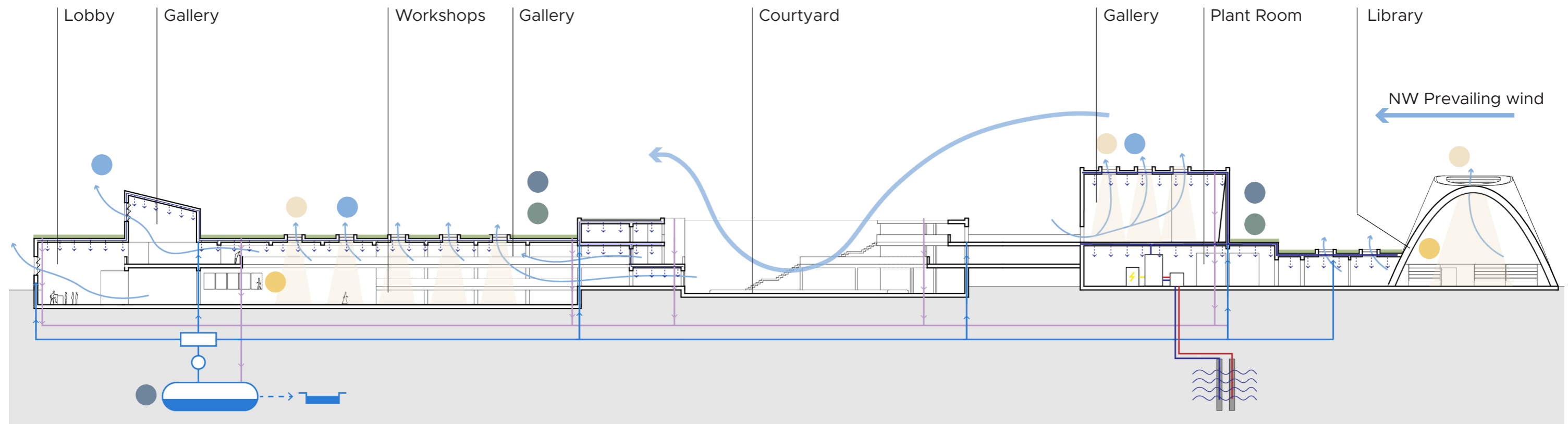




Research & Concept  
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# Climate Strategy

## Overview



### Outdoor Comfort

Plants provide shading and comfort to outdoor social spaces. Also plants help regulate humidity levels and clean polluted urban air.

### Natural Ventilation

The environmental design approach aims to maximize naturally ventilated spaces. This is achieved by ensuring every space has direct access to the exterior allowing for the cross flow of air.

### Daylight Maximization

Natural lighting was prioritized throughout the building through the implementation of floor to ceiling windows and skylights to reduce the overall energy consumption. It is complemented with artificial lighting in heavily used spaces.

### Solar Control (Shading)

Plants along the southern façade provide shading and help prevent overheating. There are fewer openings in façades with greater solar exposure and the openings there are setback to reduce direct lighting.

### Green Roof

The design has a large roof surface so incorporating vegetation on the roof is crucial to help reduce solar radiation and thus reduce cooling demands.

### Rainwater Collection

Rainwater collected is filtered and re-used as gray water in the building and as to irrigate plants.

# Climate Strategy

## Summer

### Passive ventilation

Openings are arranged to facilitate air flow, driving hot air to escape through high placed windows or skylights. Similarly, narrow horizontal floor plates aid internal air flow and mechanical ventilation reserved to frequently used areas.

### Solar control

Plants give shading and prevent overheating

### Thermal insulation

Insulation in the buildings' envelope will decrease the amount of heat transferred by radiation, reducing the need for active cooling.

### Thermal Mass

Rammed Earth walls and concrete floors act as heat sink through the day as they absorb heat gains from the occupants/ equipment and solar radiation.

### Thermal Mass

At night, when outside temperature drops, the heat accumulated in the rammed earth walls/ concrete floors is released by opening the envelope and allowing cooler air to pass through the building

### Evaporative Cooling

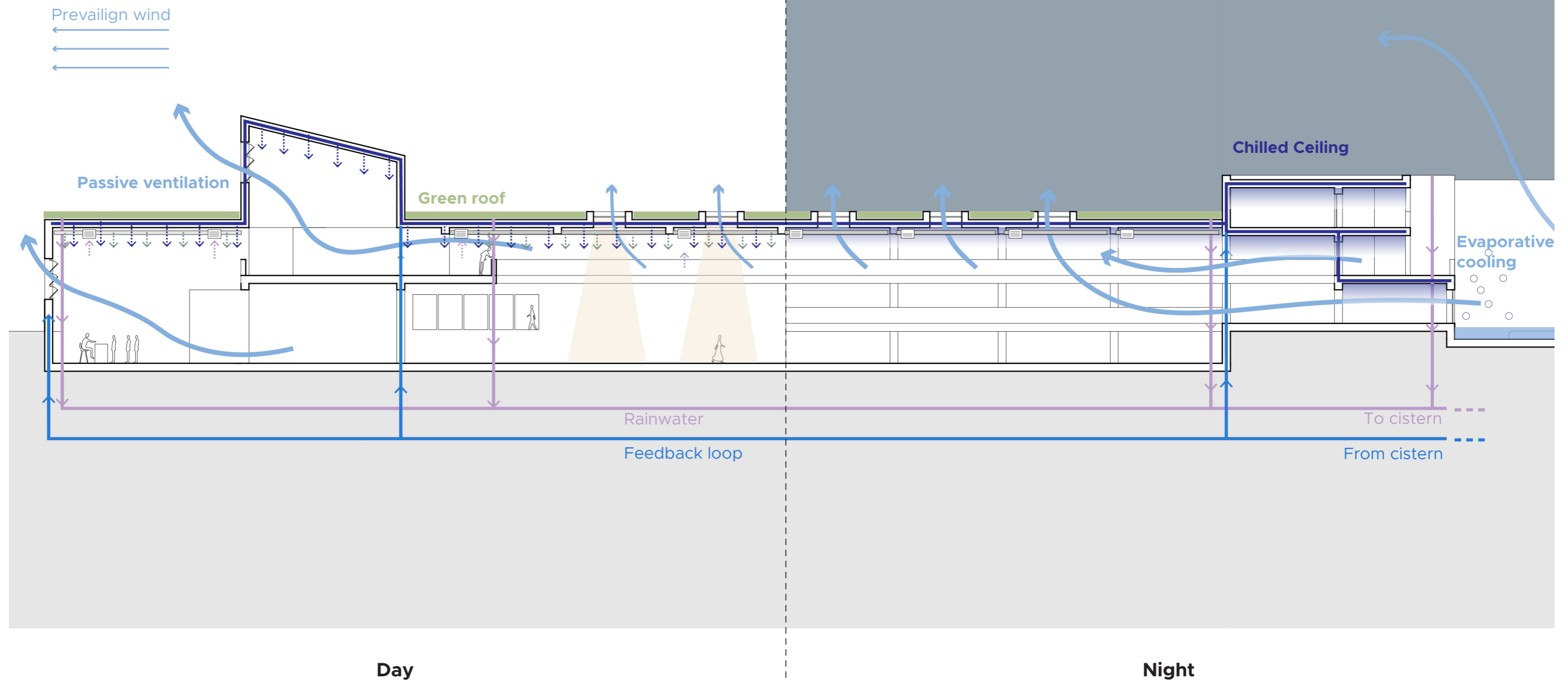
A passive cooling system which uses evaporating water from the ponds and harbour to cool pass through the building and cool it.

### Passive Ventilation

Skylights and high placed windows can be opened to exhaust warmer air

### Chilled Slabs

Water is passed through the pipes to transfer heat stored in thermal mass during the daytime



# Climate Strategy

## Winter

### Indoor Air Renewal

In heavily used areas - lobby, restaurant, library air more frequently refreshed through the air vents

### Thermal Insulation

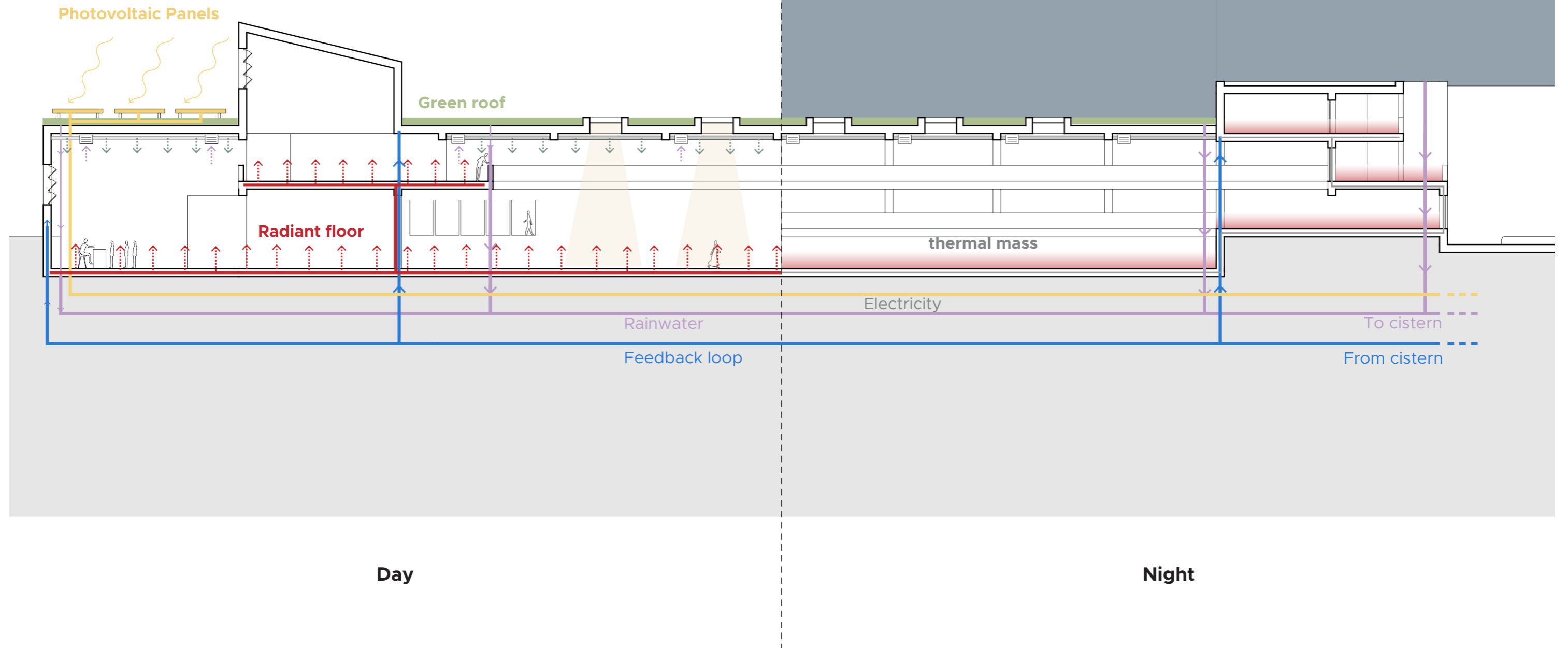
Climatised areas are wrapped in mineral wool insulation to retain heat in the building.

### Thermal Mass

Heat gain from solar radiation, underfloorheating, users and equipemnt is stored in elements with thermal mass properties (rammed earth walls and concrete floors) during day time.

### Thermal Mass

At night, heat stored in thermal mass is radiated back to the building helping to reduce big temperature fluctuations between day and night.



# Climate Strategy

## Systems

### Key

Electricity

Ventilation

Filtered water

Rainwater collection

Liquid heating system

Liquid heating system

1 Mechanical Ventilation with Heat Recovery

2 Electrical Transformer

3 Watsource Heat Pump

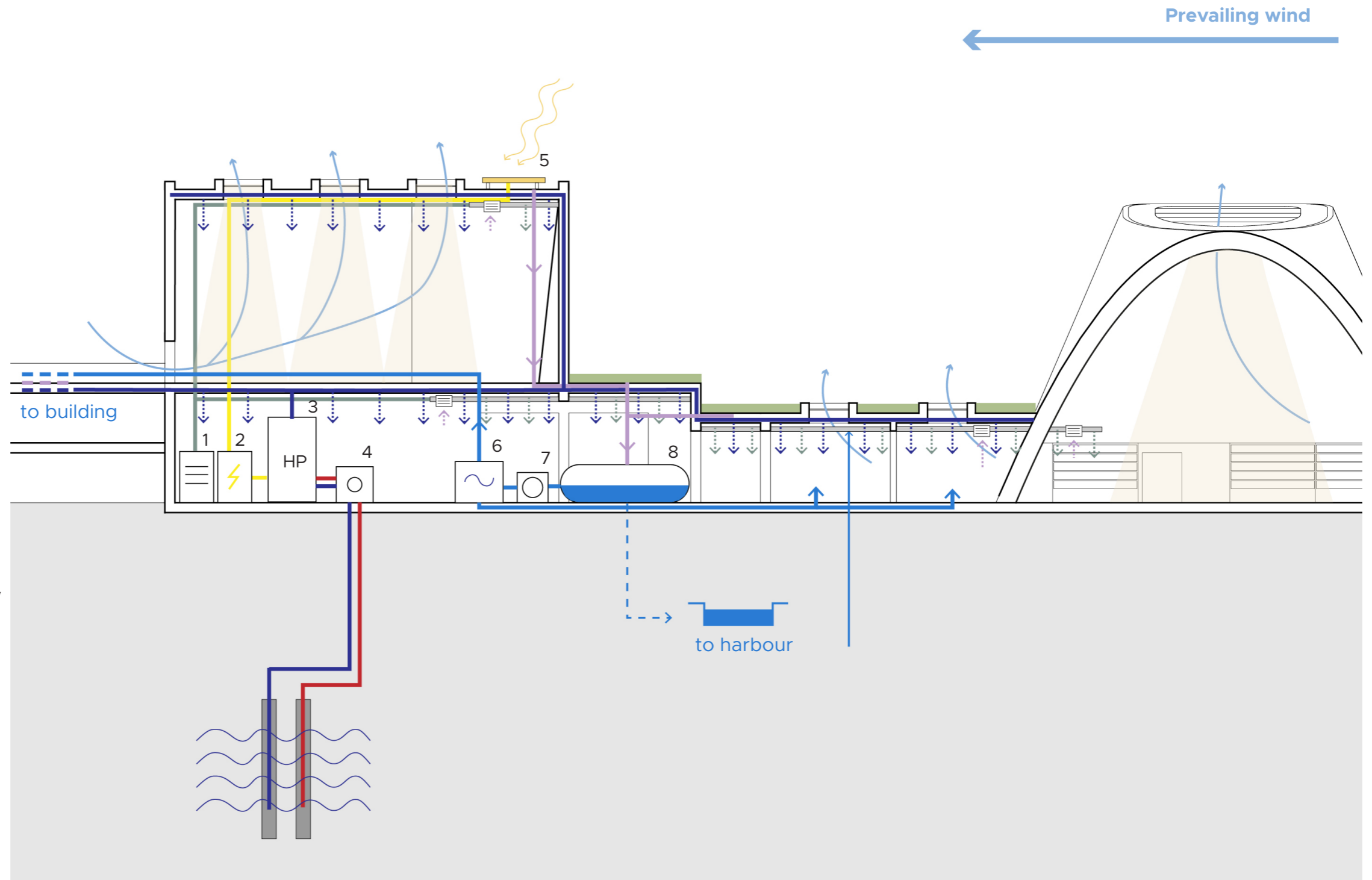
4 Preheating Unit

5 PV Panels

6 Water Filtration System

7 Pump

8 Water Retention Pond



Research & Concept  
Program organization  
Final Design  
Climate  
**Structure**  
Detail  
Views

