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# technical design book

Embrace diversity: (un)divided Hebron  
coexistence through architecture of water

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13th of April 2018

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## colophon

### technical design book

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## contents

## Project introduction and design specifications

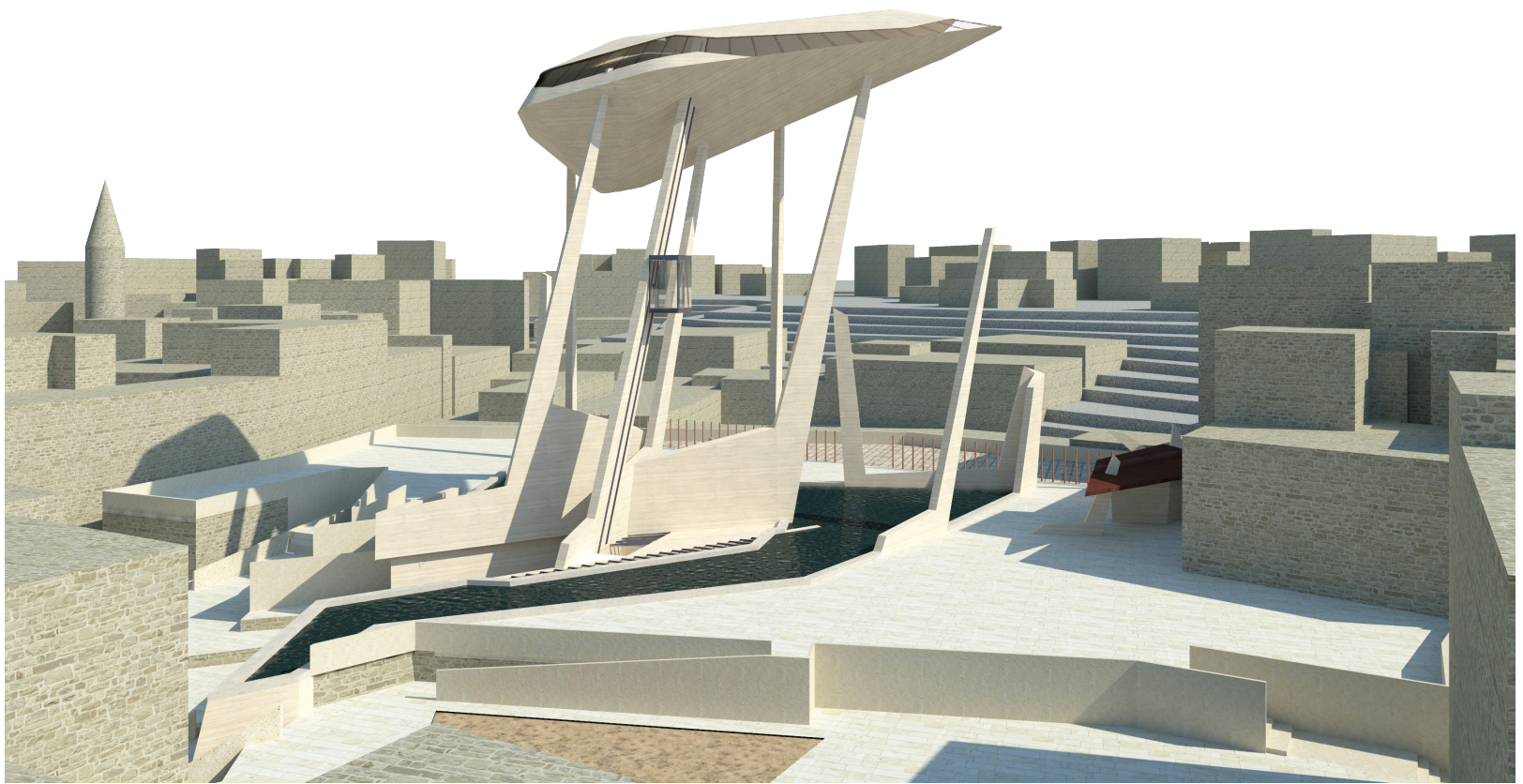
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### introduction

The Temple of Water is a building that embodies the architecture of water in attempt for the increase of tolerance and the ability to coexist between the Israelis and Palestinians.

The Temple of Water - from its concept to stand out in the (direct) environment - is shaped discordantly to its context while connecting to the people, and has many challenges to overcome and accomplish both socially as technically.





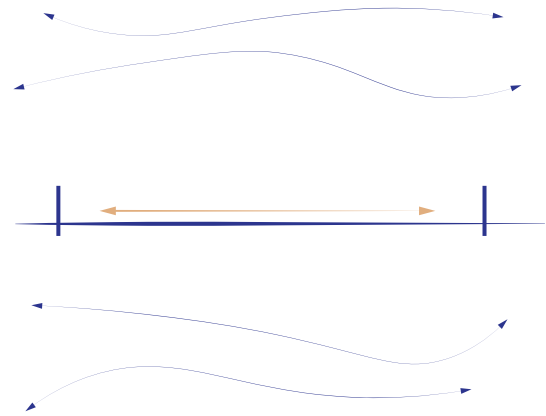
## structure

### Structural design starting points

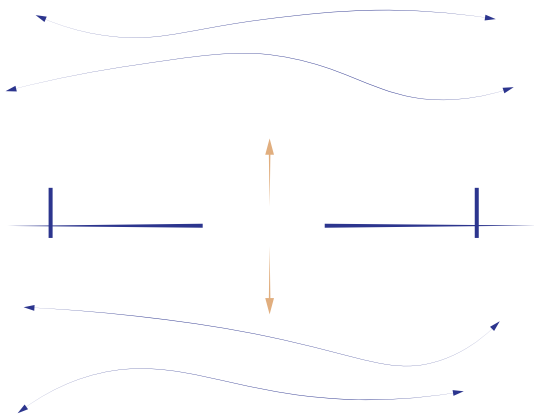
The structural design specifications follow the creation of the building and the concept of the connection between the bottom and the top of the building.

The structural design follows the concept of drilling deep into the limestone rock soil, and uses the same material as aggregate for the concrete retaining walls and other concrete structural elements.

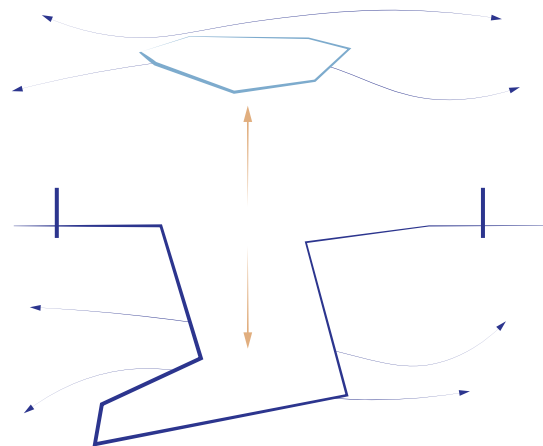
The floor plan underground stretches into the air with columns, on which the upper water storage basin is built upon. Connections are moment-resisting casted to guarantee the buildings stability.



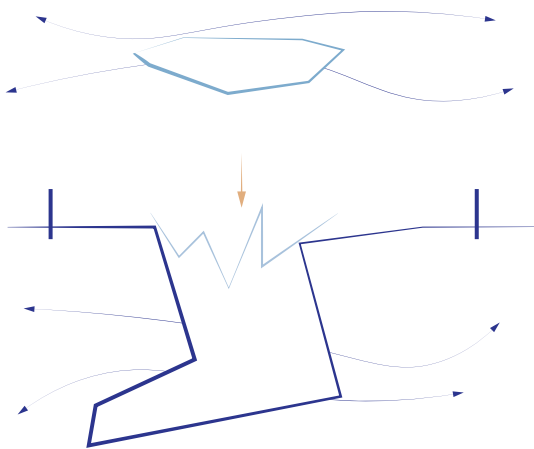
*starting situation/horizontal barriers*



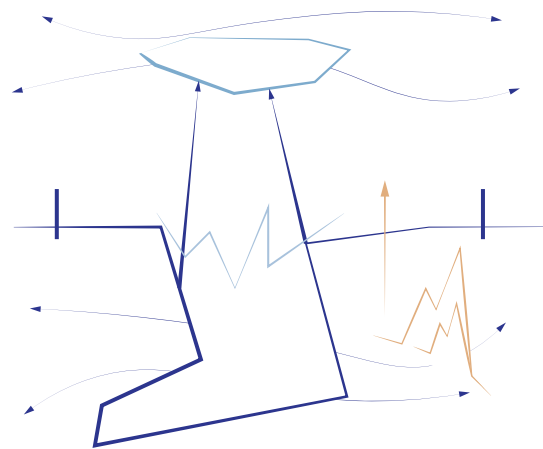
*towards space without barriers*



*water storage well/water storage tower*



*well topping/water purification basin*

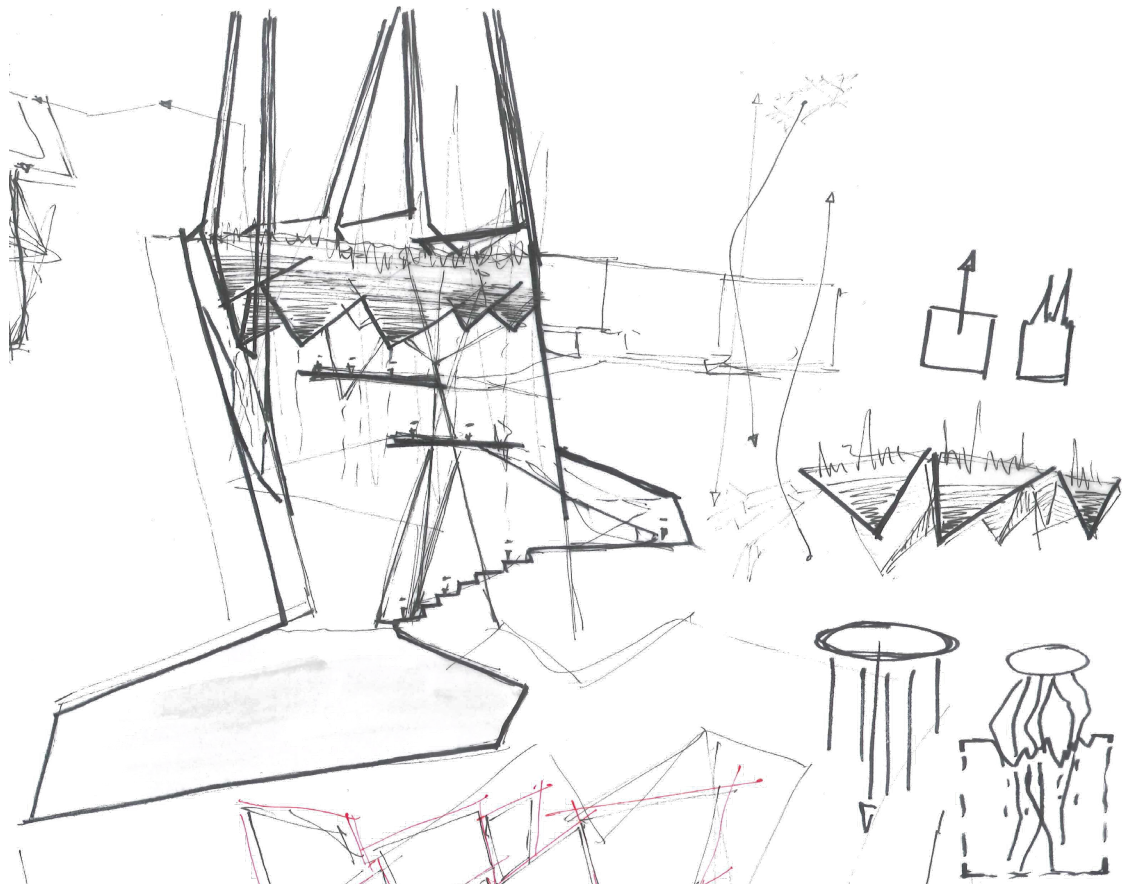


*completion/connection*

## Structural design process

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### structure



limestone?  
pigmented concrete?

tappen ...?

wood for tactile.  
directional function.

limestone

pigmented concrete  
Terra Rosa.  
overgang van bovenkant naar onderkant  
bekerde met mozaïek?

Terra  
rosa  
Kalksteen.

begroeiing?

Pergola.  
Wach?

opening up - connecting  
to city

limestone  
pigmented concrete?

