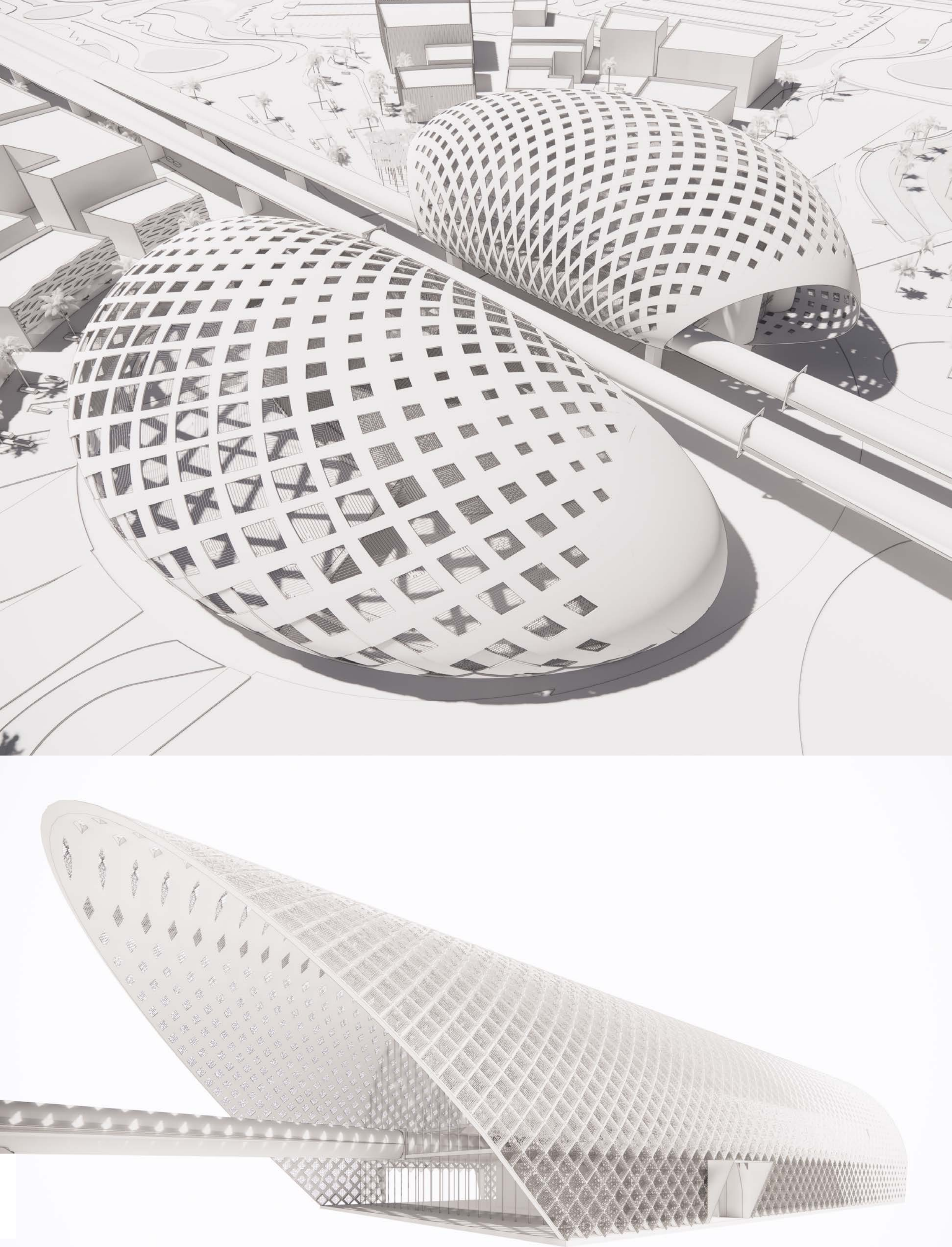
DANIEL KRAJNIK

M.Arch (RIBA/ARB Part 2)

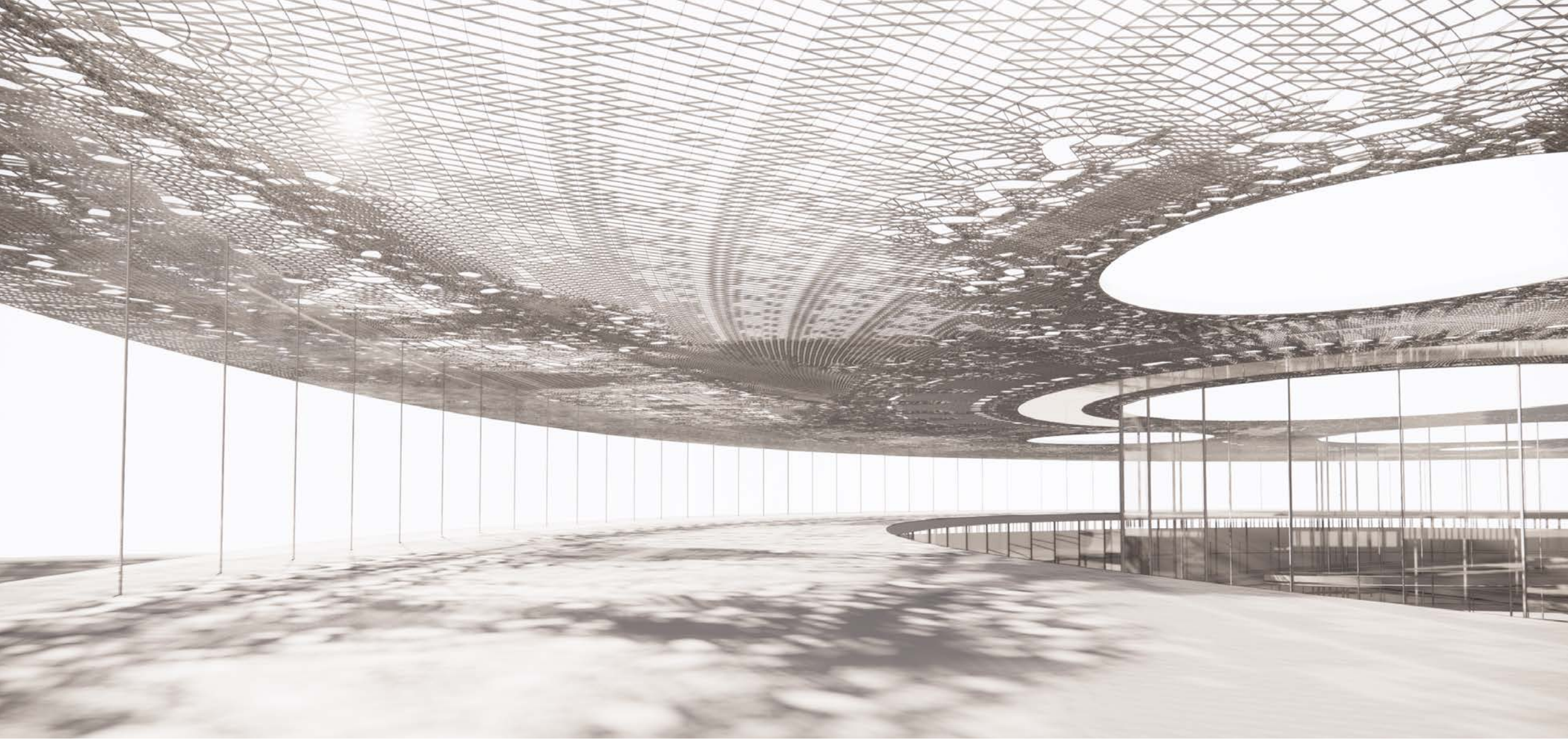


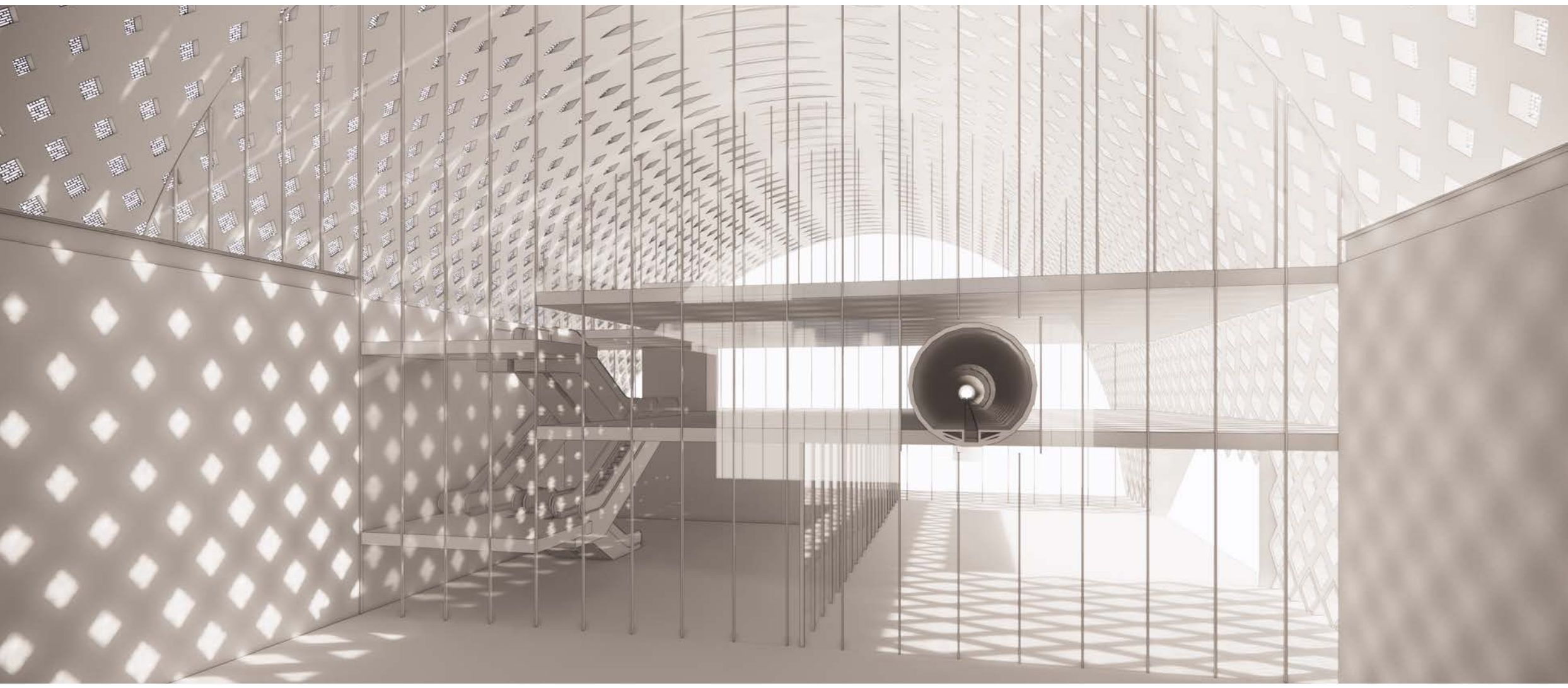
PERKINS & WILL

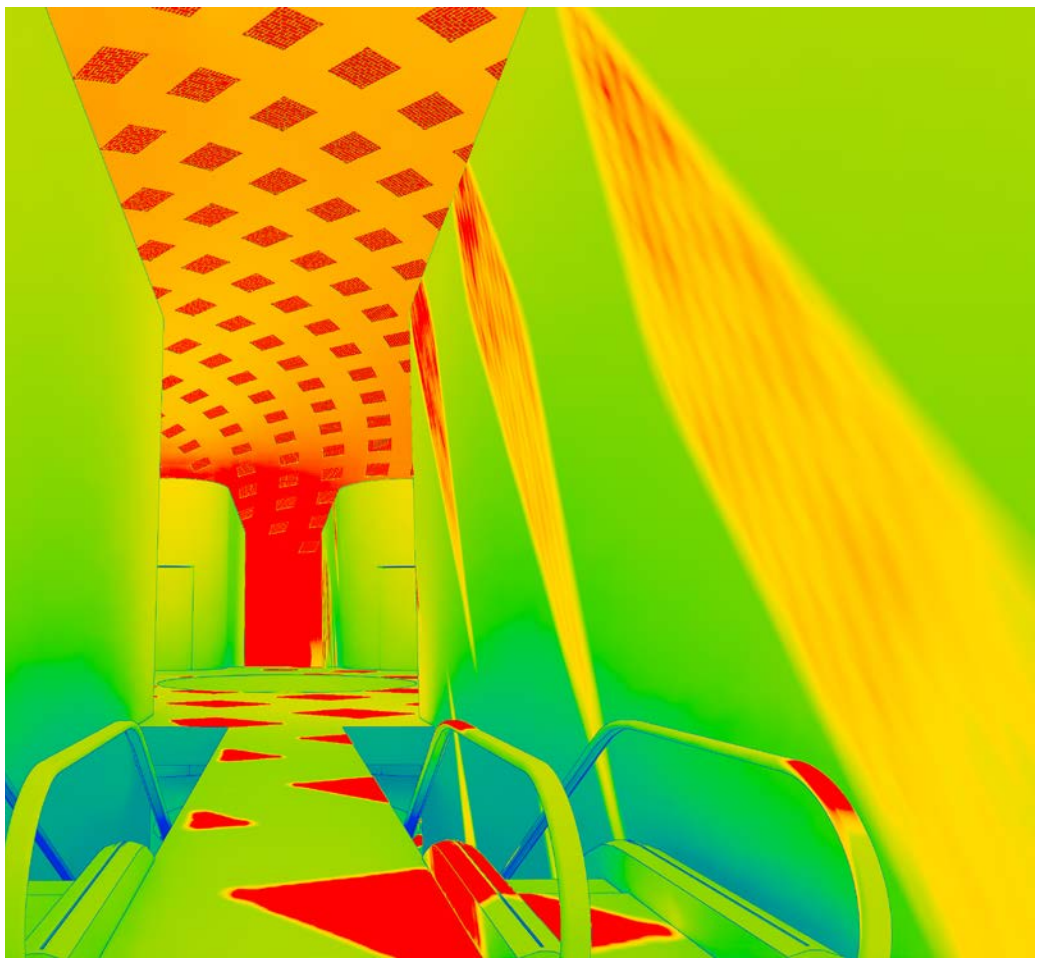
Hyperloop TT

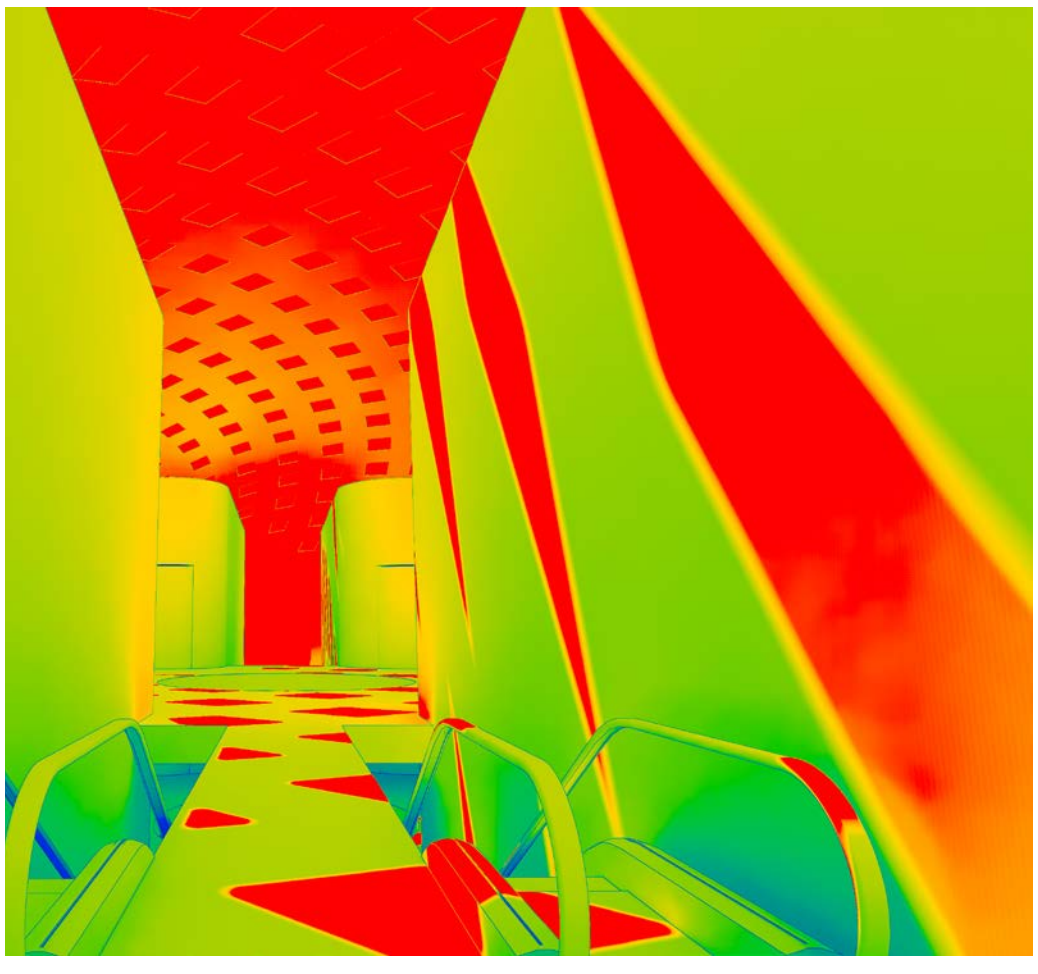
Experience Centre, Terminal, Infrastructure

Led by engineering firm "Dar Al-Handasah" our team picked up the project of architecture for Hyperloop track from Abu-Dhabi to Dubai and modified its design. My responsibility included three complex shells and facade system for the "Ultimate Station".









PERKINS & WILL

Hyperloop TT

Experience Centre, Terminal, Infrastructure

I conducted initial solar studies explaining impact of the new shading system that significantly reduced amount of insolation in the stations.

PERKINS & WILL

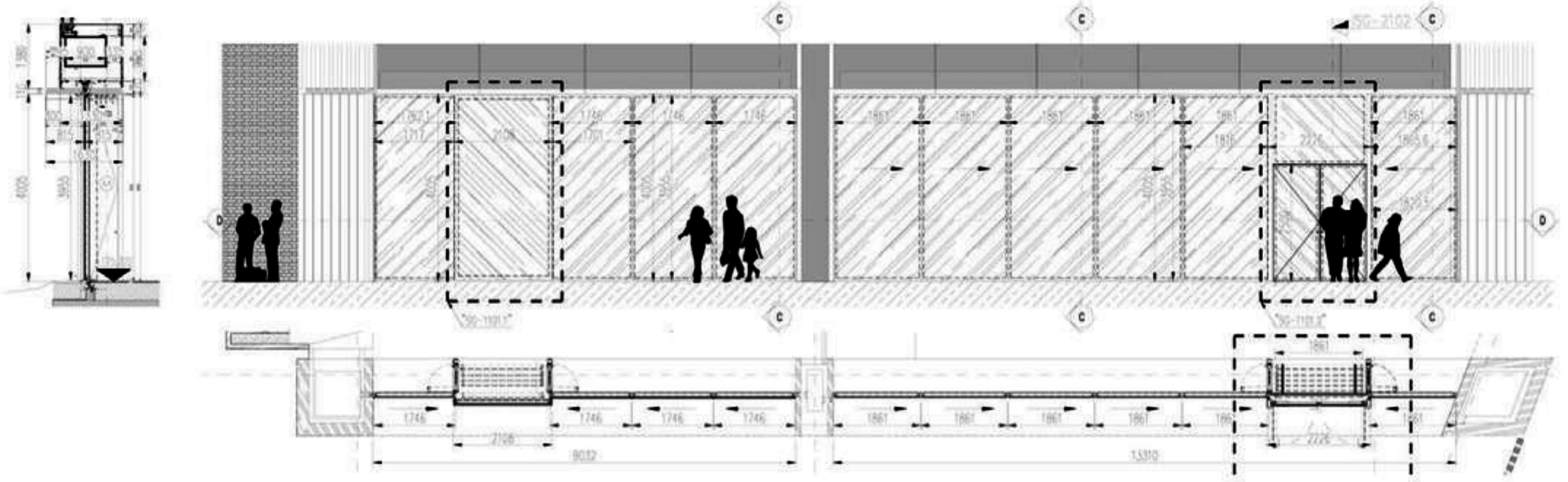
Vlorë International Airport

Proposal for the city of Vlorë in Albania's international airport. Short three days long modelling exercise that was further coordinated between the team and relevant parties.

