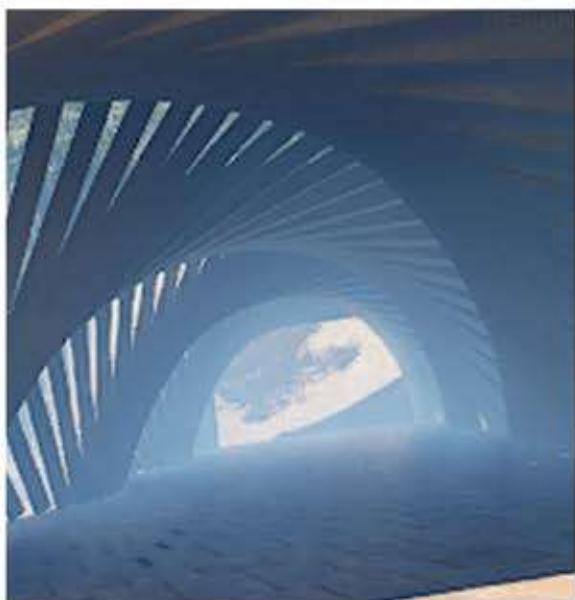
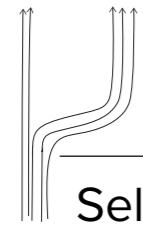


Architecture



Portfolio

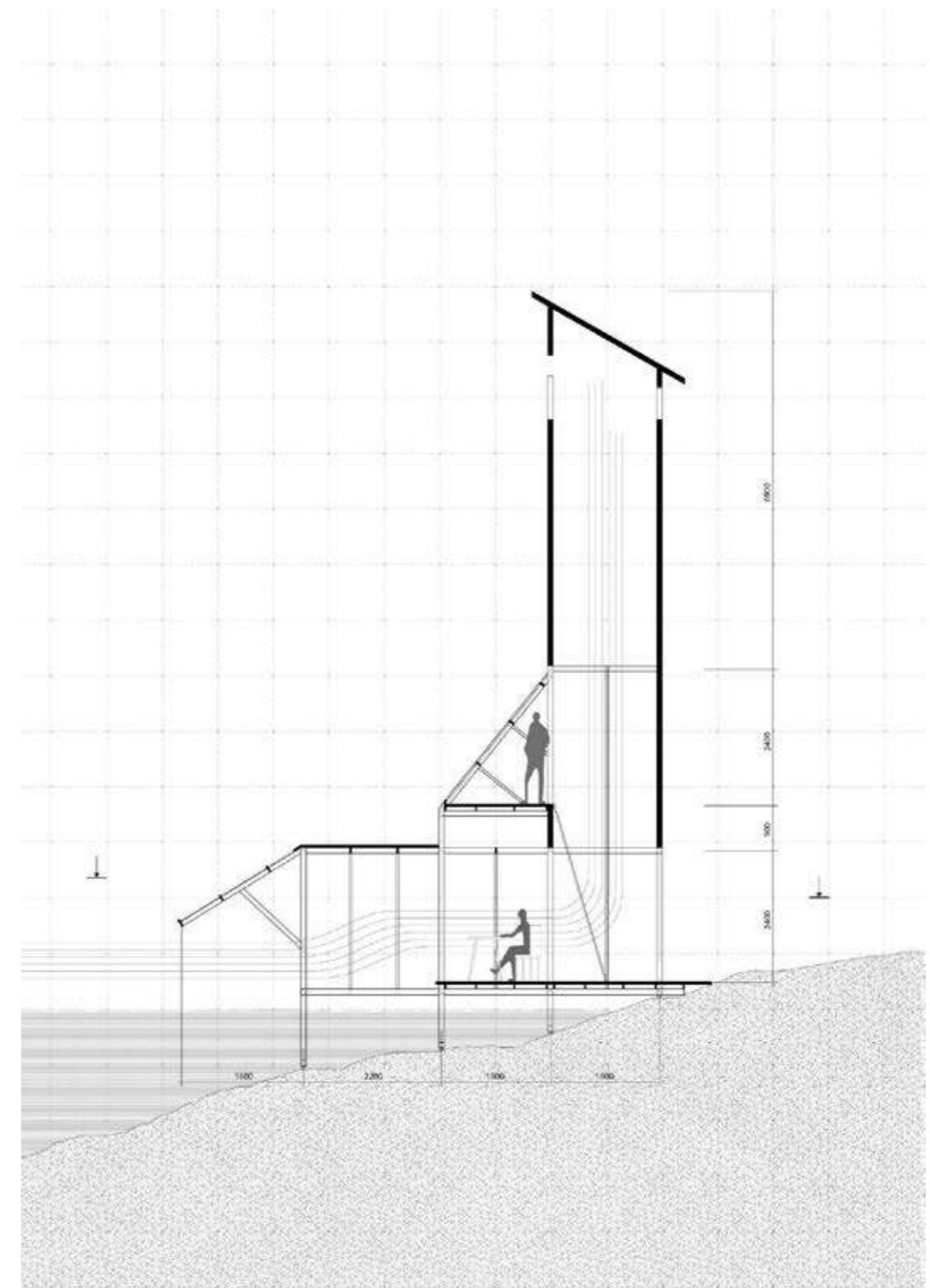
Manoj Nagarajan
2024



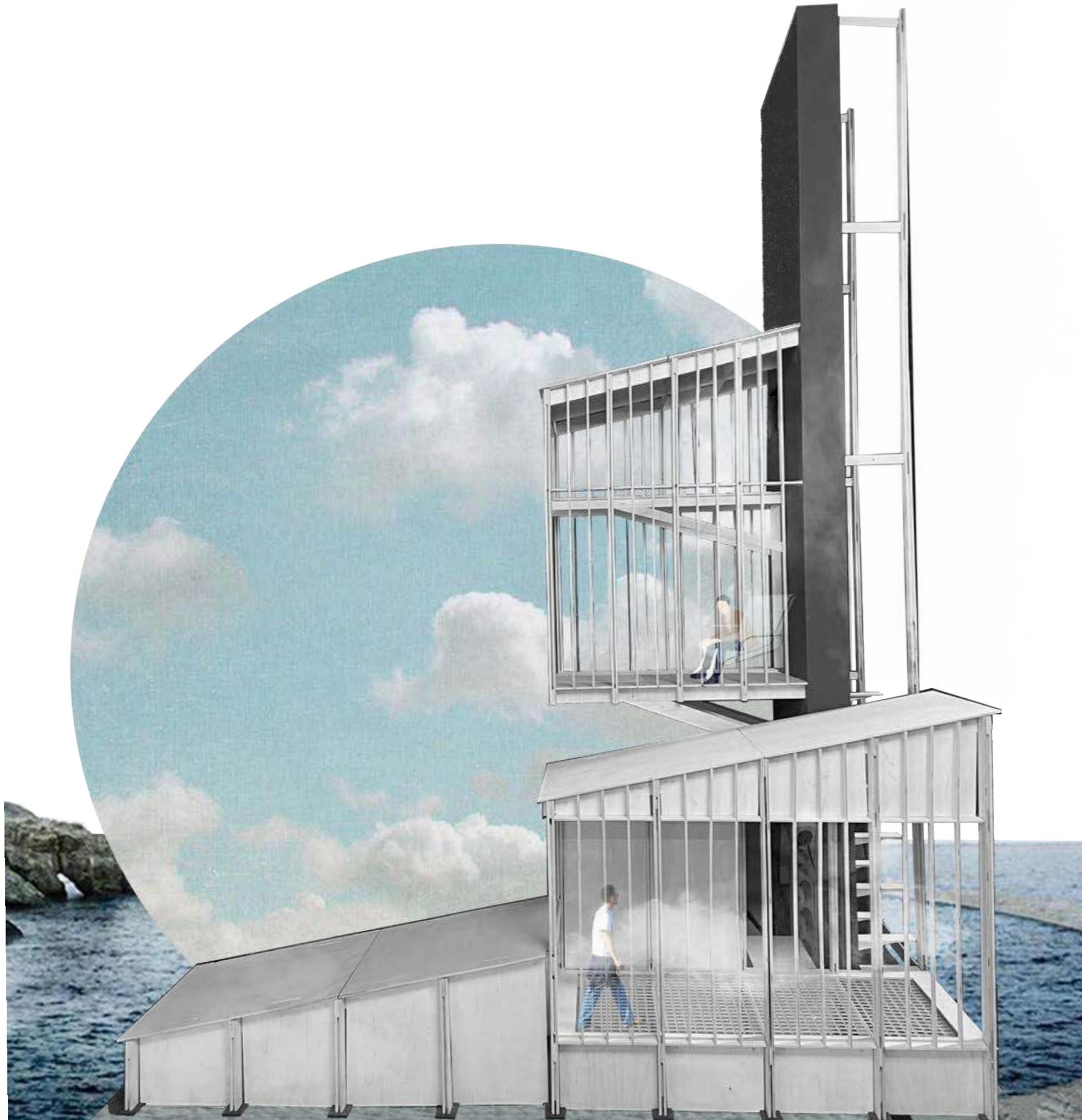
The Rise

Self Sufficient Building Studio

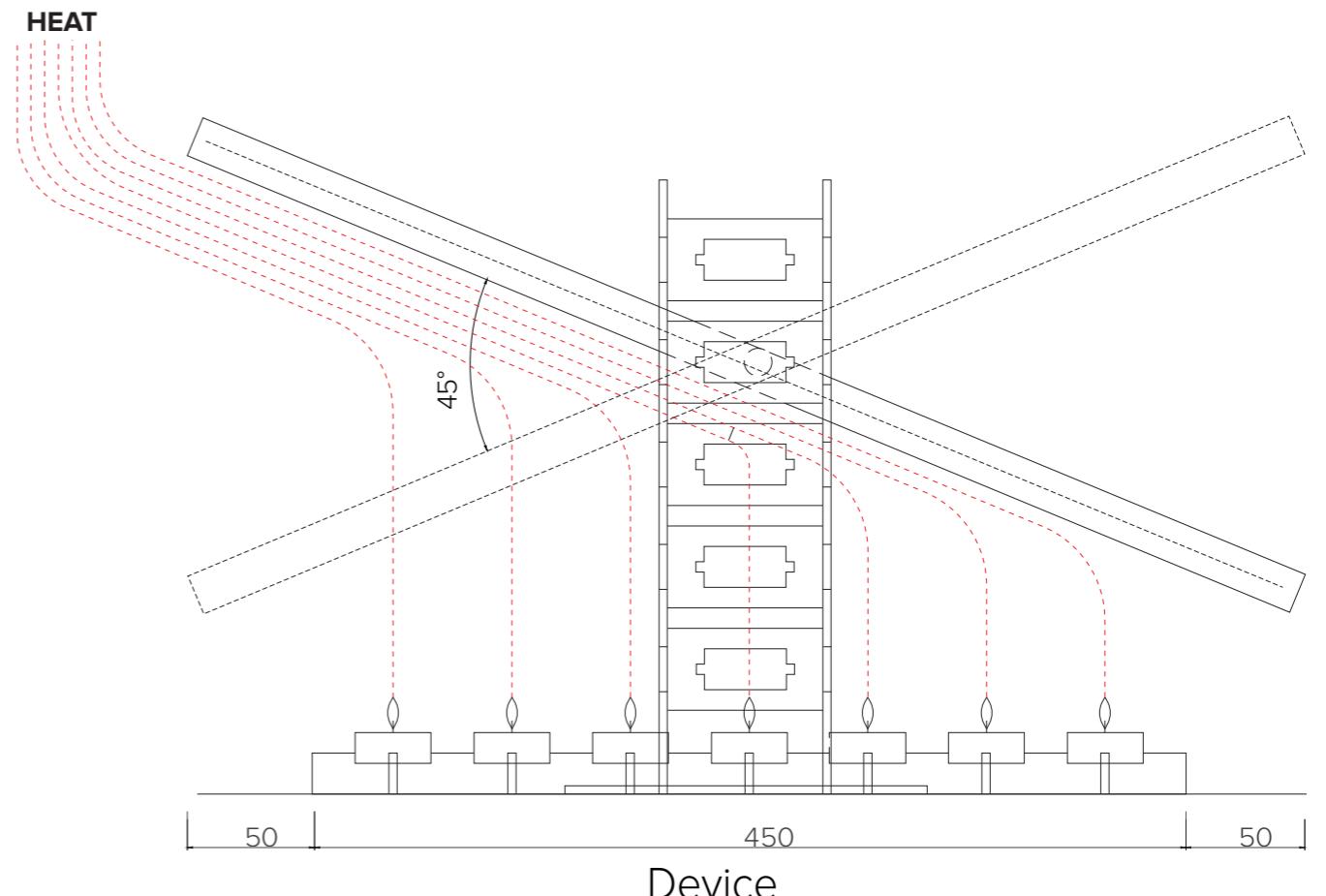
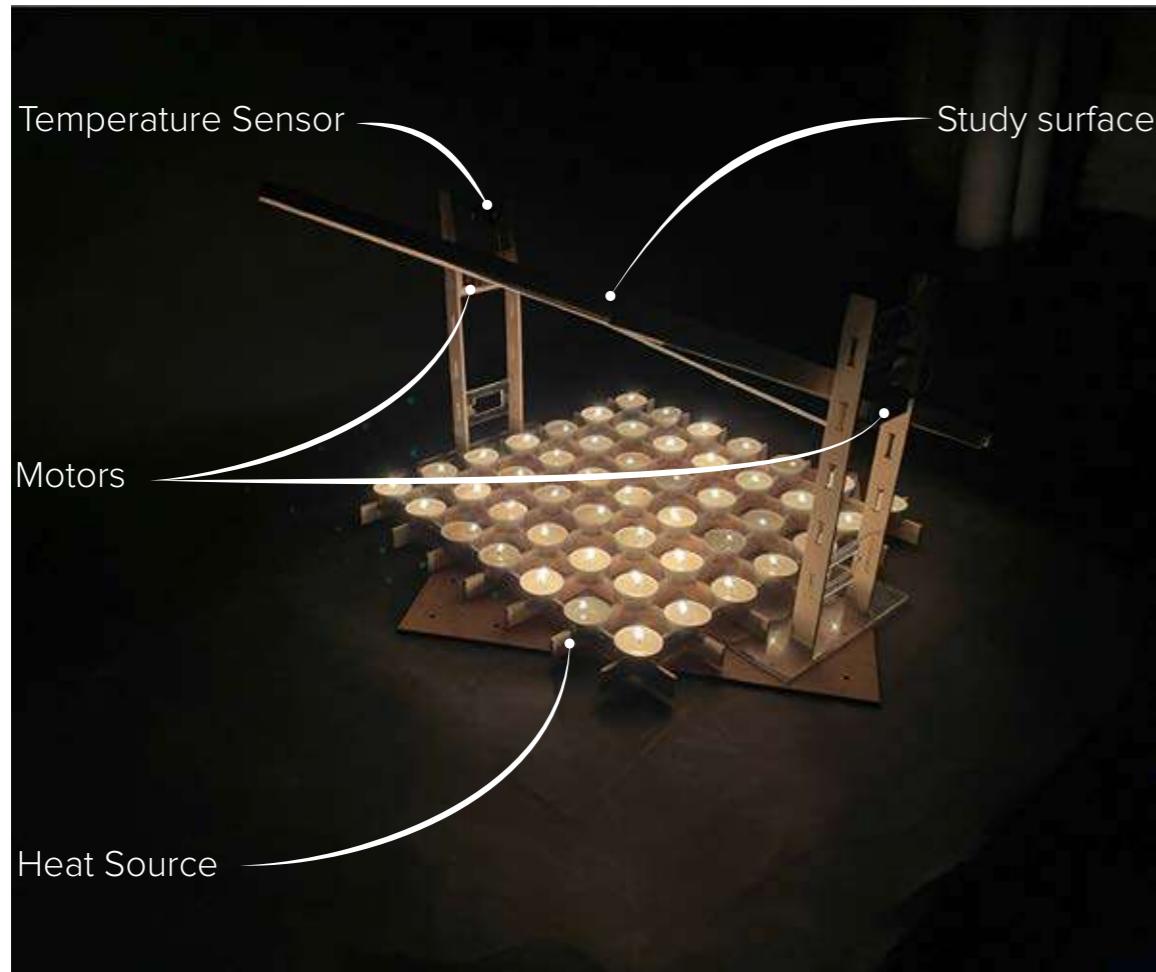
Considering heat as a phenomena to study its transfer patterns and understand its characteristics and use that as a knowledge base to design an architectural structure. Architecture in recent times have evolved into isolating the architectural space from the surrounding to conjure a habitable space. The main aim of this project aims to design the architectural space that blends with its surrounding context while providing the occupants with desirable conditions. With this an device to understand have been developed such that the heat phenomena can be studied carefully and thoroughly. Use the aquired knowledge to design the architectural structure such that it resonates with the context within with the structure is located, while the results the phenomena provides us insights to design the spaces. Thus emphasizing the phenomena to enhance the habitability of the user.