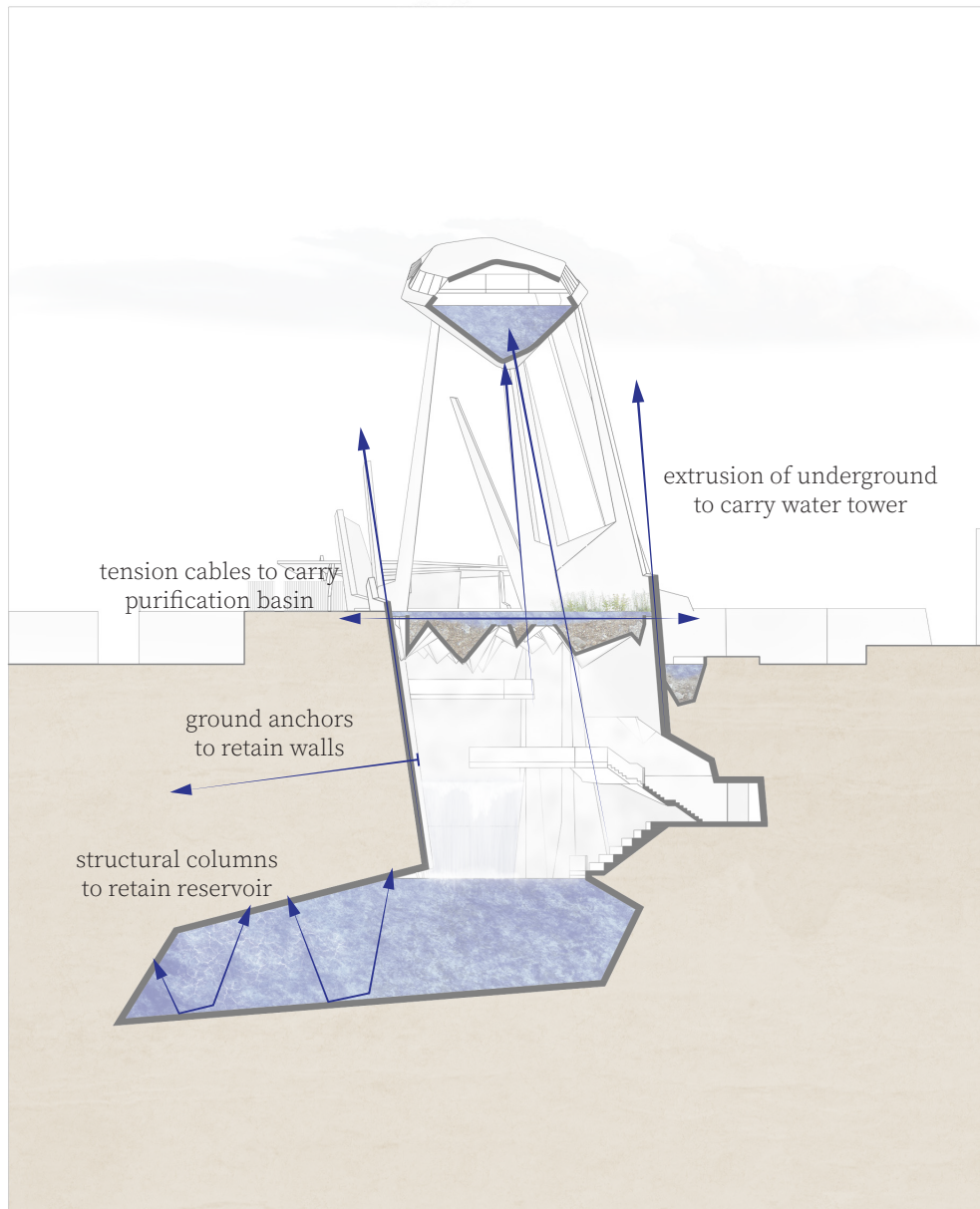
limestone

## Structural design concept

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structure



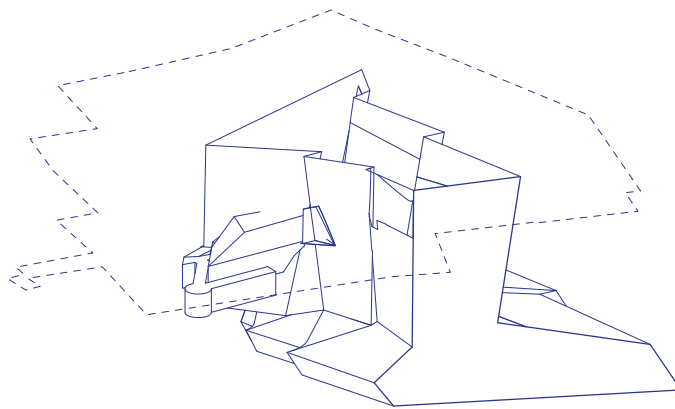


## Structural design elaboration

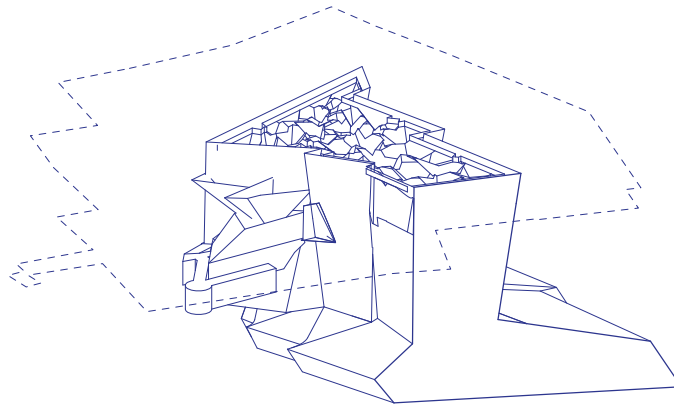
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### structure

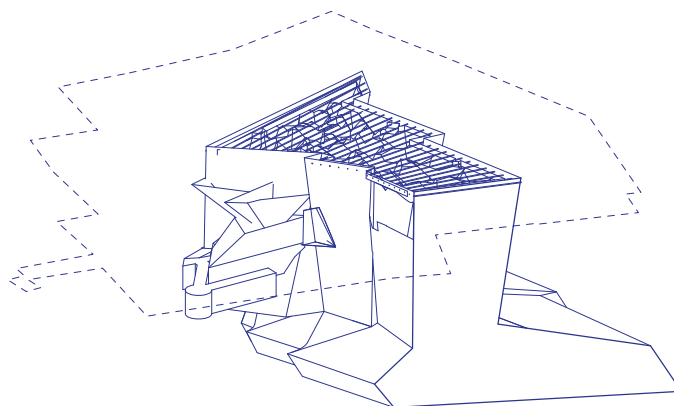
1. construction of underground  
with bottom water storage



2. well topping through  
water purification basins



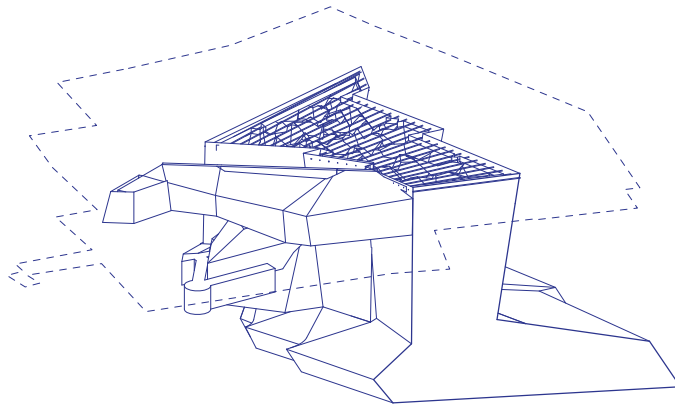
3. application of tension  
cable structure for basin support



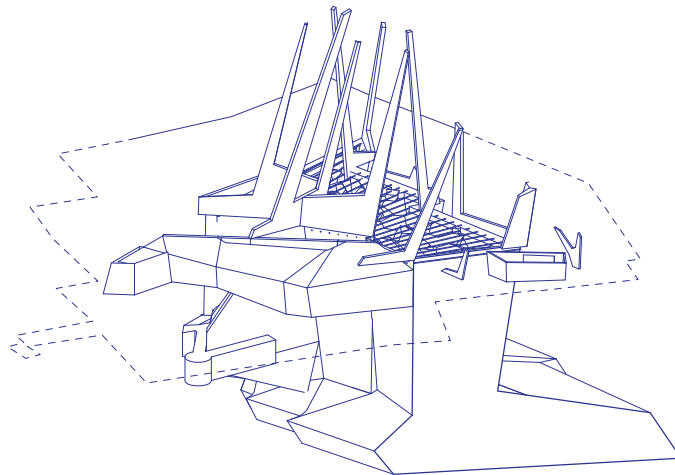
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## structure

4. construction of entrance arm  
leading to main space



5. vertical extension of floor plan  
into column structure



## Climate design starting points & process

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### climate

The climate design for the Temple of Water follows the needs of the building, the desired atmosphere of the concept and the health measurements for the users.

The humidity is held high naturally due to the building's function, and is not adjusted by any mechanical climate systems.

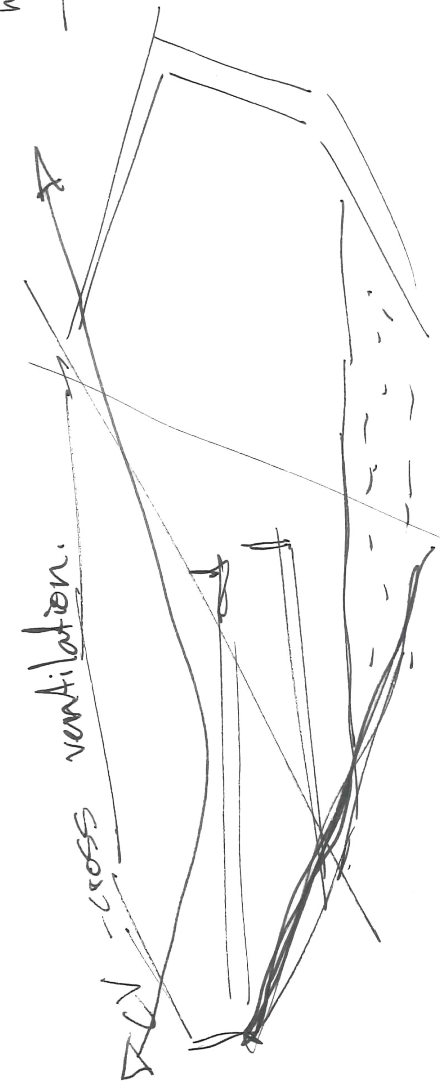
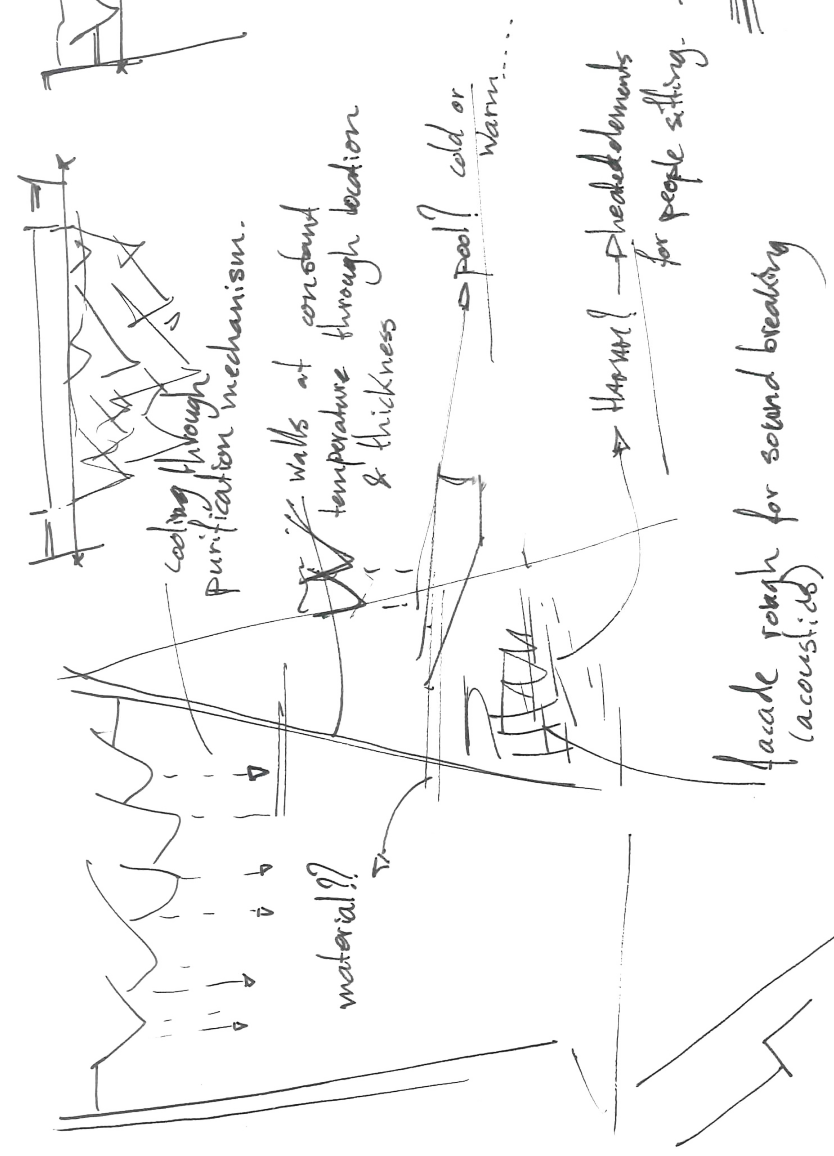
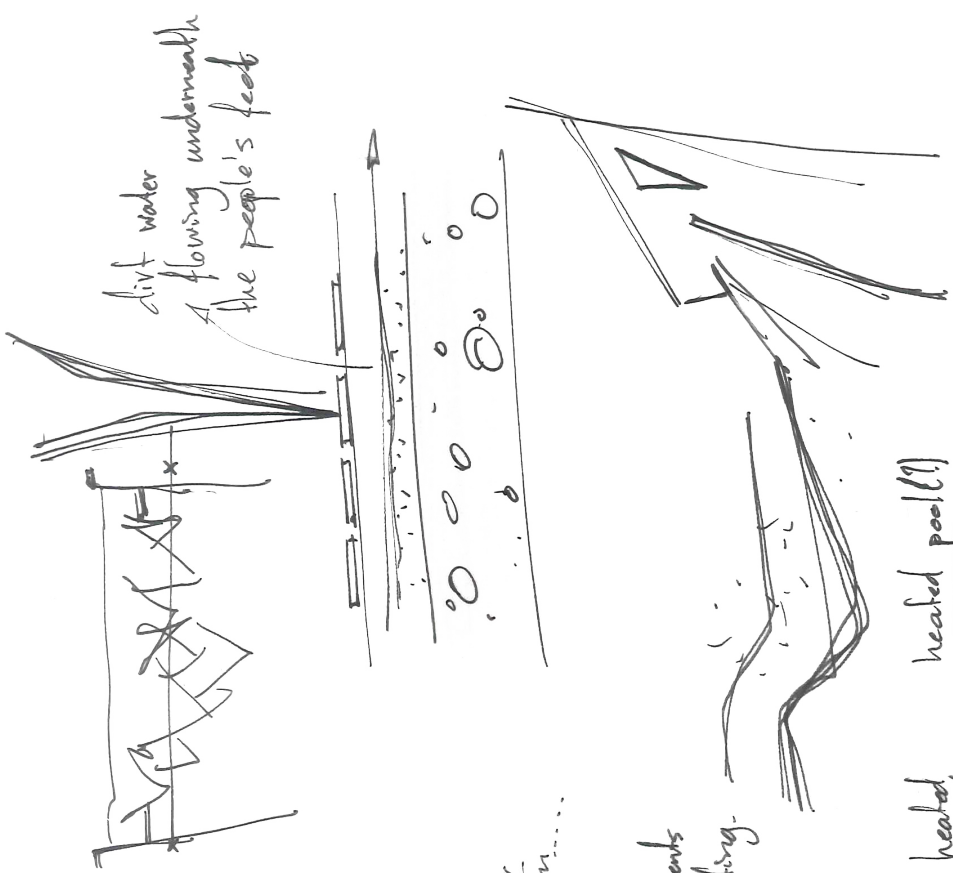
Fresh air in the underground part is let in mechanically through air duct systems that guarantee the fresh flow of air into the building from the three different levels.

