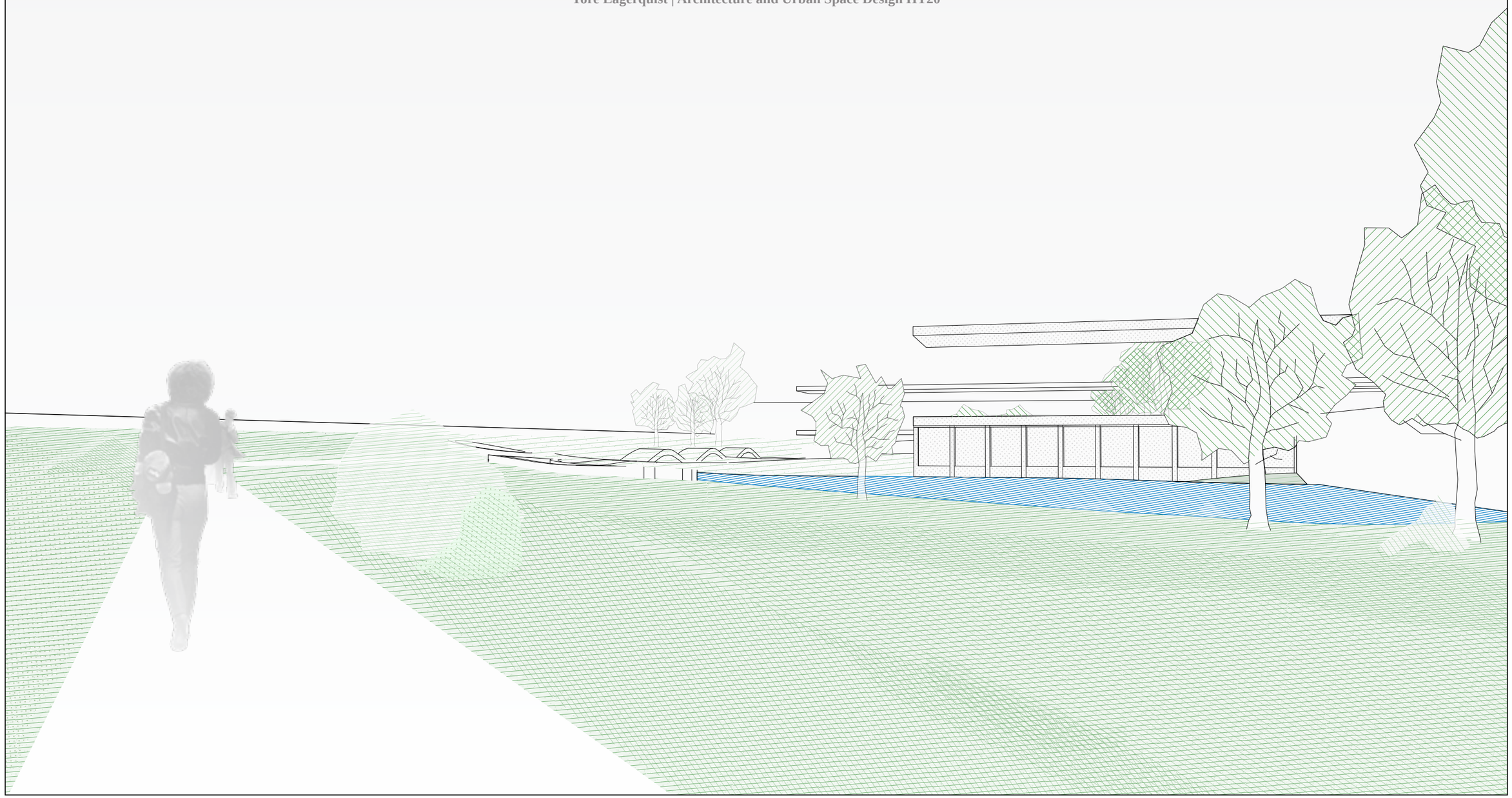
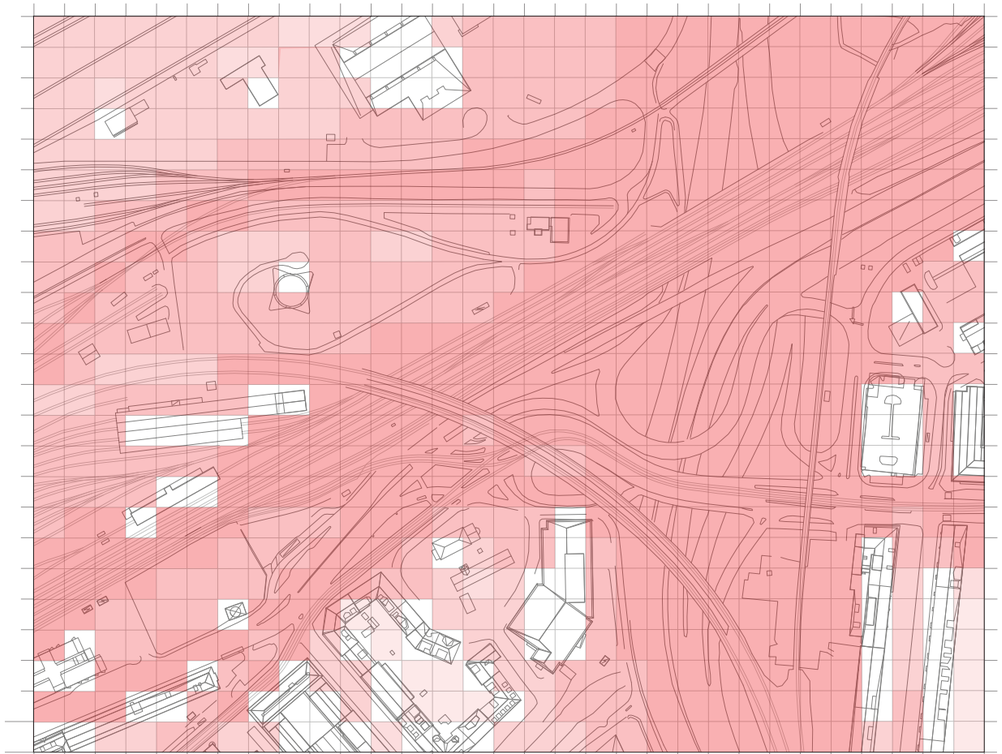
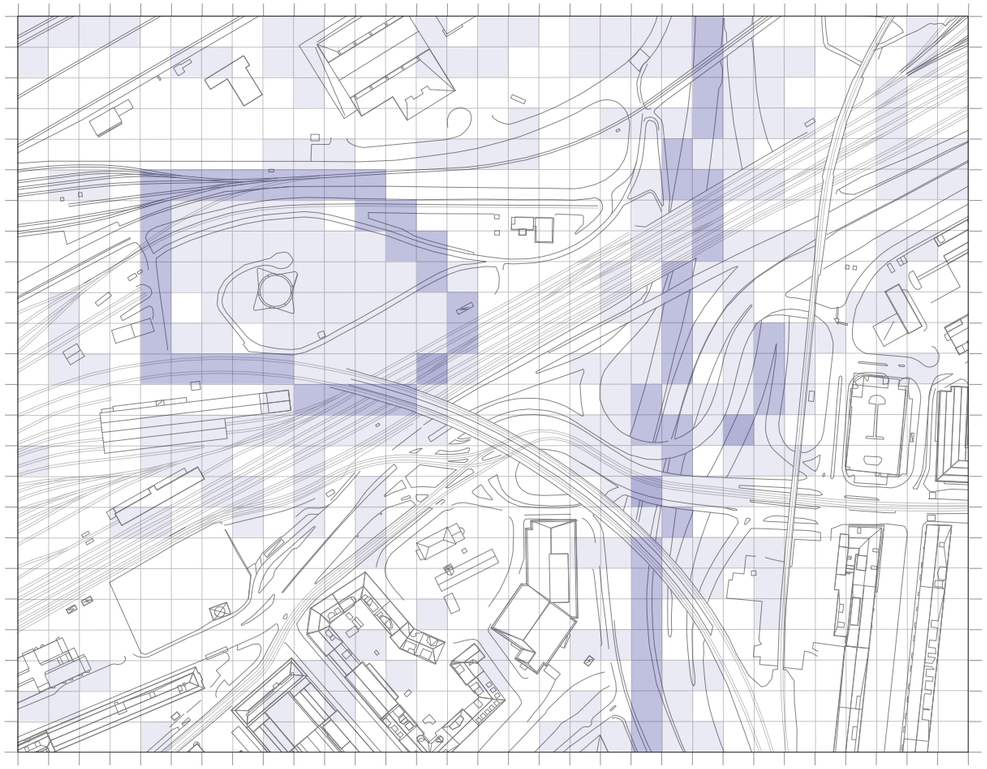
Sound and landscape

Tore Lagerquist | Architecture and Urban Space Design HT20



Two pathologies





Noise

The area is inundated by noise, produced primarily by the vast network of mobility infrastructure. The analysis made in Module 2 was relatively low in resolution, and says relatively little about the actual experience of the sound in the area.

What further analysis of the sound in the area can be made?

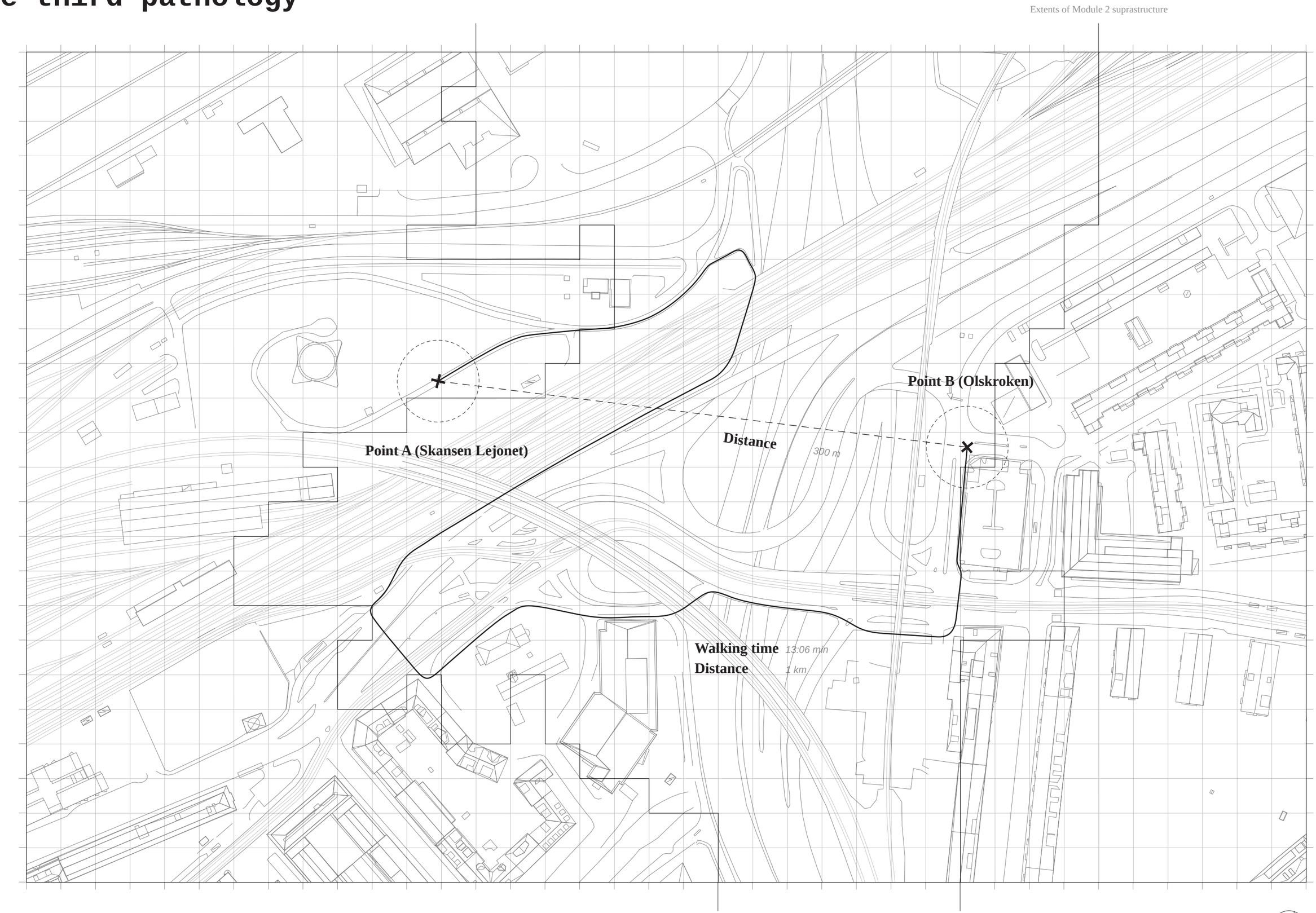
Rainwater run-off

The topography of Gullbergsvass is rather flat. Gullberget, where Skansen Lejonet is located, is one of few topographical features, together with the low terrain of the E6 highway. Much of the precipitation in the area near Skansen Lejonet will eventually end up in this kilometre-long low-point in the landscape. Some further investigation has shown that the accumulation of rain water in this area is some of the most severe in all of the central parts of Göteborg.

