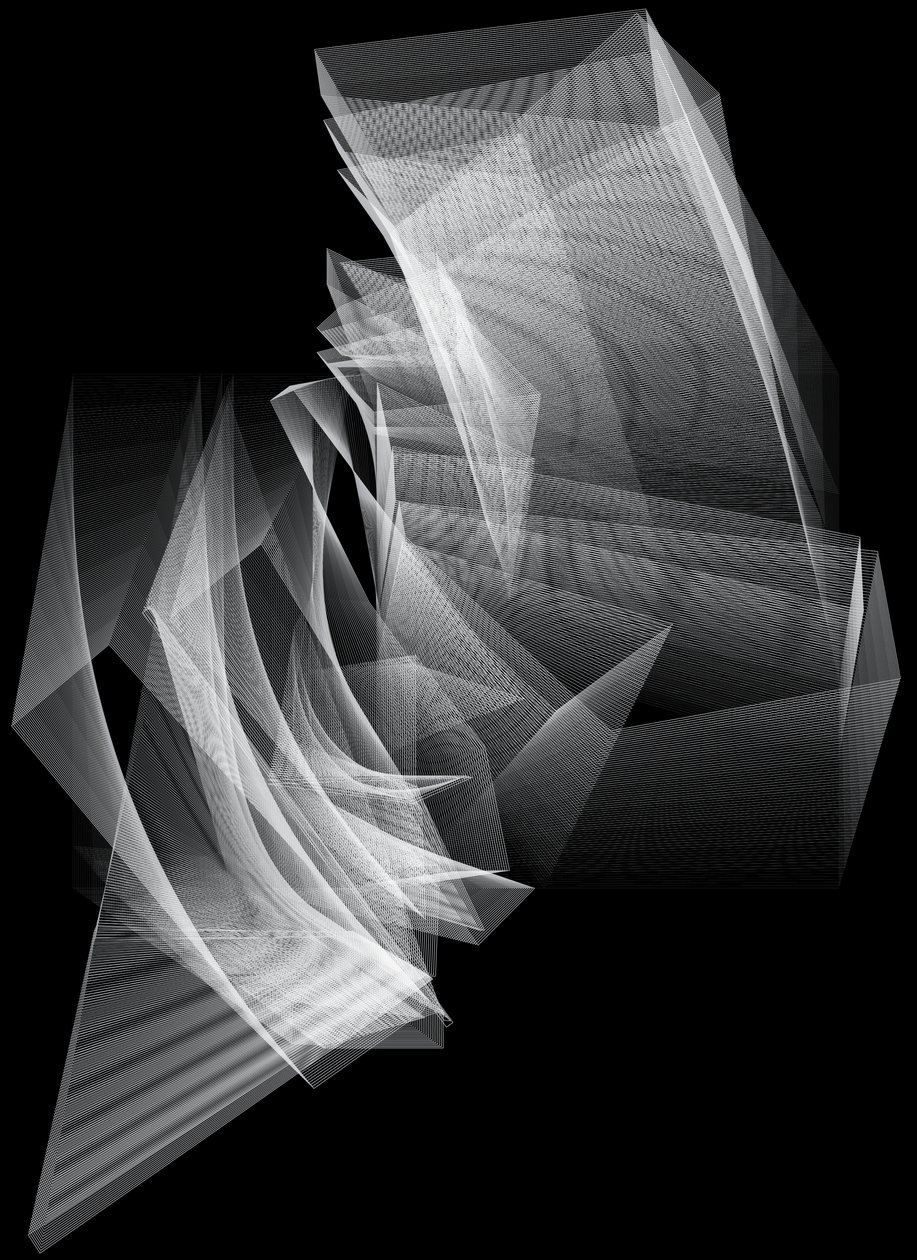
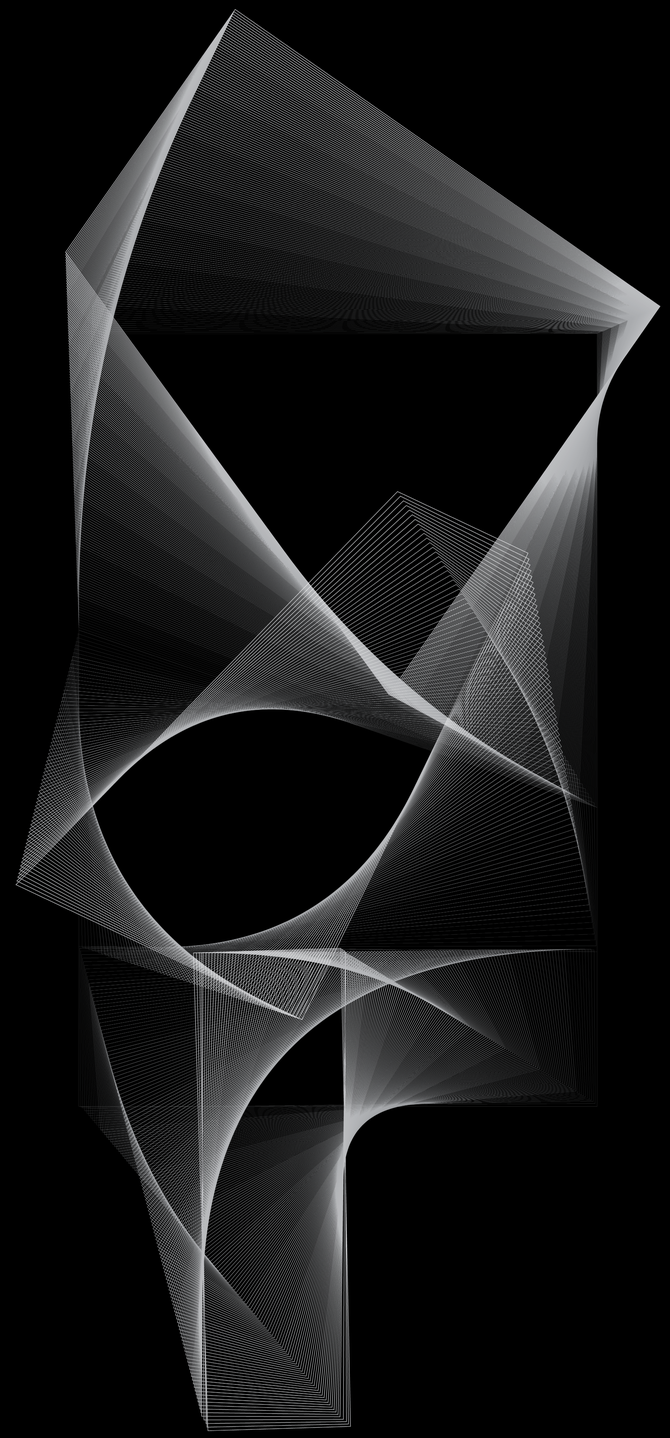
IN SHADOWS WE BOOGIE