Temperature and fresh air control in the upper water storage happens through the low-tech solution of cross-ventilation, as wind blows much in the upper levels. Also, as the upper water basin is built for only short stay, no extra requirements with regards to climate control have to be met.

The building humidifies the extreme hot and arid air in Hebron, and collects natural fall of water into the building, as well as it collects waste water from the city. Water is purified by the building and reused. Also dirt water from use in the building is drained underneath the wooden flooring from the clean water areas and reused.

Acoustically the sound of water is only diffused by washed concrete but held at its volume - the sound of people is much absorbed by porous limestone panels backed by mineral wool insulation.

The waterfall in the building guarantees the supply of energy through the use of hydropower.



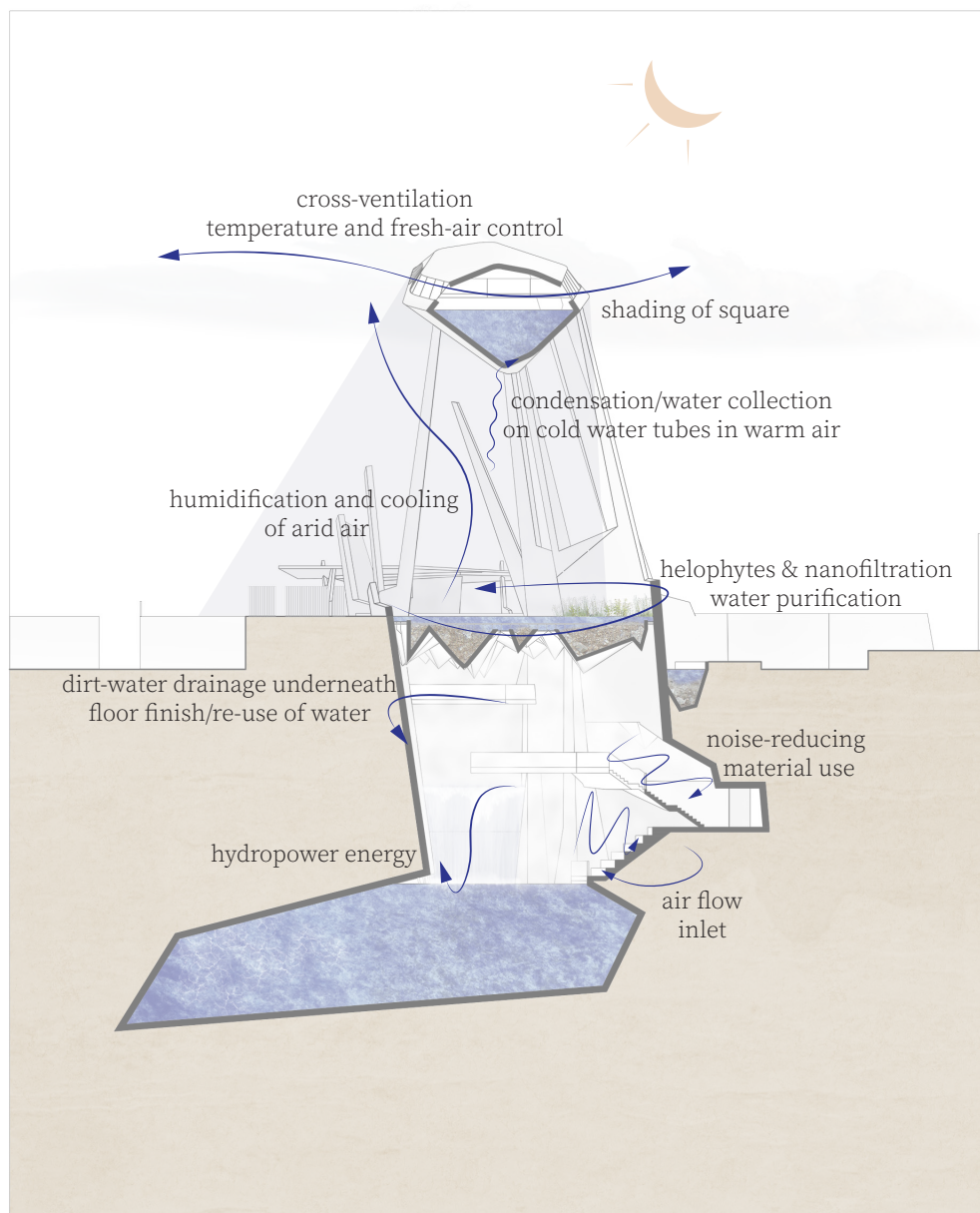
## Climate design concept - overall strategy

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### climate

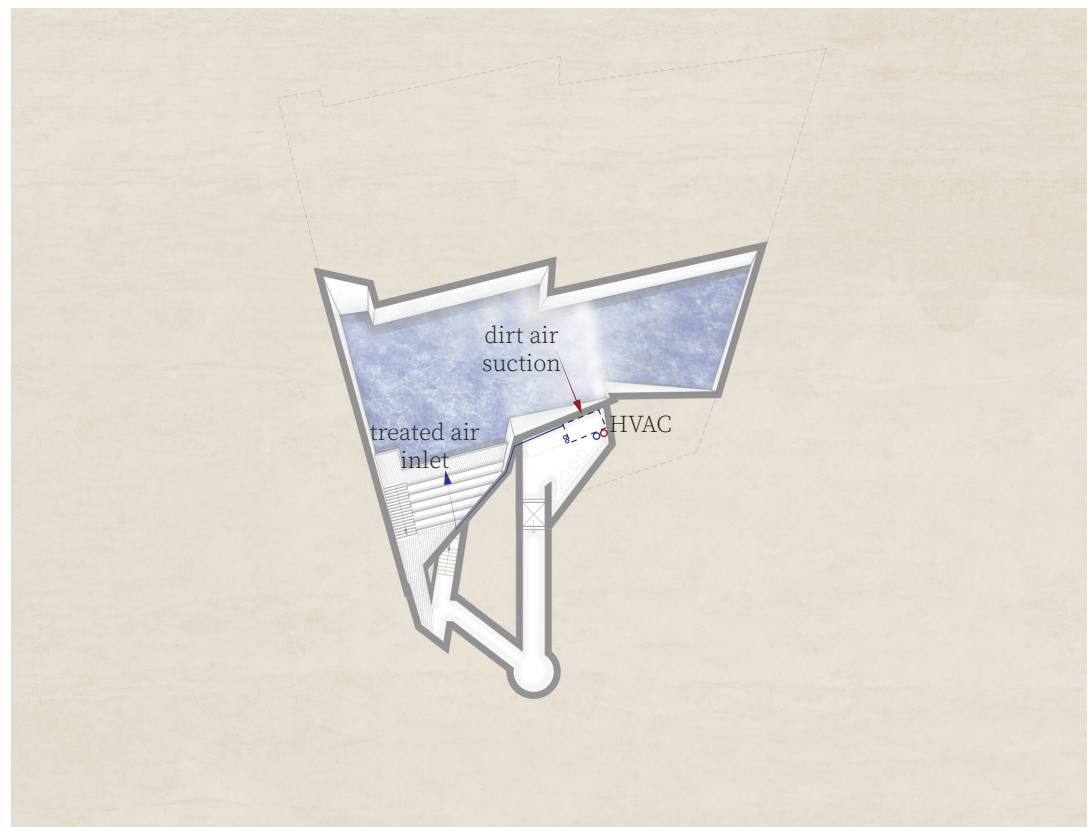
Israel and the Palestinian Territories have a long history of being in an originally native-settler conflict. In the early decades of the 20th Century, Jews were coming to the 'Land of Israel'. The migration caused extreme nationalism from the Arabs holding on to their land and from the Zionist movement of returning to the 'Promised Land'. The migration went together with warfare between the Arabs and Zionists, creating a society in which both groups mistrust and misunderstand each other, of which Israel had the ability to secure and protect itself from the Palestinians by walls.

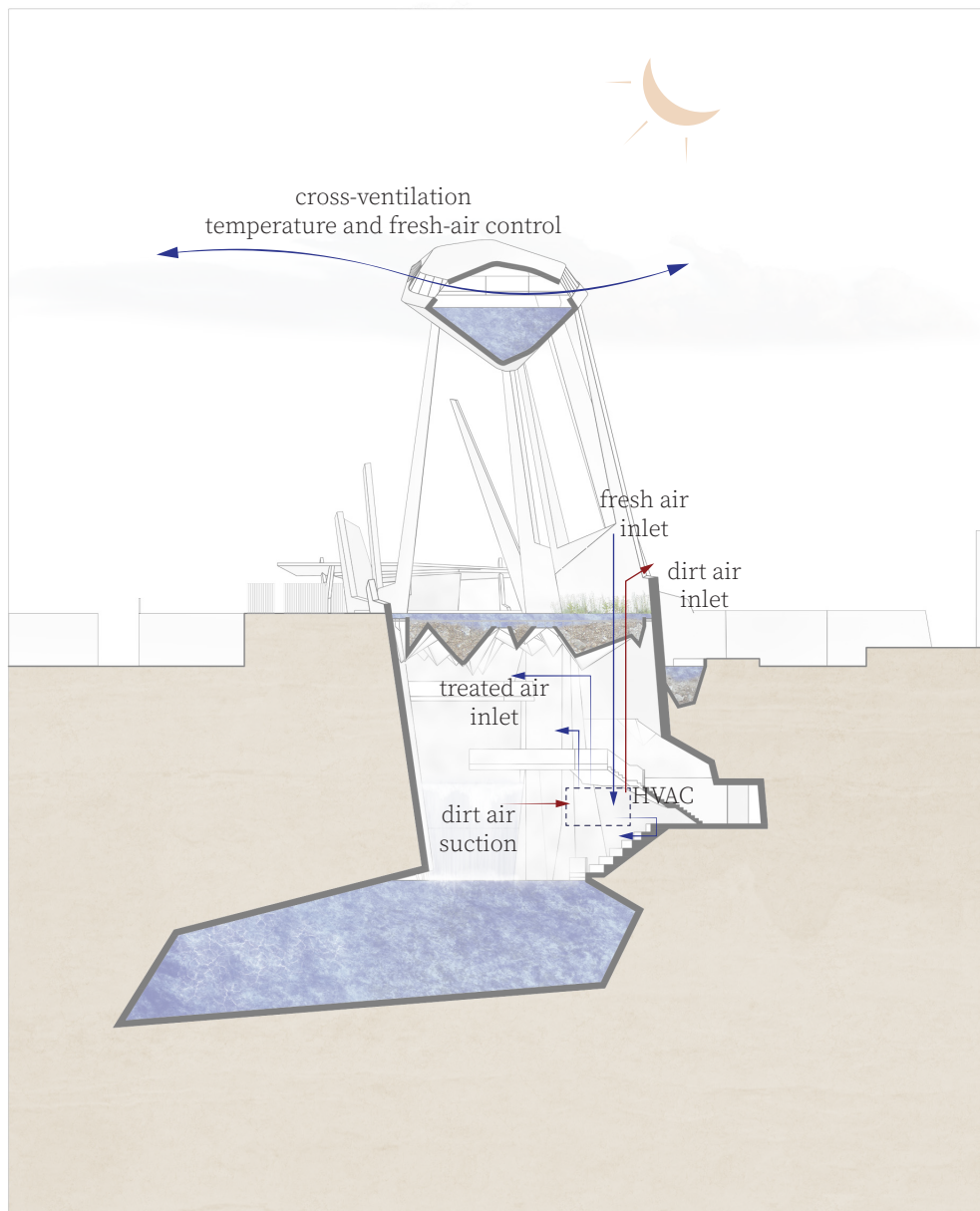




## Climate design concept - ventilation

climate





## material

### Material design starting points

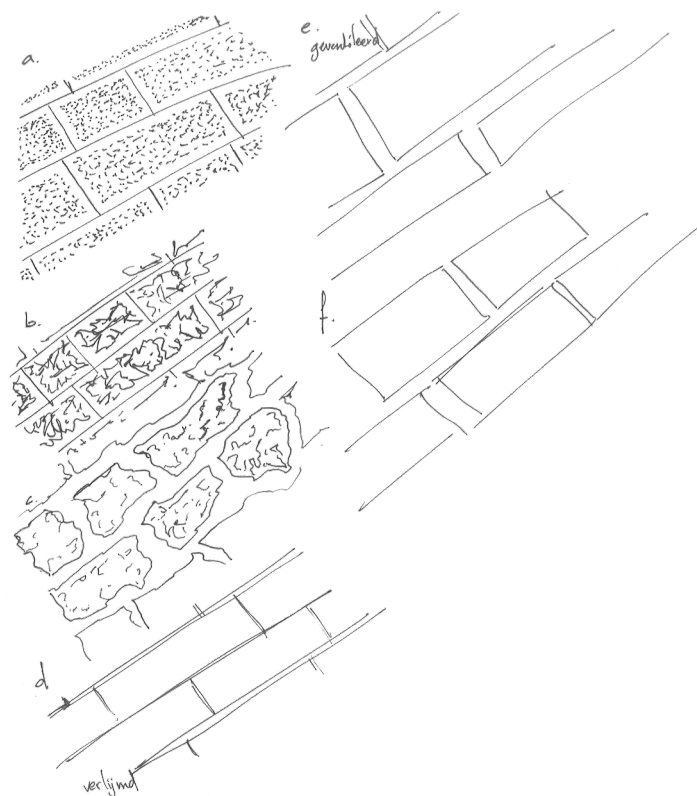
The material design is mostly based on the use of the local limestone rock, which can be used in many ways, e.g. veneer, solid panels, concrete aggregate.

Within the material design, different uses of limestone and combinations with concrete are used, much in the same color tone as the color of limestone itself.

The outside of the building is executed in polished limestone concrete; when entering the building, this polished character slowly fades into a rough, rocky and cave-y implementation of limestone, representing the feeling of walking into a cave.

