

# Marconiplein New Transportation Hub

Xi Guo 4253825

Tutors: Nimish Bioria, Henriette Bier, Karel Vollers

HYPERBODY

An aerial photograph of a city, likely Marconiplein, showing a dense urban environment with various buildings, streets, and green spaces. A red dashed line outlines a specific area in the center of the image. The word "Marconiplein" is overlaid in white text across this outlined area.

Marconiplein

# Marconiplein

Surrounding environment

Oud-Mathenesse  
&  
White Village

North Park

Spangenberg

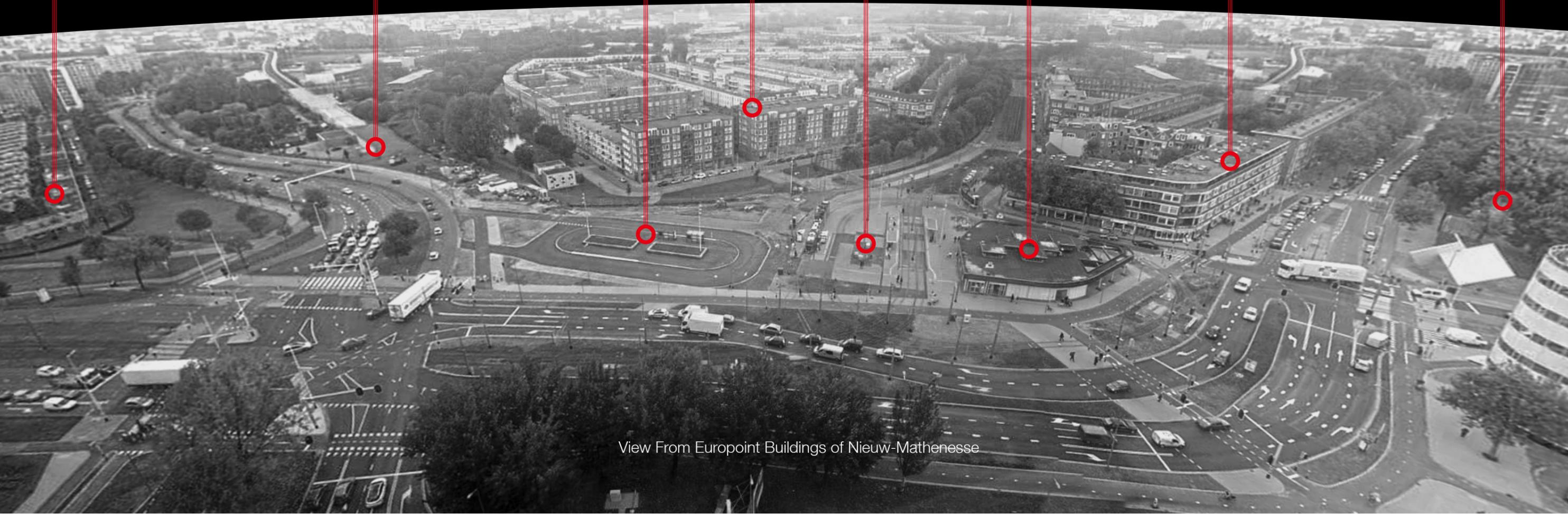
Spangenberg

Tussendijken

Bus Station

Tram Station

Metro Station



View From Europoint Buildings of Nieuw-Mathenesse

# Population Expanding

Transportation infrastructure need to be renewed to meet future demands

Oud-Mathenesse  
Residents 6500  
&  
White Village  
Residents 620

North Park  
281295m<sup>2</sup>

Spangenberg  
Residents 9,520

Spangenberg  
Residents 9,520

West Park  
175991m<sup>2</sup>

Car parking

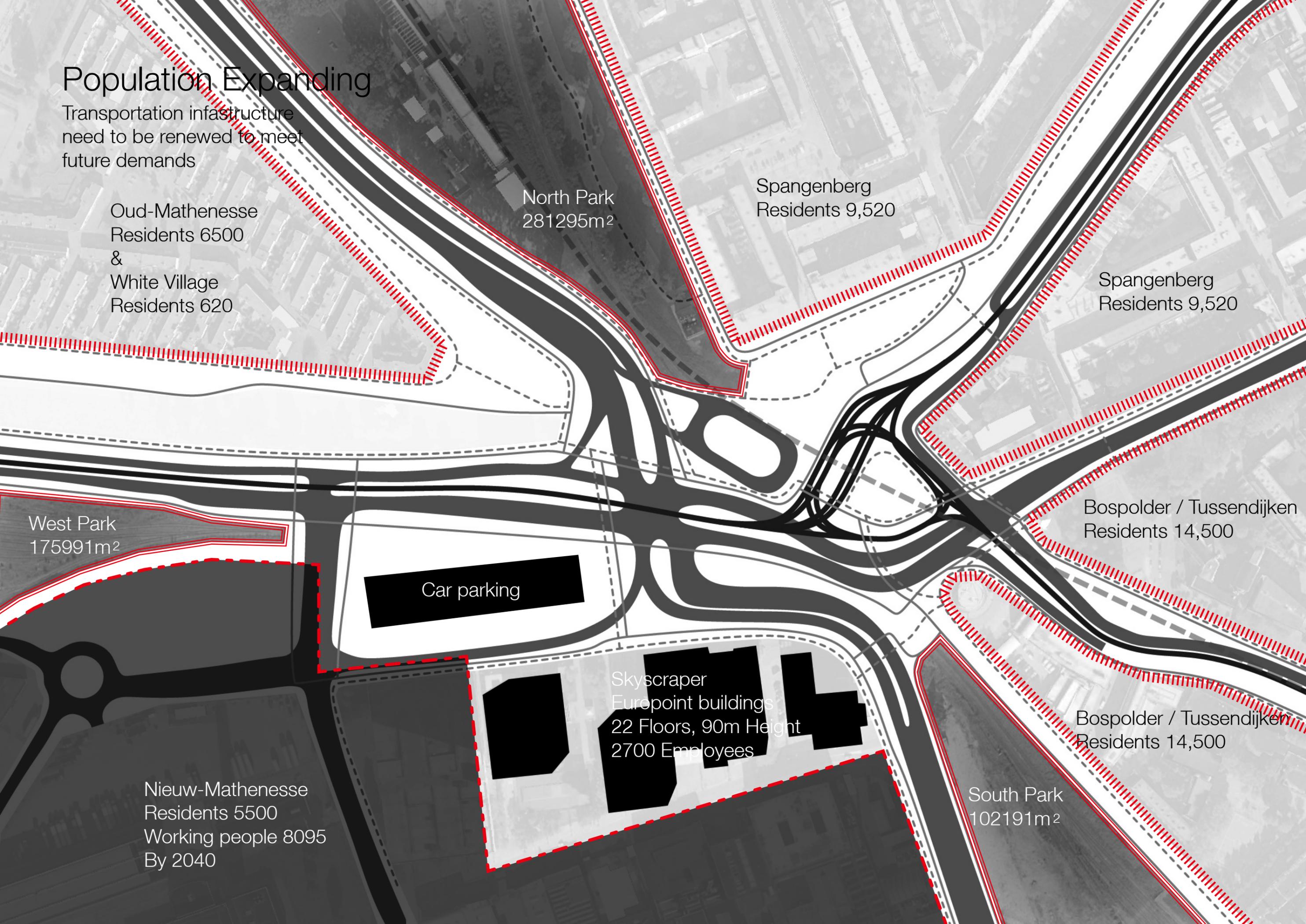
Bospolder / Tussendijken  
Residents 14,500

Skyscraper  
Europoint buildings  
22 Floors, 90m Height  
2700 Employees

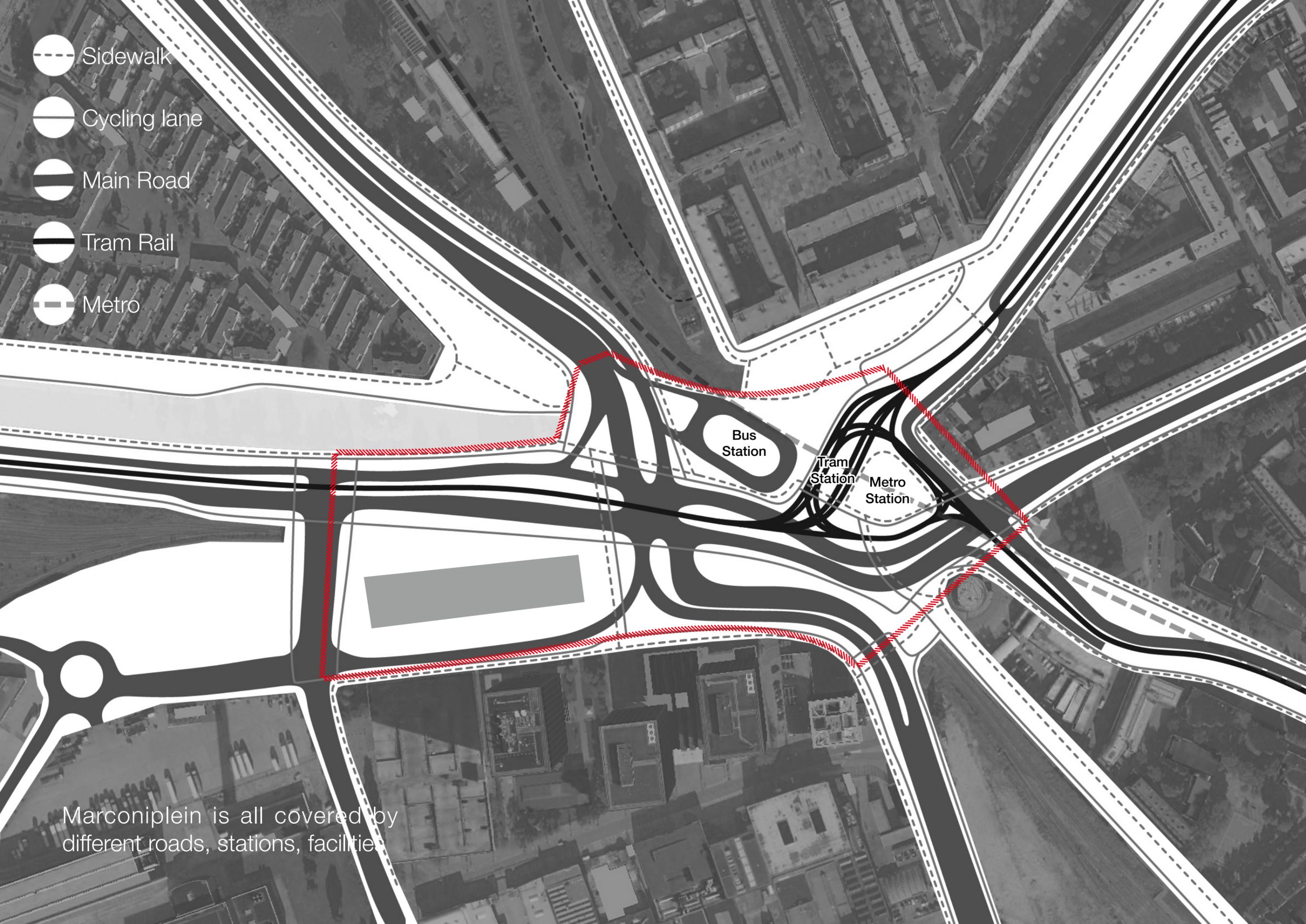
Bospolder / Tussendijken  
Residents 14,500

Nieuw-Mathenesse  
Residents 5500  
Working people 8095  
By 2040

South Park  
102191m<sup>2</sup>



- Sidewalk
- Cycling lane
- Main Road
- Tram Rail
- Metro



Marconiplein is all covered by different roads, stations, facilities

# Inefficiency



White Village

1

2

3

4

5

6

7

8

9

South Park



Metro  
Station

1

2

3

4

5

6

Europoint

Sustainable Strategy

Revival the Marconi Square as

a **Square**

Two challenges

↓  
Transportation  
efficiency

↓  
Attract people to come over  
(Benefit for local residents)

↓  
Side Walk  
Bike Lane  
Carriageway

↓  
Metro ↔ Tram  
↙ transfer ↘  
Bus

↓  
Park Connection  
Expanded Green Area  
Commercial Space



# Sustainable Strategy

Specific function requirements



## Minimal Paths Topology

Paths reconnection



## Swarm Behavior Simulation

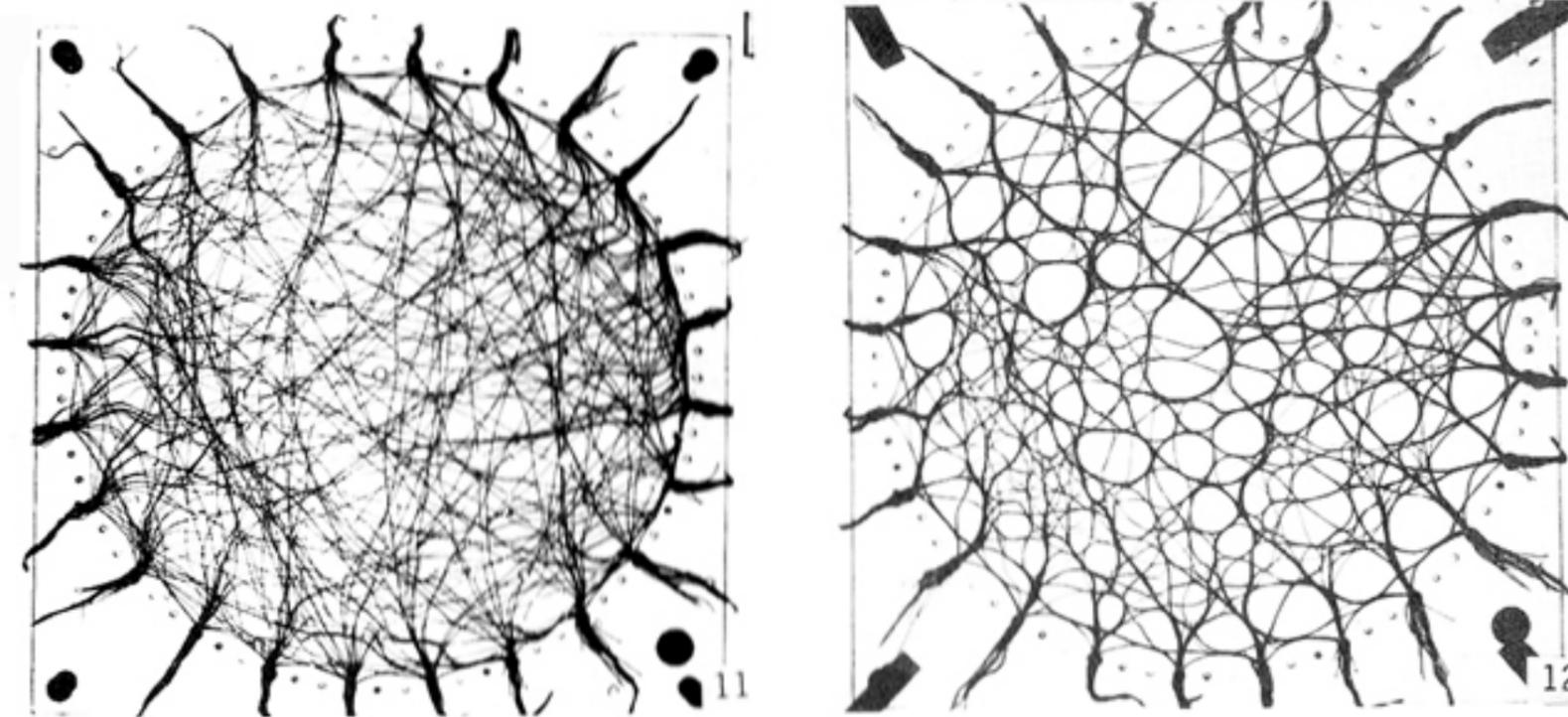
Agent-based function-position finding



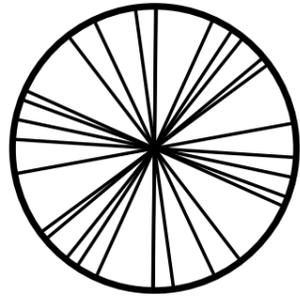
## Metaball Morphology

morphogenesis

# Minimal Paths Topology

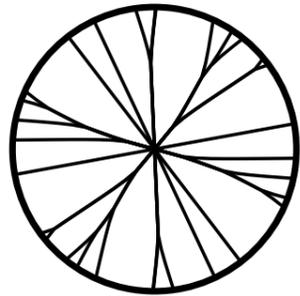


Marek Kolodziejczyk, Wool-thread model to compute optimised detour path networks,  
Institute for Lightweight Structures (ILEK), Stuttgart, 1991

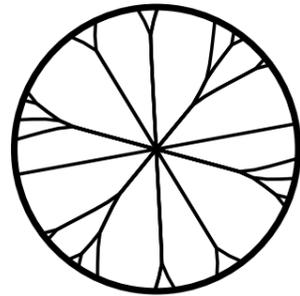


Maximal connections, Maximal efficiency  
Minimal paths, Minimal constructions

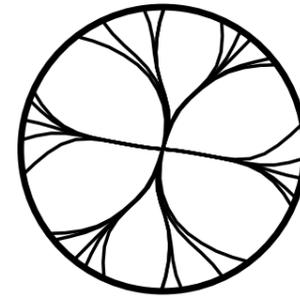
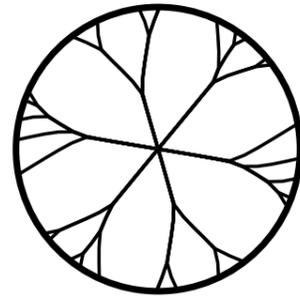
## Minimal Paths Experiments