LIGHT AND MATTER MOVE BETWEEN STATES



AND
SO
MUST
WE



ÎLE DE RATONNEAU



43°
16'
48.0"
N
05°
18'
00.9"
E

145M–65M BC

$CaCO_3$

1500–2700 KG/M^3

60–170N/MM^2

<1% ABSORPTION

DISOLVES ONLY IN ACIDIC WATER

AND

SO

WE

DIG

15080M^3
LIMESTONE
SUBTRACTION

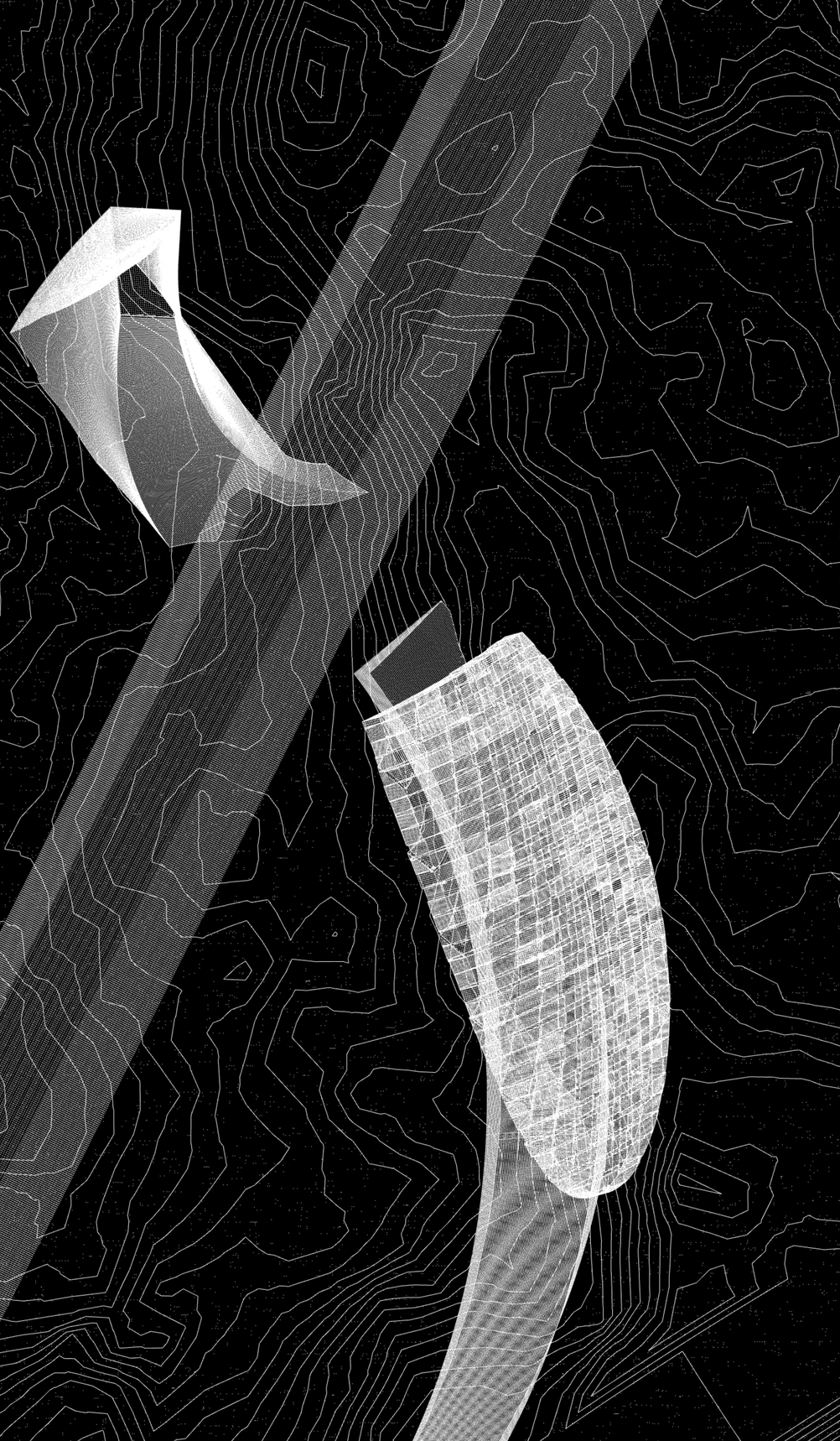

14938M3
LIMESTONE
ADDITION

44814M² CUT SURFACE

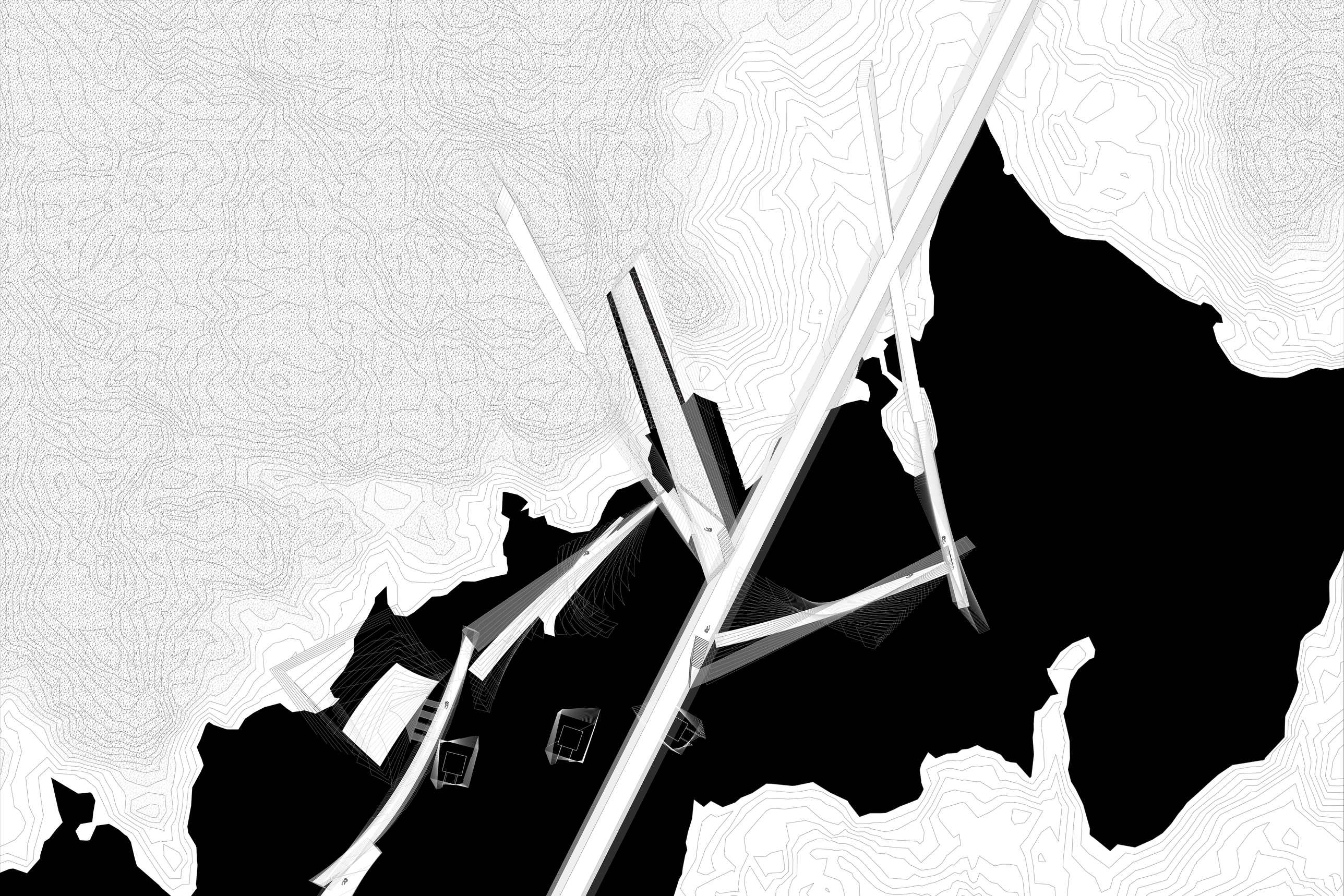
6.5M²/H

6894 HOURS

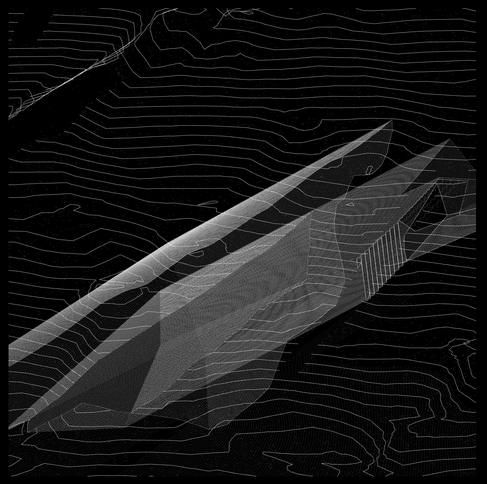
287 DAYS

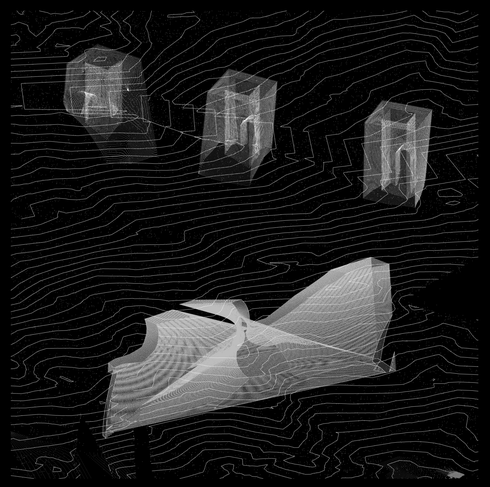


SCALE 1:20