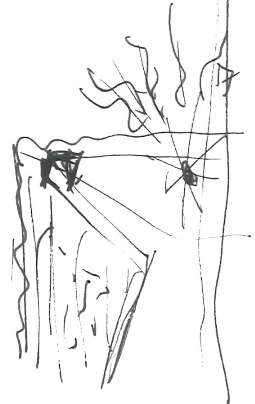
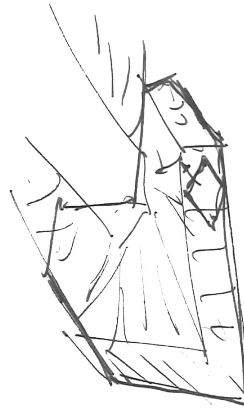
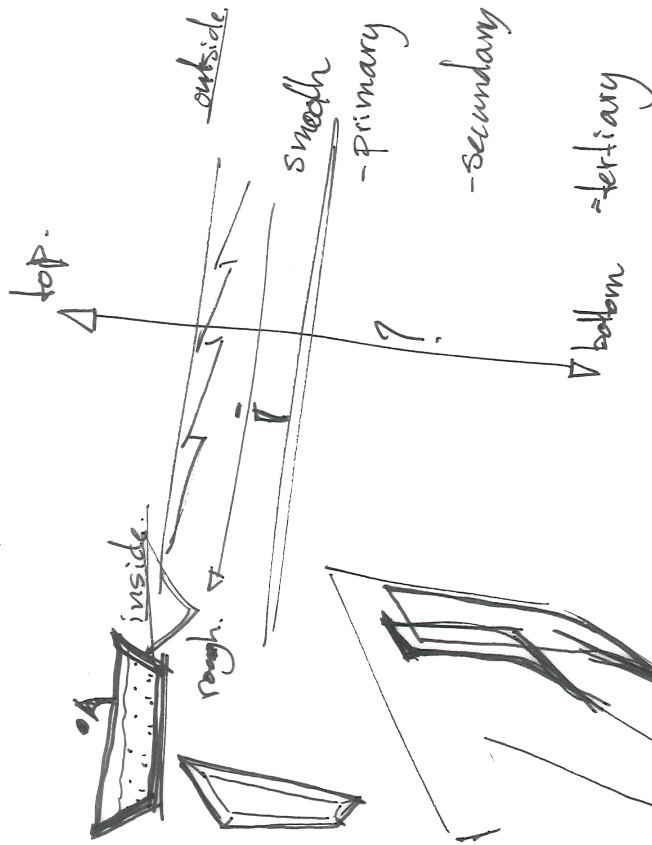
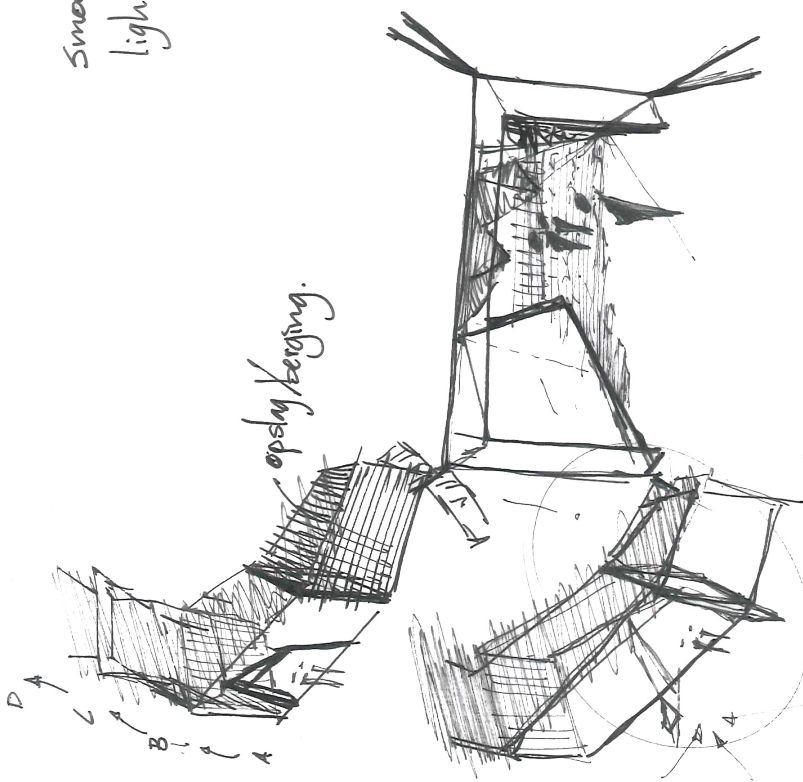
While limestone does not change a lot over time, it connects to the identity of the location and it remains at its own location. One wall in the building is not clad with any material and left bare as drilled limestone rock. Over time this will be the place where nature will take over and use sun light and humidity as the source for vegetation.

The rocky materials serve as the base for growth of vegetation and the visibility of water upon the surface. The wood stays red-ish inside and steel will oxidate.



smooth vs. rough.  
light vs. dark.

190° ↗  
120° ↘

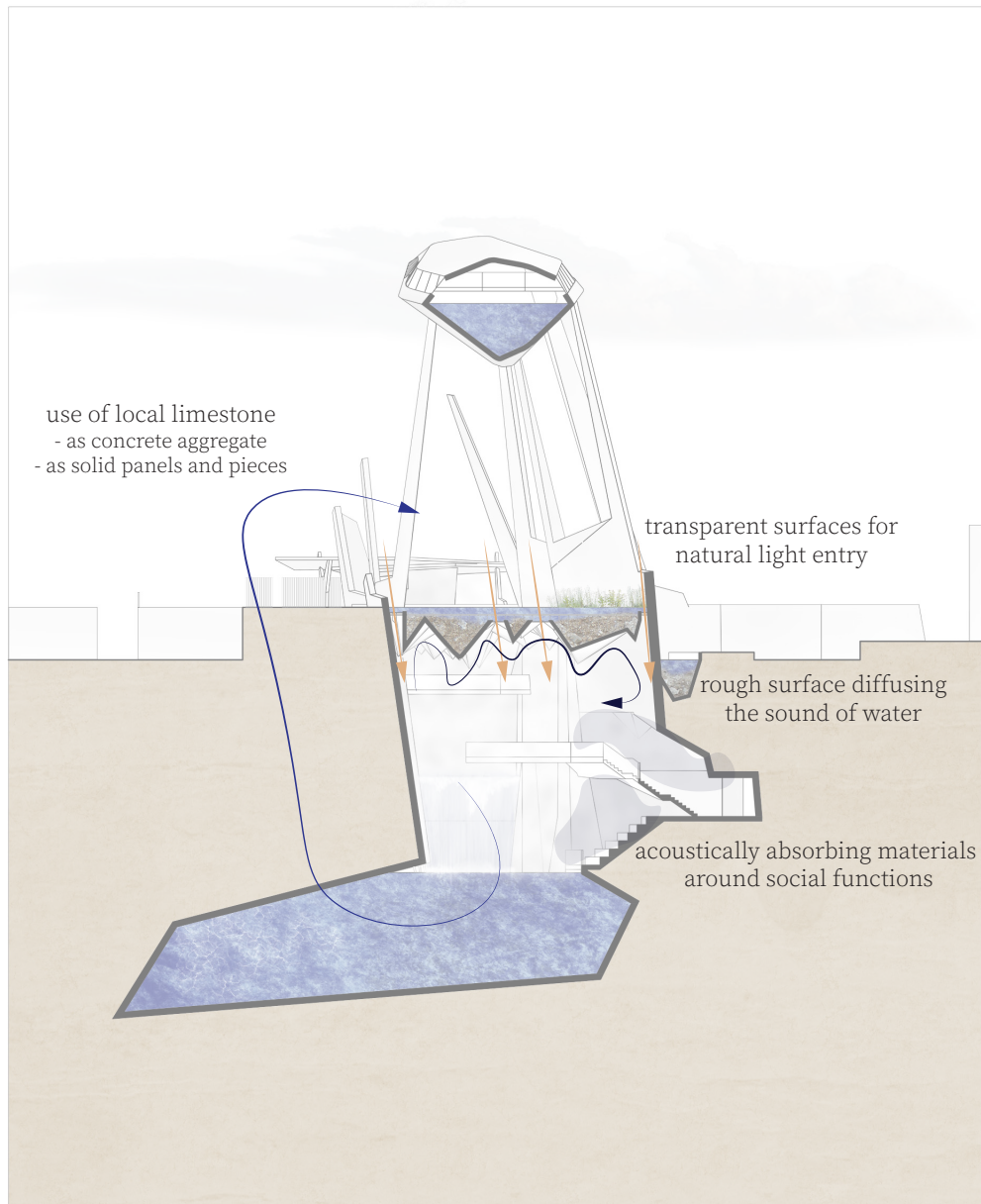


## Material design concept

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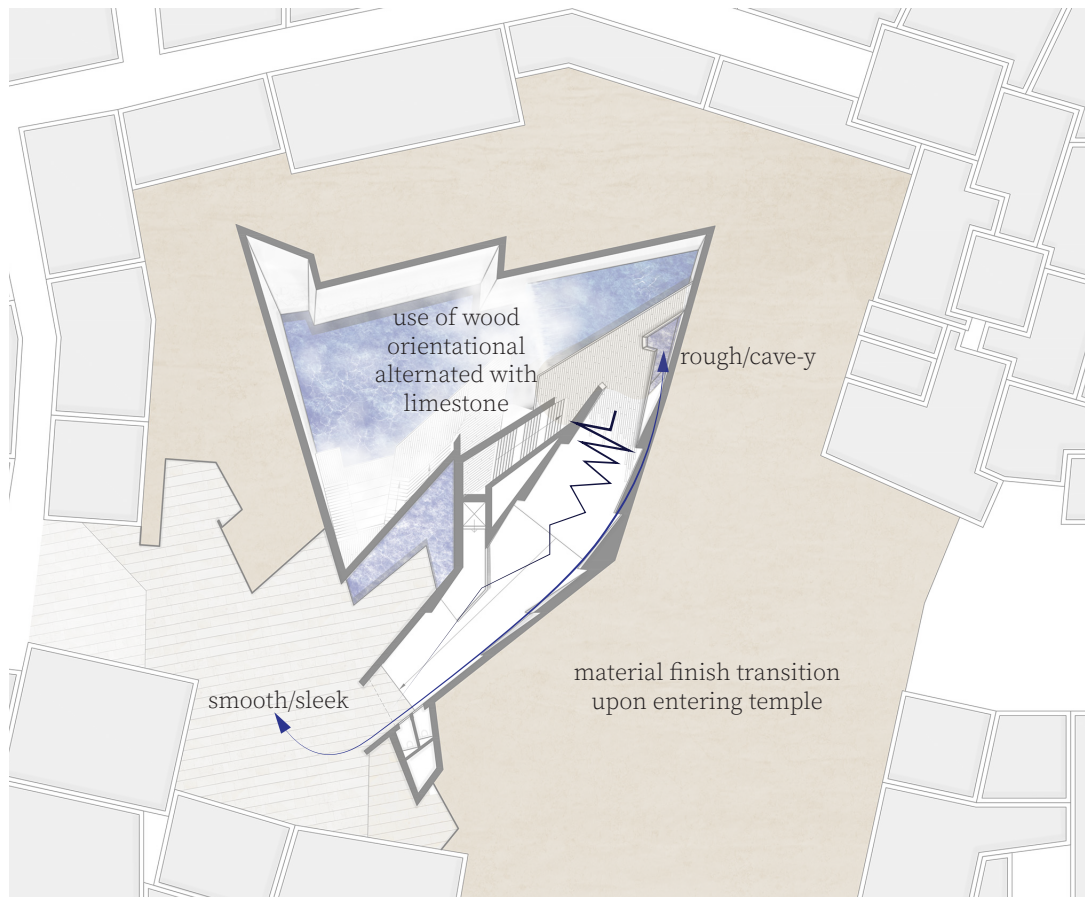
material





## Material design concept

### material







## Material design sustainability

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### material

In addition to the esthetic qualities of the used materials, the choice of materials also is made from a sustainability and durability perspective.

Part of the building is left as a bare limestone rocky facade, (re-)using the existing grounds for the building esthetics. The digging and drilling underground works as a resource for a big proportion of the building elements. The cut limestone is manufactured and reused throughout the building as limestone panels (glued or attached ventilated), as solid blocks and as an important aggregate to the concrete structure - also giving the building its sandy texture.

Not only the Temple of Water itself is provided with the local limestone, also other houses in the region can be built from this material - as it is the wide spread building material throughout Israel and the Palestinian Territories. Socially it is able to temporarily create extra jobs in the region.

Through the qualities of the limestone, the fire safety and security is higher than with regular concrete aggregates. Also higher concrete classifications can be achieved through the use of limestone as the aggregate, and no other aggregates are necessary to be used.

The steel and wood can be applied untreated, and thus no chemical means have to be used on the materials - nor any actions for maintenance (except for replacing wood planks every now and then).