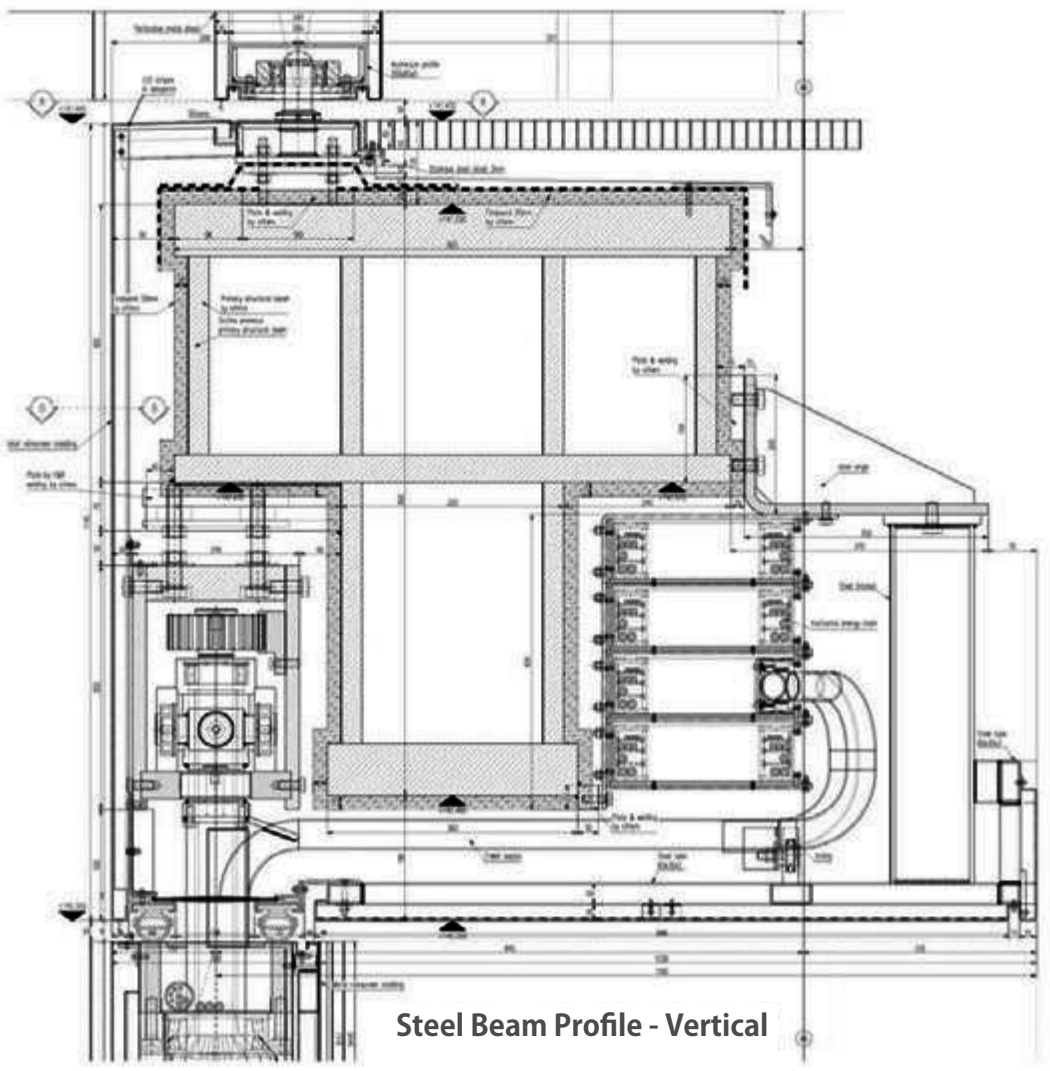
ORMS ARCHITECTS

St. Giles Mixed-Use Events Space

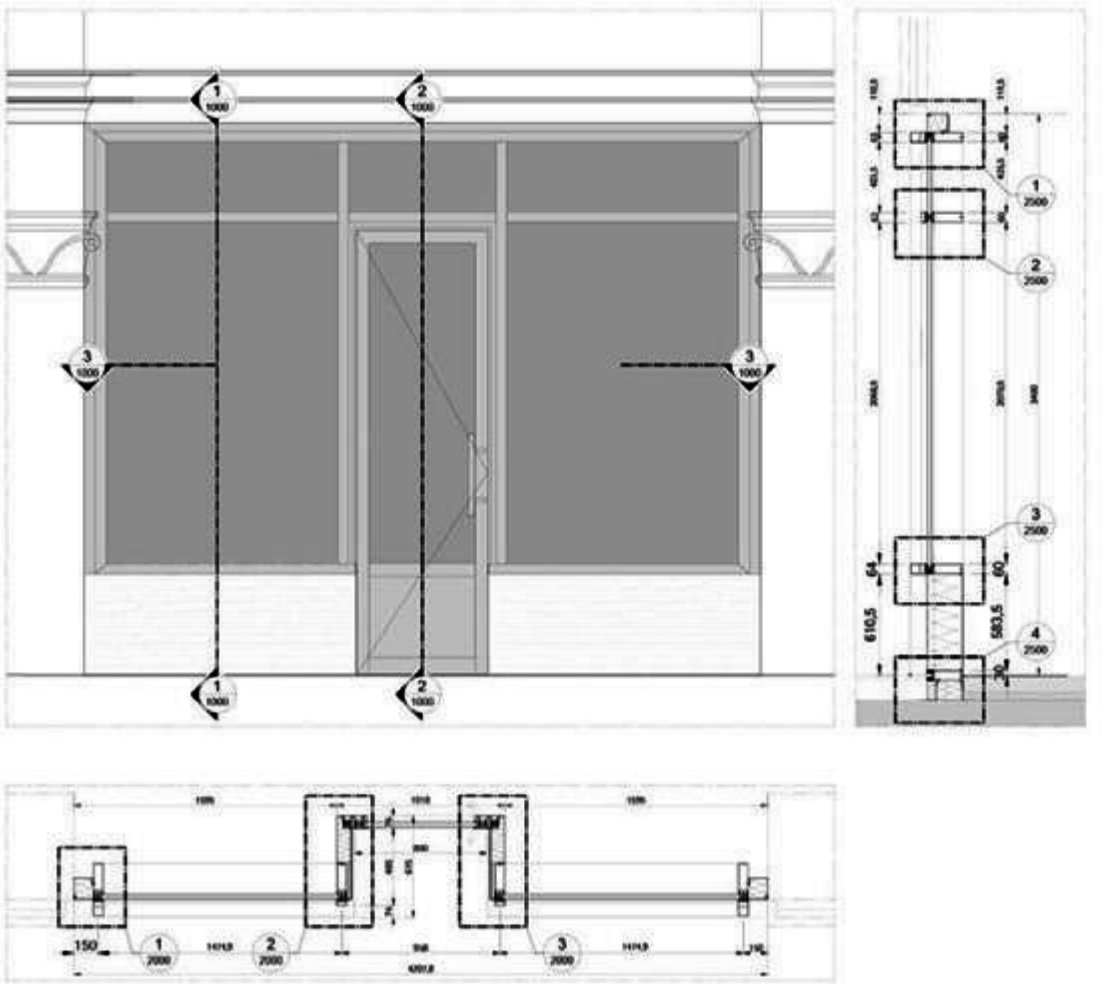
Situated at the crossroads of Oxford Street, Tottenham Court Road, New Oxford Street and Charing Cross Road with the potential of more than 200,000 visitors a day from the newly expanded Tottenham Court Road station



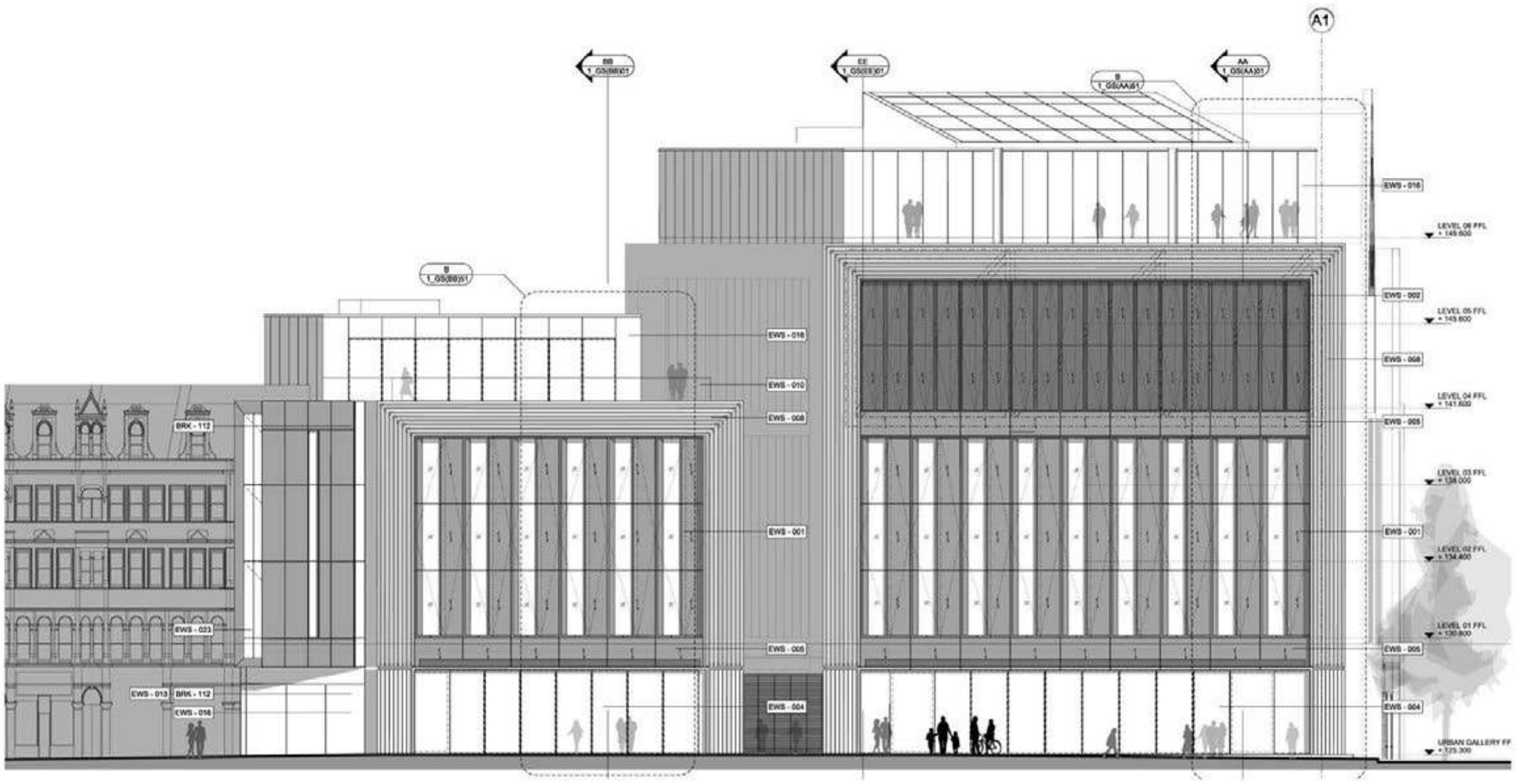
Sliding Doors - Urban Gallery



Steel Beam Profile - Vertical



External Wall System - Shop Fronts

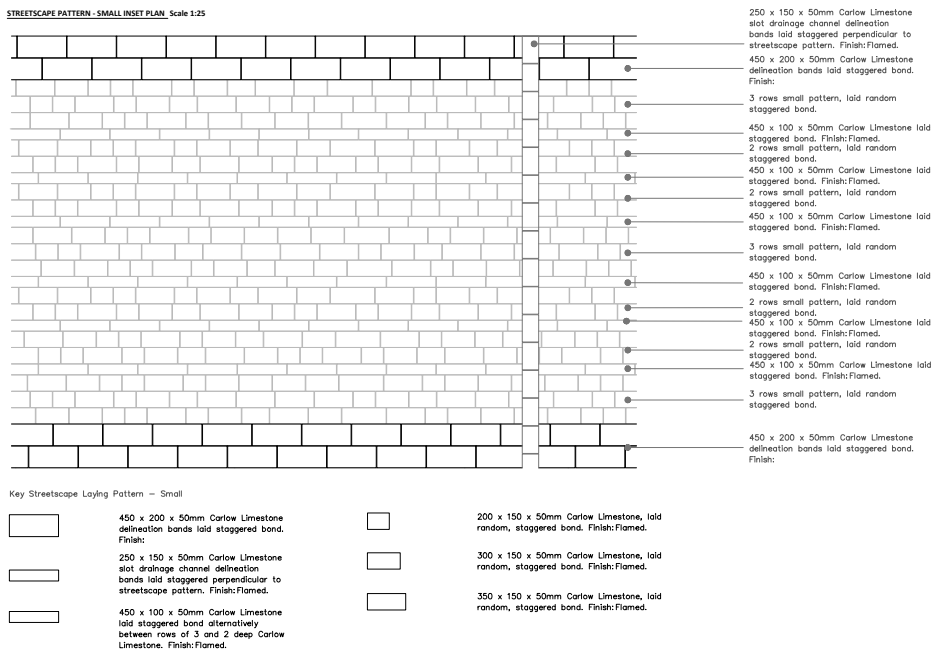


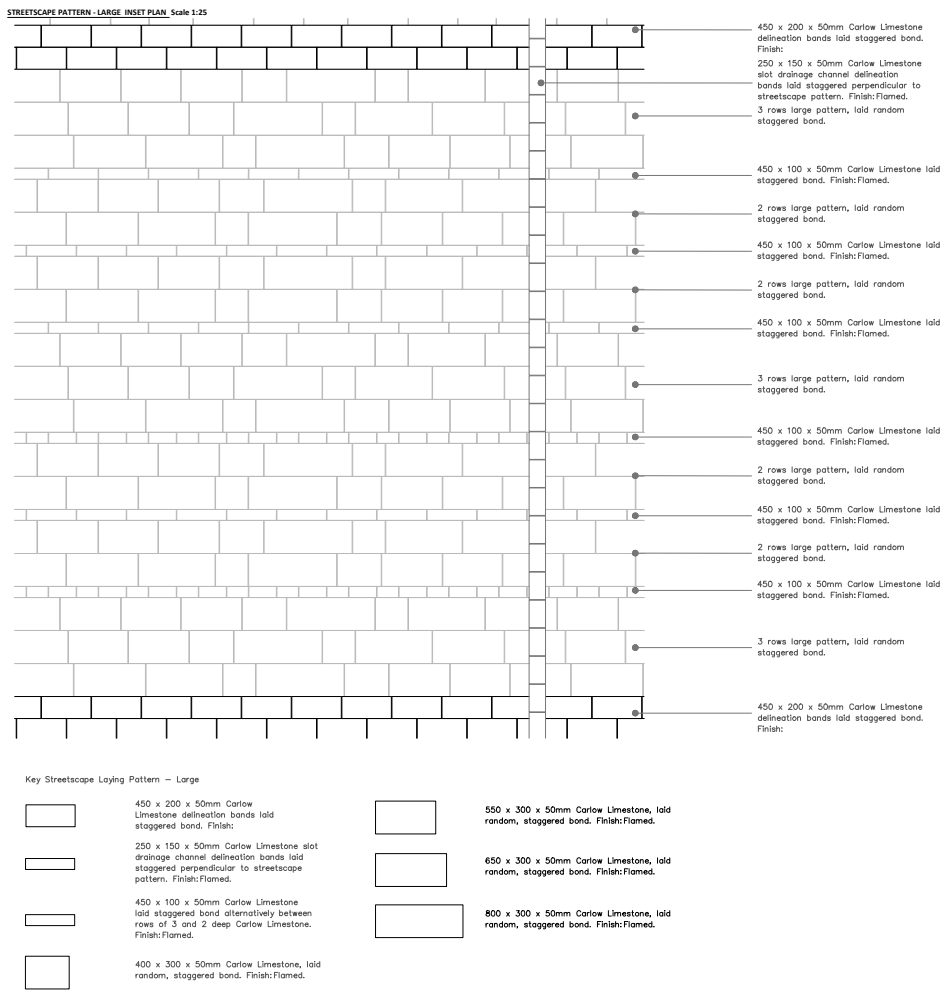
ORMS ARCHITECTS

St. Giles Circus - Detail Drawings

Detail Drawings produced using Microstation and then translated into BIM model with Revit Architecture. Pre-construction services agreement was made with the facade contractor Frener Reifer, who helped us prepare design for the retractable metal fins of the main facade.

Hard Landscape Materials Plan

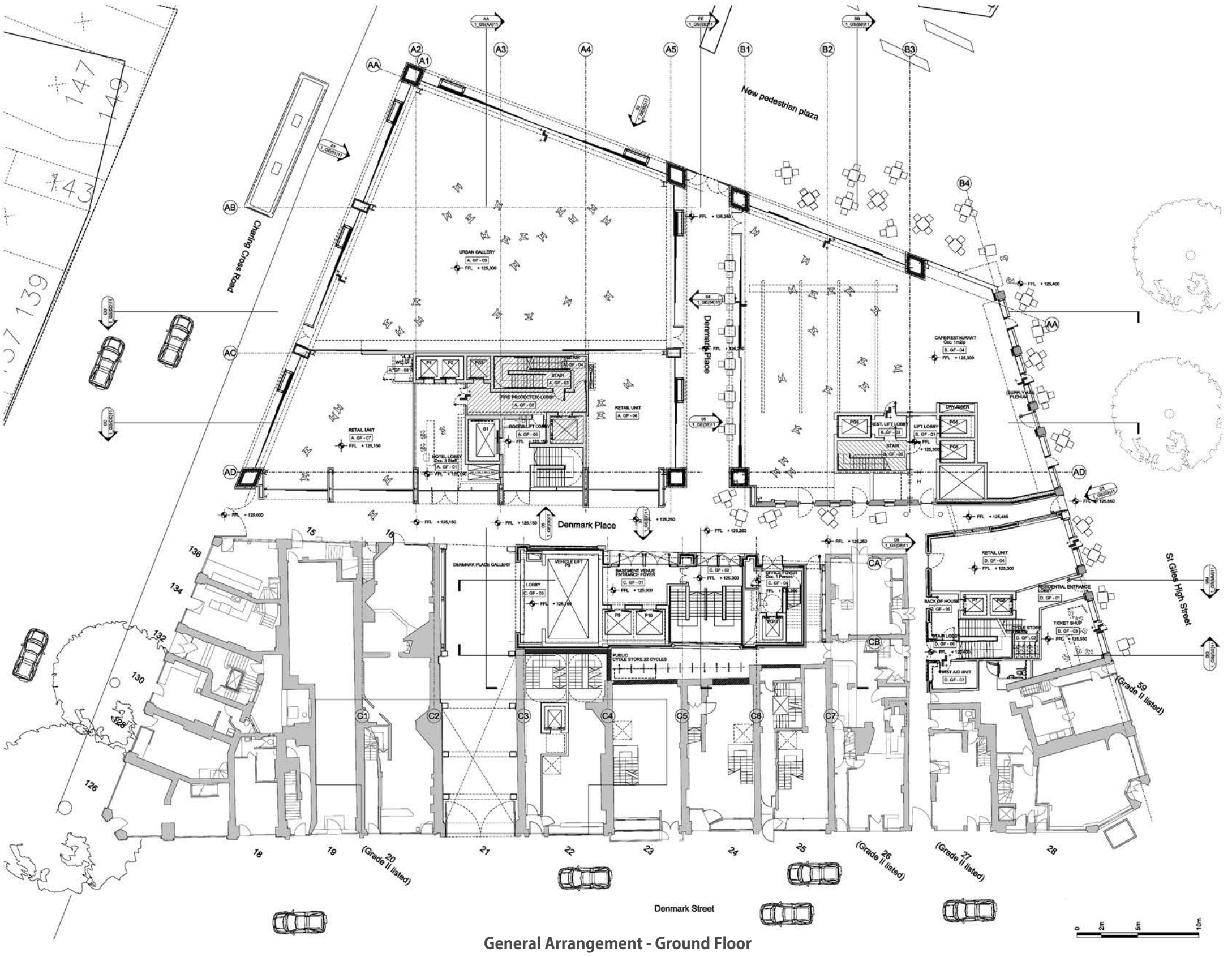




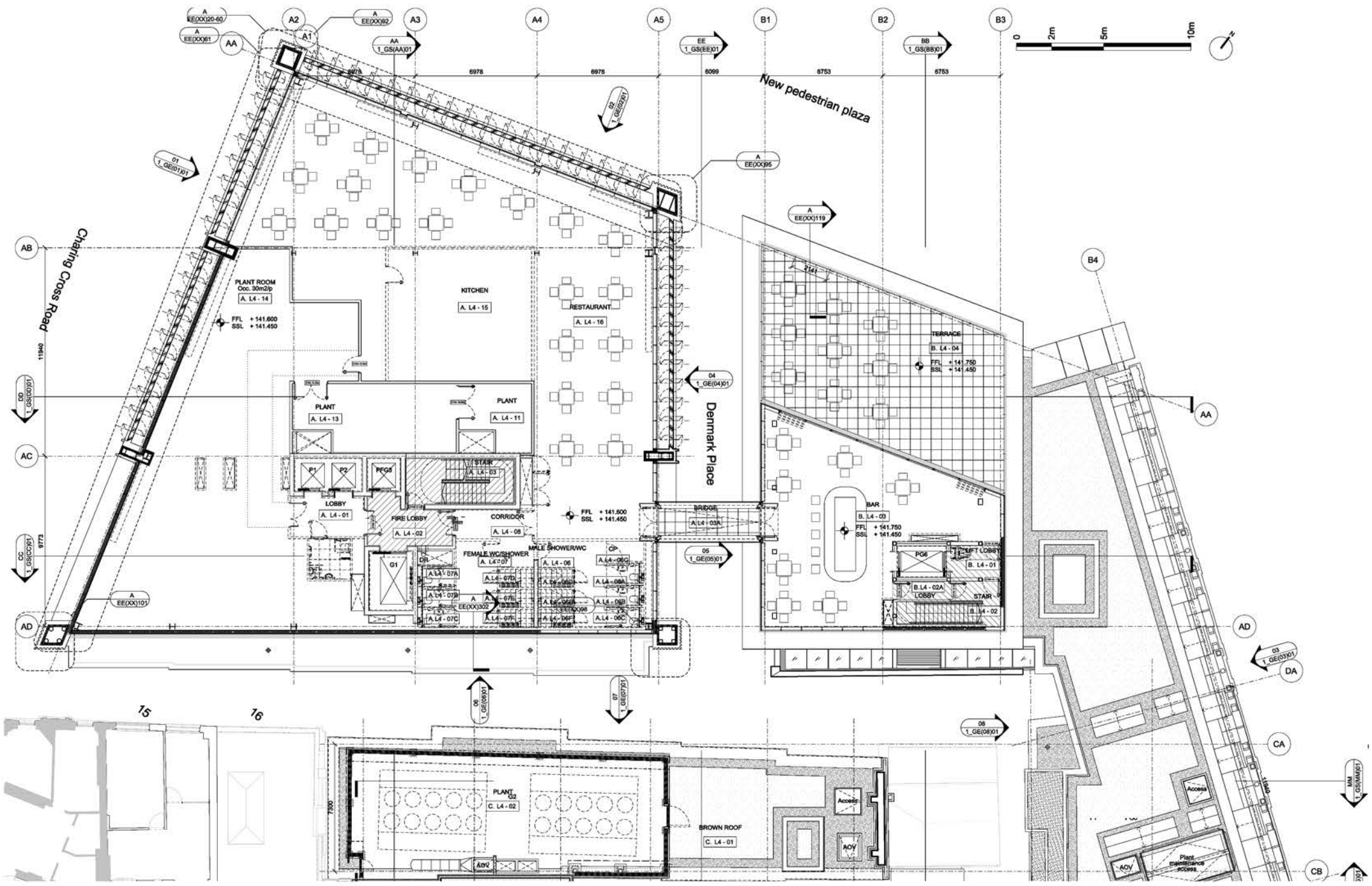
ORMS ARCHITECTS

St. Giles Circus - Streetscape

Streetscape was designed by an external consultant and integrated with other parts of the BIM model. It managed not to confuse the public in its wayfinding strategy and generate welcoming public space at the back of the Cetner Point.