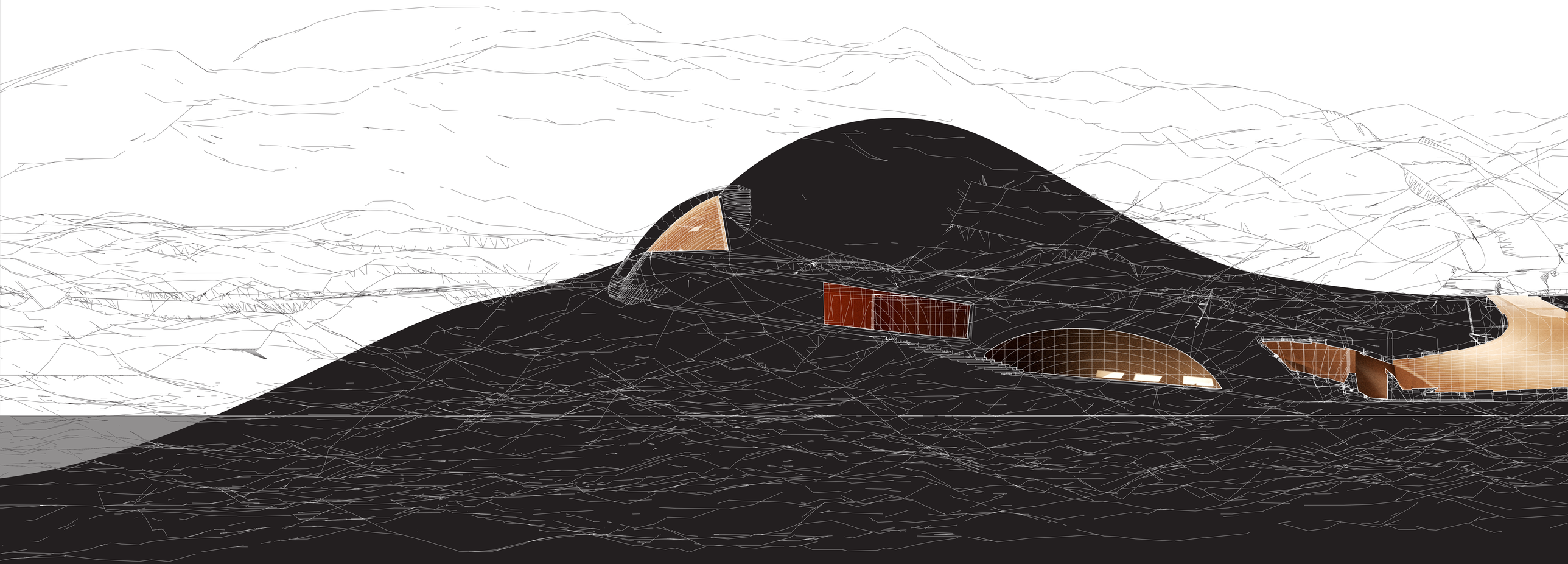


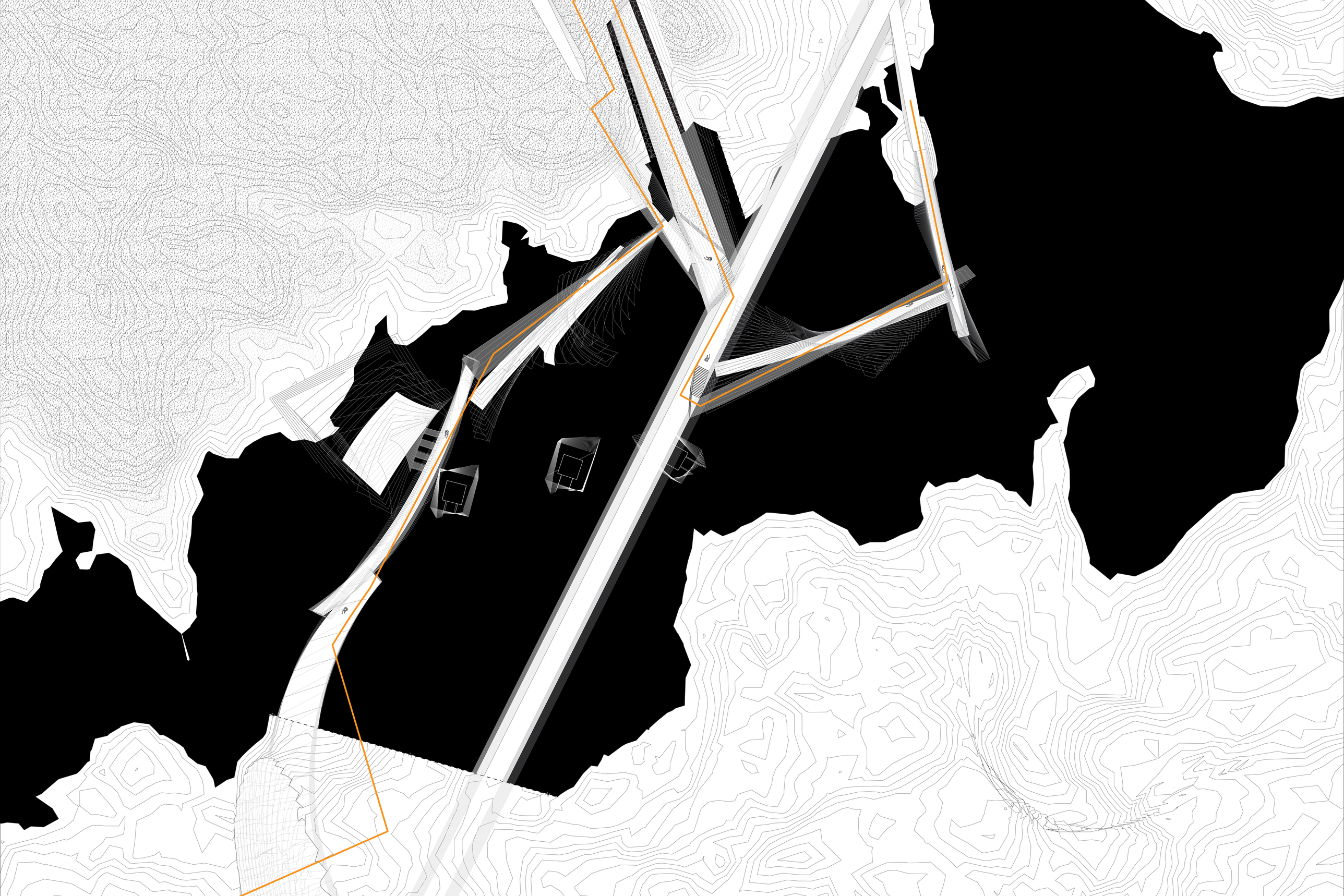


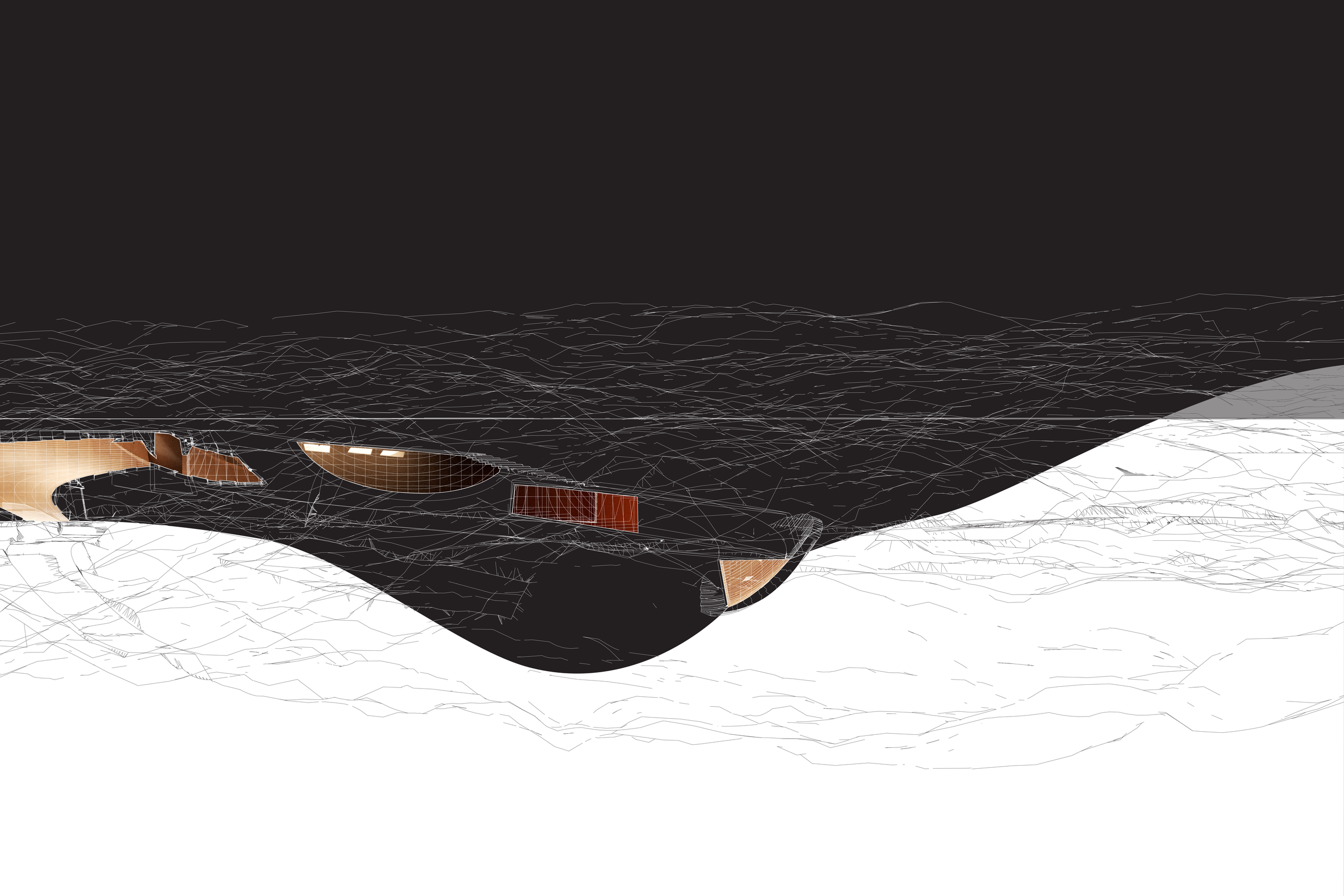


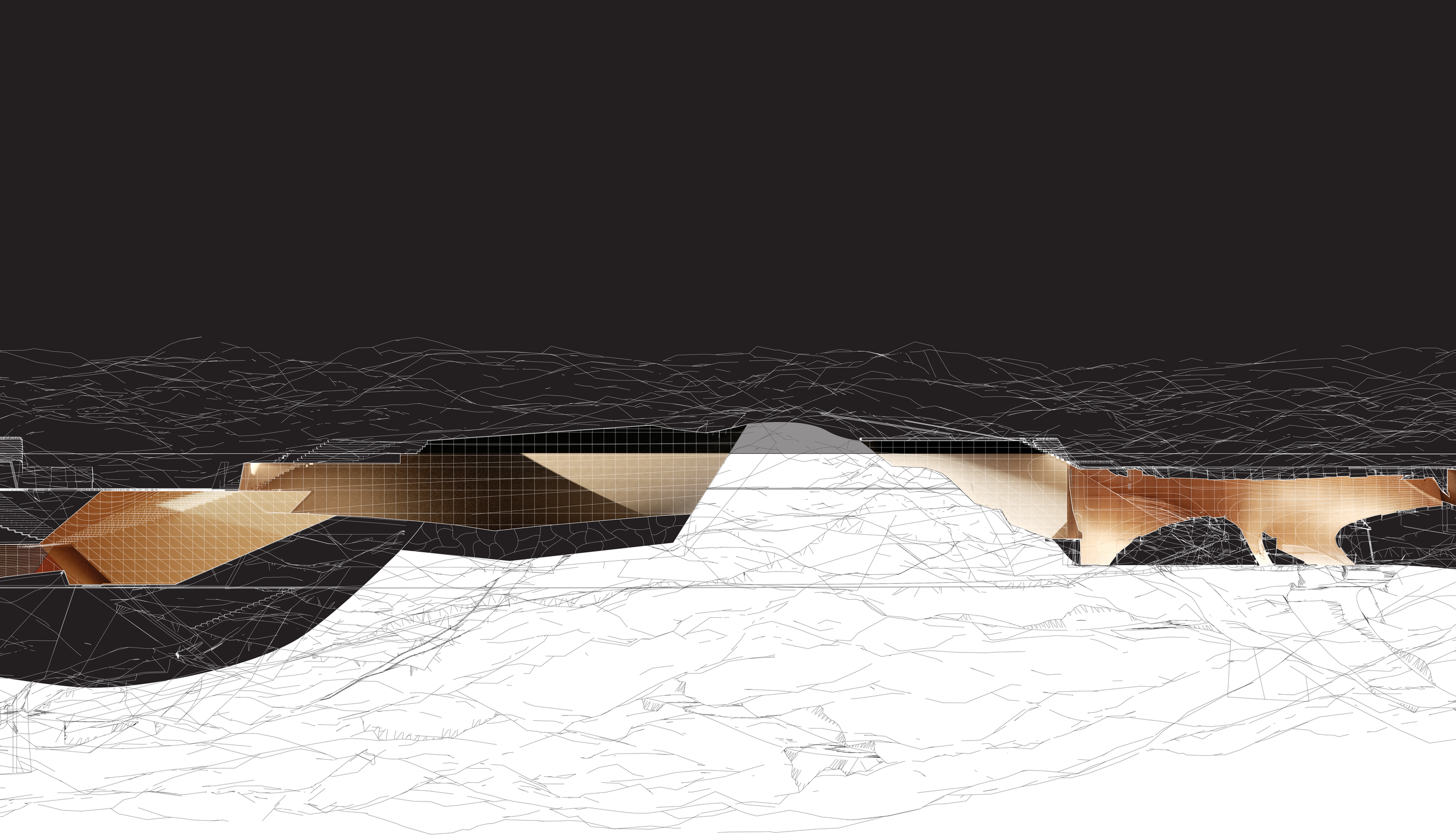
Interventions // AXO

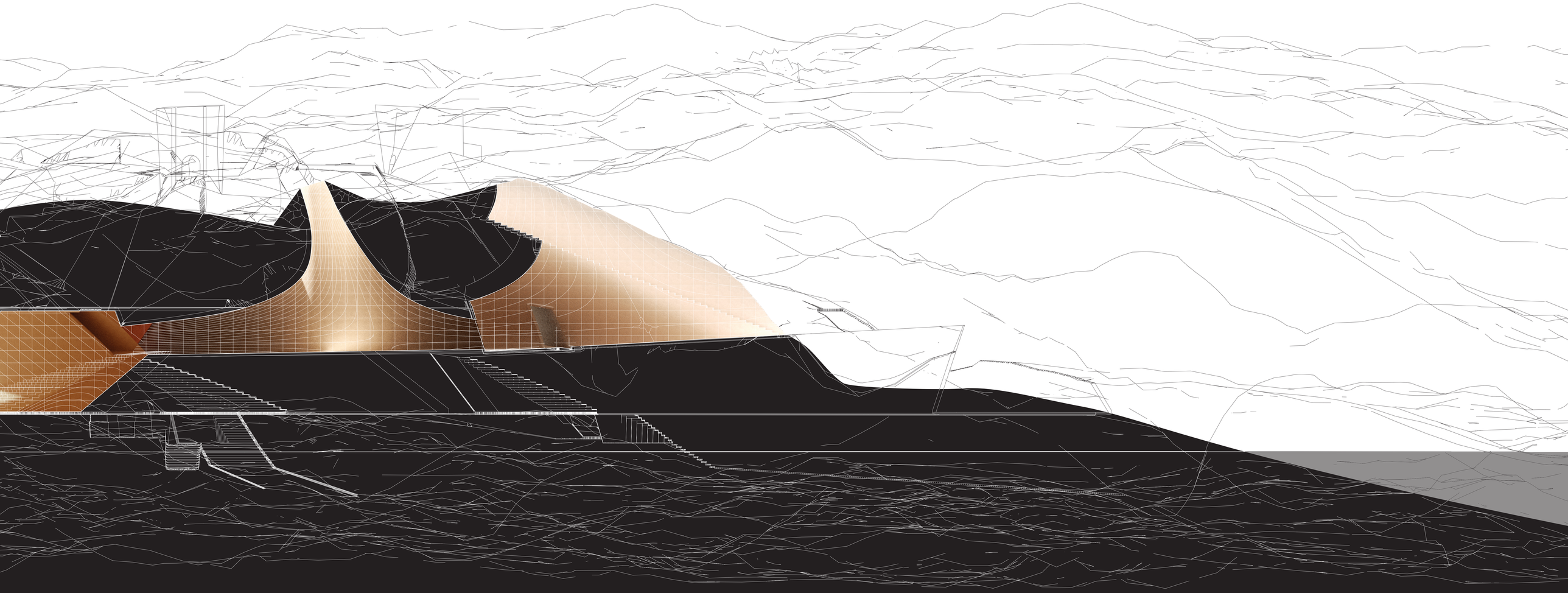


THE PLAN IS UNFOLDED TO CREATE A CONTINUOUS SECTION









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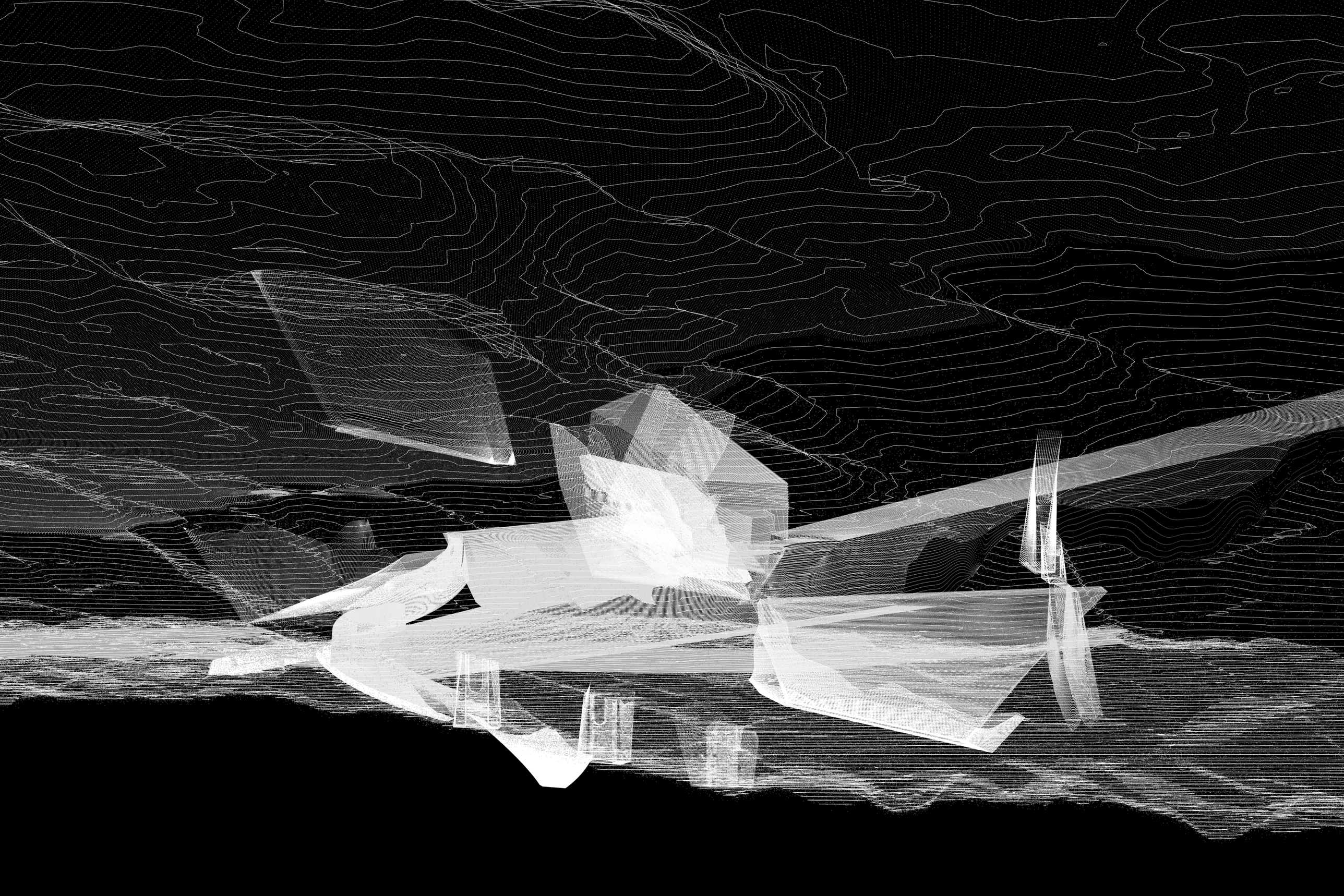
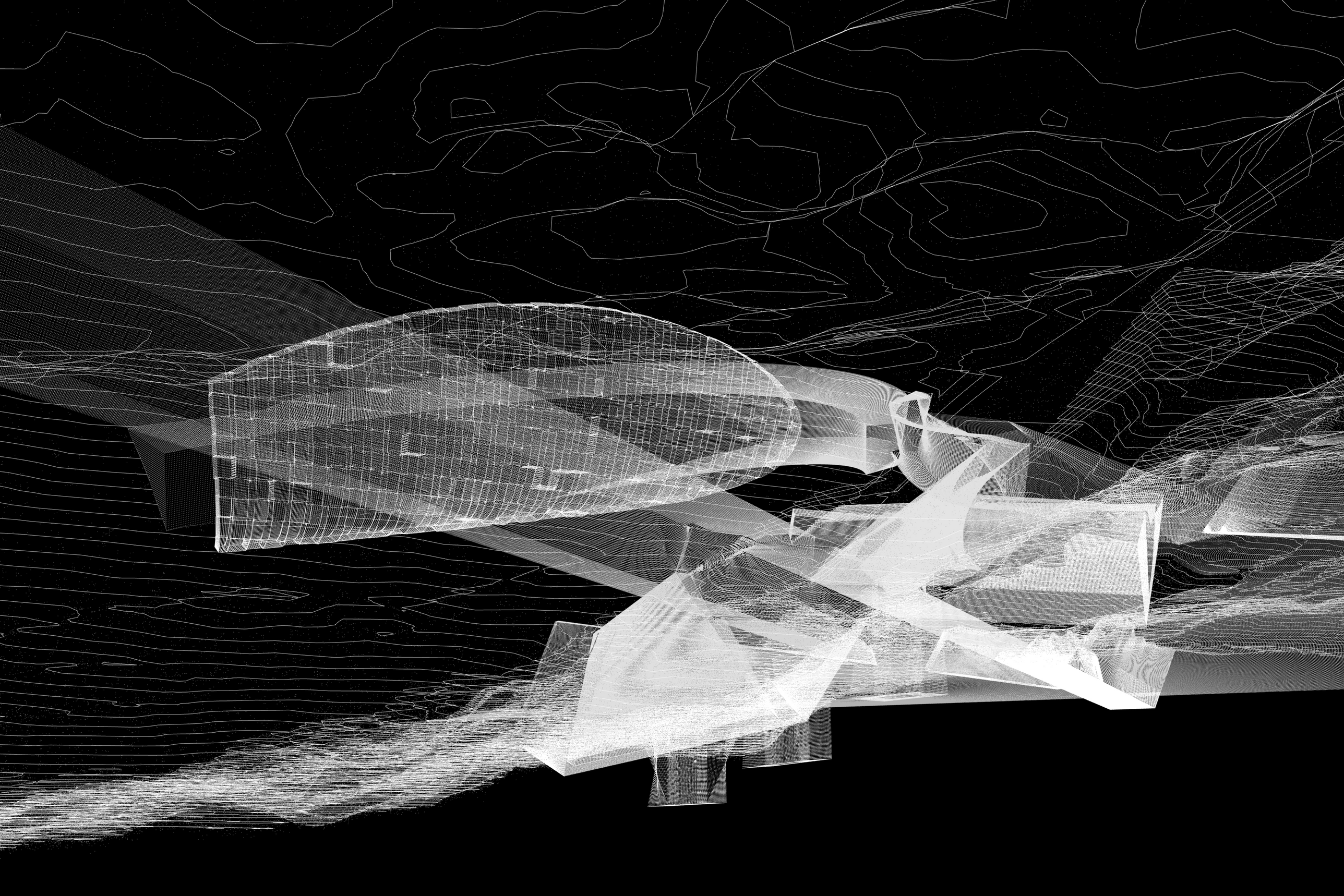
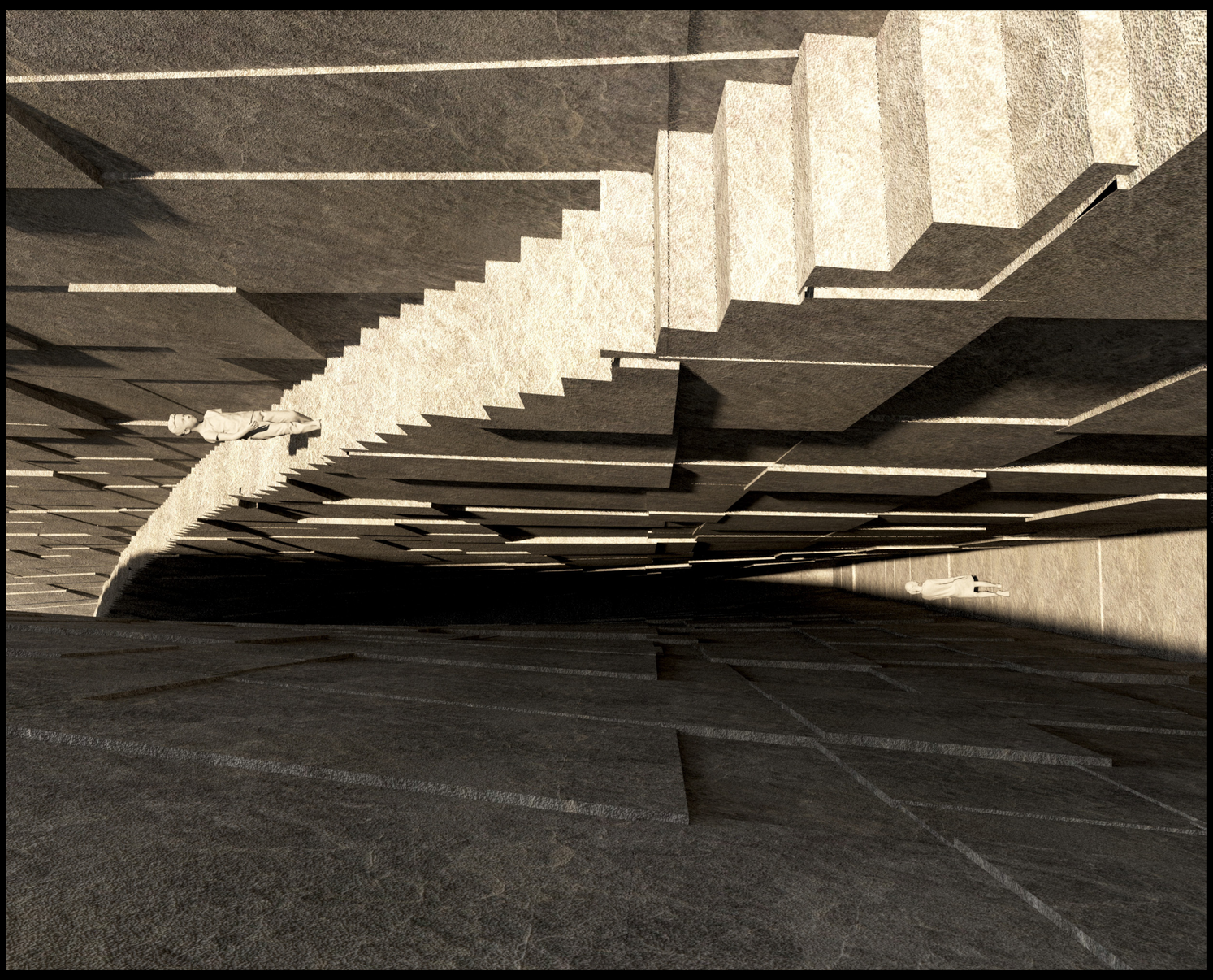
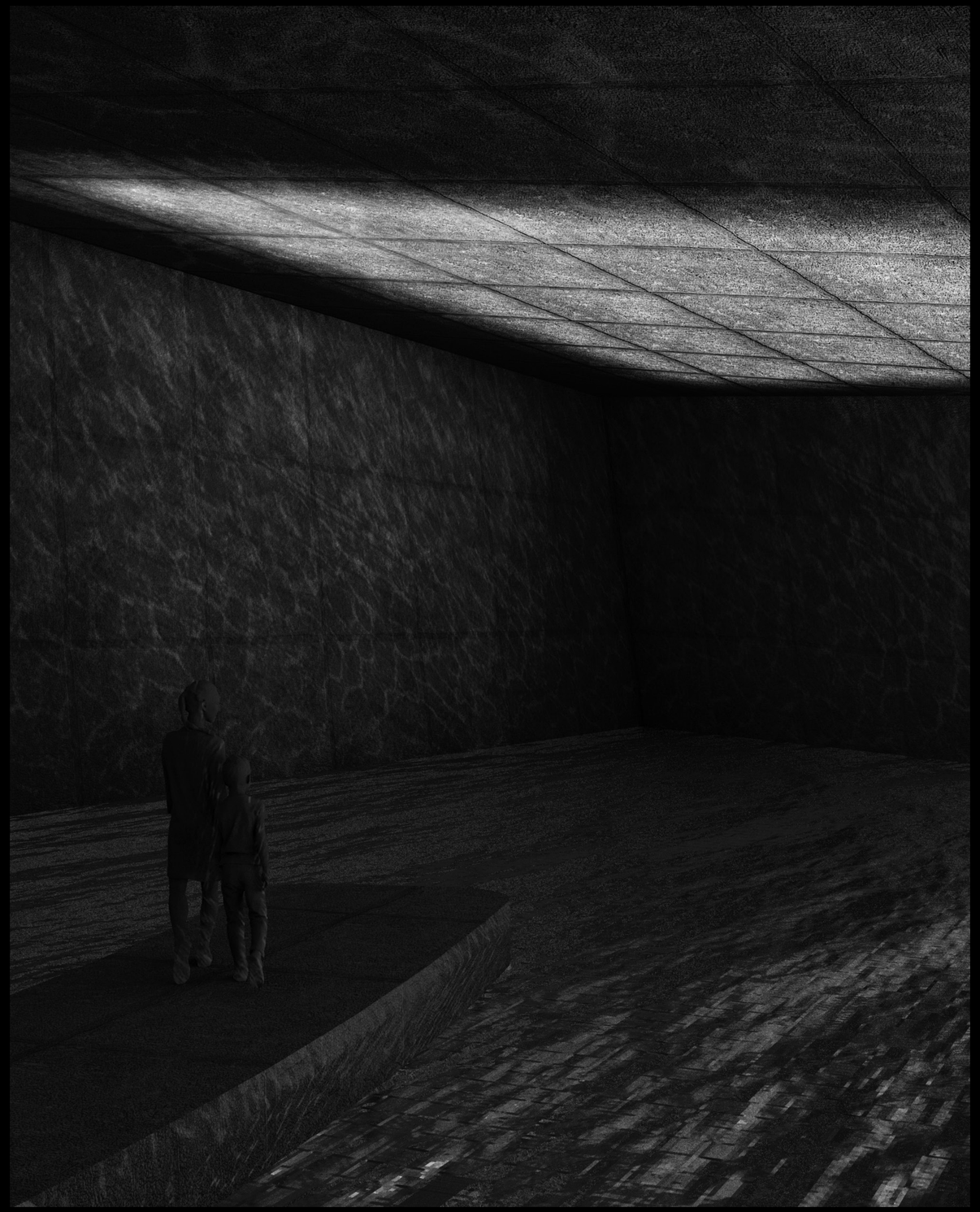