# Structure

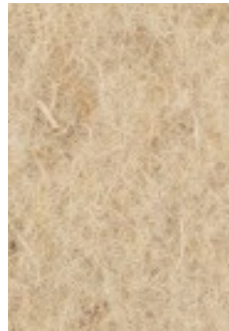
## Material Palette



Rammed Earth



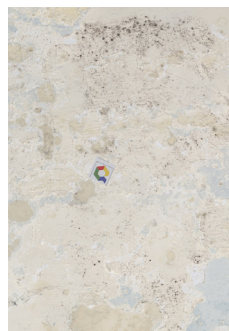
Erodable Clay Composite



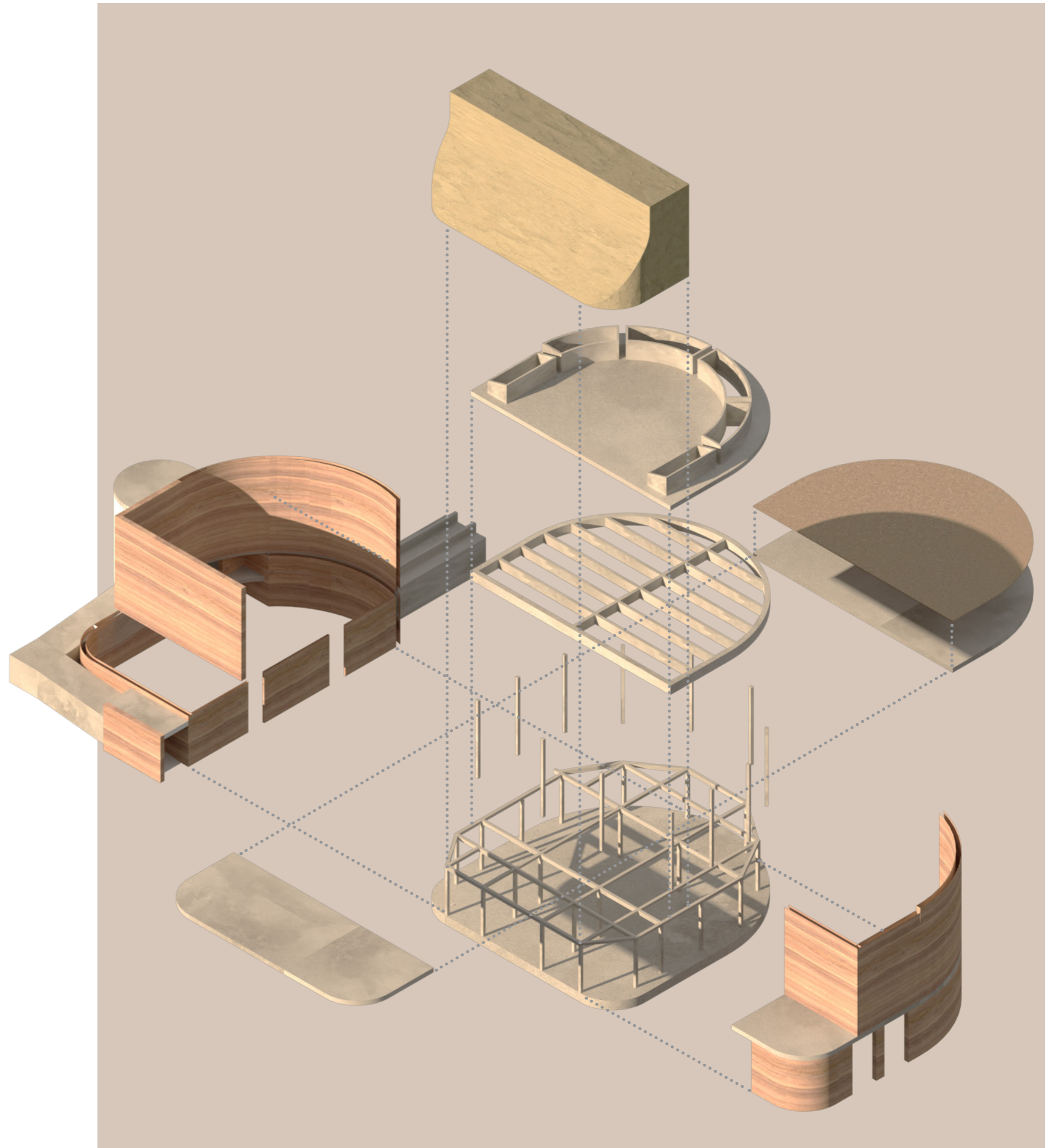
Flax Insulation panels



Prefab Concrete



Plaster



**Structure**  
**(Dis)assembly**



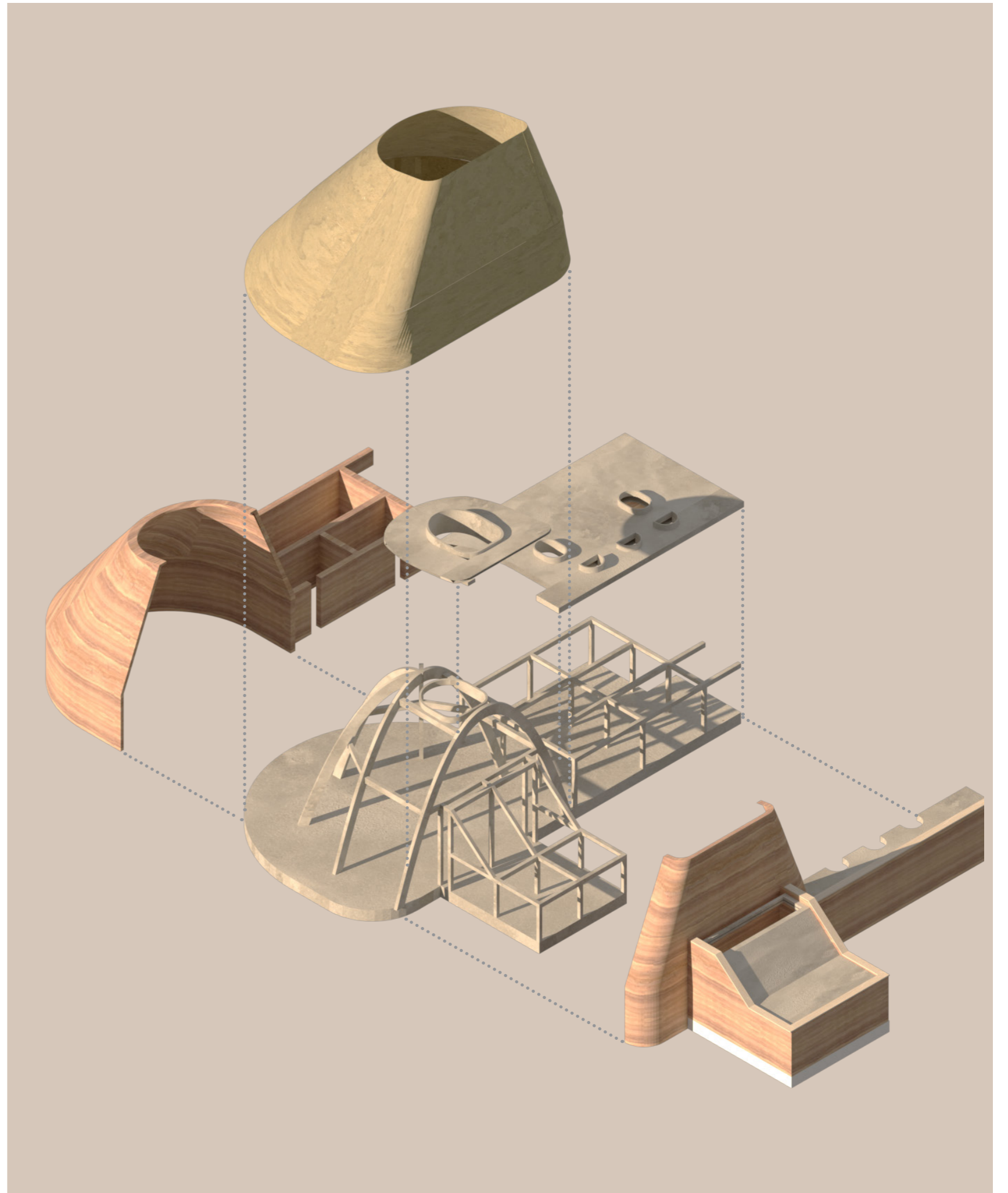
Start



3 months

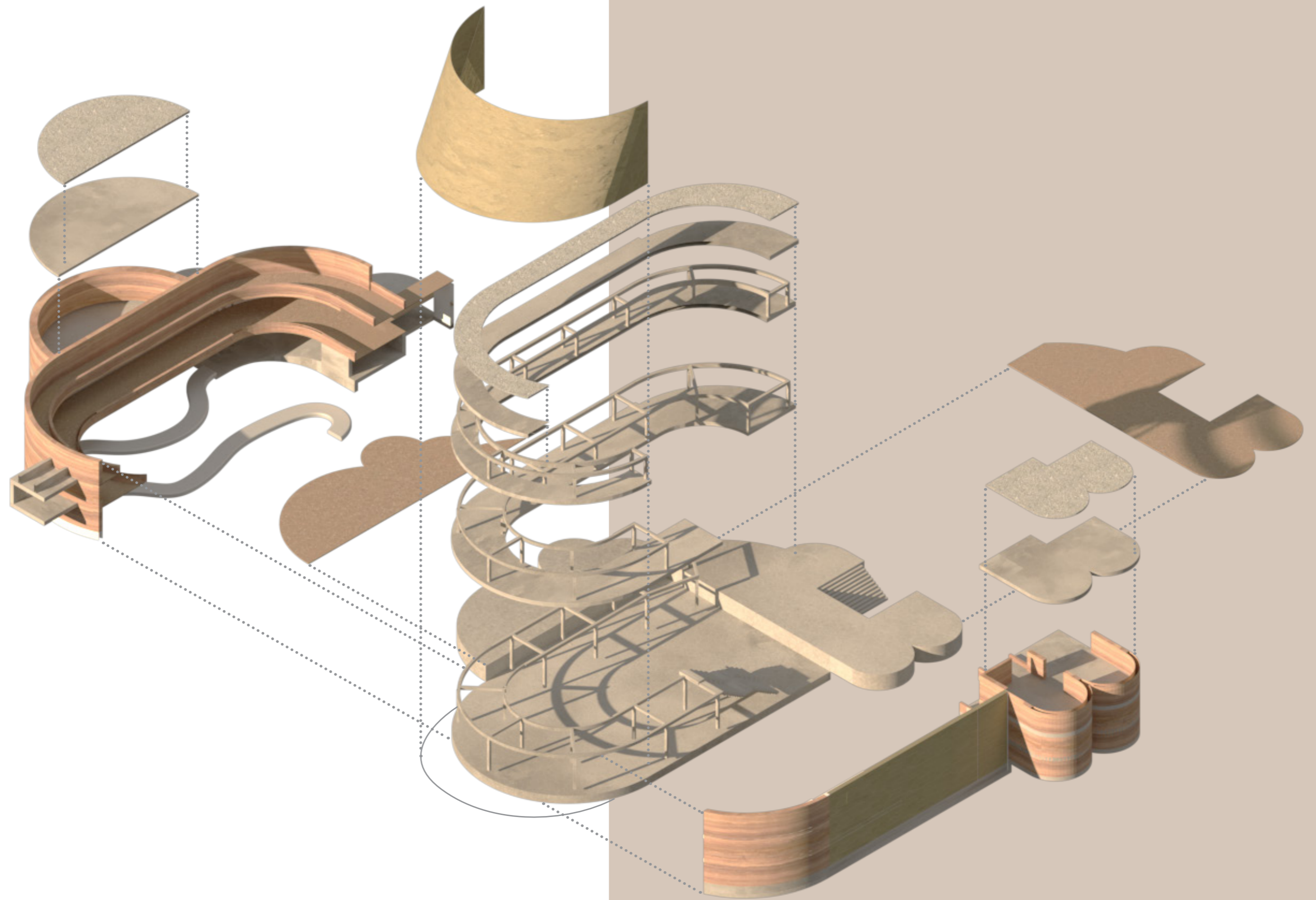


6 months



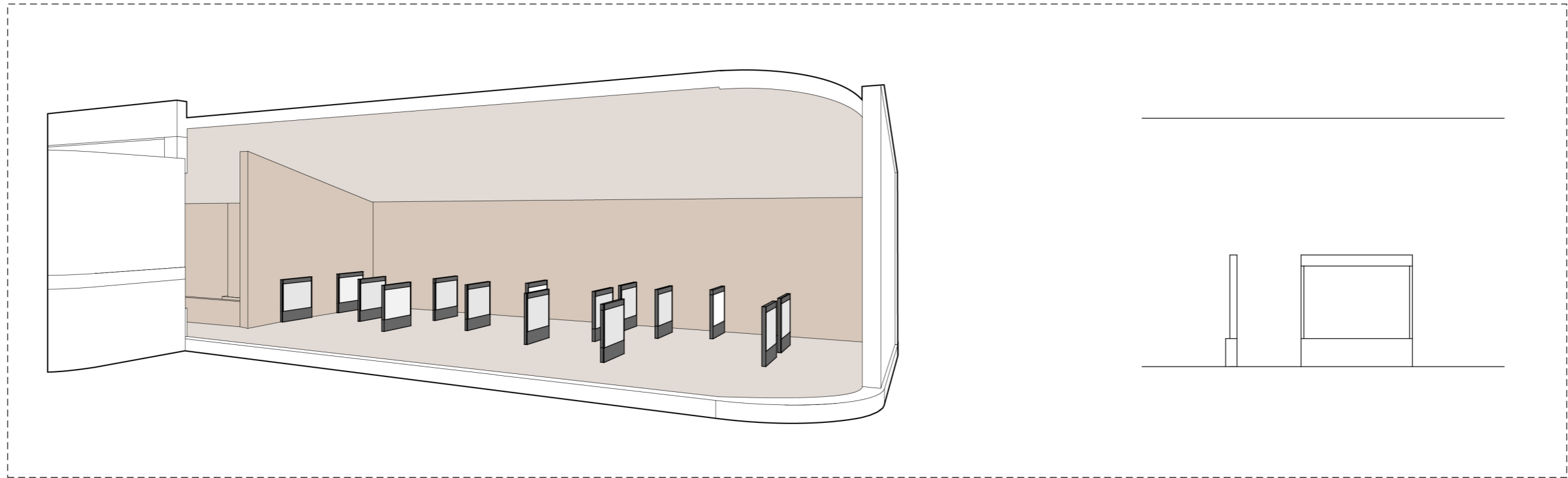


**Structure**  
**(Dis)assembly**

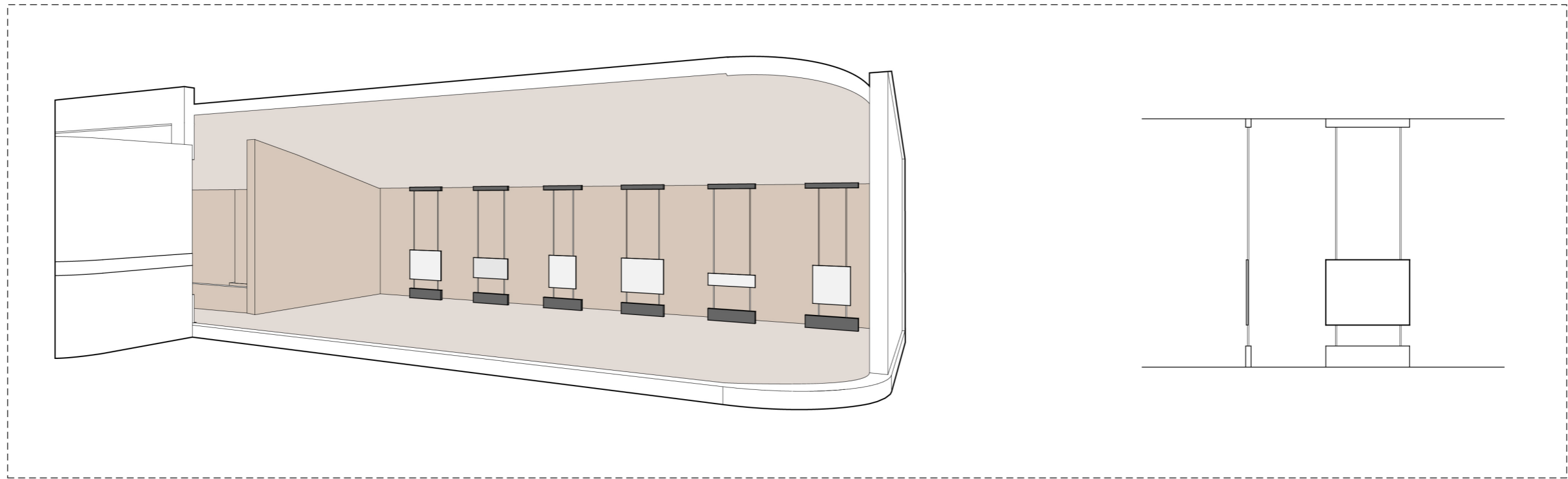


# Structure

## Temporary elements



Stand-alone frames

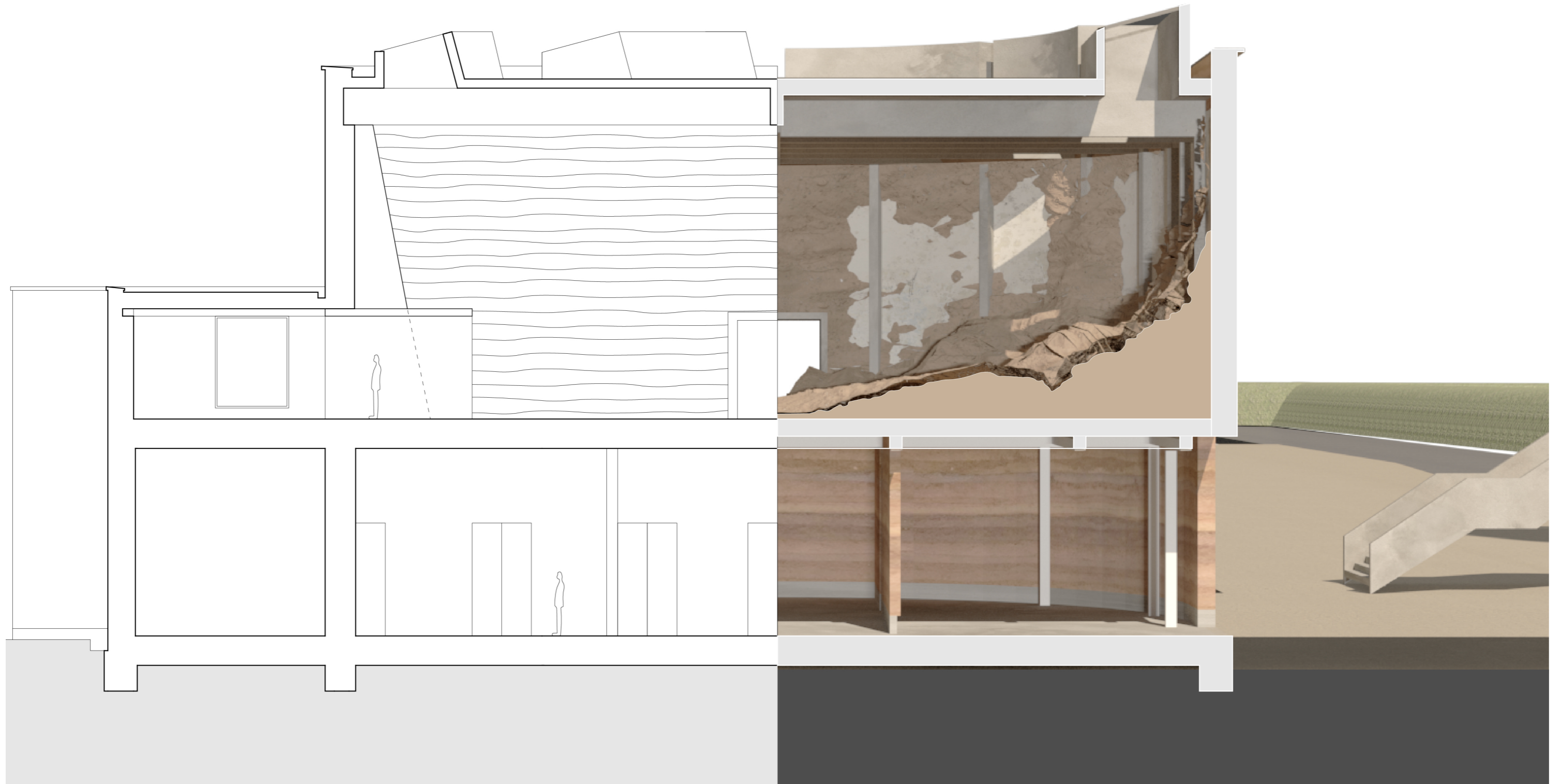


Hanging frames

Research & Concept  
Program organization  
Final Design  
Climate  
Structure  
**Detail**  
Views