Device → **Smallest Architecture** → SSB

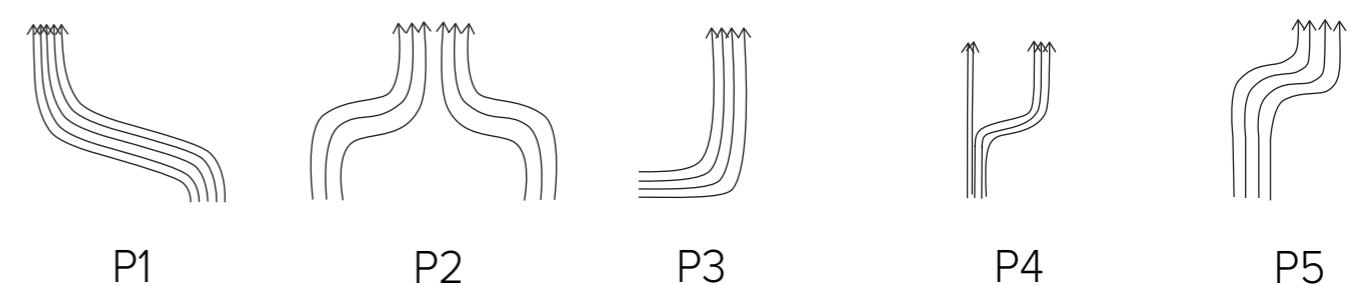


Device → Smallest Architecture → SSB



Device Logic

- Starts with ideal room temperature.
- With prevailing air currents, the temperature in one particular side of the device heats up. As soon as a certain critical temperature reached, the motors rotate the board to balance the temperature. This creates a cyclic loop of the



Transfer Patterns

Tested in varying air currents location to understand the prominent travel patterns created by the device employed.

Site Study

A widely known concept of evaporative cooling. Air is in direct contact with the cooling media, in direct evaporating cooling. Pools, ponds and water features immediately outside windows or in courtyards can pre-cool air entering the house. As water evaporates it draws large amounts of heat from surrounding air.



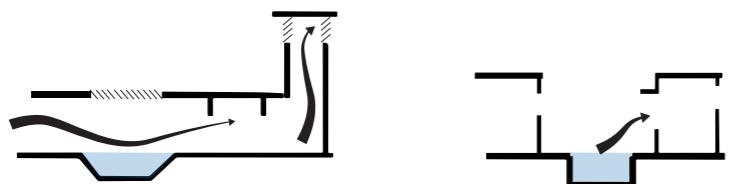
Location
Country - Spain
City - Balearic Islands

Coordinates
Longitude - 2.6501603
Latitude - 39.5696005

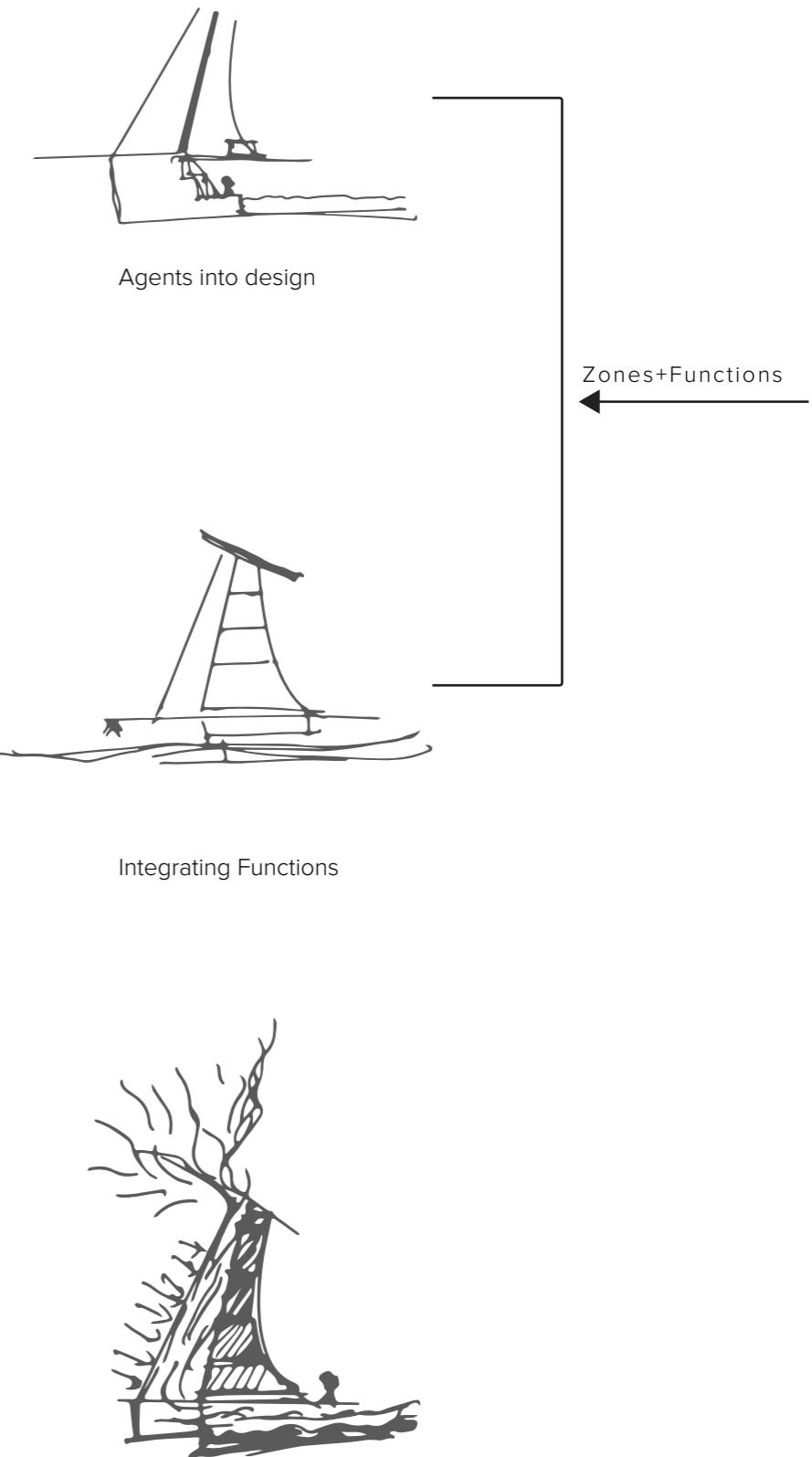
Topography
Altitude 13ft

Temperature
Annual High - 32.14
Annual Low - 16.03

Humidity
73.46%

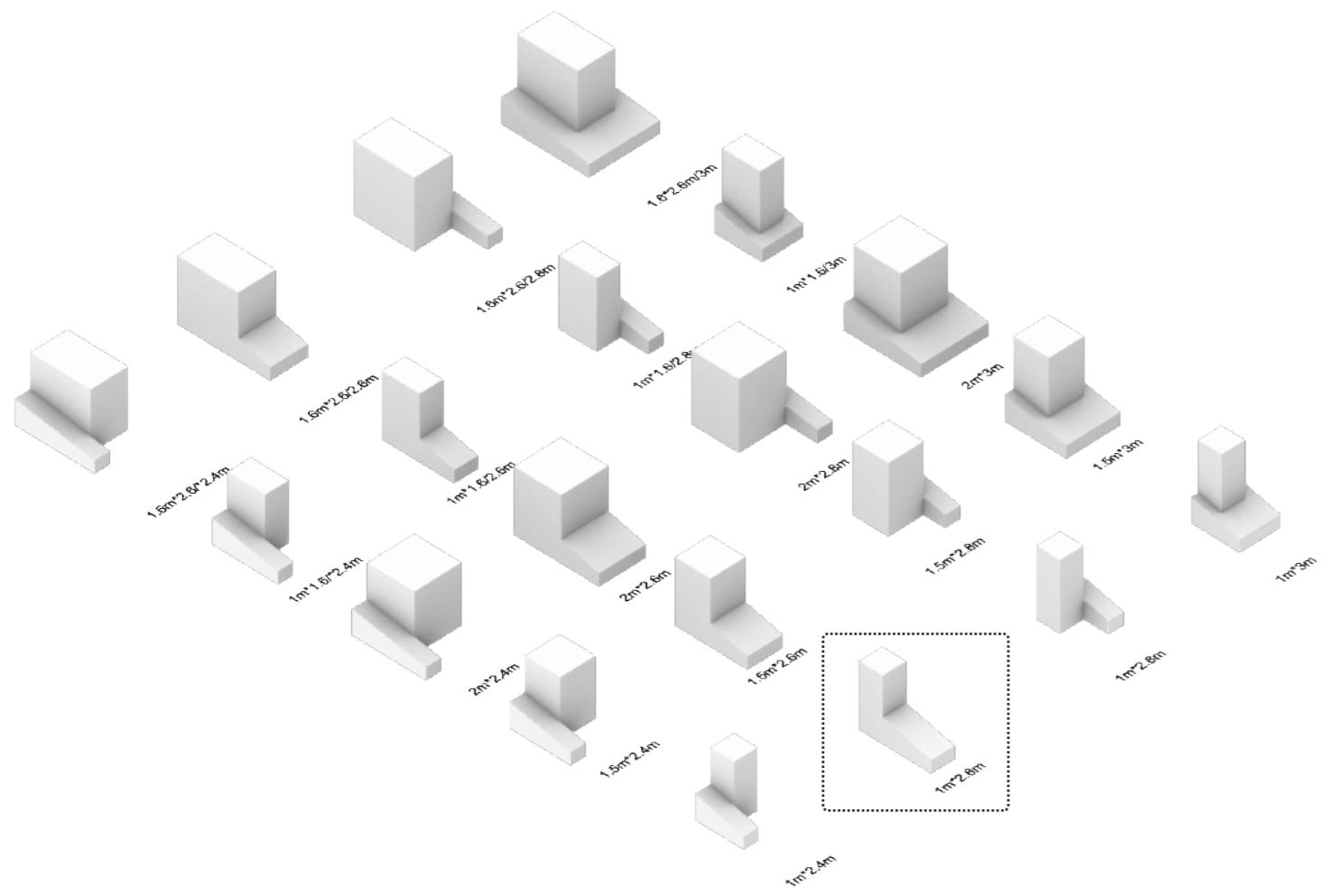


Including Water as an agent based design



Phenomena Activation

Device → **Smallest Architecture** → SSB

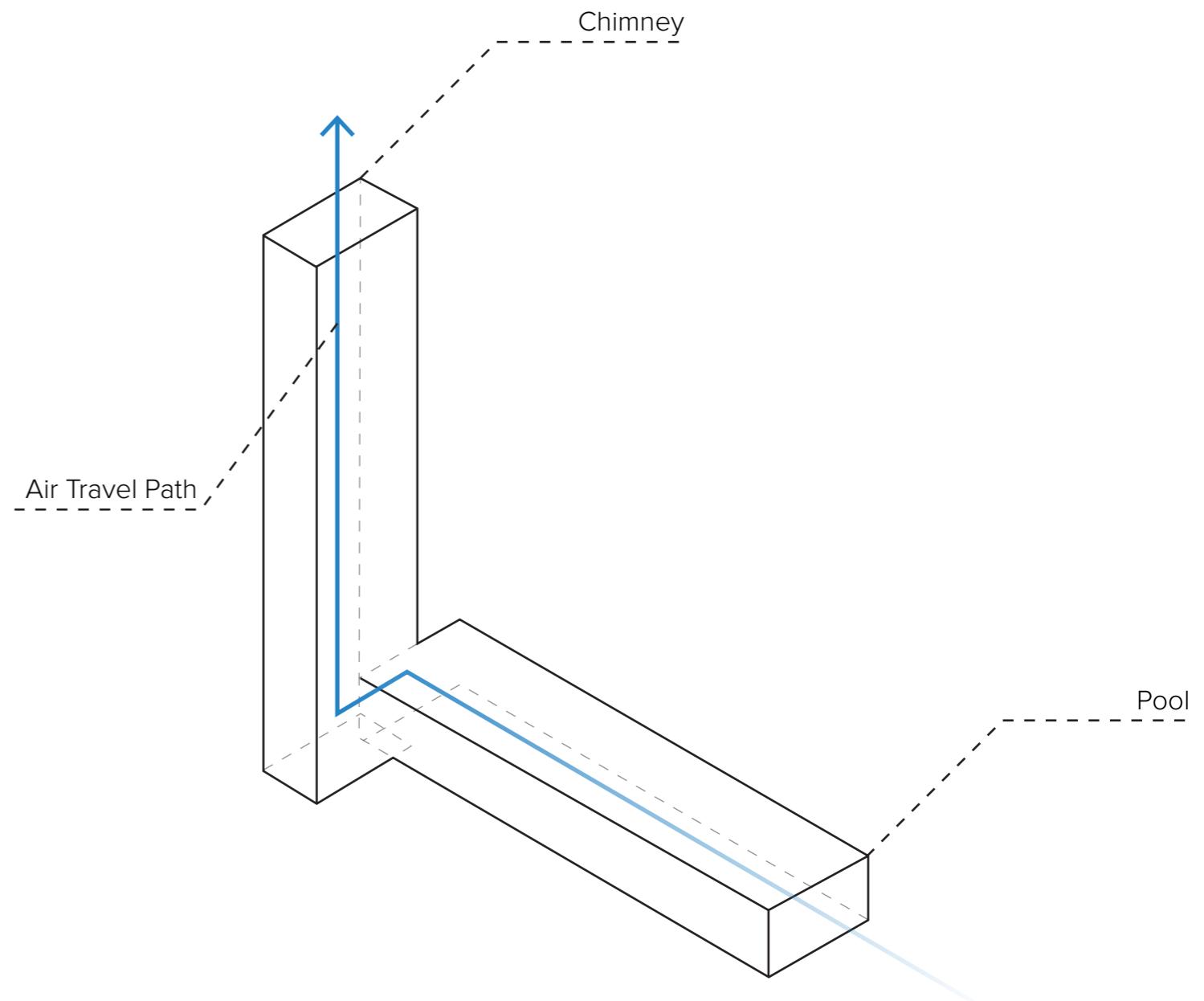


Volume Explorations

Parameters -

A horizontal bar chart illustrating the range of values for different system parameters. Each parameter is listed on the left, followed by its current value and its minimum and maximum bounds.