General Arrangement - Ground Floor



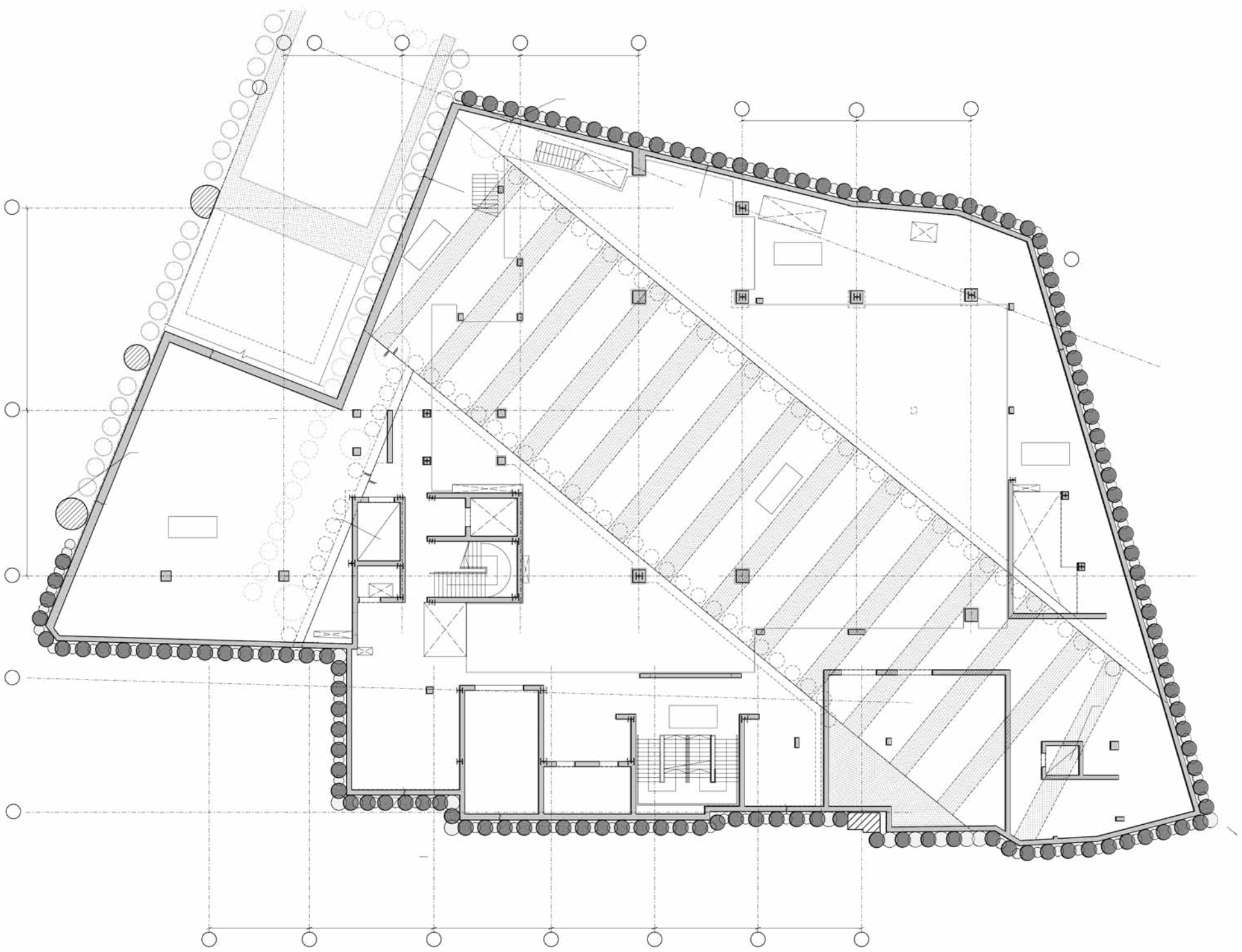
General Arrangement - Level 04

ORMS ARCHITECTS

St. Giles Circus - GA Plans

Ground Floor of the Building A has three storeys high dedicated public space, which integrates with the new entrance to the Tottenham Court Road station. It was expected to be one of the busiest junctions in London, which the building adopted opening itself to the public. GA Level 04 shows fins of its facade system.

Secant piles (males/female) Basement Plan



ORMS ARCHITECTS

St. Giles Circus - Basement

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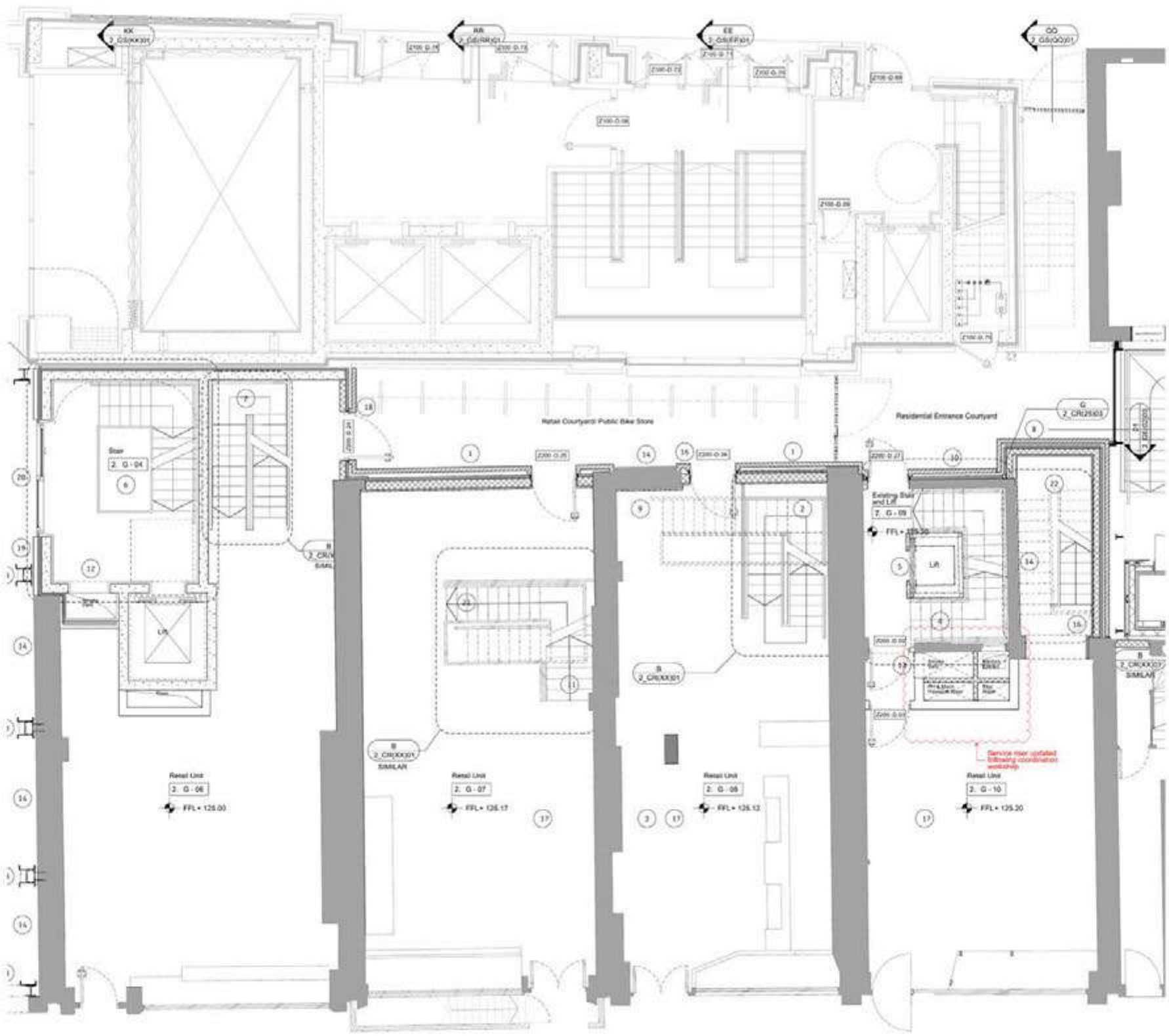
Denmark Place Internal Yards

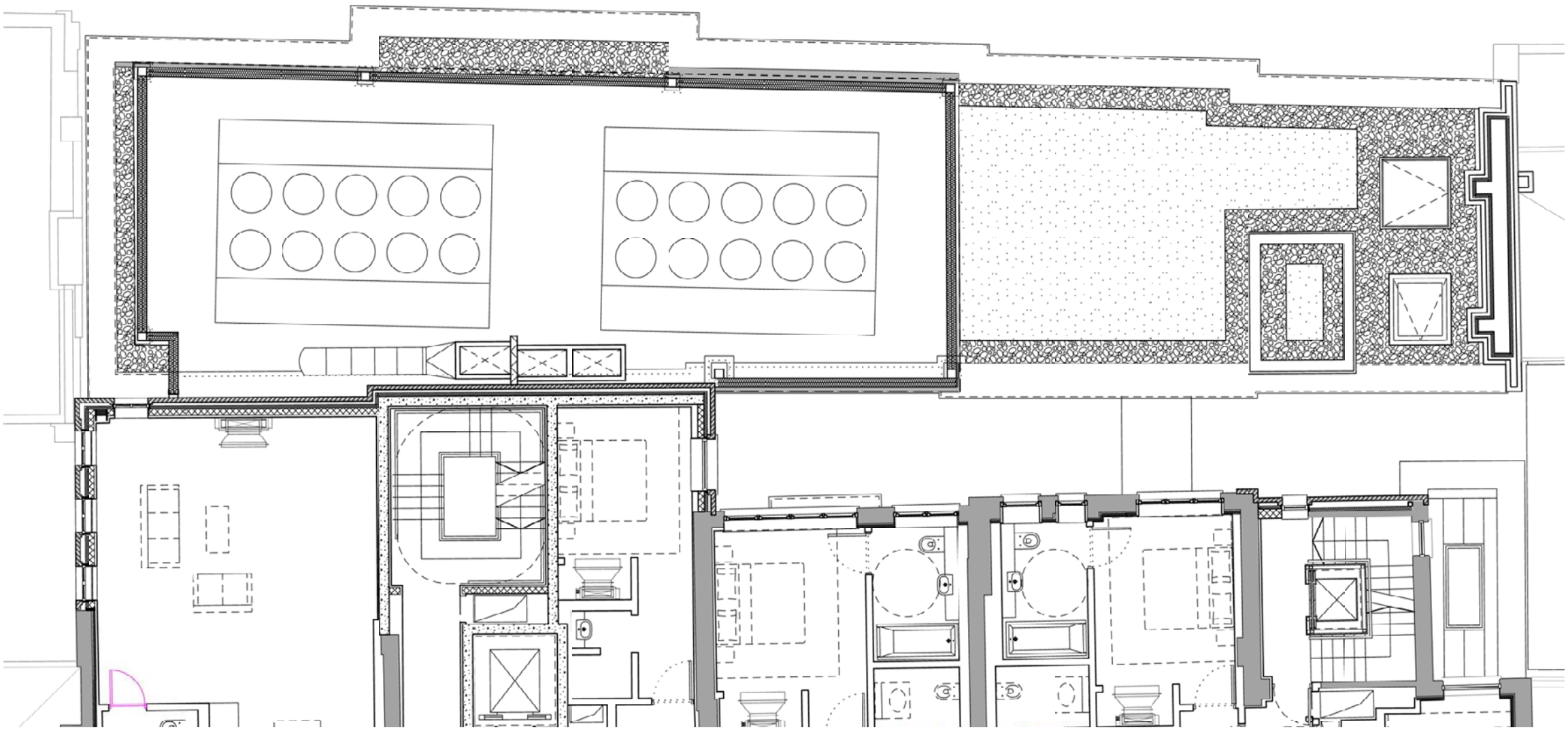


Listed Buildings at 21-25 Denmark Street

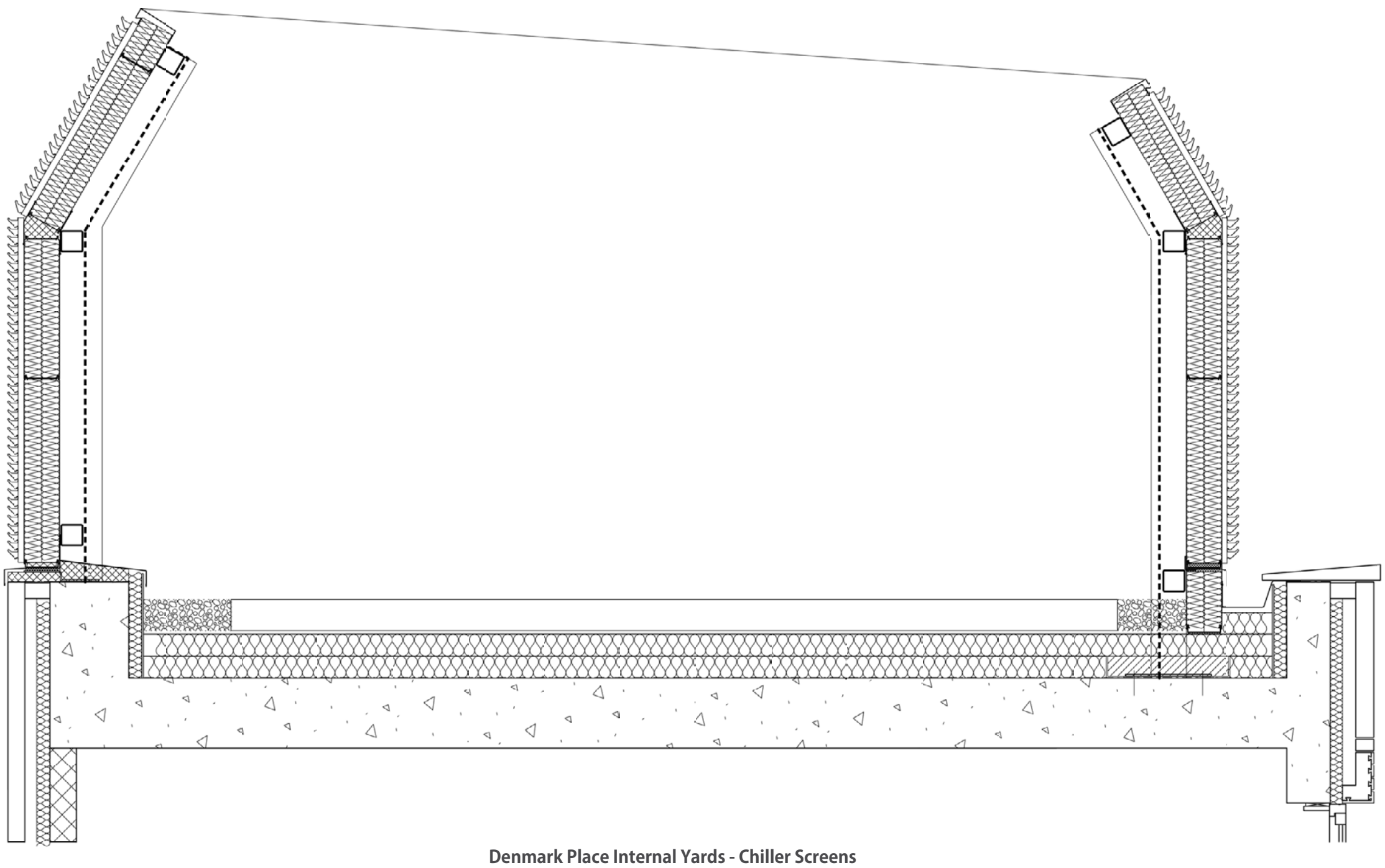
ORMS ARCHITECTS

St. Giles Circus - Denmark Place

Listed houses facing on one side Denmark Street and on the other Denmark Place presented unique challenge. Any proposed changes to the heritage had to undergo lengthy approval procedure. They represented important part of the area's identity - cradle of some of the biggest pop stars.



Denmark Place Internal Yards - Roof



Denmark Place Internal Yards - Chiller Screens

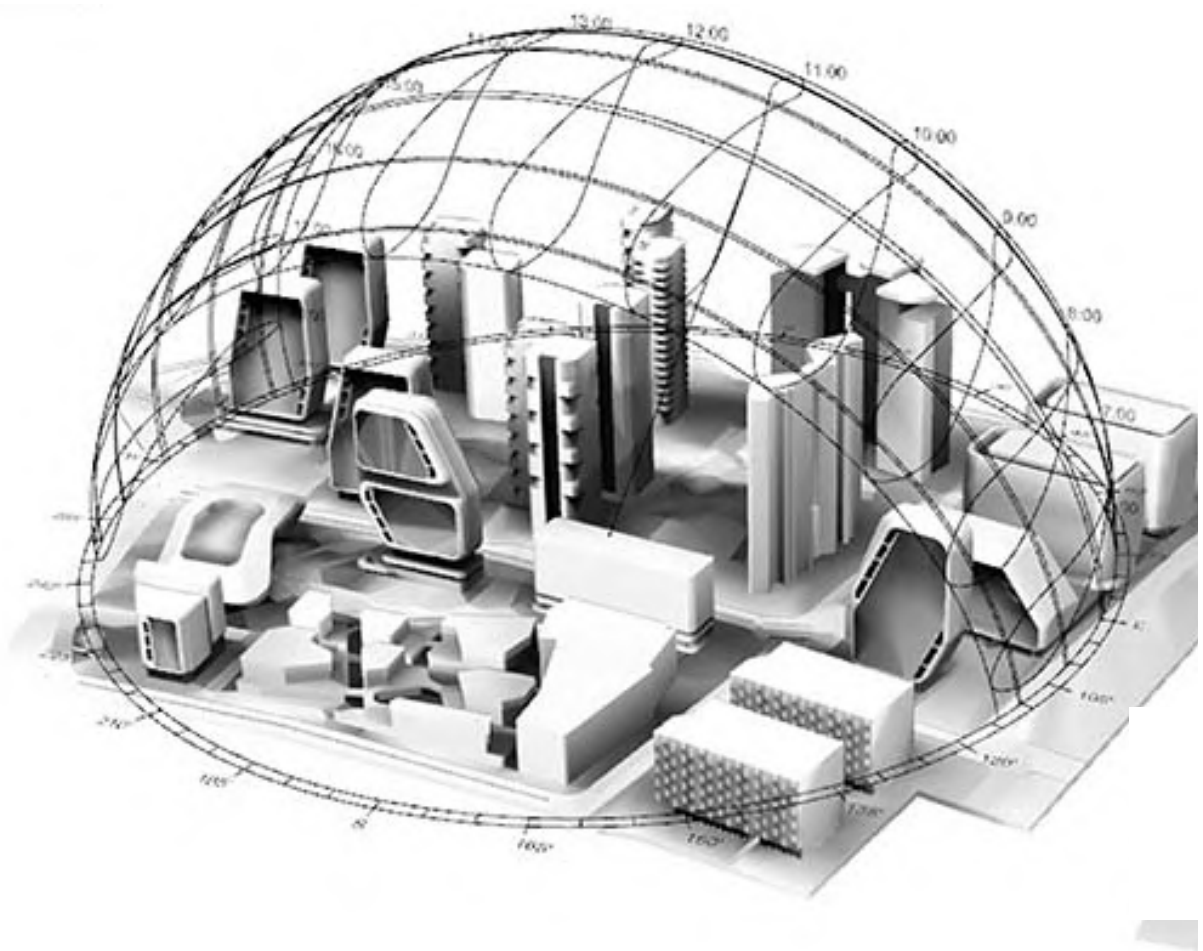
ORMS ARCHITECTS

St. Giles Circus - Chillers

Design of the chillers on top of the Denmark Place Internal Yards was coordinated by requesting minimum necessary dimensions from the contractor. They were further used for translating them into Revit model.