How can rain water be delayed from going into the E6 highway?

How can rain water be used intermittently?

The third pathology



1:2000

The third pathology

The third pathology

Texture of noise

Extents of Module 2 suprastructure

Sound event I
Railway underpass

Point B (Olskroken)

Point A (Skansen Lejonet)

Sound event II
Crossing the E6

Frequency

10 kHz

5 kHz

0 Hz

00:00 min | 01:00 min | 02:00 min | 03:00 min | 04:00 min | 05:00 min | 06:00 min | 07:00 min | 08:00 min | 09:00 min | 10:00 min | 11:00 min | 12:00 min | 13:00 min

13:06 min

Time

Point A (Skansen Lejonet)

Point B (Olskroken)

Texture of noise

Sound captured walking from Skansen Lejonet (A) to Olskroken (B)

Sound was captured while walking between point A and B. **Fig. 1** shows an overview of sound events along the path measured between 0 Hz and 10 kHz (audible sound for humans range between 20 Hz and 20 kHz). **Fig. 2** shows the same recording at a higher resolution of frequency, between 0 Hz and 2 kHz. A constant sound in the low frequency range (20-200 Hz) is visible as a horizontal band along the bottom of the graph.

Low frequency sounds have documented negative effects on human well-being. Sounds in frequencies below 200 Hz are registered in humans as signals of danger, reminiscent of thunder, volcano eruptions, earthquakes or storms. Prolonged exposure may result in negative subjective experience, reduced productivity and physcial ailment. Among common sources of low frequency sounds in urban environments are diesel motors in heavy vehicles, locomotives and work machines. (Persson Waye, 2005; 2011)

Fig. 1

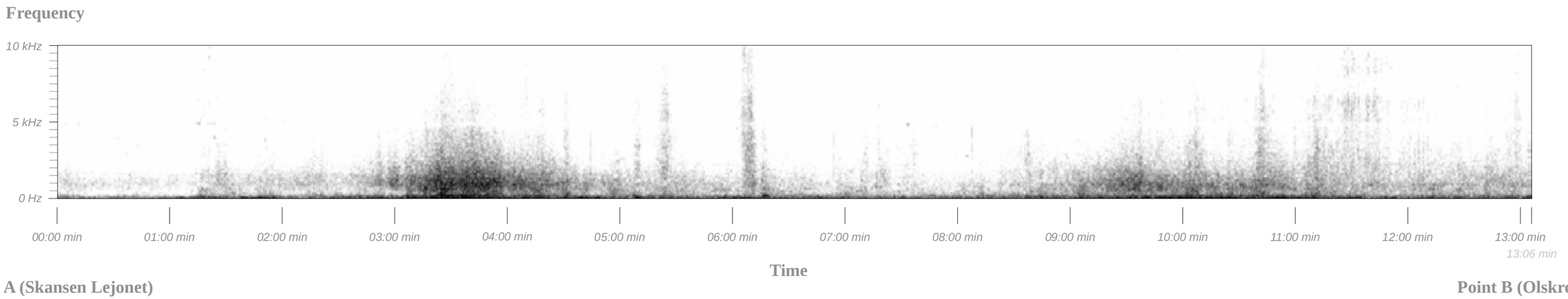
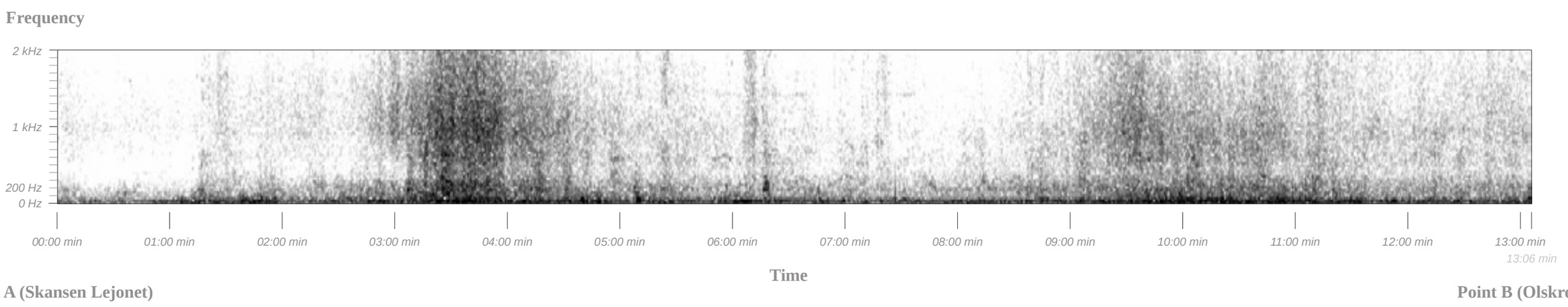


Fig. 2



Workflow Sound recording while walking from point I to point II Spectograph analysis in Audacity (various settings)

Texture of noise

Collating a series of sound recordings

Skansen Lejonet

park / green space

lower ambient noise level

Railway underpass

infrastructure / movement

high intensity noise event

Svingeln

infrastructure / movement

sporadic noise spikes

Crossing the E6

infrastructure / movement

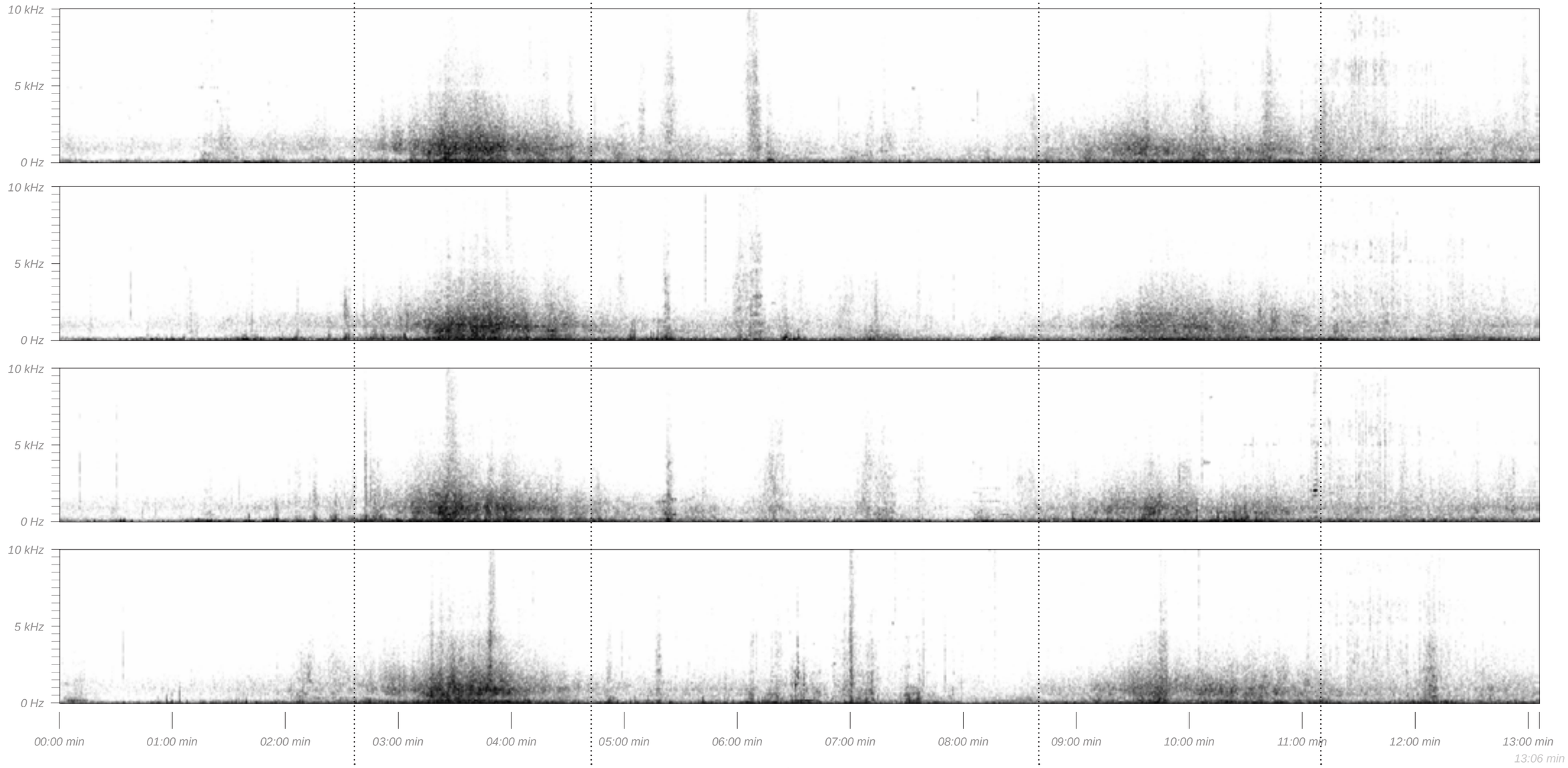
amplified noise mat

Olskroken

street / urban space

higher ambient noise level

Fig. 3

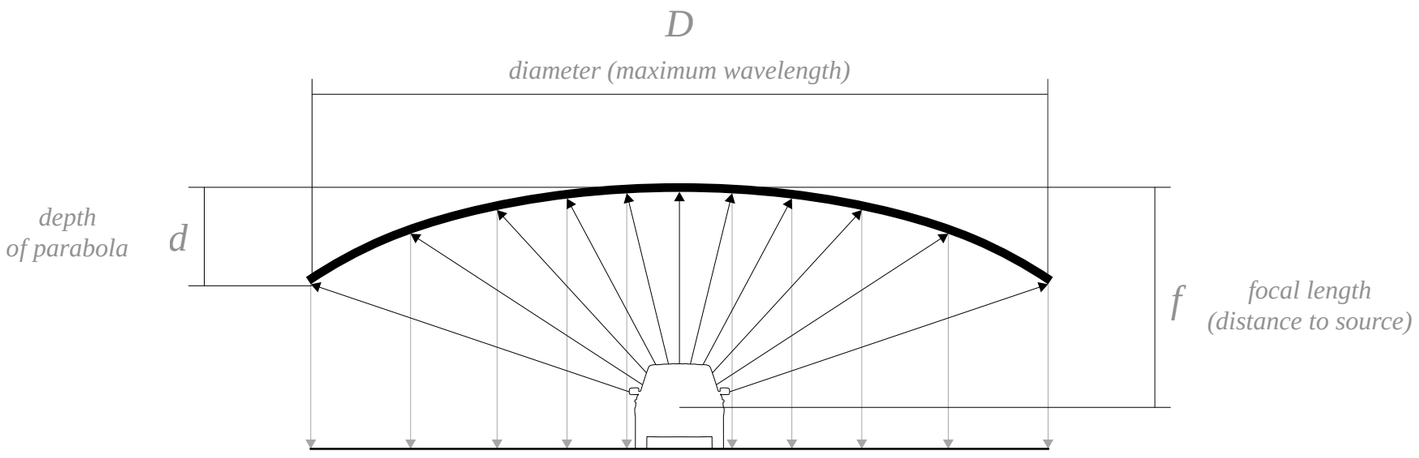


Point A (Skansen Lejonet)