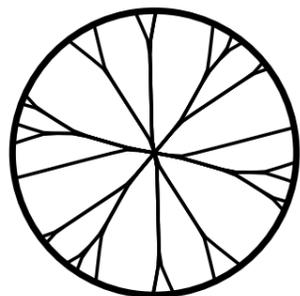
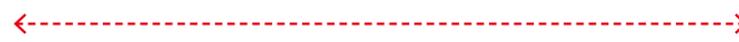
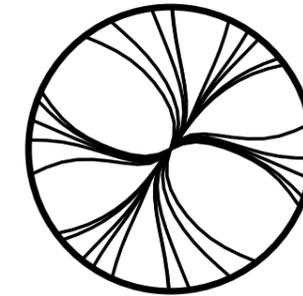
Attract Range



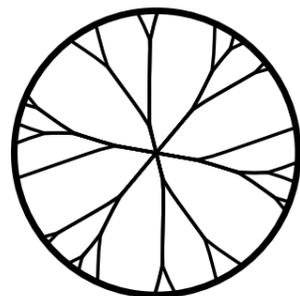
Smaller



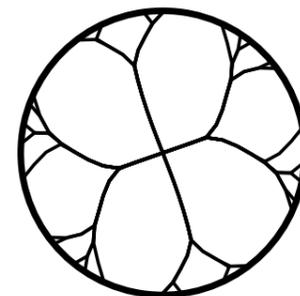
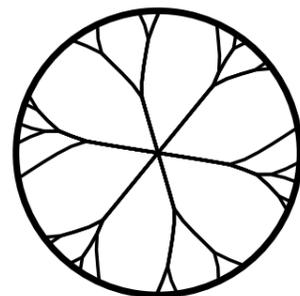
Larger



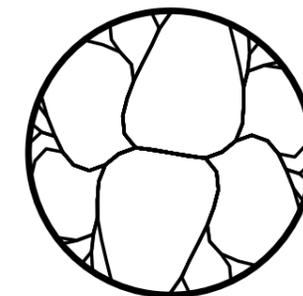
Tension



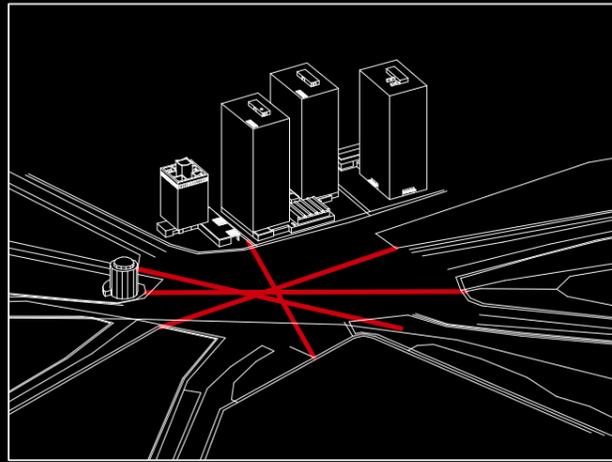
Weaker



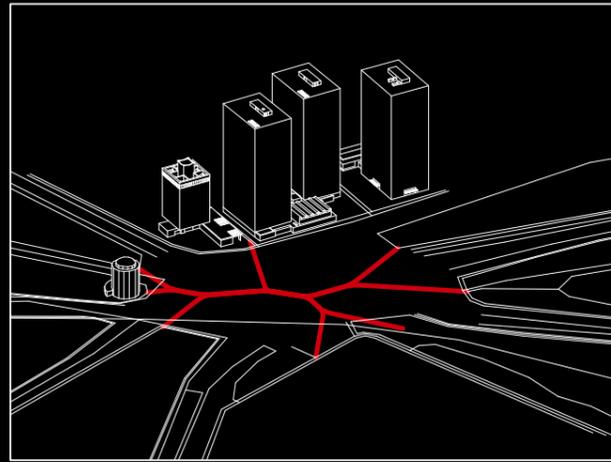
Stronger



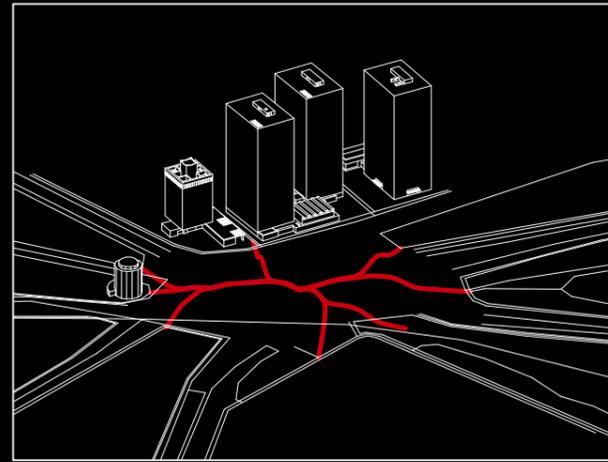
## Carriageways Reconnection



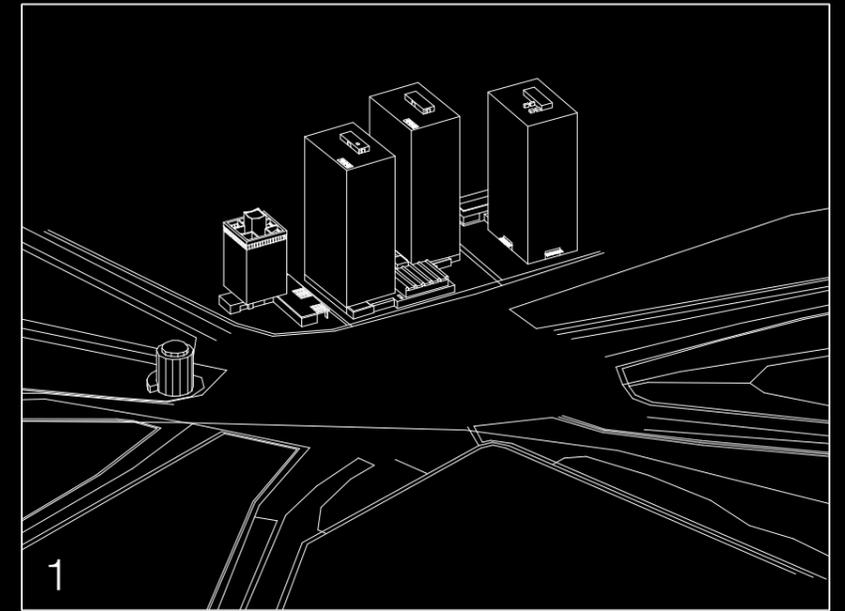
Connection Target



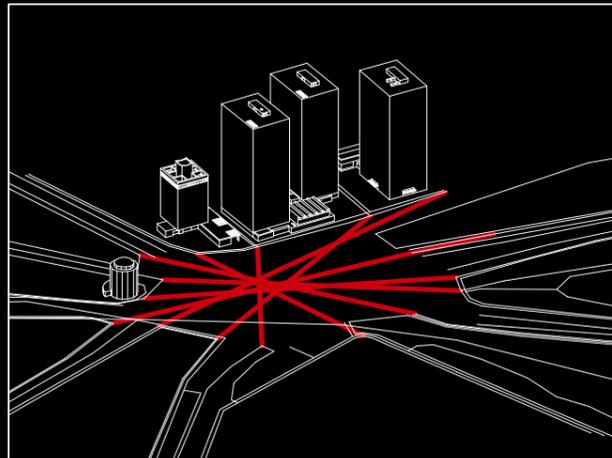
Mininal Paths Optimization



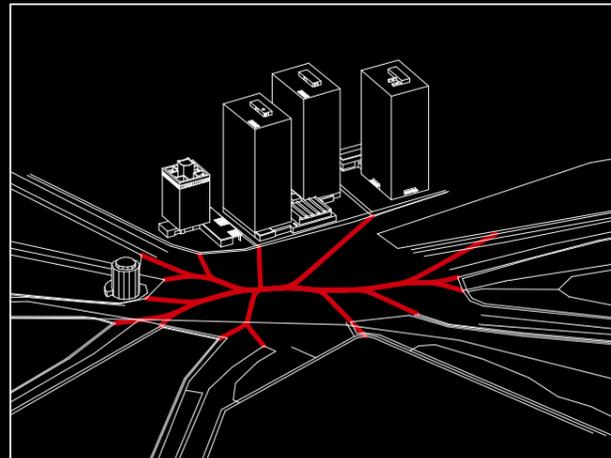
Paths Height Adjustment



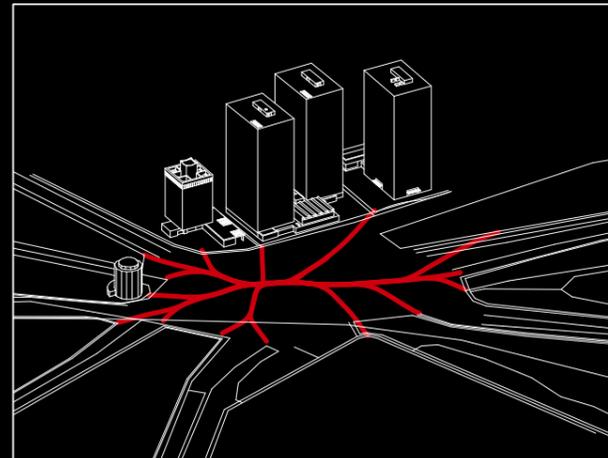
## Bike & Pedestrian Paths Reconnection



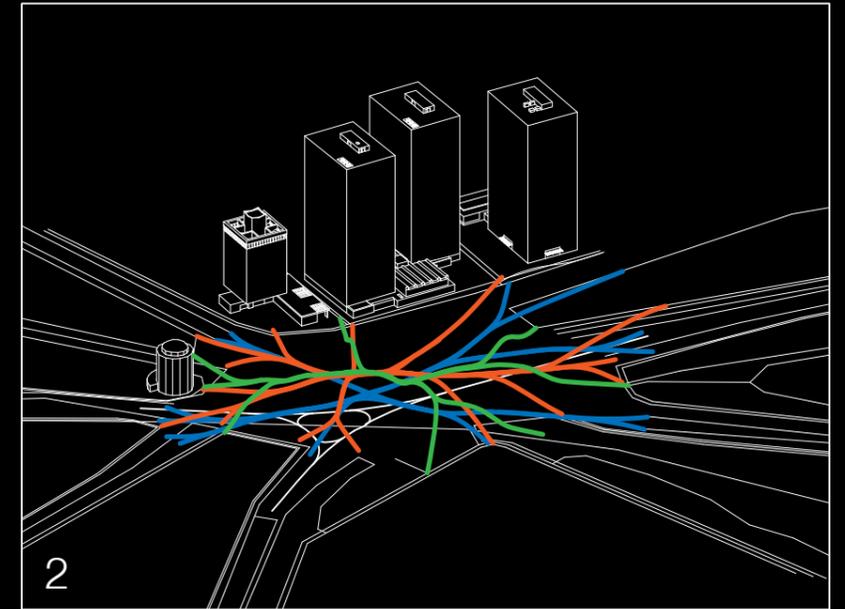
Connection Target



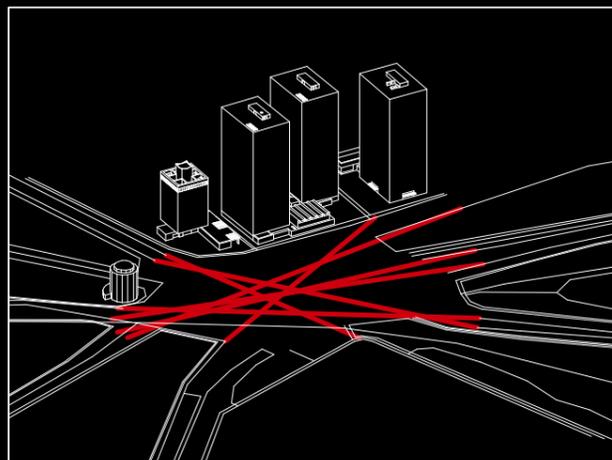
Mininal Paths Optimization



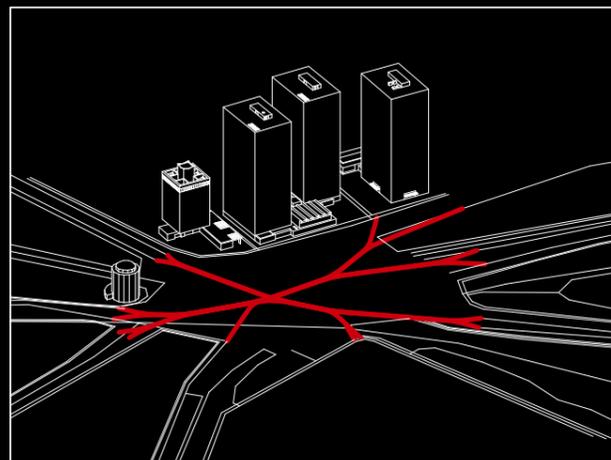
Paths Height Adjustment



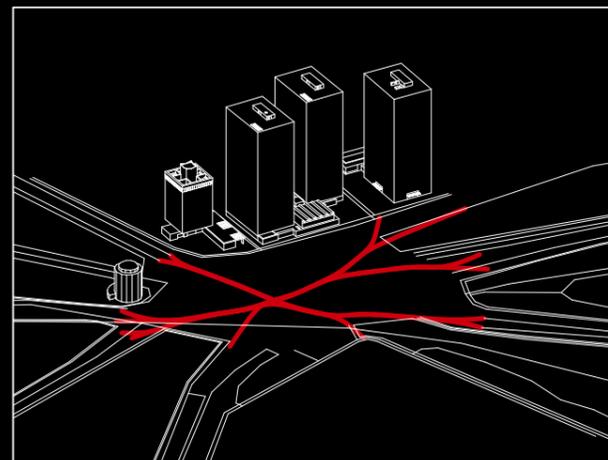
## Pedestrian Viewing Paths Reconnection