Covered with cooling white paint Smart City in Bangalore tried to utilise today's ubiquity of data

Shading played an important part in the region and was used as a design accelerator

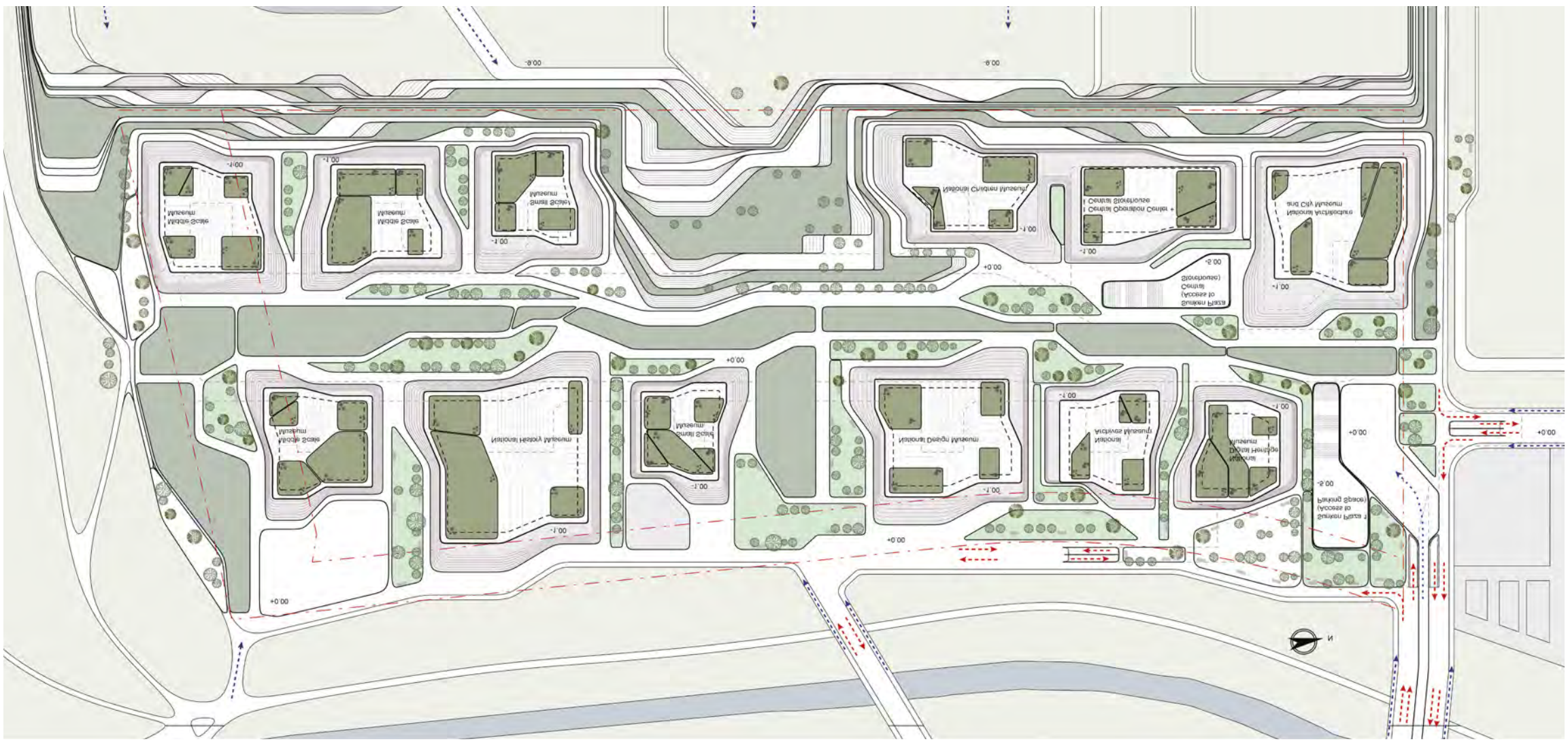


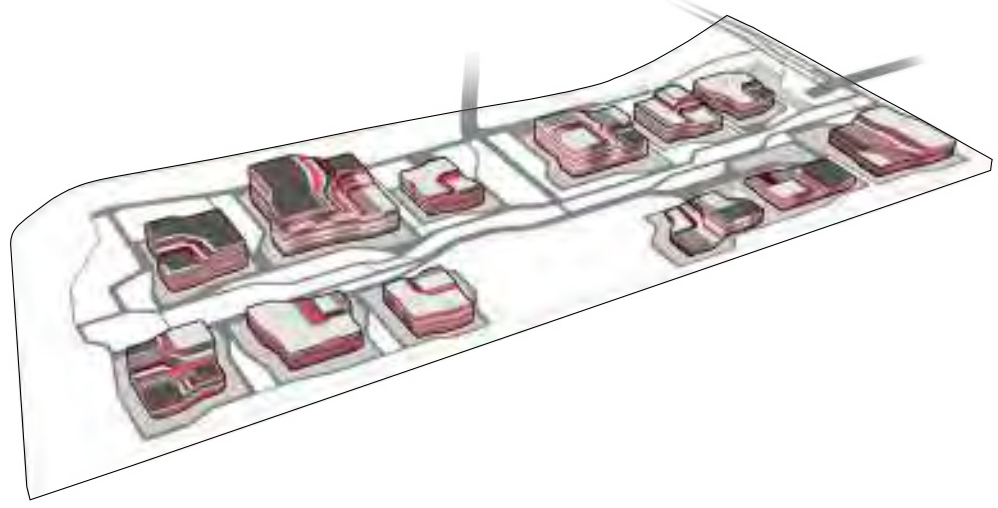
Solar optimization in Grasshopper

UN Studio

Smart Karle Town Center Masterplan

The area of Bangalore's Karle Town Center Masterplan has been called a sillicon valley of India. Collaboration on this scheme was closely tied with in-house research by UNSense. My role involved preparation of design for the facade including optimizing it against solar gains.

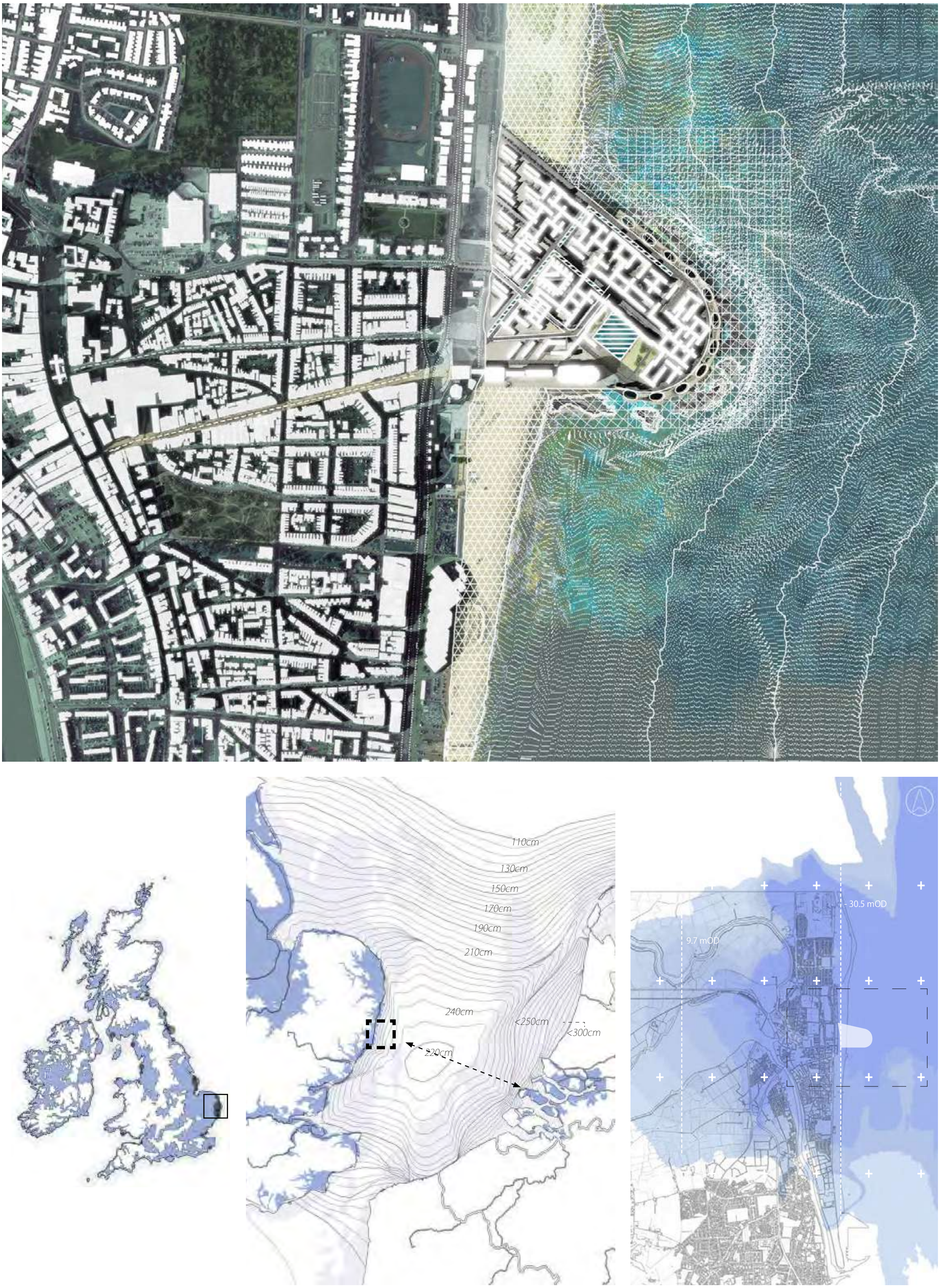




SEJONG MUSEUMS COMPLEX

Museums and Landscaping

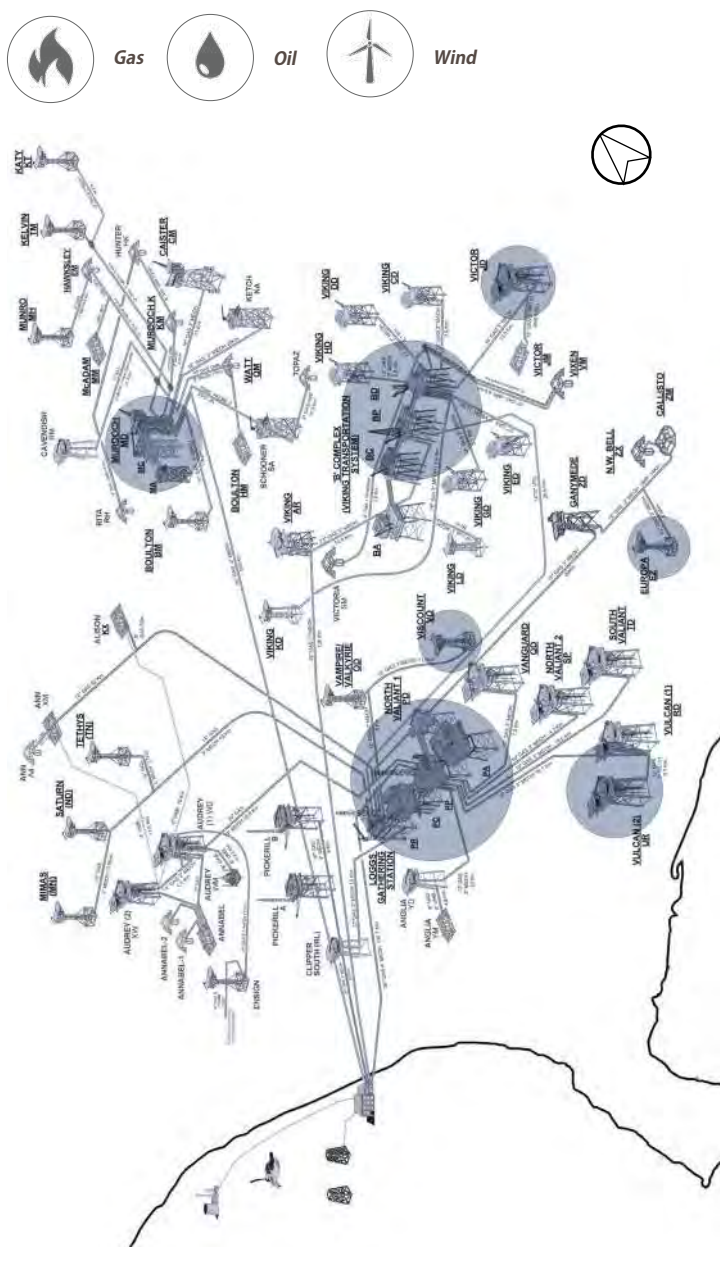
Competition entry for the Administrative City of Sejong in South Korea. Team work, during which my individual tasks included preparation of diagrams explaining design process and plan for the masterplan and the first phase of the construction.

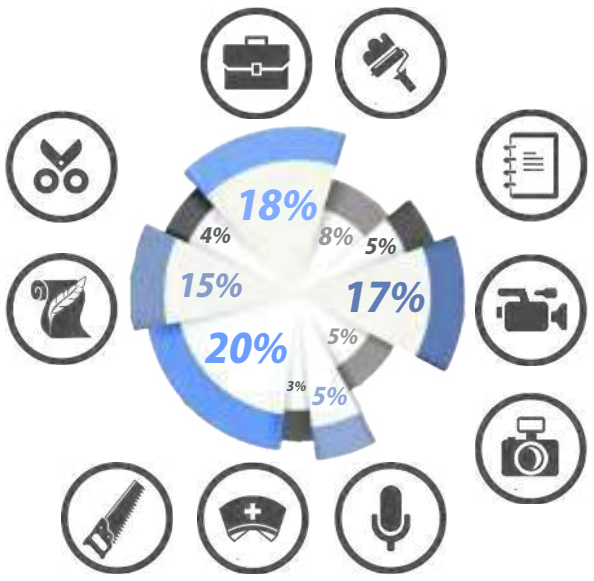


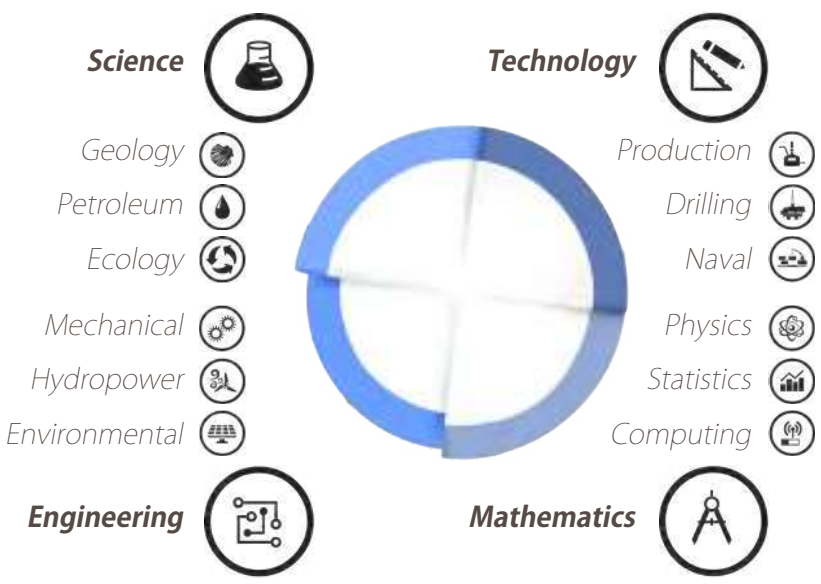
SITE AND CONTEXT

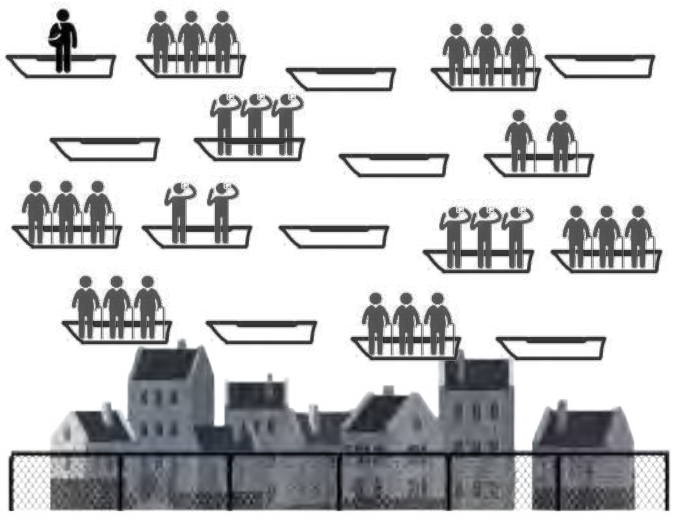
Anti-flooding solutions

Global warming and resulting rise of sea level and increase in storm frequency is challenging many coastal cities globally. This project aims to explore the potential of creating neighbourhoods and entire communities in these changing ecological and spatial conditions in Great Yarmouth waterfront.









MASTERPLAN

Anti-flooding solutions

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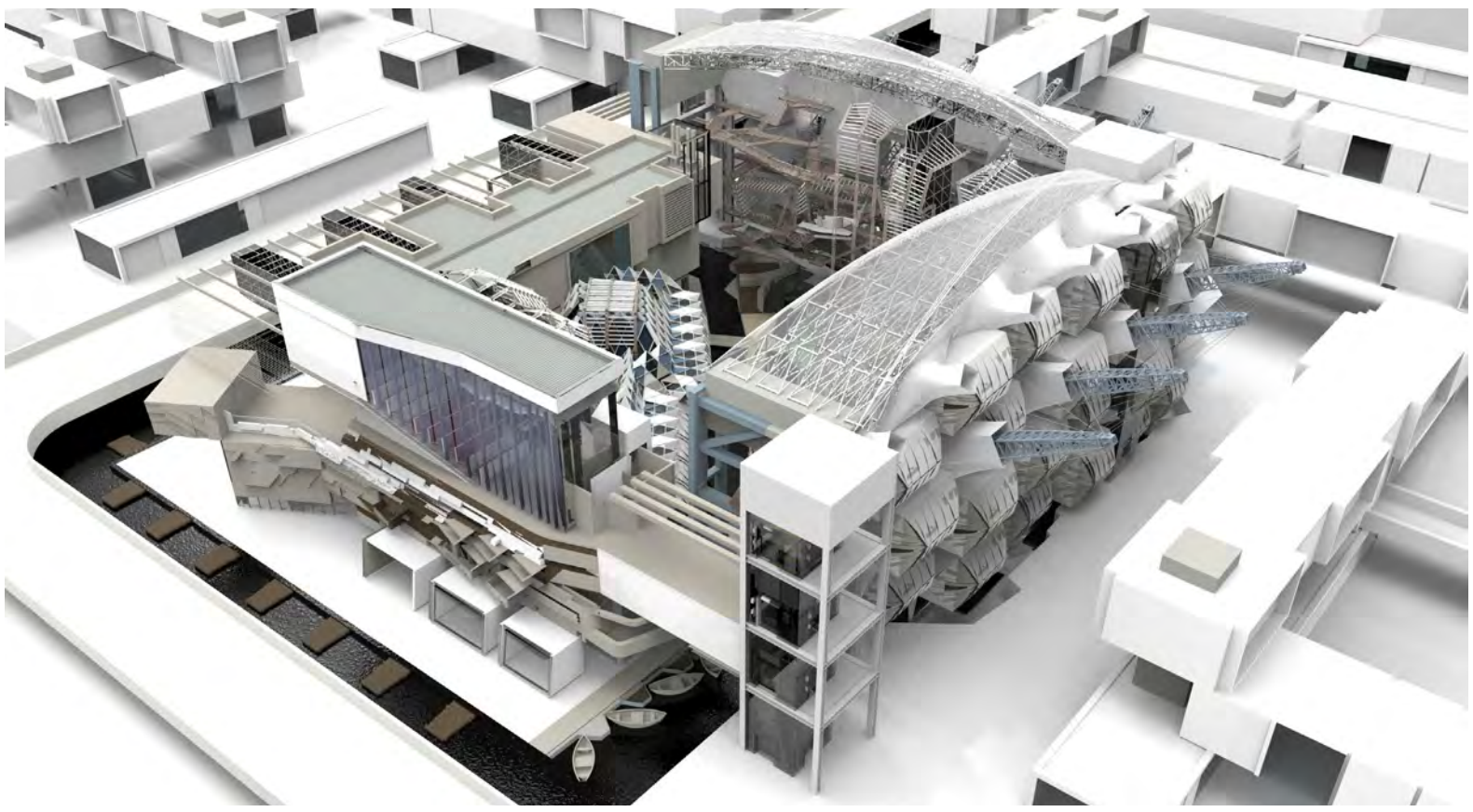
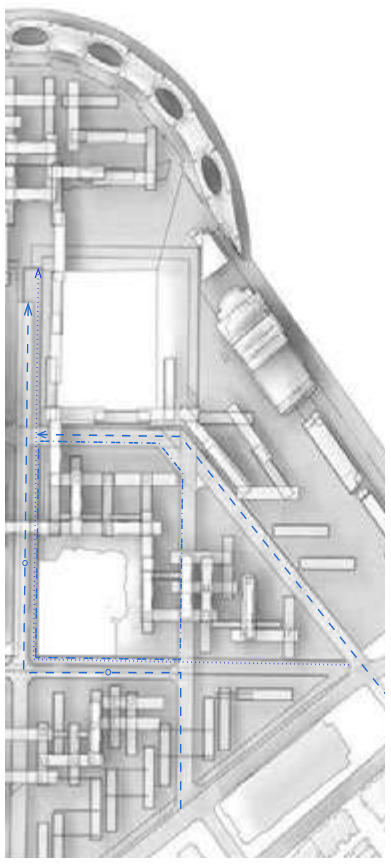
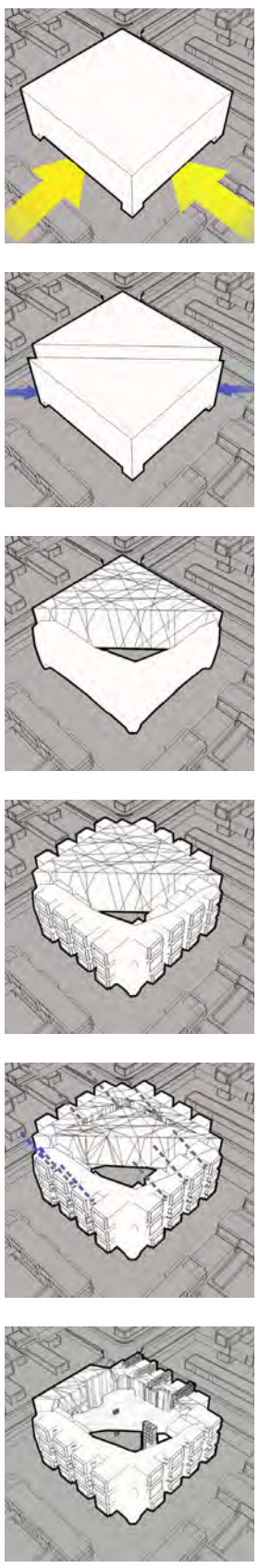
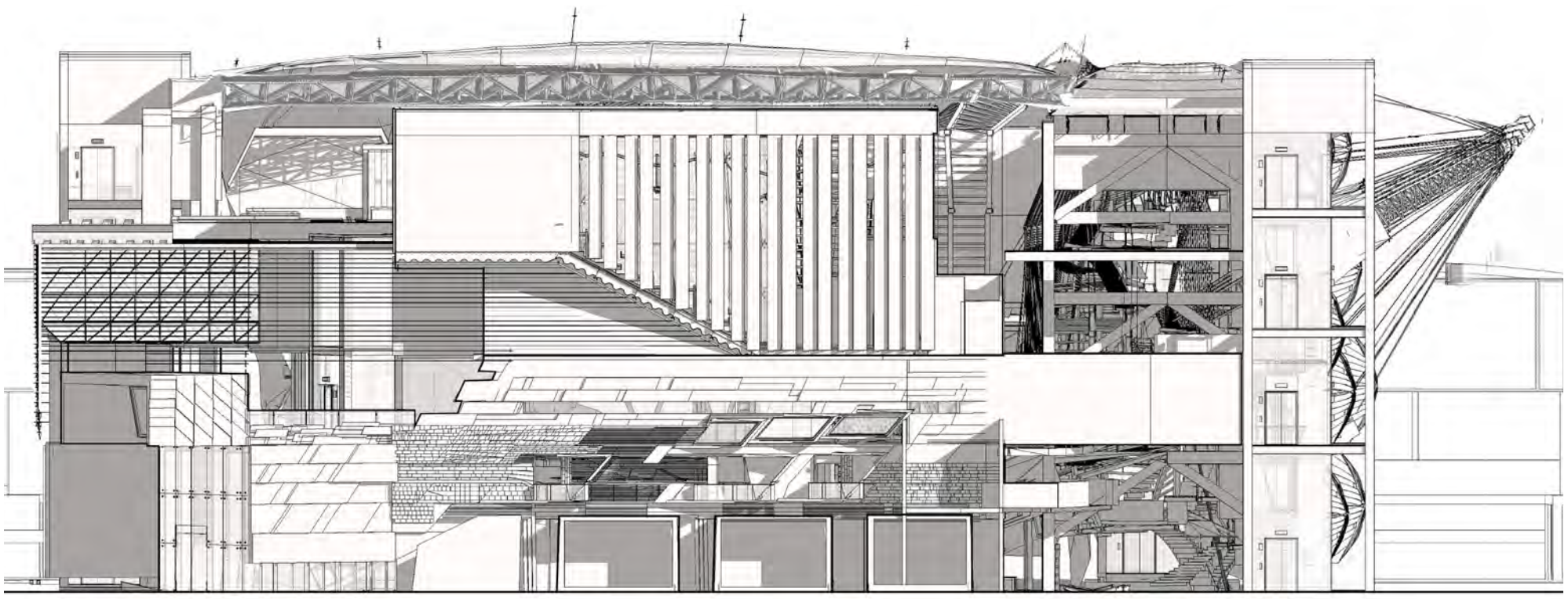