Point B (Olskroken)

Texture of noise

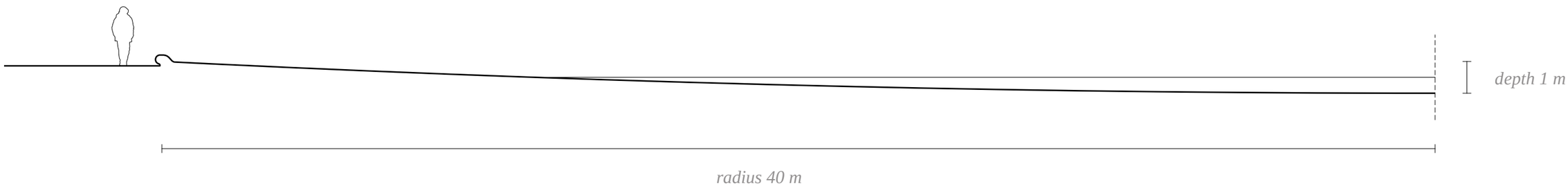
Mitigation through reflection



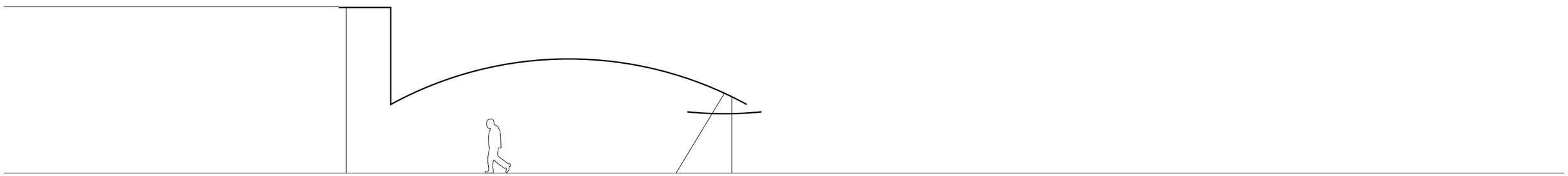
$$d = \frac{D^2}{16f}$$

Parabolic shapes and water

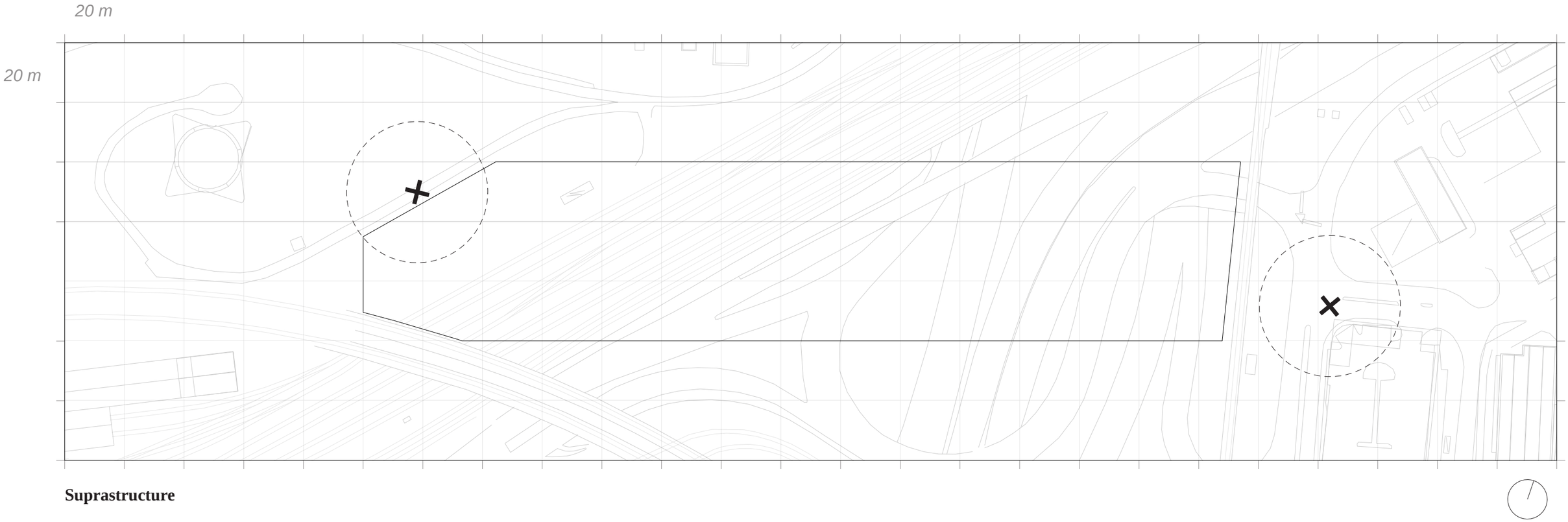
Plaza España Herzog & De Meuron *Santa Cruz de Tenerife, Spain*