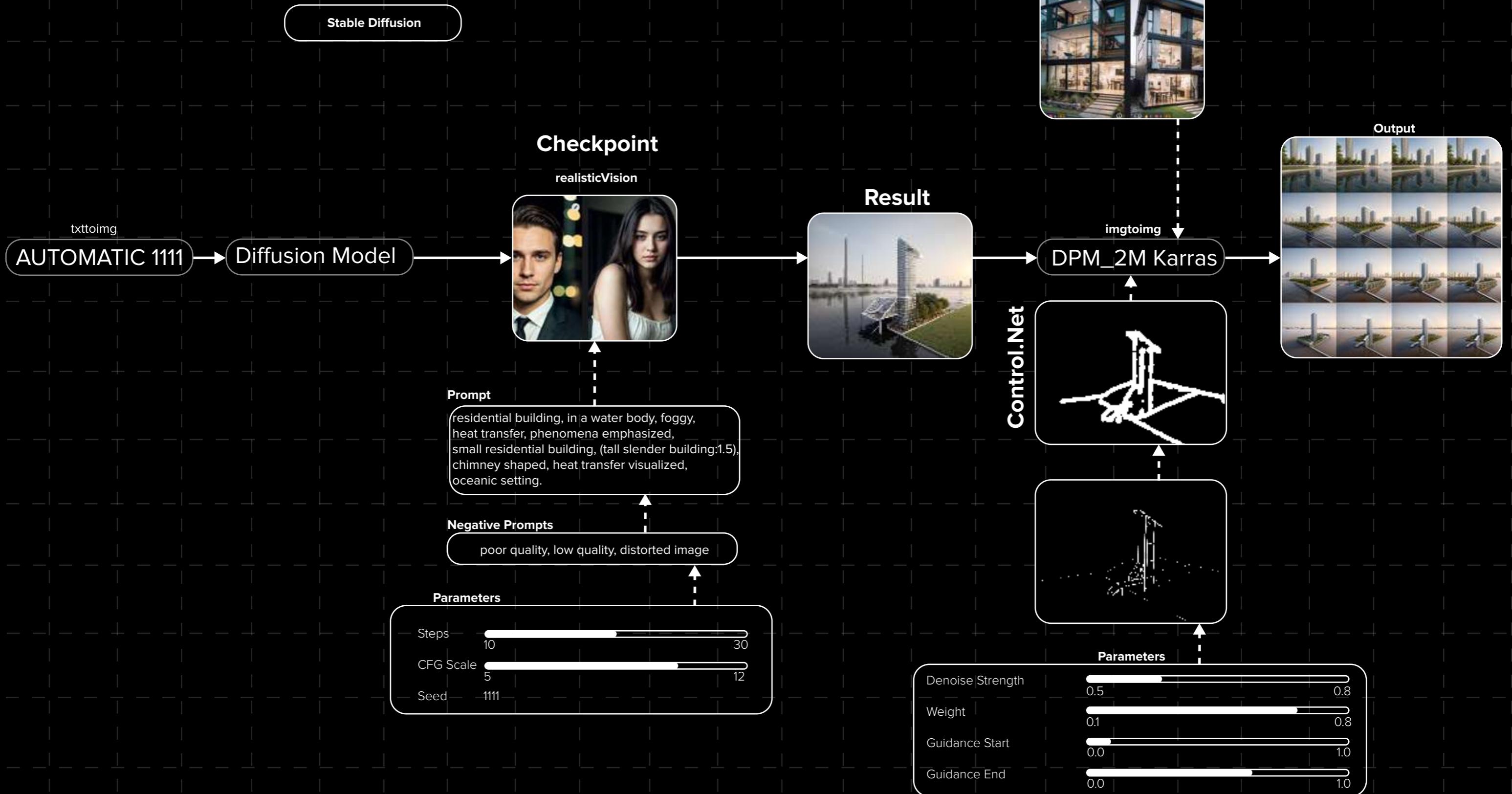
Parameter	Current Value	Min Value	Max Value
Total Volume	100M3	180M3	180M3
Air Currents Distance	12M	16M	16M
Activation Surface Area	6M2	12M2	12M2
Occupants	2	10	10
Spaces	2	6	6



Flow Principle



Design Proliferation using AI



Device ——> Smallest Architecture ——> **SSB**

[ControlNet]
Guidance End: 0.25



[ControlNet]
Guidance End: 0.5



[ControlNet]
Guidance End: 0.75



[ControlNet]
Guidance End: 1



[ControlNet]
Weight: 0.35



[ControlNet]
Weight: 0.65



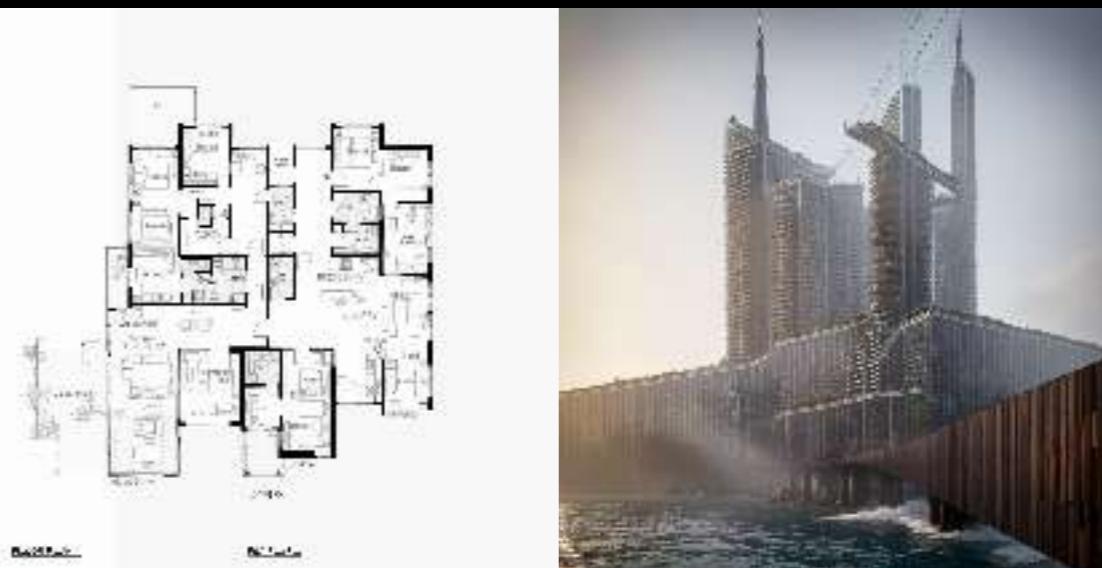
[ControlNet]
Weight: 0.90



Device → Smallest Architecture → SSB



Parameters
Seed 1111
CFG Scale 10 30
Steps 5 12



Parameters
Seed 1114
CFG Scale 10 30
Steps 5 12



Parameters
Seed 1113
CFG Scale 10 30
Steps 5 12



Parameters
Seed 1115
CFG Scale 10 30
Steps 5 12



Parameters
Seed 1113
CFG Scale 10 30
Steps 5 12



Parameters
Seed 1116
CFG Scale 10 30
Steps 5 12

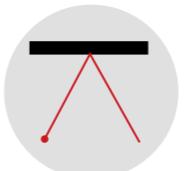
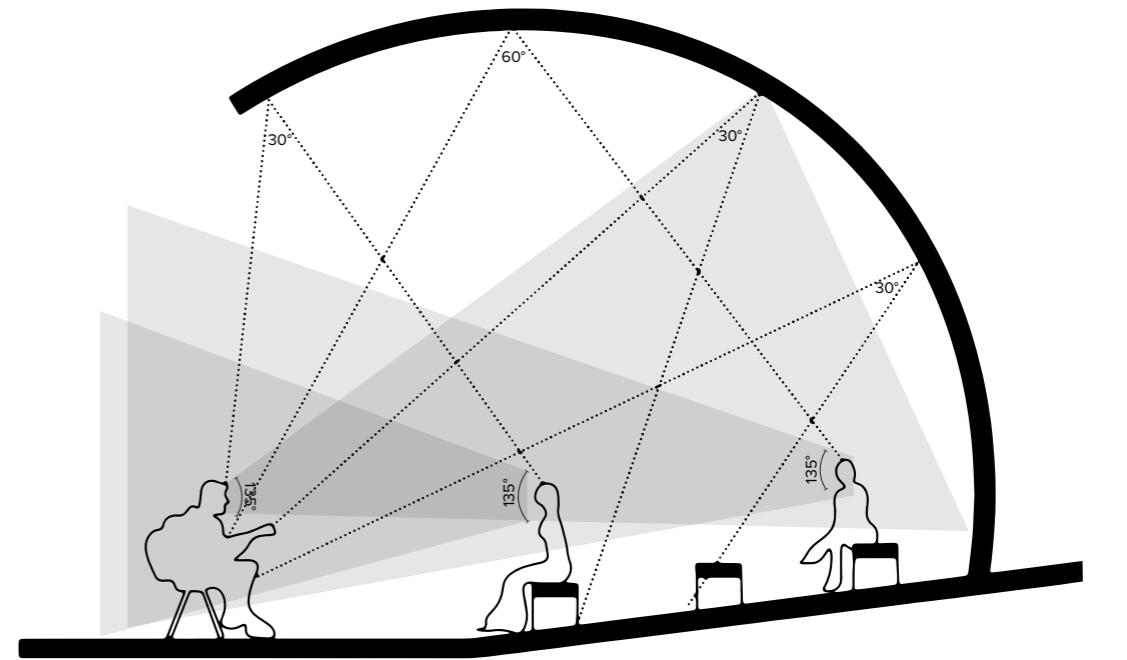
Scaling up - Multi Channel Image Control



Kniphofia

From Composition to Computation

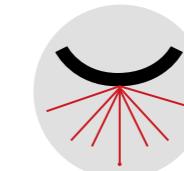
" Located in Cape Town, this proposal aims to envision and promote the establishment of inclusive public spaces in these densely inhabited regions where leisure opportunities are presently limited in Cape Town, our proposition strives to embrace and empower these marginalized communities, cultivating a sense of belonging and furnishing public spaces for recreation and social cohesion." The studio focus on understanding the computation and composition in gaudian architecture. It primarily employs the computation methods to compose, design and fabricate the geometry using computational tools and how such tools can be employed to derive to evolve from the hyperbolic structures developed within the design studio. The complex geometry creation which is inspired from the structures such as sagrada familia to be deployed within the given brief to be employed in such a way that benefits the architecture in a functional and aesthetical aspects. Such condition have been used in various ways such as including sound, playing with the lighting within the structure and its immidiate surrounding influenced as such.



Reflection Type - 1



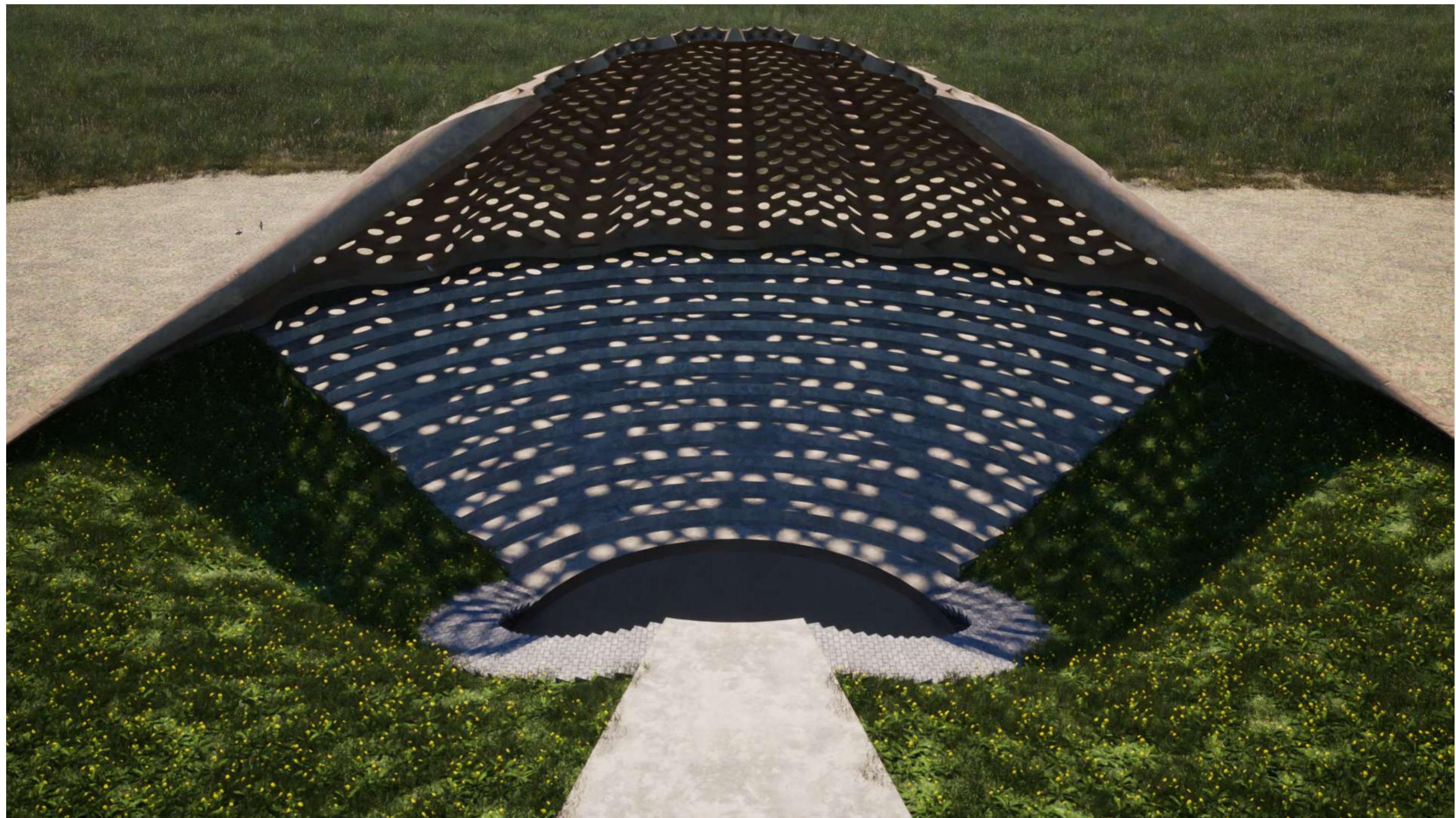
Reflection Type - 2



Reflection Type - 3



Reflection Type - 4



Parameters Deduced from Concept



Deriving inspiration from Kniphofia, a native plant species found in Cape town and grows vertically with staggering long flowers. Parameters from Kniphofia to be applied in composition.