STUDENT CENTER

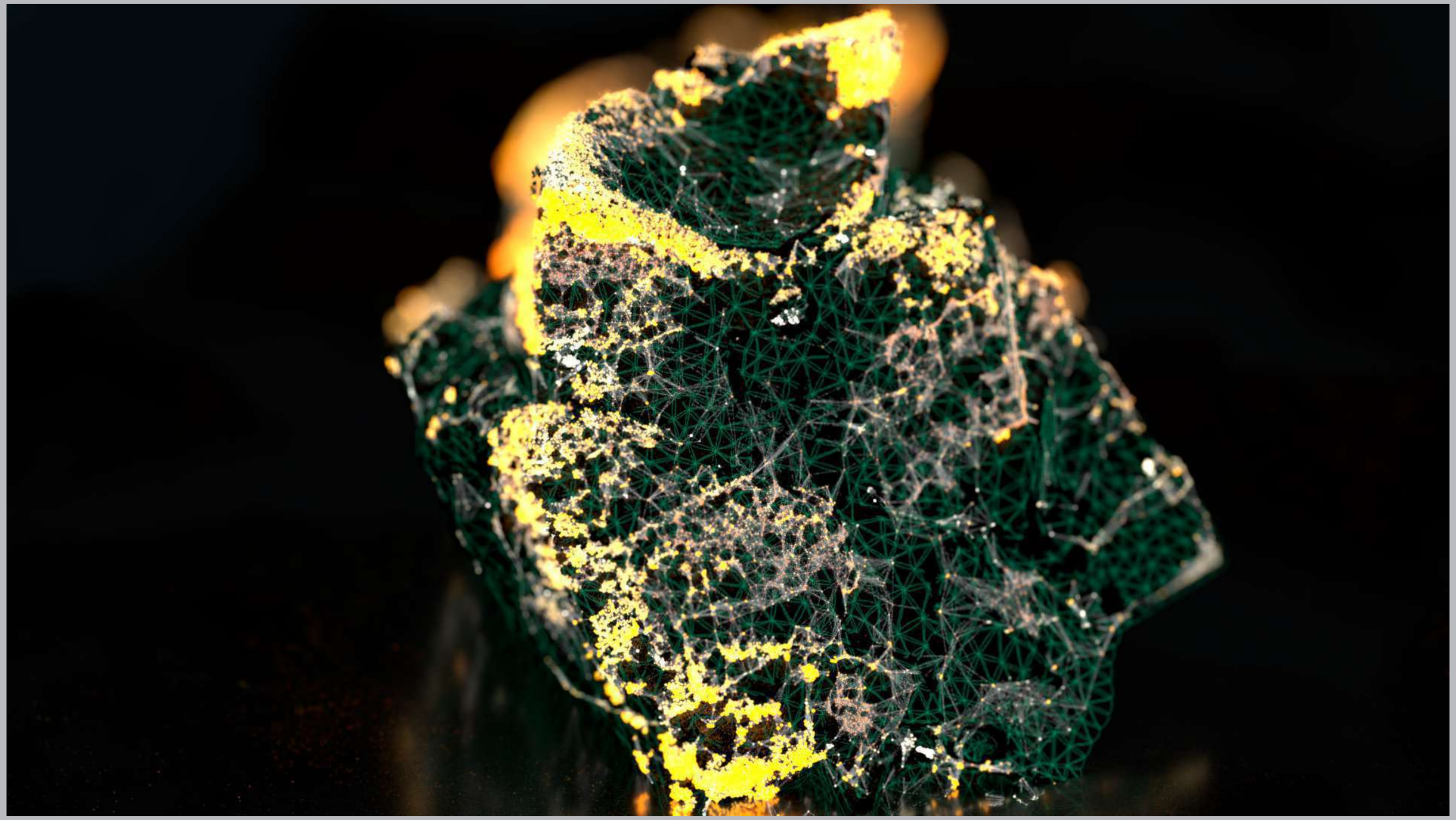
Generator of social interactions

Second part of the projects takes the proposed design situation onto a single building level. Created densification of activites, transit oriented environment and mixed-use of spaces leads to dichotomy of architecture precedented in architecture of Great Yarmouth itself. The Center forms a hub that brings together entrepreneurs, communities and students.

ARTIFACT

Machine Learning in Architectural Design

Design project tightly connected to the research conducted in the thesis module. Attempt is made to develop a novel technique based on machine learning (ML) technology and apply it to the chosen site.



DATA EXTRACTION

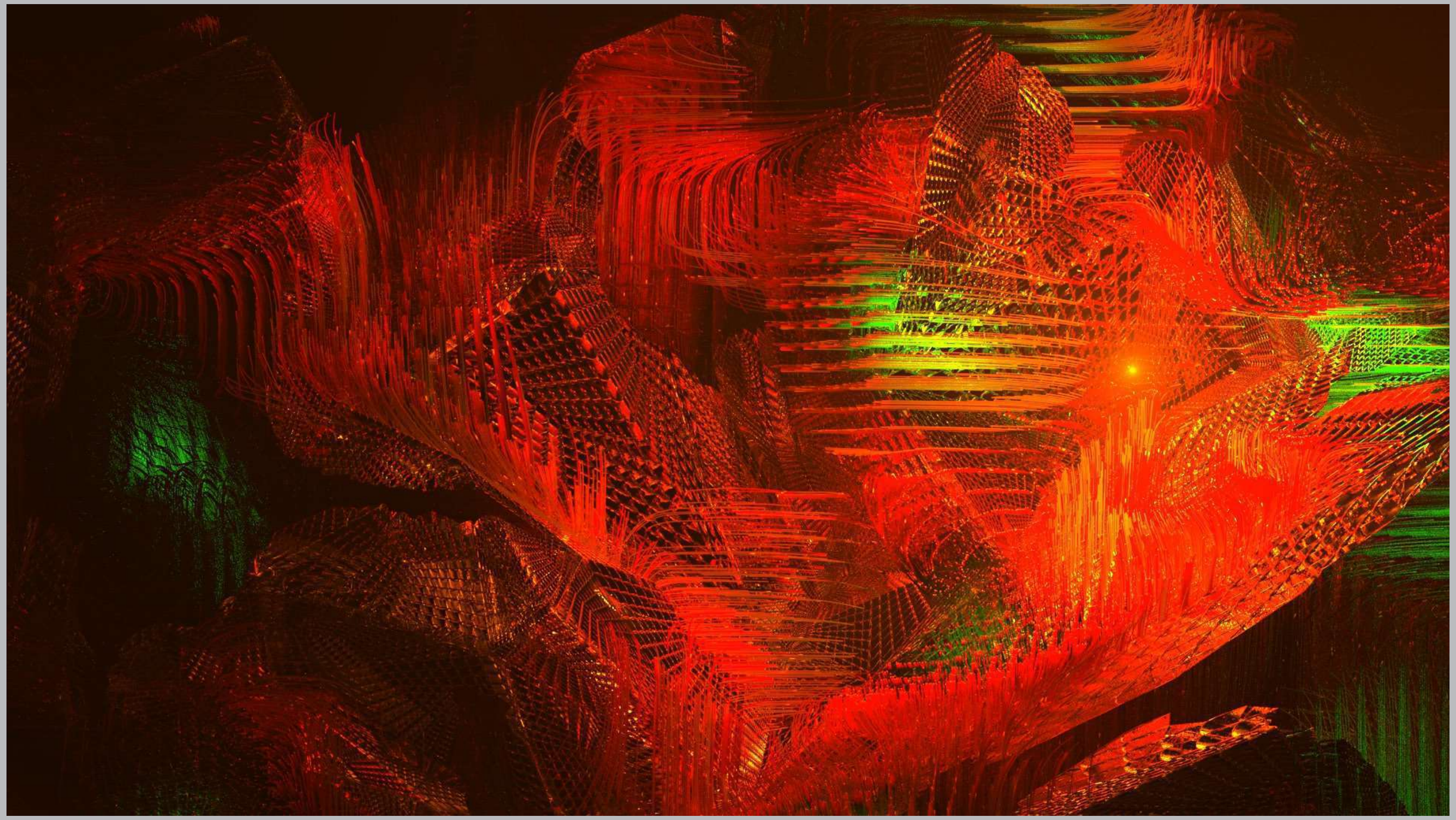
Define Features and Useful Aggregates

The project began with an algorithm scripted for data extraction based on number of characteristics. Typically regular properties, such as color or reflectivity can be customized based on added data sets, for example physical properties: dew point, thermal expansion, behavior under tension and compression.

EMERGENT DESIGN

Sketch Development of Structures driven by the Aggregates

Fluency in this process allows for connecting aggregated points on the objects' surface with the "architecture algorithm", which creates sketch proposals.



STRUCTURE OF MOSS GROWTH

Adversarial Behaviors feeds into Generative Design

In this iteration I generated set of interconnected branches that compete against each other over a place to live echoing behavior of a real moss habitat.

HYBRID SCENE

Digital Interpretation of the 18th century vision

Digital Recreation of the Piranesi's landscape allows for vast amounts of information to be embedded directly in the subjects. This often referred to as unstructured data can give rise to interesting behavior.

DATA EXTRACTION

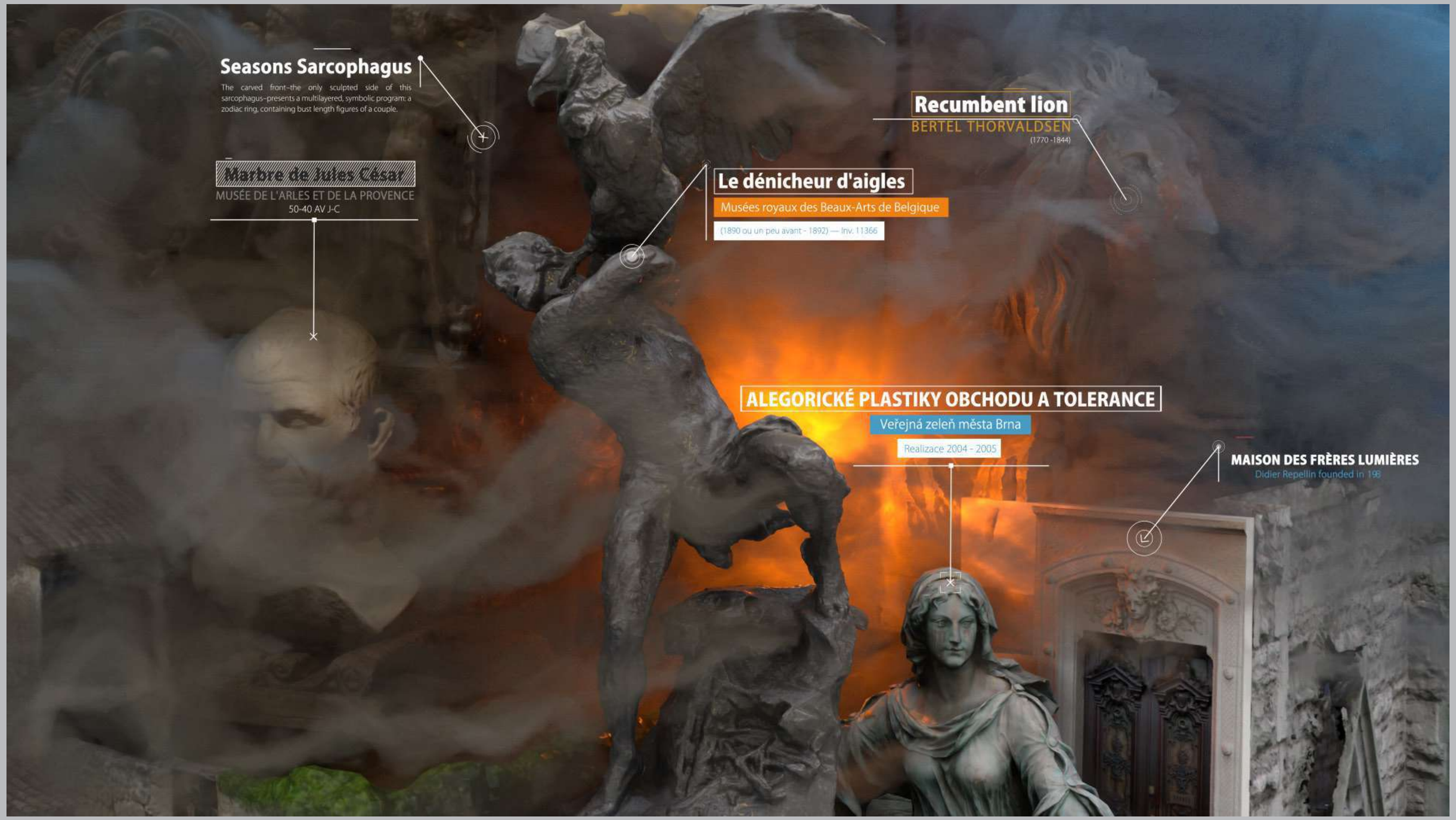
Methodology based on Photoscanning and Data Wrangling

Landscape itself stems from the ground, on which it stands. By analyzing footprints left on the rocks and hard soil we can recreate architecture that once stood there or speculate about what could have been there.

STACKED LANDSCAPES

Increasing scale draws closer to the Piranesi's original vision

Each object comes with its own story, but they are arranged in a way that suggest coherent planning. This Landscape of Architectural Paradoxes becomes a field for further speculation.



DATA EXTRACTION

Digitalization of the landscape allows for precision in planning process

Each story is recorded and drawn back to its original context. Nothing is lost.

DATA INTEGRATION

Therefore subsequent generation semi-automatically develops based on its surrounding

Similarly to the process applied to the first artifact the "architecture algorithm" chooses its defining properties and grows from the chosen subject outwards. It interacts with its surrounding bridging and cantilevering over the cliff.

MACHINE LEARNING ARCHITECTURAL SEGMENTATION

Machine learning augments connectivity of the architectural features

Unstructured Information embedded into photoscanned assets can be interpreted through novel machine learning-based algorithms. In this example window frames of two different styles are recognised. Similarly other architectural elements are grouped and organized.

FRAMEWORK PROPOSAL

It grows organically blending with the landscape into a draft proposal

This structure allows for sketch proposal of architecture embracing and revealing Piranesi's landscape based on its relation to the whole.

SITE ANALYSIS

Our scenario assumed locating the construction in San Francisco due to its high profile within today's tech community

San Francisco faced dramatic growth in the recent years due to income of numerous high-tech companies. Both young startups and large, public companies have established their permanent base there creating a potential for building vibrant communities.

SITE ANALYSIS

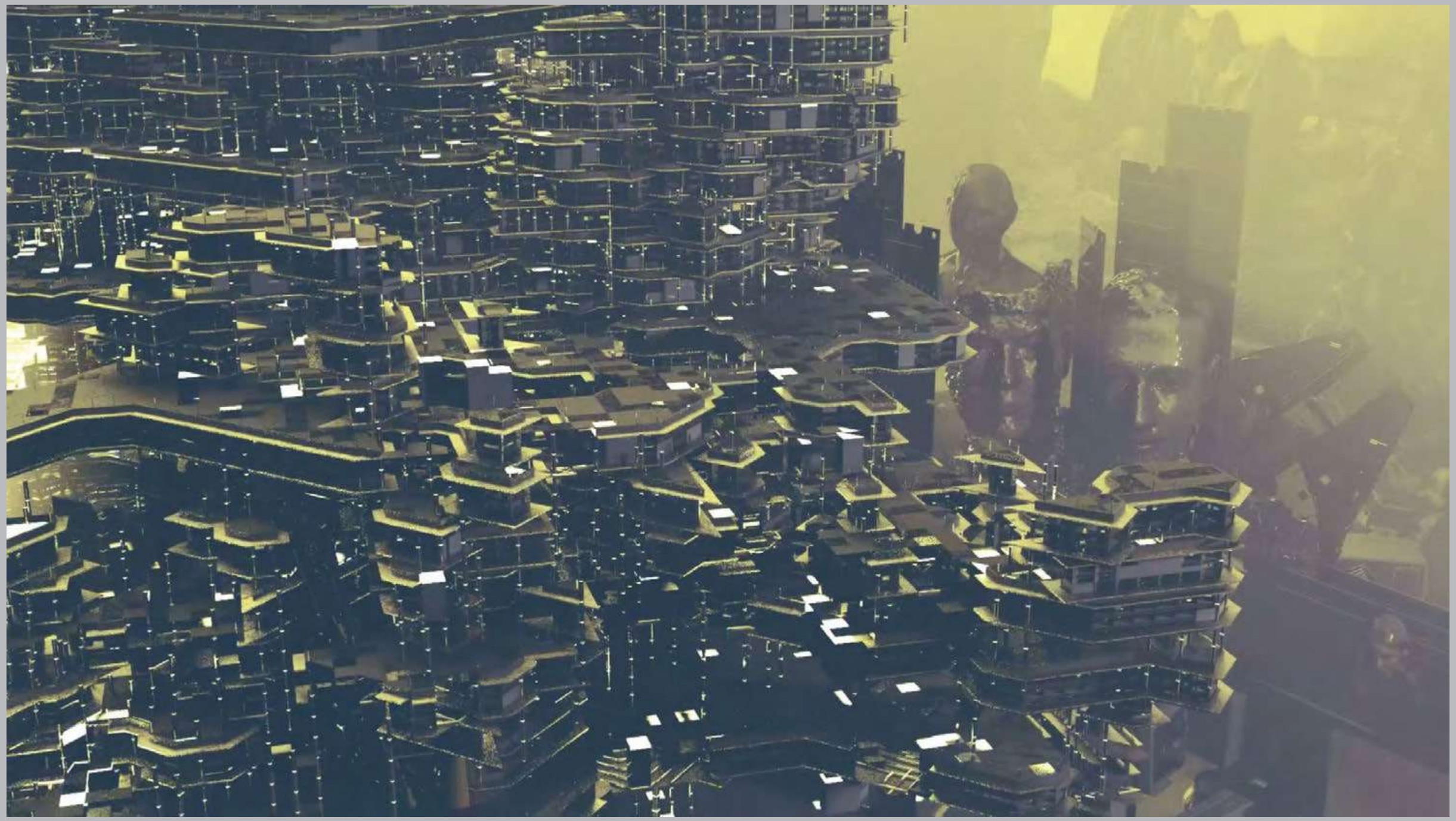
Embarcadero is the busiest public plaza in the city centre

At the focal point of the city stands Embarcadero - public plaza with rich history. It was chosen due to critical point of activities occurring in this area. Public meets with the private mixed-use parts of the city.

URBAN INTERVENTION

It leads the design to treat the imminent landscape as a data source

Embarcadero was used as a platform for extracting subjects in a process similar to the previous recreation of Piranesi's etching. However, it was designed as a vision of "Piranesi of the 21st century". It gave rise to structure, which embraced trend for further densification of the city centre.



OFFICE GENERATION

Structure is based on the surrounding functions consisting of mixed-use workplace, hospitality and retail

Density of the mixed-use scheme represented landscape of paradoxes, which on its own appeared as a whole. Its powerful relationship were further extrapolated onto the neighboring skyscrapers connecting them with a functional skybridge.