Complexo Desportivo Álvaro Siza Vieira *Gondomar, Portugal*

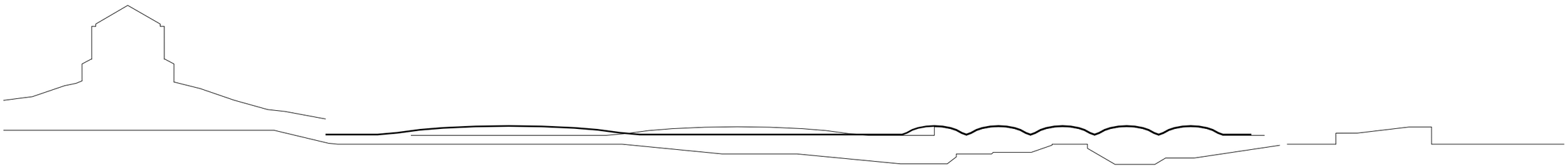


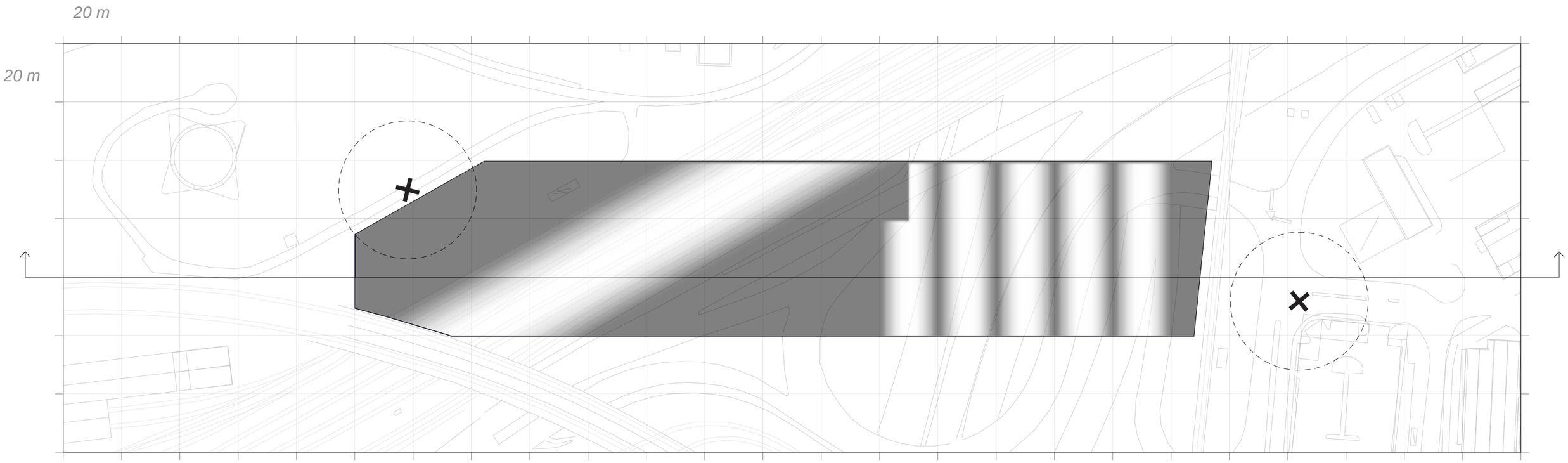
Forming the slab



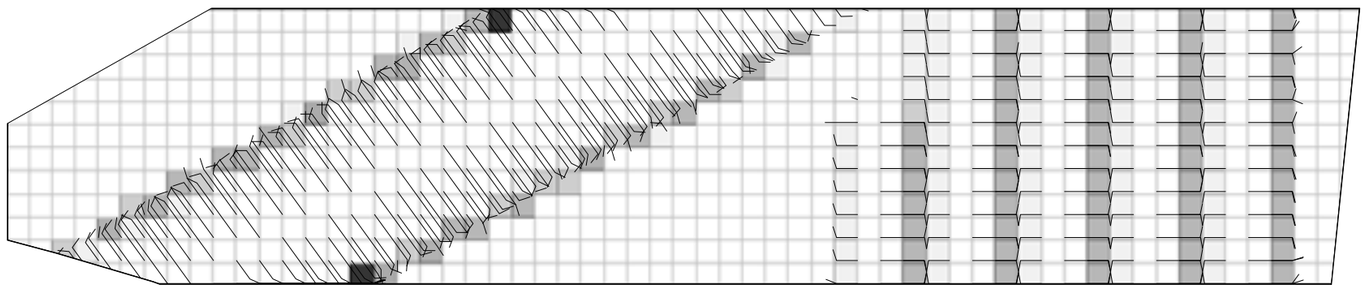
Suprastructure

Forming the slab



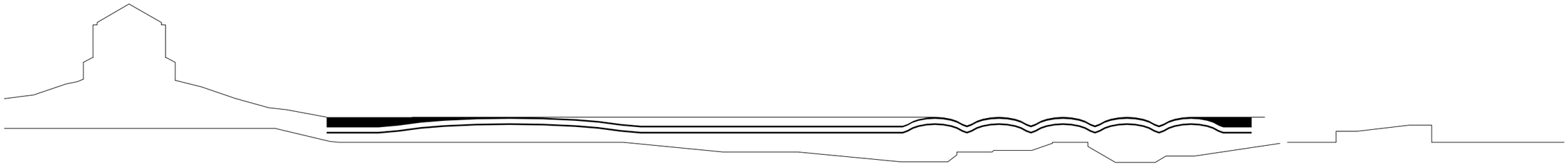


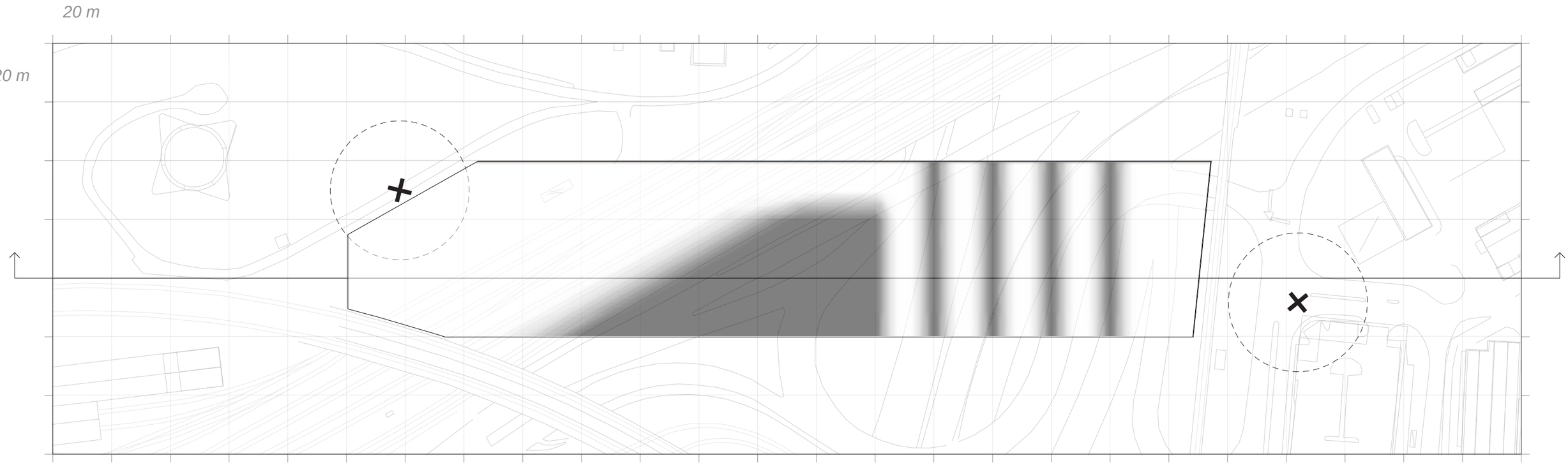
Heightmap



Rainwater runoff and collection

Forming the slab





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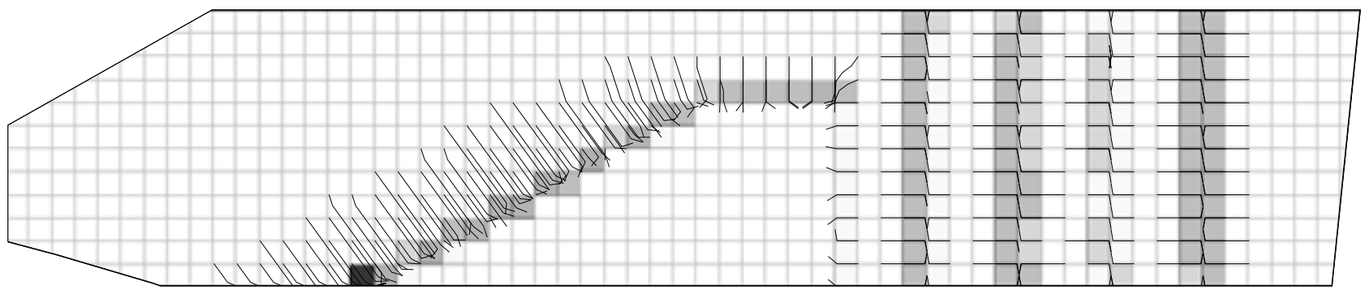

Rainwater runoff and collection

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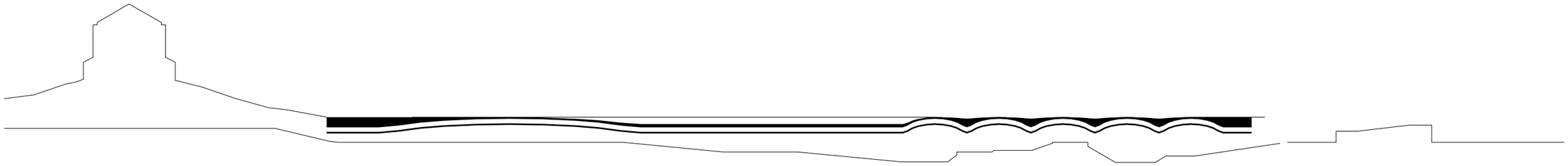

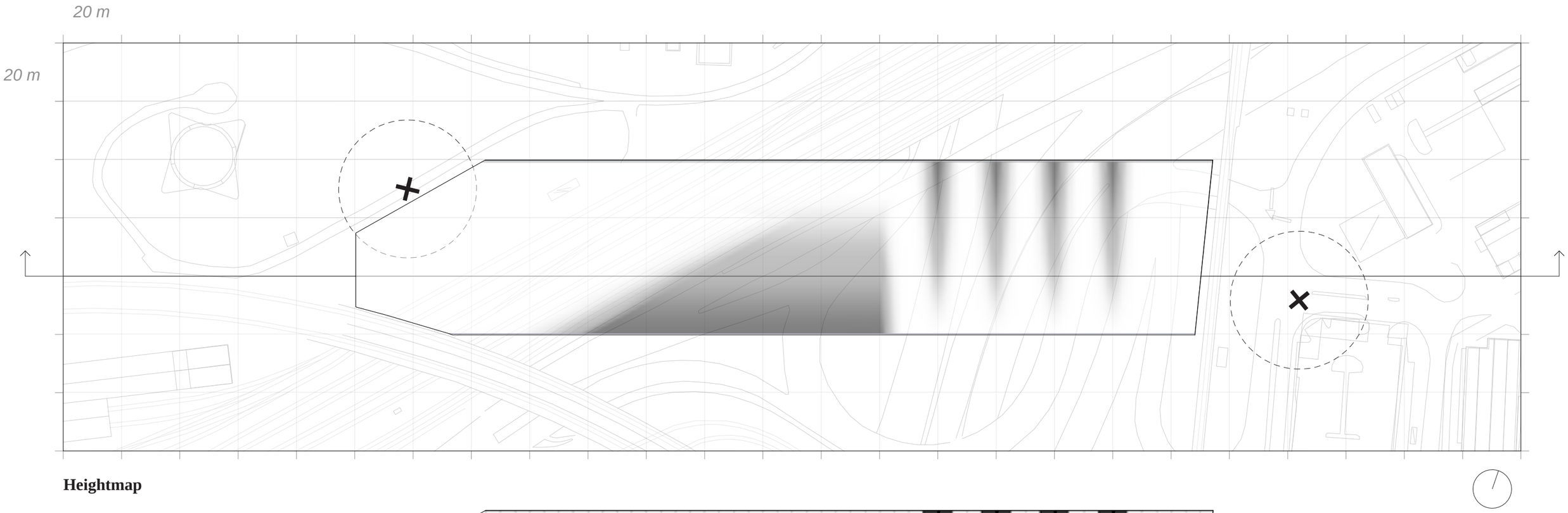

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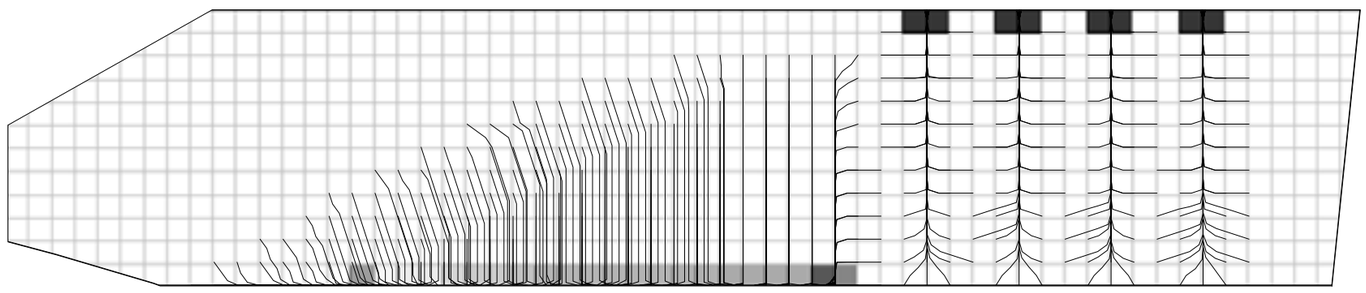
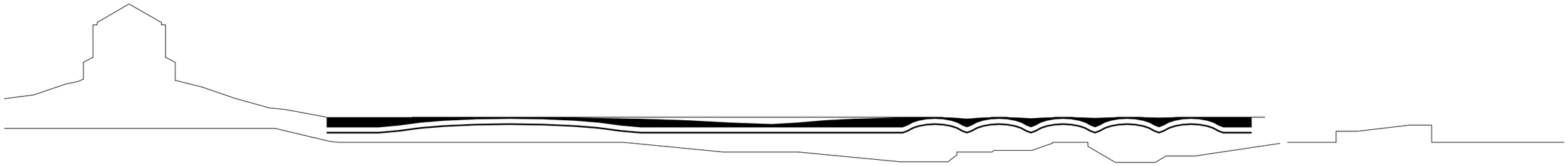
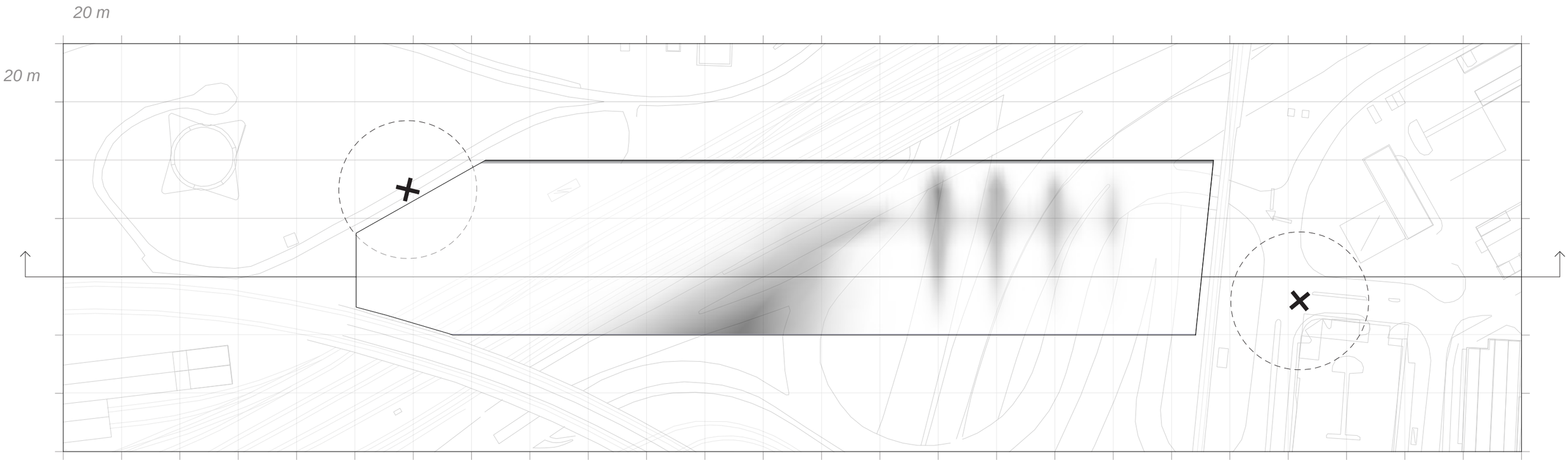


Rainwater runoff and collection

Forming the slab





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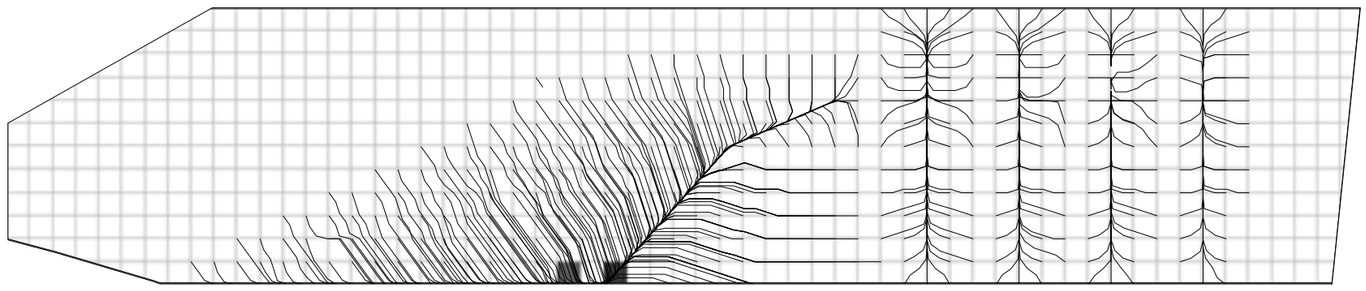
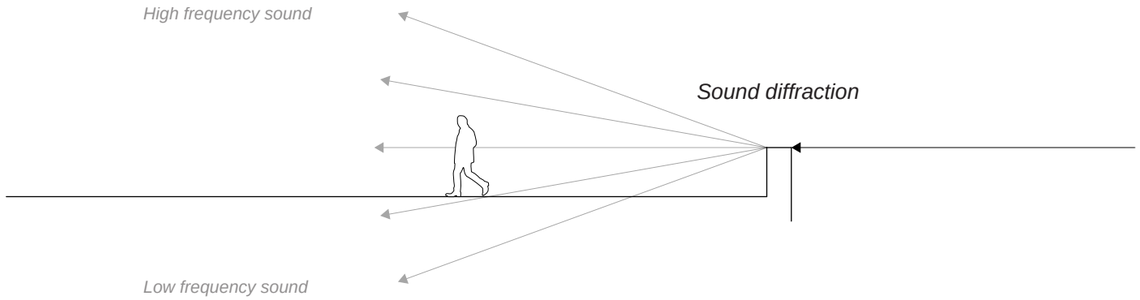
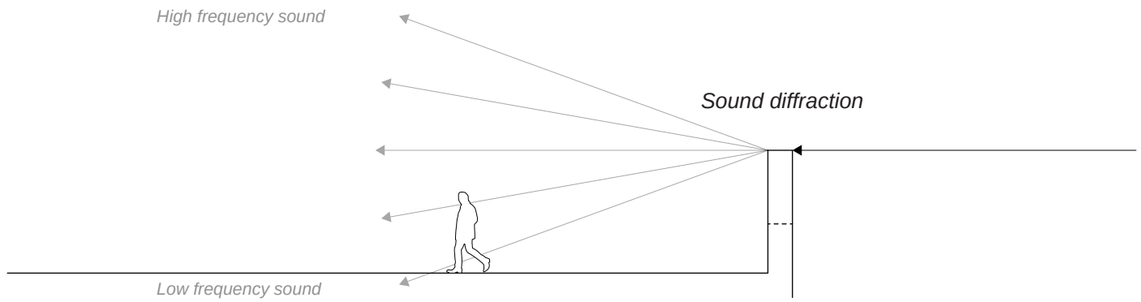
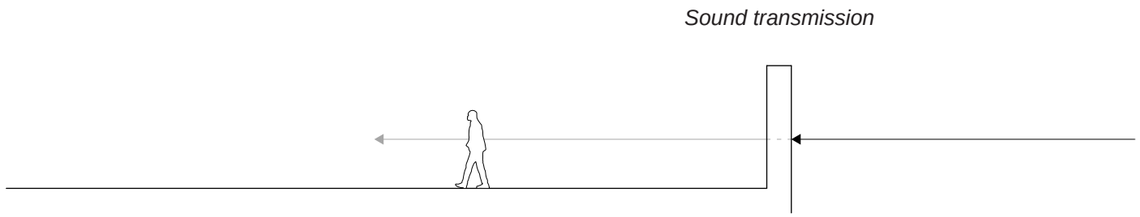