Tilt



Rotation



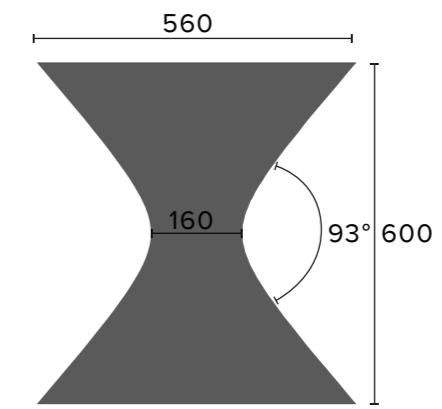
Orientation



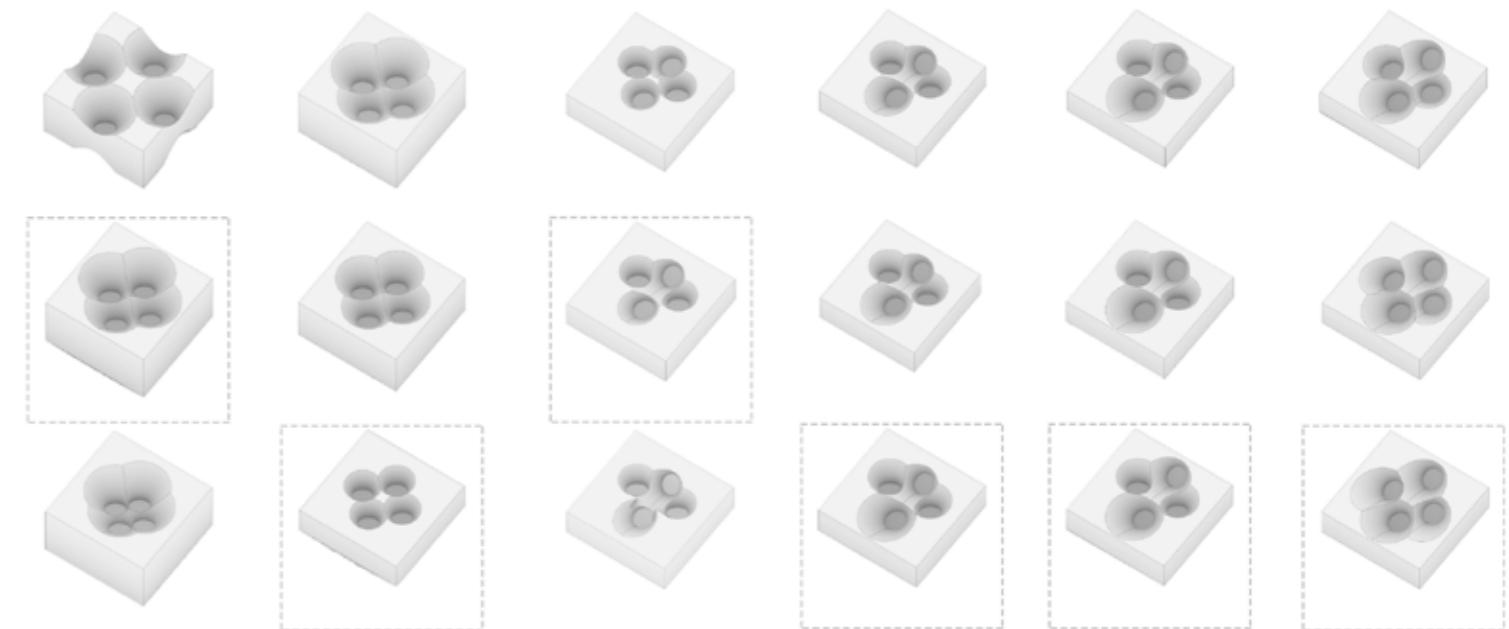
Staggering

Inspiration to parameters

Hyperboloid composition

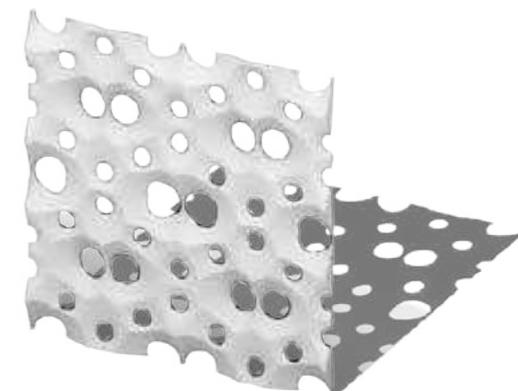
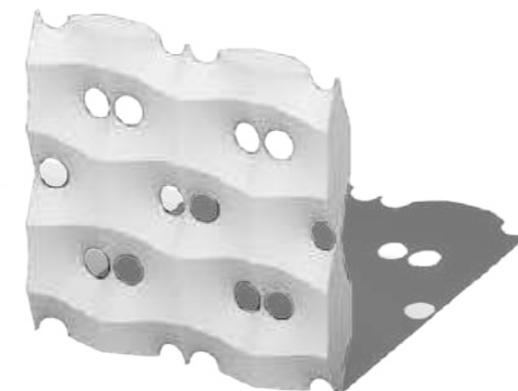
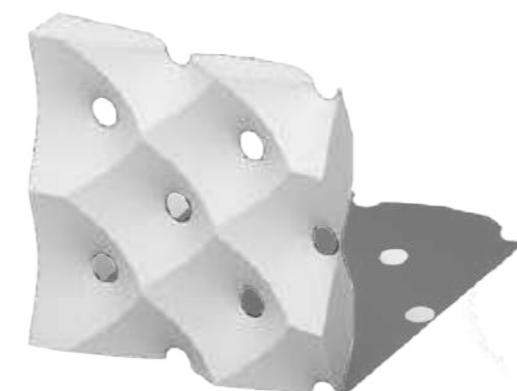
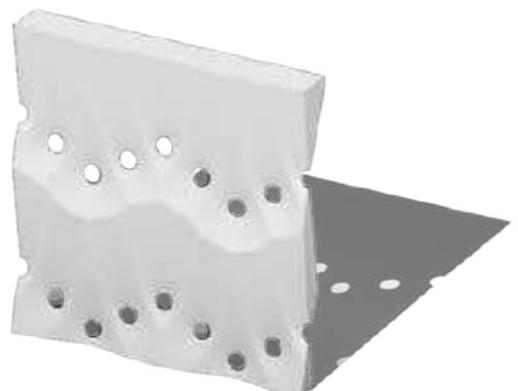
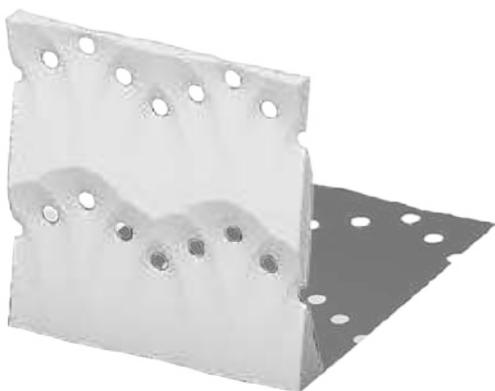
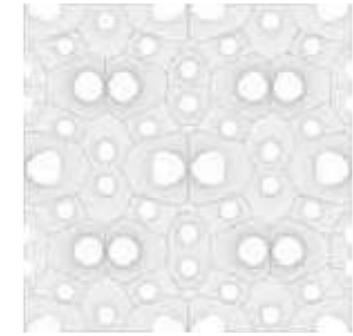
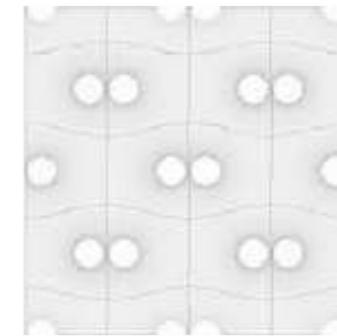
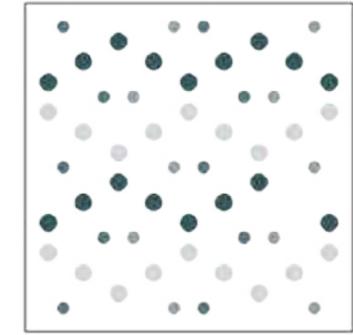
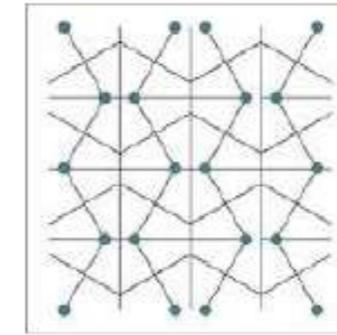
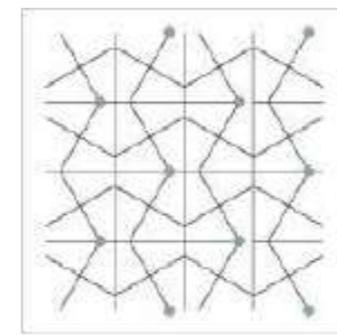
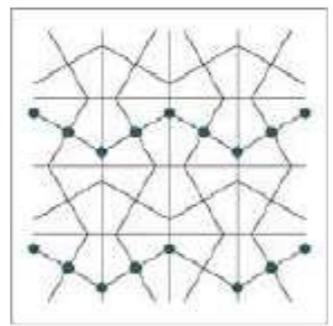
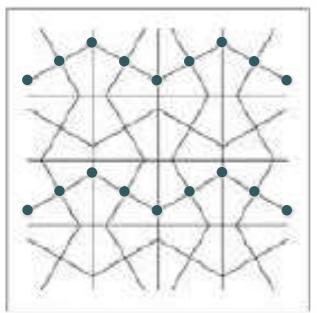


Circle Radius	Base box height	Adding hyperboloid	Partial Tilting	Displacing	Tilting and rotation
---------------	-----------------	--------------------	-----------------	------------	----------------------



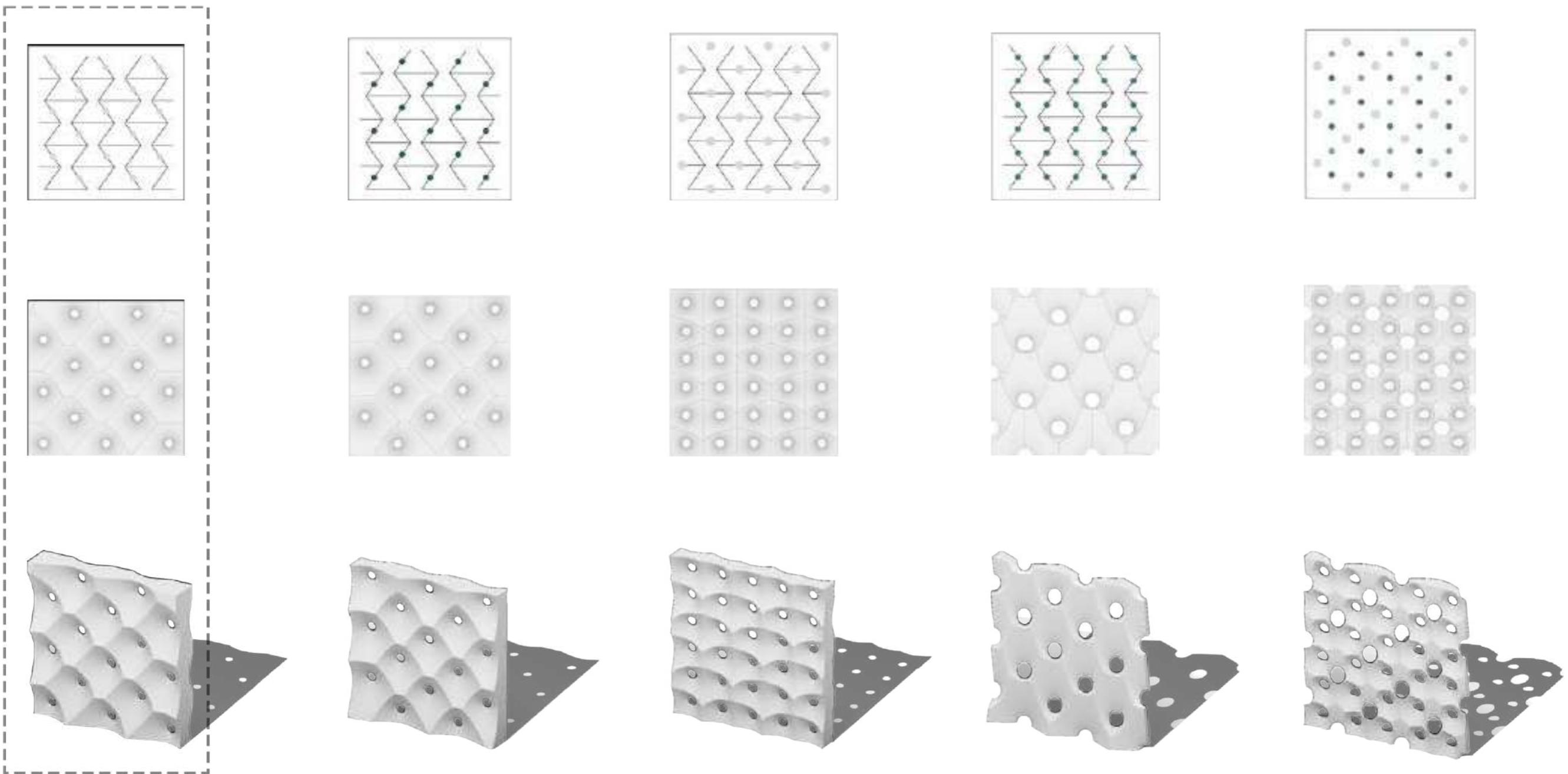
Catalogue

WALL GRID EXPLORATION



SQUARE GRID CATALOGUE

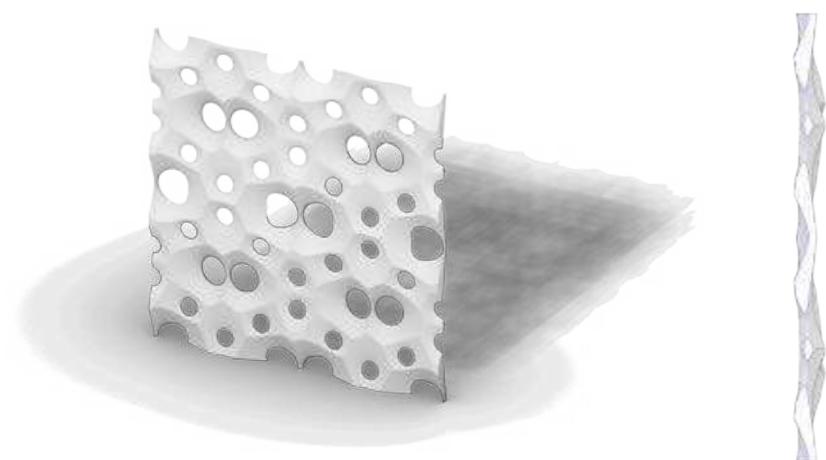
WALL GRID EXPLORATION



TRI GRID CATALOGUE

WALL PERFORMANCE ANALYSIS

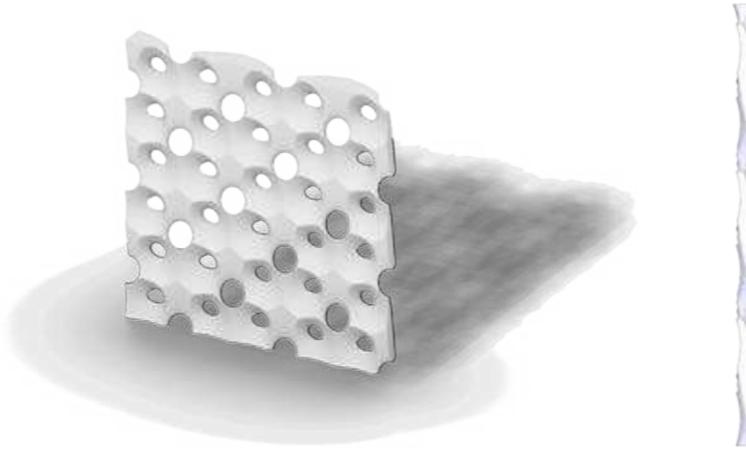
ITERATION -1



Hyperboloid_1
Inner radius:1.8
Outer radius:34.54
Height:14
Asymptote:48.80
Rotation:90
Tilt:+6

Hyperboloid_2
Inner radius:1.1
Outer radius:50.85
Height:12
Asymptote:17.1
Rotation:90
Tilt:+6

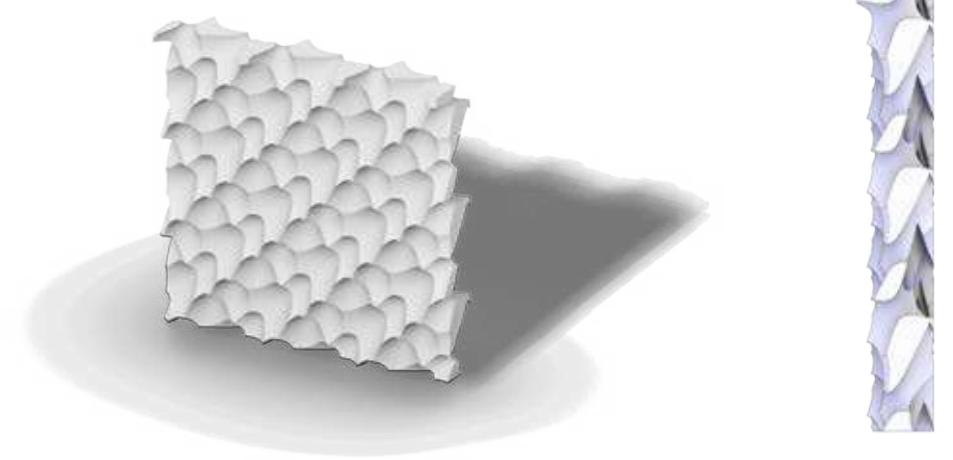
ITERATION -2



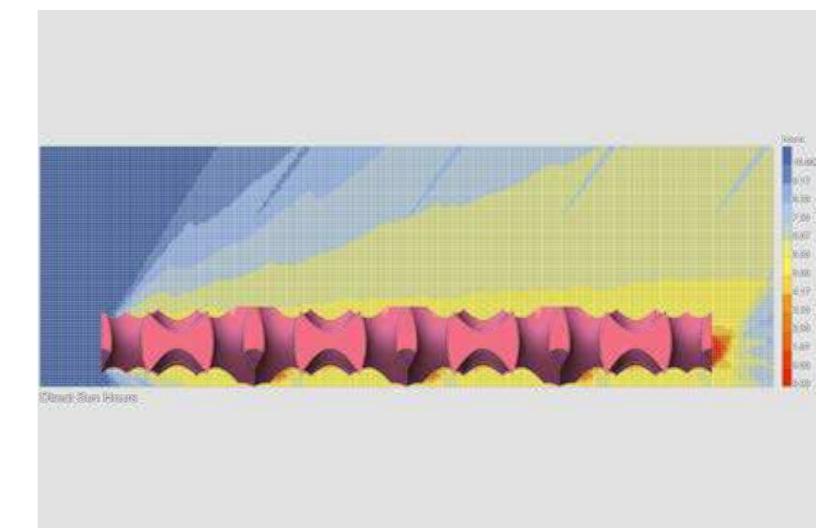
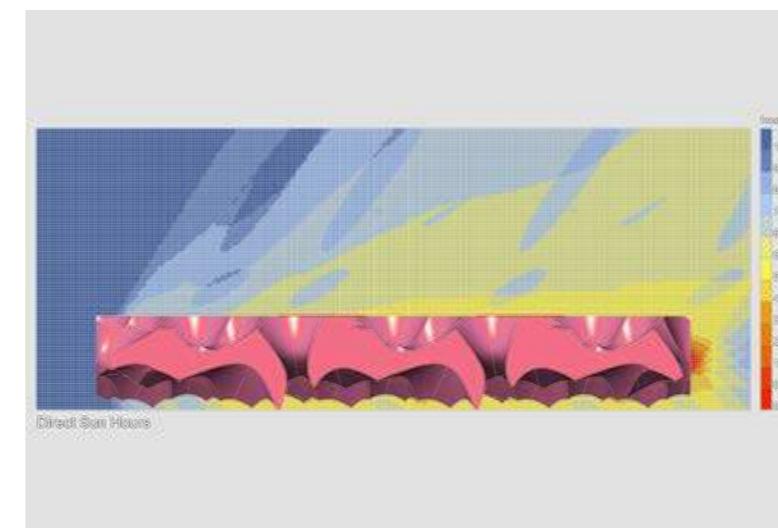
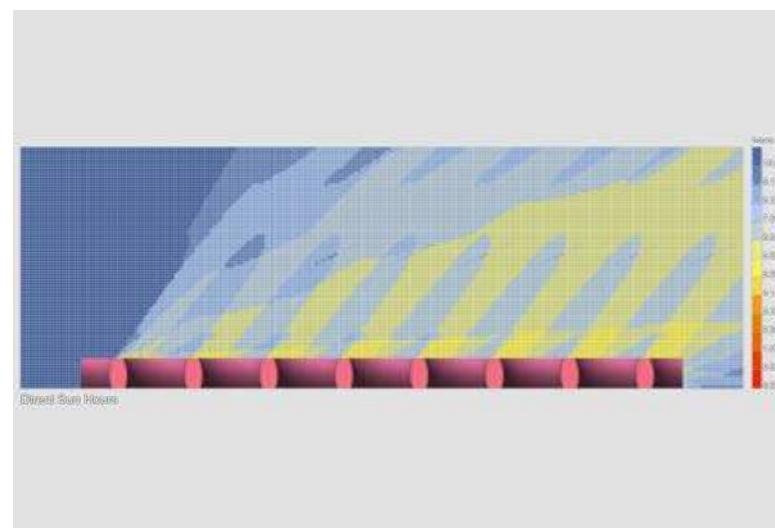
Hyperboloid_1
Inner radius:1.80
Outer radius:28.79
Height:12.42
Asymptote:49.40
Rotation:90
Tilt:-6