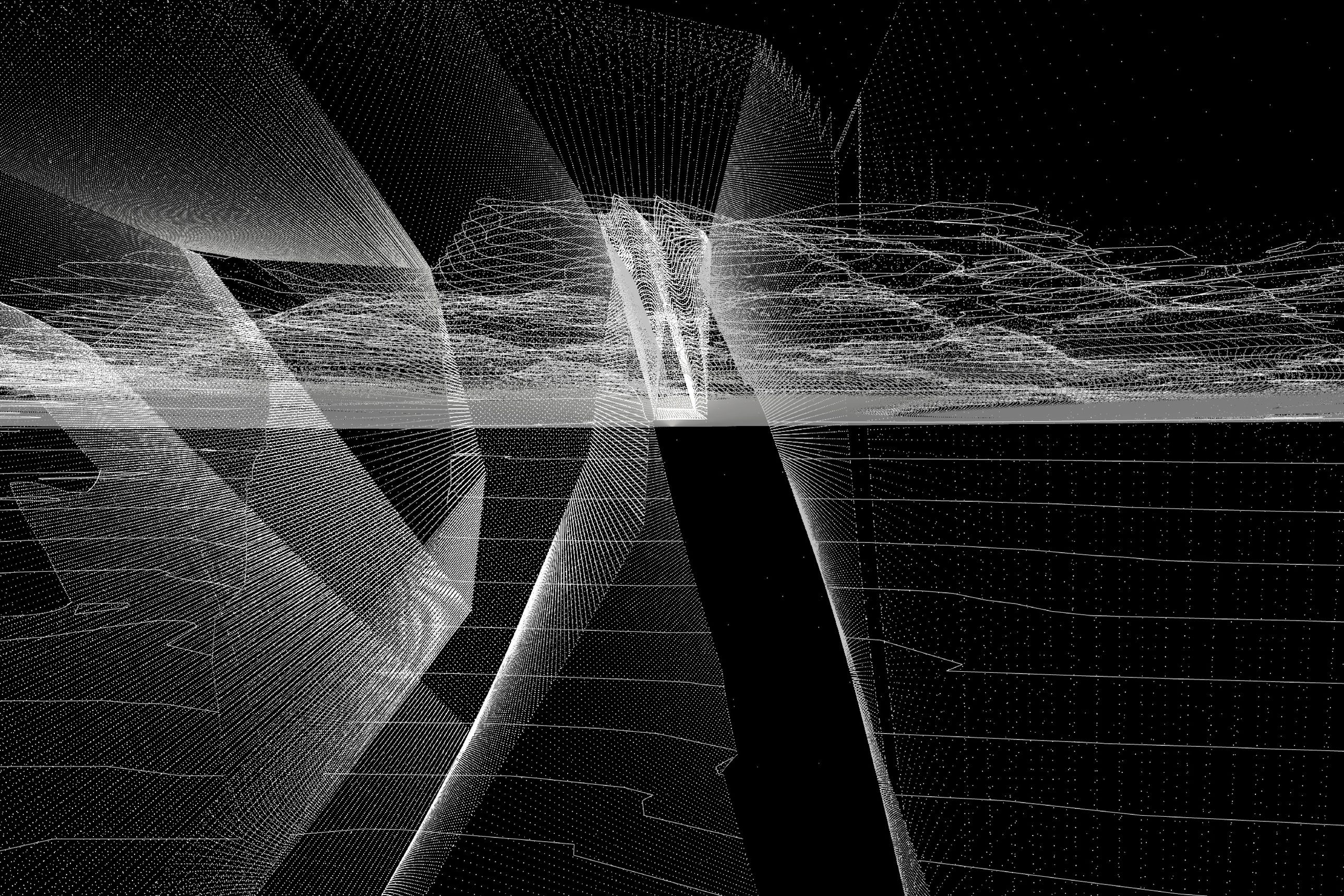



experience



GIF

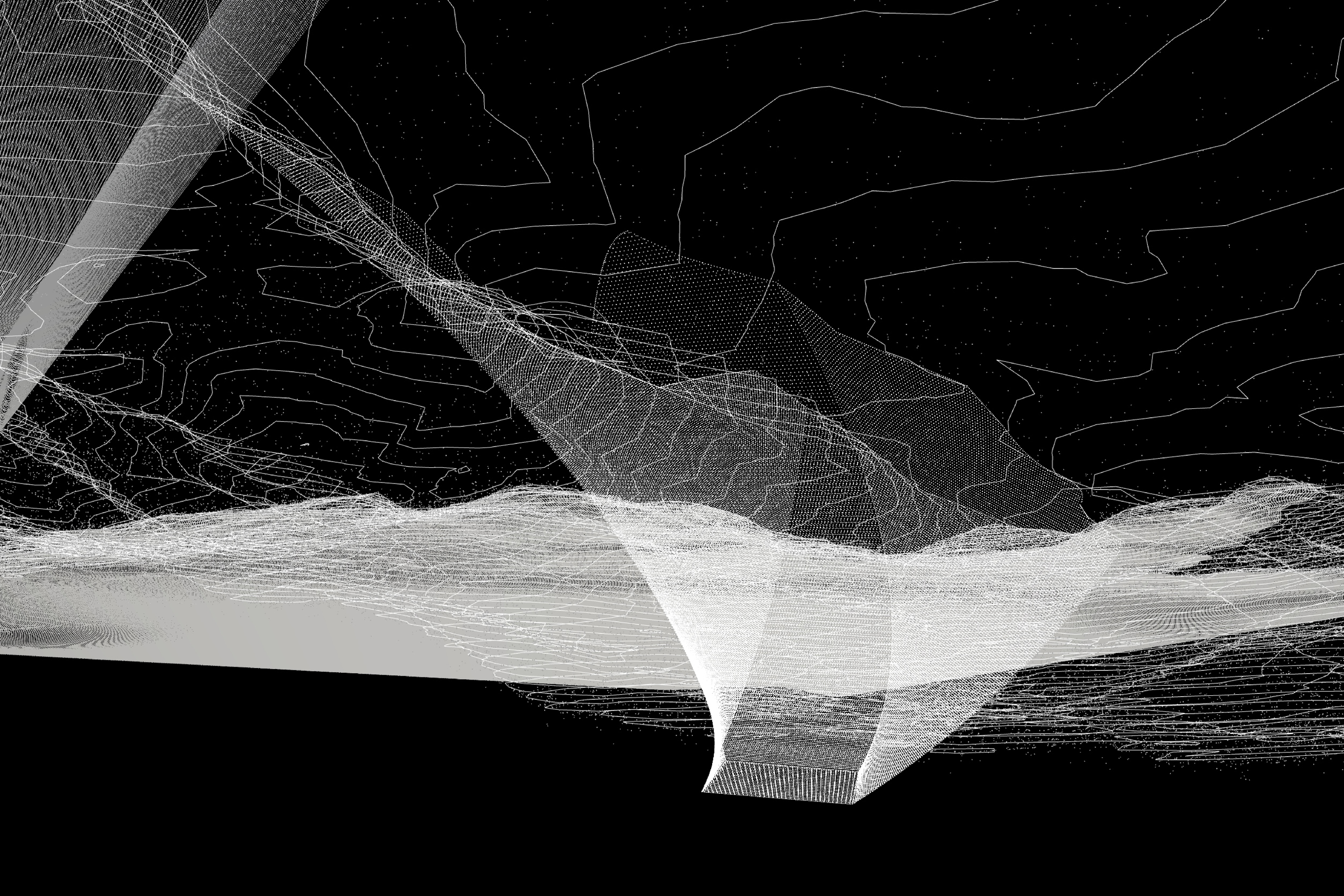














_Physicality

_Shape

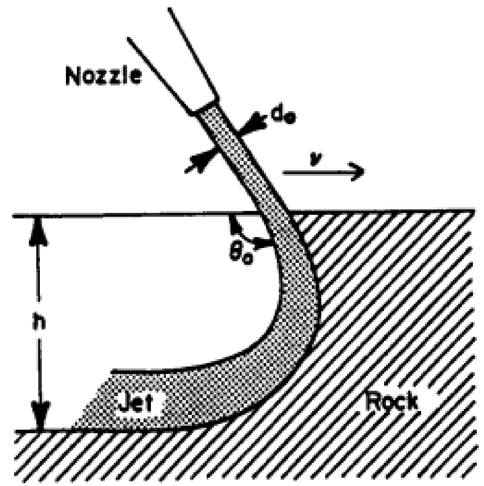


Fig. 1. A model of rock erosion using a high-pressure water jet (after [1]).

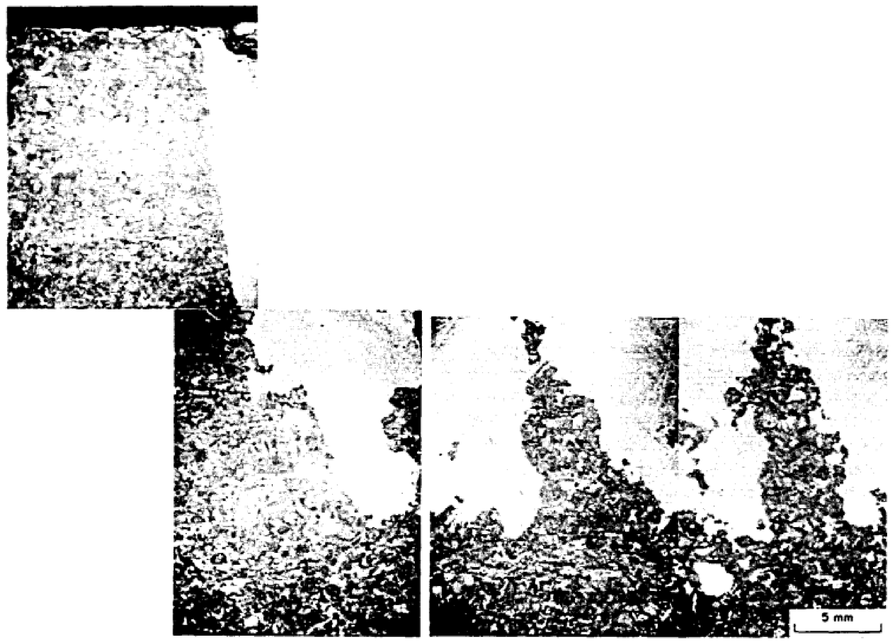
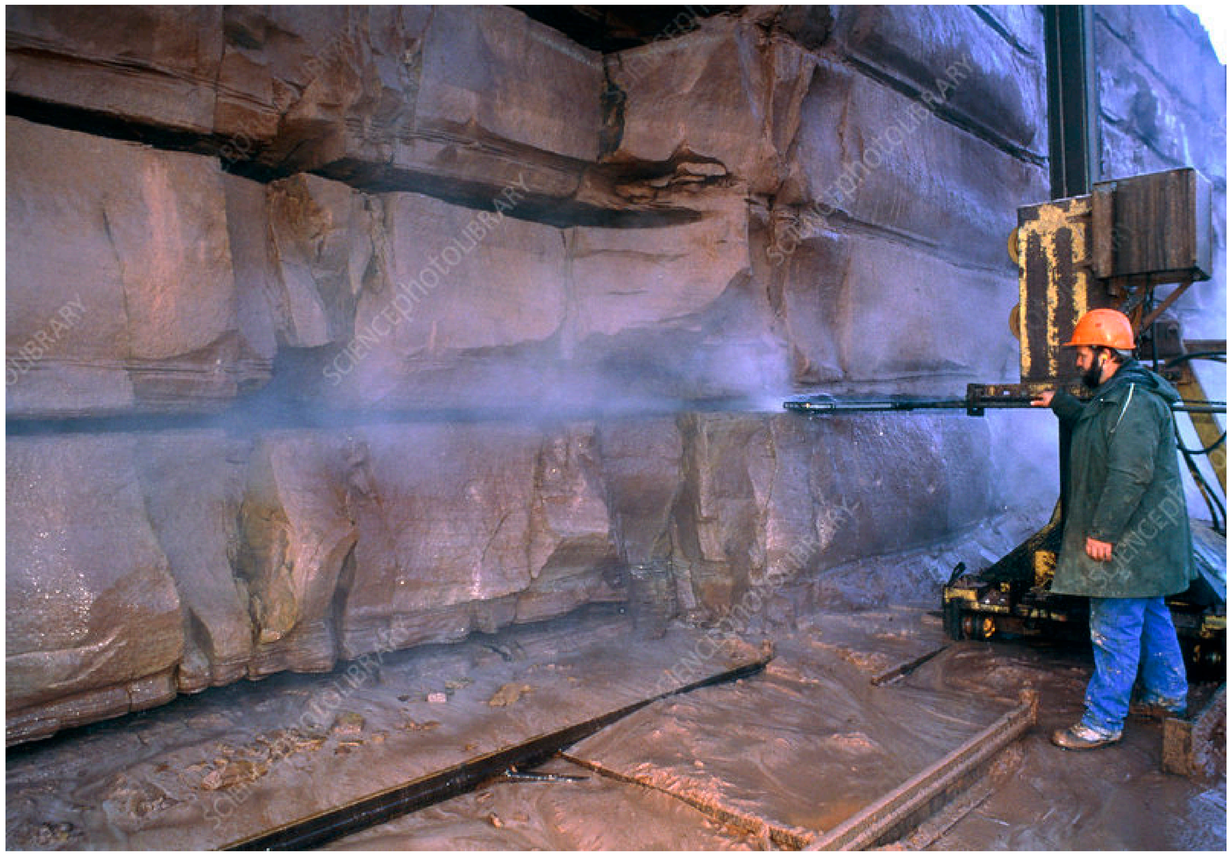
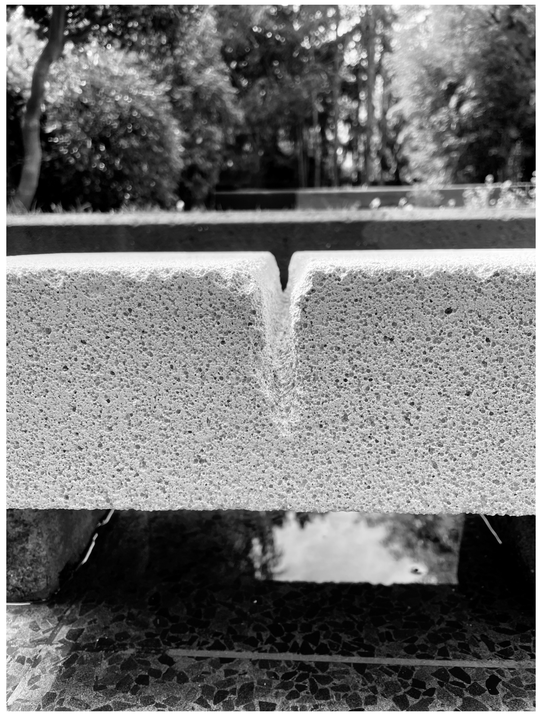


Fig. 15. Cross section through rock showing the edge of the kerf immediately ahead of the jet and the bottom of the kerf.