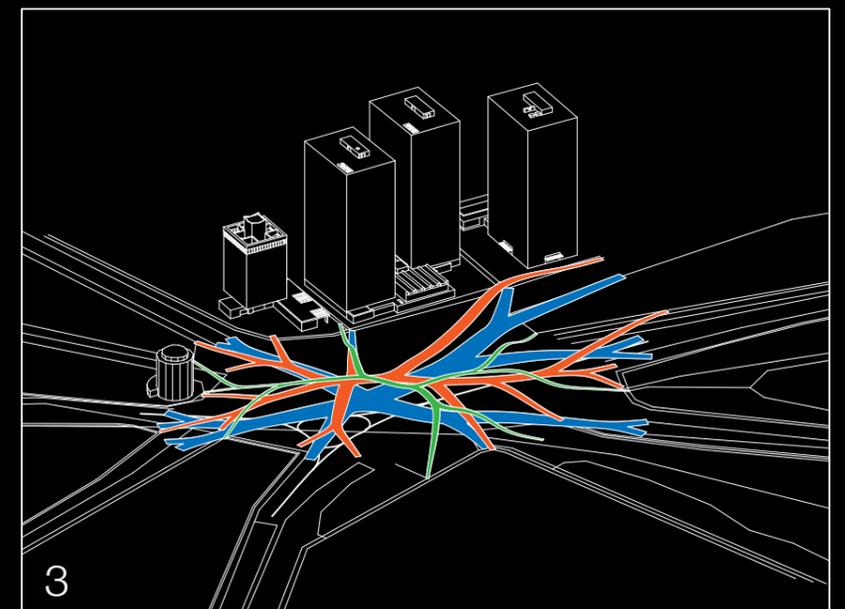
Connection Target



Mininal Paths Optimization

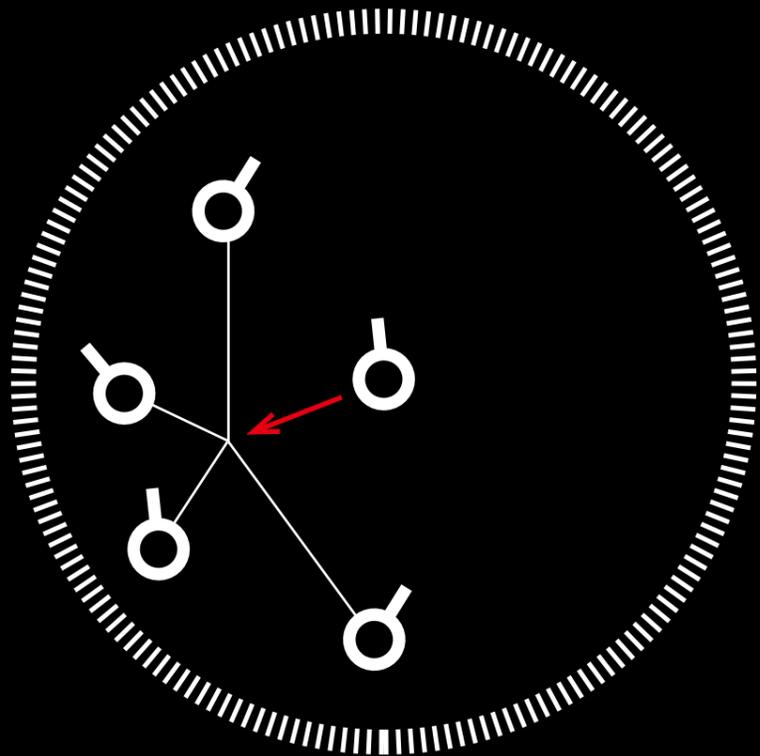


Paths Height Adjustment

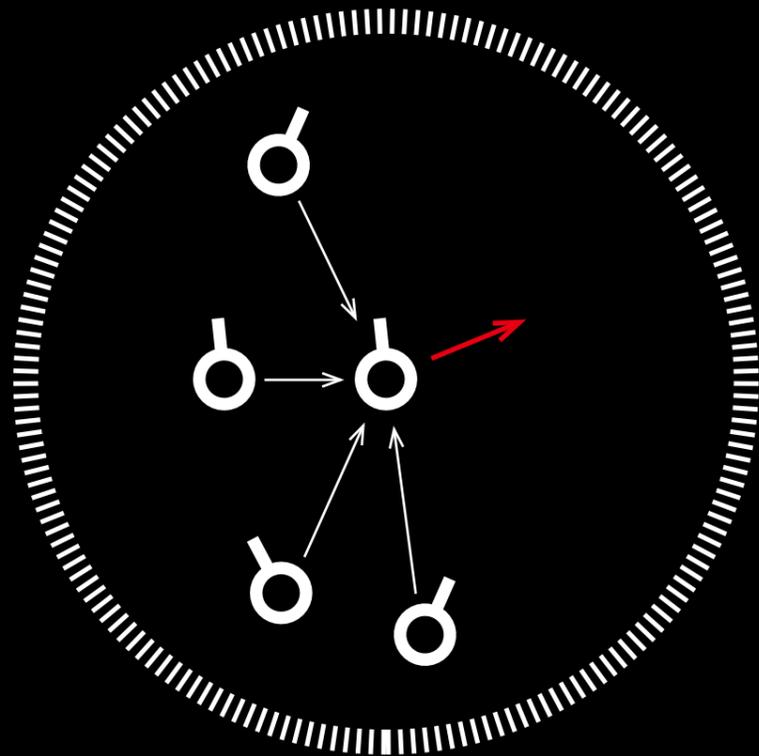


# Swarm Behaviour Simulation

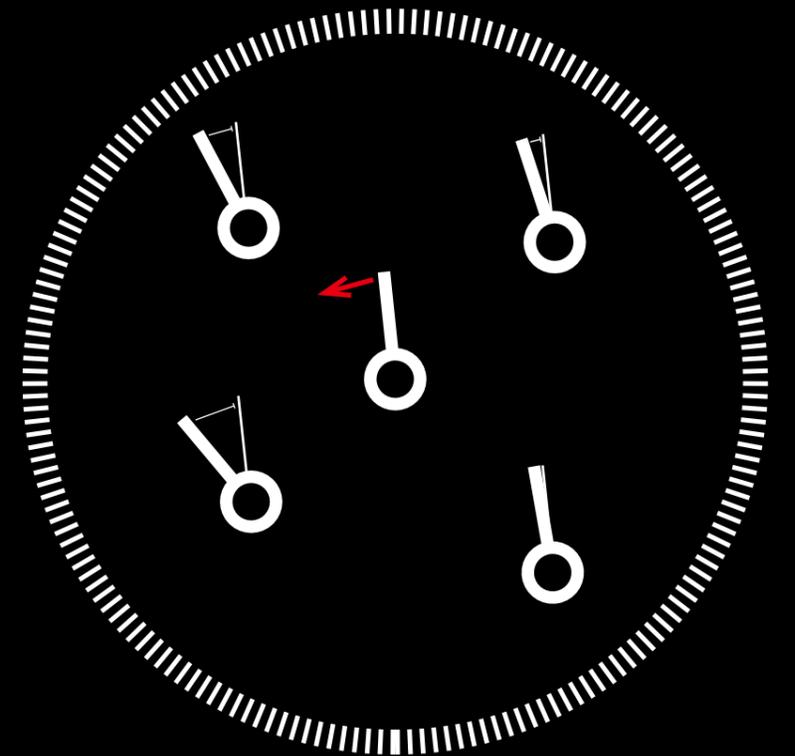




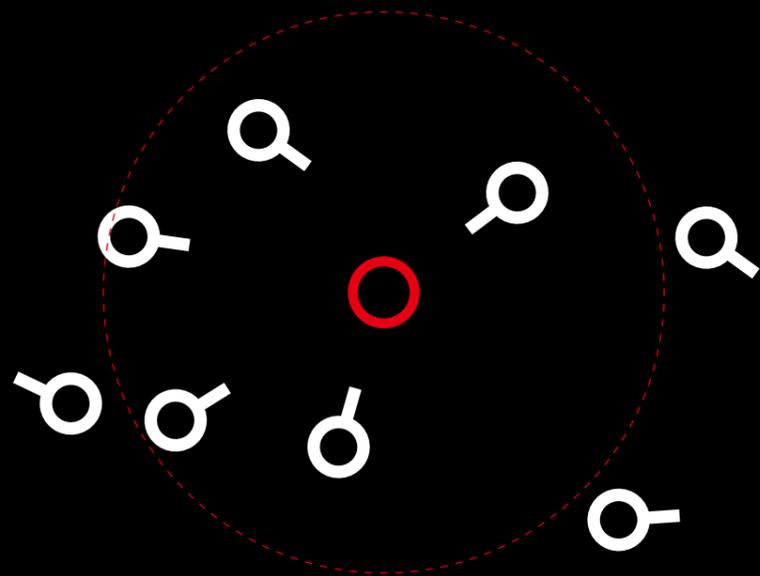
Cohesion



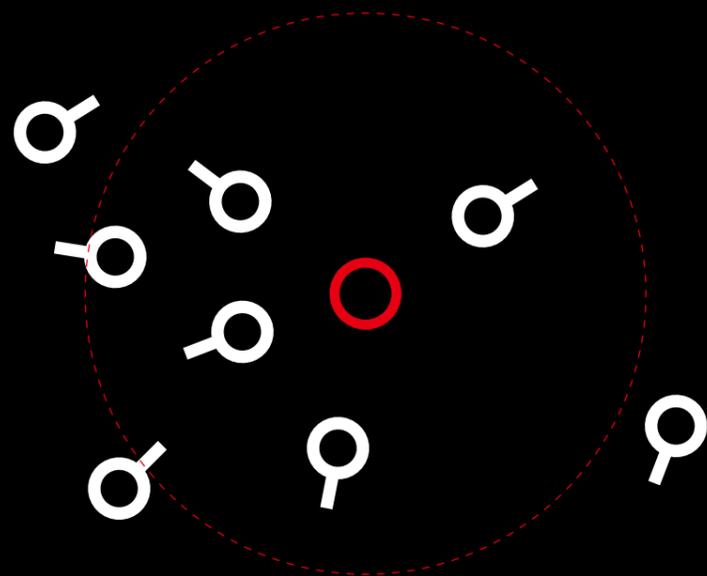
Separation



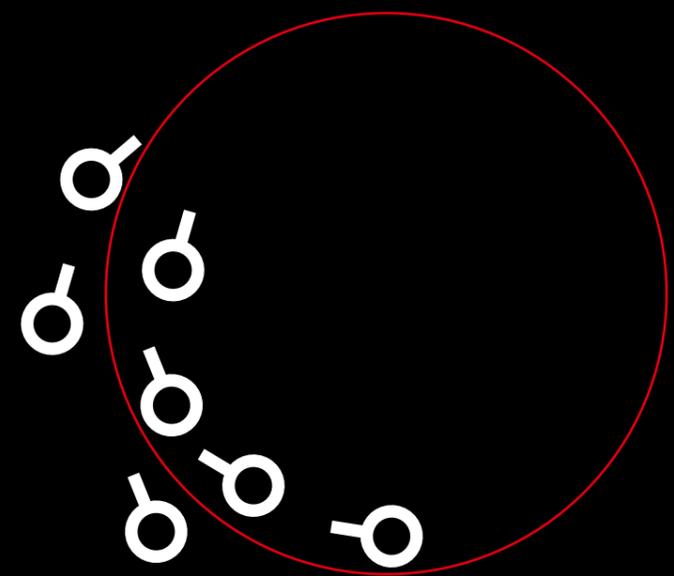
Alignment



Seek\_Positive

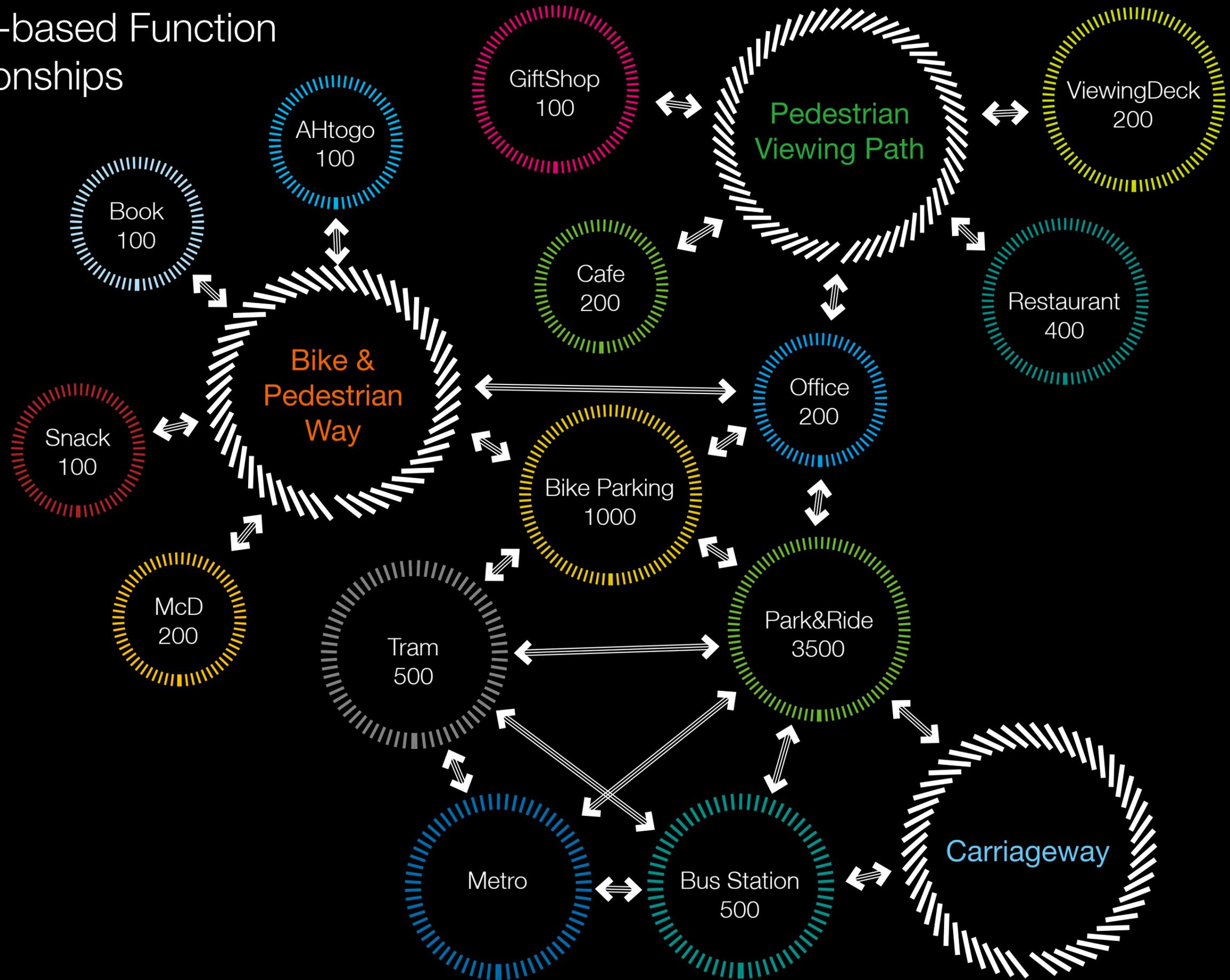


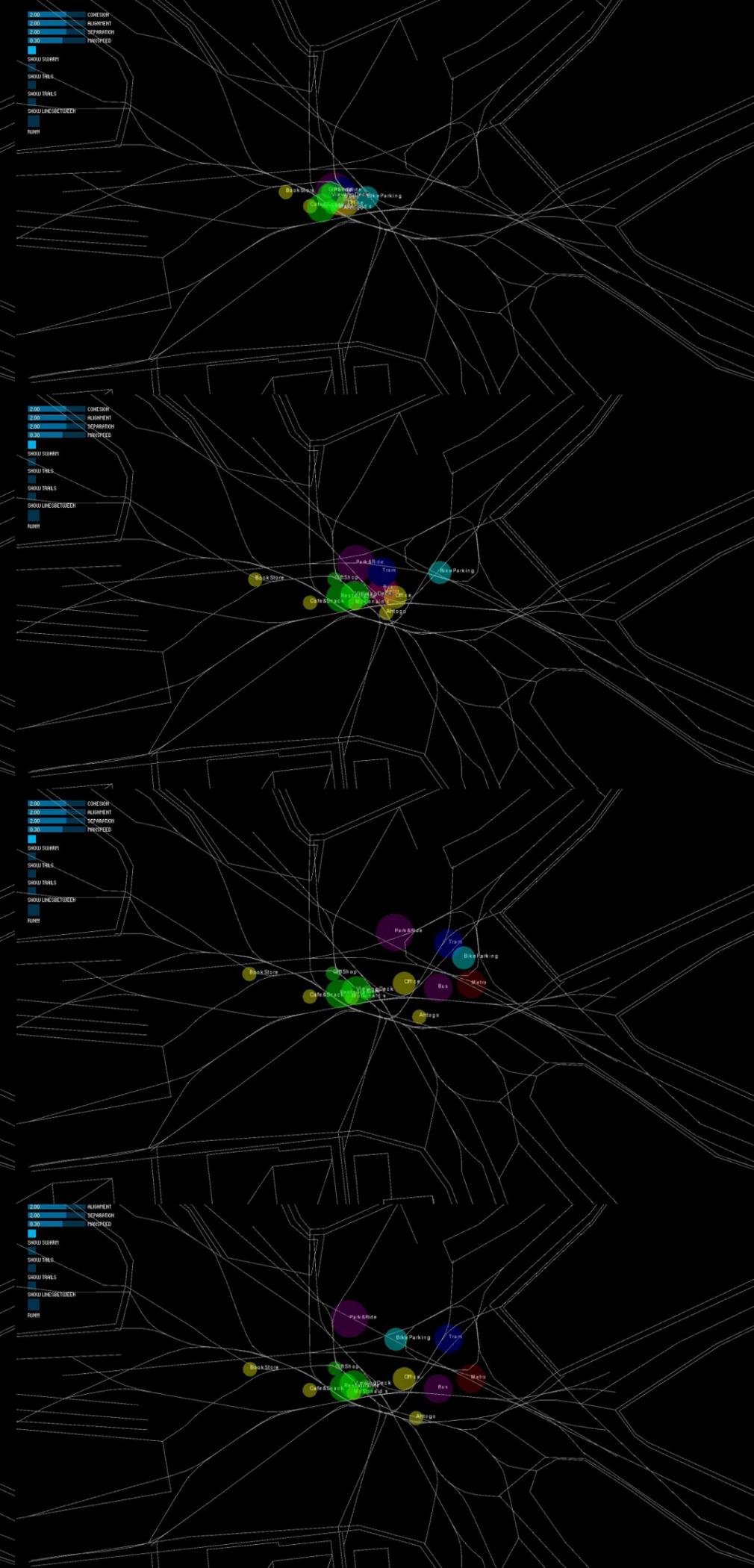
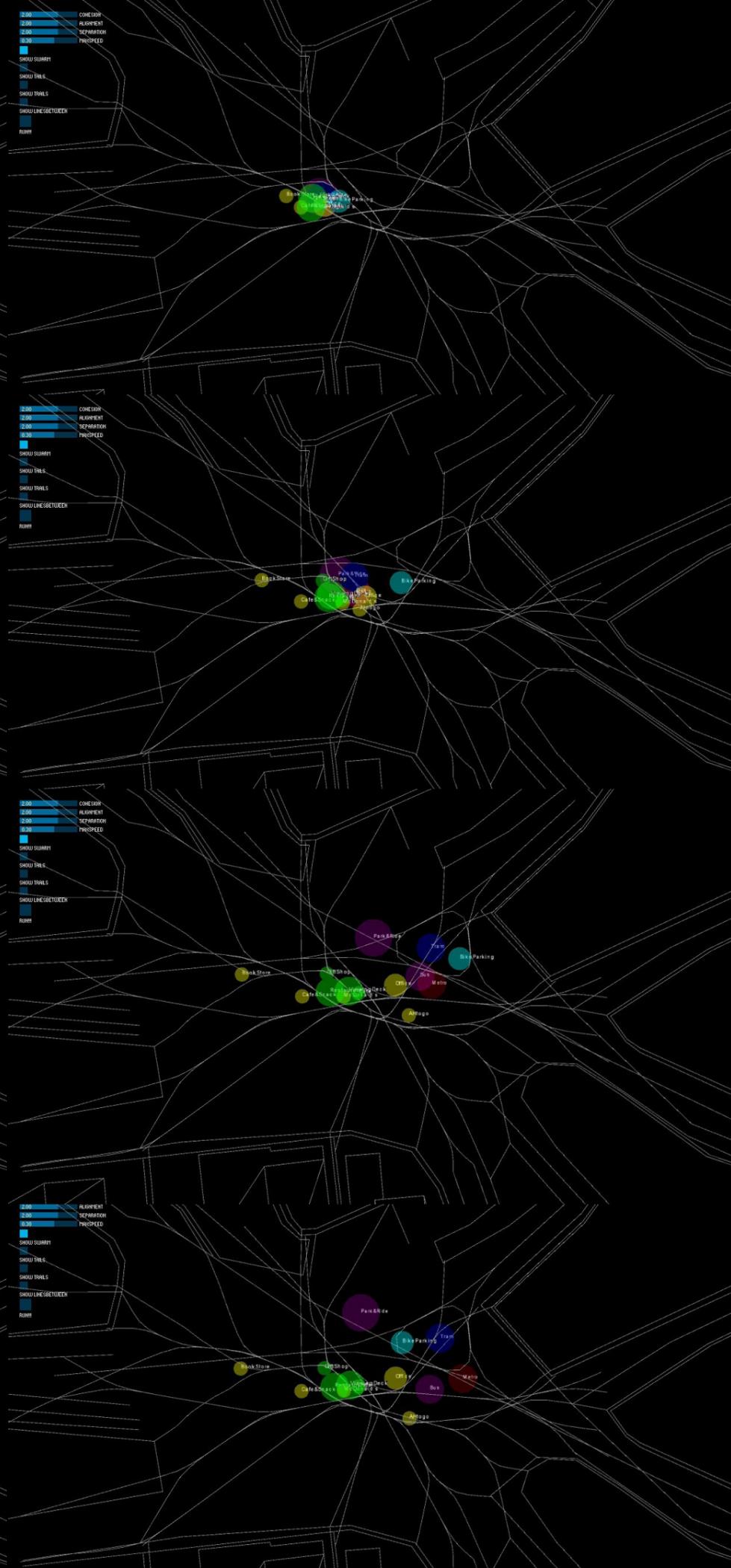
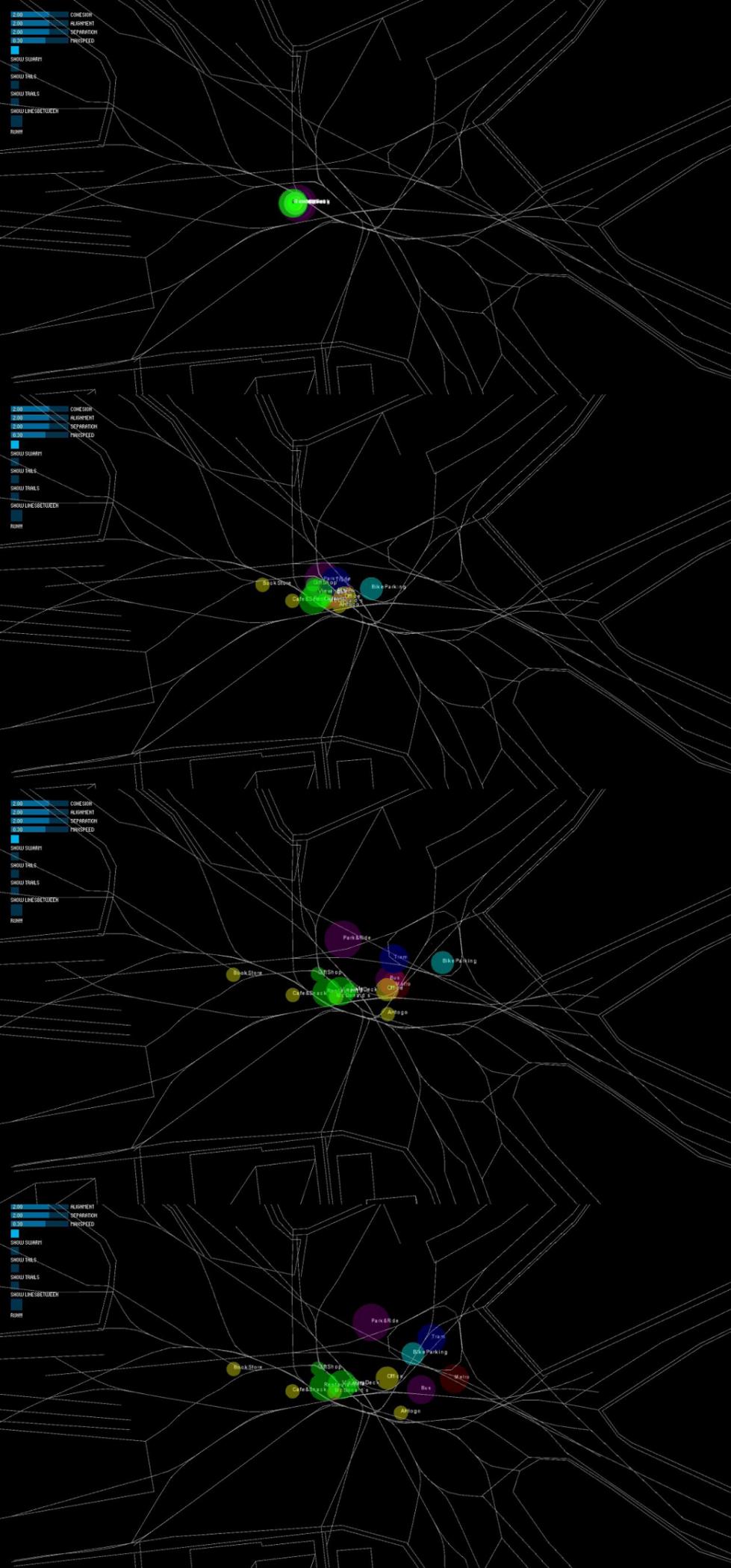
Seek\_Negative