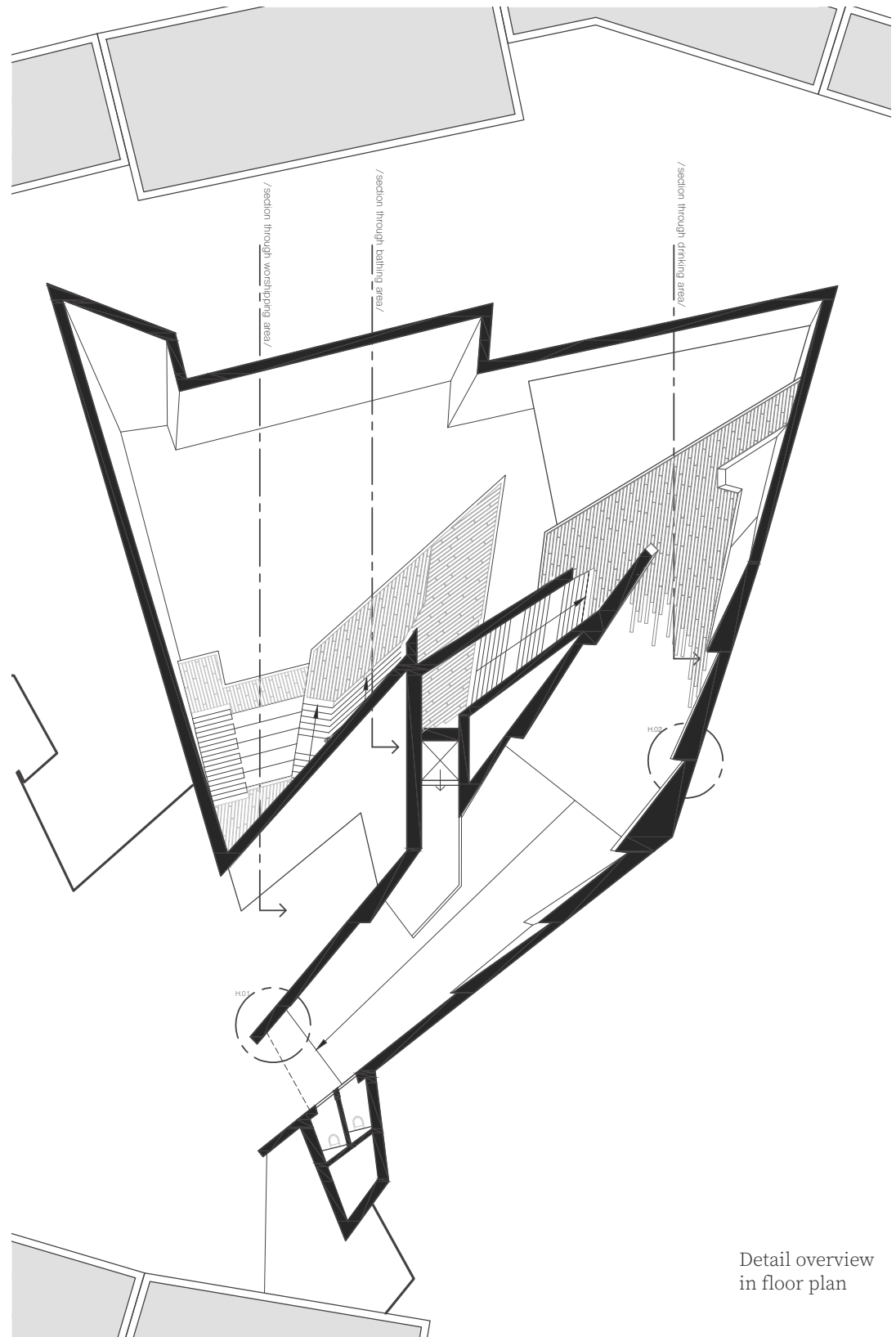




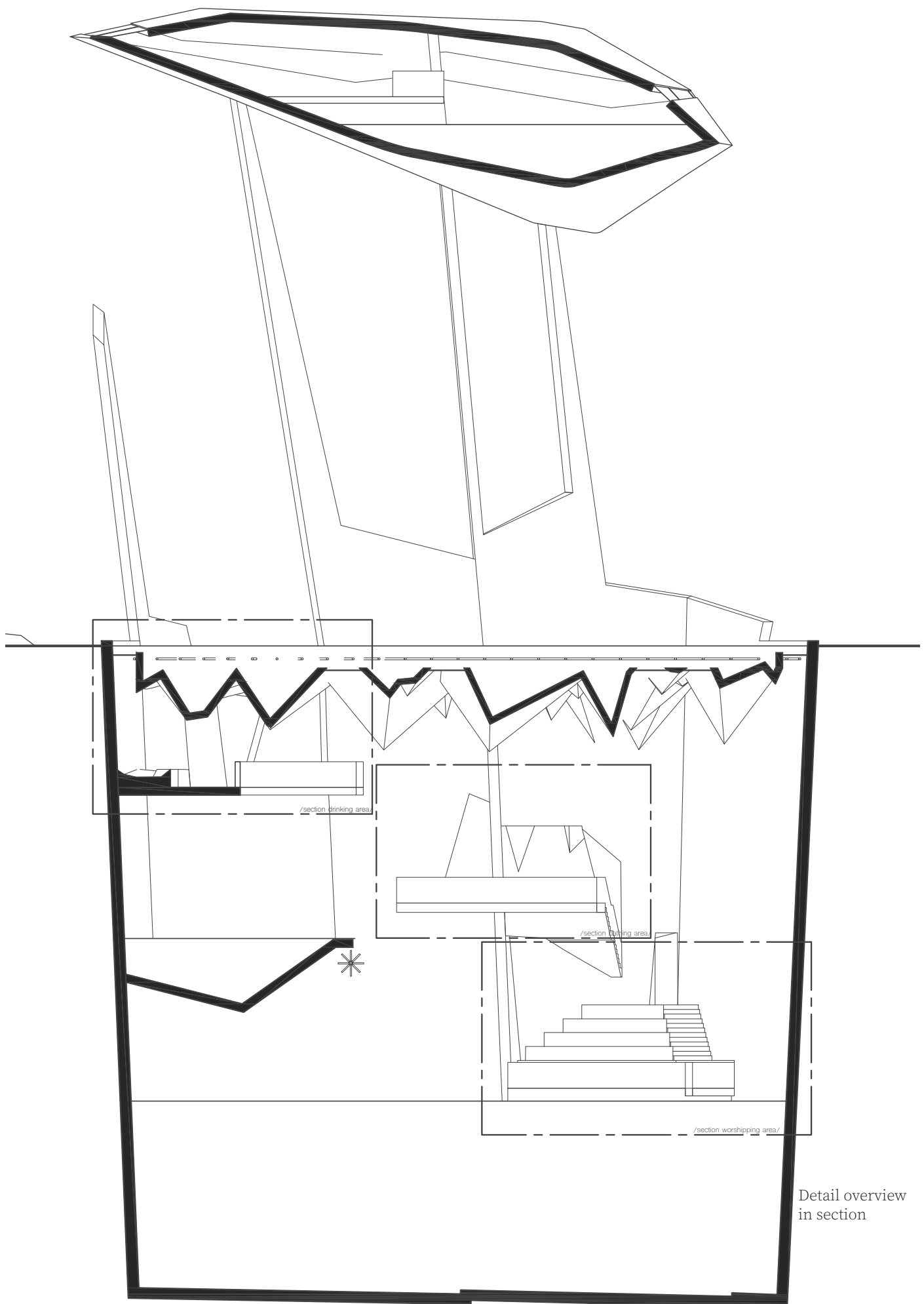


## Detail overview

material

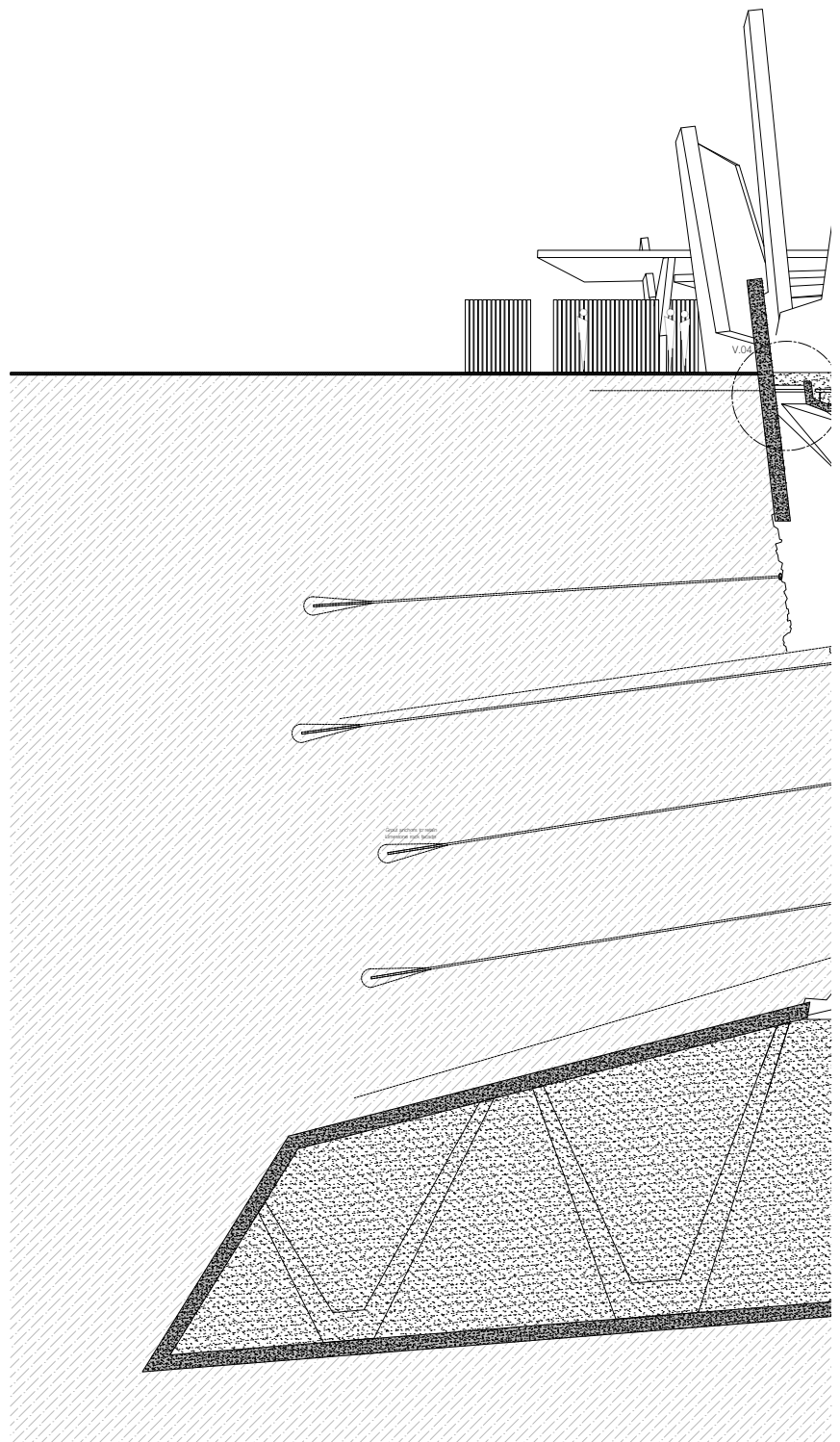


Detail overview  
in floor plan



Detail overview  
in section

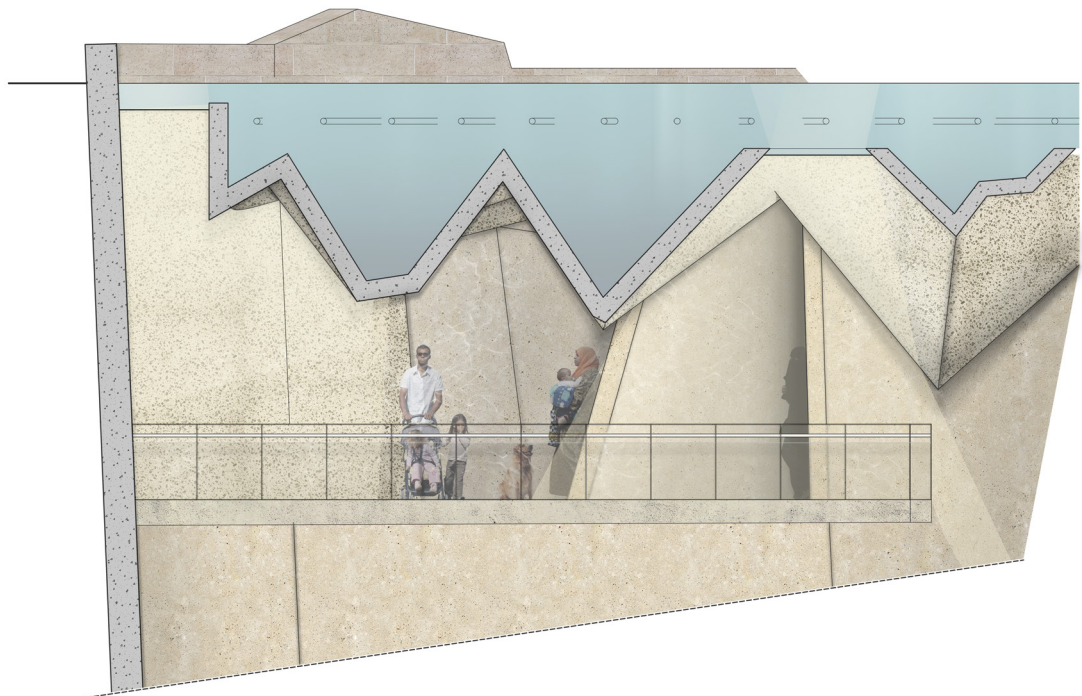
## material





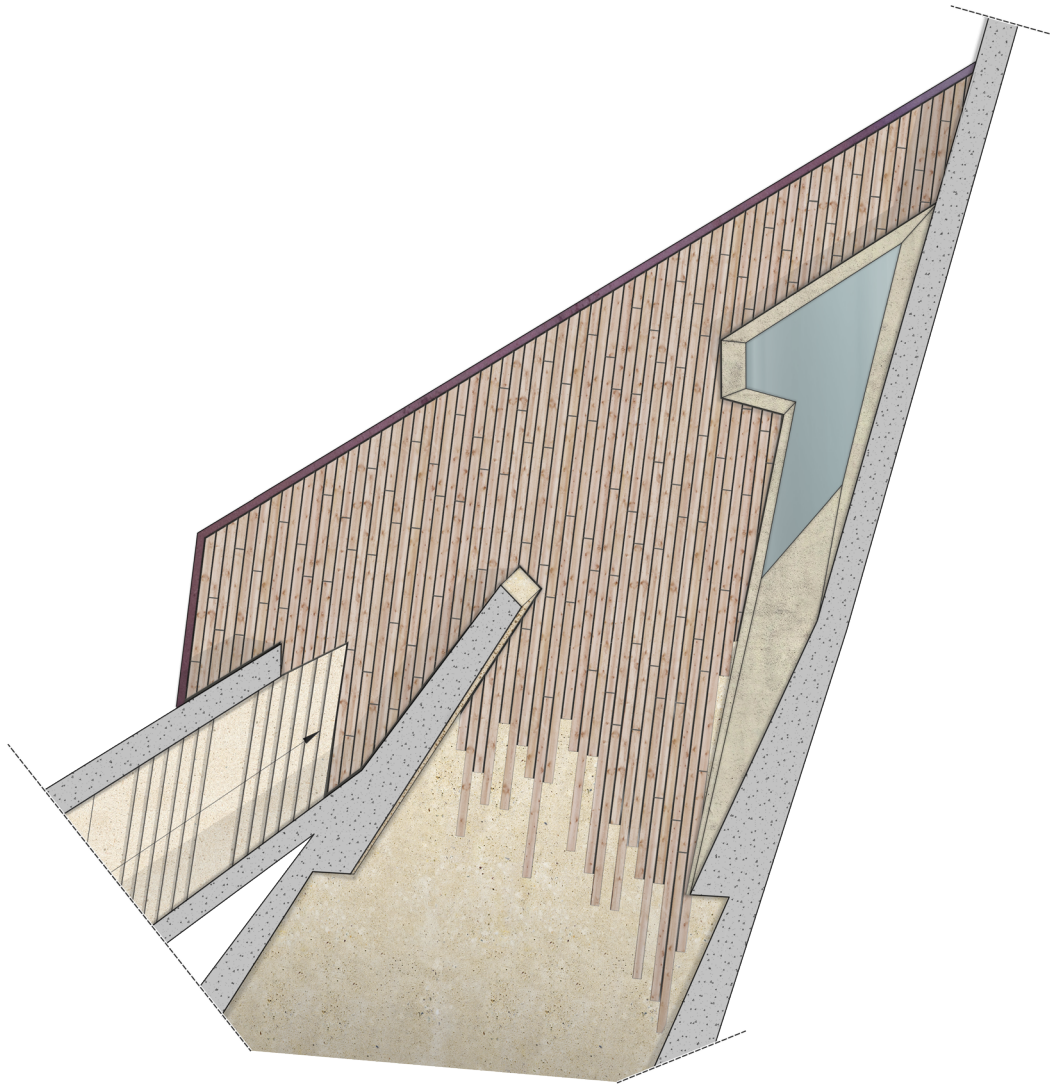
## Detail plans & elevations - drinking area

material



Detail elevation  
Drinking area  
scaled to 1/100  
(originally 1/50)