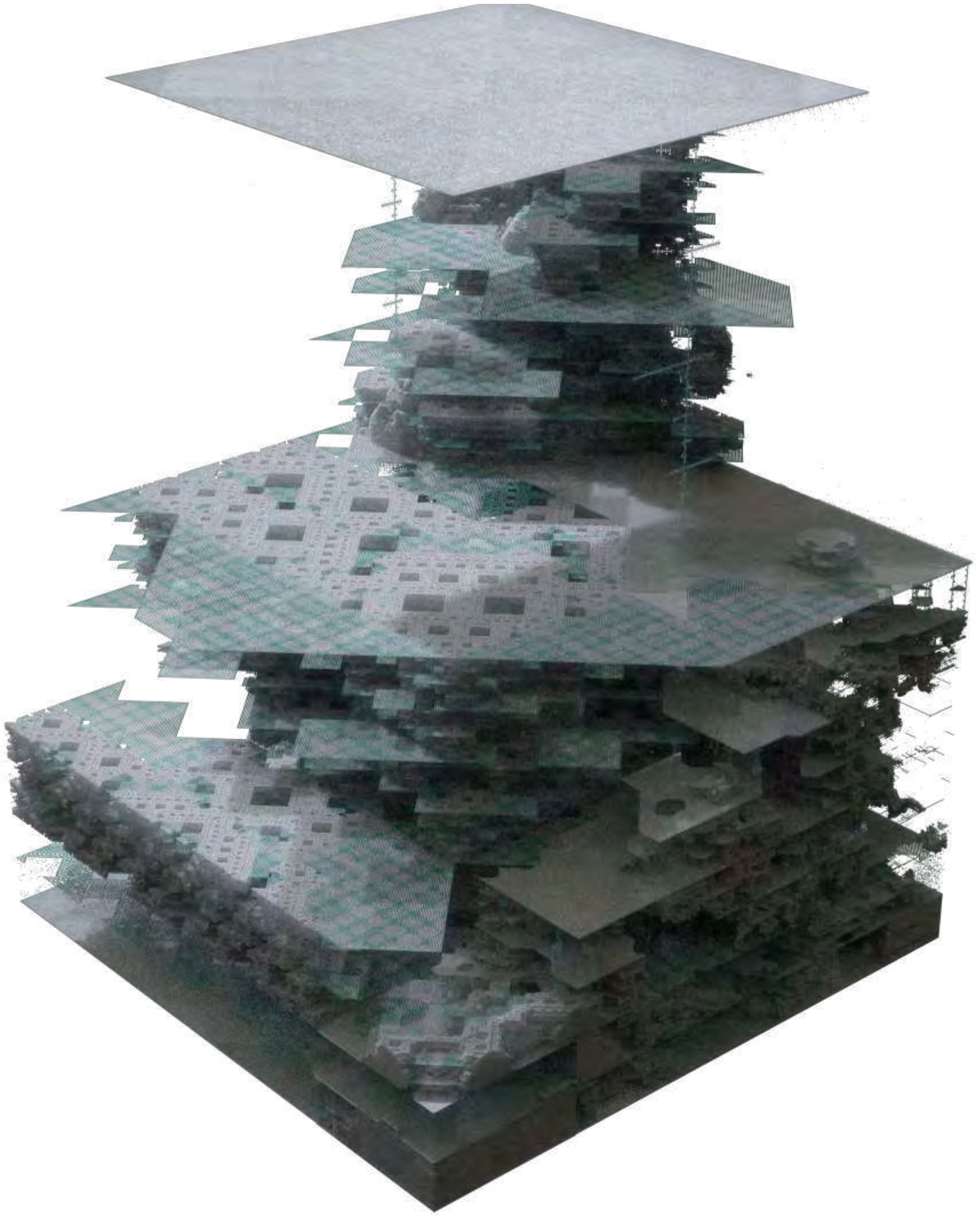
CONTEXT-BUILDING RELATION

Experience follows the context

Final experience of the building is tightly connected with its immediate surrounding. The user never feels isolated from the context. One can simply by observing the arrangement of spaces predict or take interest in the outside conditions.

NATURE 2.0

2011 M.ARCH YEAR 4



SQUARE-DIAMOND SUBDIVISIONS

TURNTABLE A

Please scan the QR Code to go to the animation

Scan me

Kronshtadtsky District 9

Coordinates: 60°00′N 29°46′E

Area: 19.35 km²

Founded: 1704

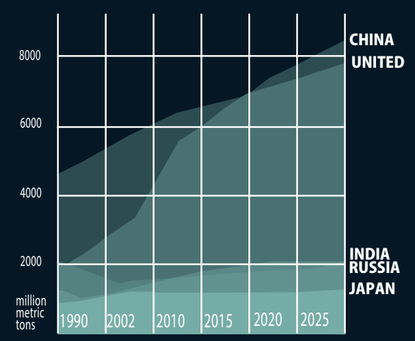
Population (2010 Census): 43,005 inhabitants

WASTE WATER CONNECTION

PORT / DOCKLAND

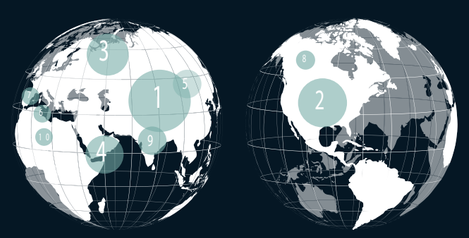
CATALYST FOR URBAN GROWTH

HISTORICAL & PROJECTED CO2 EMISSION



TOP 10 COUNTRIES WITH THE HIGHEST CO2 EMISSION

1. CHINA
2. UNITED
3. RUSSIA
4. INDIA
5. JAPAN
6. GERMANY
7. UNITED KINGDOM
8. CANADA
9. SOUTH KOREA
10. ITALY



SITE STRATEGY

Urban Growth Sprawling in St Petersburg

An analysis of the the city expansion of growth of waste water treatment plants from St Petersburg to the Island of Krogstadt and surrounding developments.

Krogstadt Island, St Petersburg, Russia

THE GULF OF FINLAND

THE BALTIC SEA

Main Sea Port

EXISTING WATER TRAFFIC

Fort Alexander
1845

Fort Peter

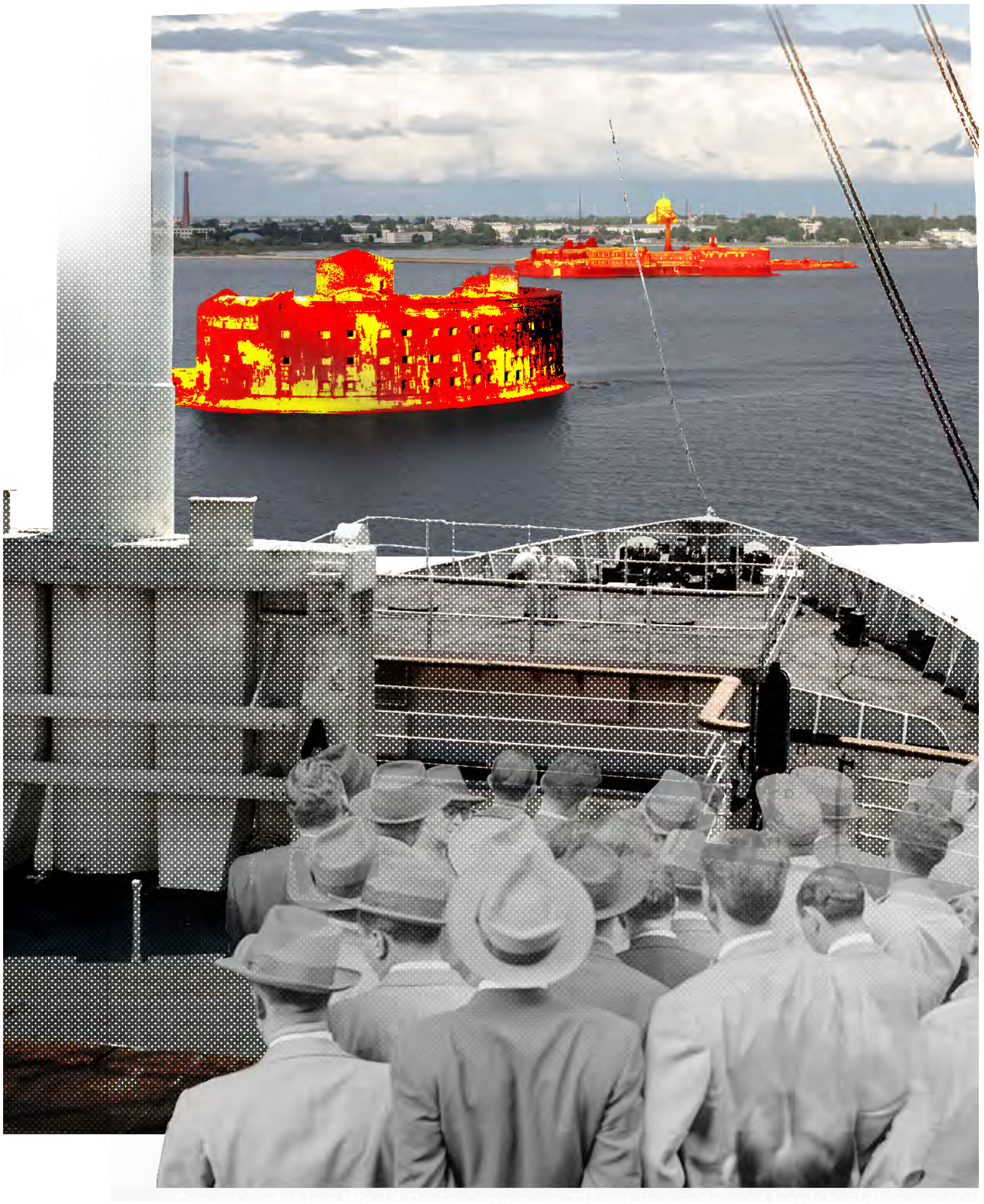
Kronstadt Center
1704

St Petersburg Dam
1980 - 2011

Tower Blocks Estate
1985

Tolbaaken lighthouse

From Helsinki
Tallinn
Stockholm



Crowd watching World Series games on TV set in window of bank building on 40th

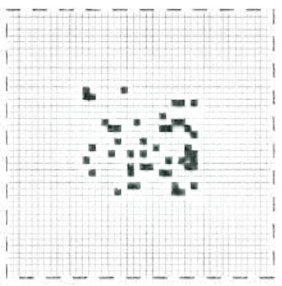
SITE ANALYSIS

KRONSTADT CITY APPROACH

Site photography and collage in search of the historical context

Cellular Automata 01

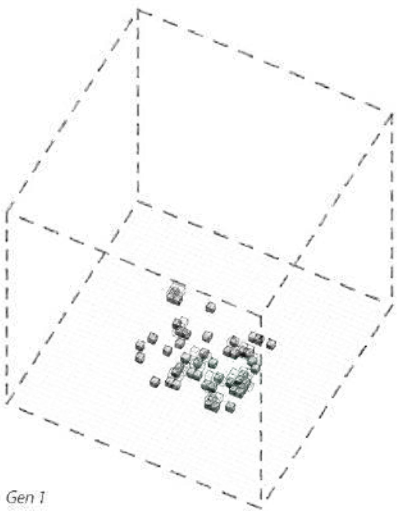
Evolution Rules



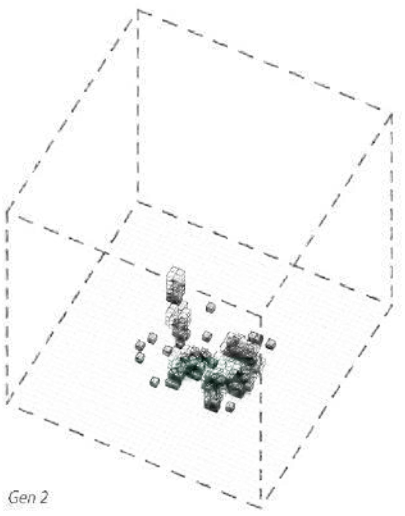
01
Evolution Rules:
3 - Born
2,3 - Survive

Grid:
42 x 42 cells

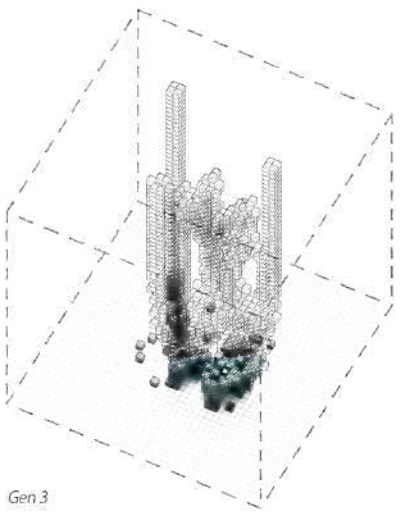
Seeds:
48 cells



Gen 1



Gen 2



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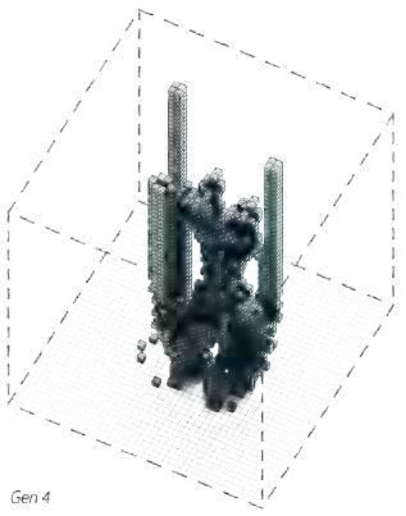
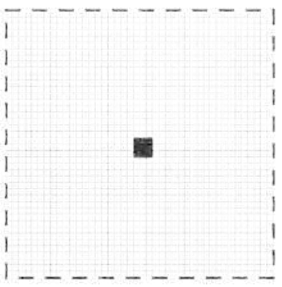


Gen 4

Cellular Automata 02

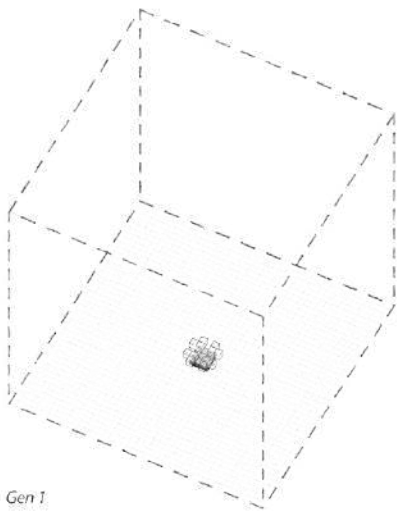
Evolution Rules



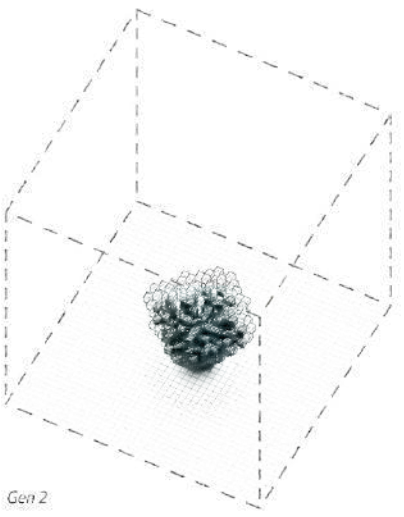
02
Evolution Rules:
4 - Born
2,3 - Survive