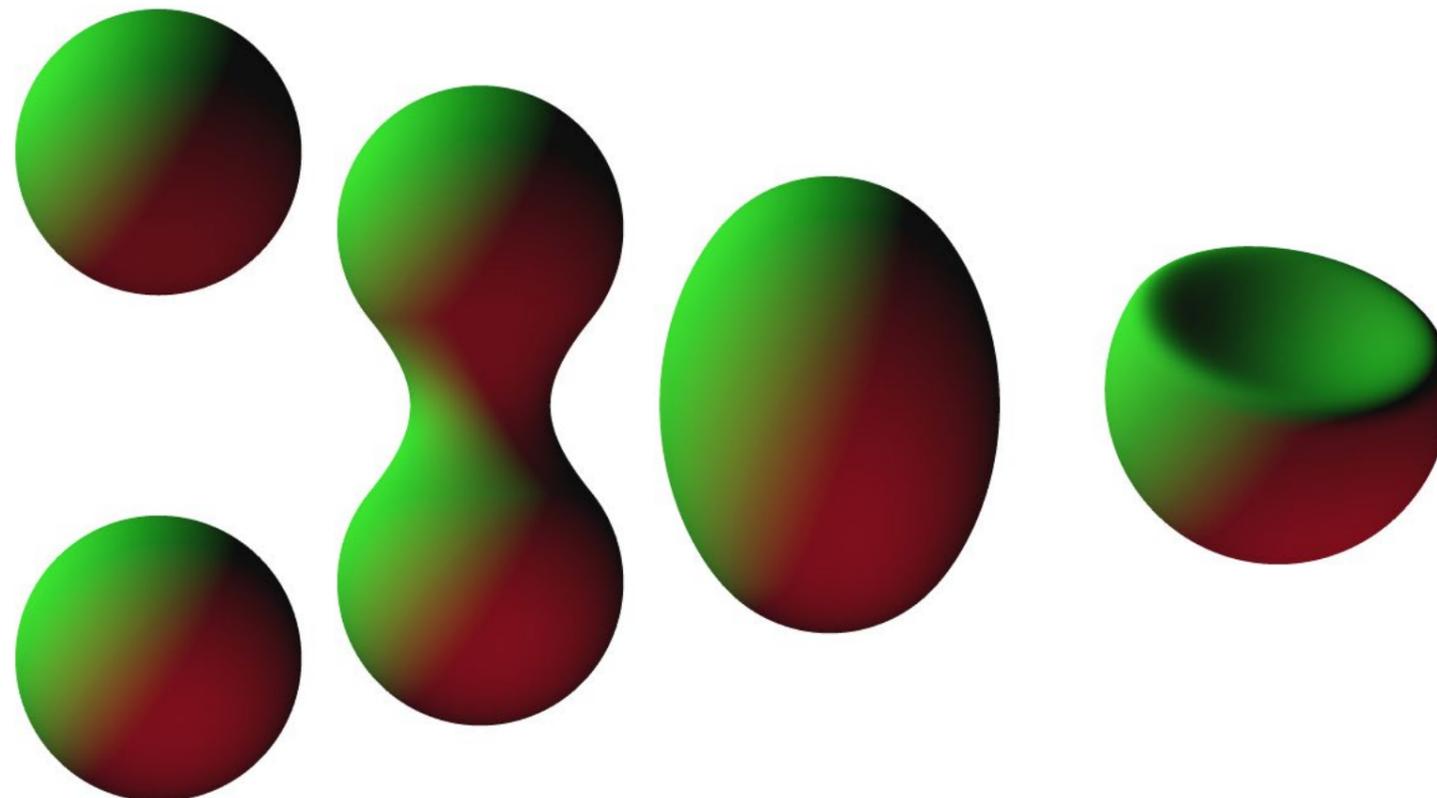
FlowAlong Spline

# Agent-based Function Relationships



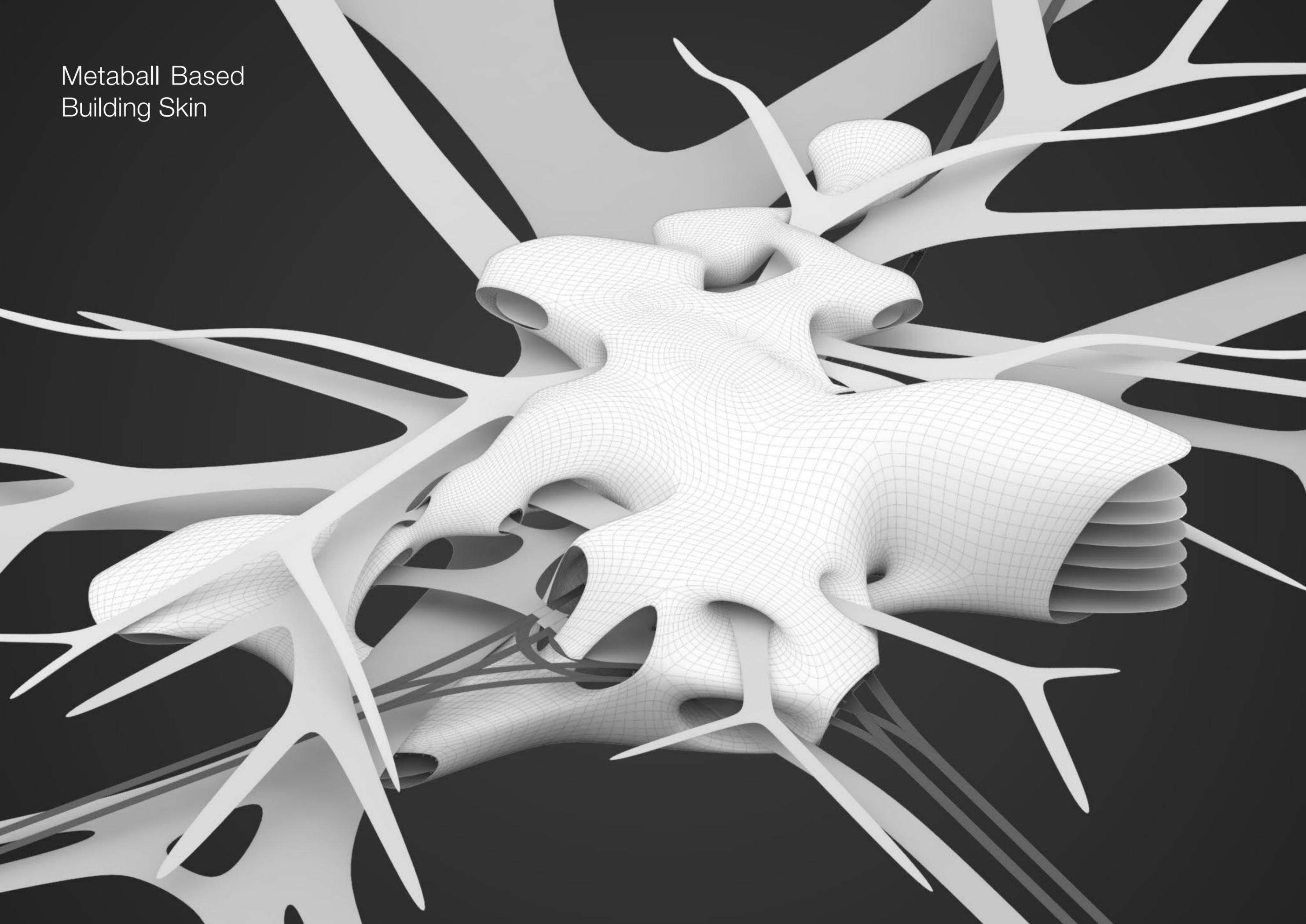


# Metaball Morphology

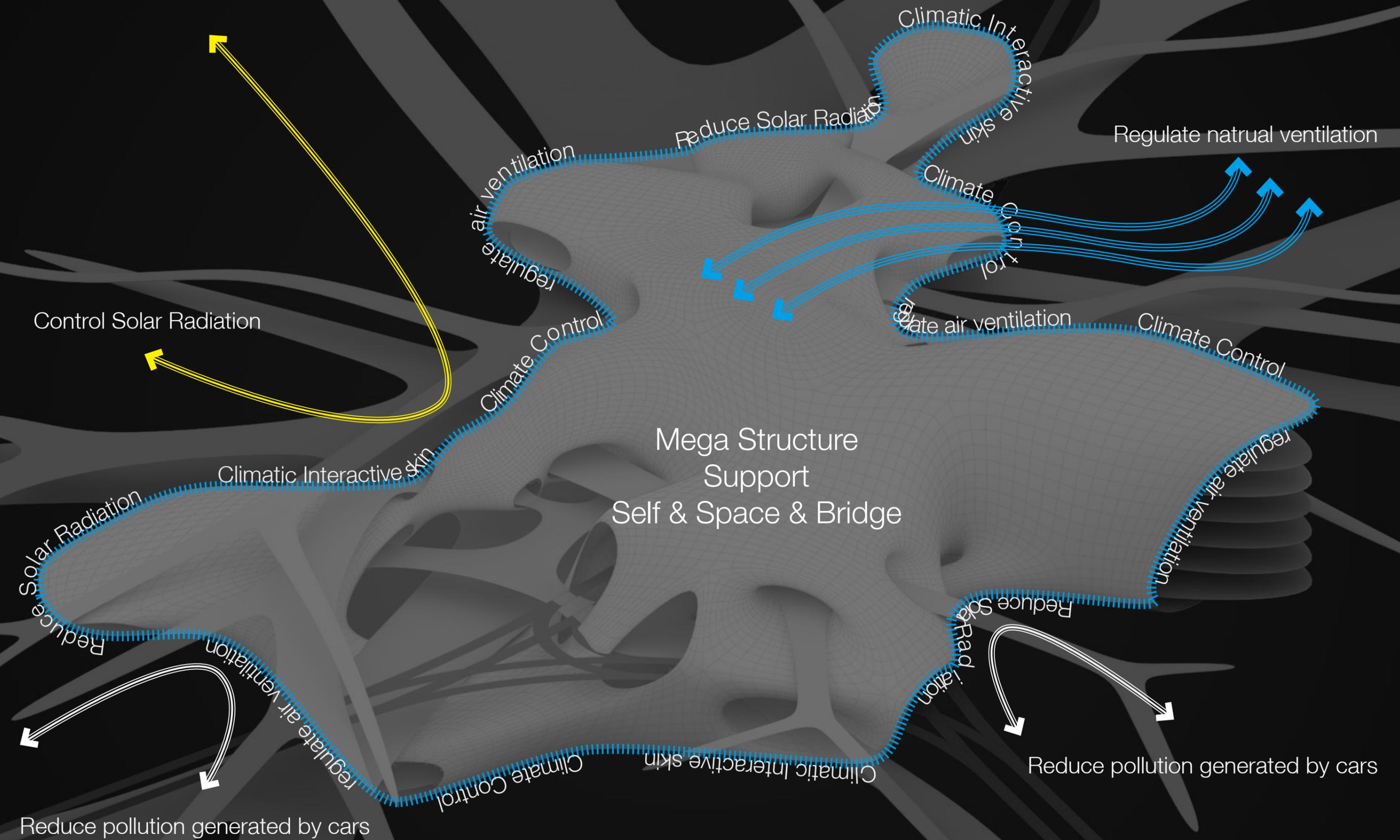


The influence of 2 positive metaballs on each other

Metaball Based  
Building Skin



# Skin Possibilities In Future



Architectural Workflow