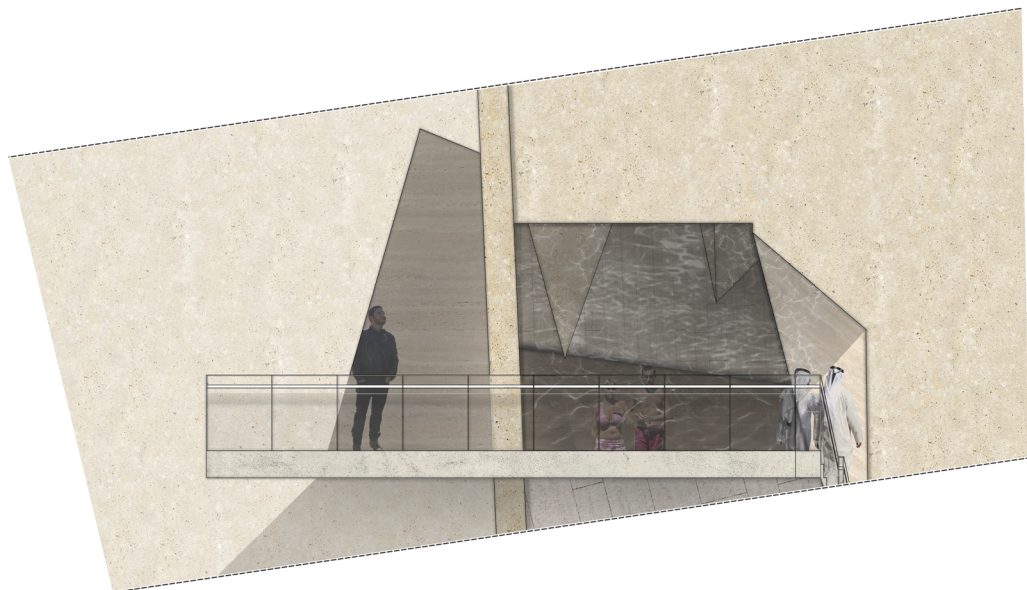




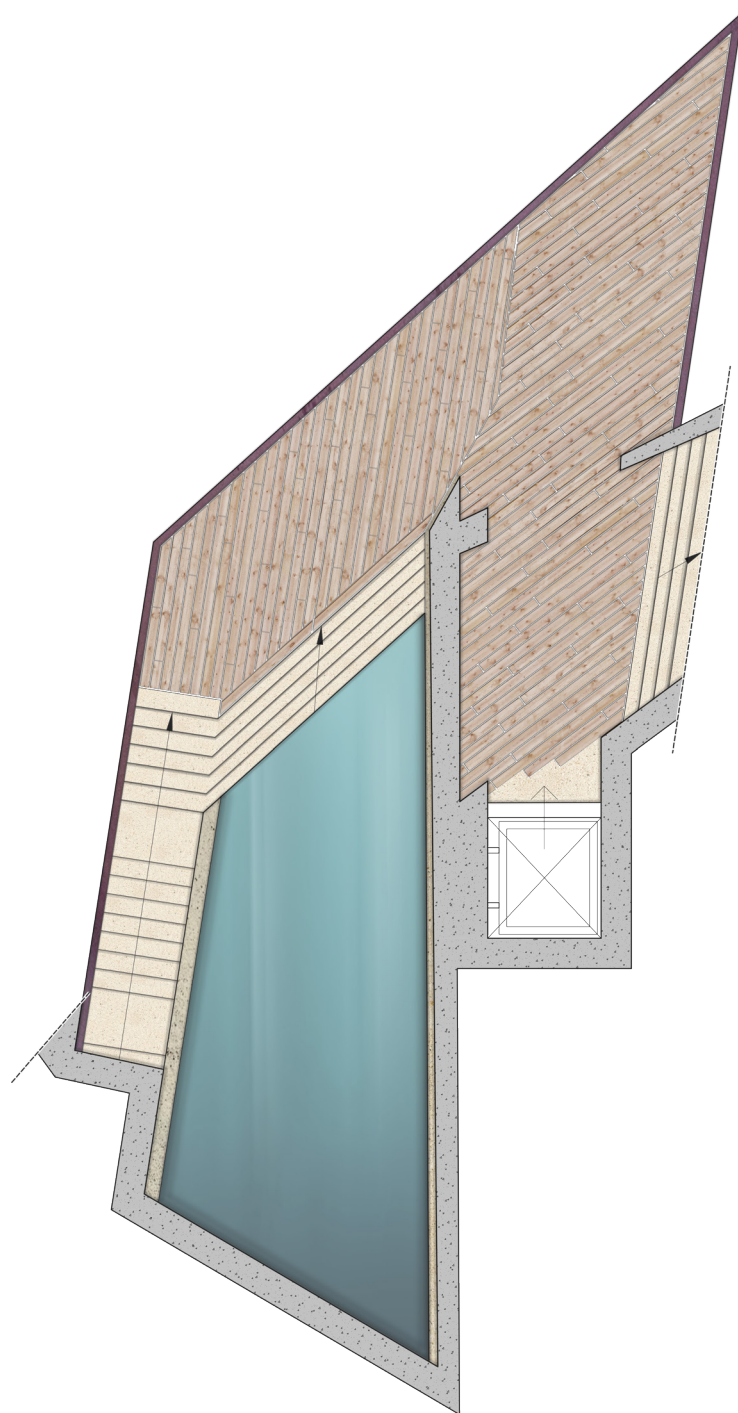
Horizontal detail section  
Drinking area  
scaled to 1/100  
(originally 1/50)

## Detail plans & elevations - bathing area

material



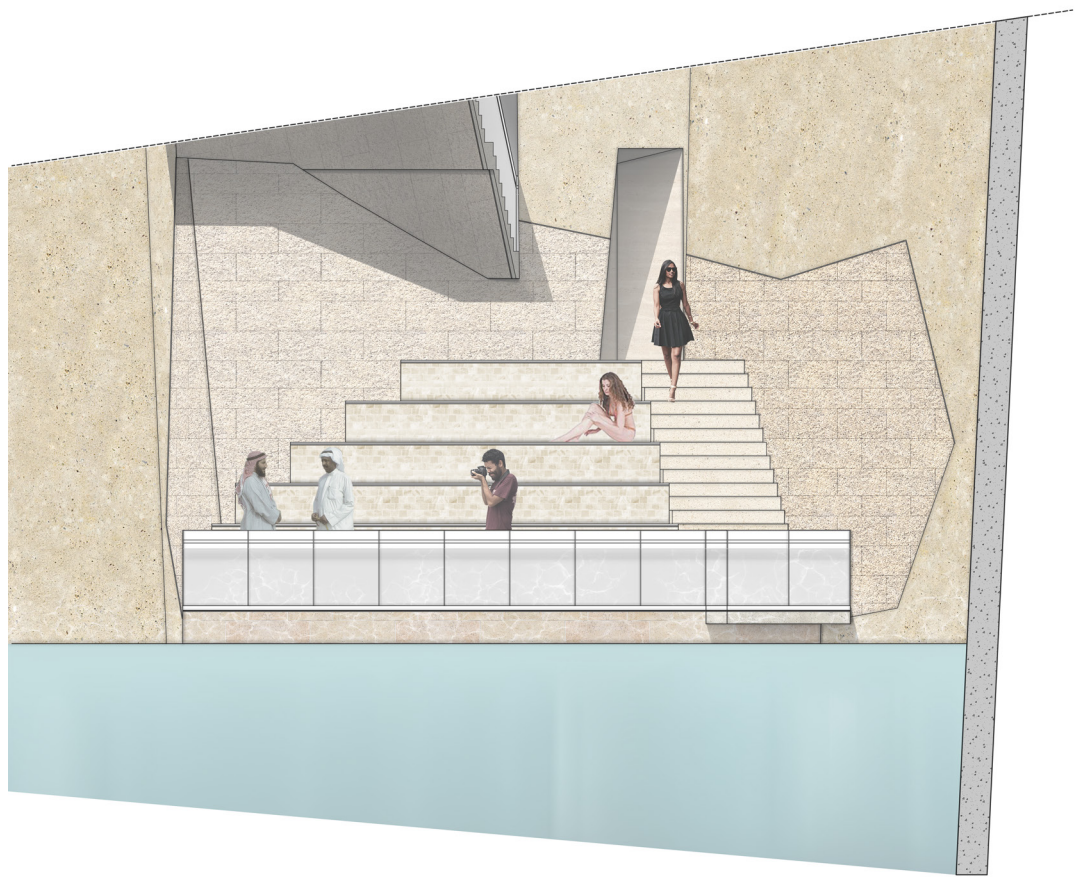
Detail elevation  
Bathing area  
scaled to 1/100  
(originally 1/50)



Horizontal detail section  
Bathing area  
scaled to 1/100  
(originally 1/50)

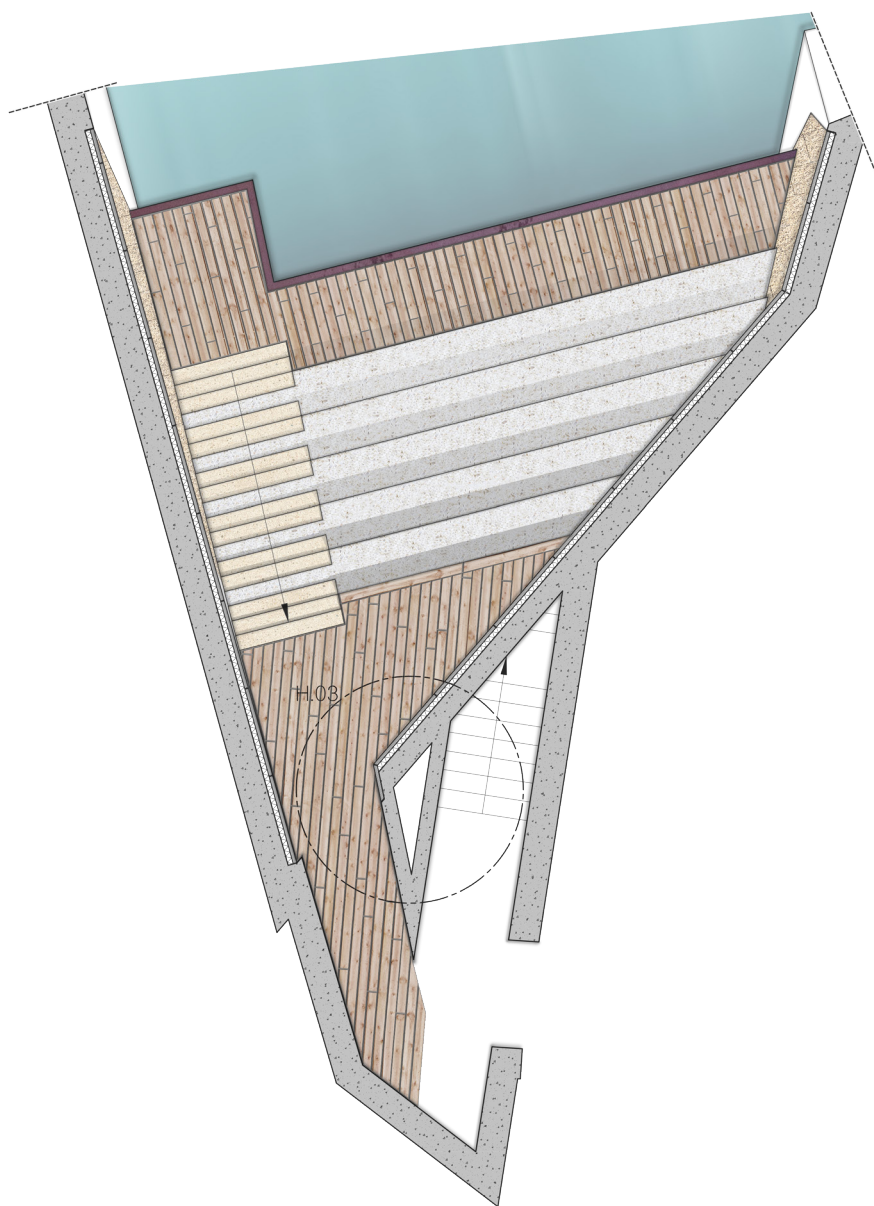
## Detail plans & elevations - worshipping area

material



Detail elevation  
Worshipping area  
scaled to 1/100  
(originally 1/50)





Horizontal detail section  
 Worshipping area  
 scaled to 1/100  
 (originally 1/50)