Grid:
42 x 42 cells

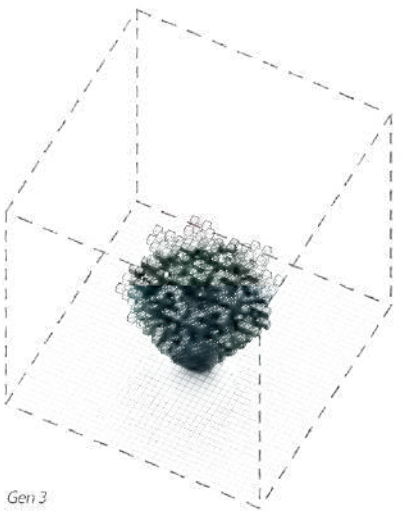
Seeds:
9 cells



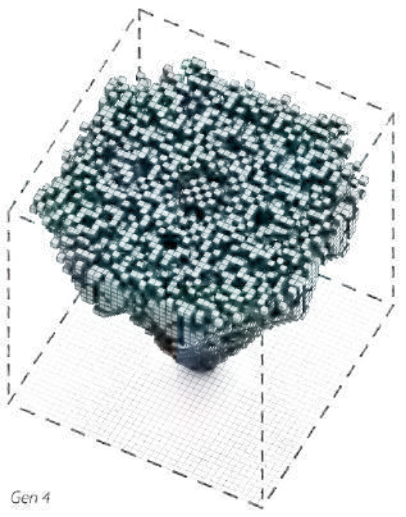
Gen 1



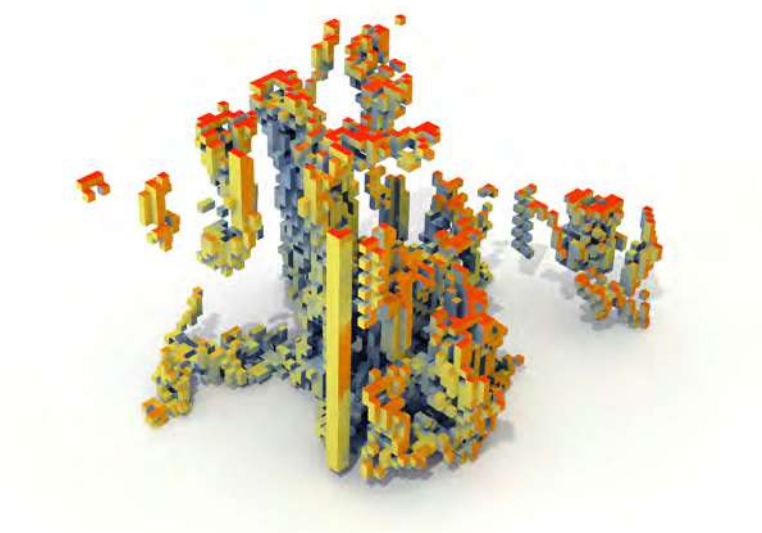
Gen 2

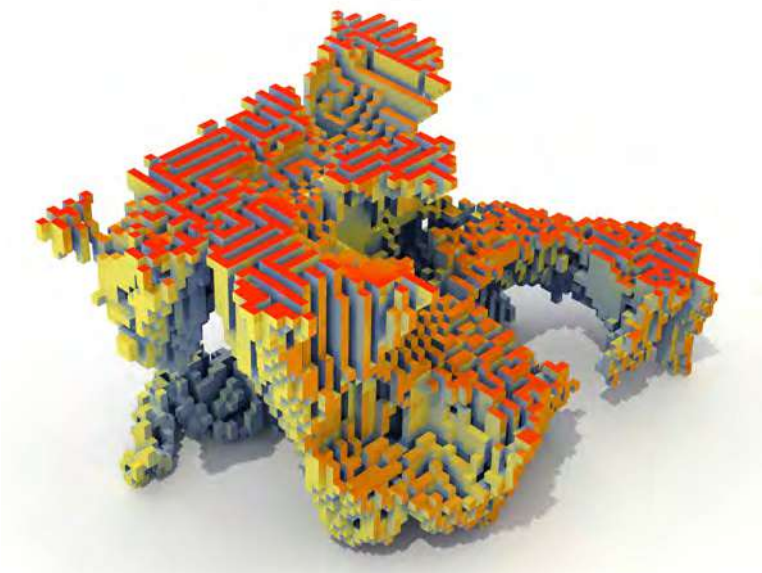


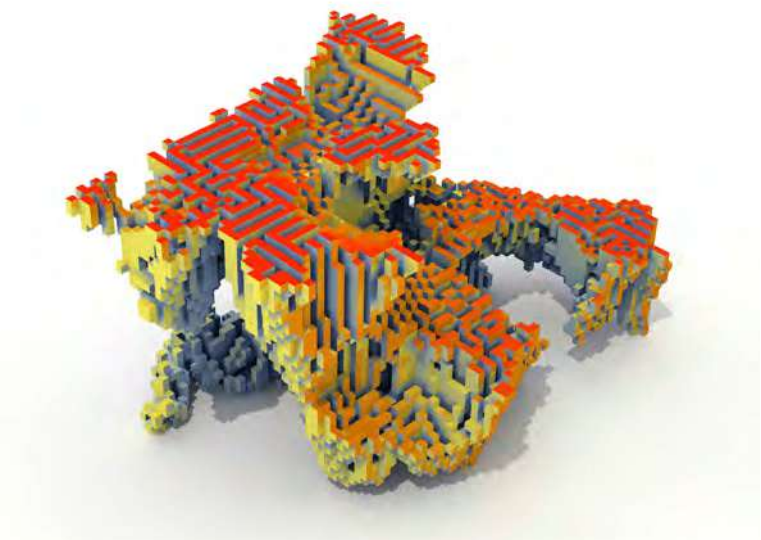
Gen 3

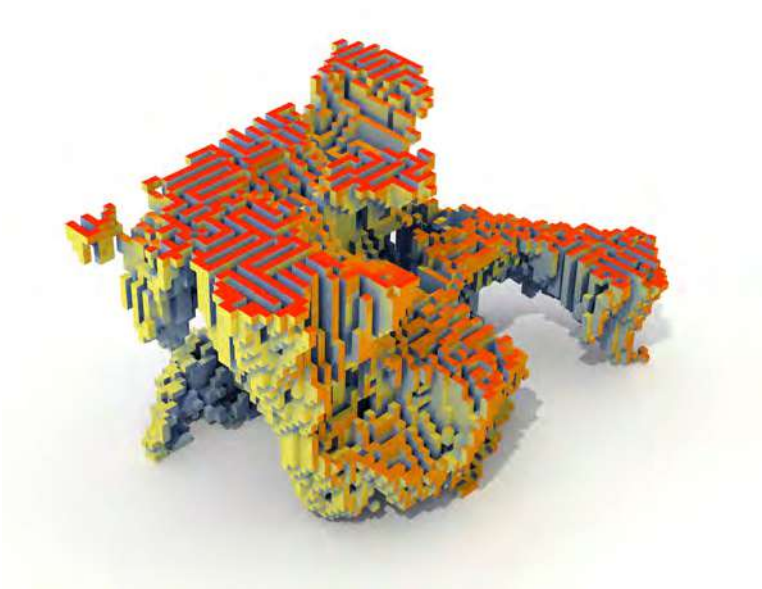


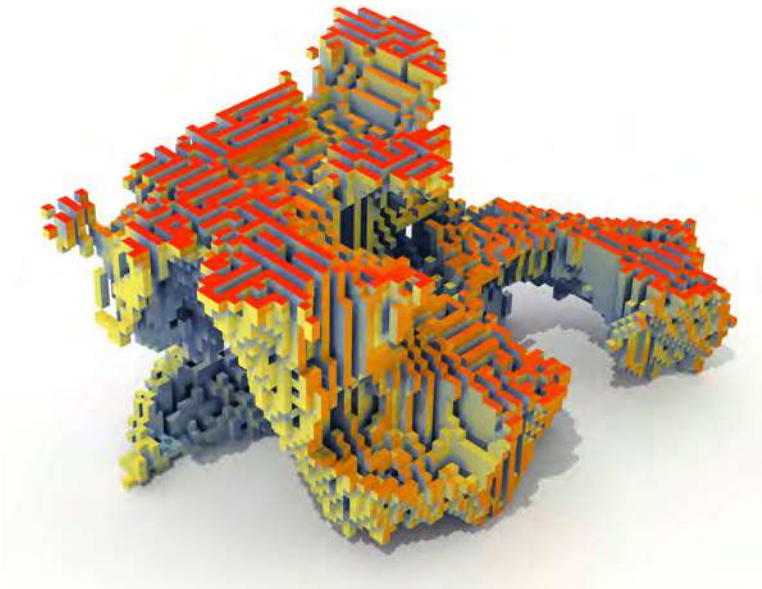
Gen 4

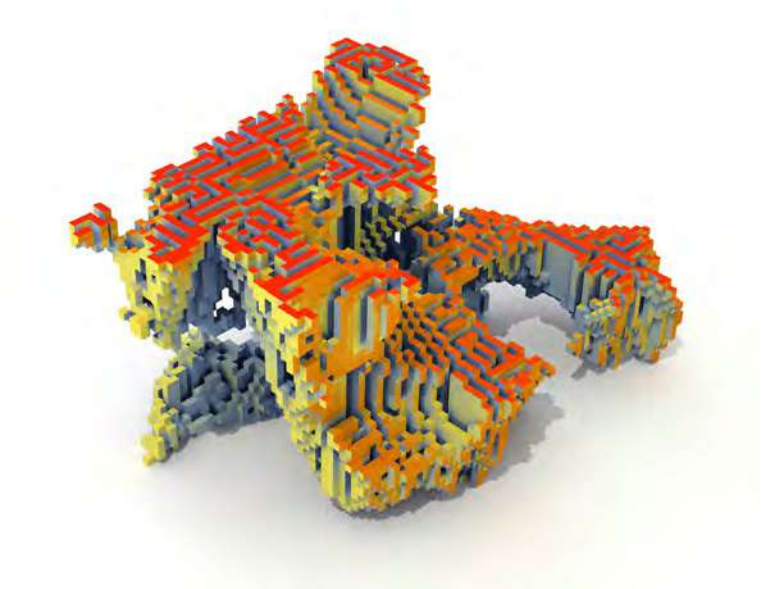


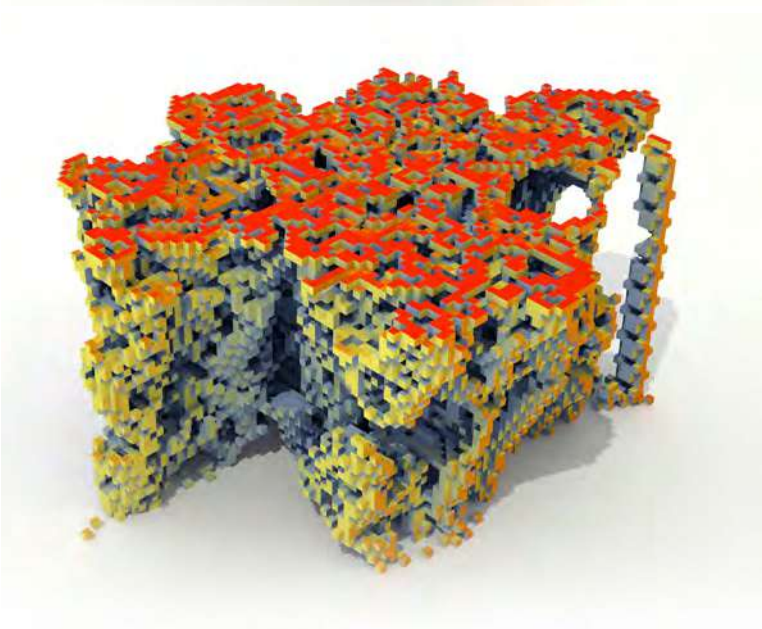


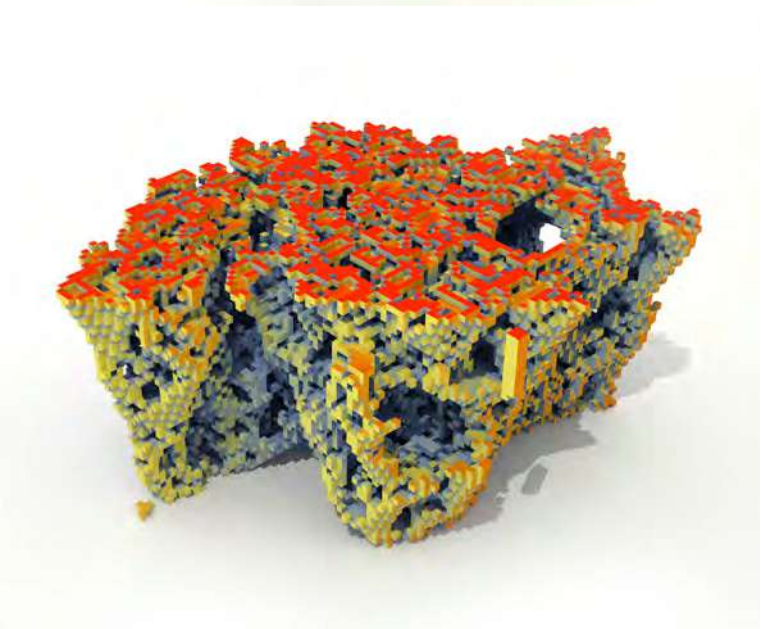








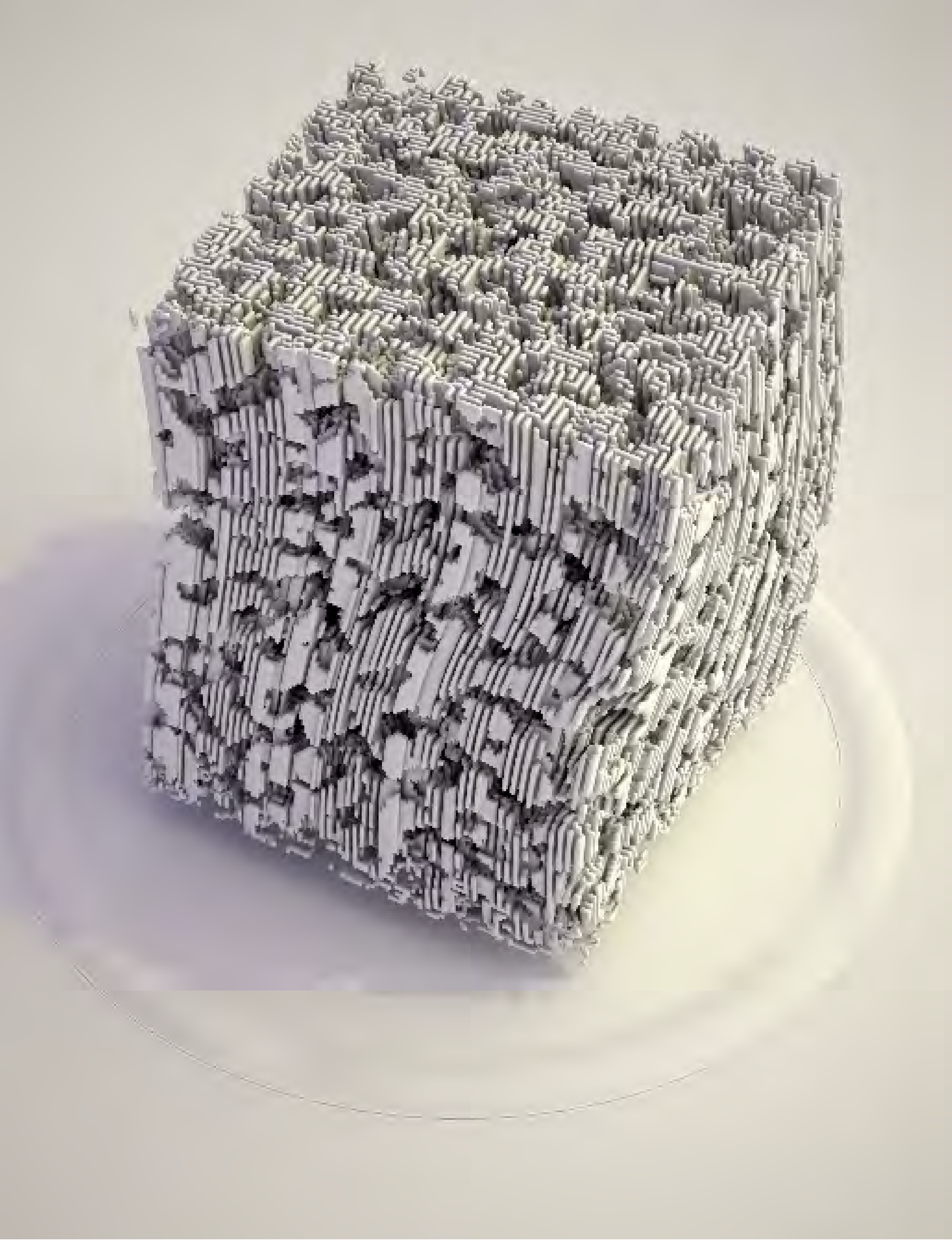




CELLULAR AUTOMATA

RELATIONSHIP BETWEEN TWO FIELDS

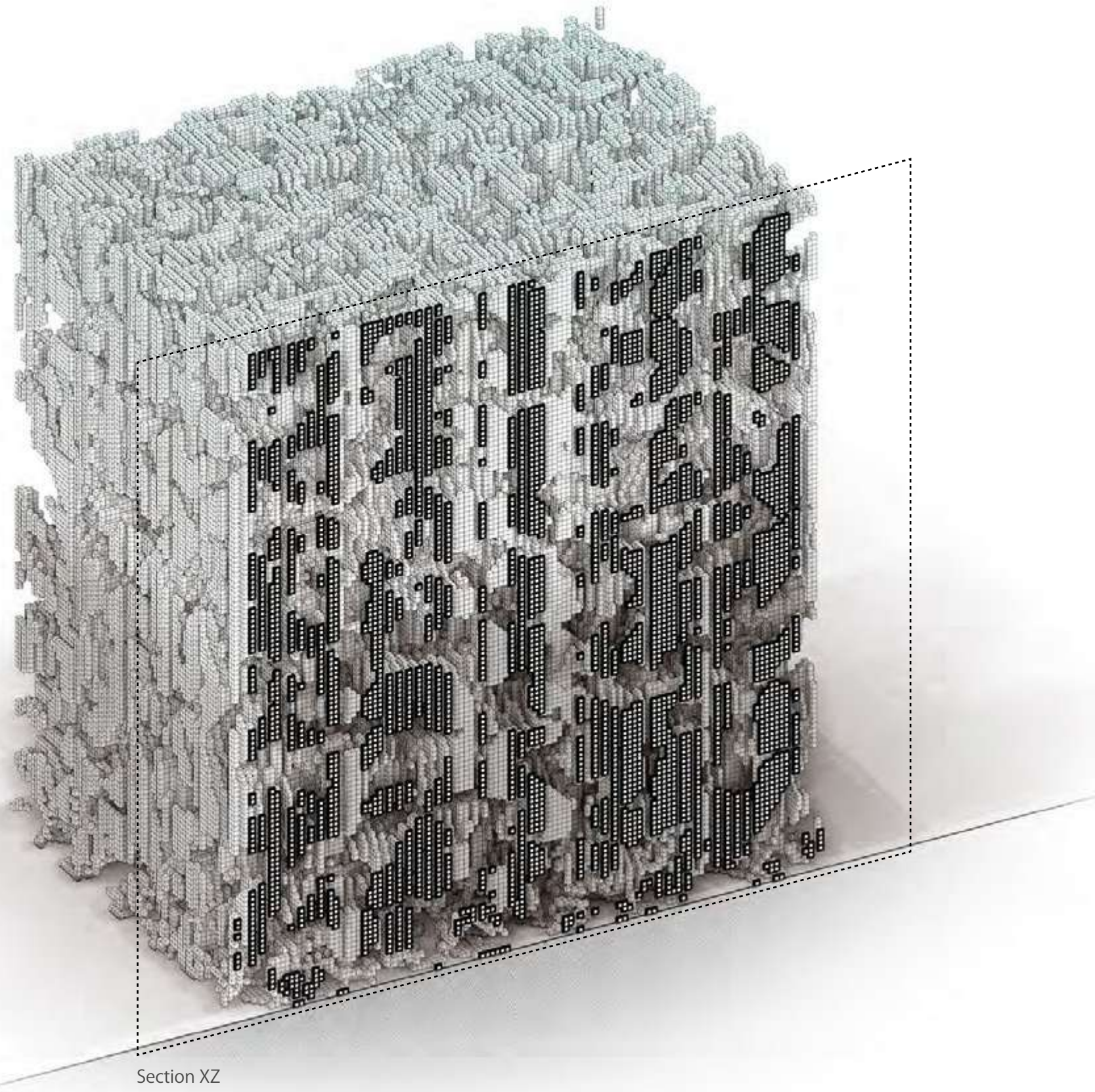
An investigation in the relationship between the field and the object. A top- down apporach to design.



TYPOLOGY A

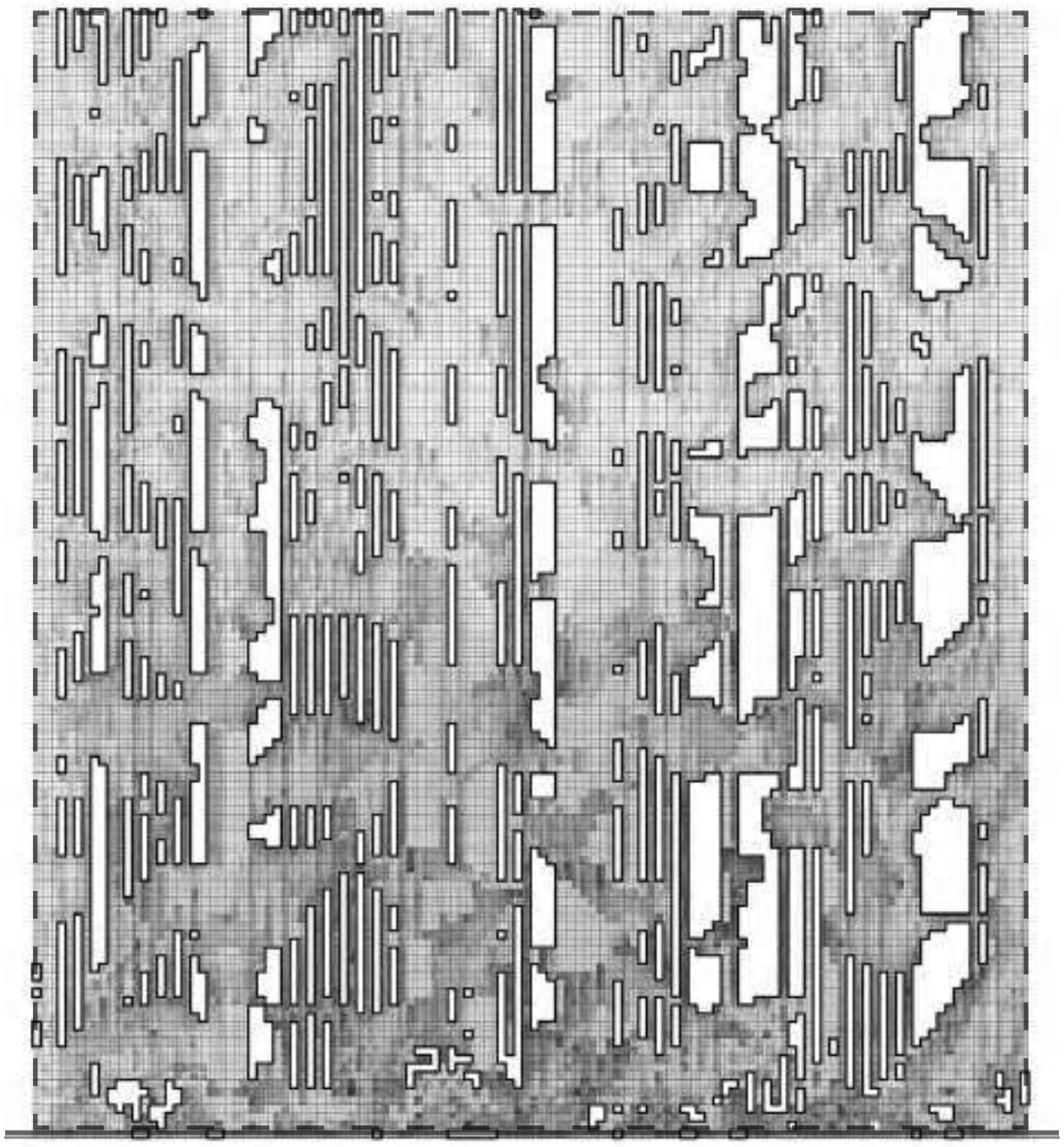
RULES 3 : 2-3

Typology A provided most striking results, while it was almost impossible to construct



Section XZ

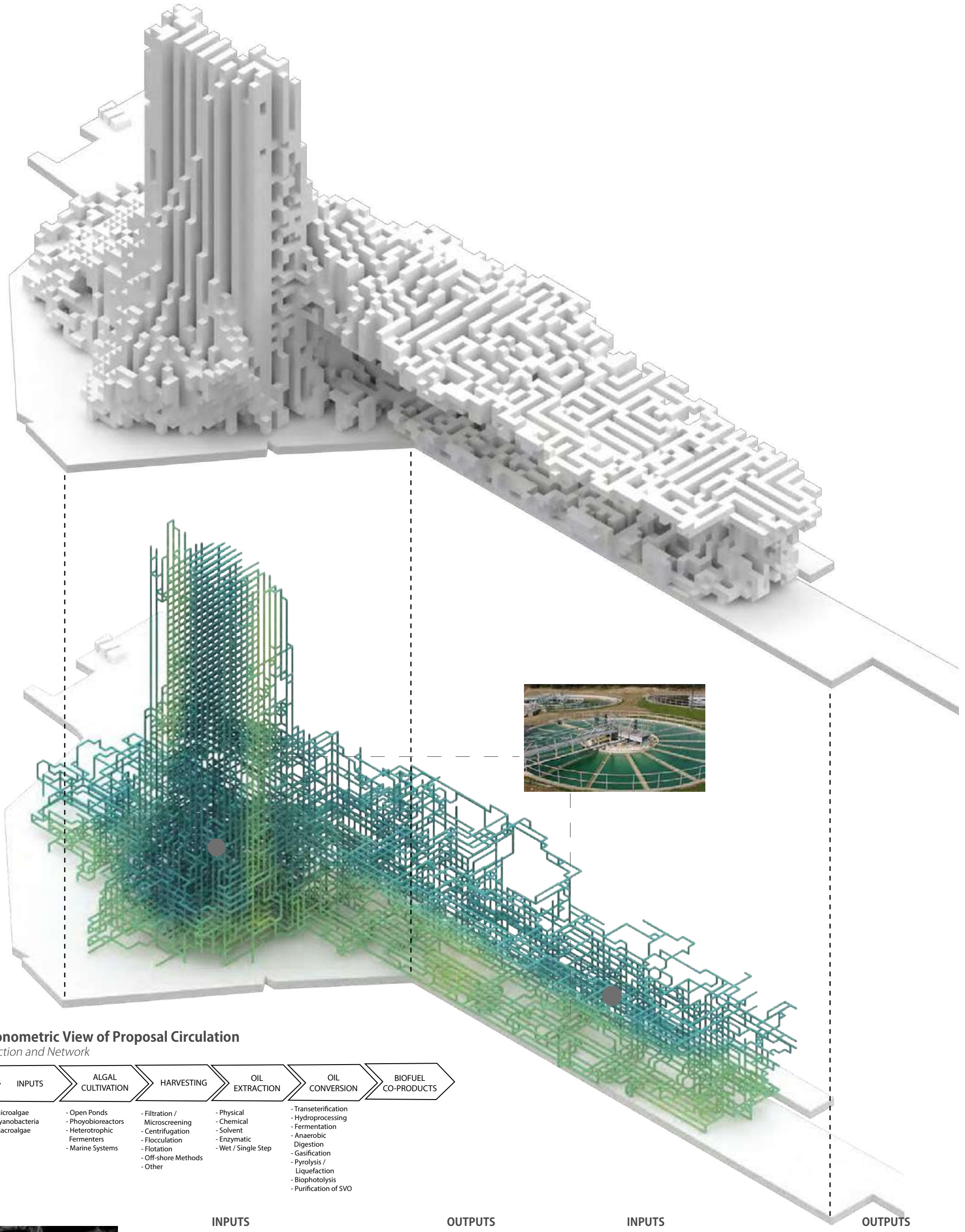
Single units	3907
Clusters	311



TYPOLOGY A

LARGE SECTION FRONT

Positive version



Axonometric View of Proposal Circulation

Function and Network

INPUTS → ALGAL CULTIVATION → HARVESTING → OIL EXTRACTION → OIL CONVERSION → BIOFUEL CO-PRODUCTS

- Microalgae
- Cyanobacteria
- Macroalgae

- Open Ponds
- Phoyobioreactors
- Heterotrophic Fermenters
- Marine Systems

- Filtration / Microscreening
- Centrifugation
- Flocculation
- Flotation
- Off-shore Methods
- Other