Hyperboloid_2
Inner radius:1
Outer radius:17.83
Height:9.66
Asymptote:59.70
Rotation:90
Tilt:-6

ITERATION -3

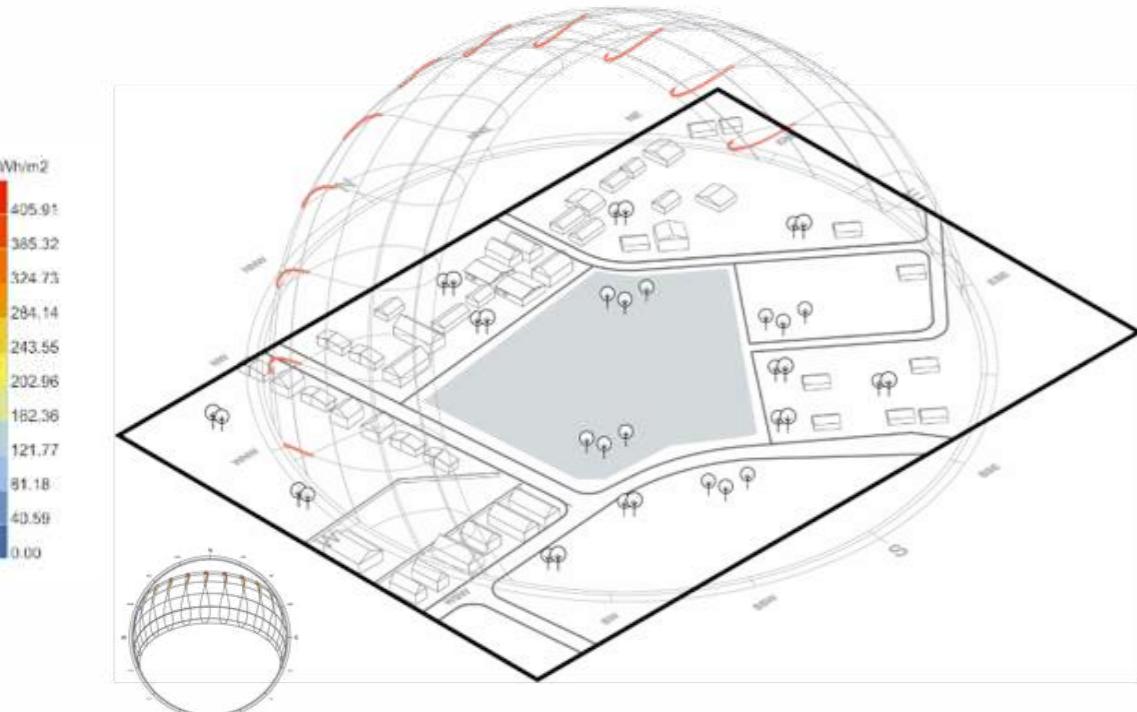
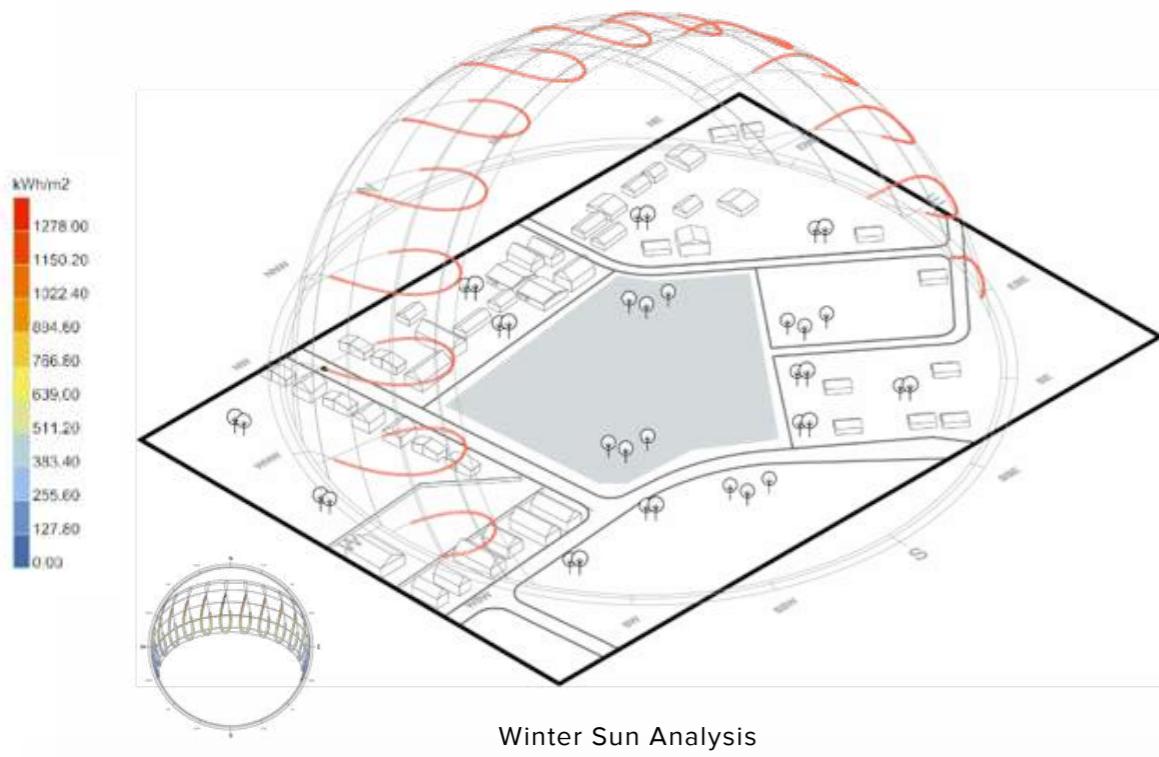


Hyperboloid
Inner radius:1
Outer radius:5.49
Height:6
Asymptote:106.3
Rotation:25.5
Tilt:1.25



RADIATION CATALOGUE

CONTEXT - ANALYSIS



In Cape Town the summers are warm, dry and mostly clear; the winters are long, cold, partly cloudy, and it is windy all the year.



More than 50% (189 days a year) of the time you will experience temperatures of over 21 degrees in Cape Town.



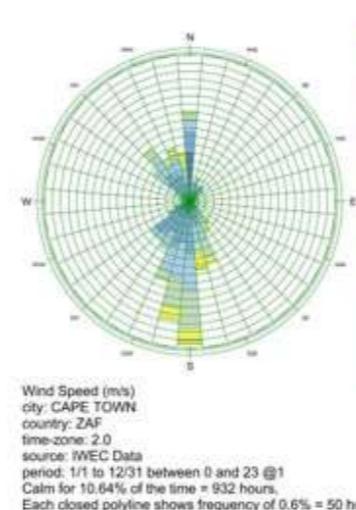
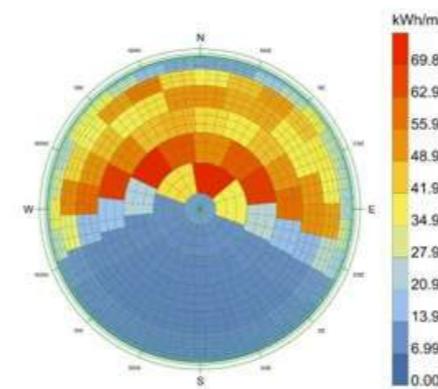
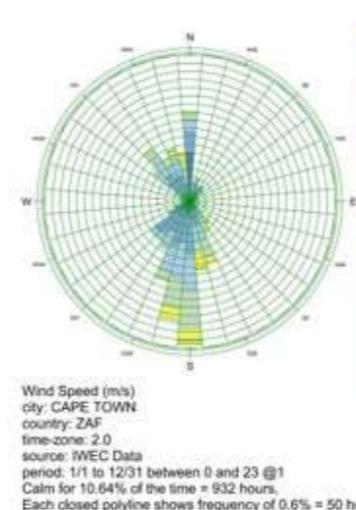
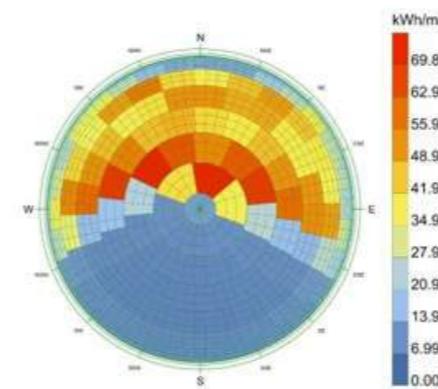
Influence of the ocean, though sometimes a hot and dry wind called Berg , able to raise the temperature to around 35 °C, blows from the mountains.



In the winter is mild, there can be some cold and windy days. On the coldest nights of the year, the temperature can drop to around freezing.

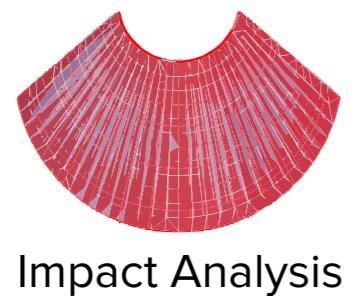
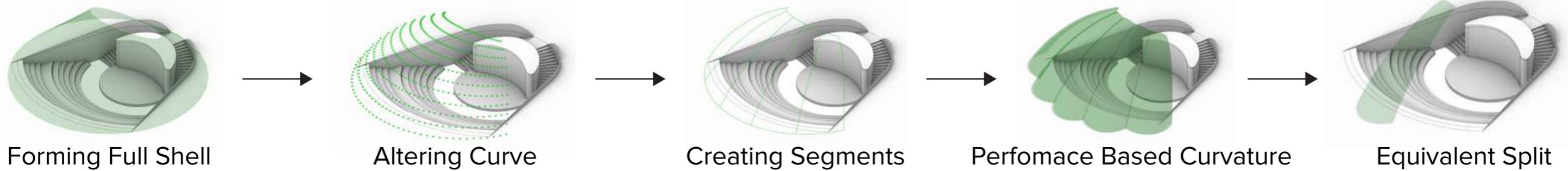


The average temperature of the coldest month (July) is of 13°C , that of the warmest month (February) is of 22°C.