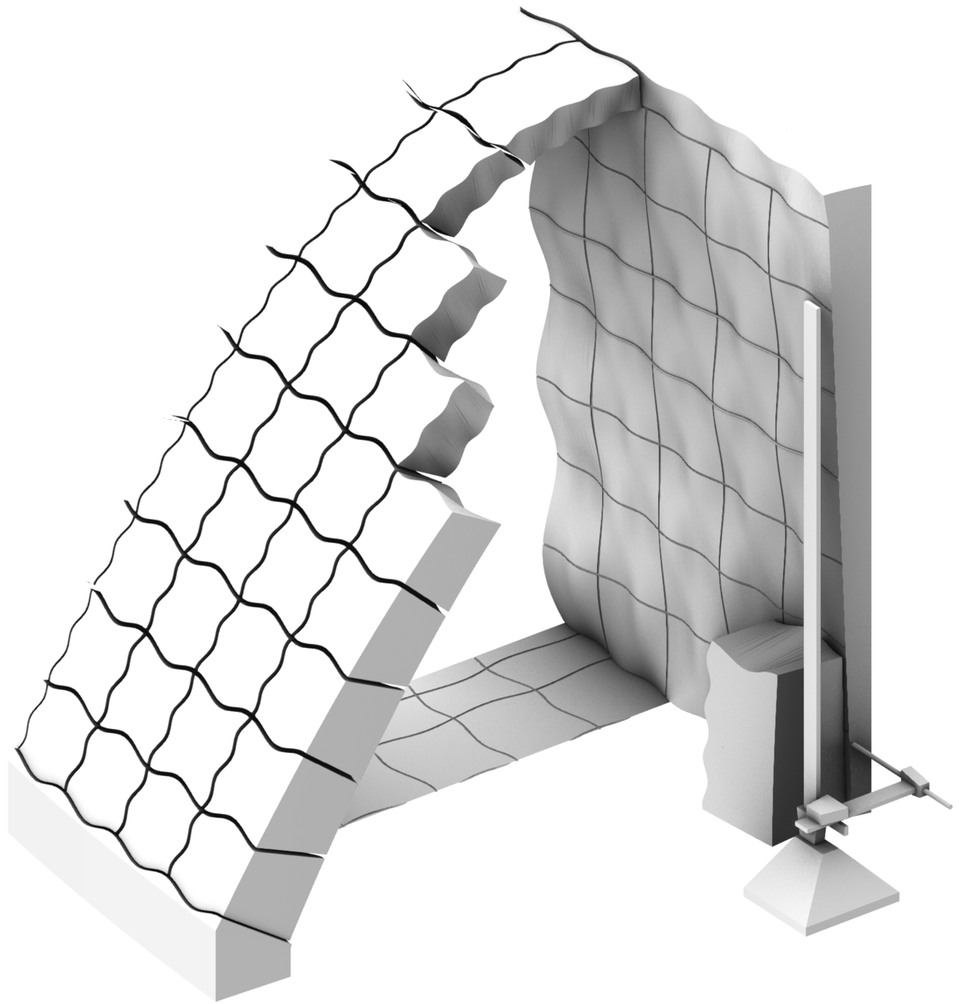




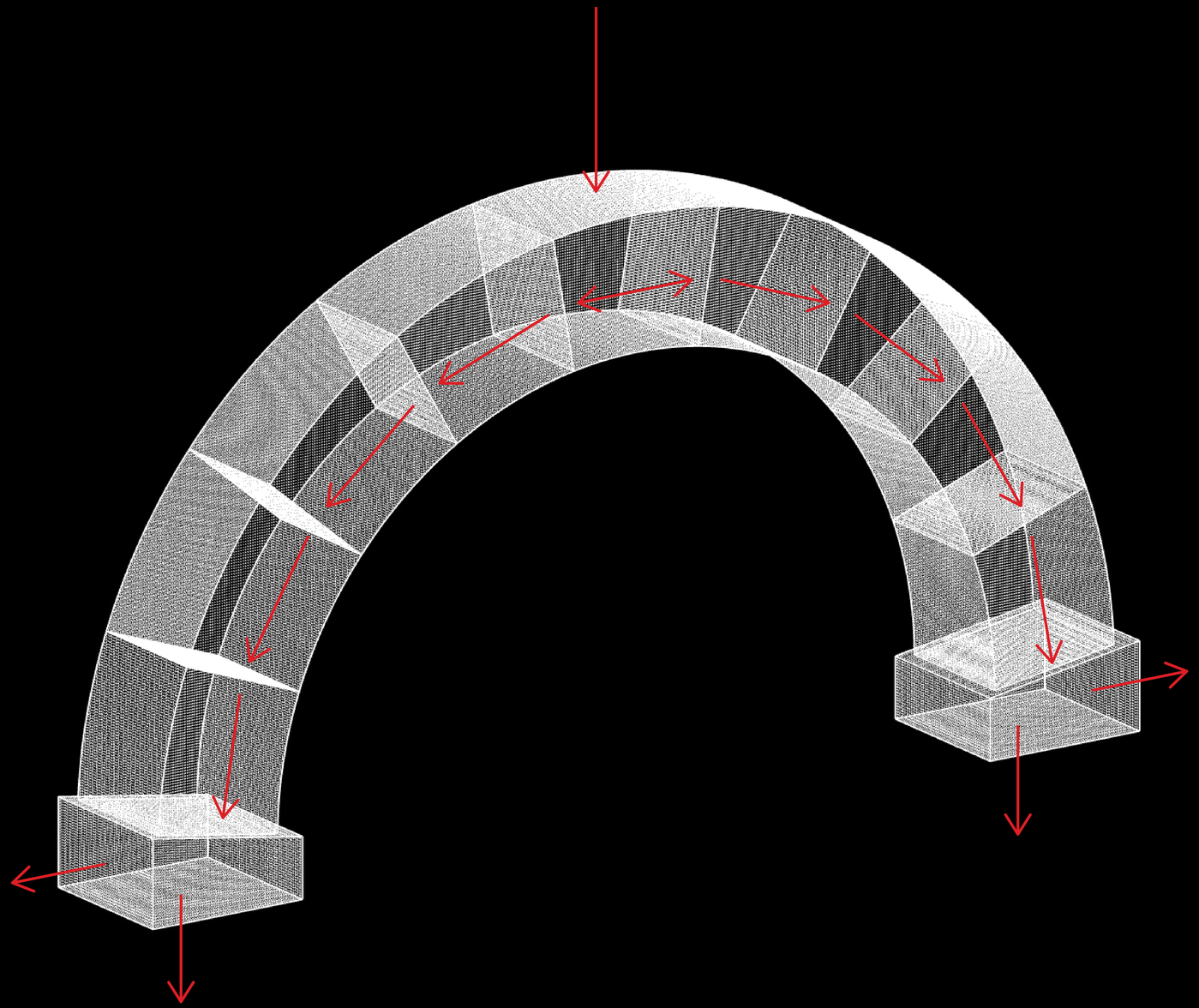


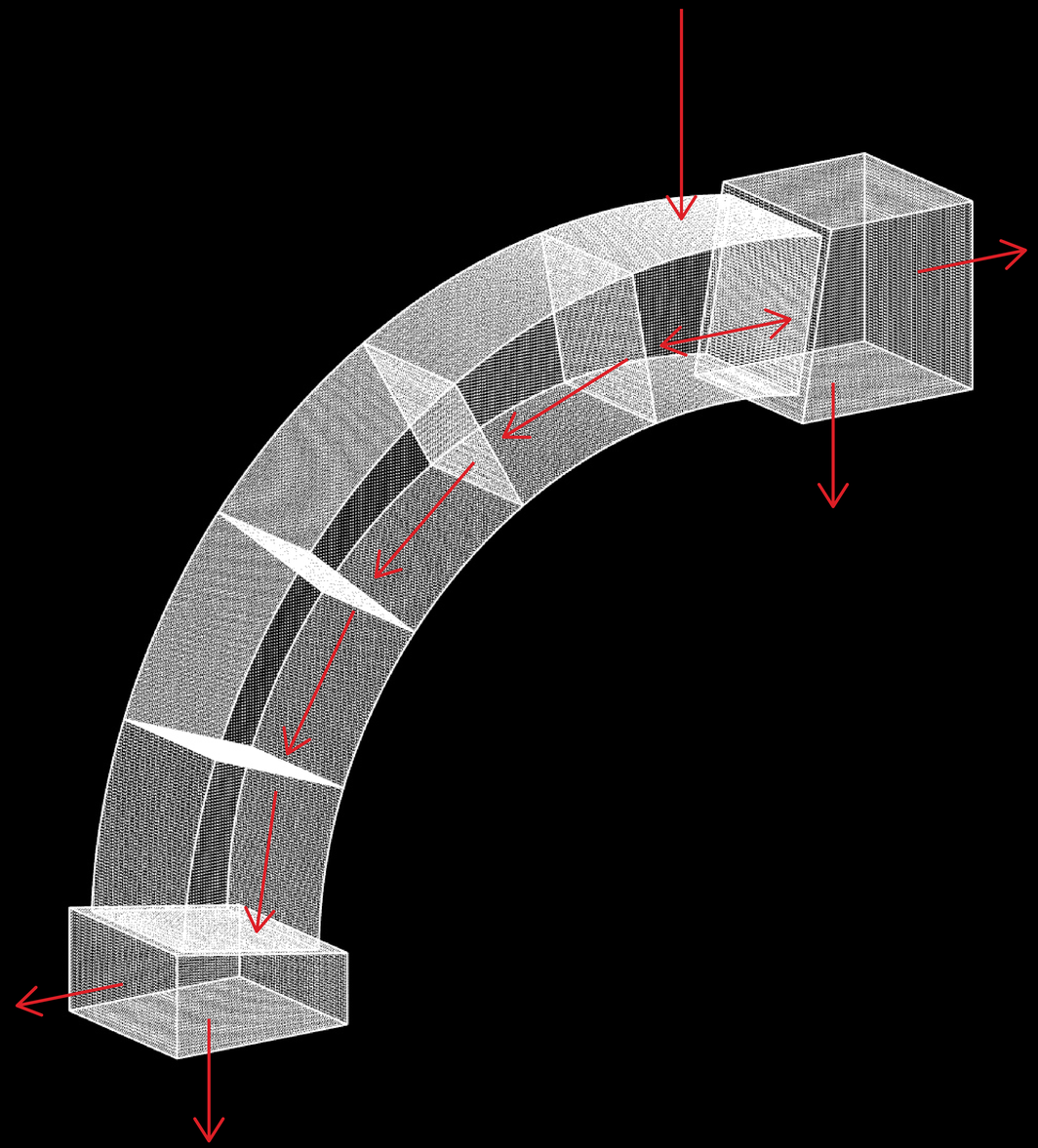


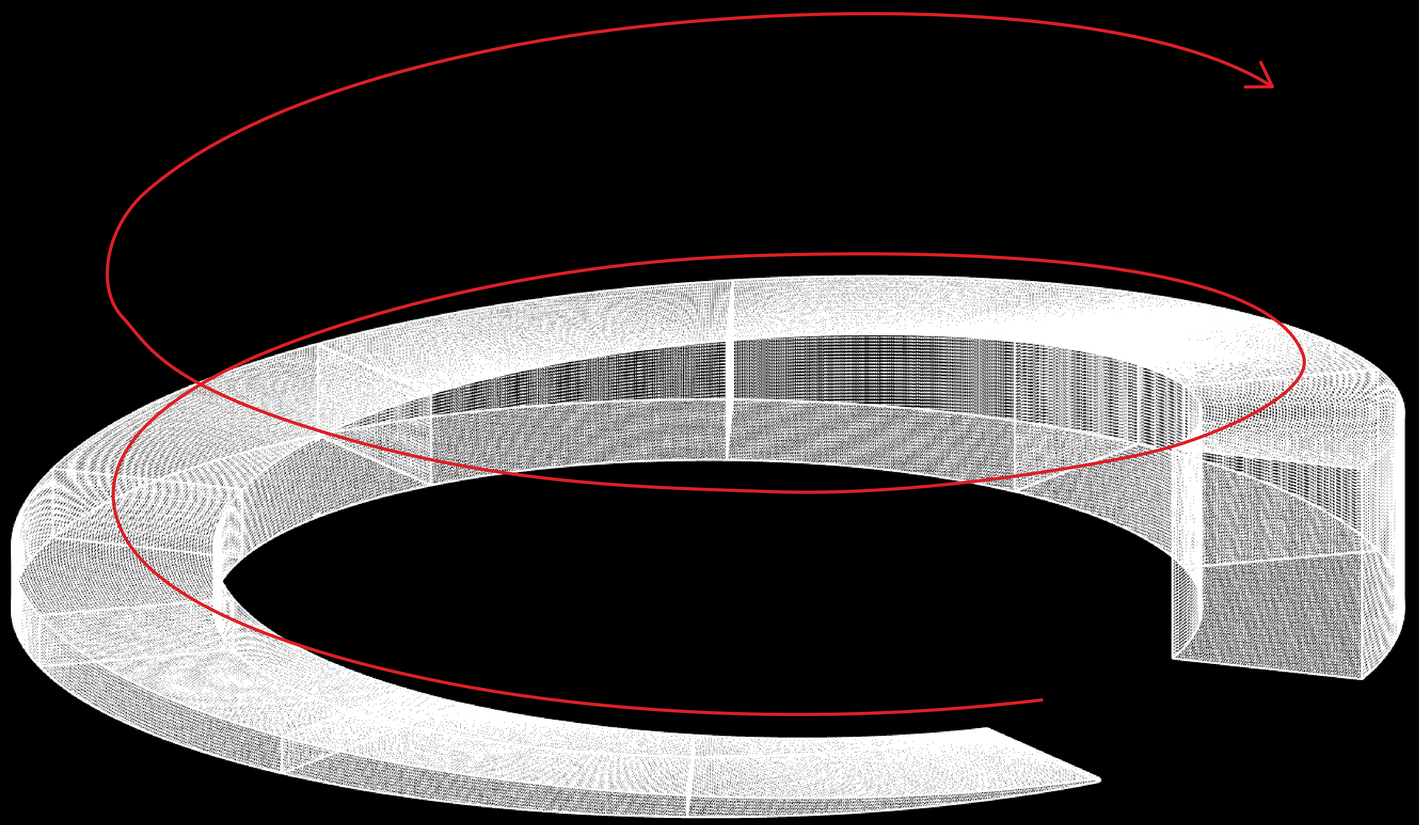


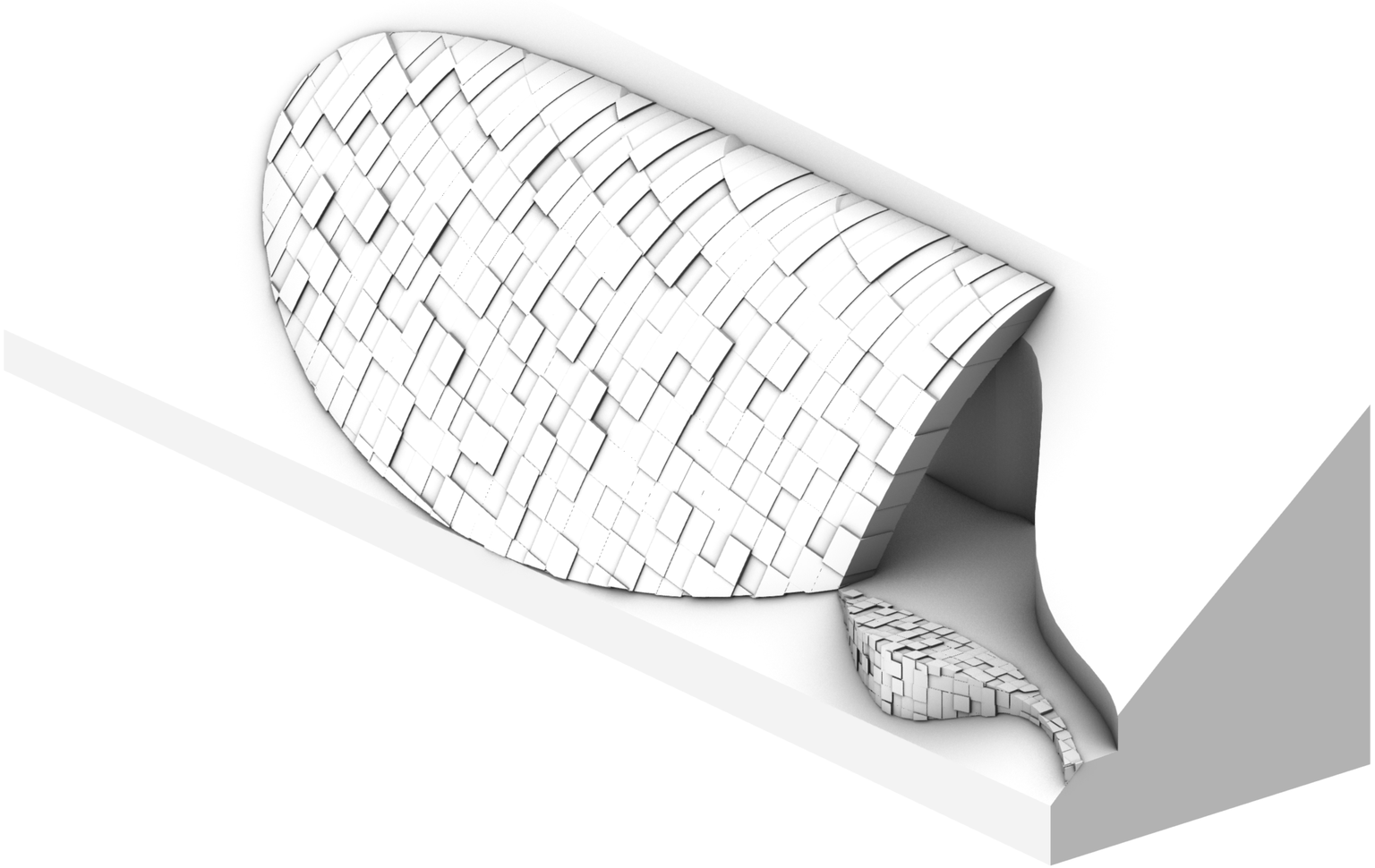


_Concept - from mountain to arch

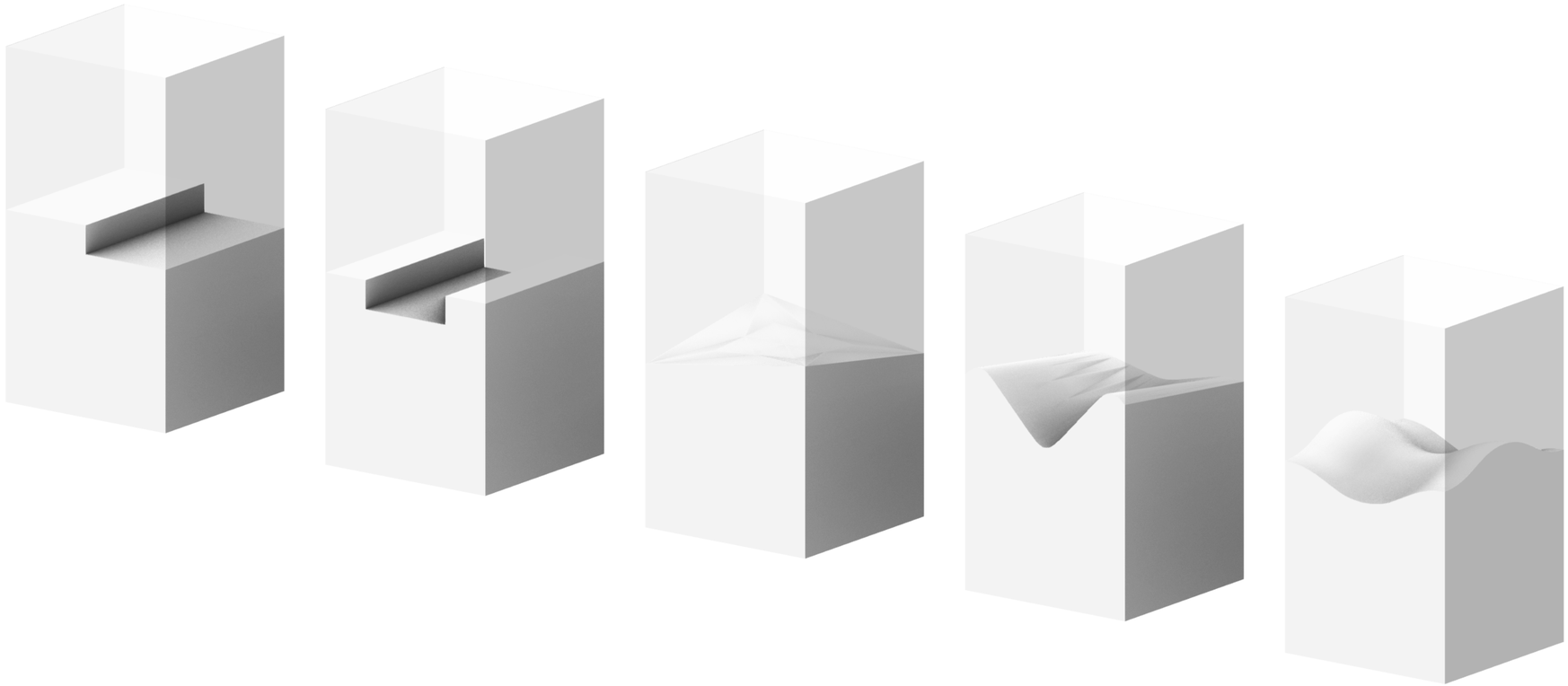




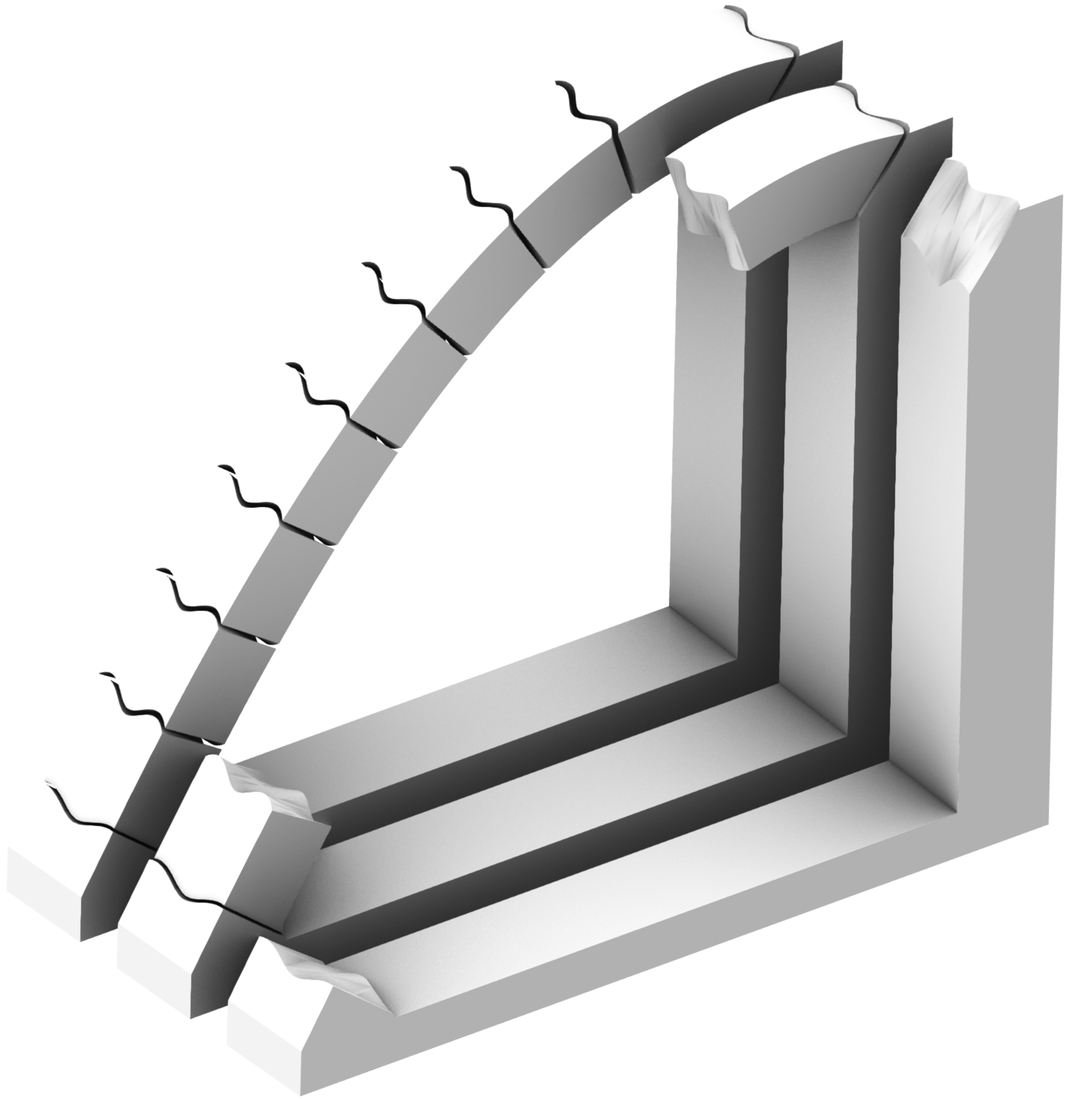




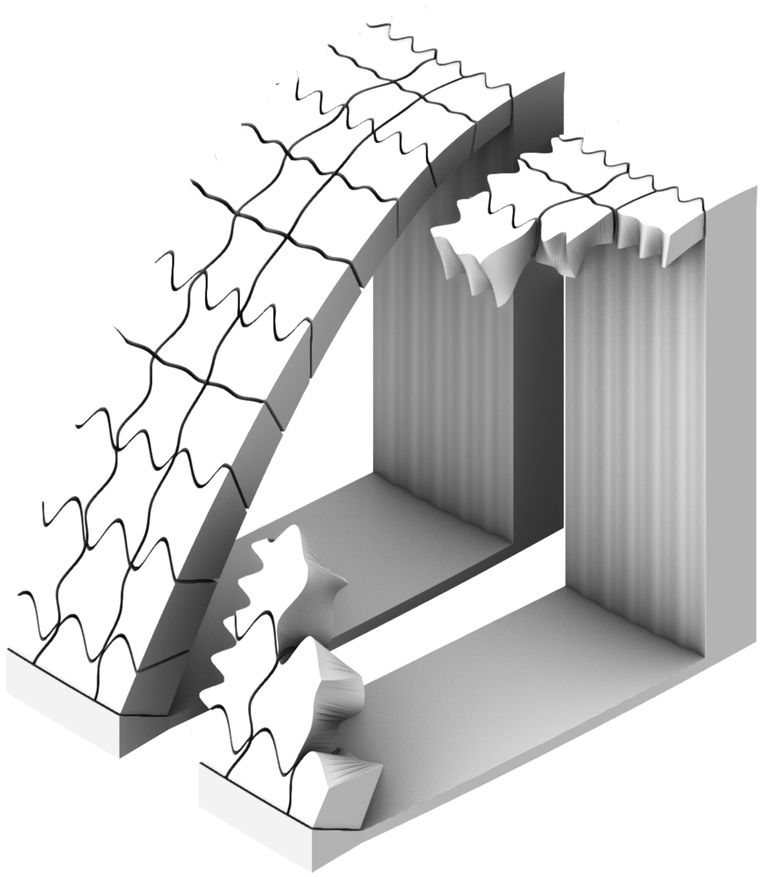
_Improved shape



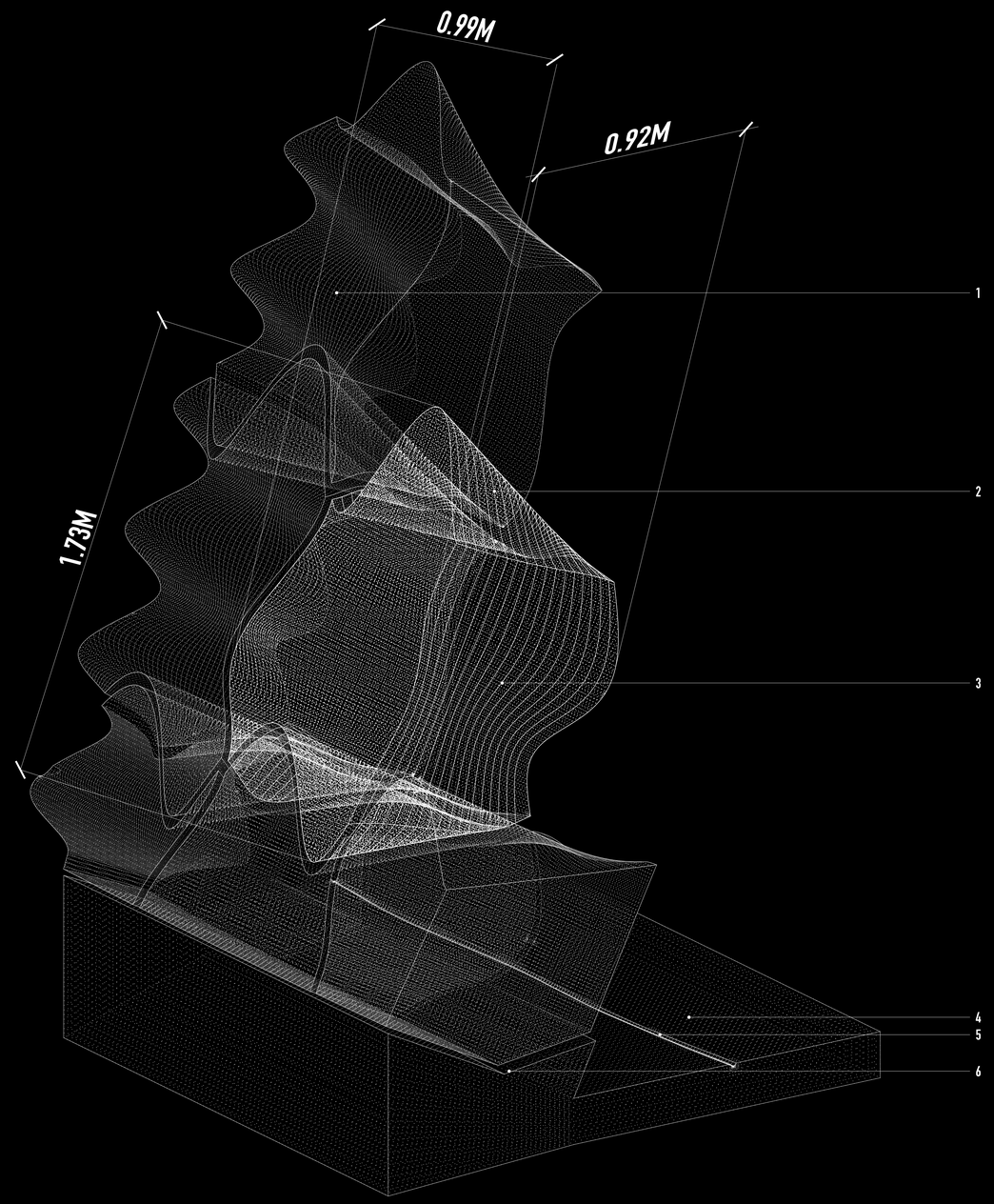