Simulation

Deepen Design

Minimal Paths Topology

Paths reconnection

Paths

Carriageway

Bikeway

Pedestrian way

Swarm Behavior Simulation

Agent-based function-position finding

Function Volumes

Inner Skin

Substructure

Rooftop viewing deck

Metaball Morphology

morphogenesis

Architecture Skin

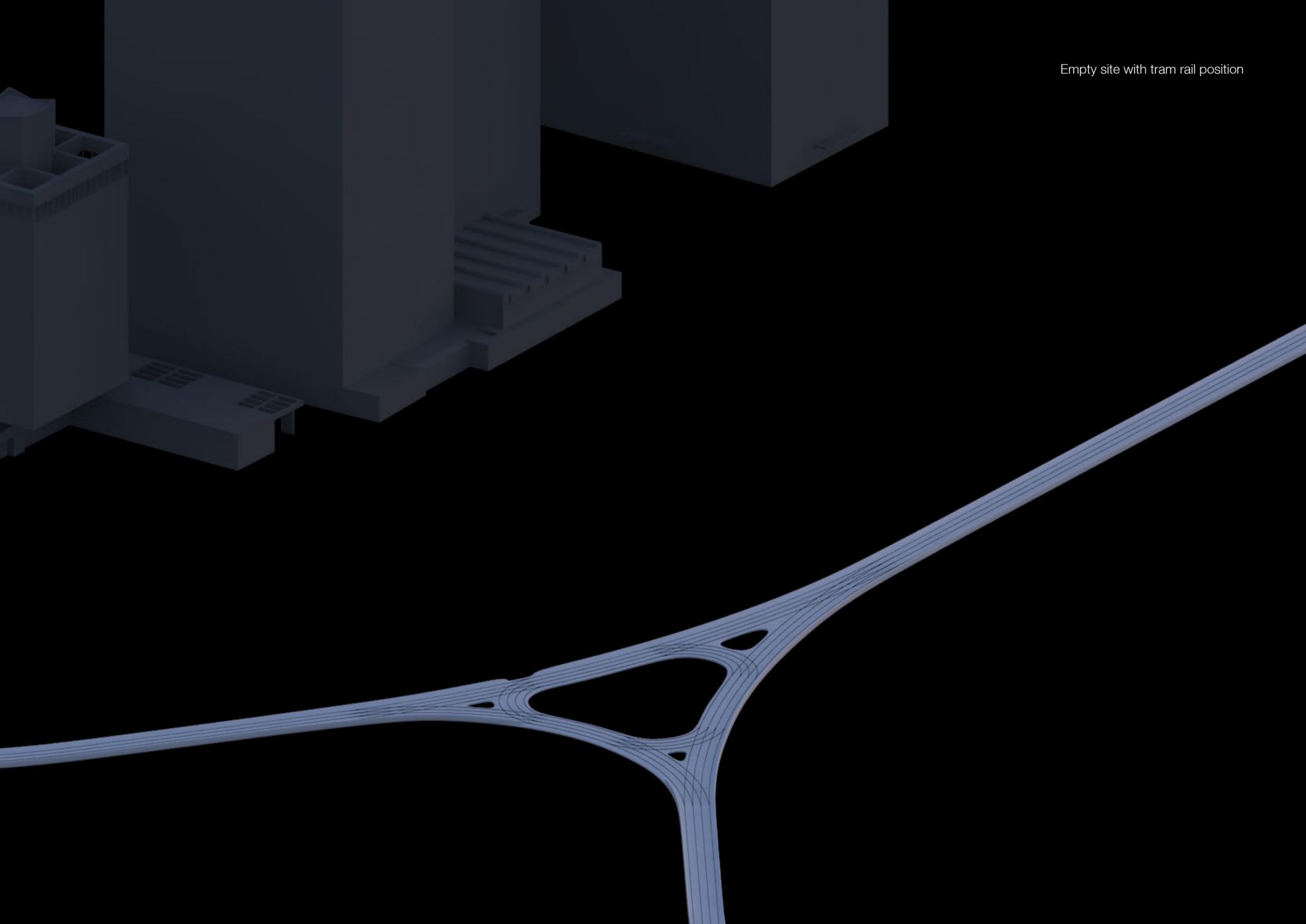
Climate Design

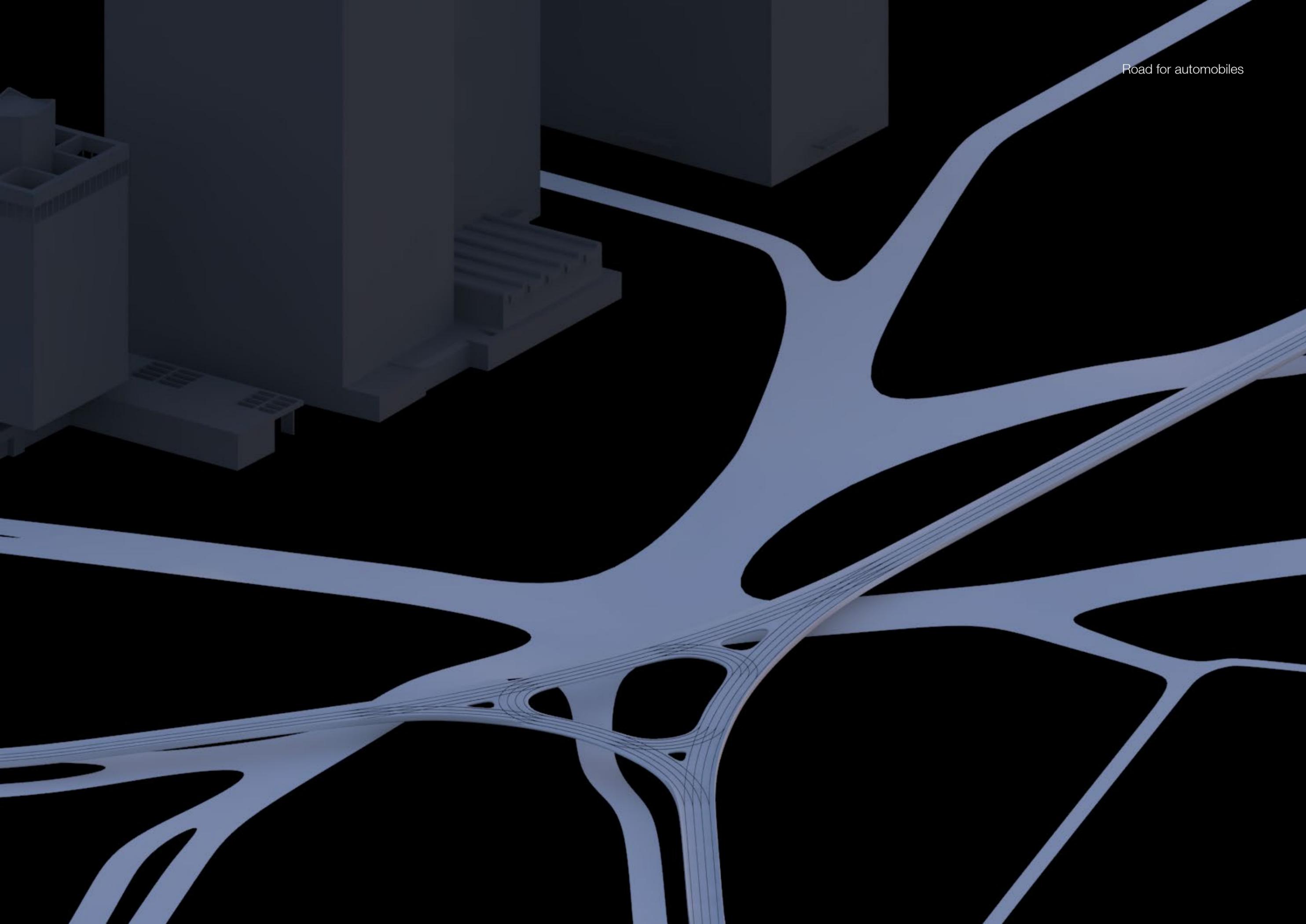
Main Structure

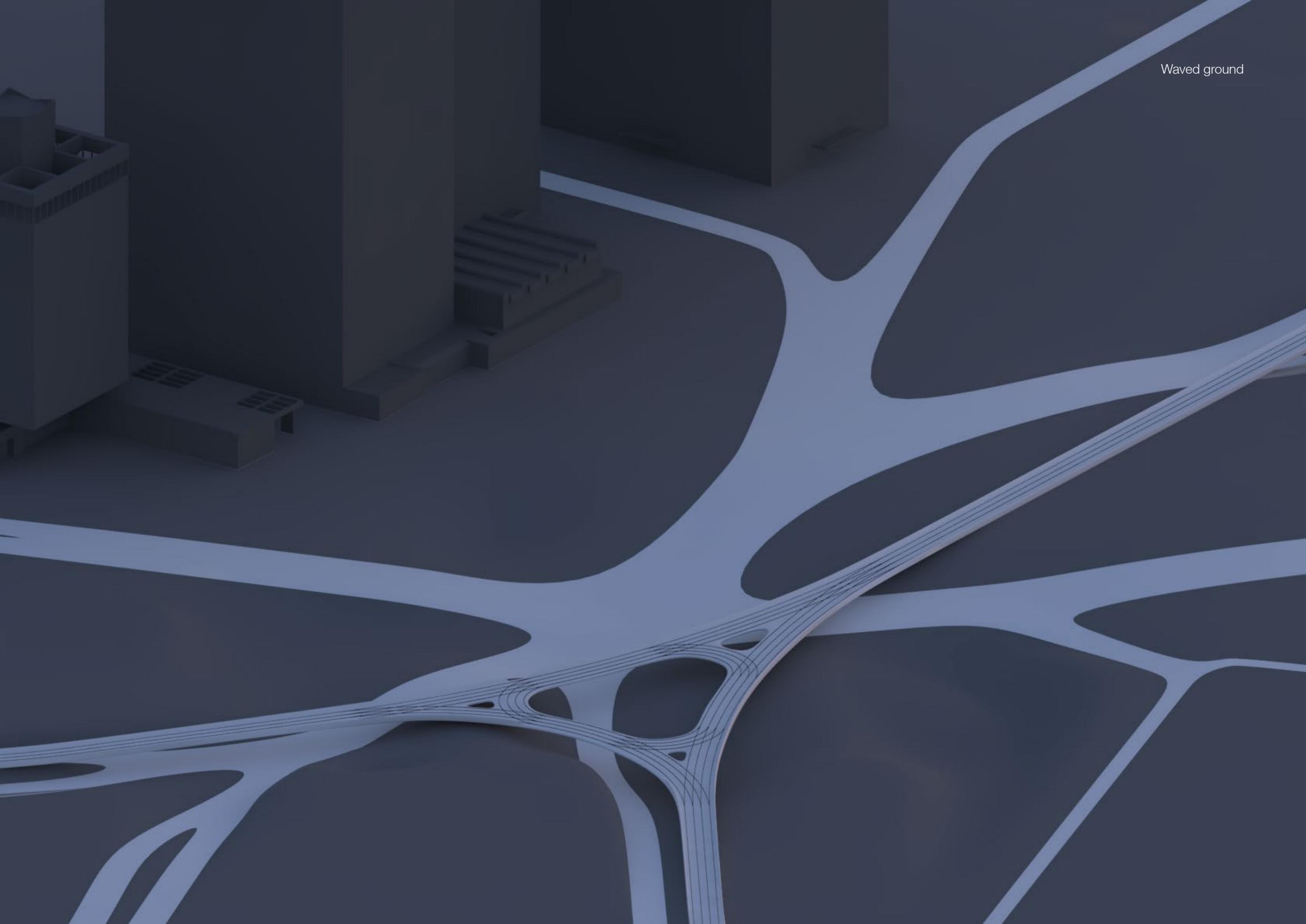
bottom up

top down

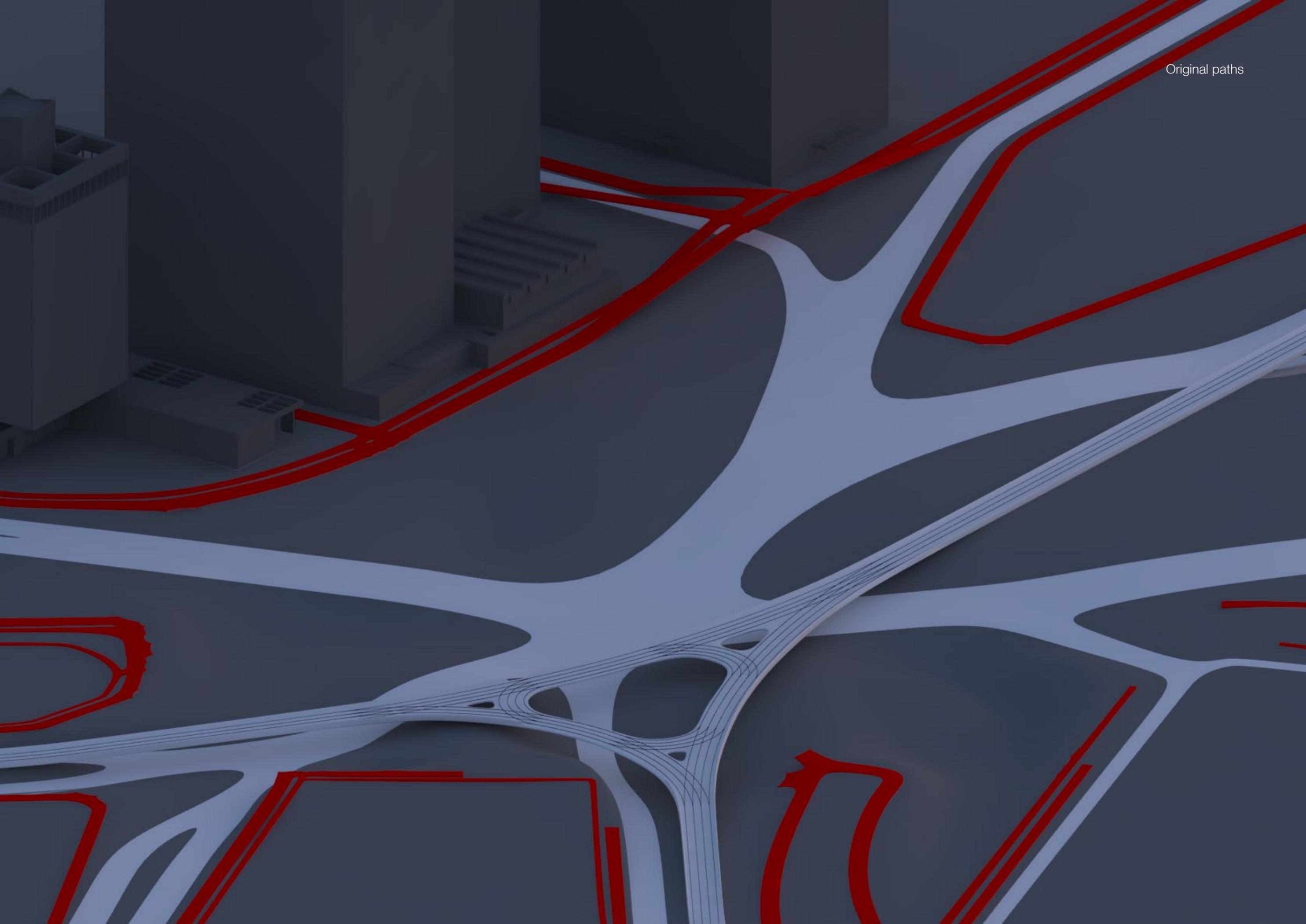
Empty site with tram rail position

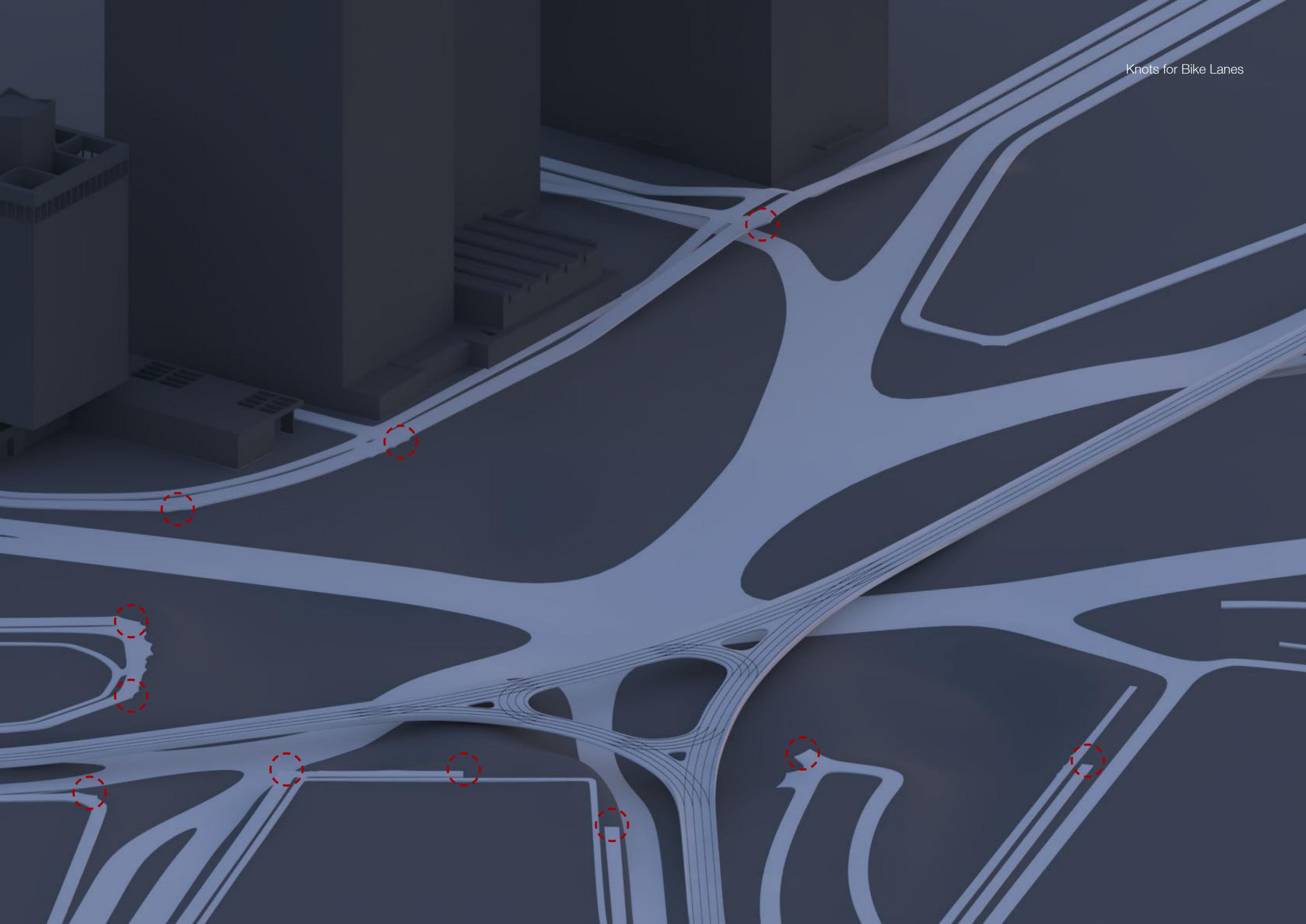