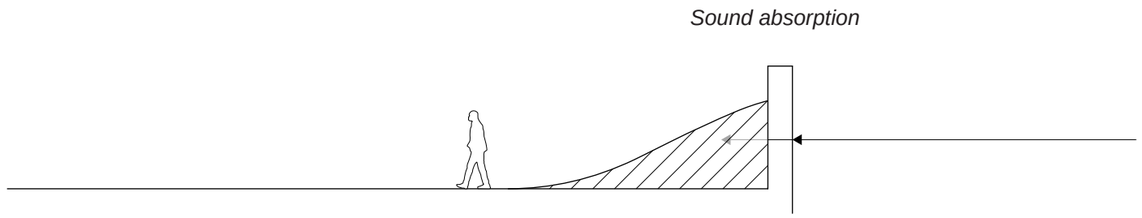
Rainwater runoff and collection

Mitigation at the perimeter

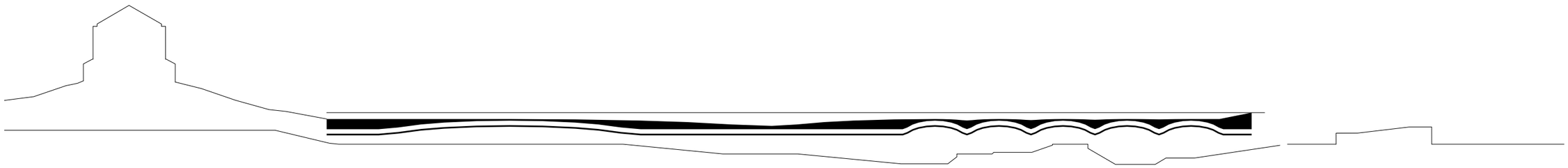


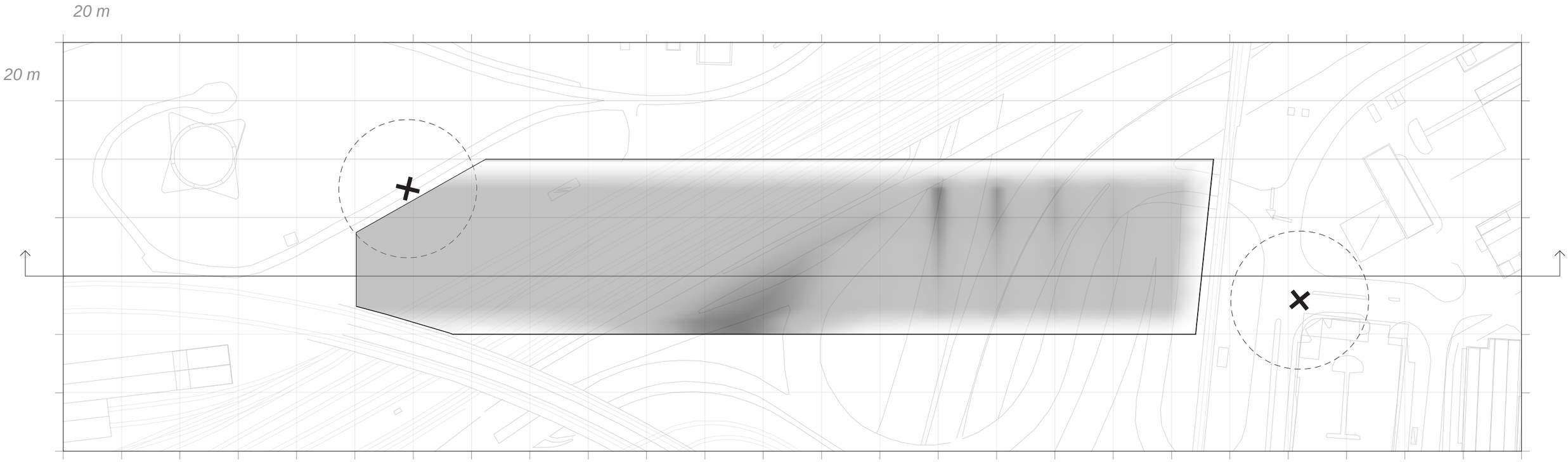






Forming the slab





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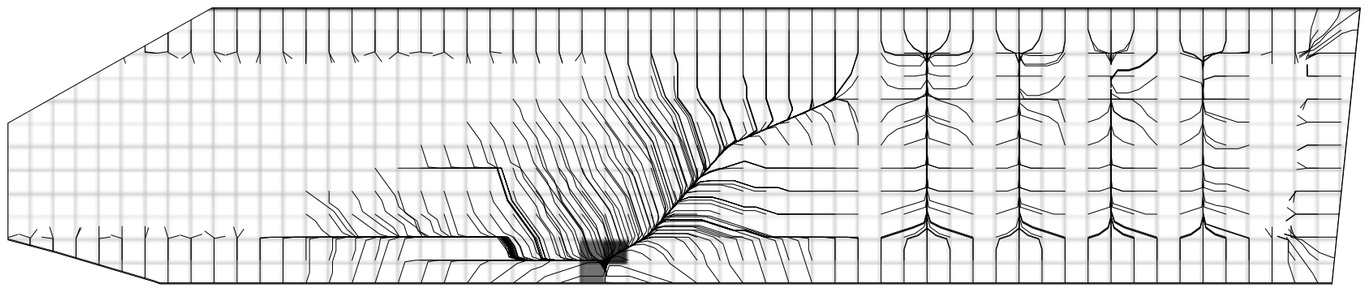
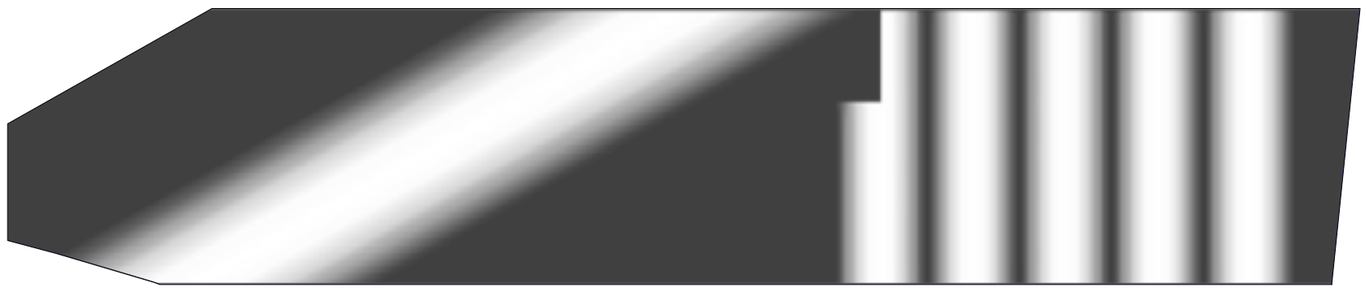


Rainwater runoff and collection

Forming the slab

Final topography



Sound mitigating layer (concrete loadbearing structure)

Depth map (distance between the surface of the topography and the sound mitigating layer)

Implementation

Depth map

0 - 1.25 m *hard surface / light vegetation*

1.25 - 2.5 m *heavy vegetation*

2.5 - 3.75 m *heavy vegetation / interior space + light vegetation*

3.75 - 5.0 m *interior space + light vegetation / trees*

Implementation

Depth map

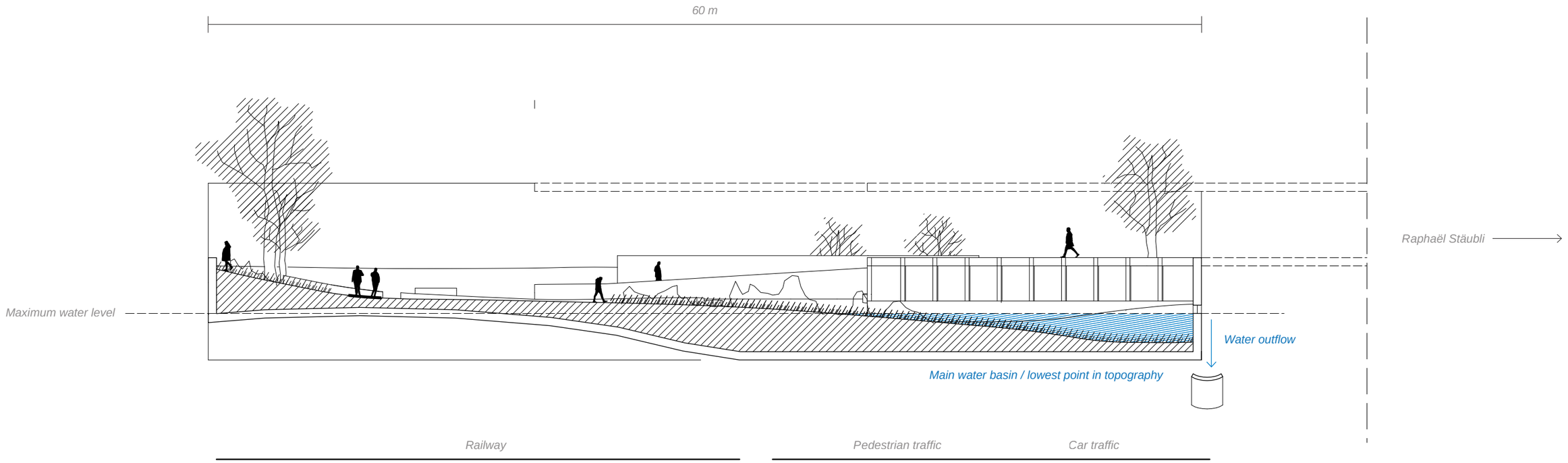
0 - 1.25 m *hard surface / light vegetation*