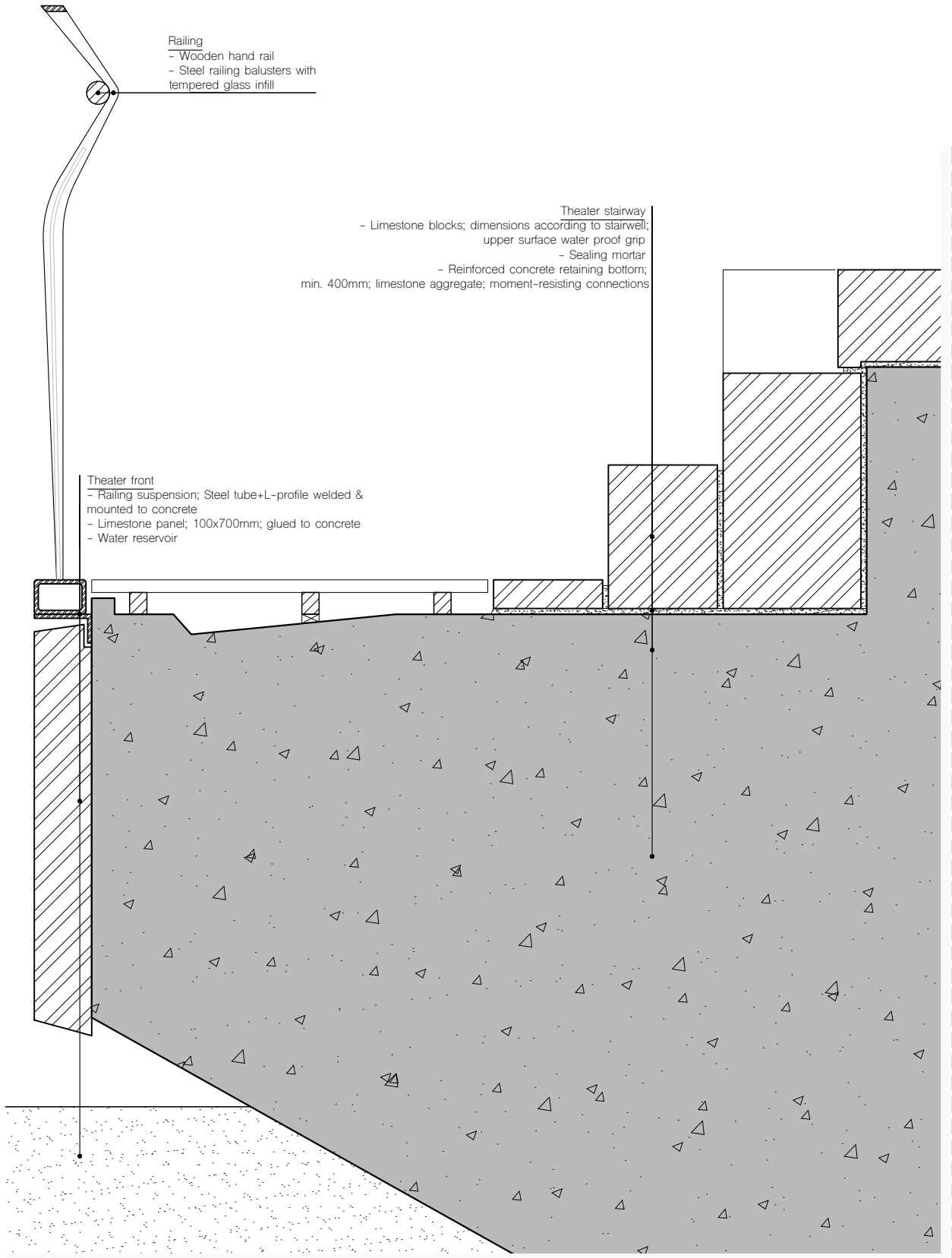
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## material

### Detail drawings

The details as indicated in the detail sections, plans and elevations, are elaborated on scale 1/10 on the next pages. In these drawings the connections, dimensions and exact materialisation i.e. the detailed elaboration can be read.

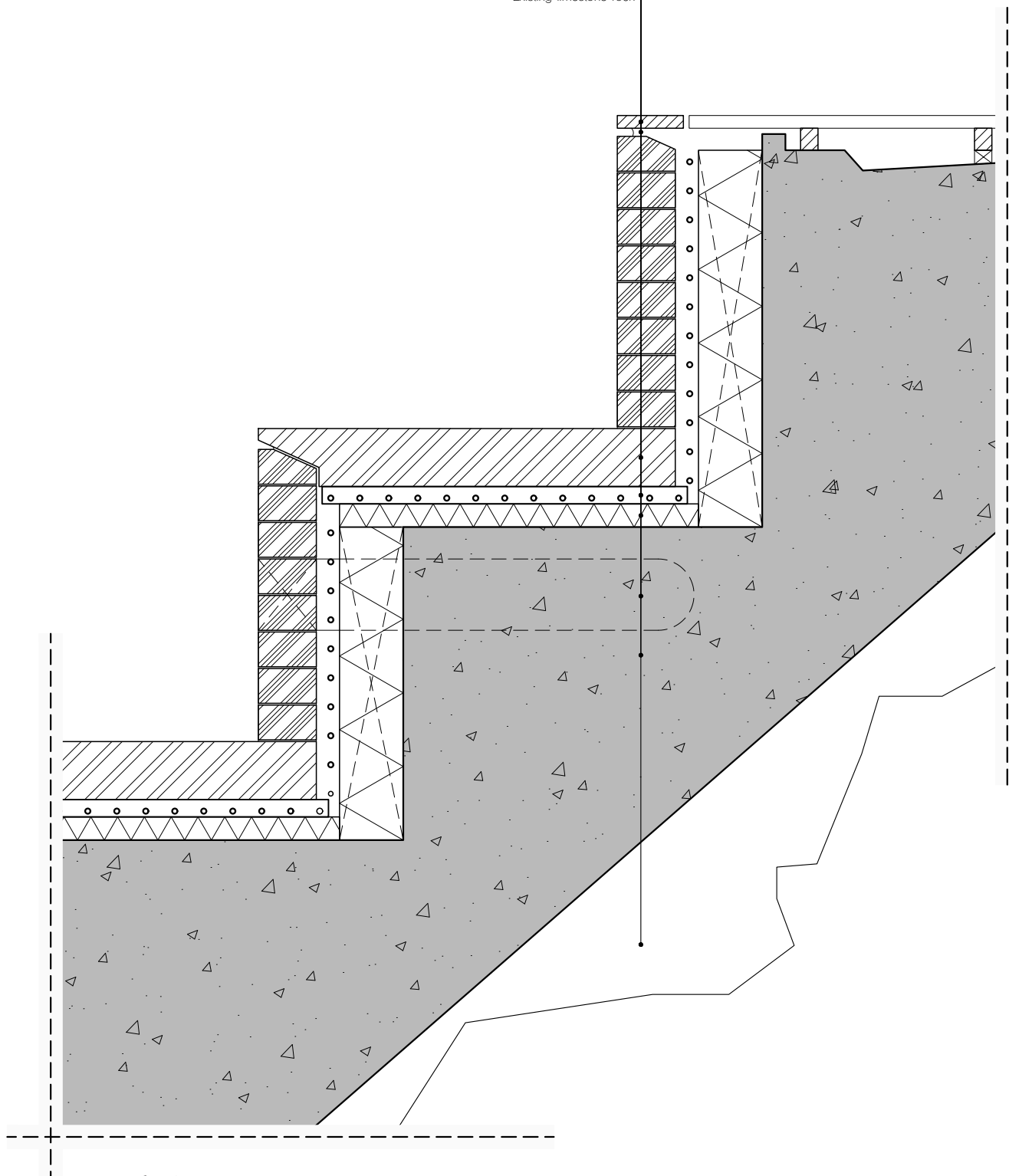
# Detail V.01



scale 1/10

## Detail V.02

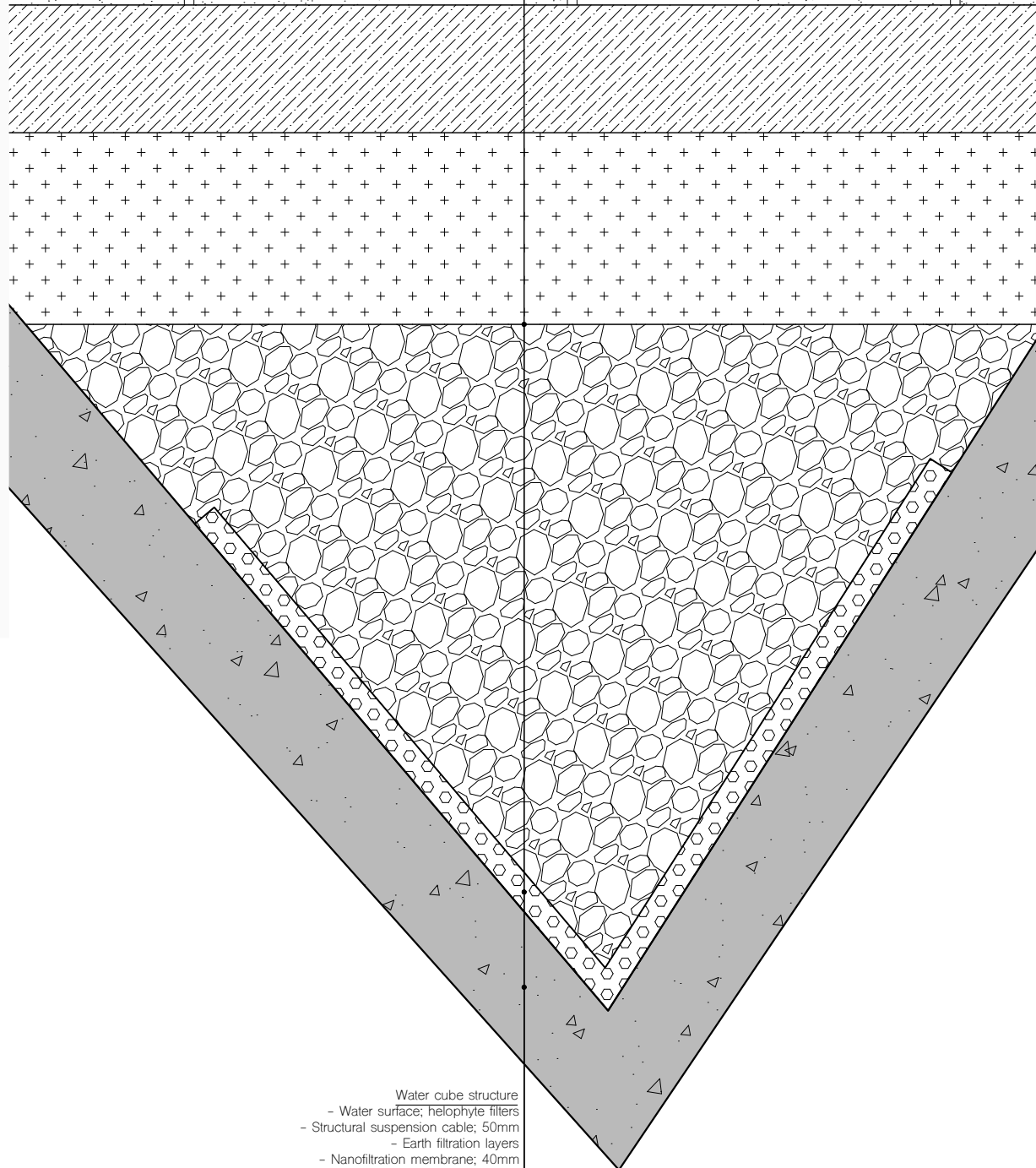
- Theater structure
- Wooden planks flooring; 20mmx114mm
  - Sealing mortar
  - Saltstone blocks; 60x100mm
  - Limestone panels; 100x720mm
  - Heating tubes; water heating
  - Insulation, mineral wool; 35mm
  - Fresh air inlet system; casted in concrete
  - Reinforced concrete retaining bottom; min. 400mm;  
limestone aggregate; moment-resisting connections
  - Existing limestone rock



scale 1/10



## Detail V.03

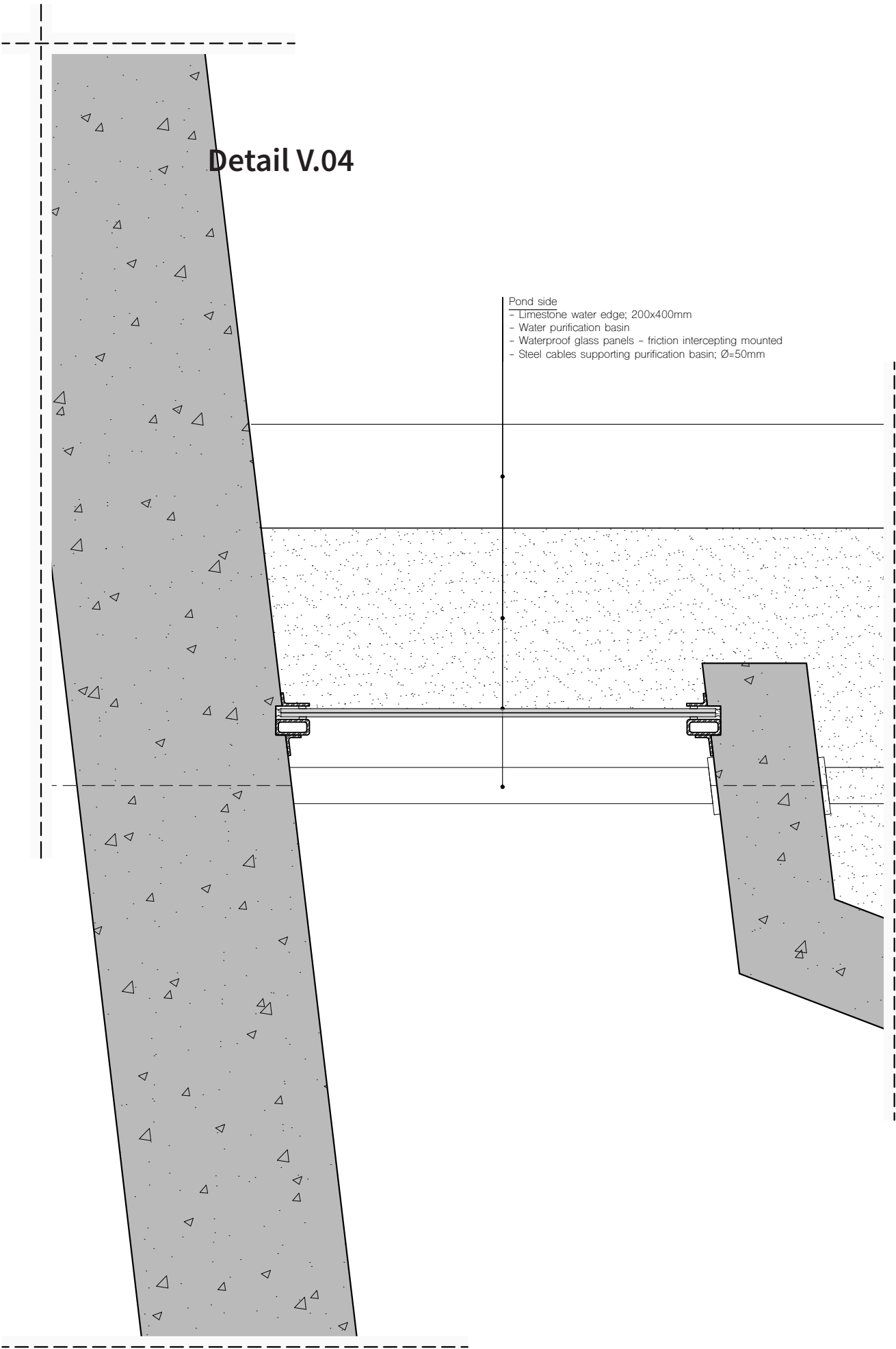


- Water cube structure
- Water surface; helophyte filters
  - Structural suspension cable; 50mm
  - Earth filtration layers
  - Nanofiltration membrane; 40mm
  - Reinforced concrete bottom; 400mm-tapered to 250/300mm; limestone aggregate; washed surface; moment-resisting connections