# Detail

## Building Fragment 1:50



# Detail

## Façade Fragment 1:20

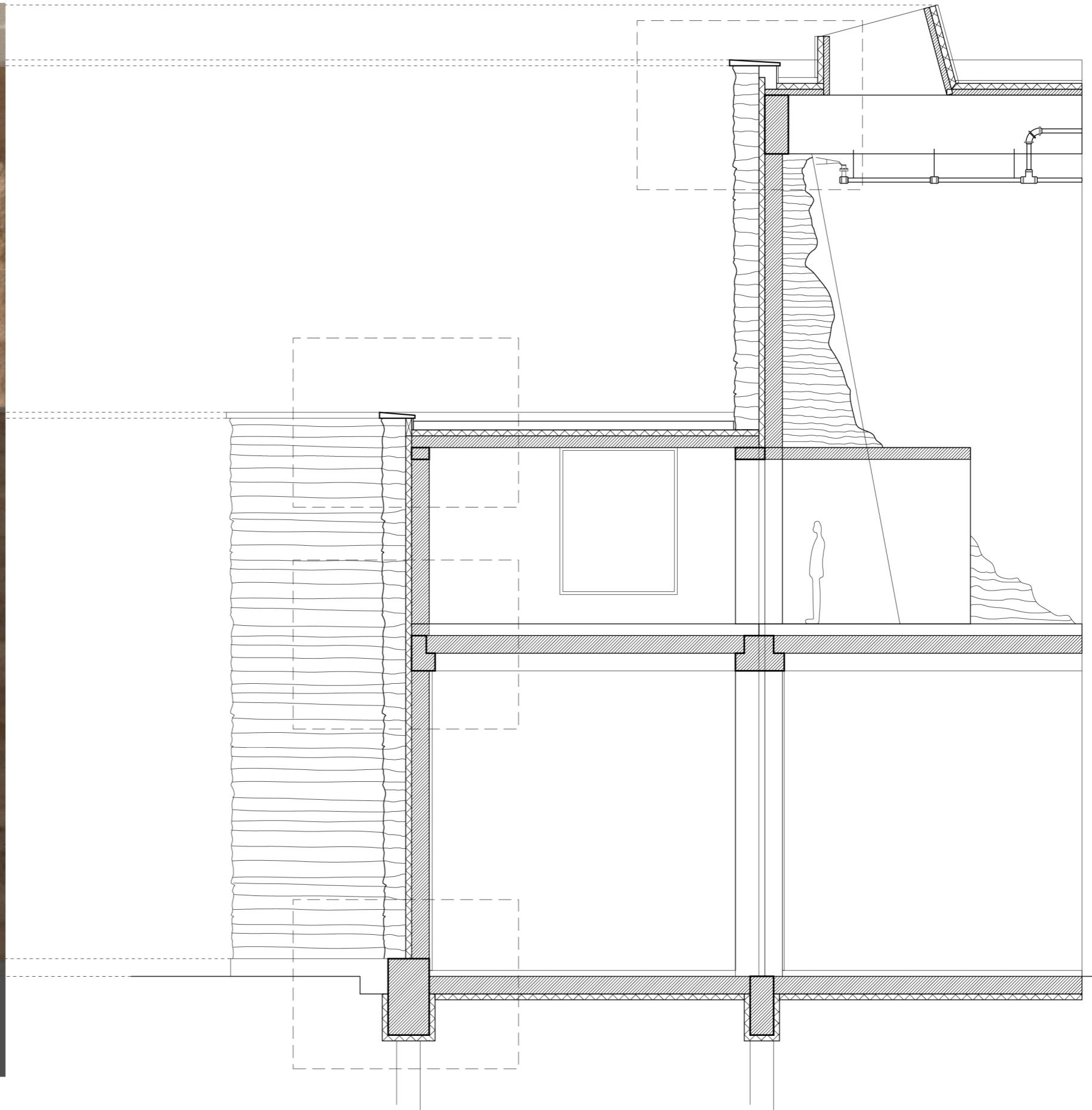
▽ 17 m

▽ 16 m

▽ 9 m

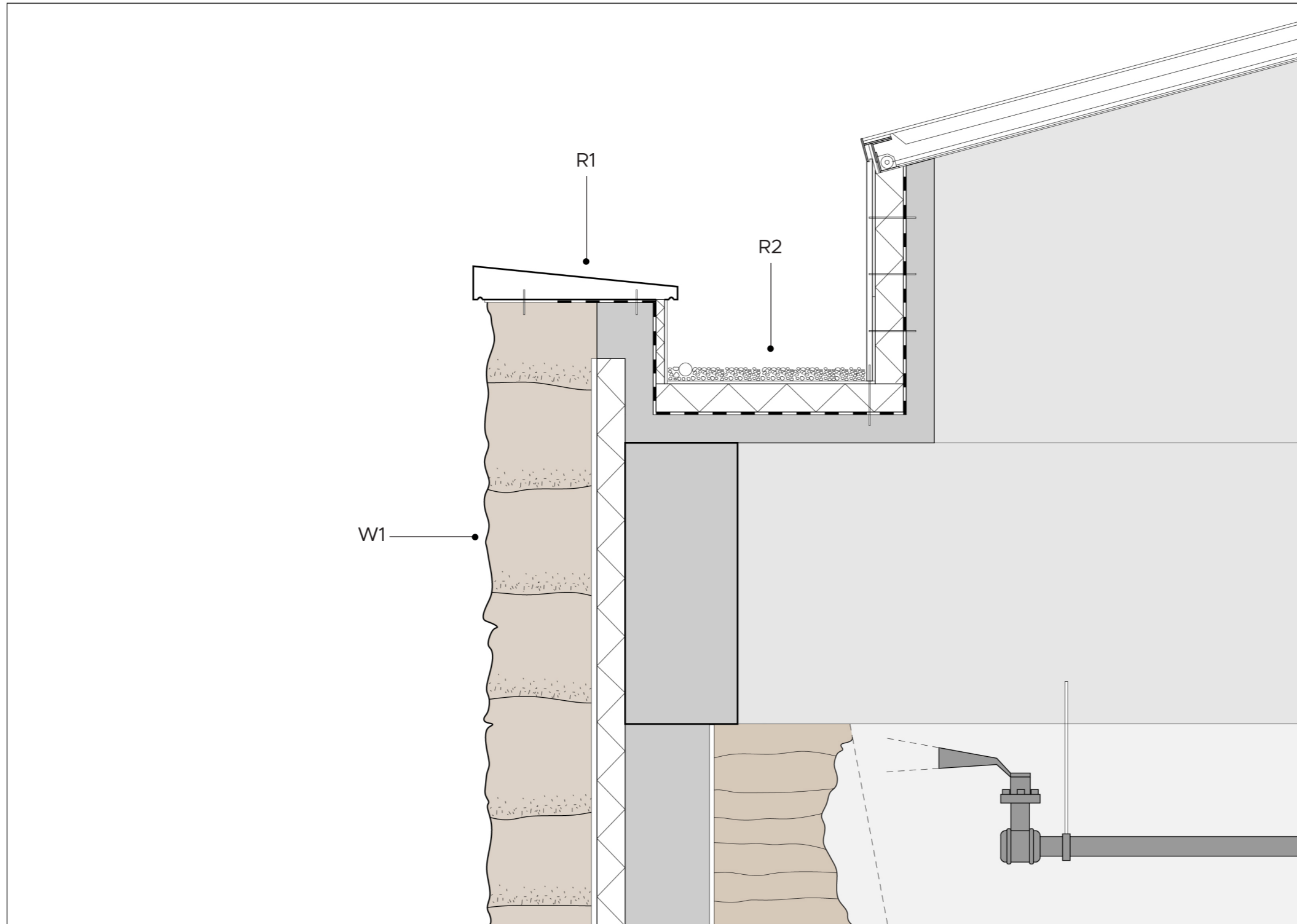
▽ 6 m

▽ 0.3m



# Detail

## Parapet 1:10



R1

Stone covering 3% slope 3 mm  
Waterproofing layer 5mm  
Metal fixtures

R2

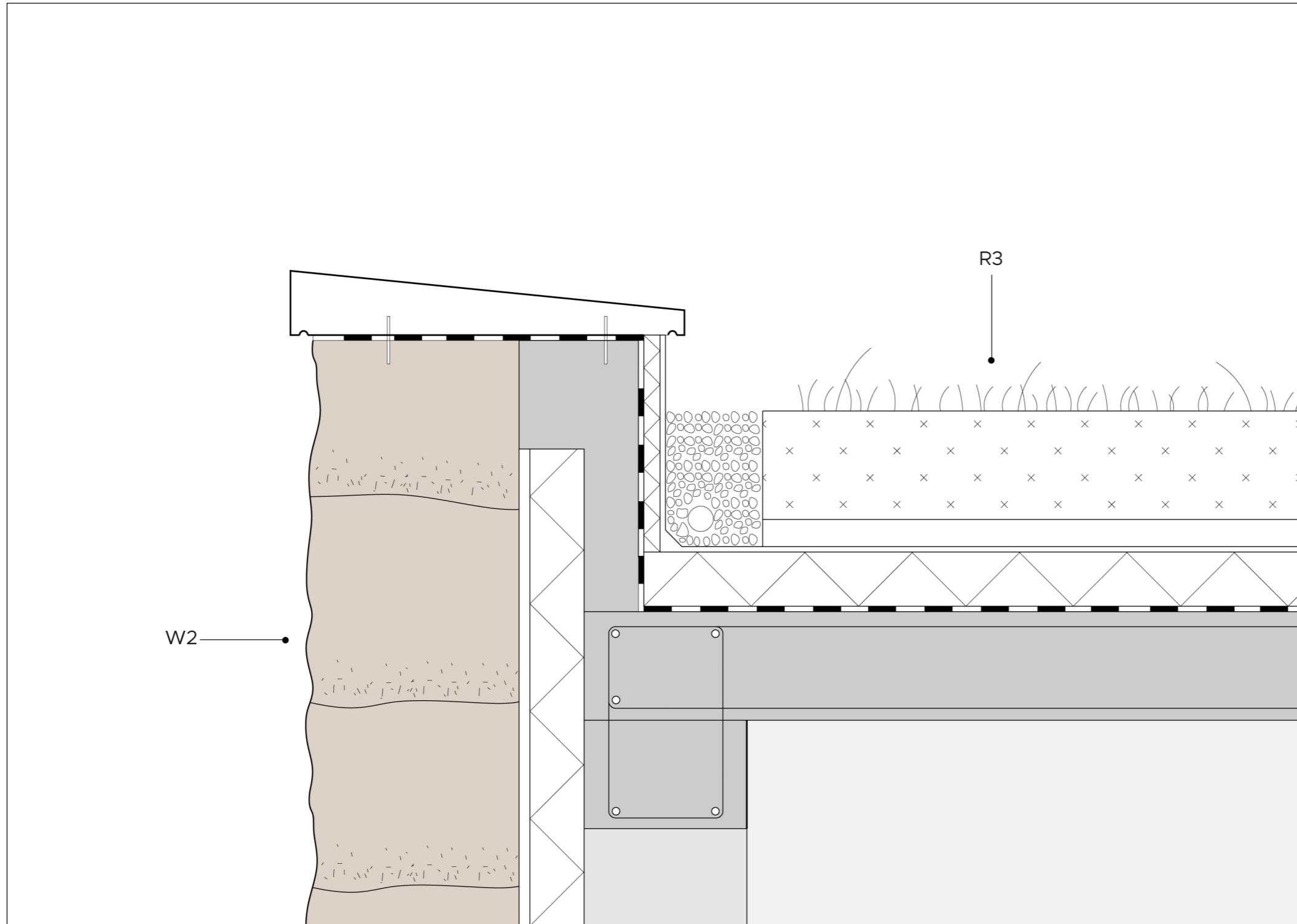
Drainage cells at a slope 50mm  
Protection layer 2mm  
Flax Thermal Insulation 100mm  
Waterproof membrane 2mm  
Concrete slab 150mm  
Galvanized steel skylight frame 100mm

W1

Rammed Earth Wall 400mm  
Air gap 2mm  
Flax Thermal Insulation 100mm  
Concrete Ring beam 400x1000mm  
Concrete Column 300x300mm  
White Plaster 3mm  
Erodable Clay composite Wall 500mm  
Copper water spraying piping 32mm

# Detail

## Green Roof 1:5



R3

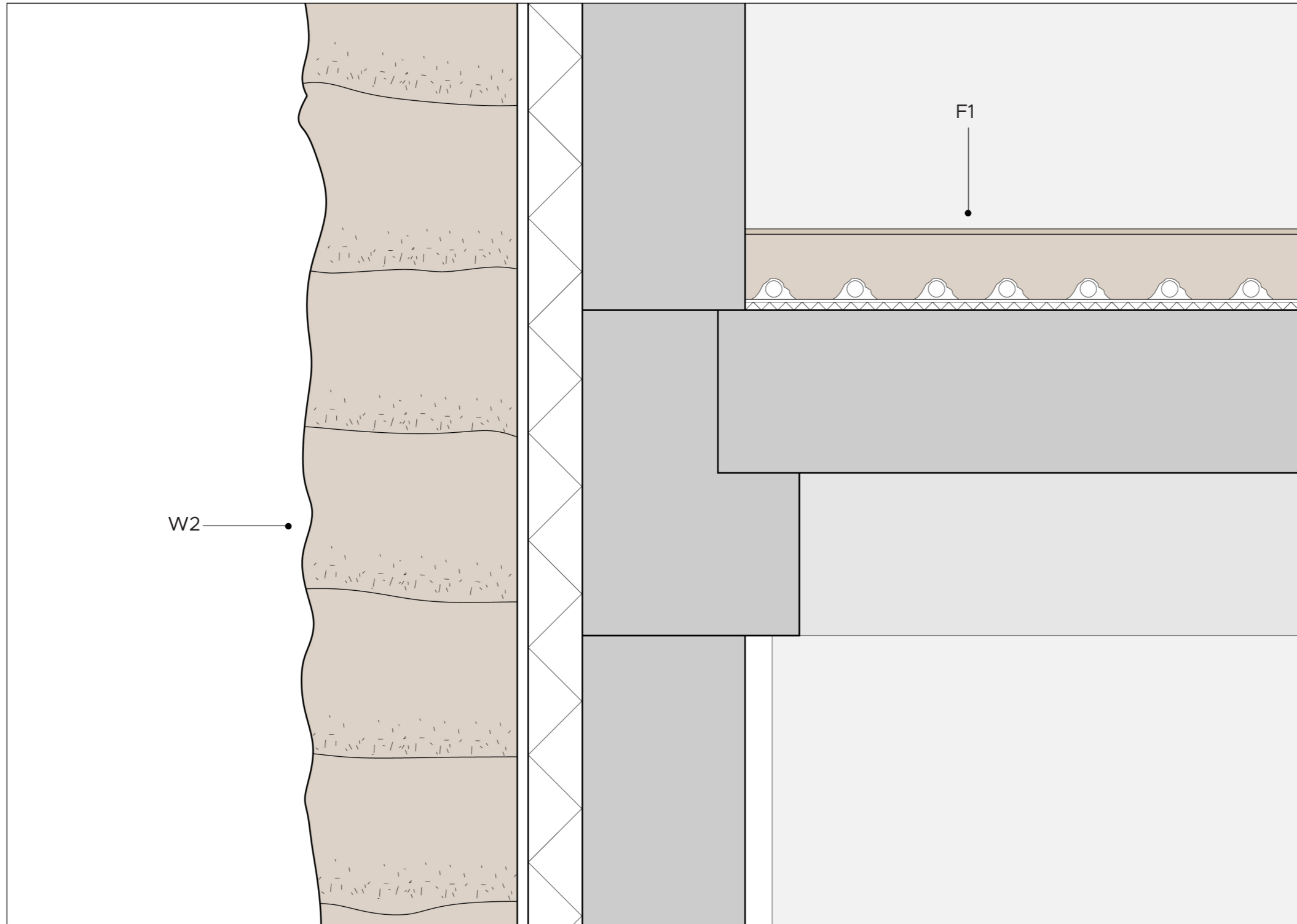
- Growth Substrate 200mm
- Drainage cells 50mm
- Drainage cells at a slope 50mm
- Protection layer 2mm
- Flax Thermal Insulation 100mm
- Waterproof membrane 2mm
- Concrete slab 200mm

W2

- Rammed Earth Wall 400mm
- Air gap 2mm
- Flax Thermal Insulation 100mm
- Concrete Ring beam 400x1000mm
- Concrete Column 300x300mm
- White Plaster 3mm

# Detail

## Intermediate Floor 1:5



F1

- Surface finish 1mm
- Rammed earth floor 100mm
- Clay mortar 20mm
- Heating pipe 10mm
- Footfall Insulation 20mm
- Foil 1mm
- Concrete slab 200mm

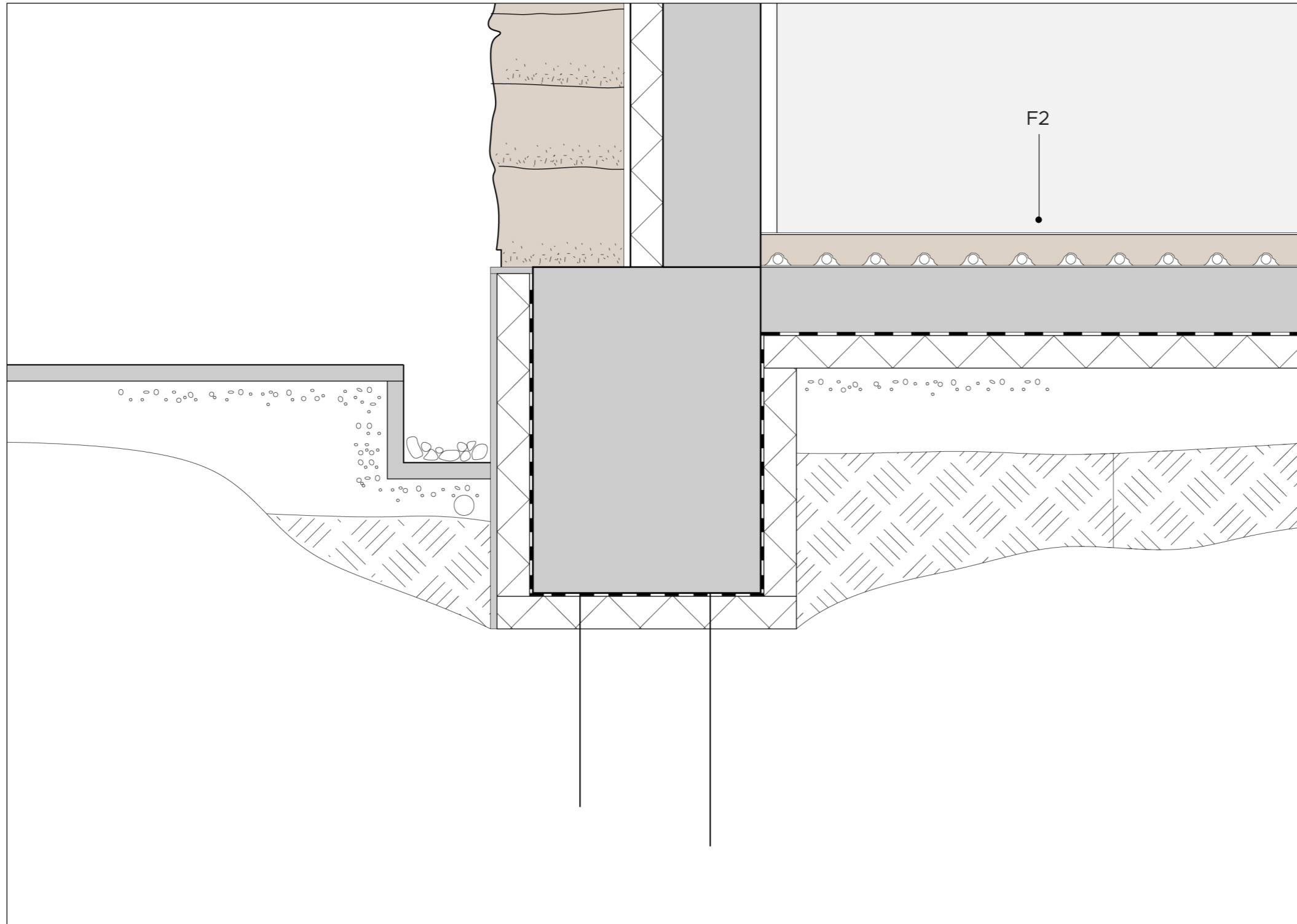
W2

- Rammed Earth Wall 400mm
- Air gap 2mm
- Flax Thermal Insulation 100mm
- Concrete Ring beam 400x500mm
- Concrete Column 500x300mm
- White Plaster 3mm