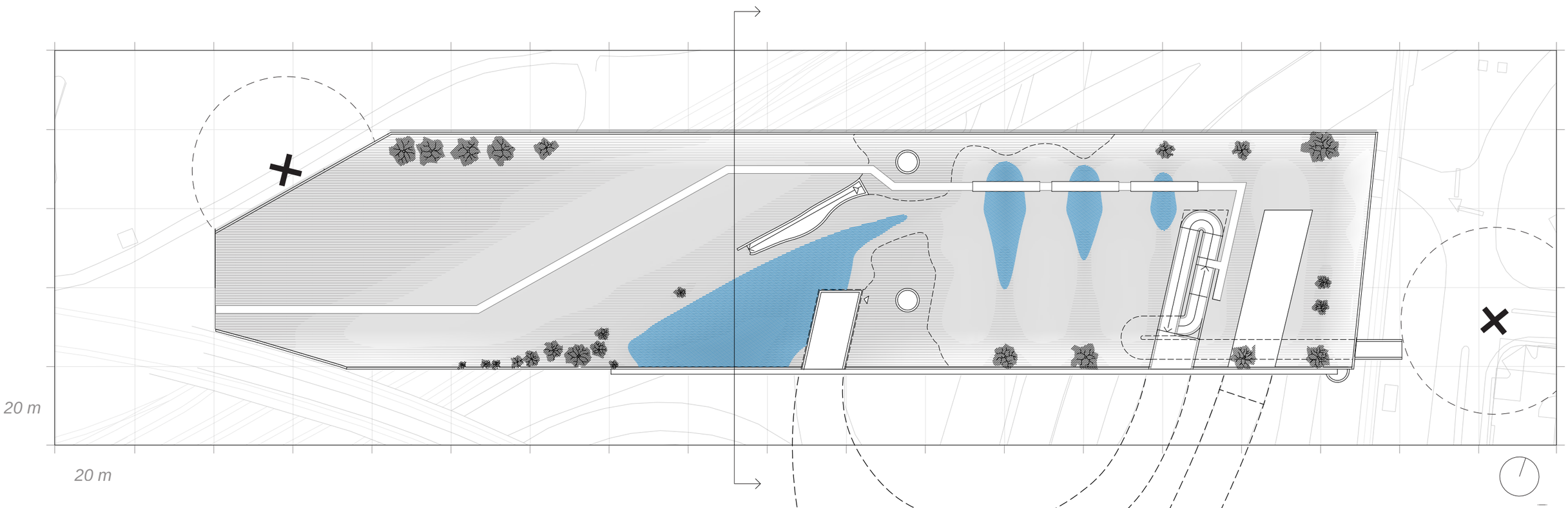
1.25 - 2.5 m *heavy vegetation*

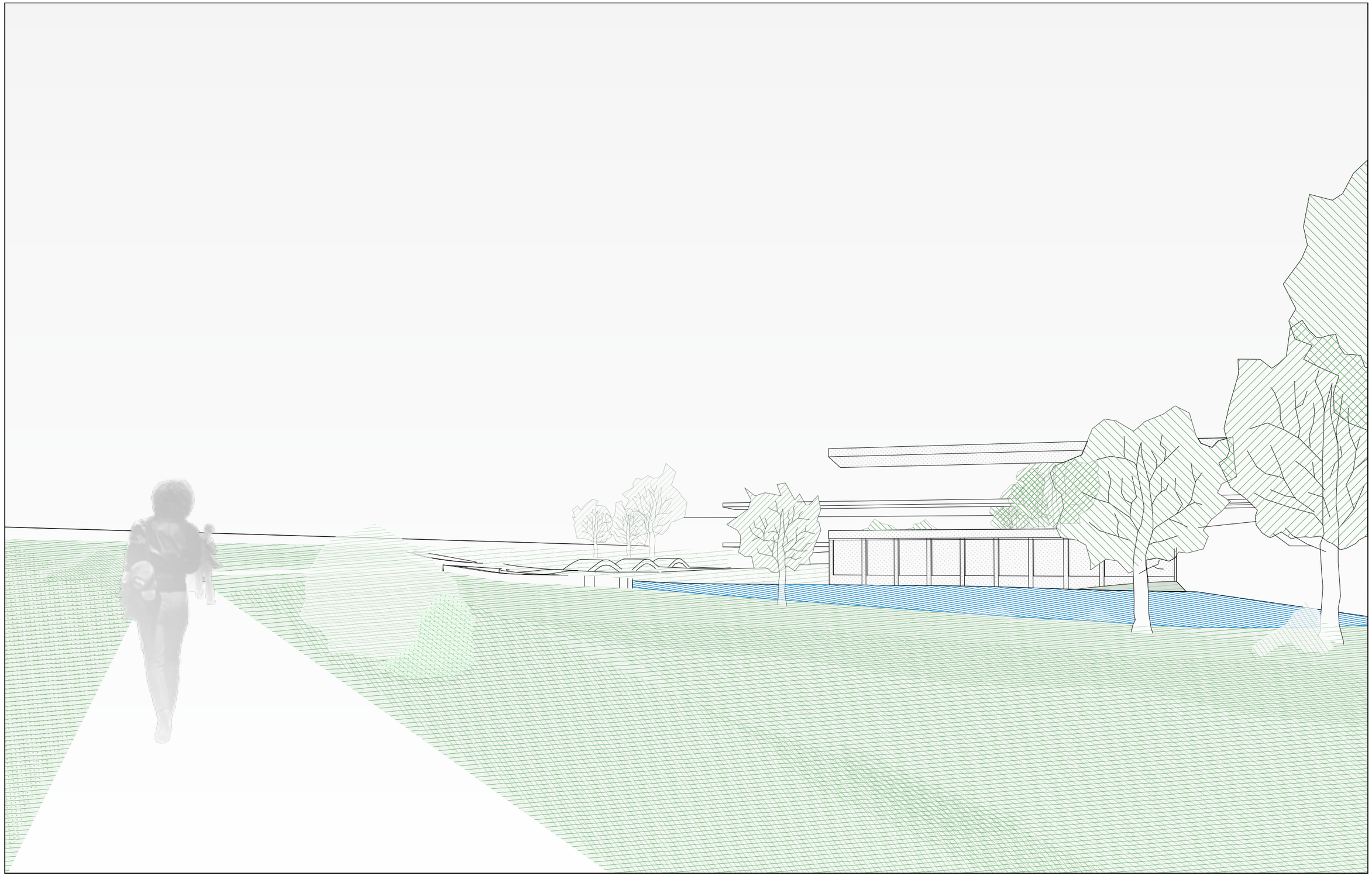
2.5 - 3.75 m *heavy vegetation / interior space + light vegetation*

3.75 - 5.0 m *interior space + light vegetation / trees*

Implementation







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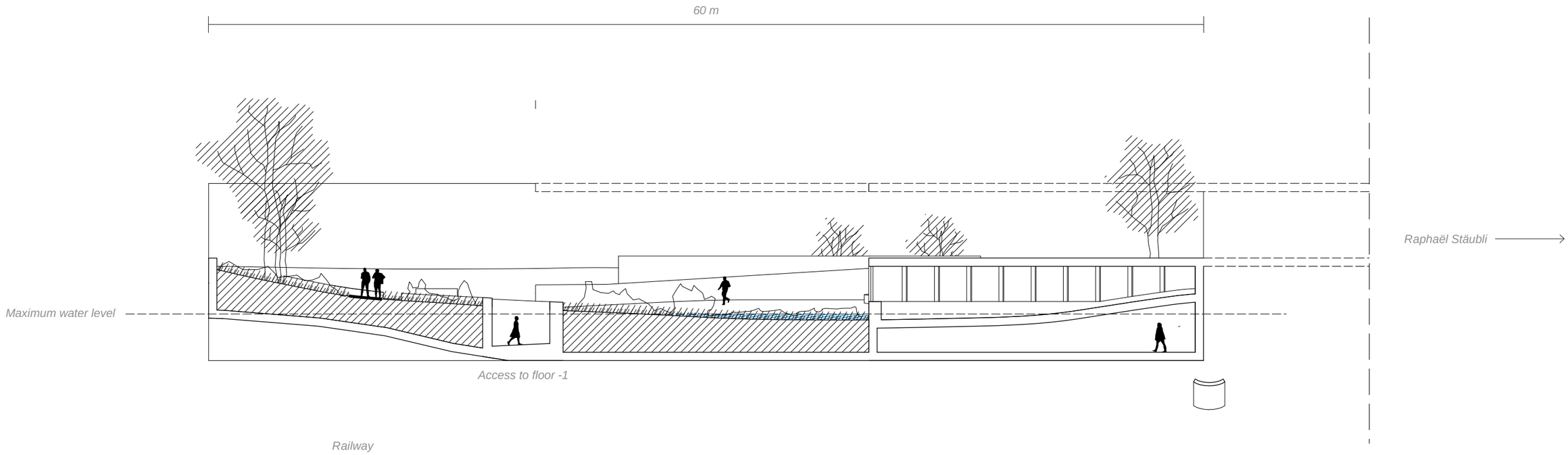

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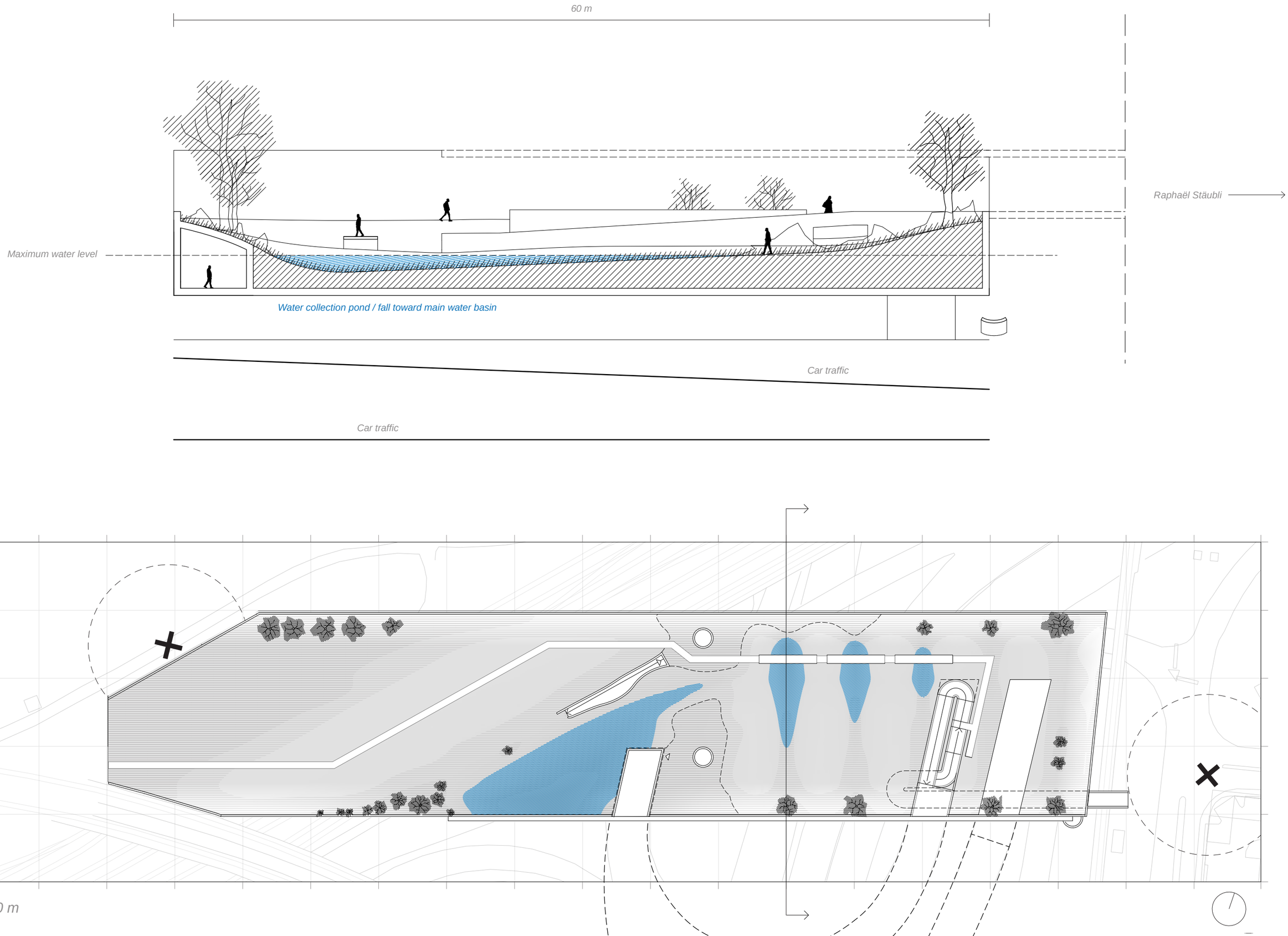