_3D interlocking patterns // Axo Models



_Arch prototype 2.0

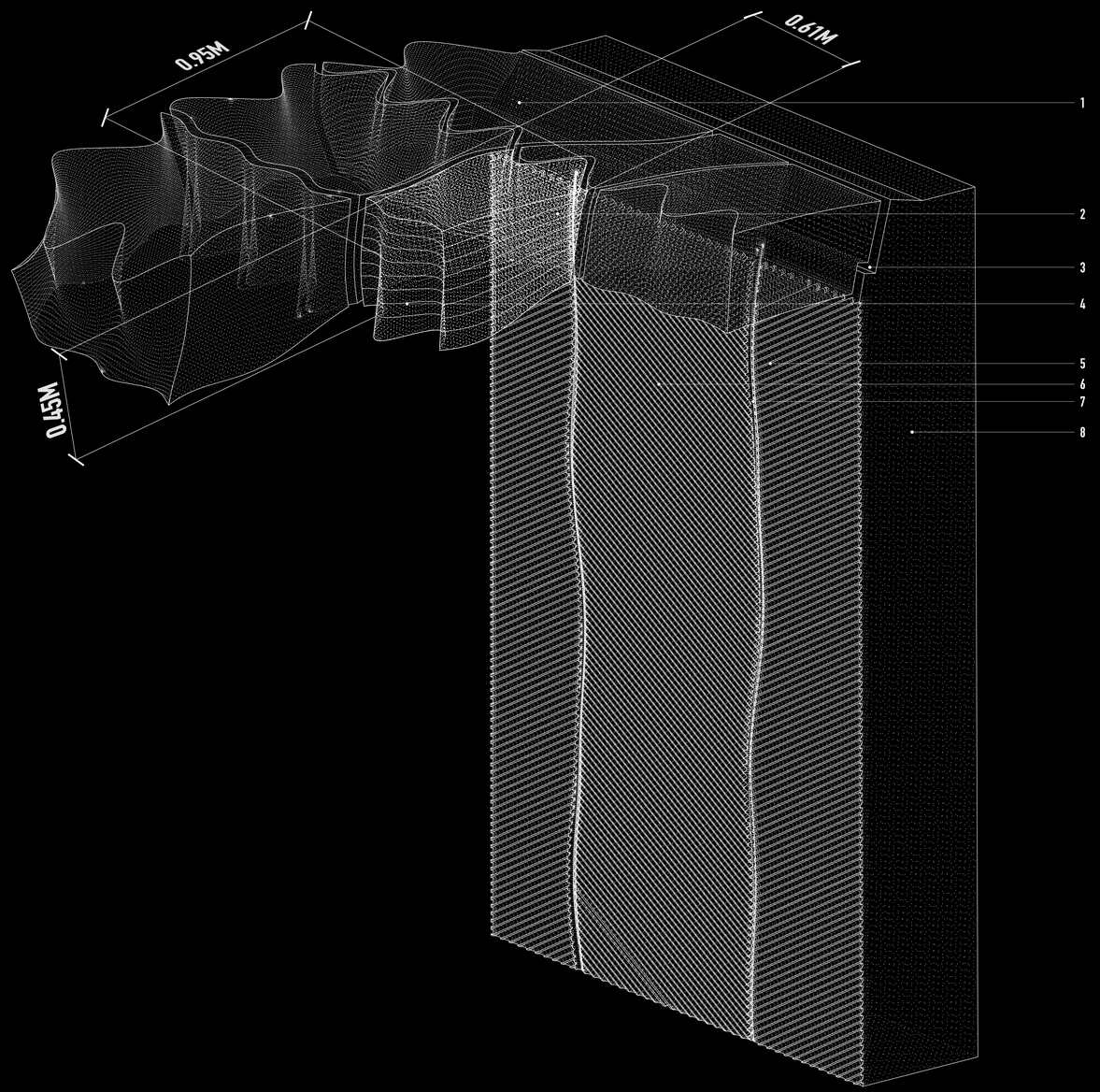


_Arch prototype 3.0



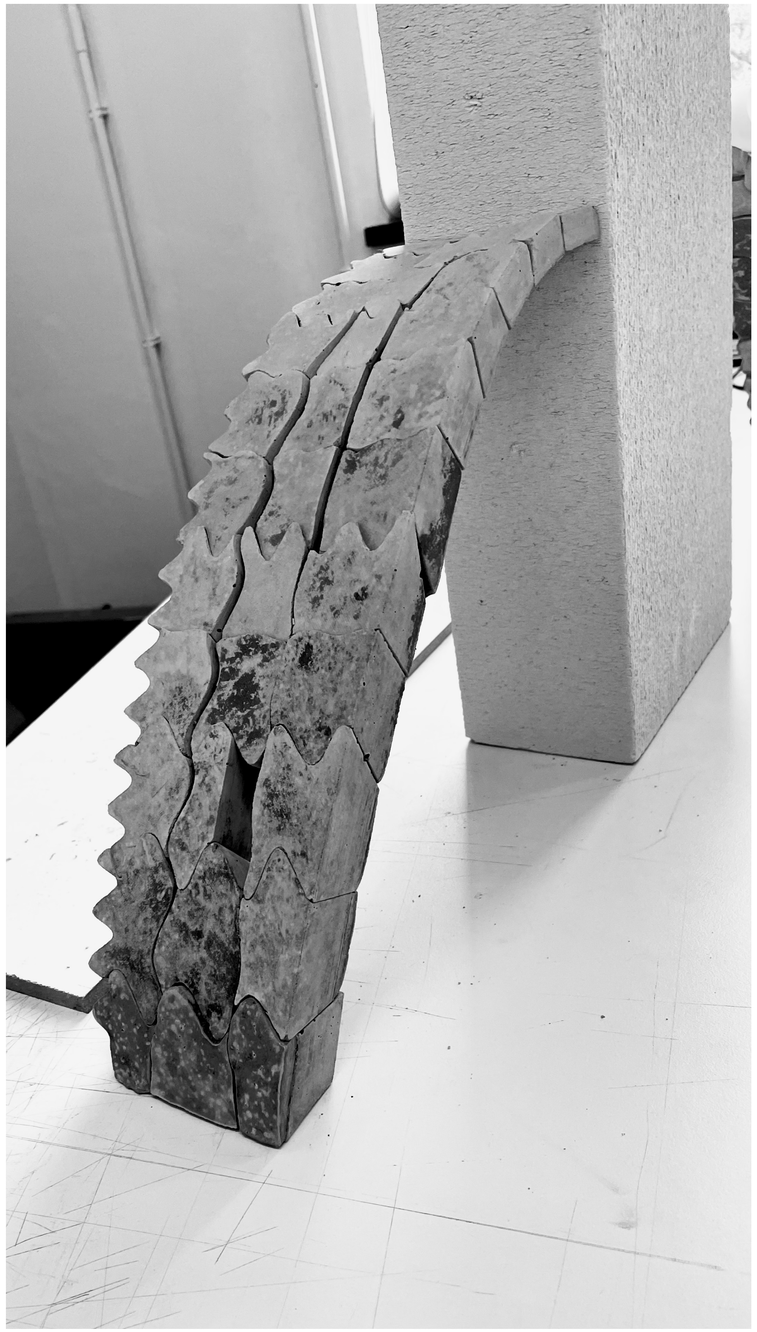
CNC-WATERJET CUT LIMESTONE BLOCK 1
SINGLE CURVED INTERLOCKING PATTERN (HORIZONTAL) 2
SINGLE CURVED INTERLOCKING PATTERN (VERTICAL) 3
SLOPE TOWARDS 'WET' SPACES 4
CUT LEFTOVERS FUNCTION AS DRAINAGE CHANNELS 5
FOUNDATION CONNECTION CARVED IN GROUND 6