- Physical
- Chemical
- Solvent
- Enzymatic
- Wet / Single Step

- Transeterification
- Hydroprocessing
- Fermentation
- Anaerobic Digestion
- Gasification
- Pyrolysis / Liquefaction
- Biophotolysis
- Purification of SVO

SYNURA PETERSENII (GOLDEN ALGAE)

Temperature: 20 °C
Light source: Non
Intensity: Non
Periodicity: 12/12 h L/D

INPUTS

SUNLIGHT / INDIRECT SUNLIGHT

HEAT

CO2

INORGANIC

WATER

OUTPUTS

BIOGAS

BIOFUEL

AQUACULTURE

BIOMASS

INPUTS

HEAT

ORGANIC

WATER

OUTPUTS

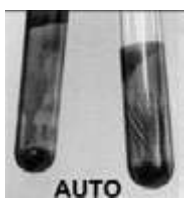
CO2

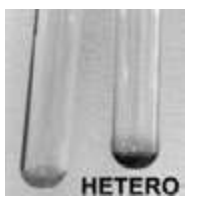
NUTRACEUTICALS

PHARMACEUTICALS

SEWAGE TREATMENT

FOOD

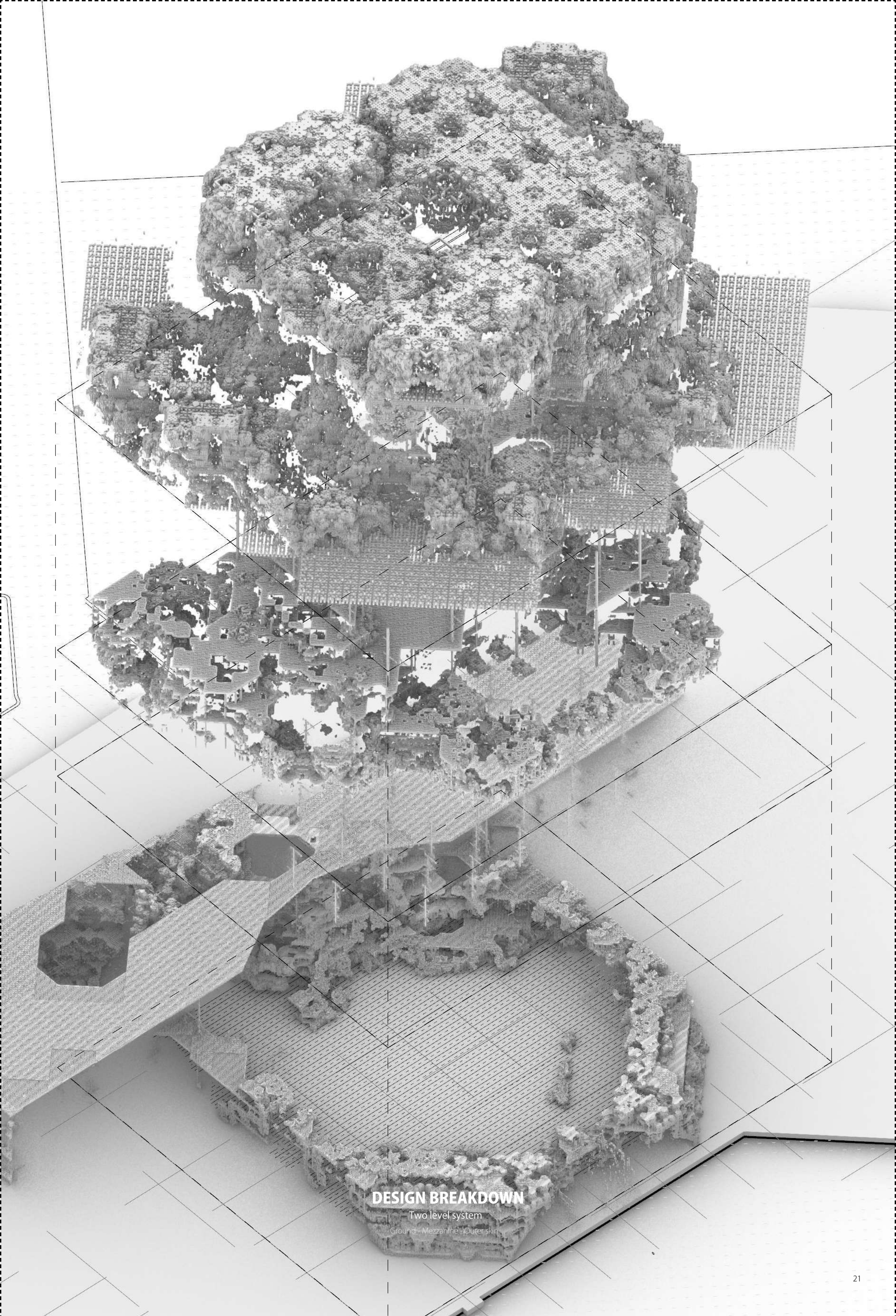




ALGAE SYSTEM

System for growth, cleansing and harvesting

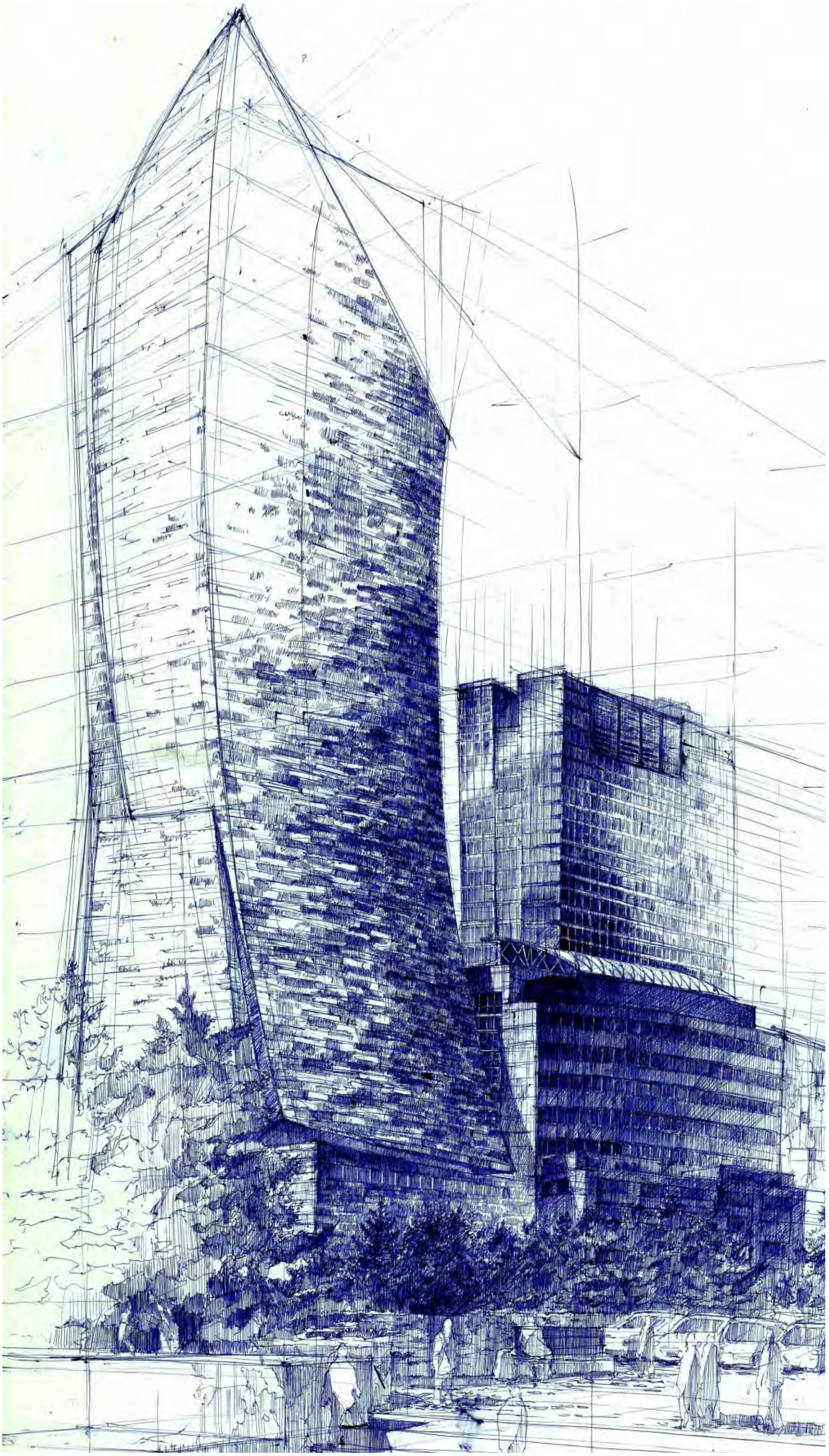
At its current state vacuoles hosts water and is the storage of water which as a system is fine by itself. However having natural growth within the same system would be more energy efficient and given natural qualities to the material envelop. Algae can grow on only water and indirect sunlight, giving coloration and the potential of growth within a building facade.

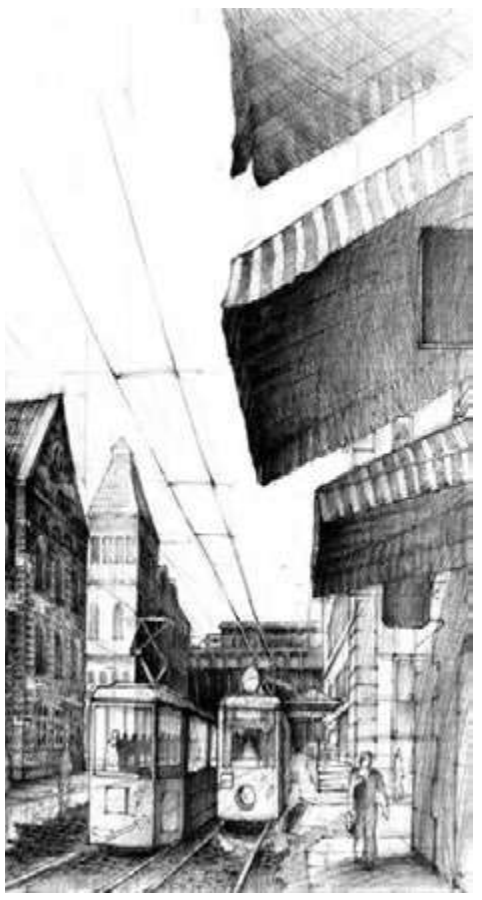


DESIGN BREAKDOWN

Two level system

Ground - Mezzanine - Outer skin

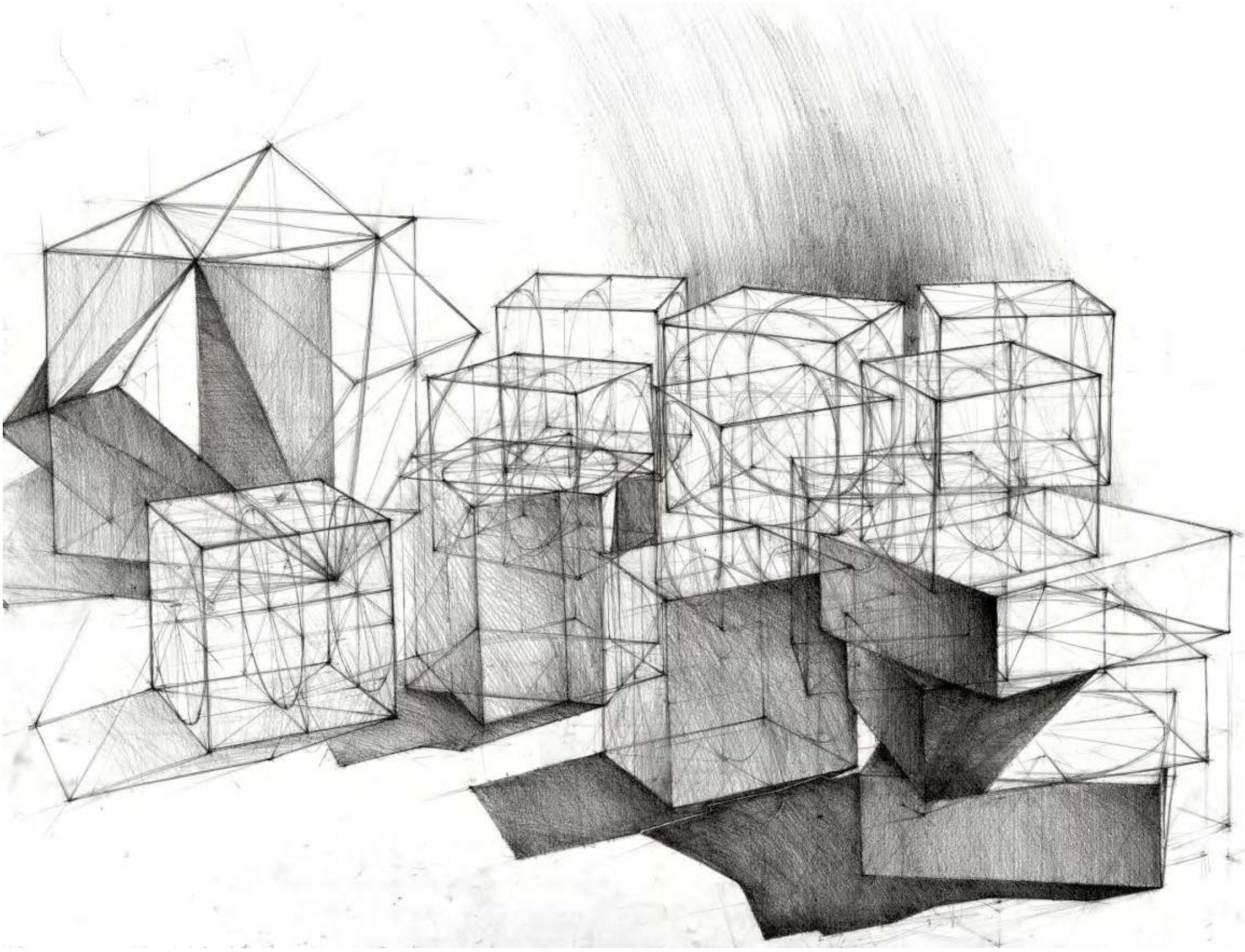


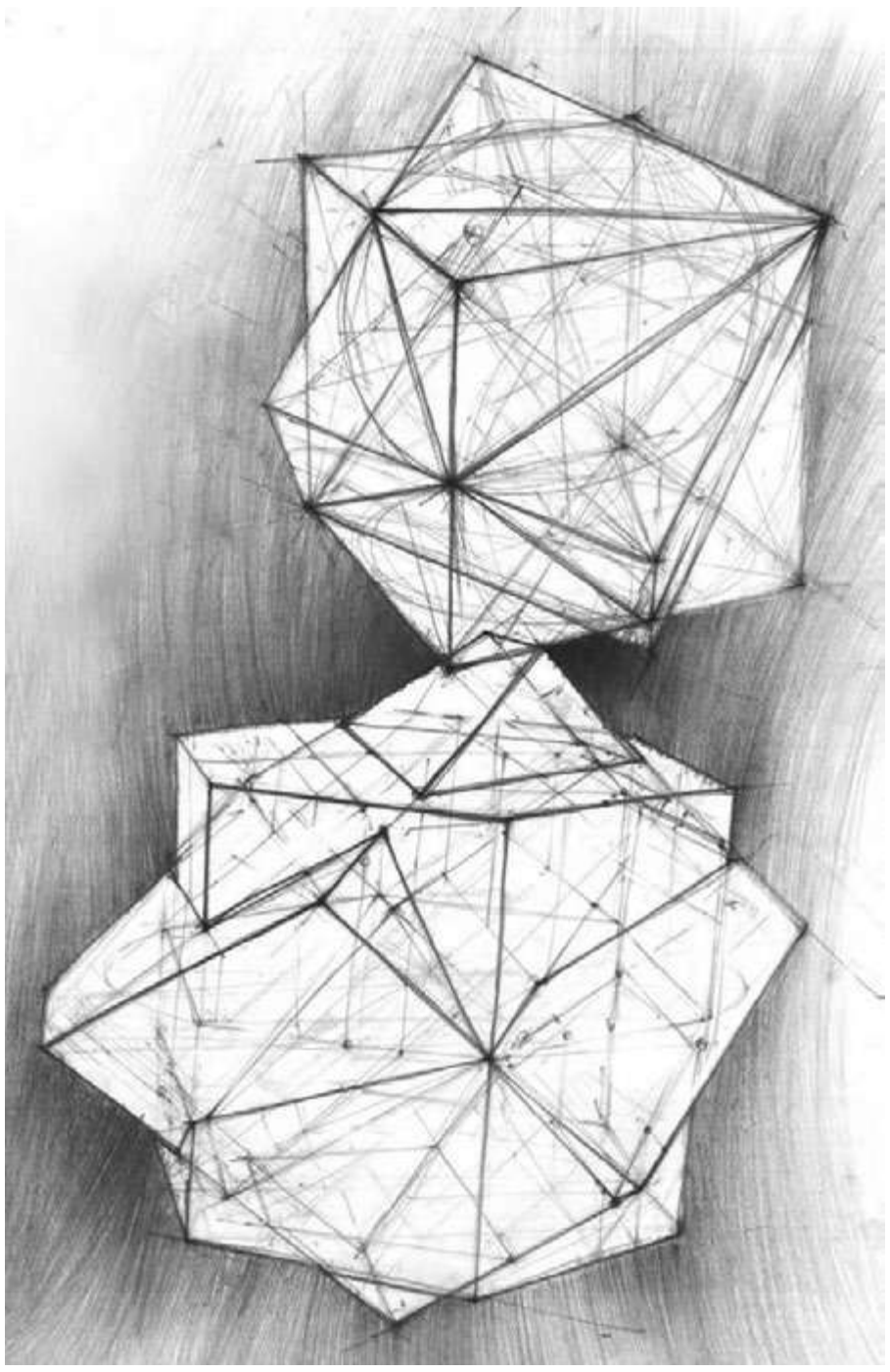


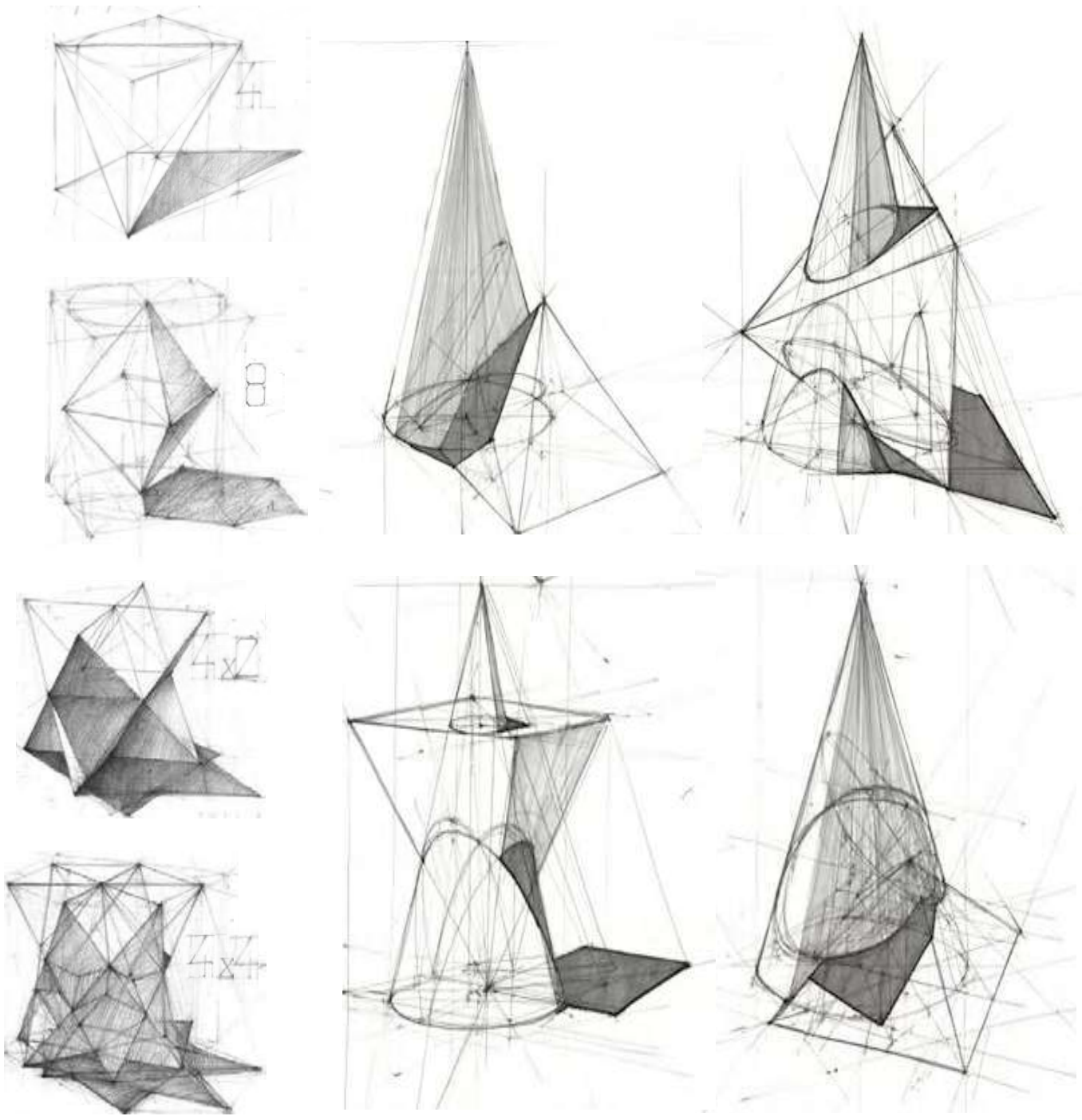
URBAN LANDSCAPING

Hand Drawings

My journey into architecture began with passion for on-site hand drawing. Experiencing architecture through periods of observation and craftsmanship opened my senses onto the rich world of the cities.







MATHEMATICAL

Hand Drawings

Taking inspiration from mathematical concepts of calculus I experimented with hand drawing techniques to analyze prisms. I found various configurations potentially applicable to architecture.