# Detail

## Ground Floor 1:10



F2

Surface finish 1mm

Rammed earth floor 100mm

Clay mortar 20mm

Heating pipe 10mm

Foil 1mm

Concrete slab 200mm

Concrete pile foundation

Flax Thermal insulation 100mm

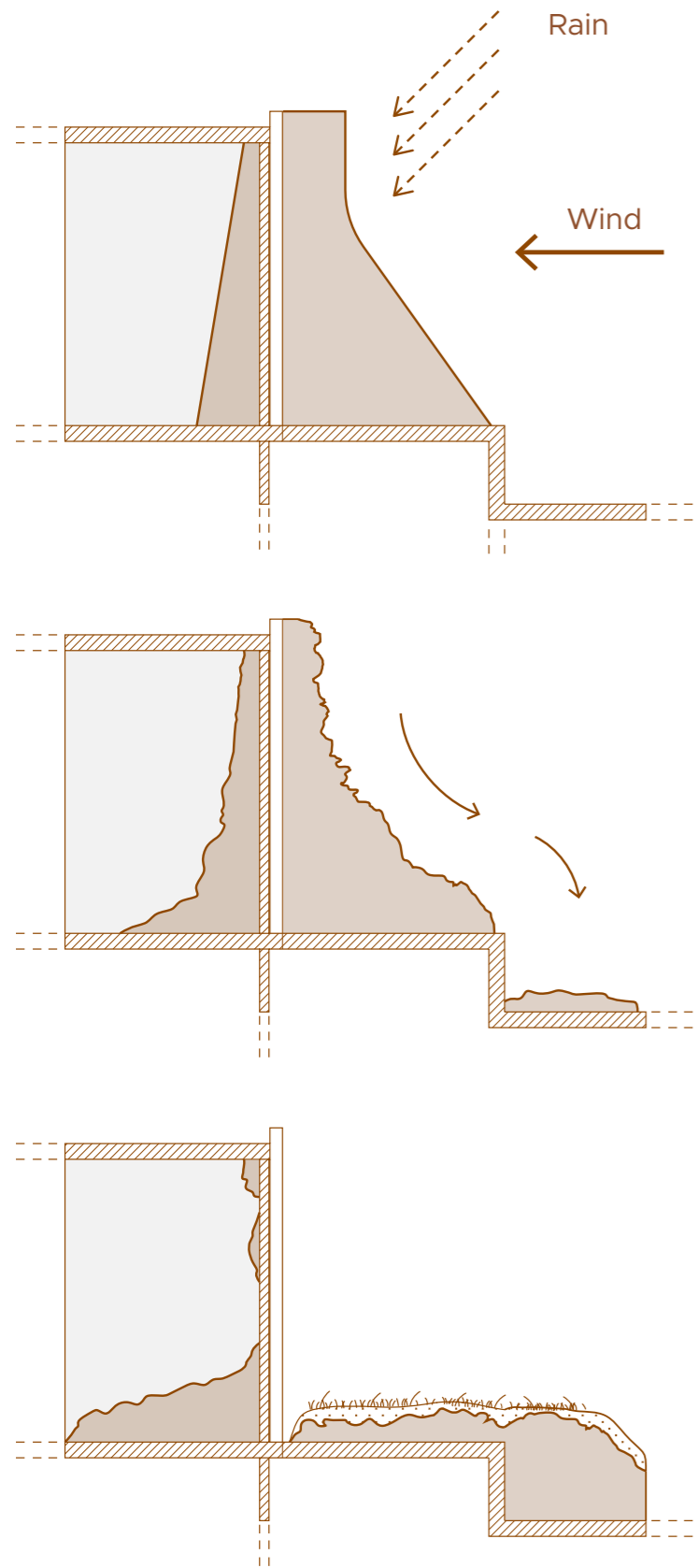
Damp proof membrane 2mm

Compacted ground

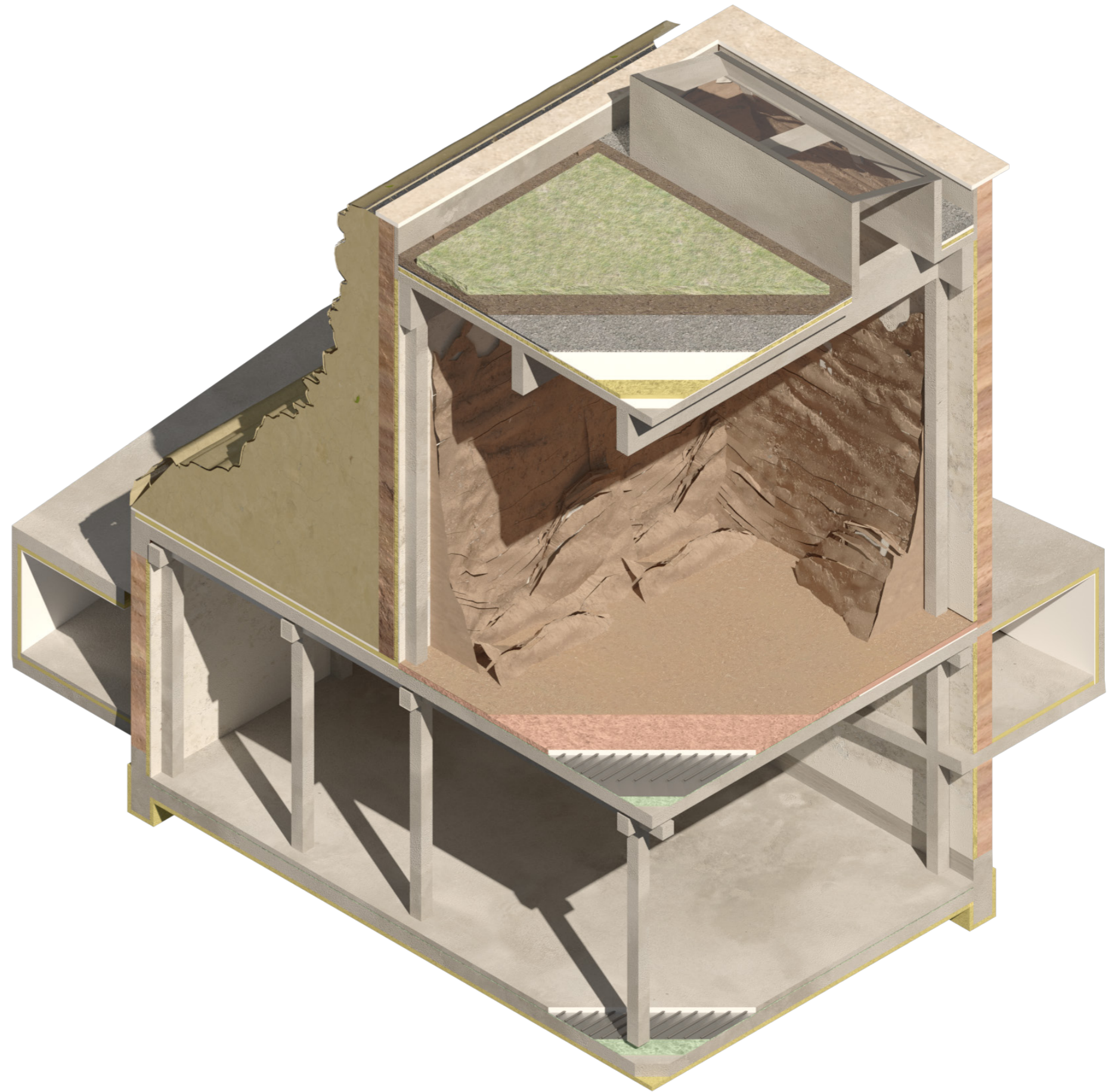
Gravel drainage layer

# Detail

## Corner Fragment 1:20



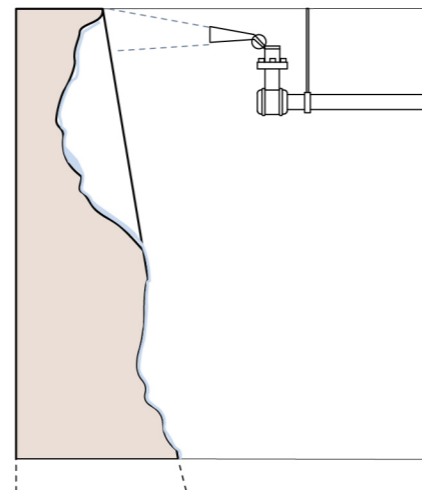
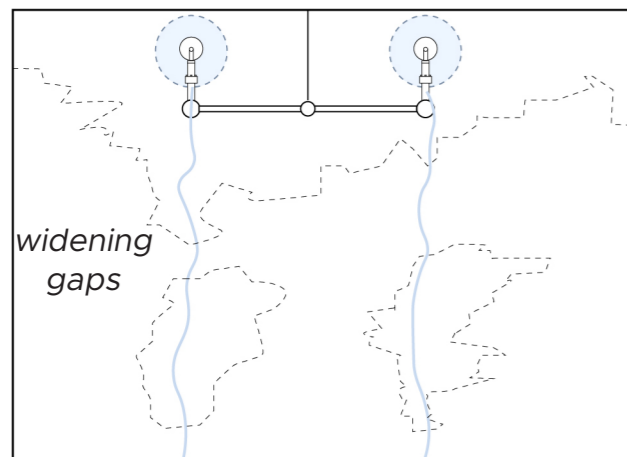
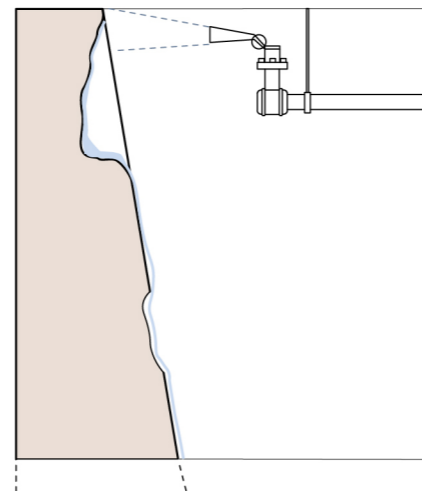
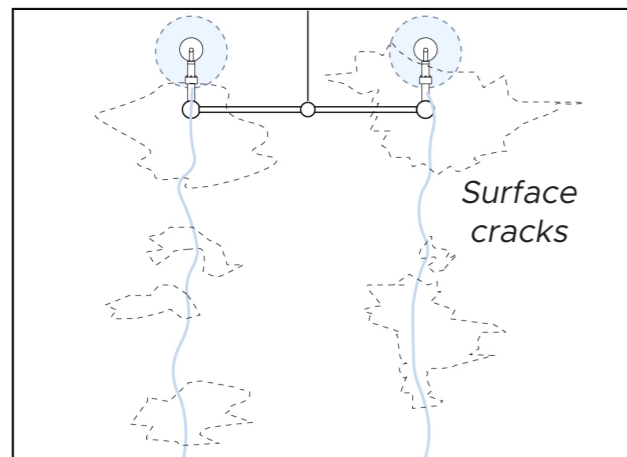
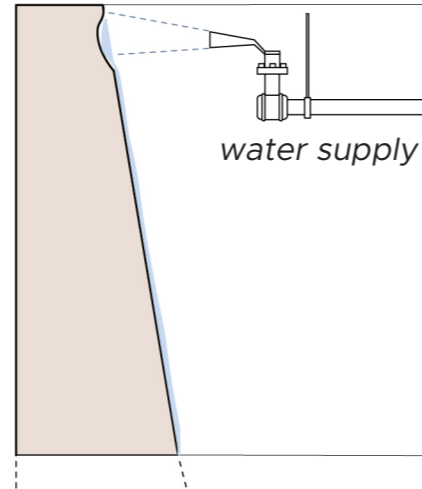
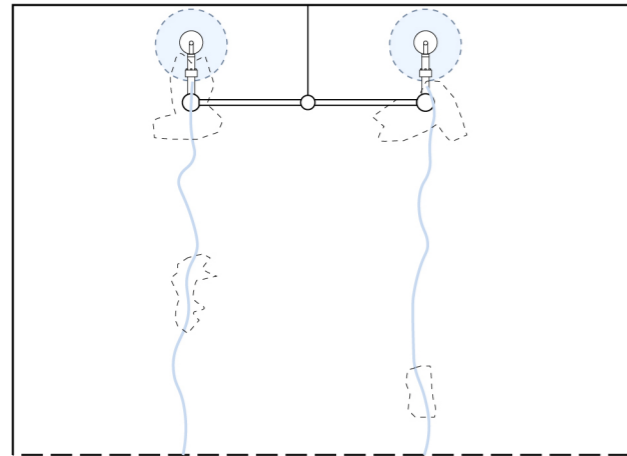
Erosion Process