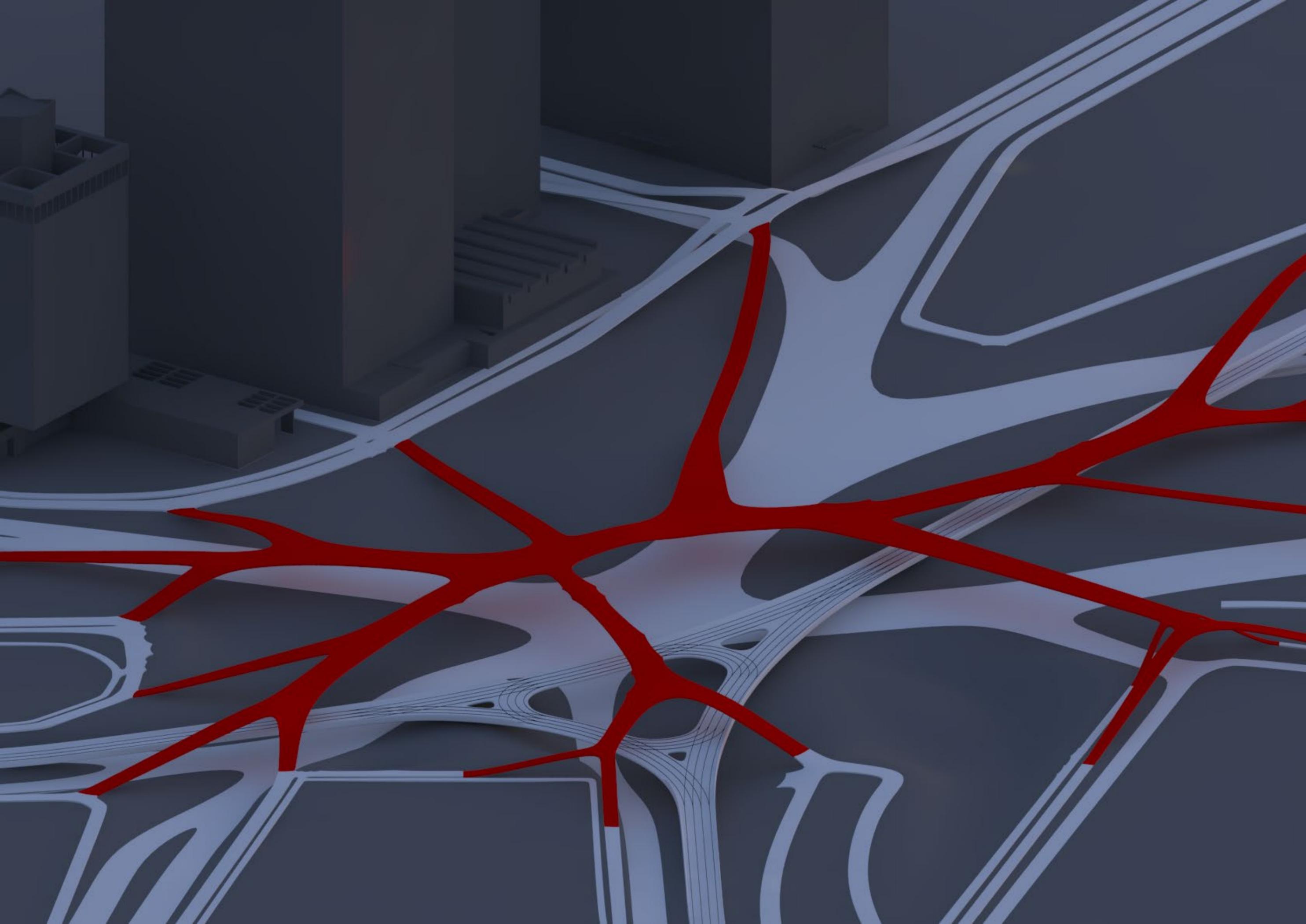




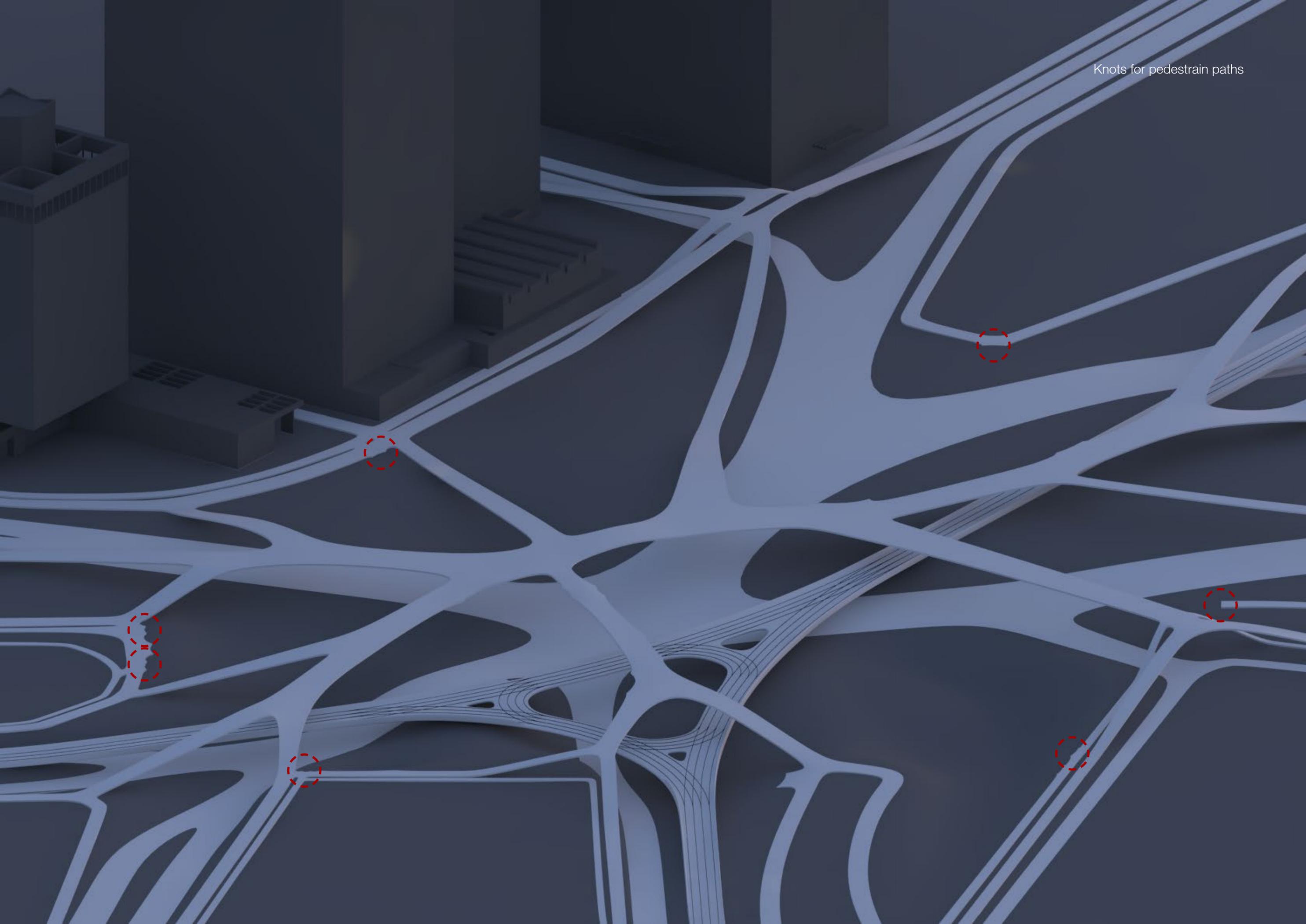
Original paths



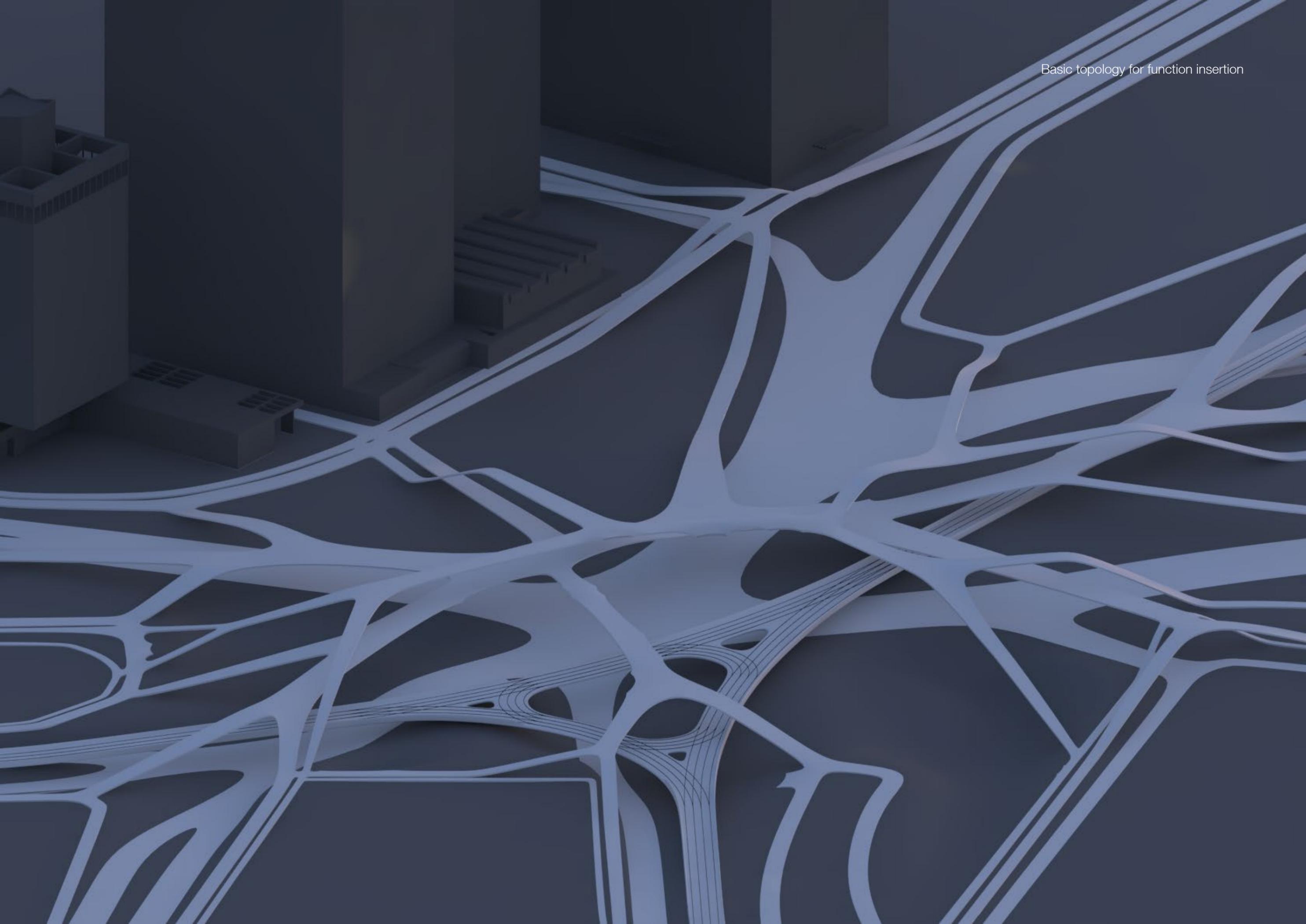


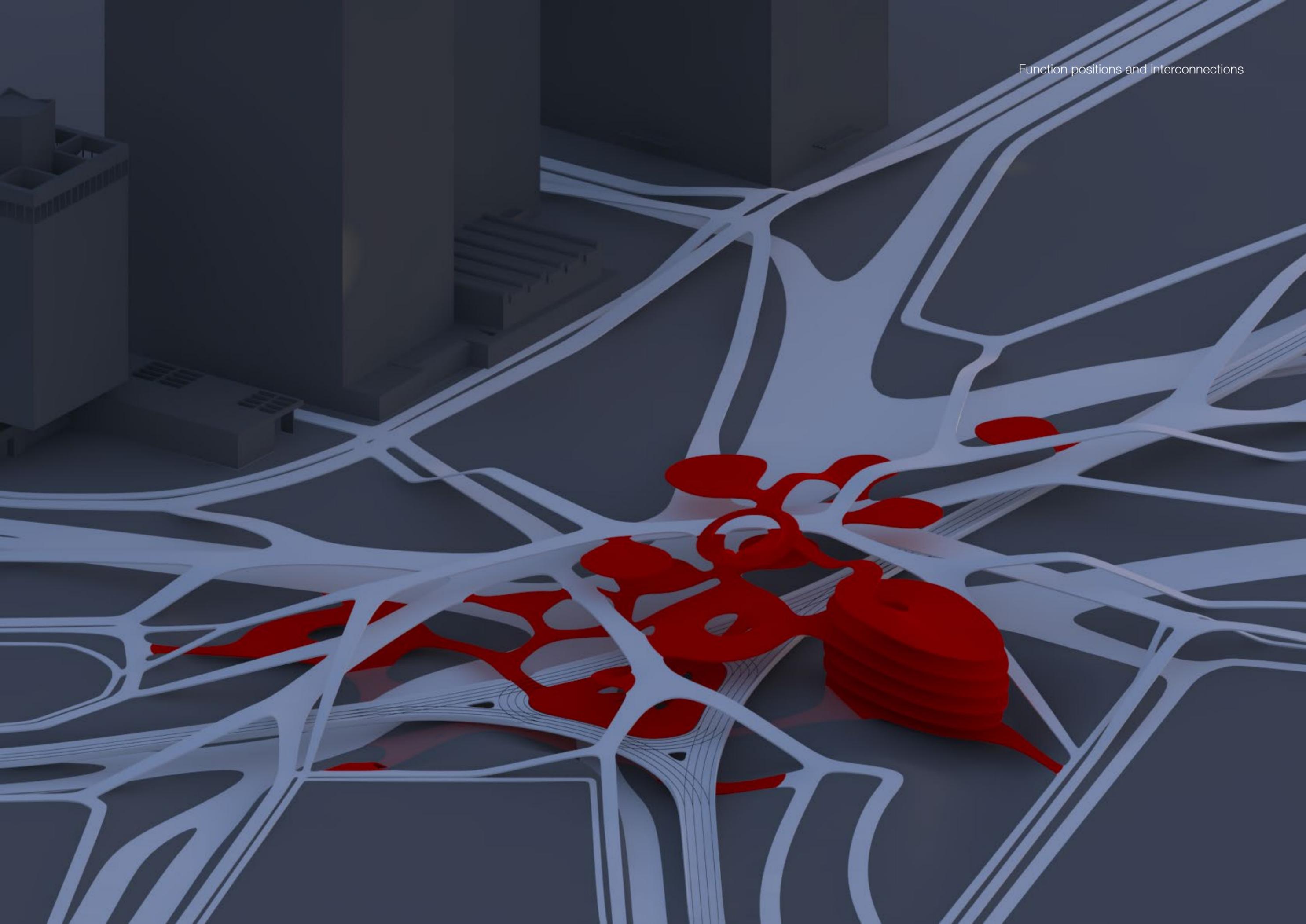


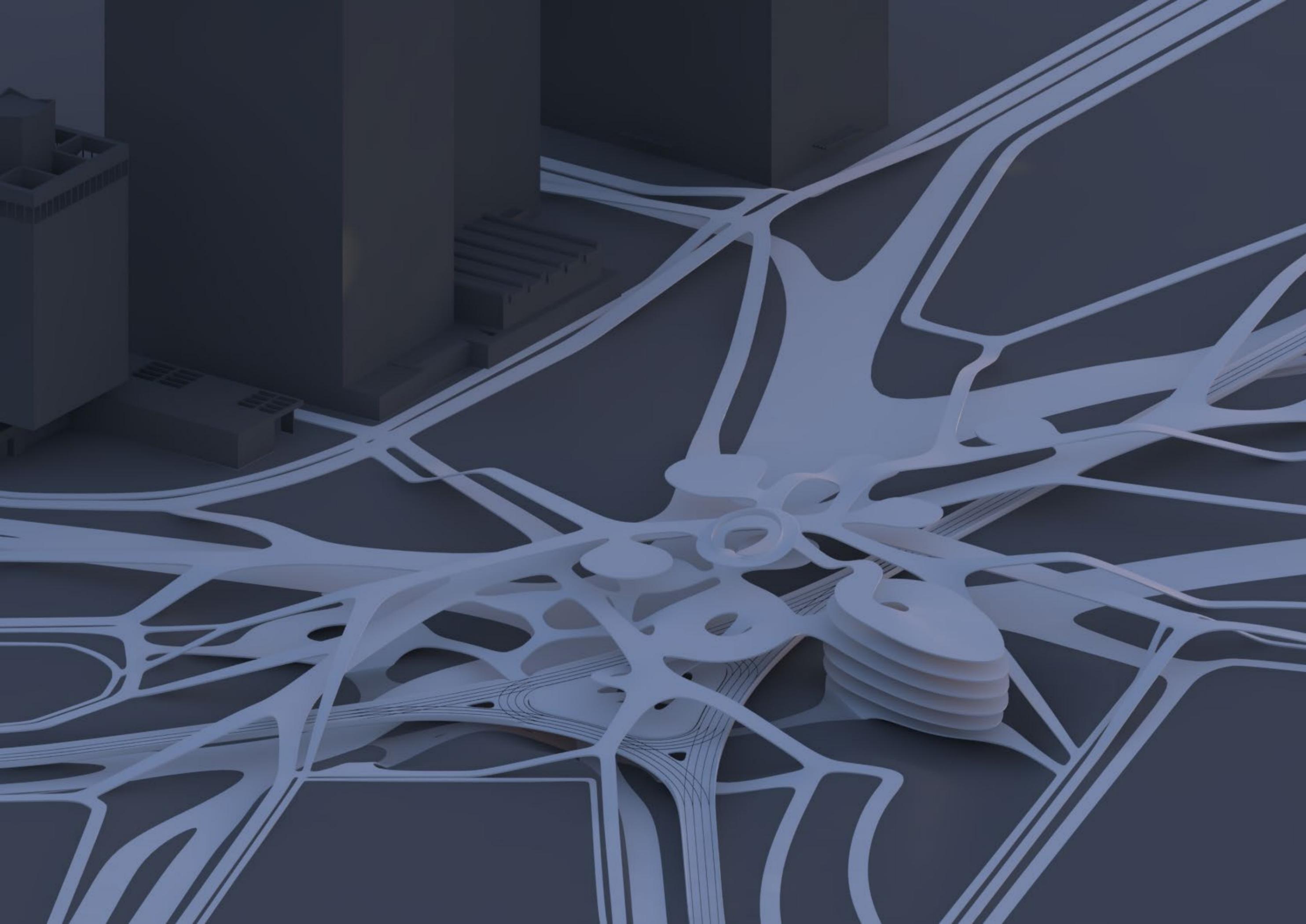
Knots for pedestrain paths





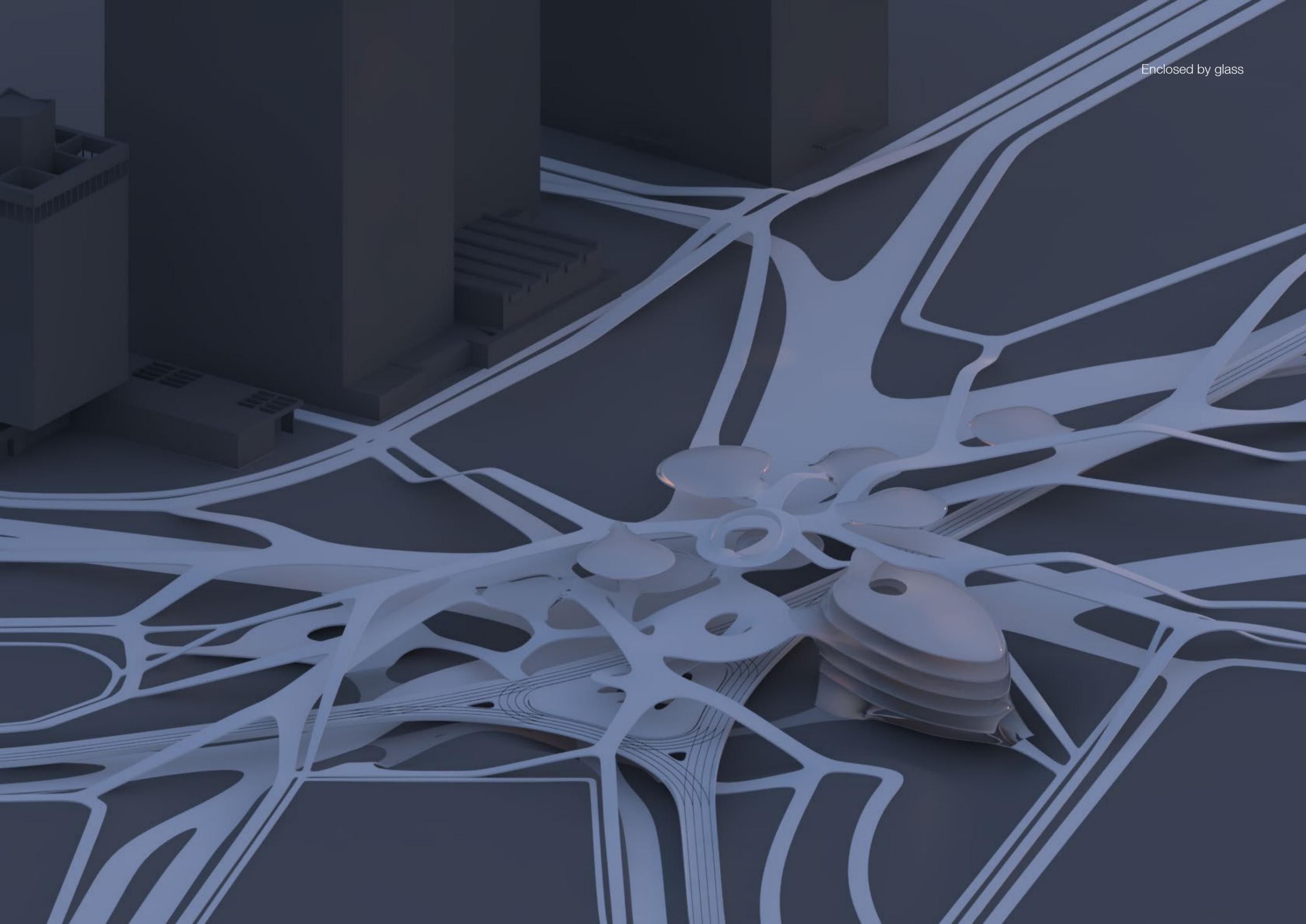


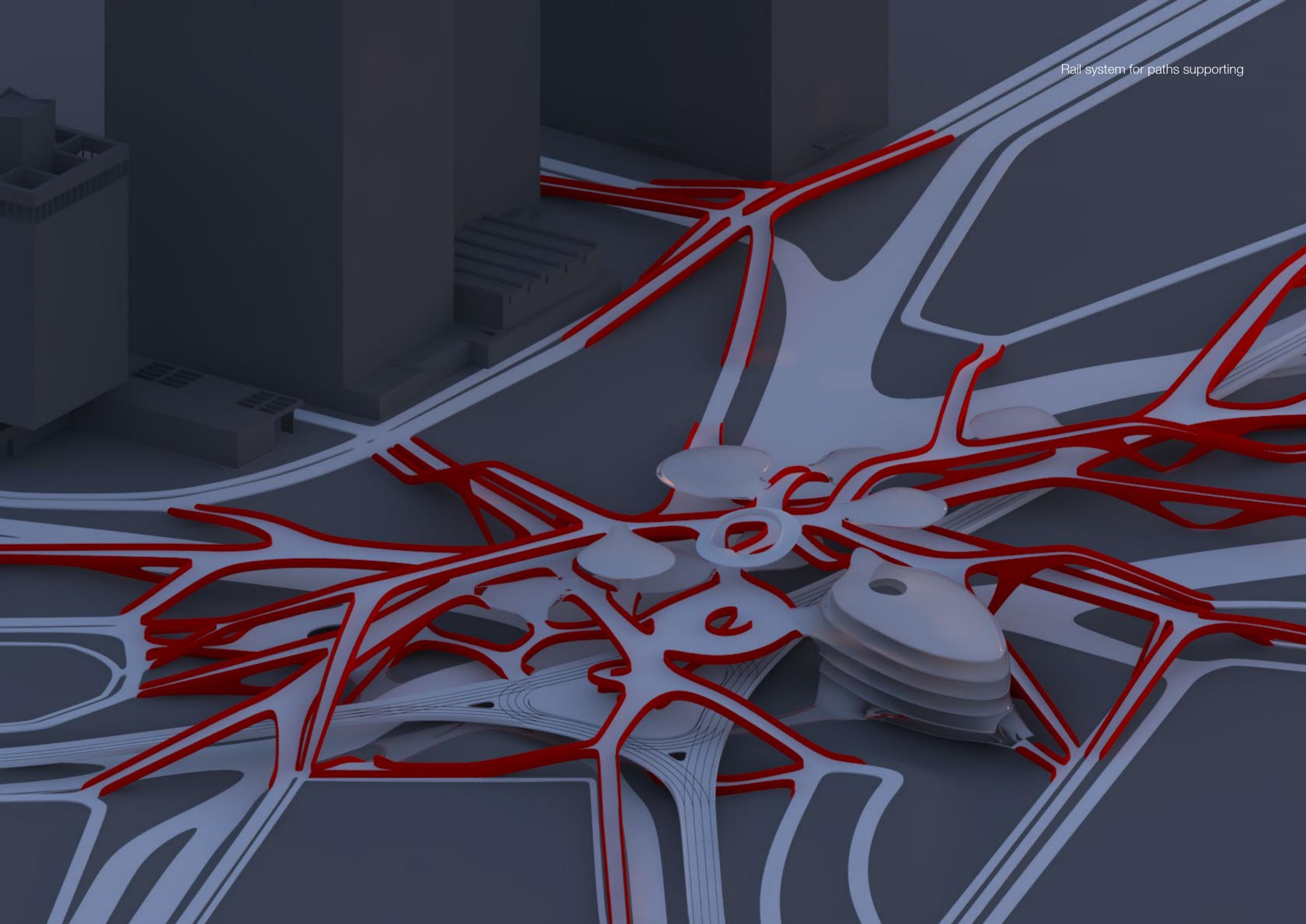