SCALE 1:5

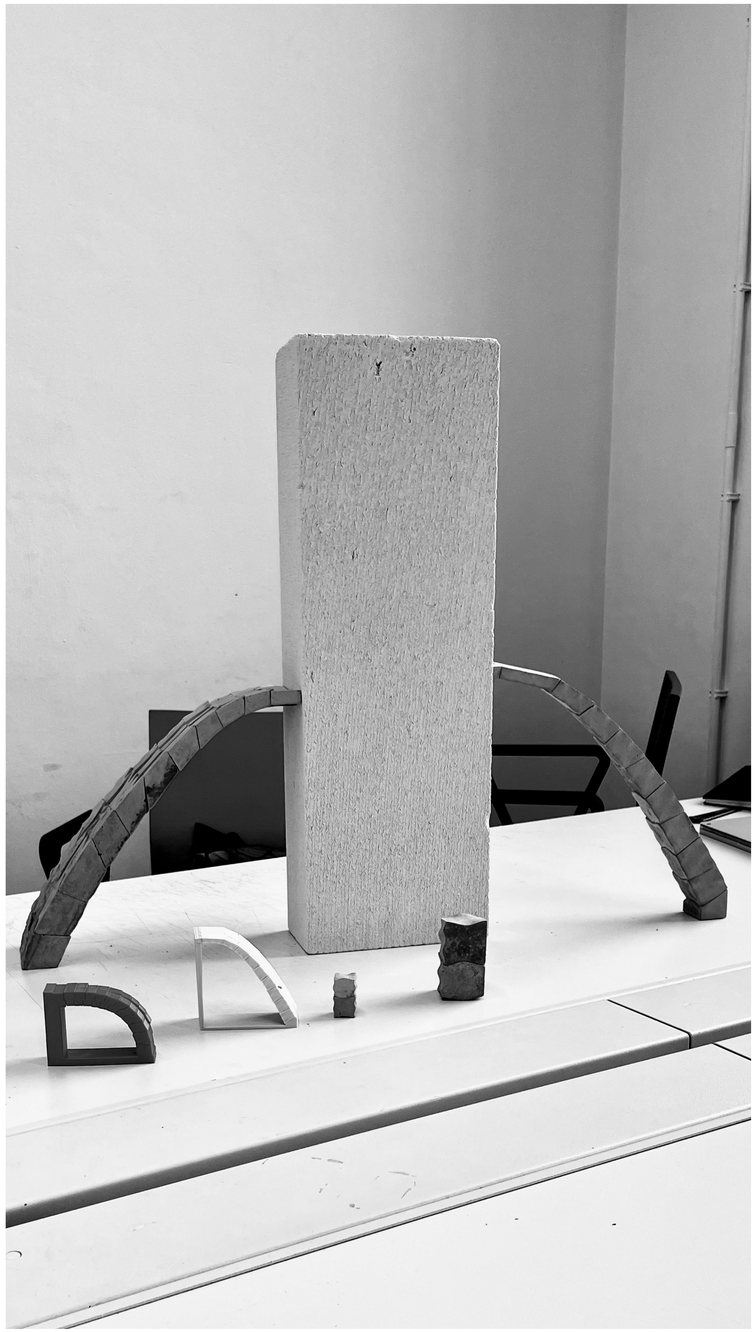


CNC-WATERJET CUT LIMESTONE BLOCK 1
SINGLE CURVED INTERLOCKING PATTERN (HORIZONTAL) 2
CARVED TOP ARCH COMPRESSION CONNECTION 3
SINGLE CURVED INTERLOCKING PATTERN (VERTICAL) 4
INTENTIONALLY EXAGGERATED WATERJET FLUTING (TYPE 1) 5
INTENTIONALLY EXAGGERATED WATERJET FLUTING (TYPE 2) 6
CUT LEFTOVER CHANEL FOR CONDENSATION COLLECTED THROUGH TYPE 1+2 7
GROUD // LIMESTONE MASSIF 8

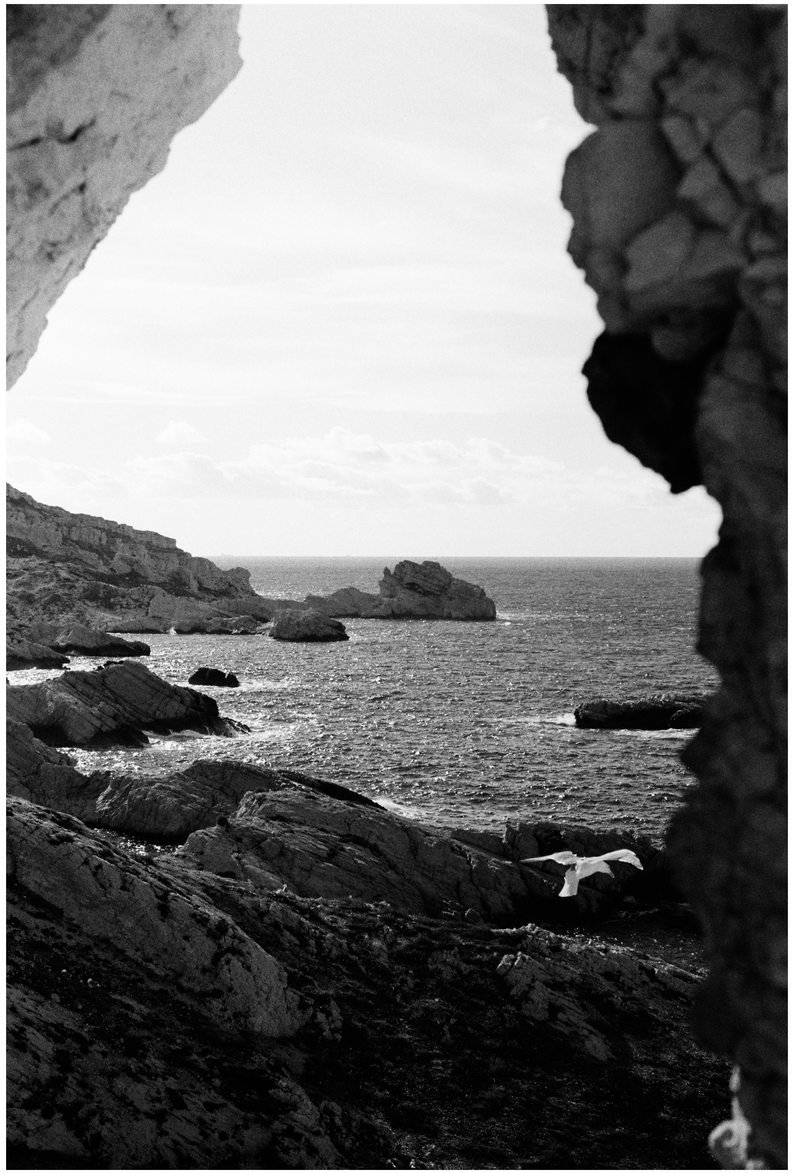
SCALE 1:5



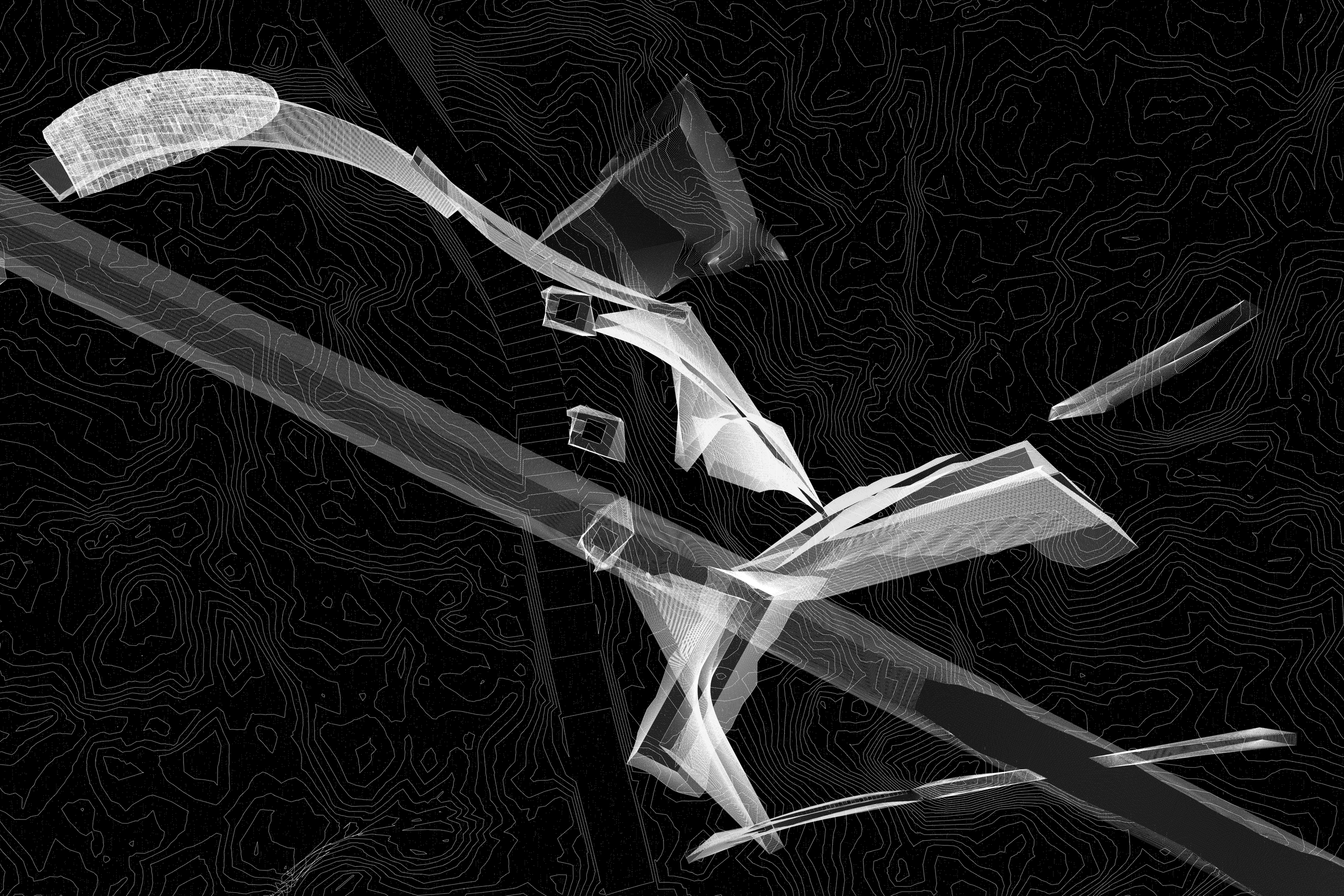


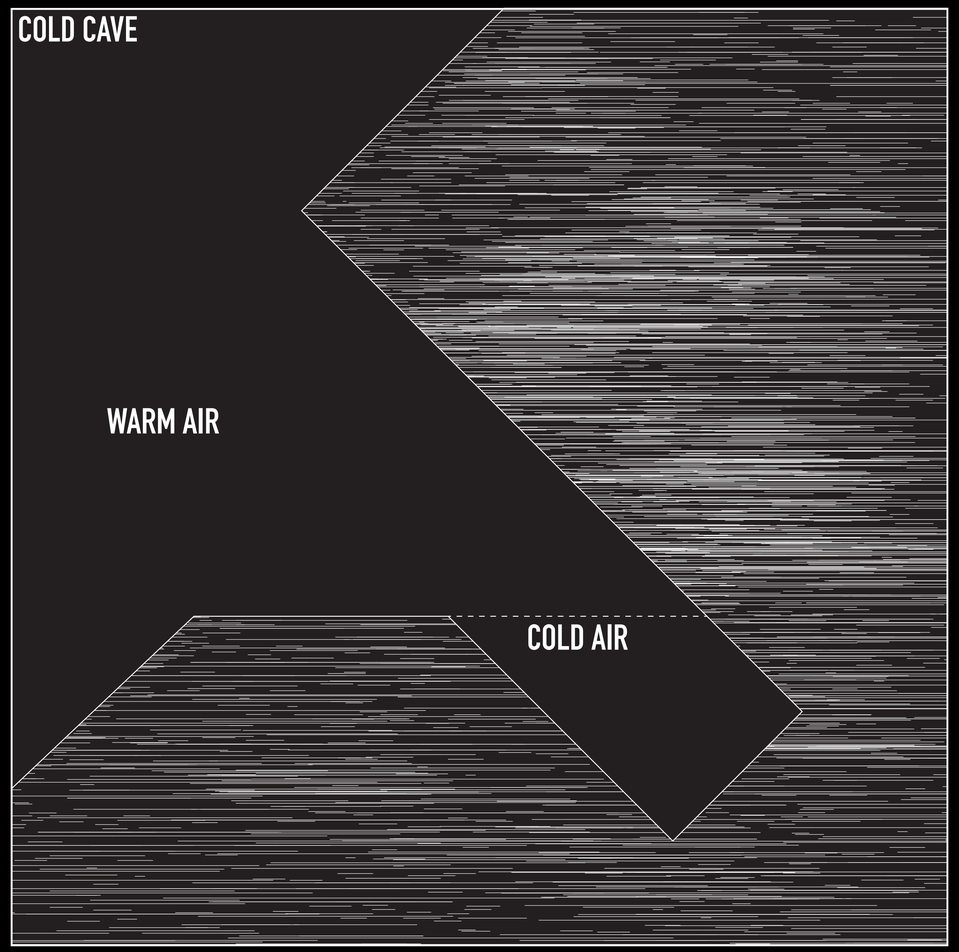


_Physical Arch Prototype



_Climate Effort




COLD CAVE
WARM AIR
COLD AIR


WARM CAVE
COLD AIR
WARM AIR



_Natural Ventilation // Climate // Diagram

$$Rc = \frac{\Sigma Rm + Rsi + Rse}{1 + \alpha} - Rsi - Rse$$

$$R = d / \lambda$$

Limestone lambda = 1.4-1.7
Material thickness = 50-500M
Rsi for anything that touches ground = 0.17
Rse for anything that touches ground = 0.17
Due to the nature of the ‘material’ a being the solid stone ground a = 0

so

Rc = ((R + Rsi + Rse) / (1+a)) - (Rsi - Rse)

becomes

Rc = R

Rc = 50/1.7 || 500/1.4
Rc = 29.4 || 357.14

Rc = 29.4 || 357.14
Huge numbers, but ultimately meaningless.

The whole intervention is aired through from the outside, meaning the temperature is not affected much by the Rc.
Heat from the core of the earth starts playing a role as we dig 10+ meters into the ground.
Heat retention by the extremely heavy material evens out the temperature.



1.Entry 2.Cold zone 3.Transition zone 4. Deep cave







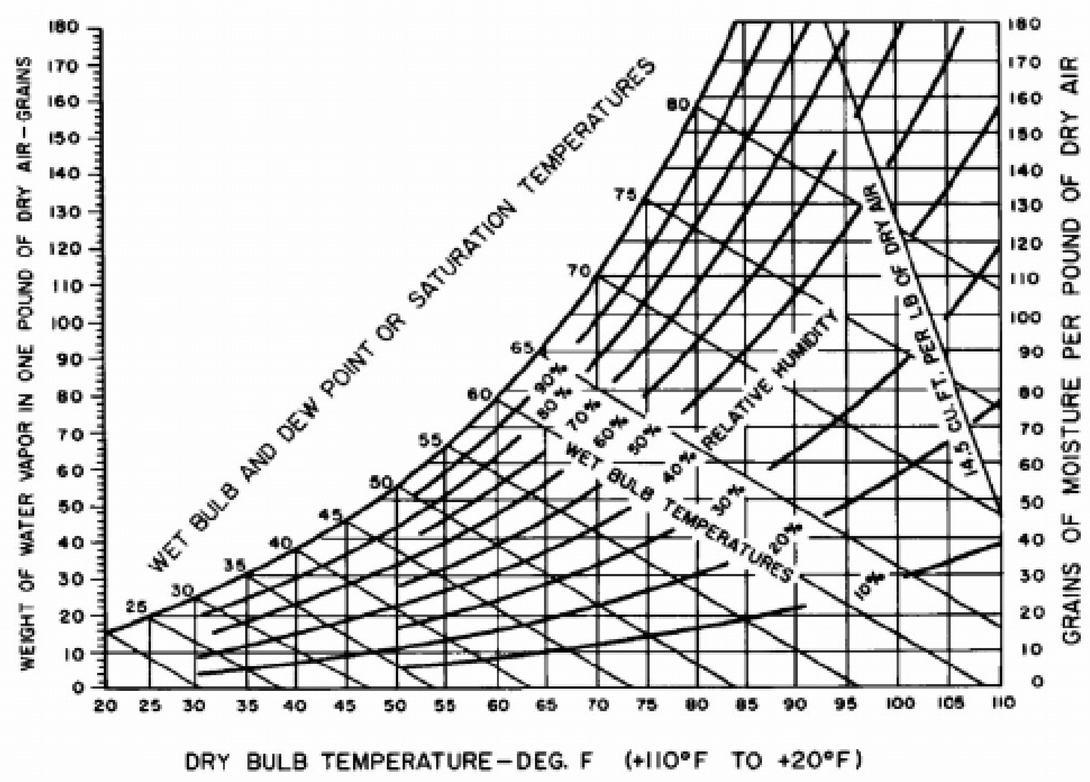
Airflow direction as a result of relative temperature.