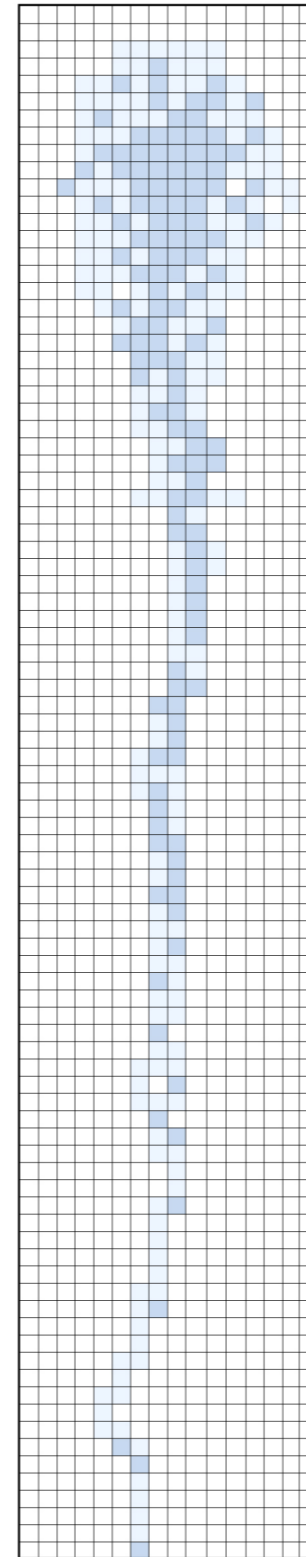
# Detail

## Interior Wall Erosion

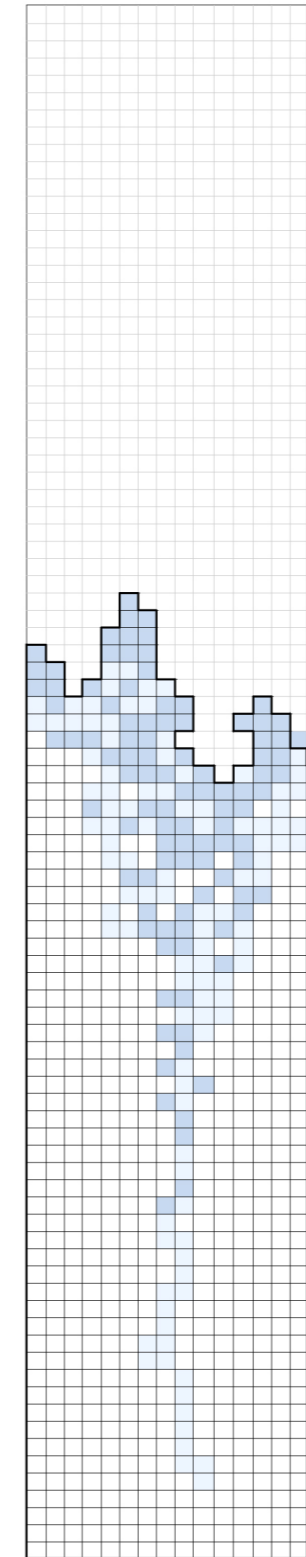
Regular water exposure



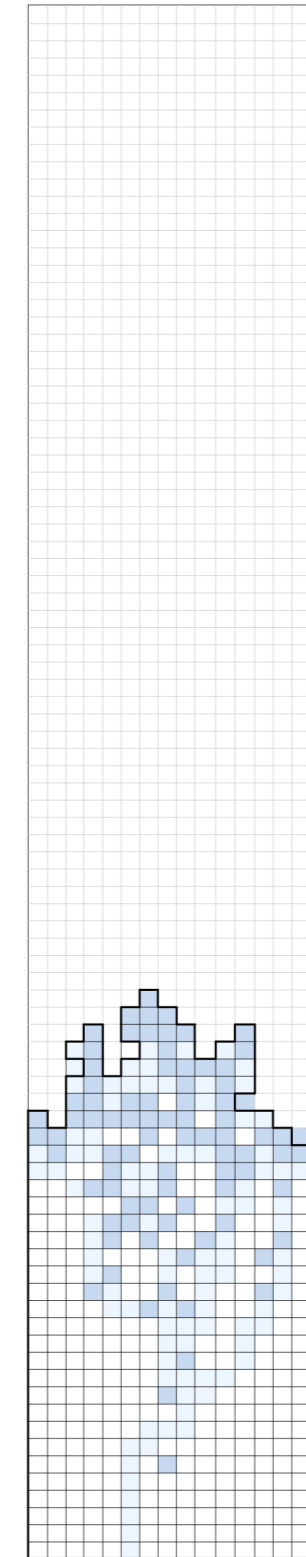
Water infiltration



Start

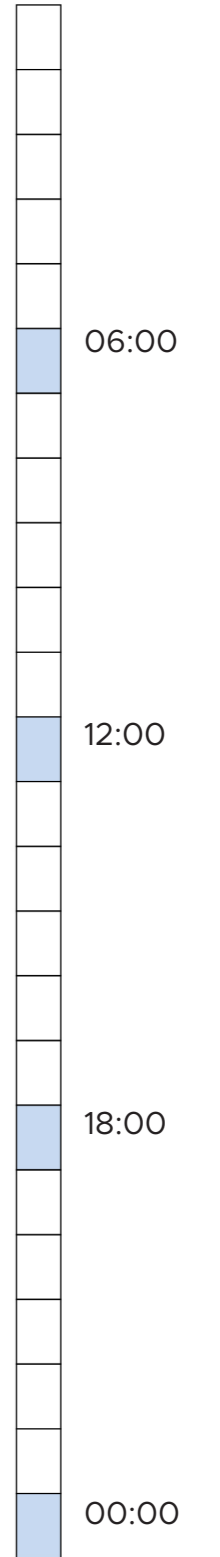


6 months



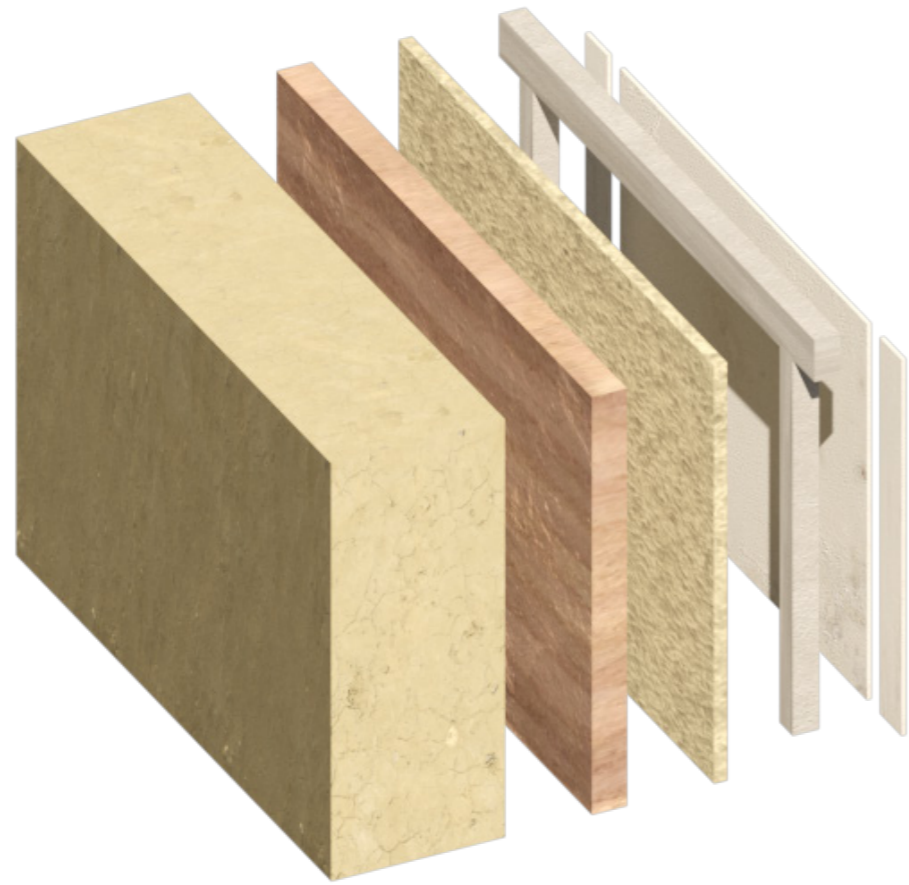
1 year

Water schedule



# Detail

## Exterior Wall Composition



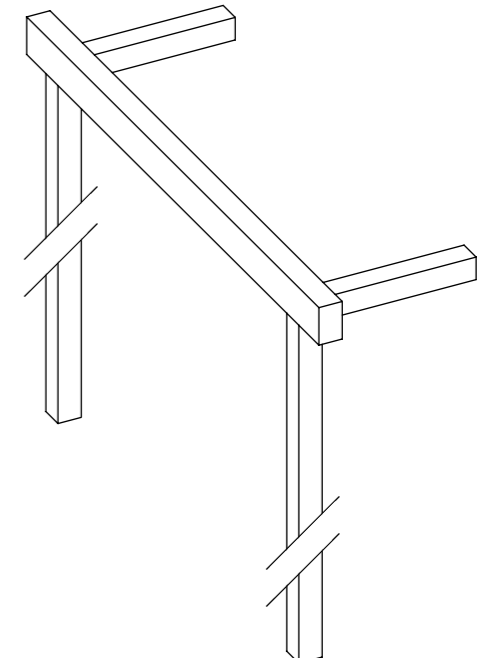
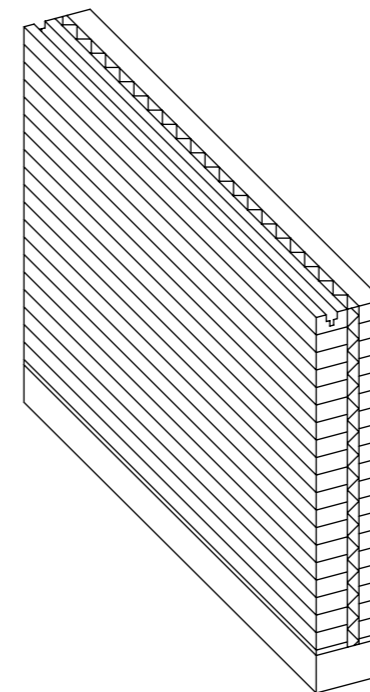
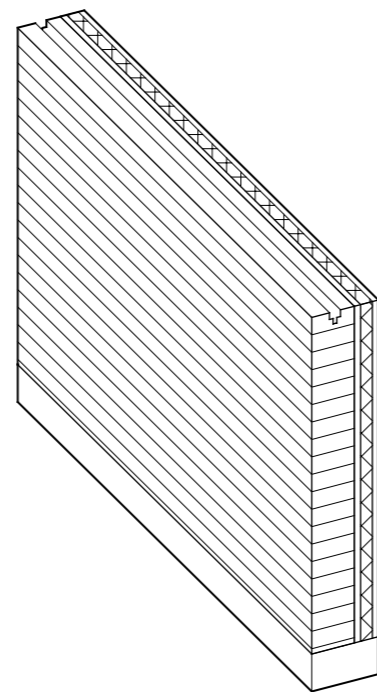
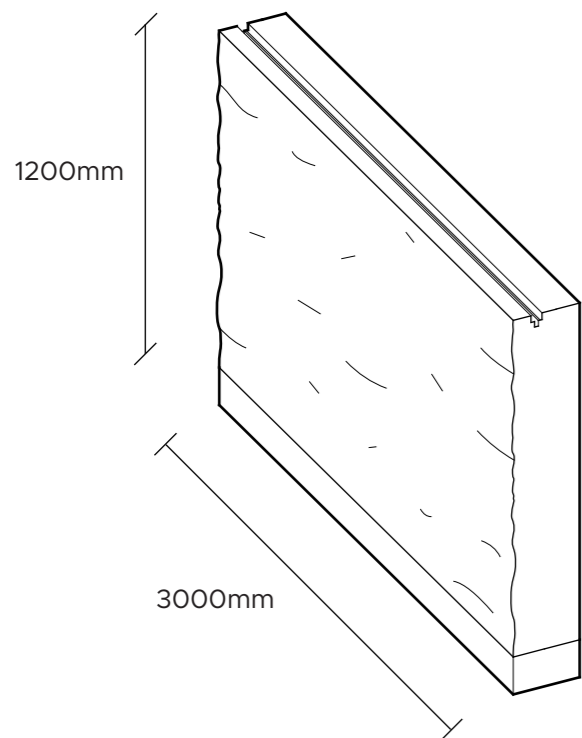
1