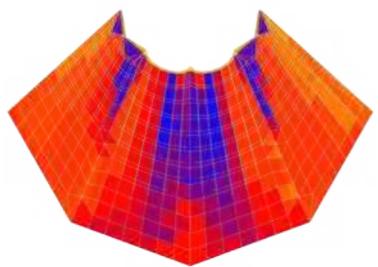


ENVIRONMENTAL ANALYSIS

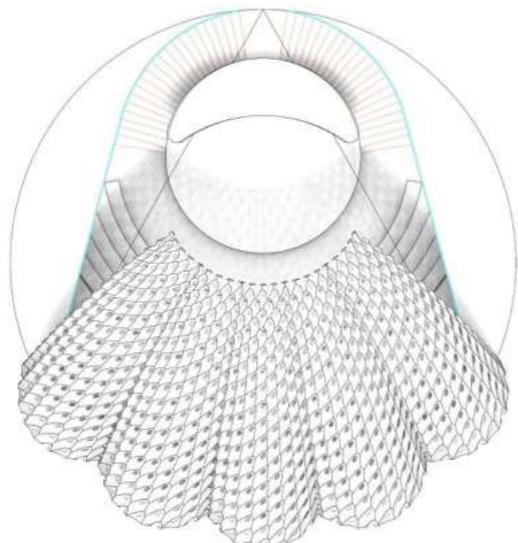
Form Finding



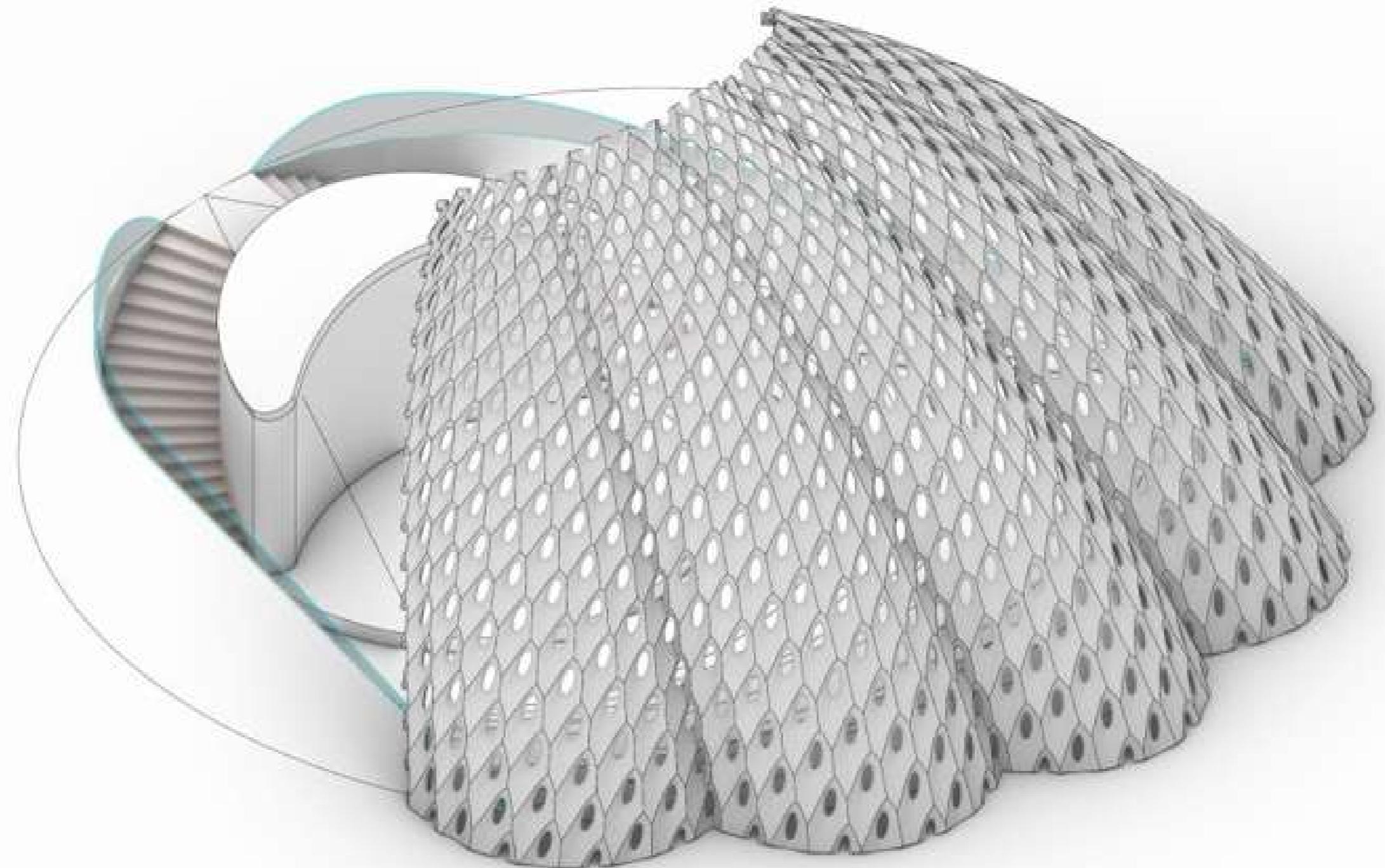
Impact Analysis



Context Effect

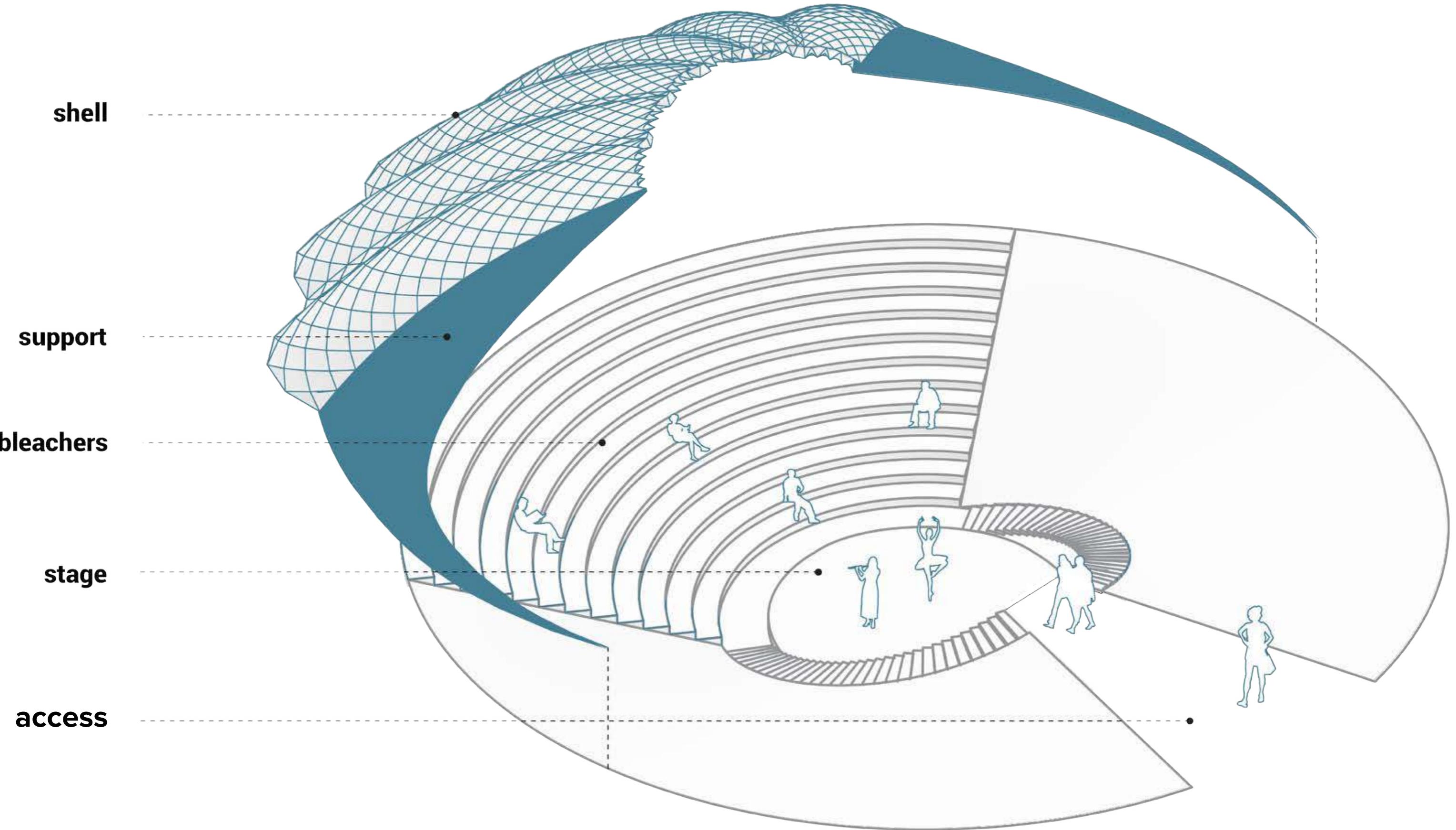


Top View

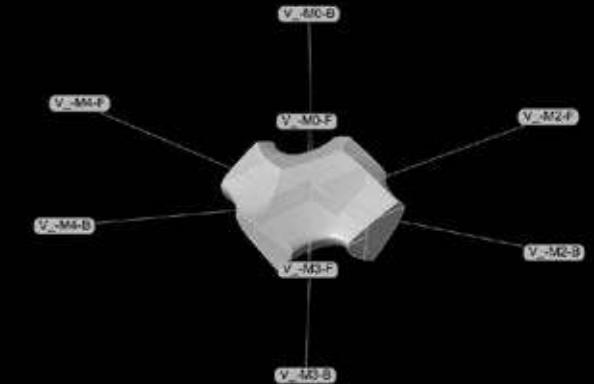
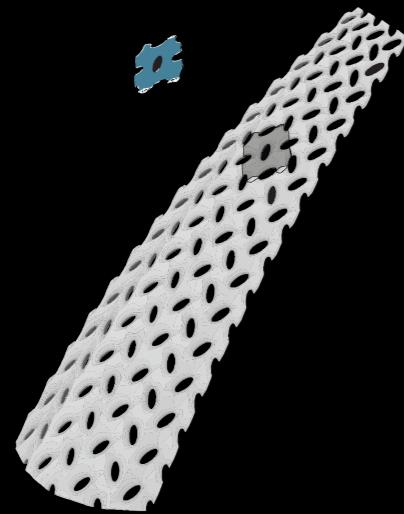