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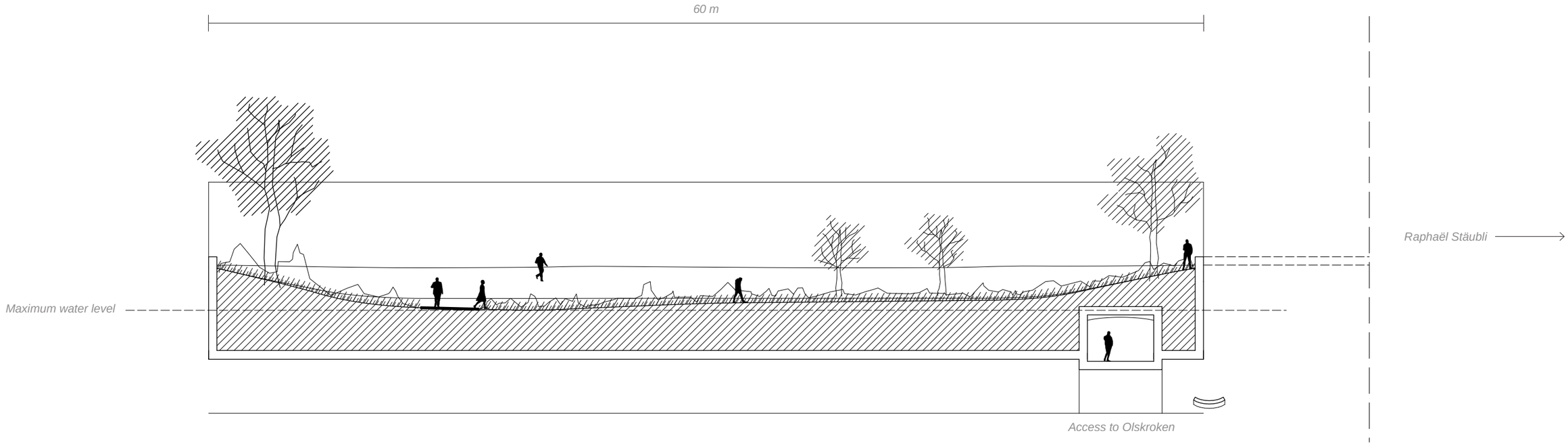

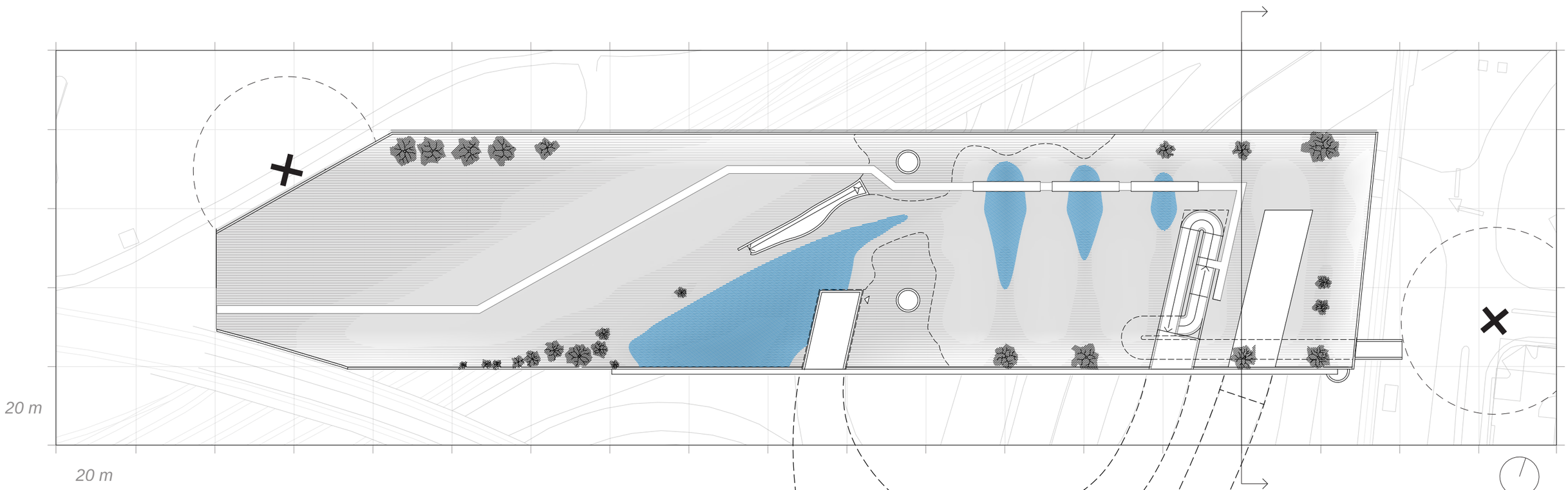

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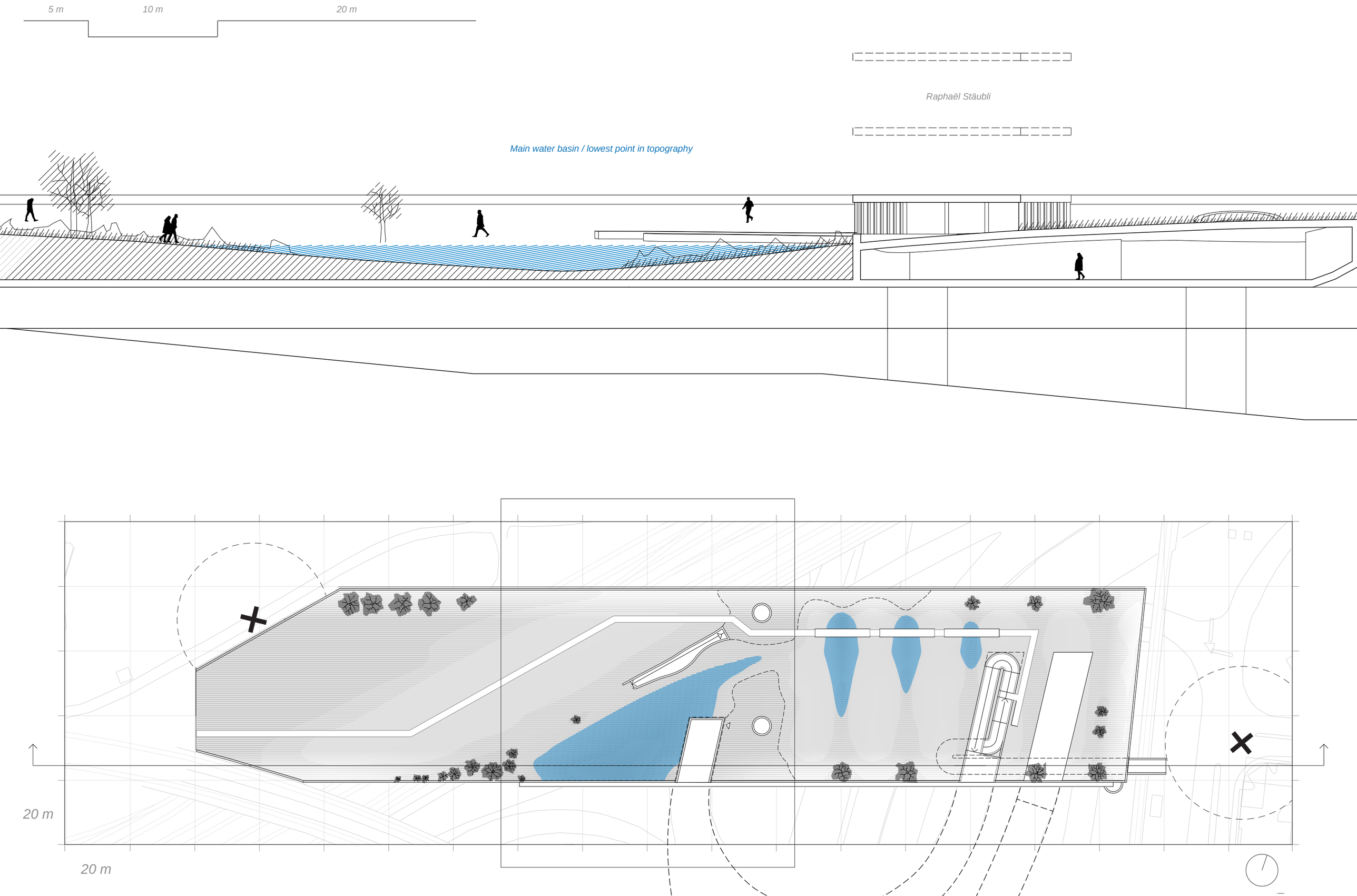

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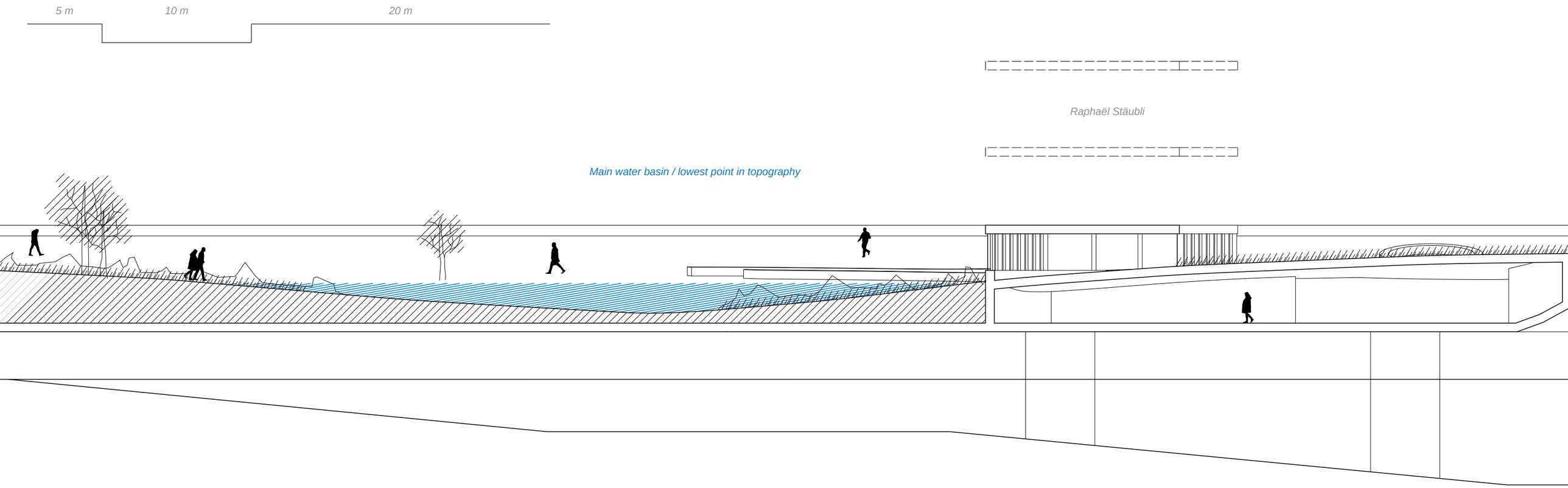