Short-term Erosion



2

Long-term Erosion

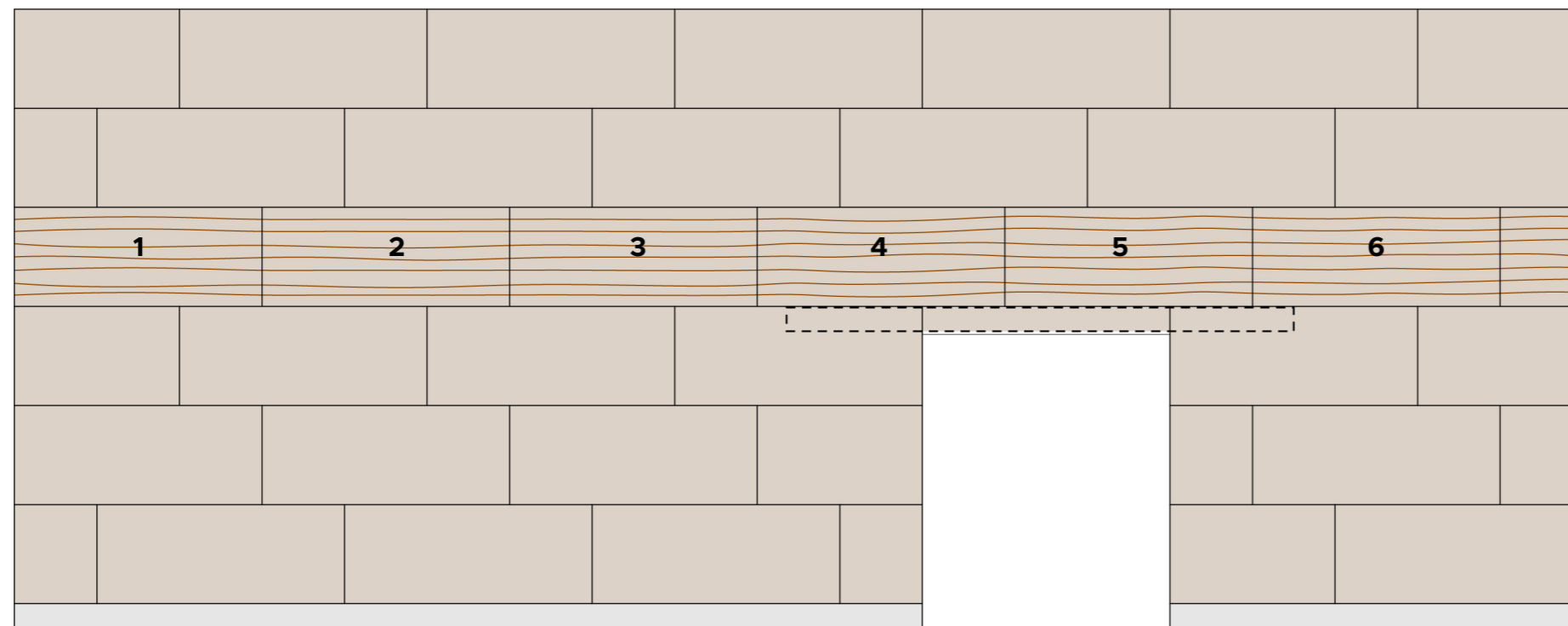


Prefabricated elements

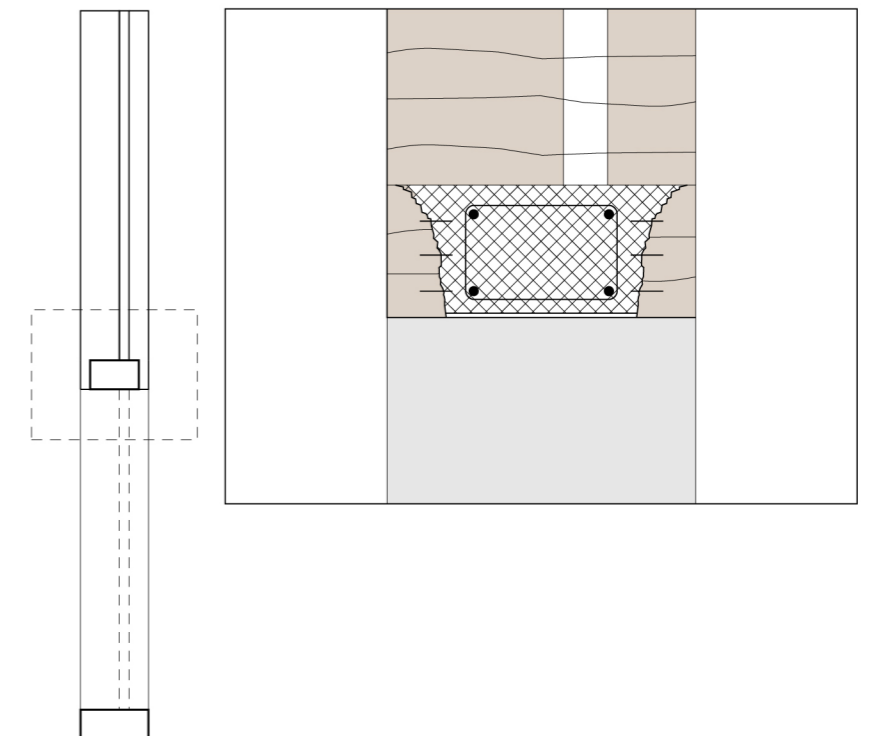
# Detail

## Prefabrication & assembly

Assembly sequence follows a longitudinal pattern



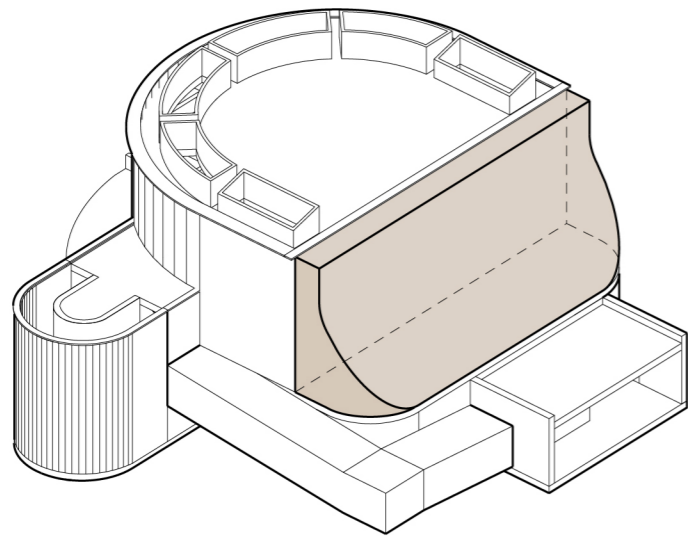
Concealed beam



# Detail

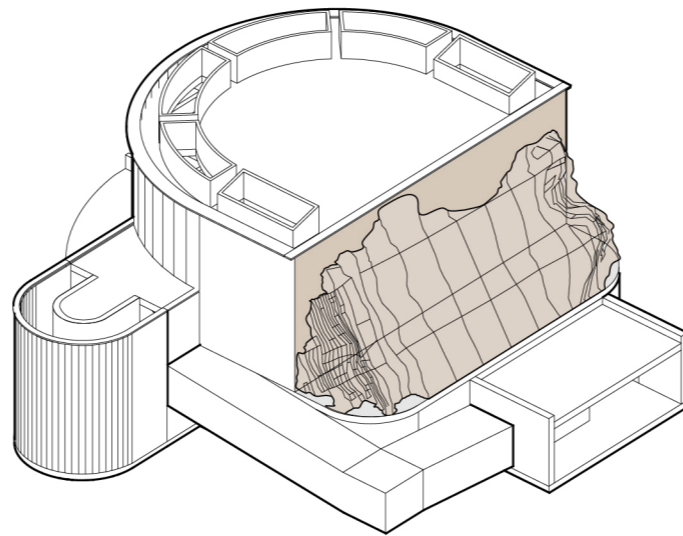
## Erosion Cycle & Renewal

1



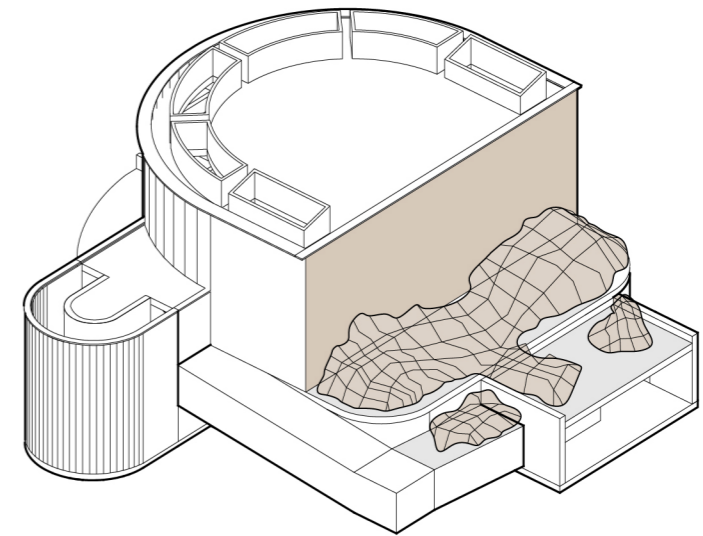
Initial state

2



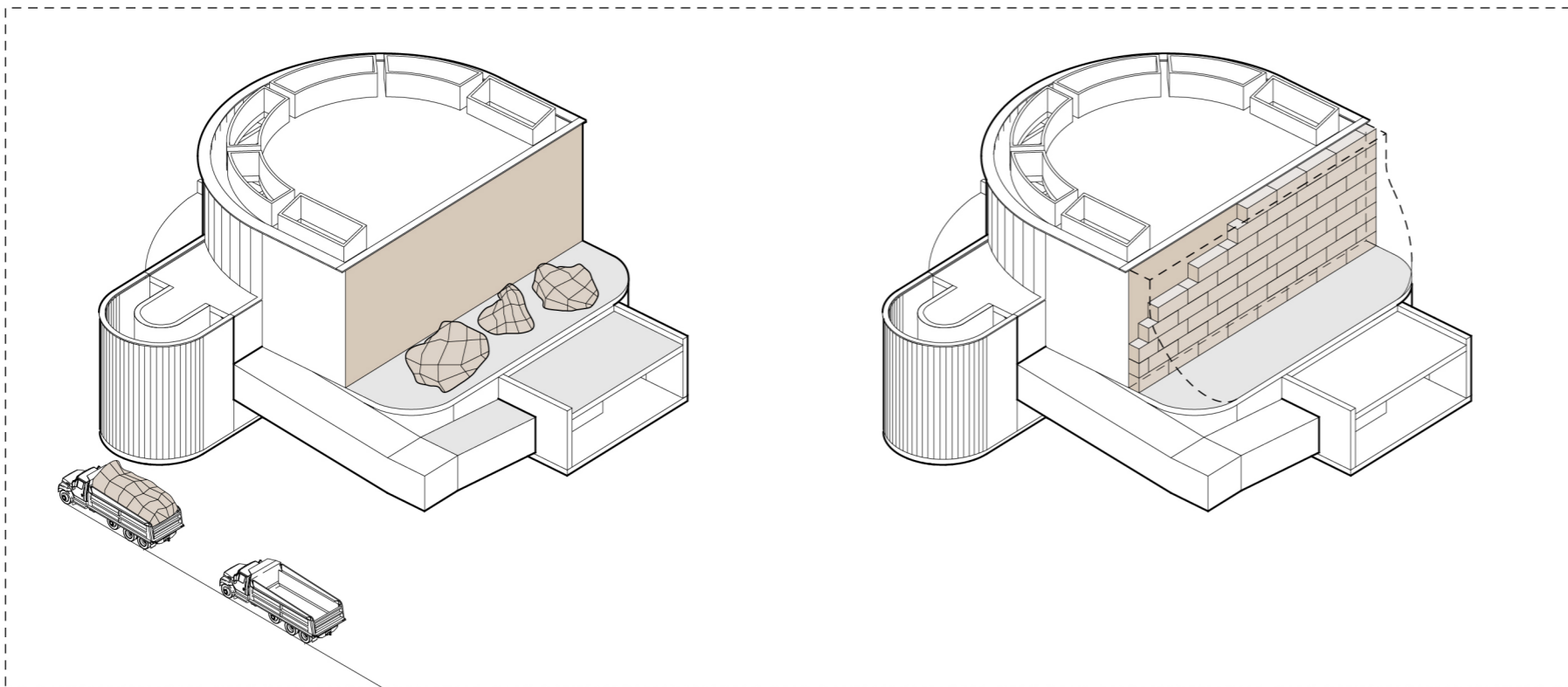
Erosion and weathering after exposure to elements

3



After approximately 6 months or 400mm of rainfall most of the material has eroded

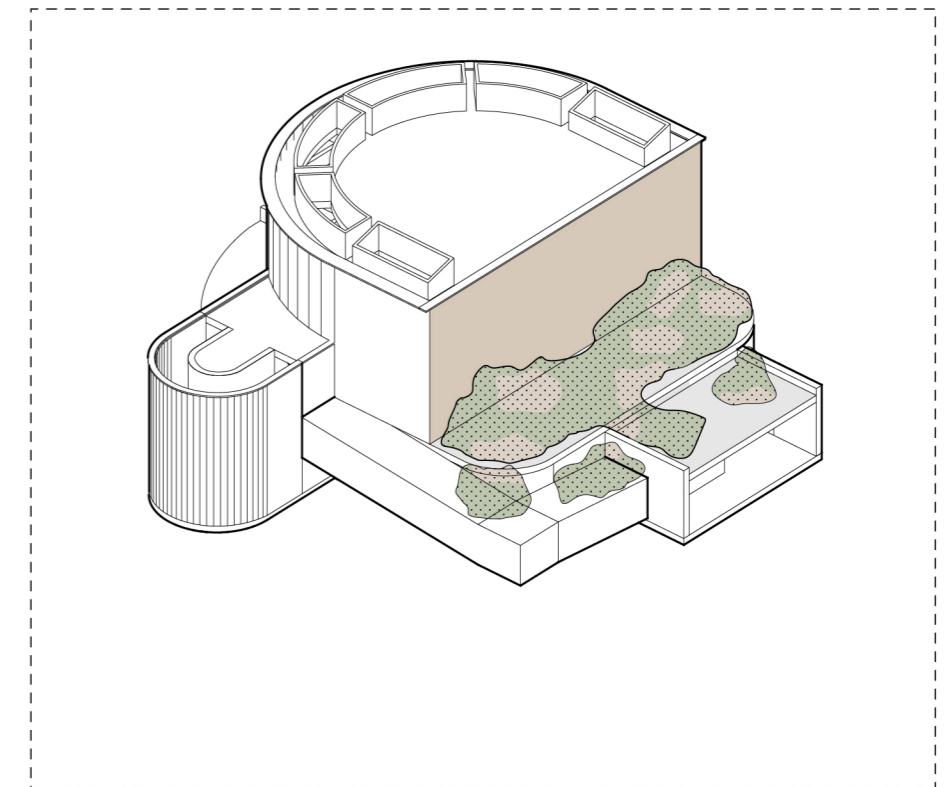
4a



Option 1: Debris is collected and sent to the factory for the re-purposing and fabrication of new elements

Rebuild short term erosion wall and start cycle again

4b

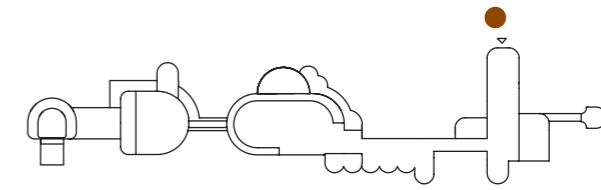