Performance Based Design

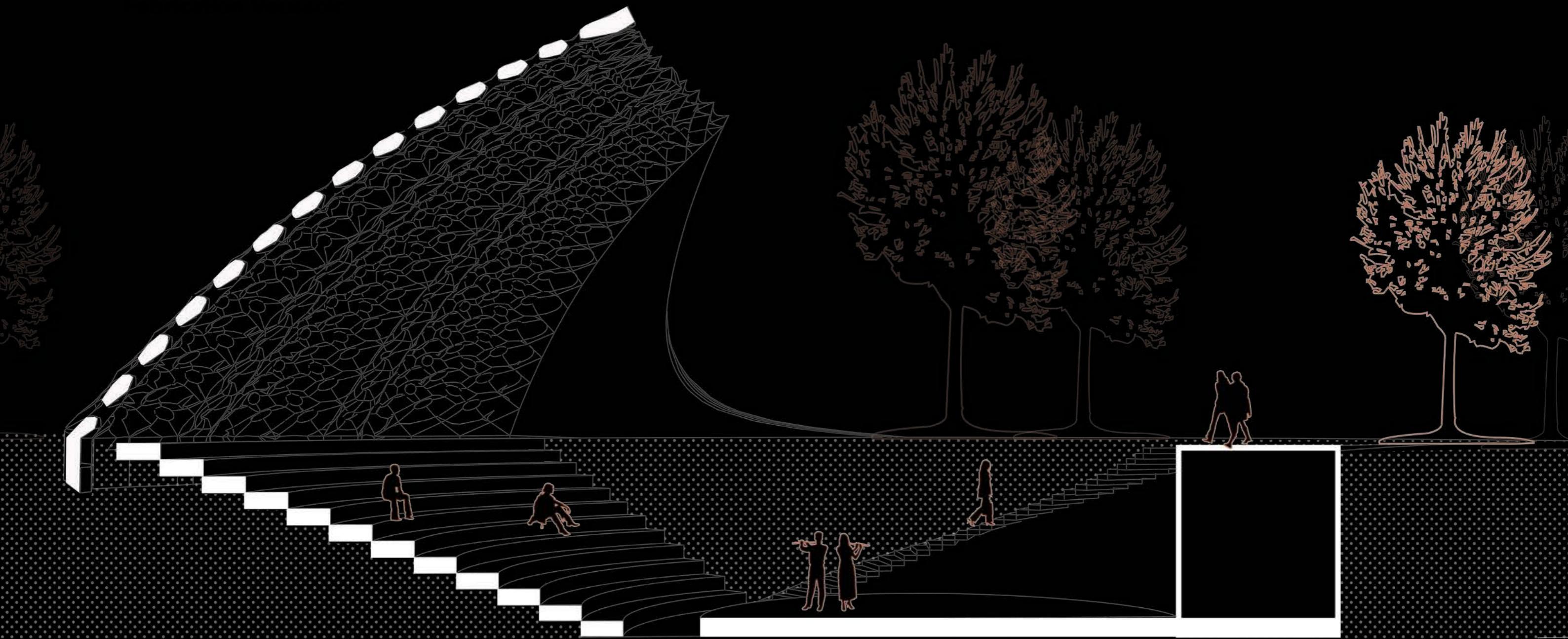
Structure Composition



Fabrication



Youssoir Selection

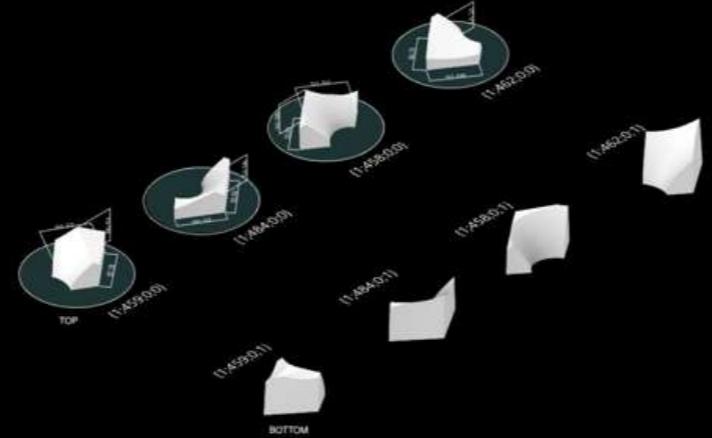


SECTION

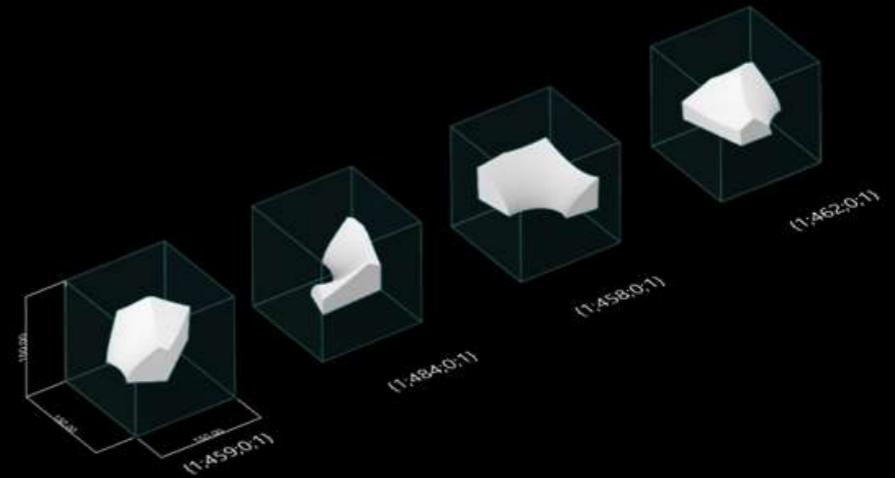
FABRICATION



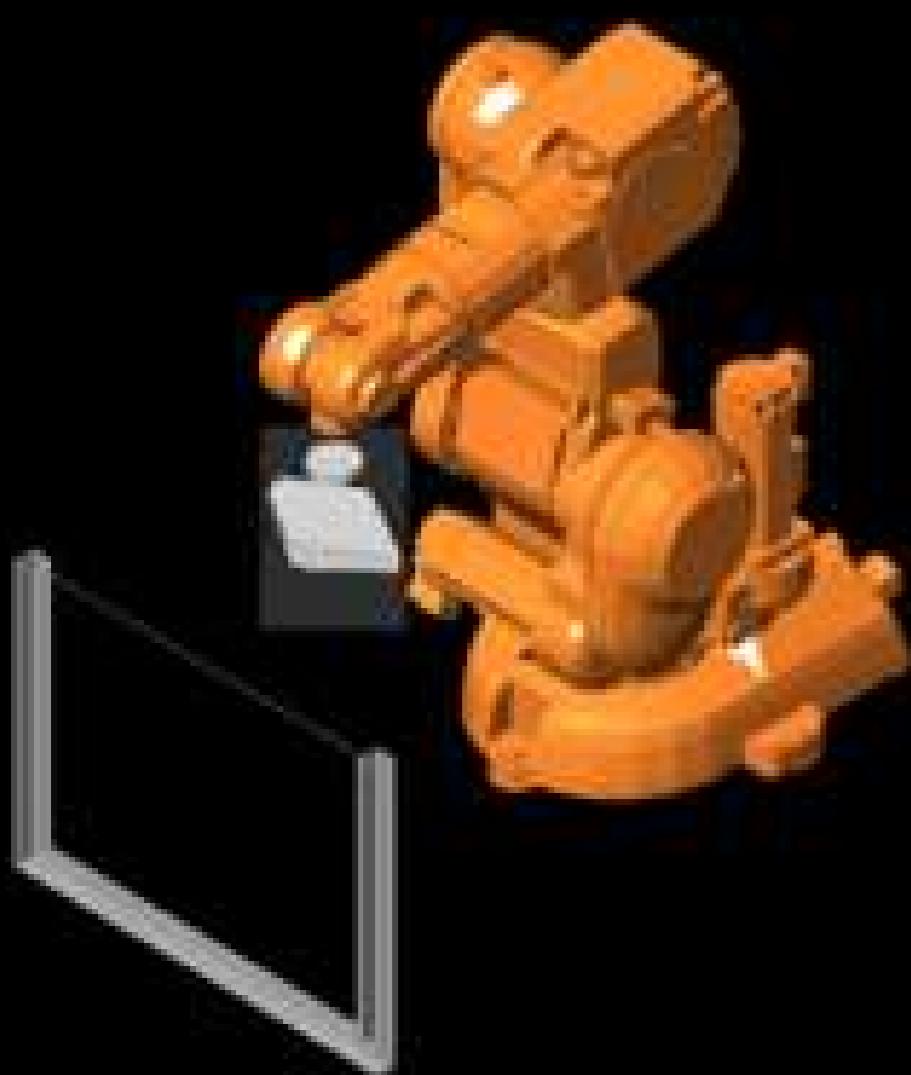
Module



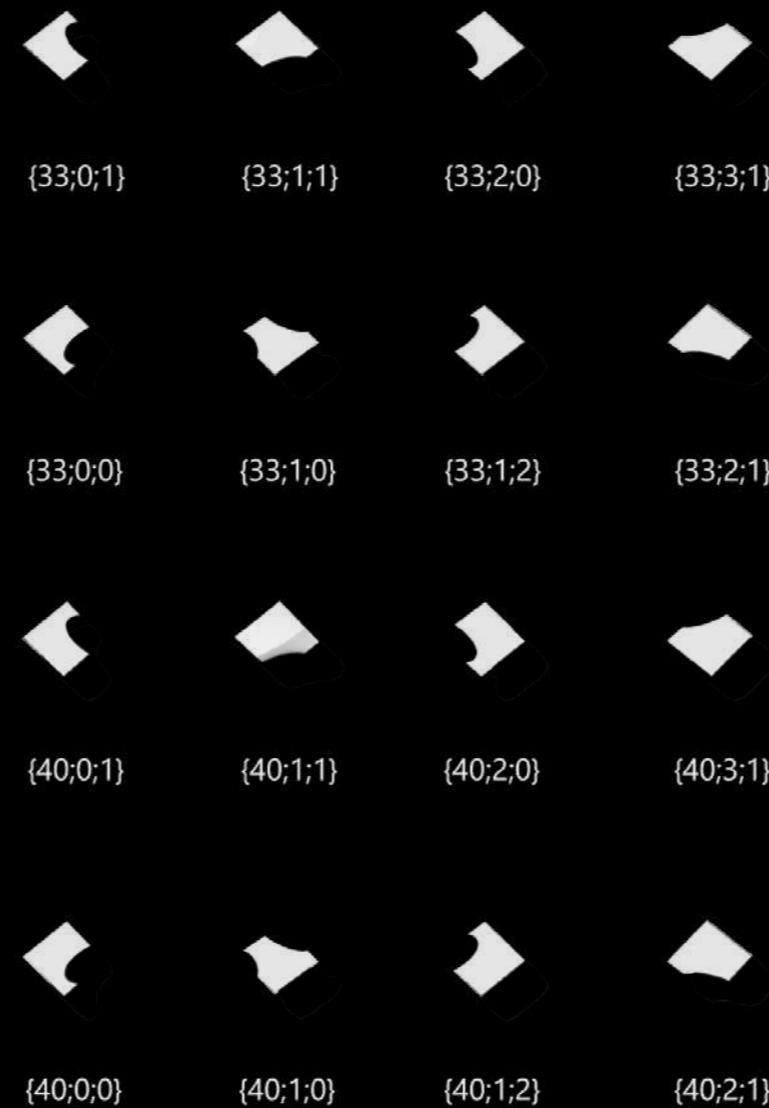
Voussoir Cuts



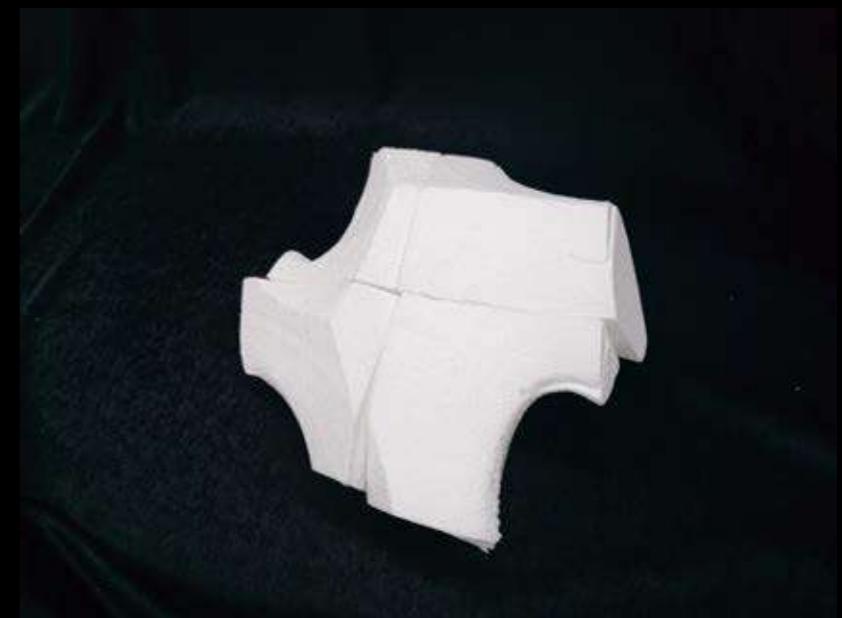
Sampling For Robotic Wire Cut



Robotic Fabrication - Average Timing 13 Mins/P



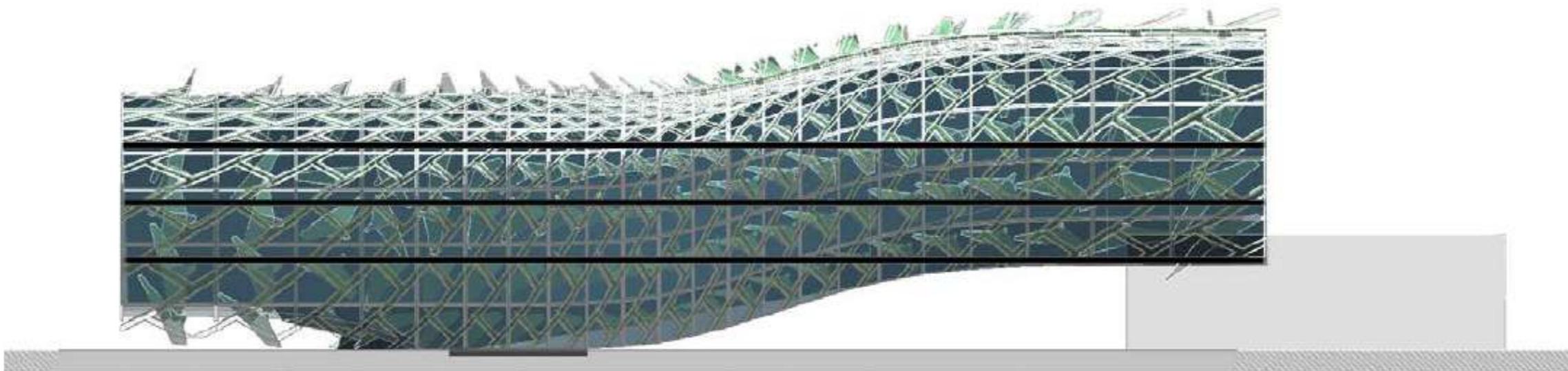
Fabrication Catalogue

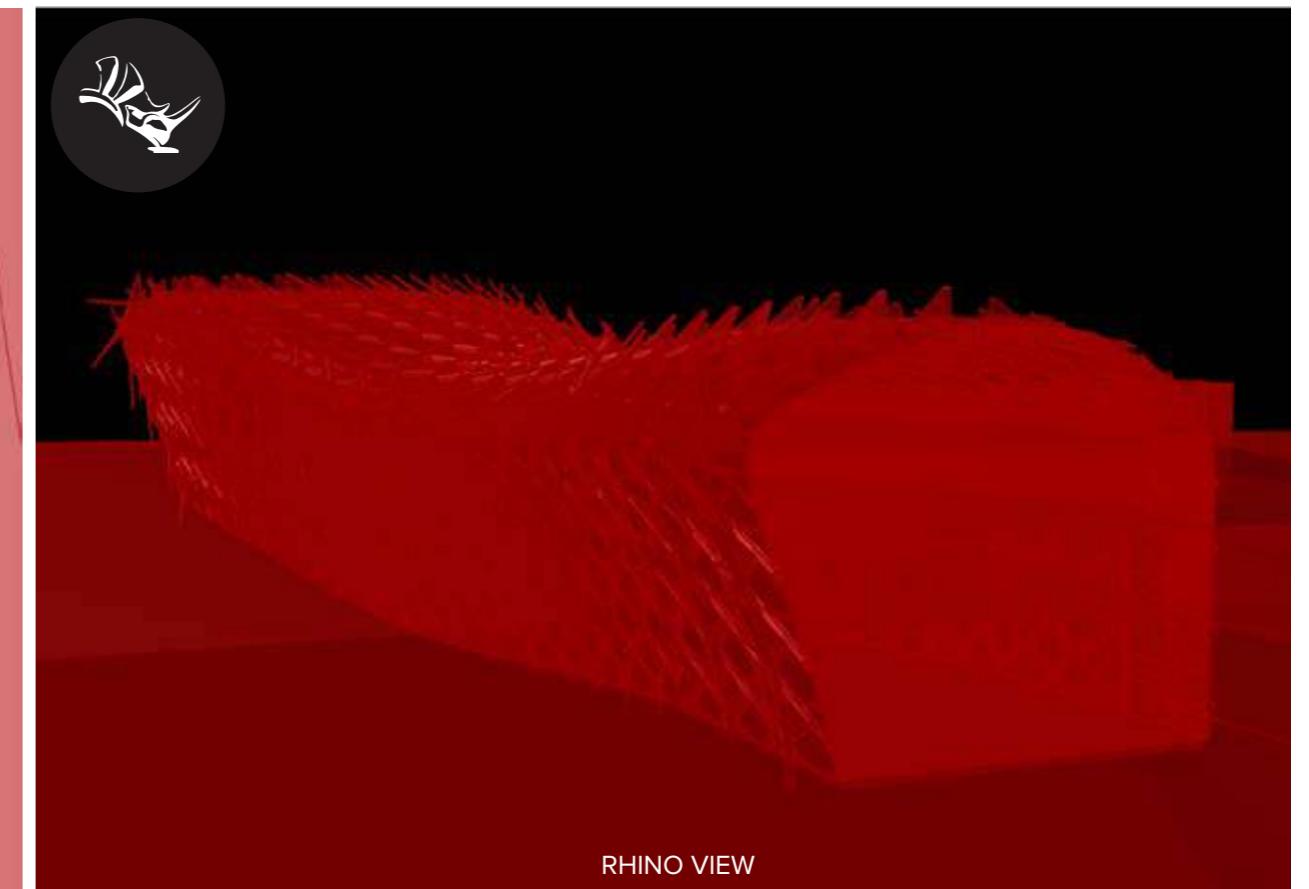
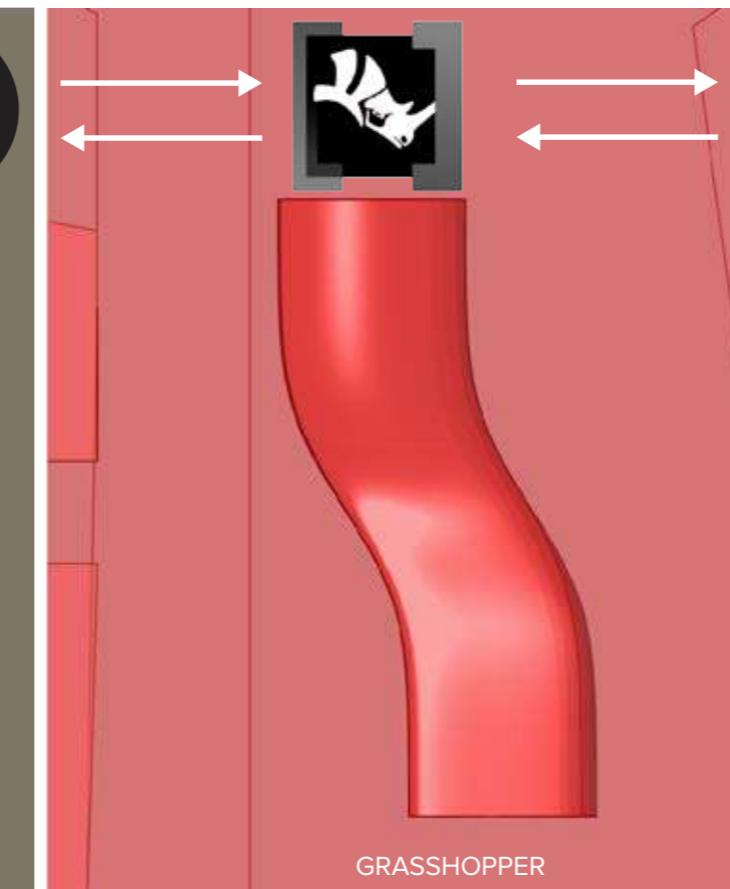
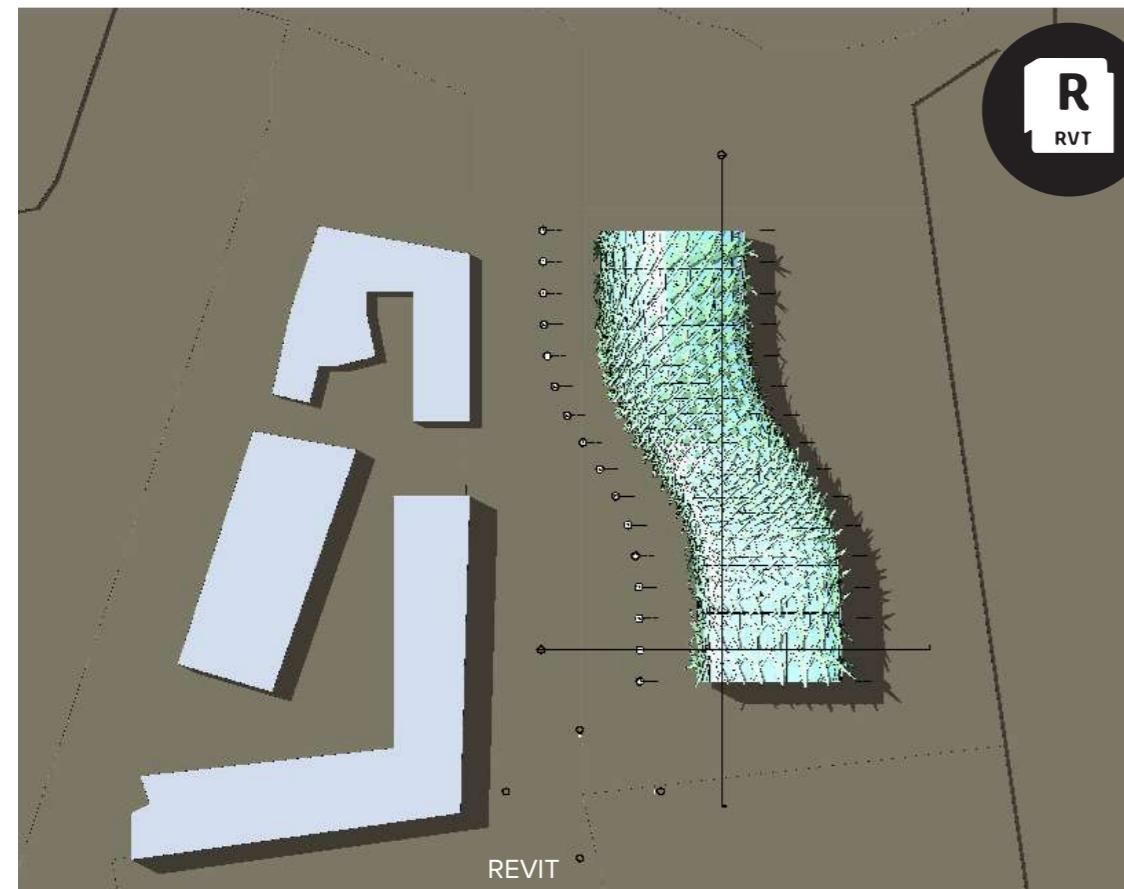
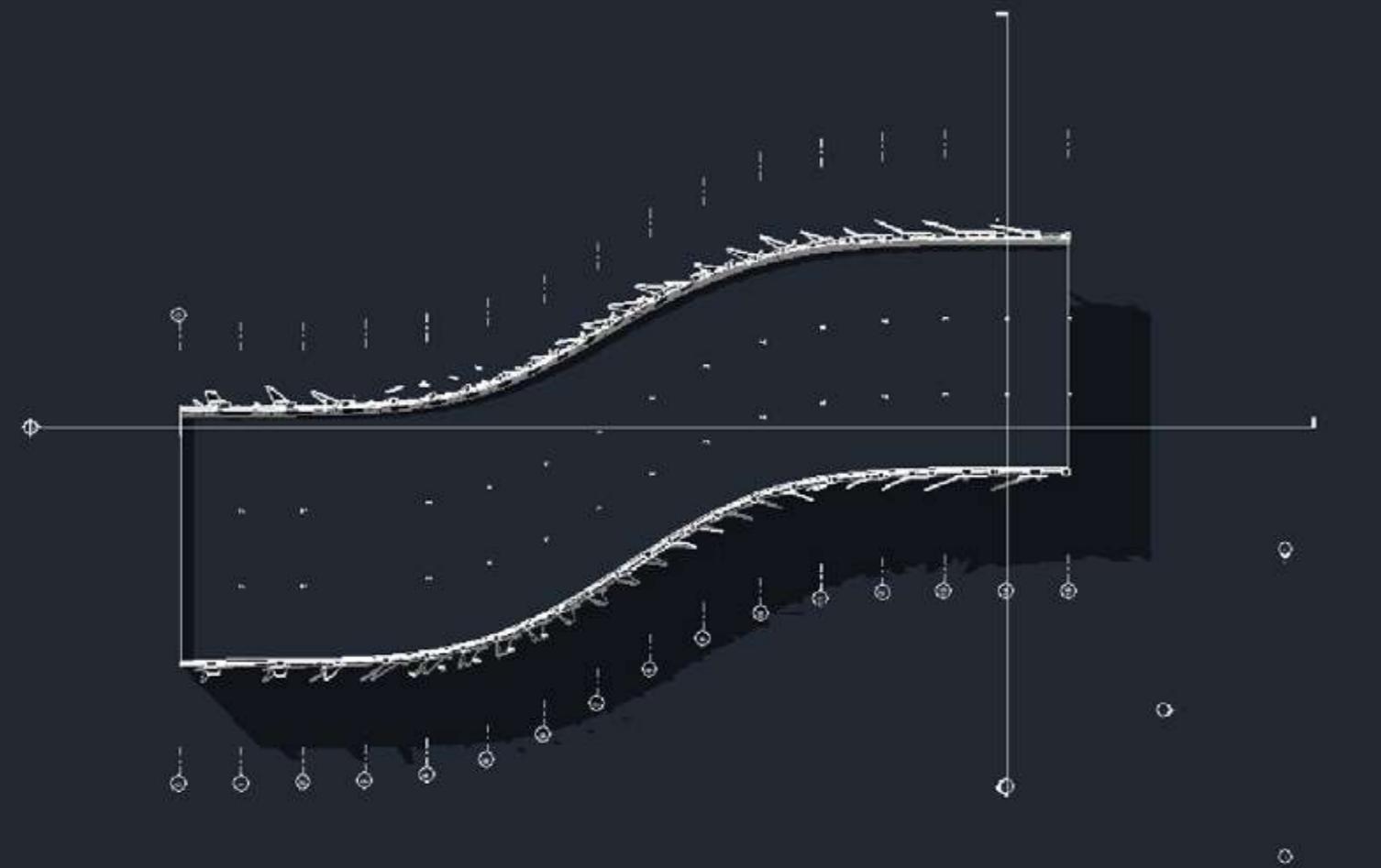