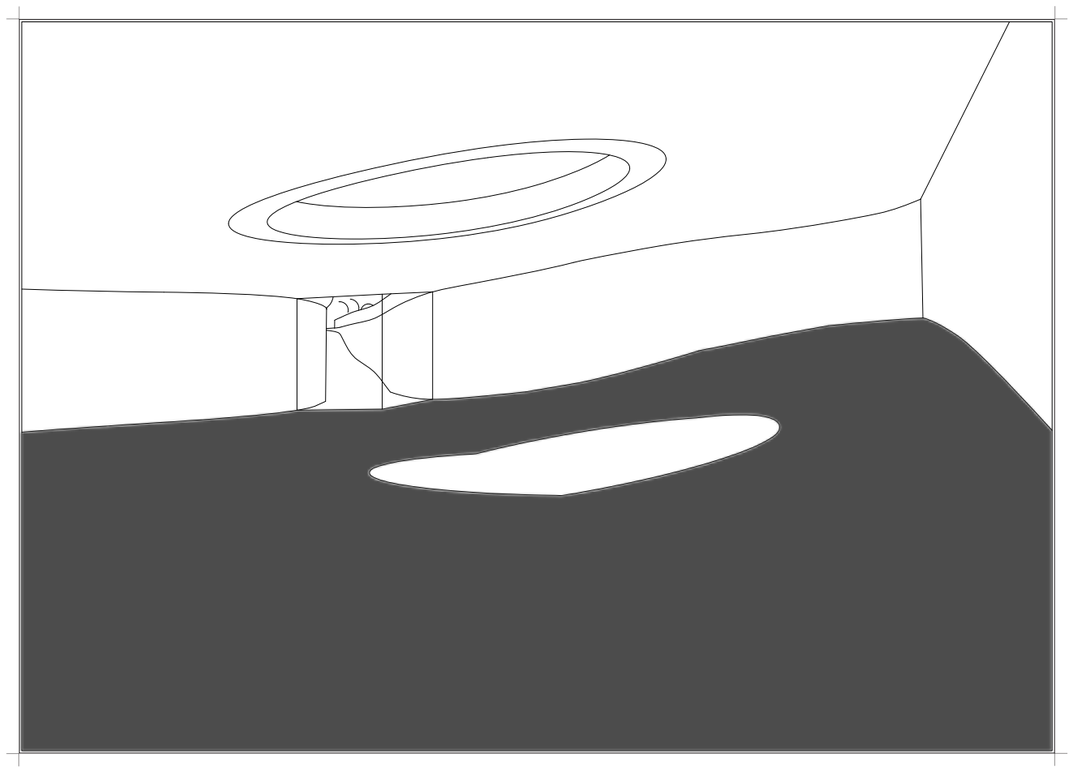

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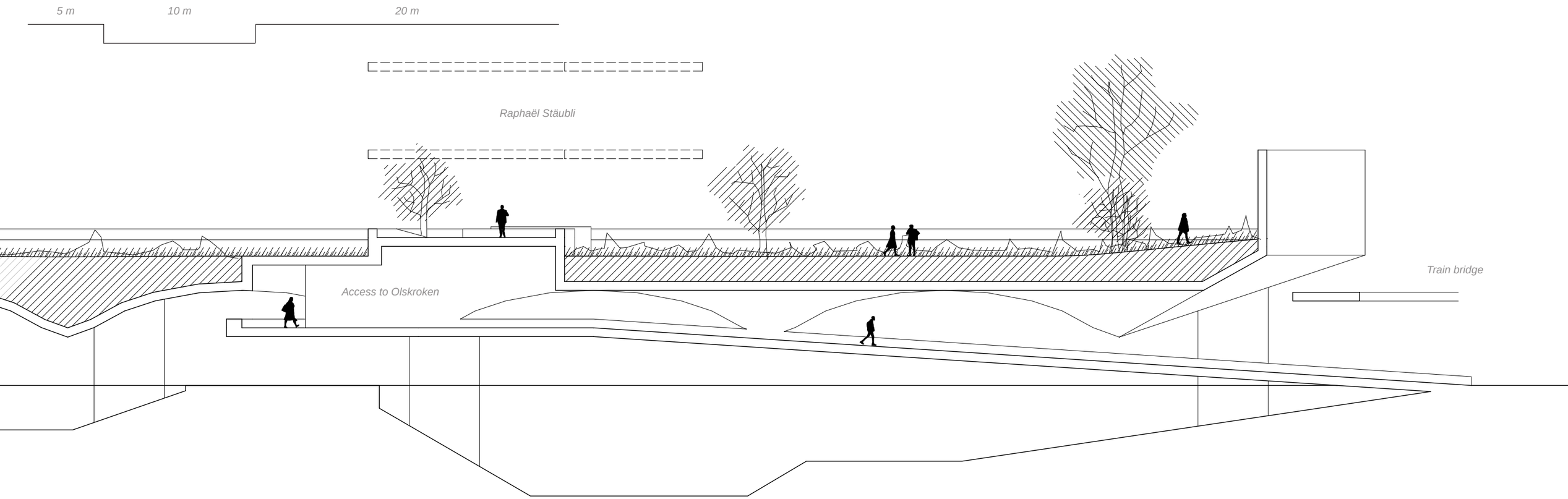

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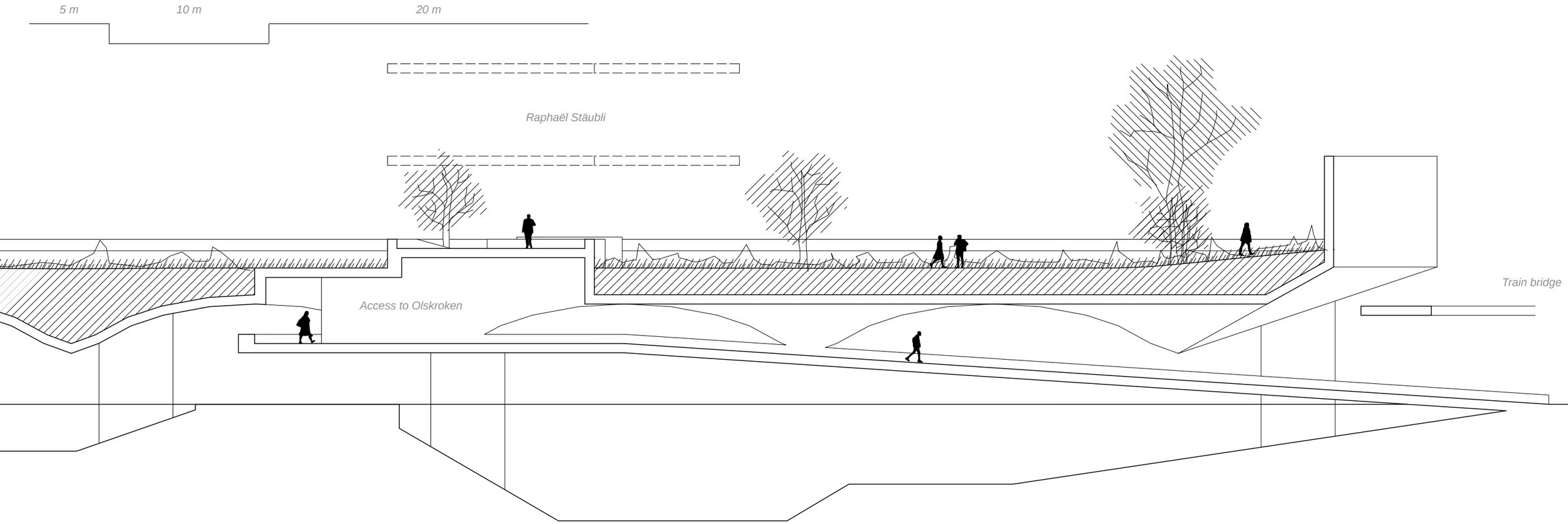

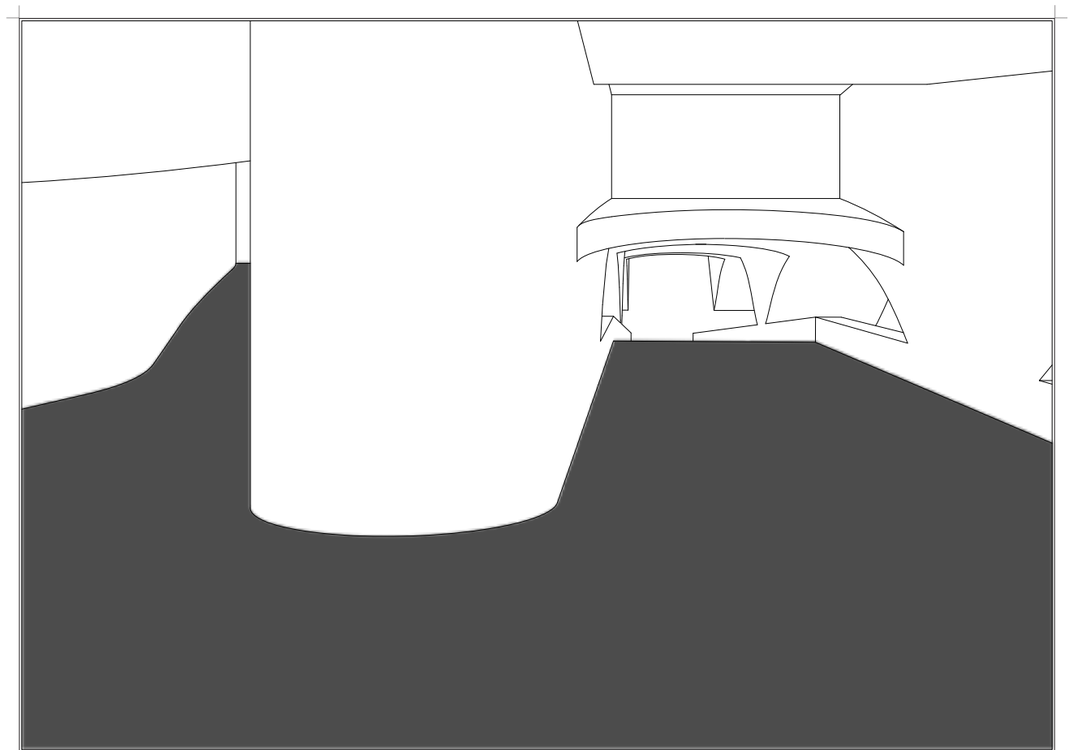

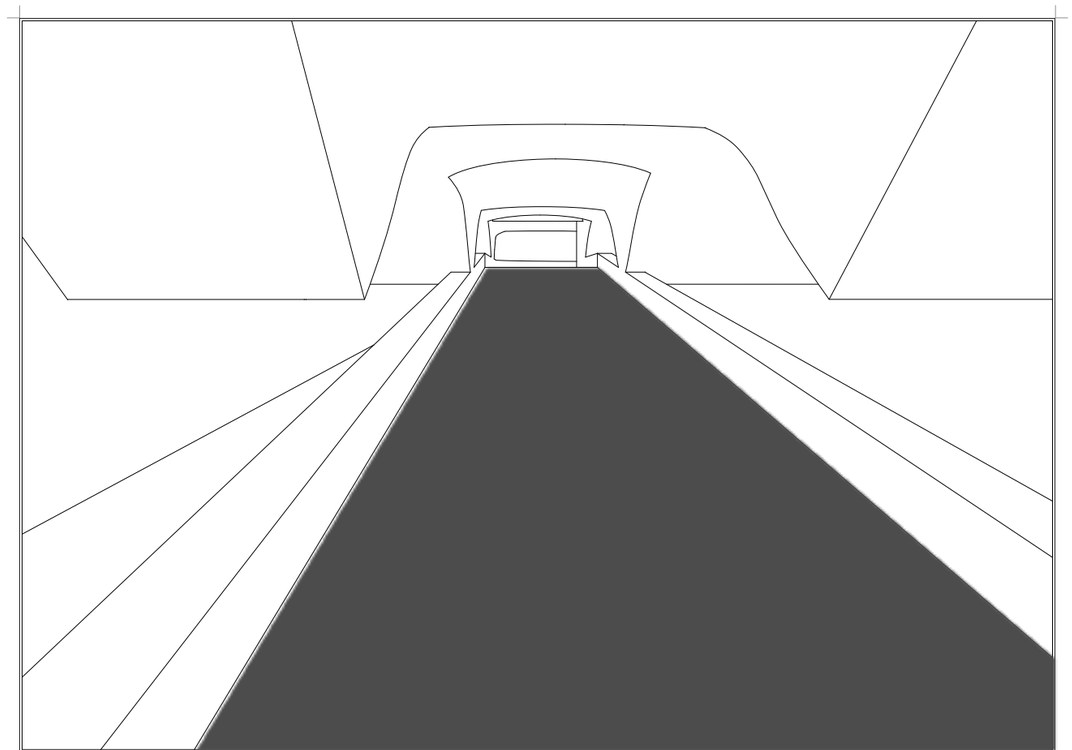

Implementation

5 m 10 m 20 m

Water collection ponds / fall toward main water basin