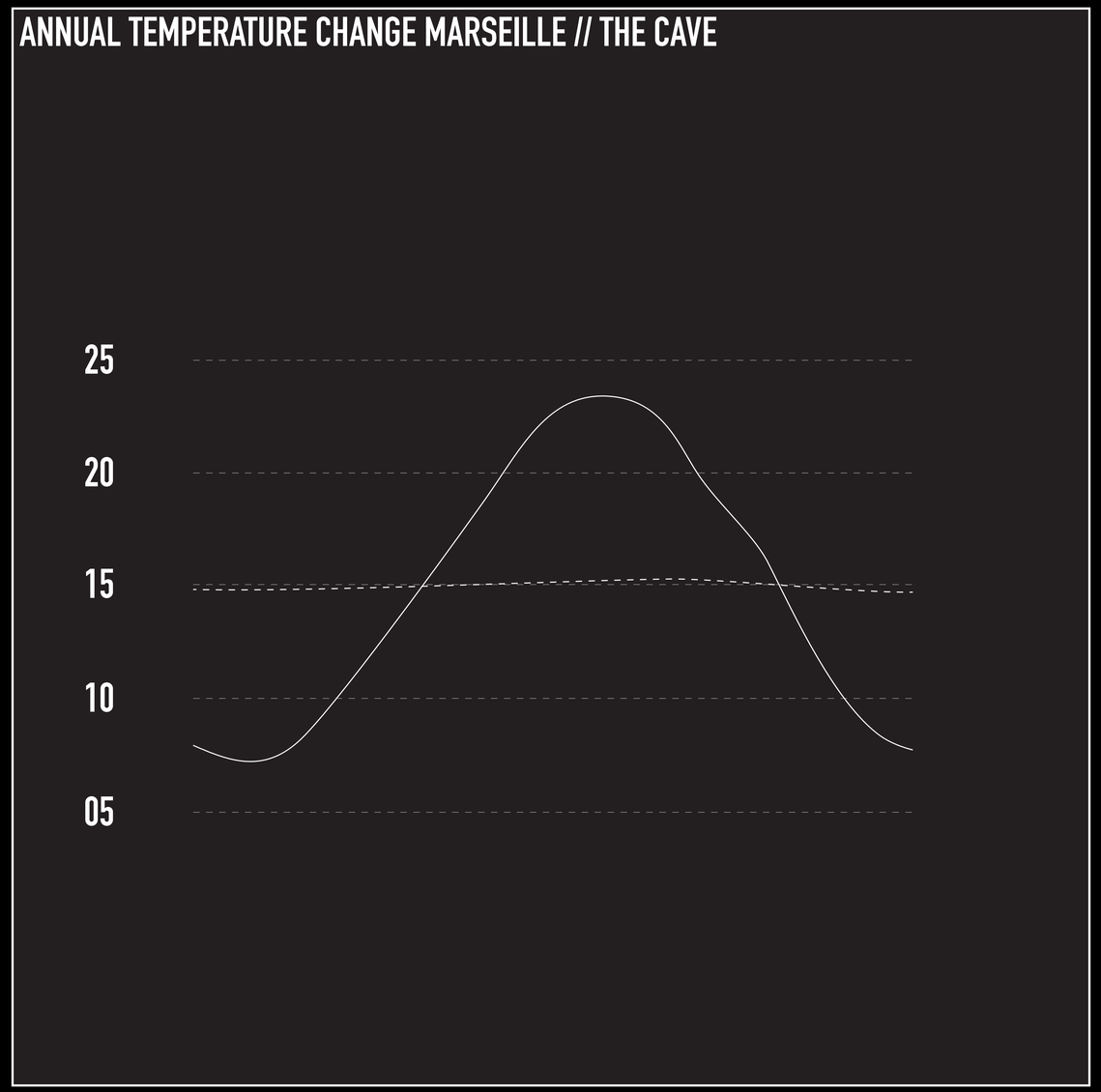


What happens now?

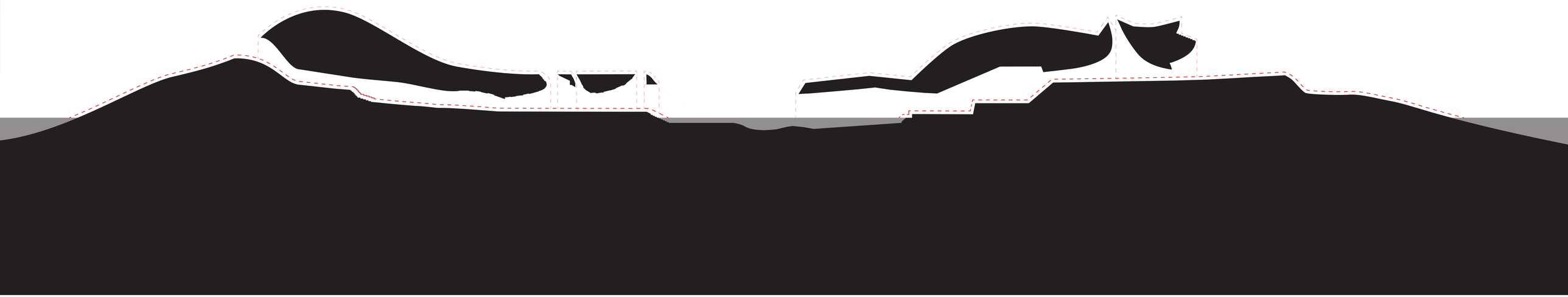


_Natural Ventilation // Climate // Diagram


WEIGHT OF WATER VAPOR IN ONE POUND OF DRY AIR – GRAINS
GRAINS OF MOISTURE PER POUND OF DRY AIR
WET BULB AND DEW POINT OR SATURATION TEMPERATURES
RELATIVE HUMIDITY
WET BULB TEMPERATURES
14.5 CU. FT. PER LB. OF DRY AIR
90%
80%
70%
60%
50%
40%
30%
20%
10%
DRY BULB TEMPERATURE – DEG. F (+110°F TO +20°F)



Stone keeps the yearly average.

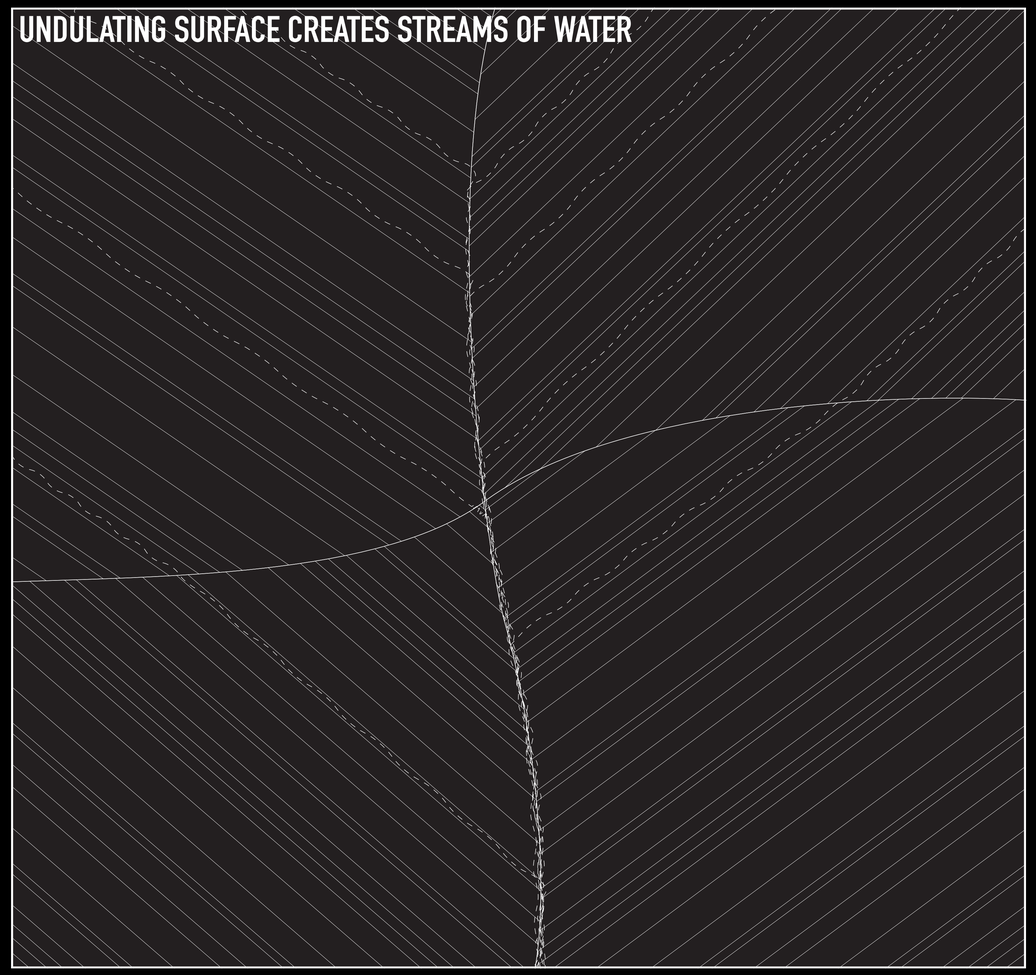


_Condensation and Precipitation Path

POLISHED SURFACE BECOMES GLOSSY WITH EVEN CONDENSATION DISTRIBUTION



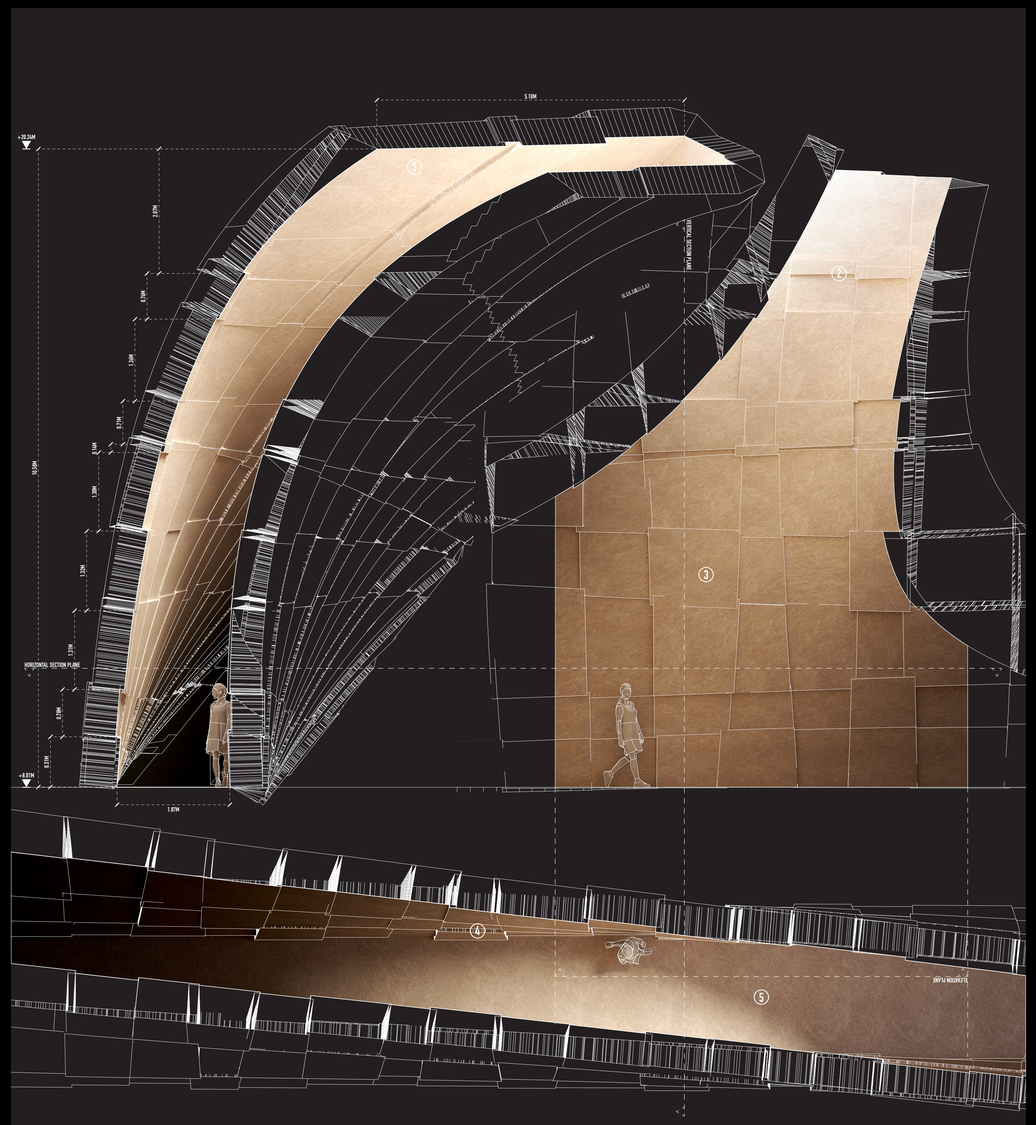
UNDULATING SURFACE CREATES STREAMS OF WATER



Condensation Design

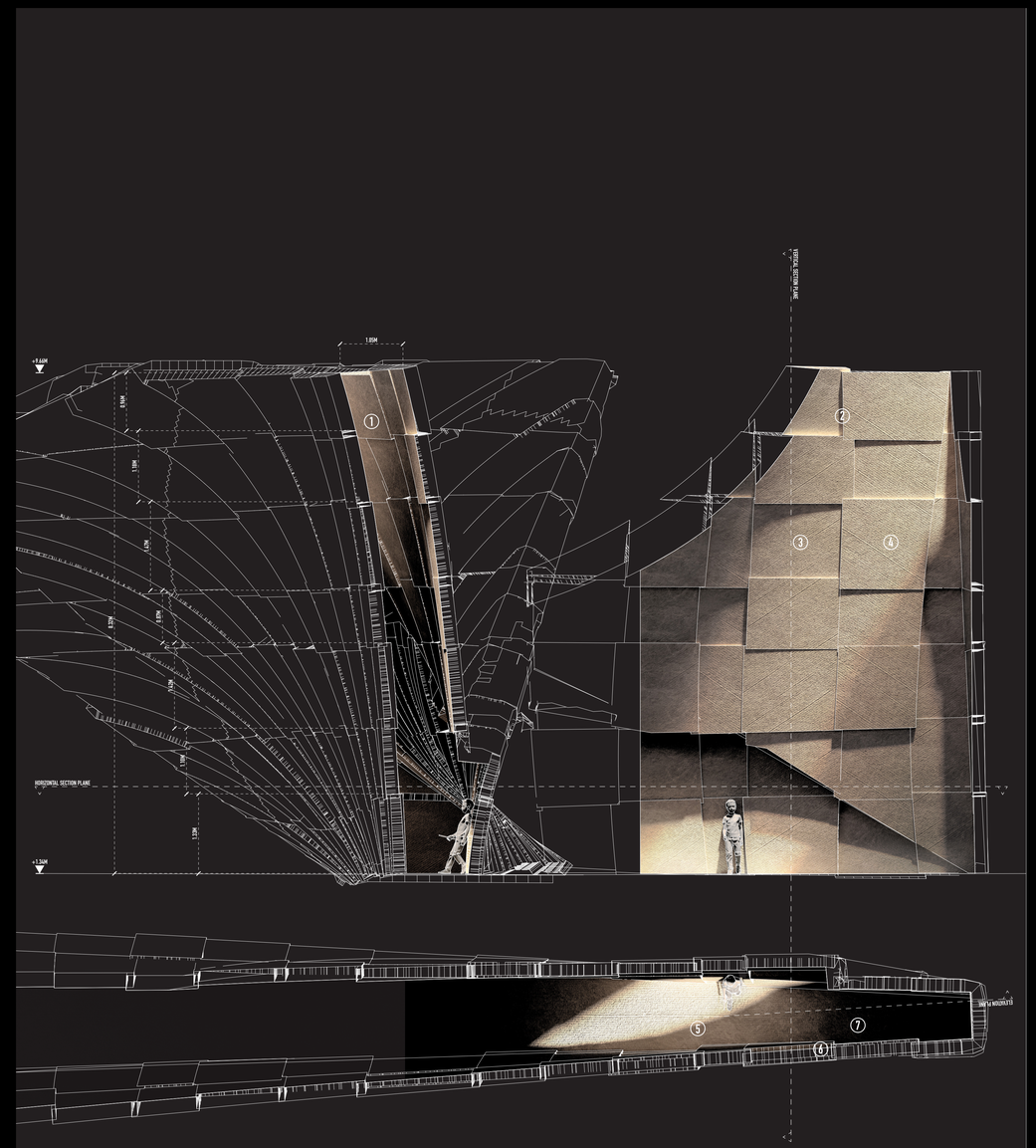


Kintsugi or Shimmering seams



LIMESTONE WALL (EDGE OF SUBTRACTION) 1
BLOCK EDGE WATERJET REMNANTS 2
WATERJET POLISHED (TYPE 1) FOR ECHO // REVERB 3
PROTRUSION DIFFERENCES DUE TO HUMAN INACCURACY 4
2% SLOPE FLOOR FOR WATER DRAINAGE 5

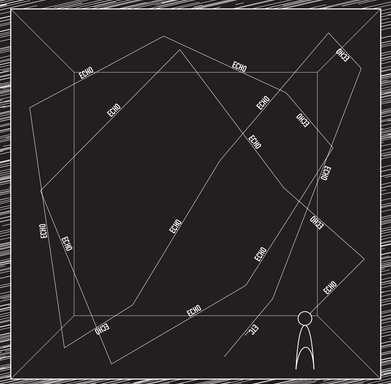
SCALE 1:20



LIMESTONE WALL (EDGE OF SUBTRACTION) 1
BLOCK EDGE WATERJET REMNANTS 2
WATERJET FLUTING (TYPE 1) FOR SOUND DIFFUSION 3
WATERJET FLUTING (TYPE 2) FOR SOUND DIFFUSION 4
WATERJET FLUTING (TYPE 3) FOR GRIP WHEN WET 5
PROTRUSION DIFFERENCES DUE TO HUMAN INACCURACY 6
2% SLOPE FLOOR FOR WATER DRAINAGE 7

SCALE 1:20

FLAT SURFACE INDUCED REVERBERATIONS


Echo
Echo
Echo