Physical Prototype

Rhinolnside

Technical Skills Explorations

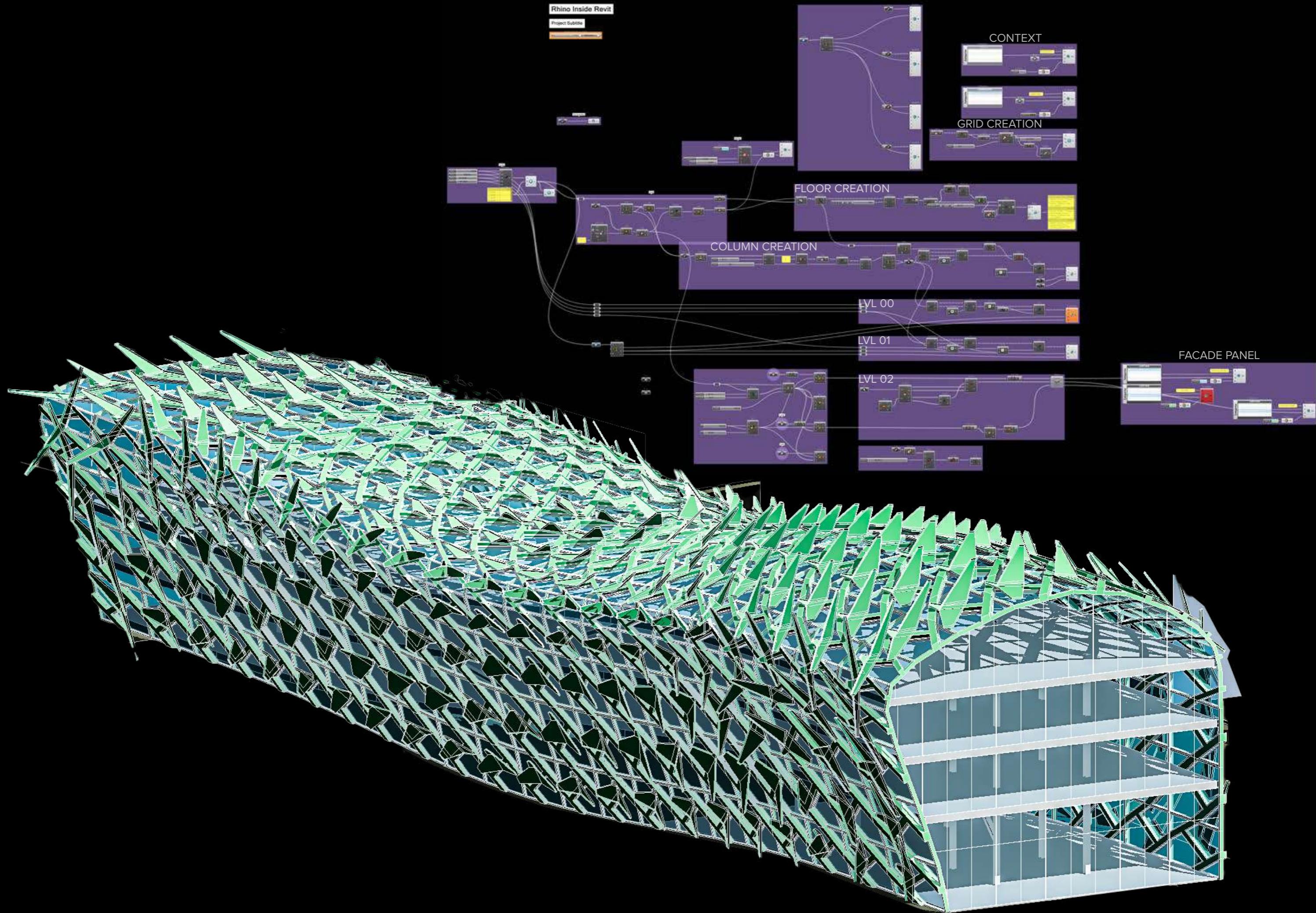




REVIT

GRASSHOPPER

RHINO VIEW

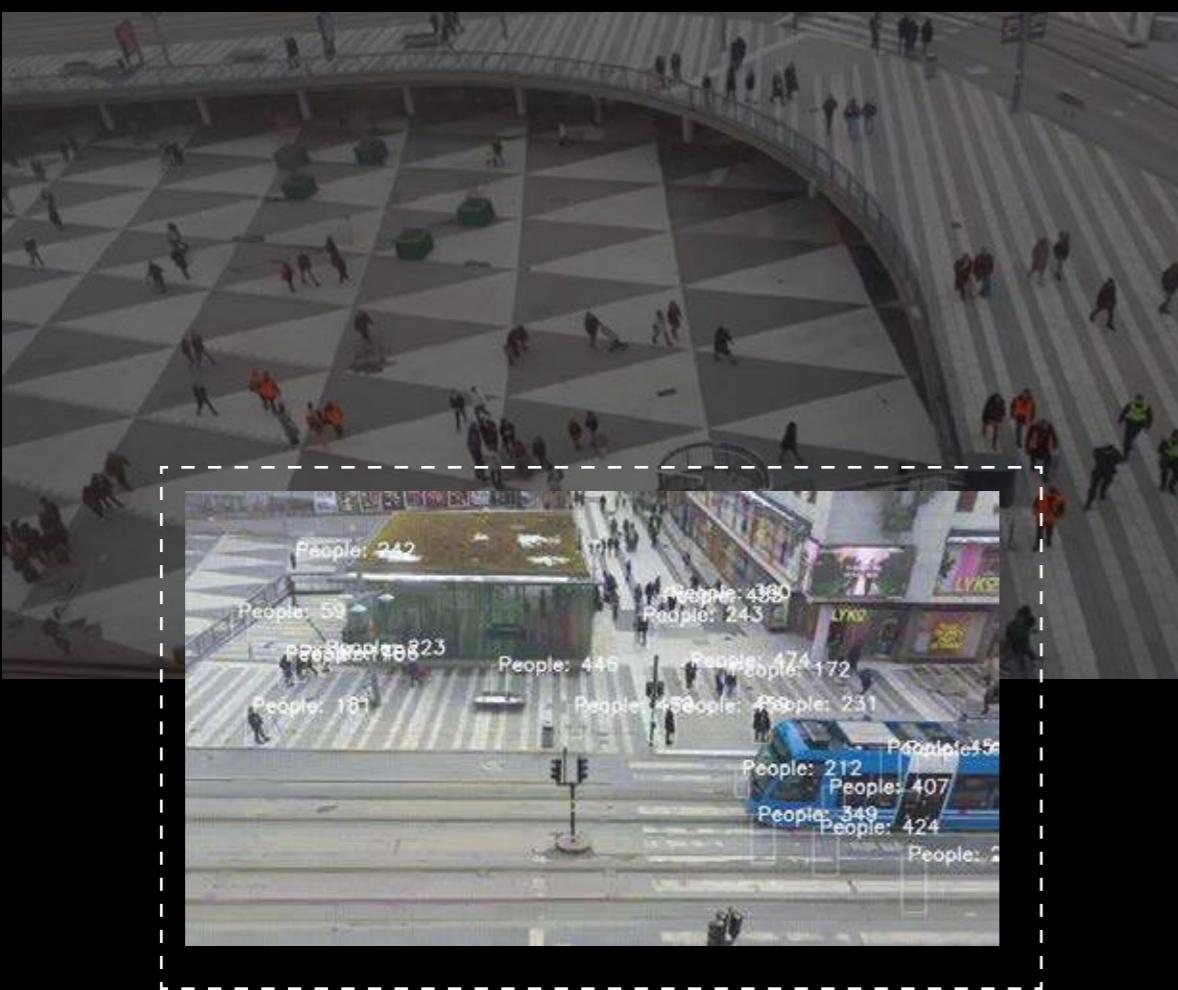


Object Tracking Using Machine Learning

The idea is to use machine learning algorithms to search through the given image to detect objects.



in a video clip using the principles of the methods applied in detecting objects in images.



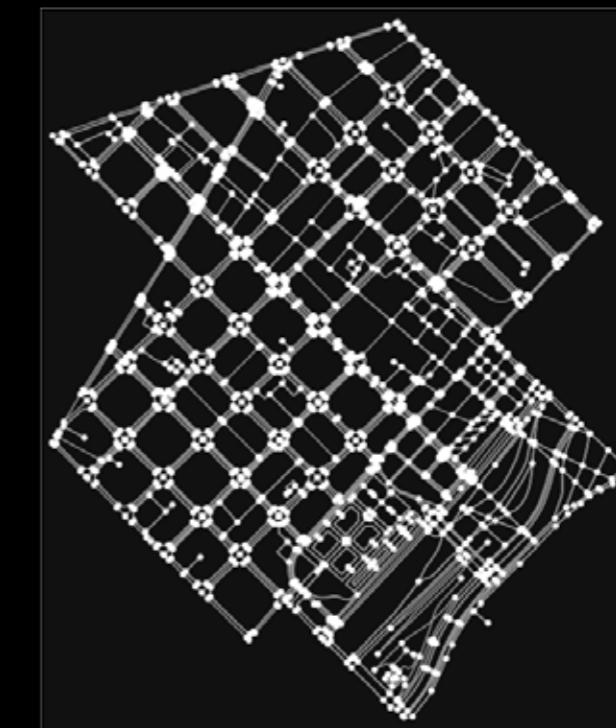
The Given clip is deducted into a number of **frames**.

Using **open cv** library to read the image as numpy array.

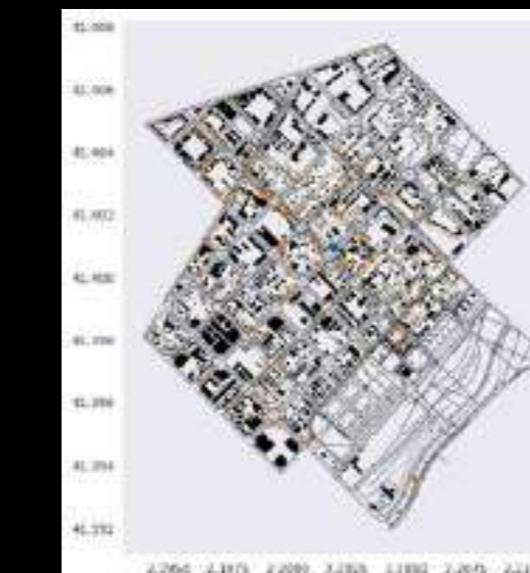
Instanciating **existing trained models** on predicting the primary subjects in this case humans.

Based on the **overlap** of similar pixels from the previous frame assiging ids and creating **object tracking** applications.

Geo Spatial Analytics



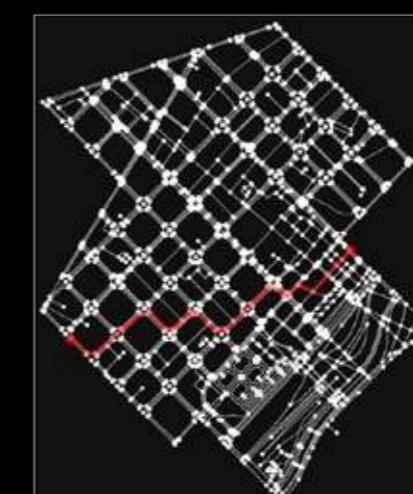
Conducting a Spatial study in an urban scenario to validate the walkability of a particular province in barcelona and finding shortest route to such facilities



Plotting Nearest facilities such as restaurants from predominantly floating population areas

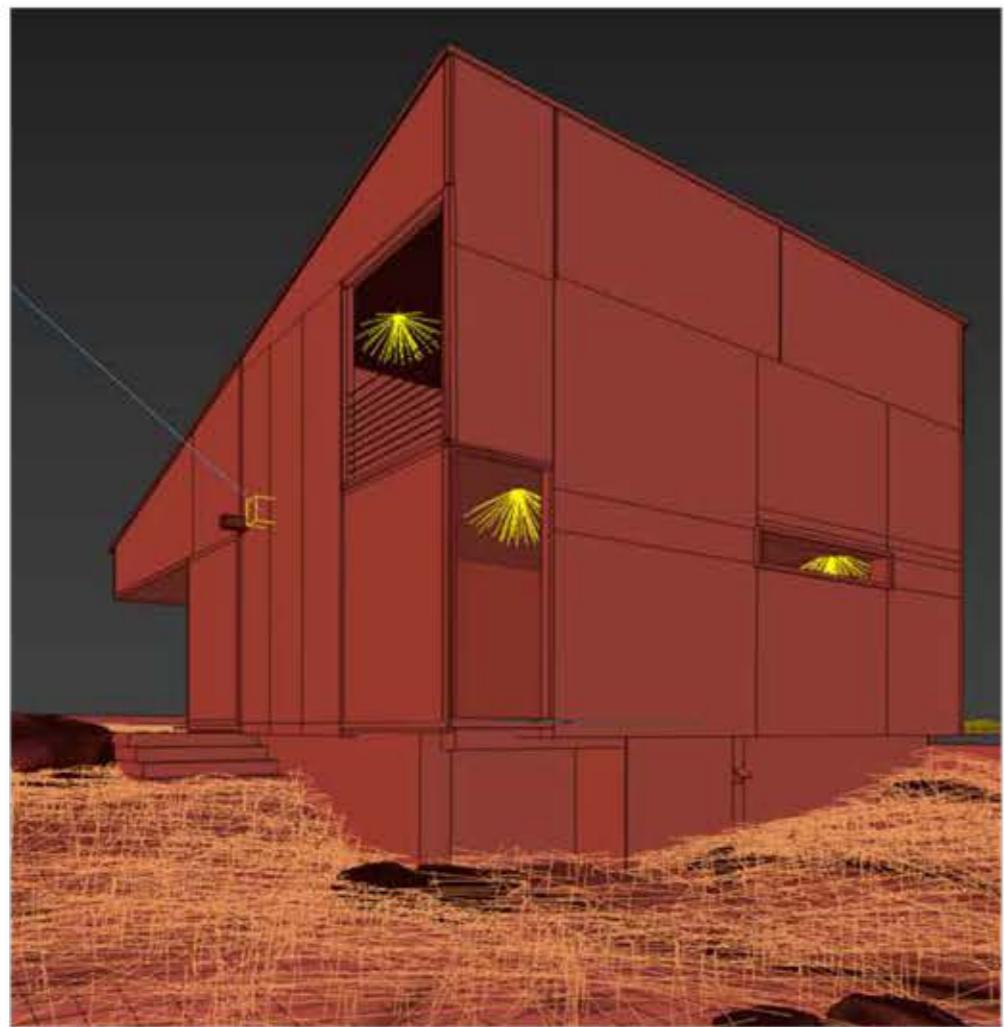


Defining range in order to choose various location of interests



Using node connection and shortest path algorithms to create a shortest path from the origin and destination considering the nodes





THANK YOU!

Visualisation

https://www.instagram.com/mesh_and_maps/

Archives

<https://issuu.com/manojmunch/docs/>