Option 2: leave leftover material as substrate for future plant growth

Research & Concept  
Program organization  
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**Views**

# Views

## Main Entrance

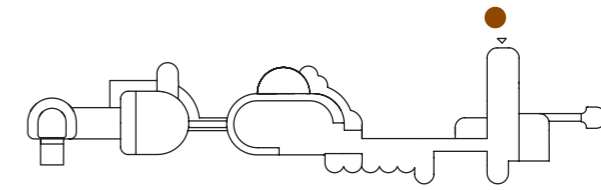


Time of day: 10am  
Month: June 2021



# Views

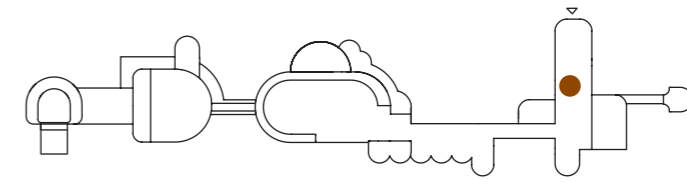
## Main Entrance



Time of day: 11am  
Month: April 2022

# Views

## Main Entrance/ Lobby

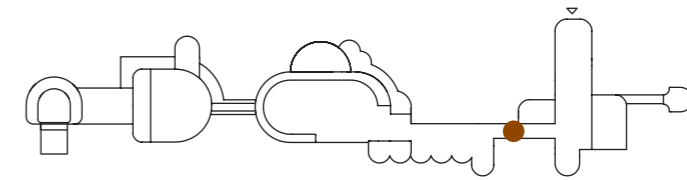


Time of day: 10am  
Month: June 2021

Program: Lobby, ticket office, cloak room, lockers, meeting point

# Views

## Interior corridor

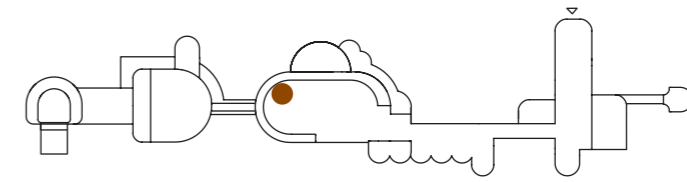


Time of day: 10am  
Month: June 2021

Program: hallway, workshops, café,  
shop

# Views

## Courtyard

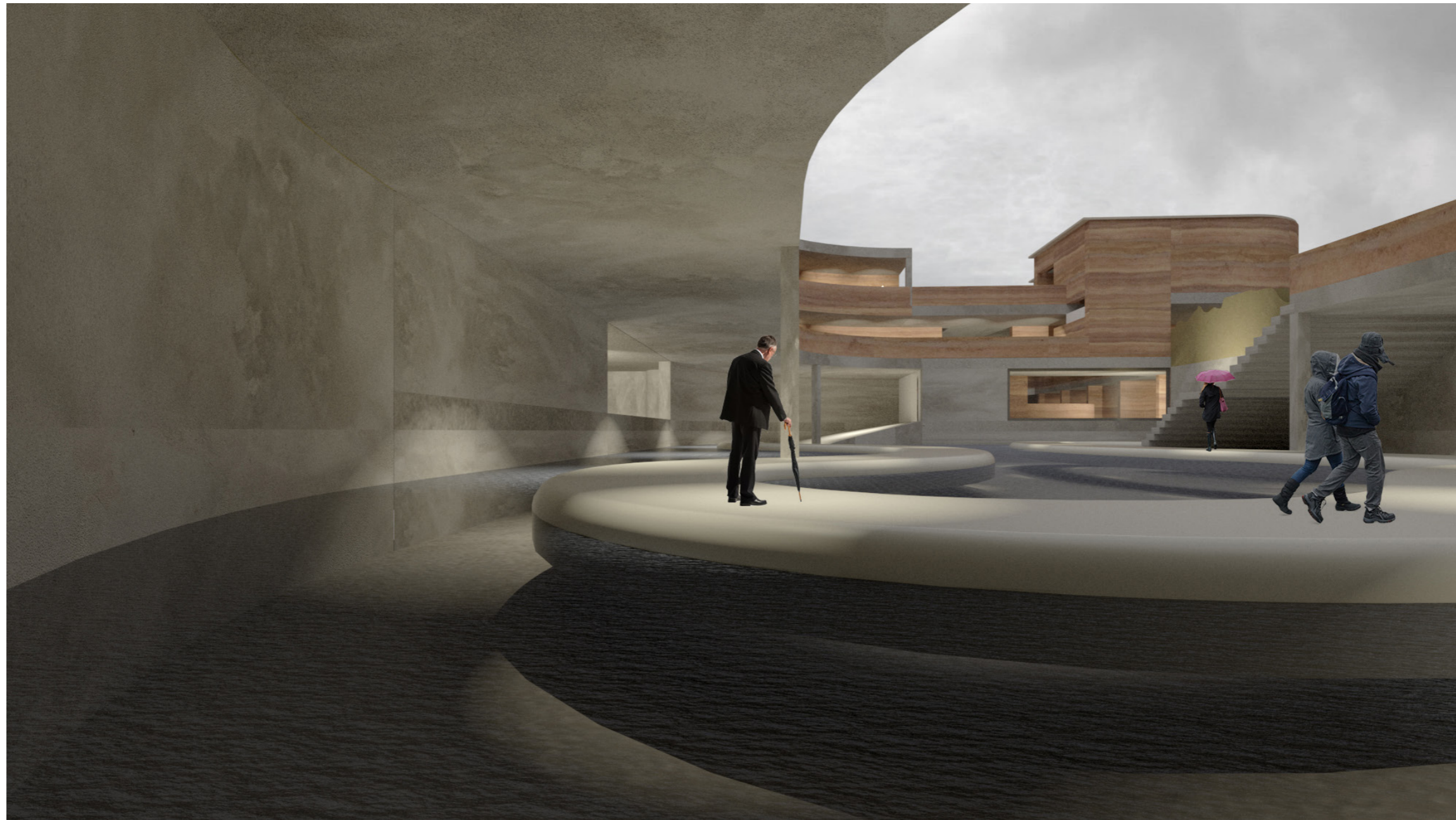
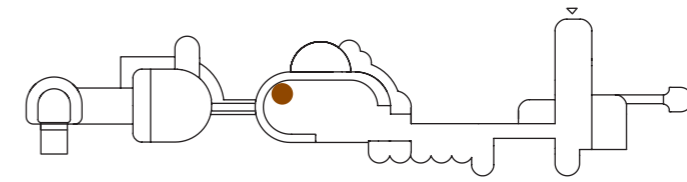