scale 1/10

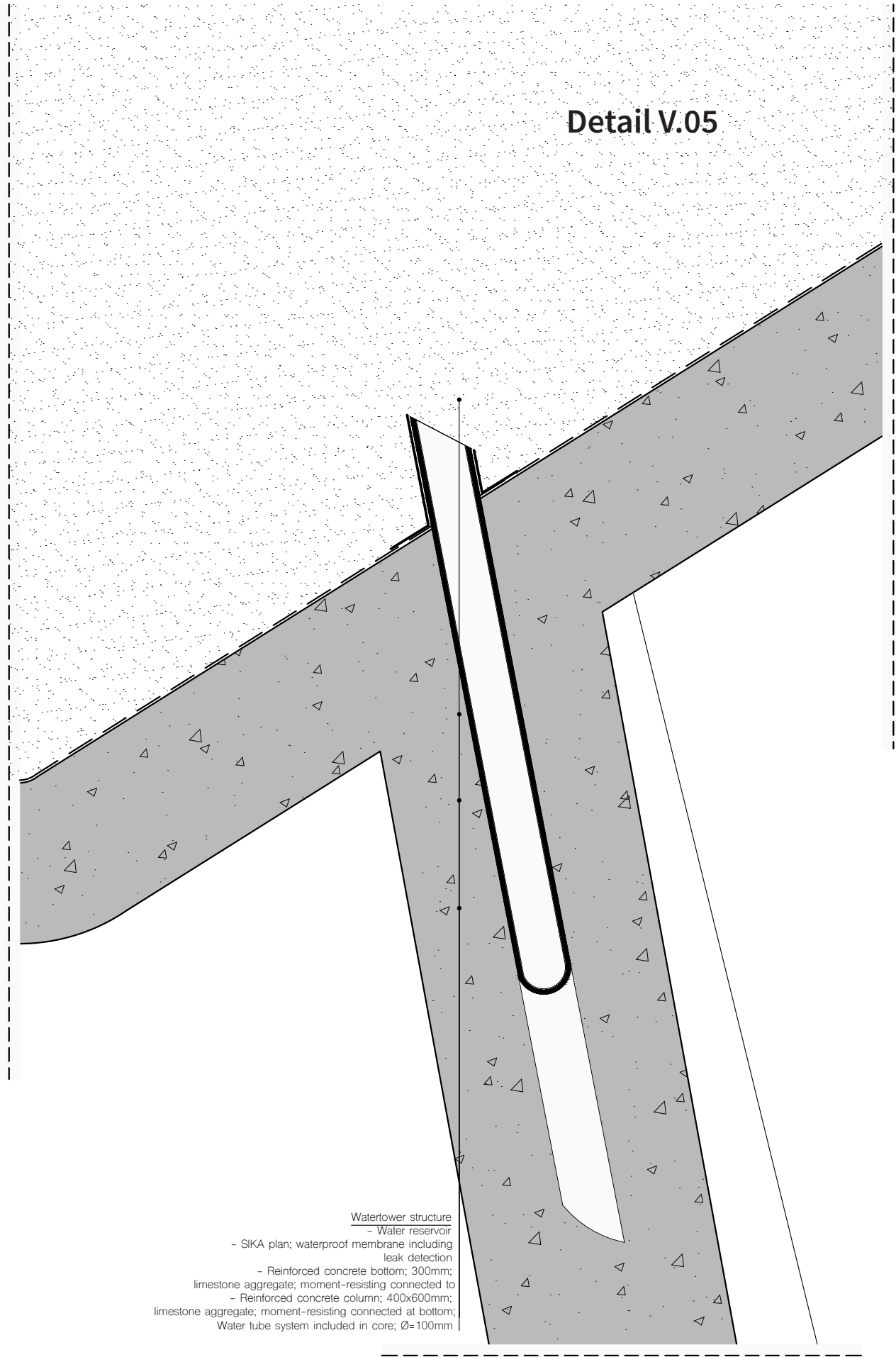
## Detail V.04

- Pond side
- Limestone water edge; 200x400mm
  - Water purification basin
  - Waterproof glass panels - friction intercepting mounted
  - Steel cables supporting purification basin; Ø=50mm



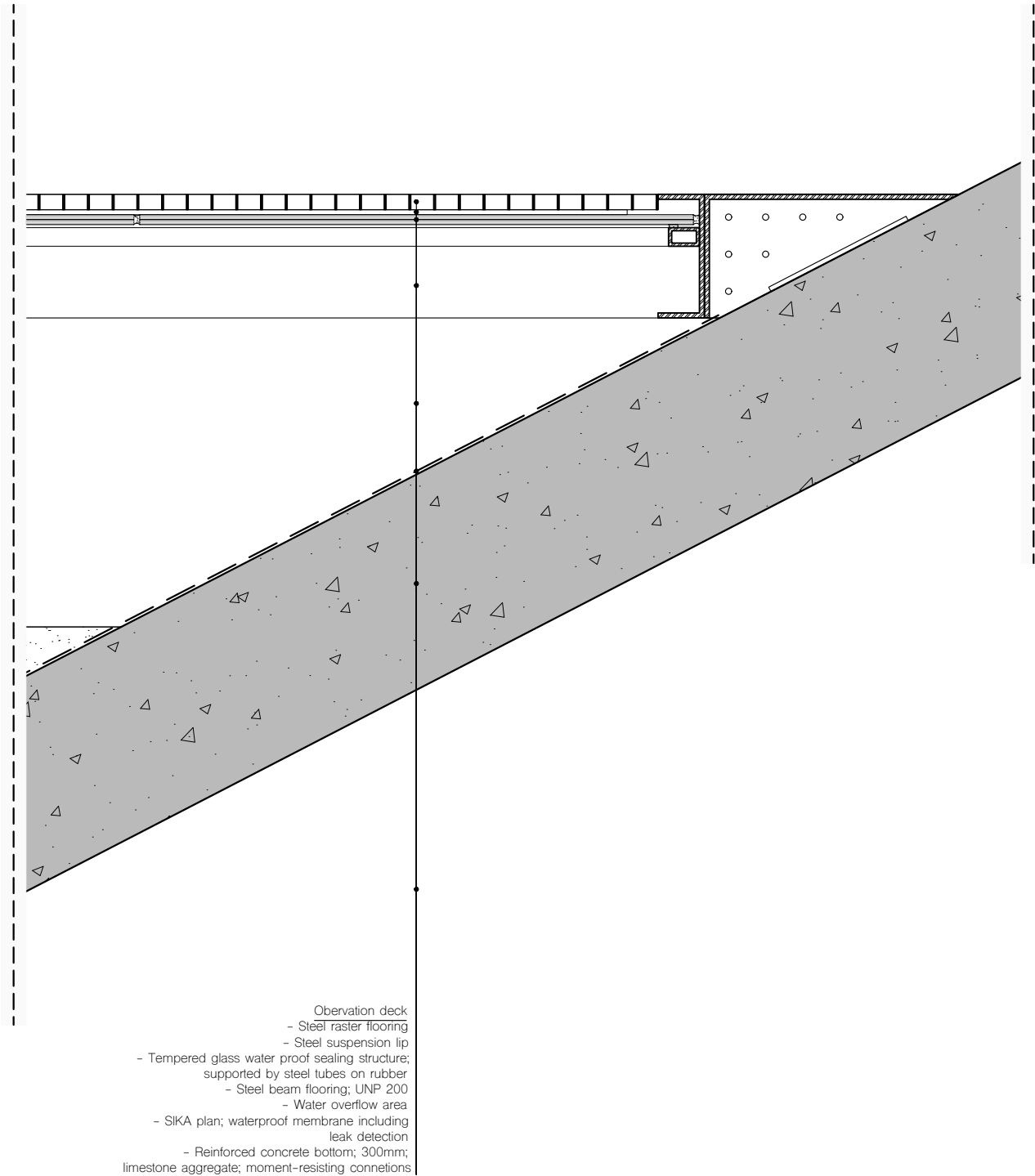
scale 1/10

## Detail V.05



scale 1/10

## Detail V.06



scale 1/10

## Detail H.01

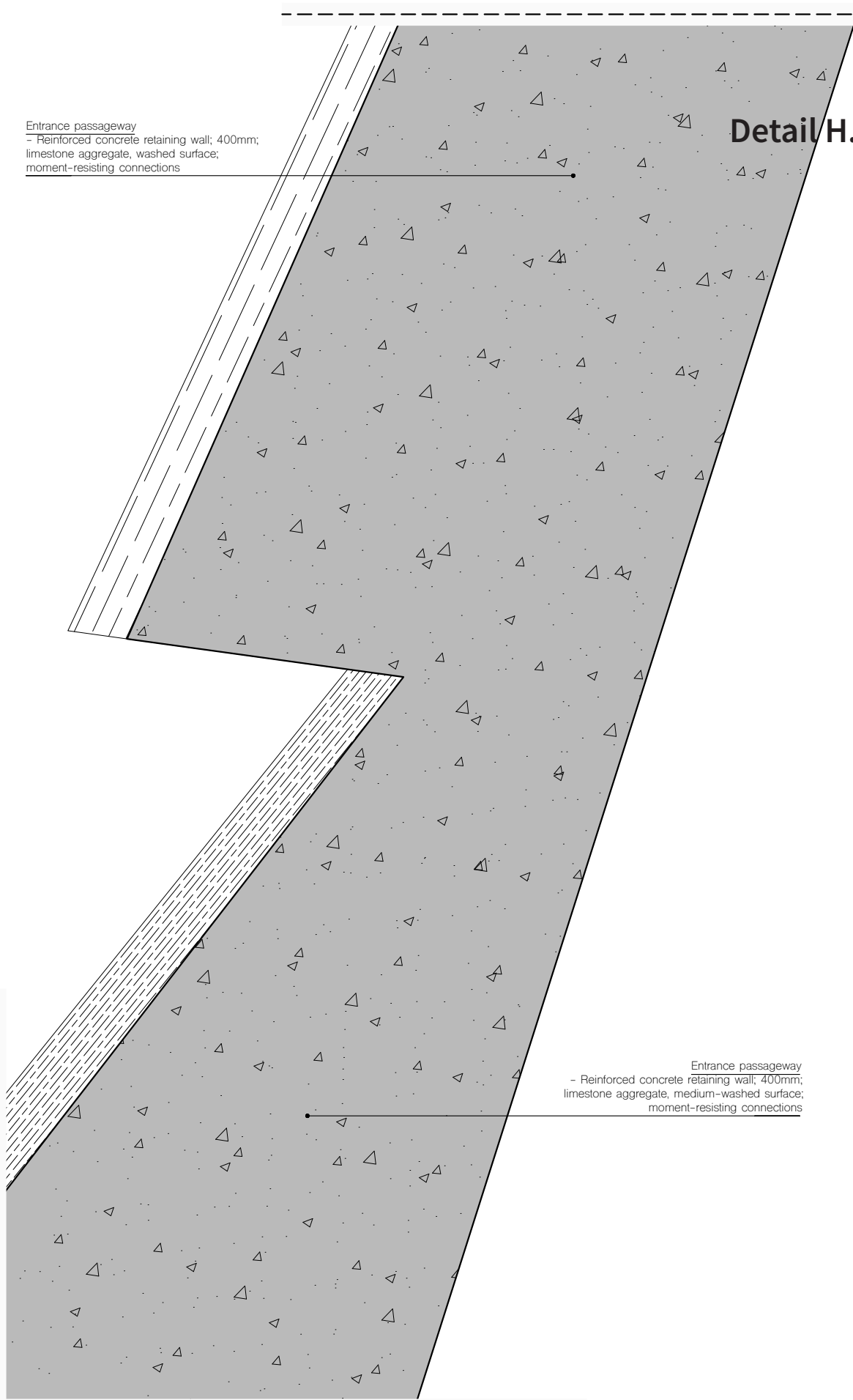
Entrance passageway  
- Reinforced concrete retaining wall; 400mm;  
limestone aggregate, polished surface;  
moment-resisting connections

Gate entrance  
- Vertical sliding profile embedded  
in concrete wall;  
garage door sliding vertically

scale 1/10

Entrance passageway  
- Reinforced concrete retaining wall; 400mm;  
limestone aggregate, washed surface;  
moment-resisting connections

## Detail H.02



Entrance passageway  
- Reinforced concrete retaining wall; 400mm;  
limestone aggregate, medium-washed surface;  
moment-resisting connections

scale 1/10

Theater wall  
 - Porous limestone panels; 50x1200mm;  
 anchored to concrete back structure  
 - Insulation; mineral wool; 70mm  
 - Reinforced concrete retaining wall; 400mm;  
 limestone aggregate; moment-resisting connections

## Detail H.03

Passageway underground  
 - Reinforced concrete retaining wall; 400mm;  
 limestone aggregate, polished surface;  
 moment-resisting connections

scale 1/10