Time of day: 11am  
Month: June 2021

Program: Courtyard, Gallery A,  
Flood room

# Views

## Courtyard

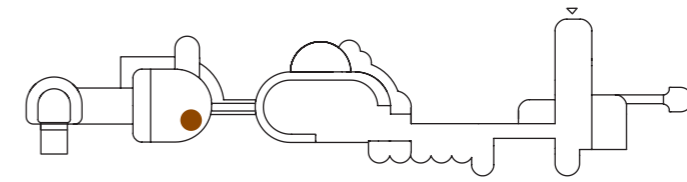


Time of day: 11am  
Month: April 2022

Program: Courtyard, Gallery A,  
Flood room

# Views

## Gallery

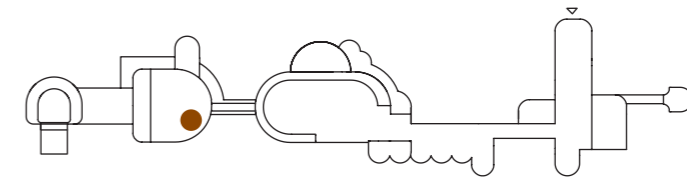


Time of day: 1pm  
Month: June 2021

Program: Gallery B

# Views

## Gallery

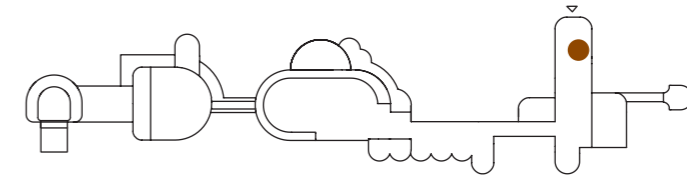


Time of day: 1pm  
Month: April 2022

Program: Gallery B

# Views

## Gallery



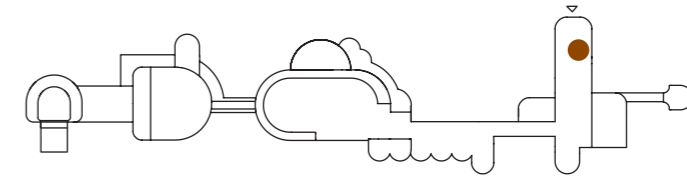
Time of day: 10am  
Month: June 2021

Program: Gallery E



# Views

## Gallery

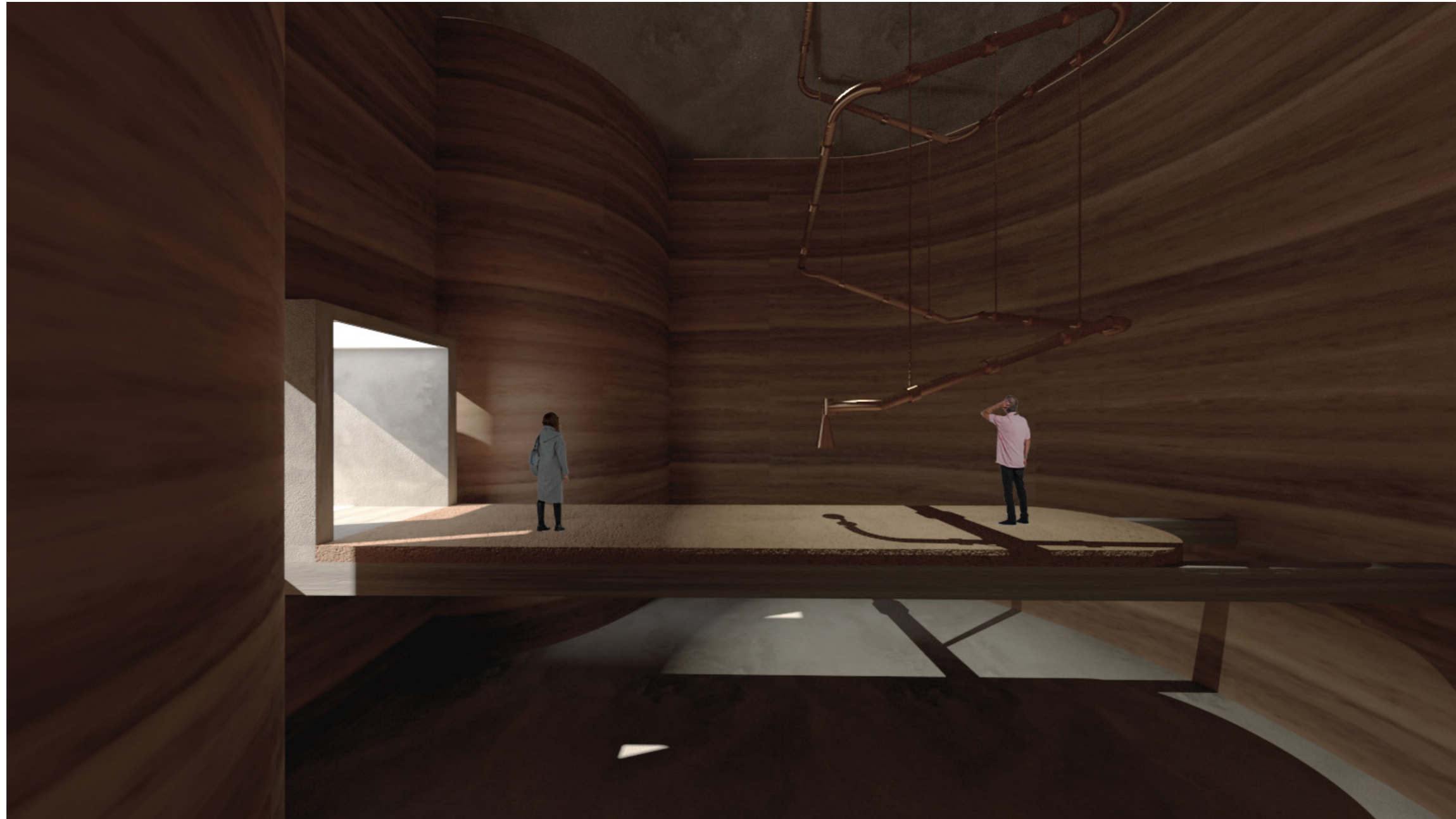
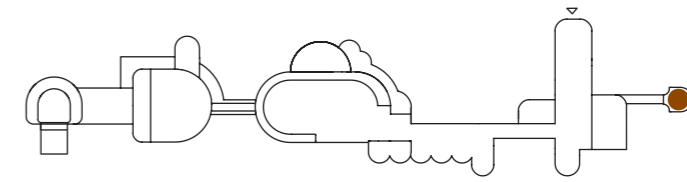


Time of day: 10am  
Month: April 2022

Program: Gallery E

# Views

## Gallery

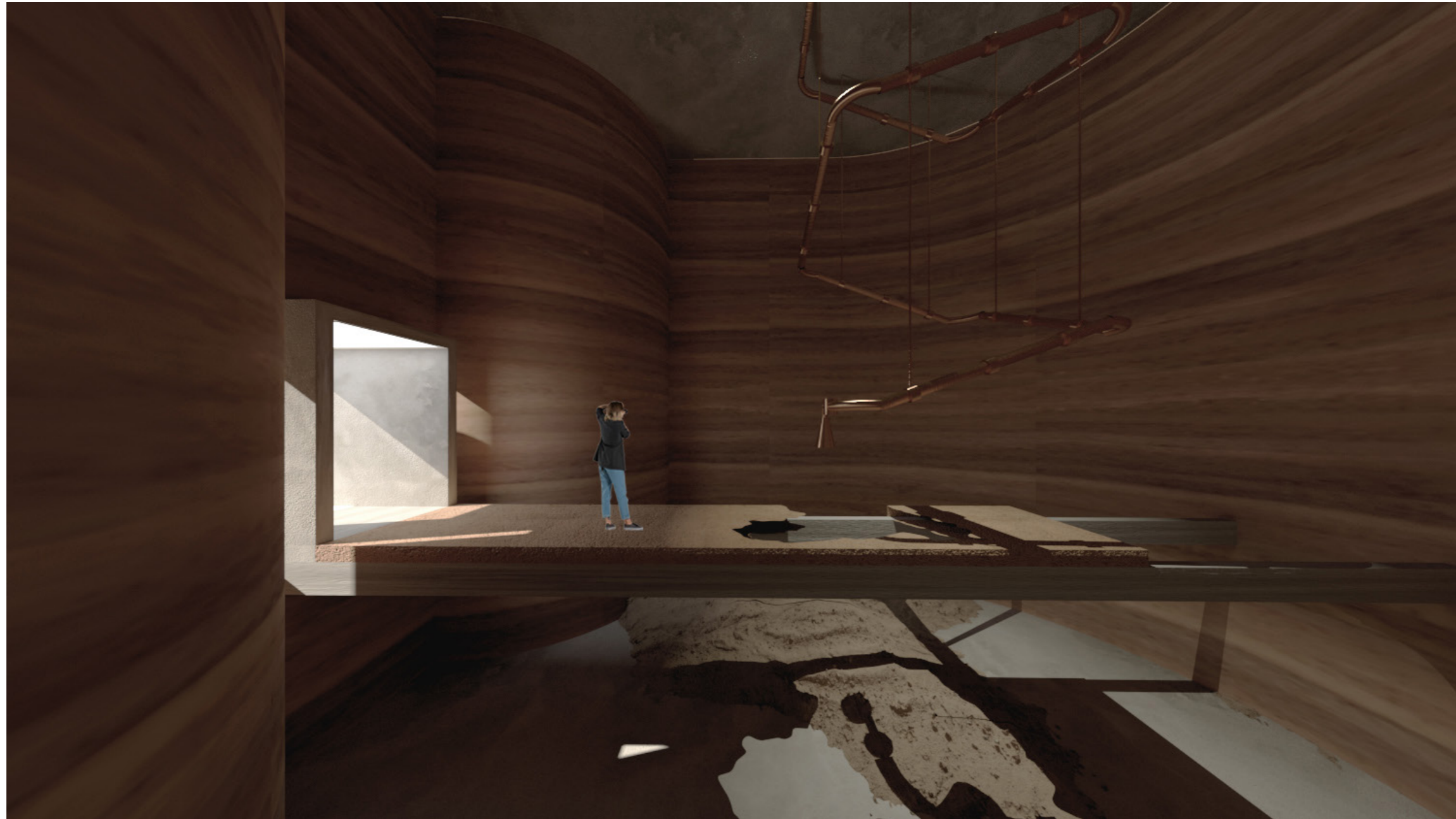
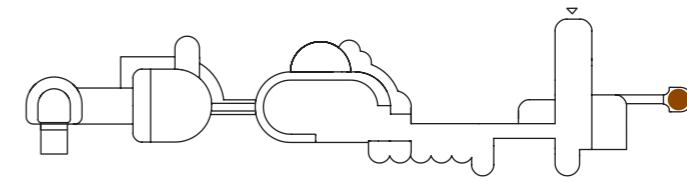


Time of day: 4pm  
Month: June 2021

Program: Gallery F

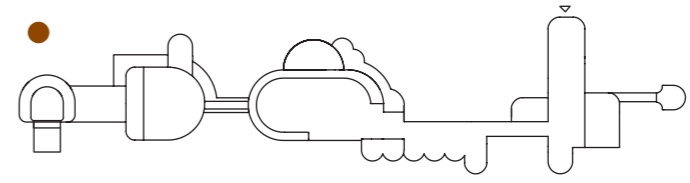
# Views

## Gallery

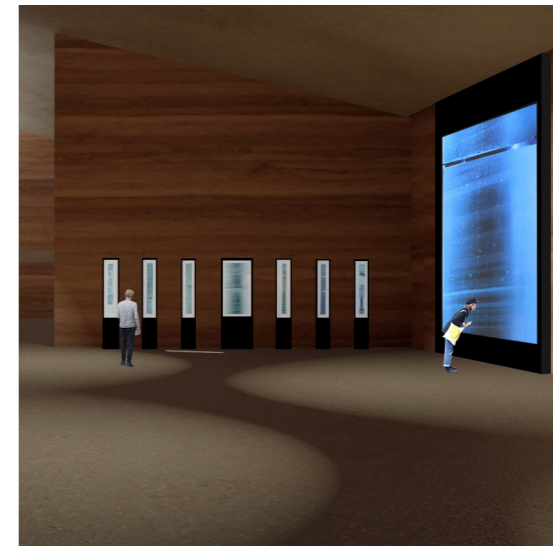
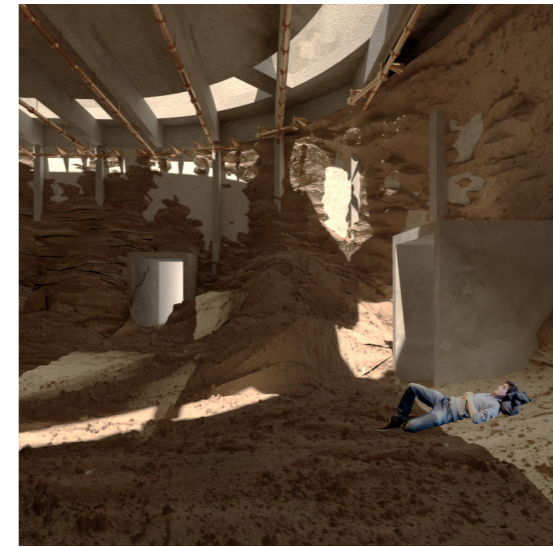
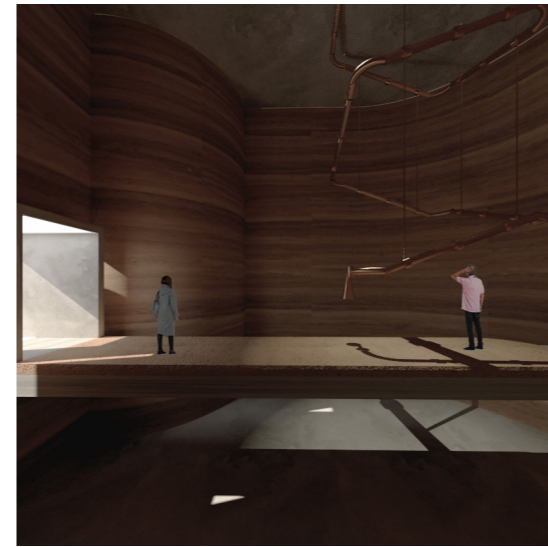
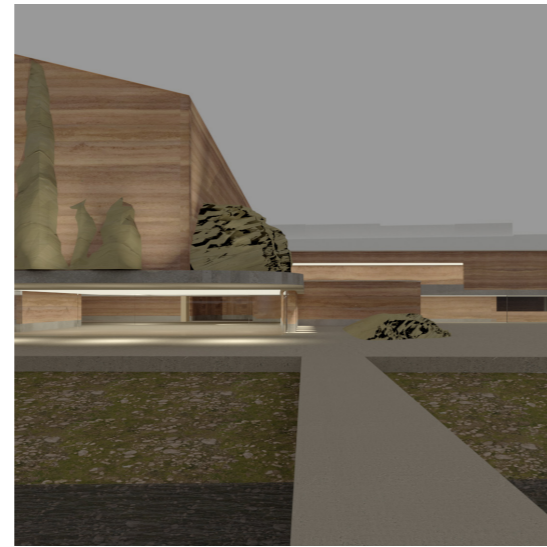
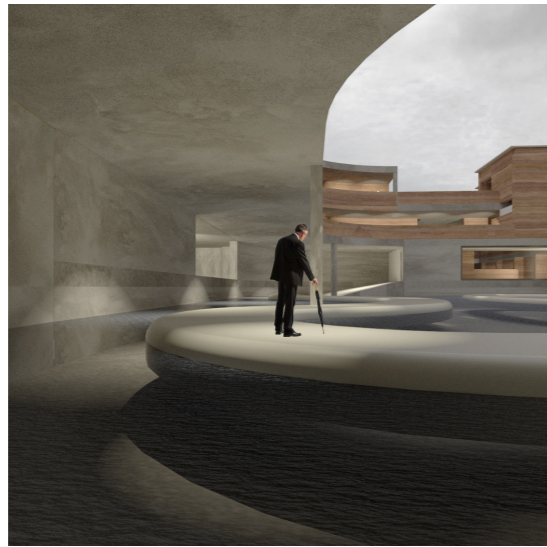
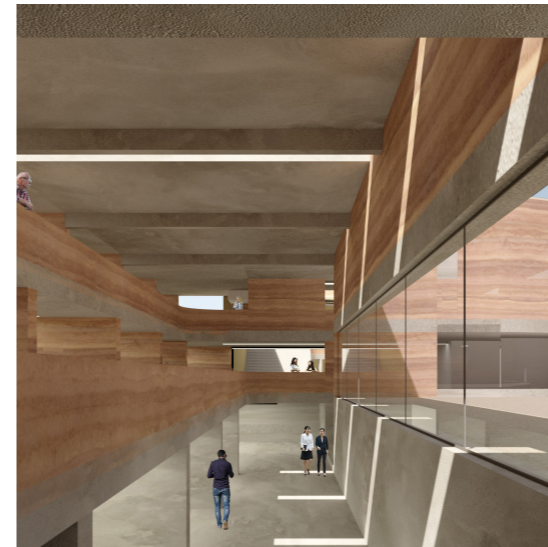


Time of day: 5pm  
Month: April 2022

Program: Gallery F



Time of day: 6pm  
Month: June 2021



**Thank you!**  
***The end***