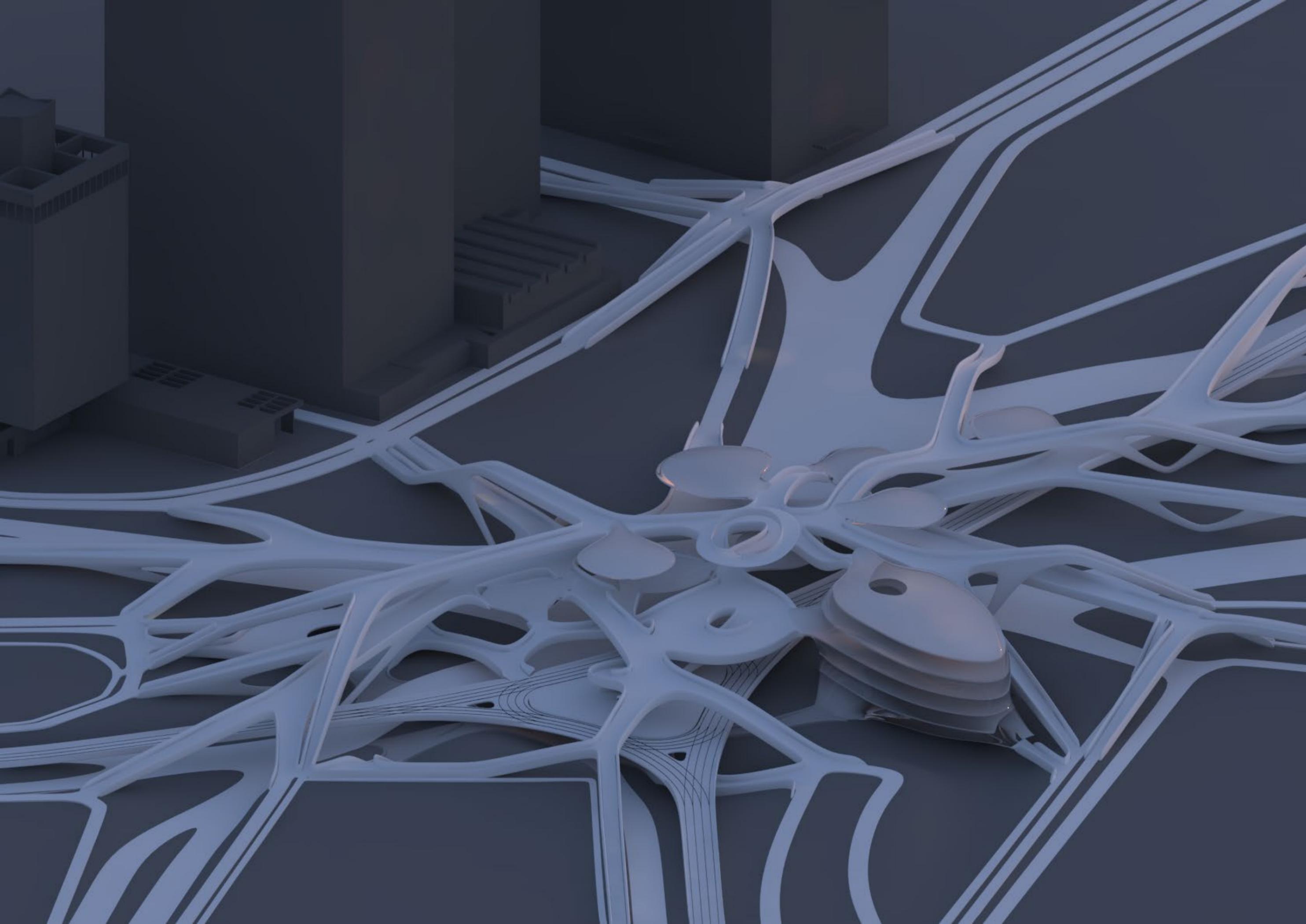


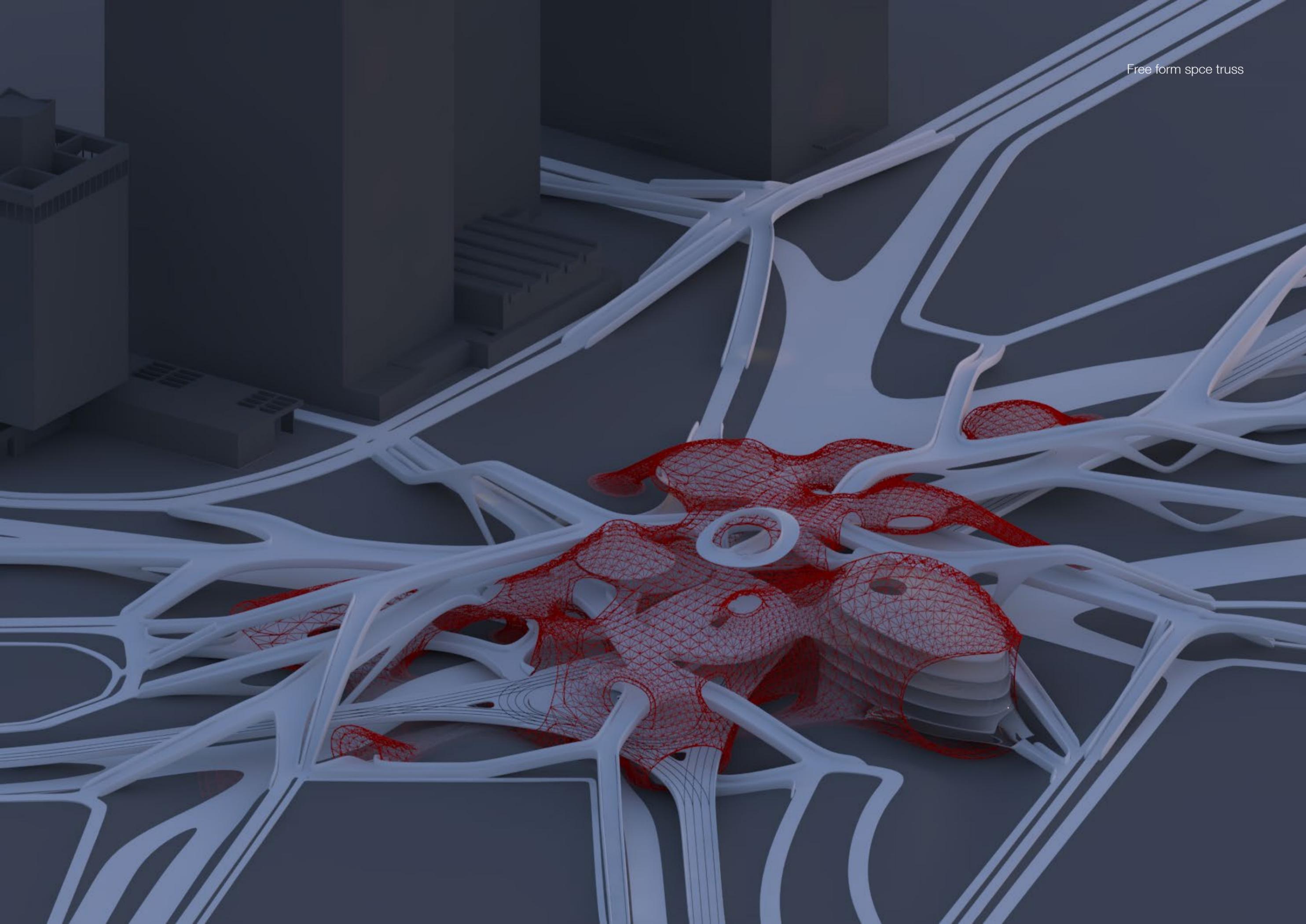


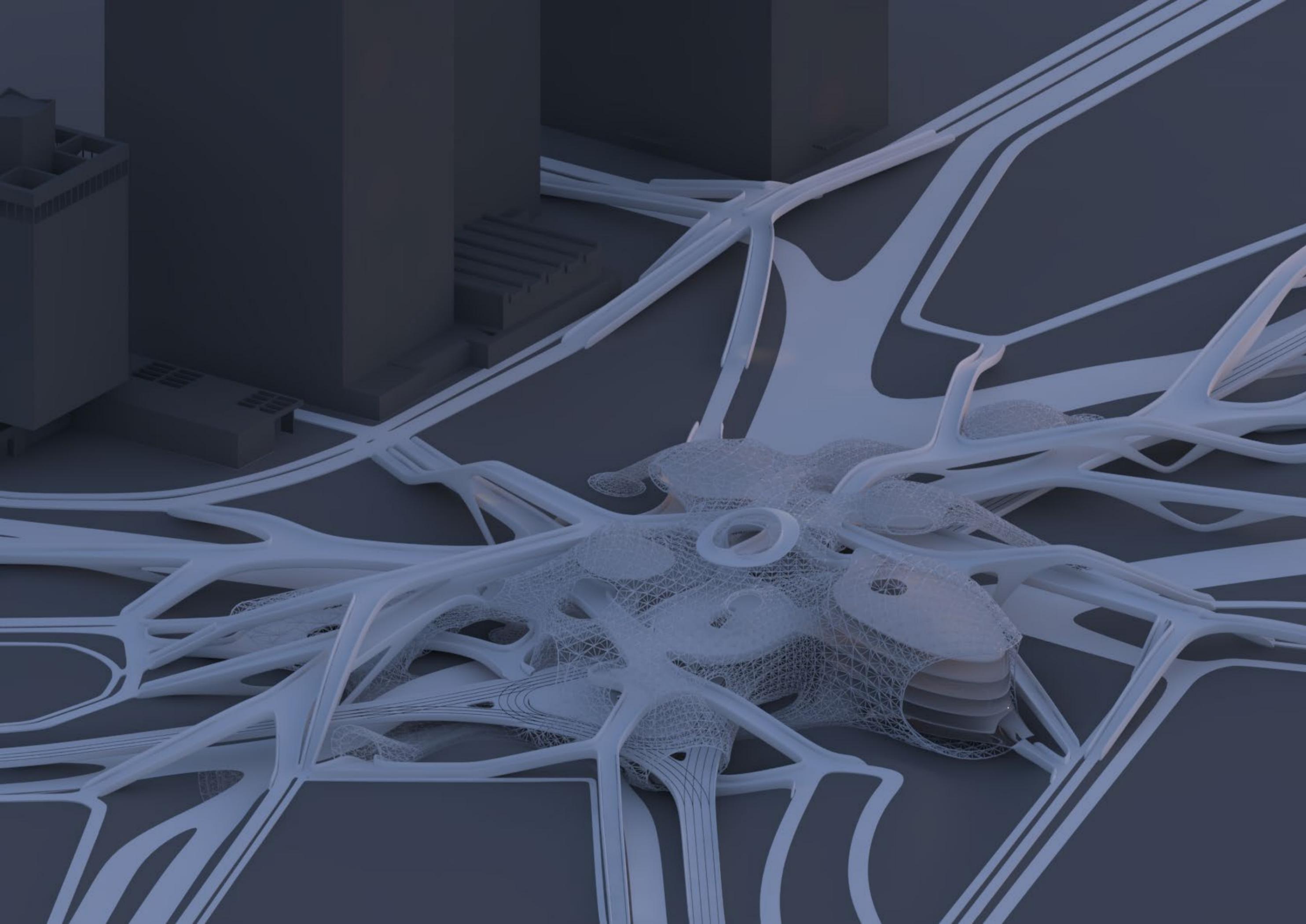
Enclosed by glass

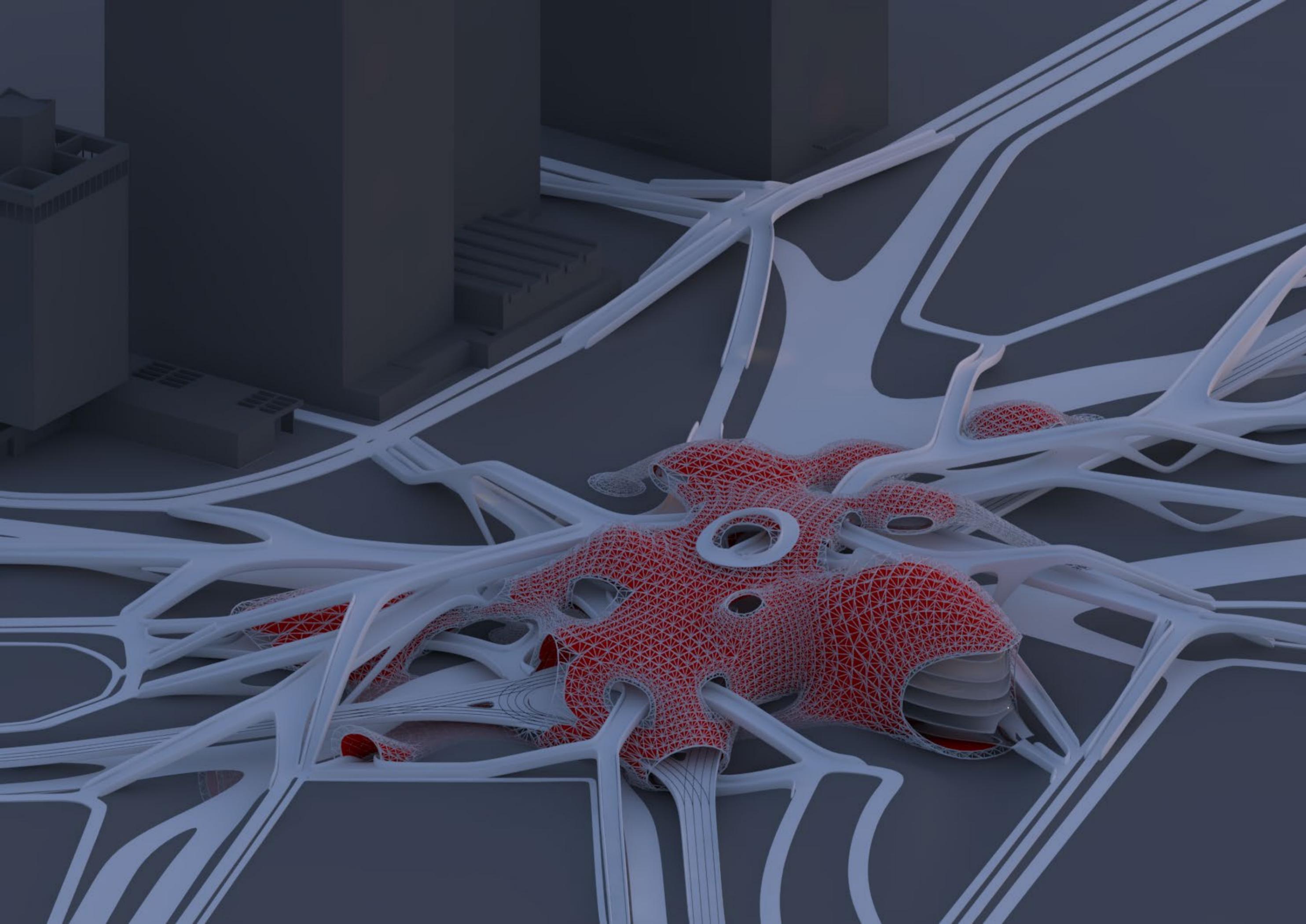


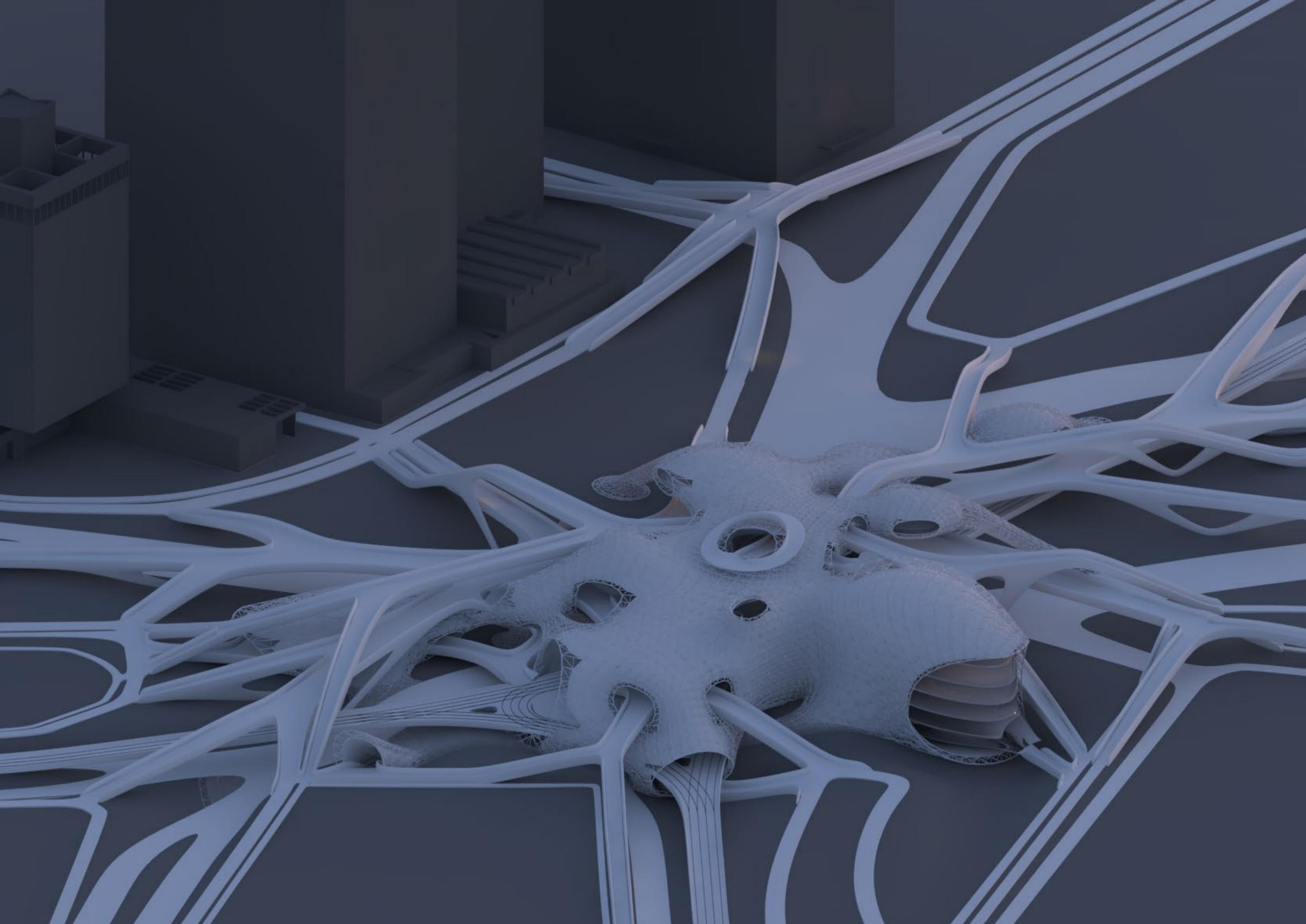




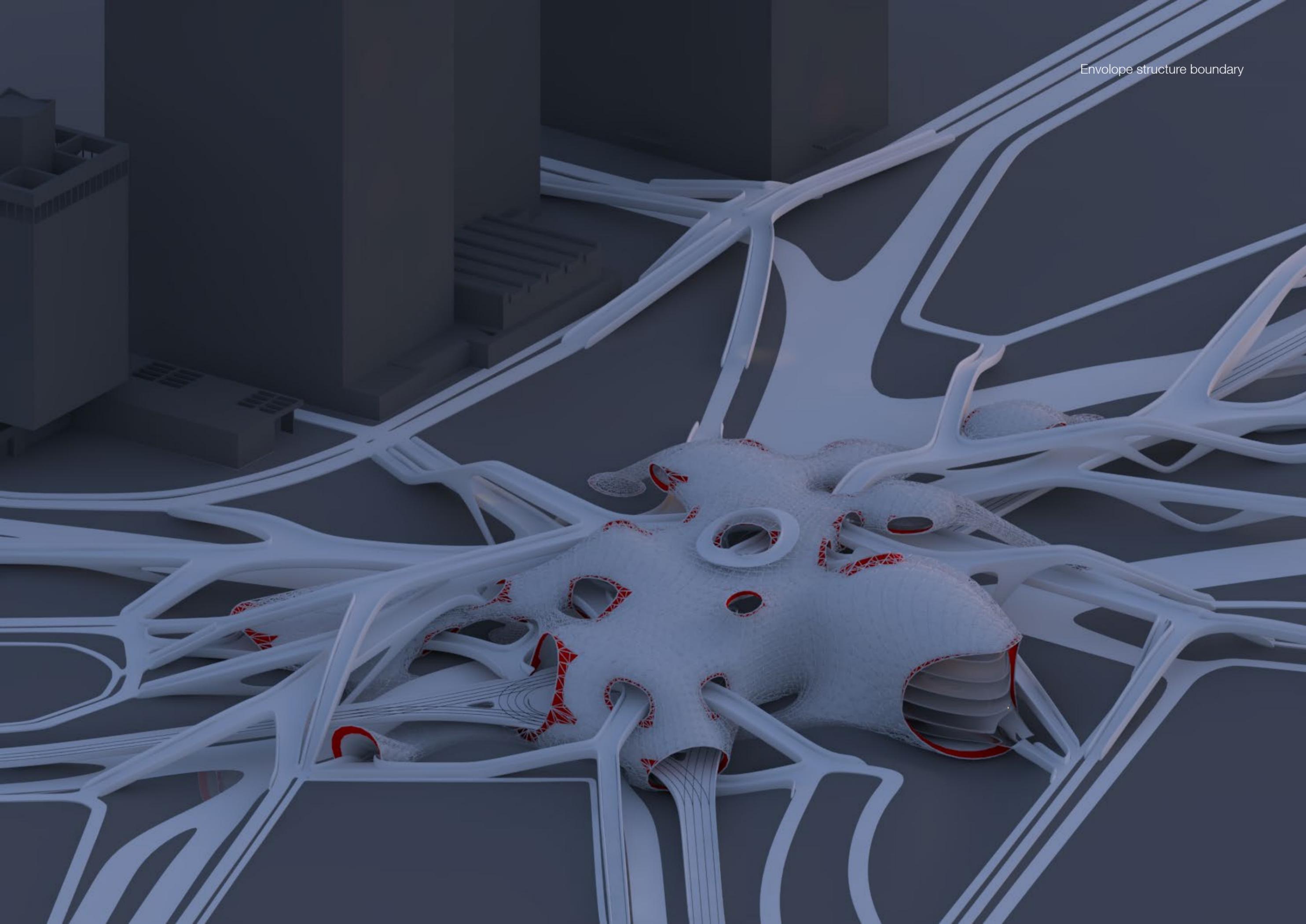


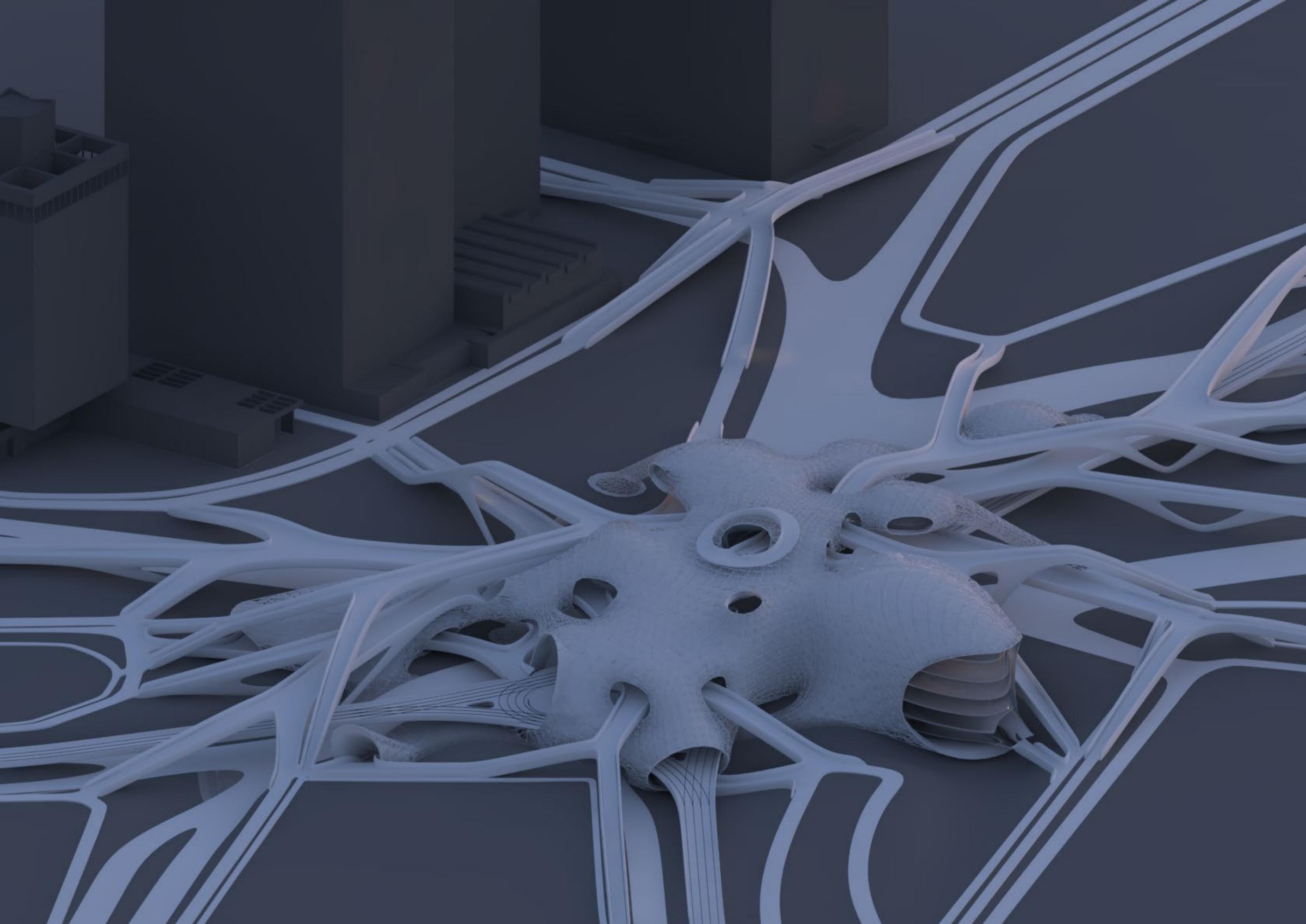


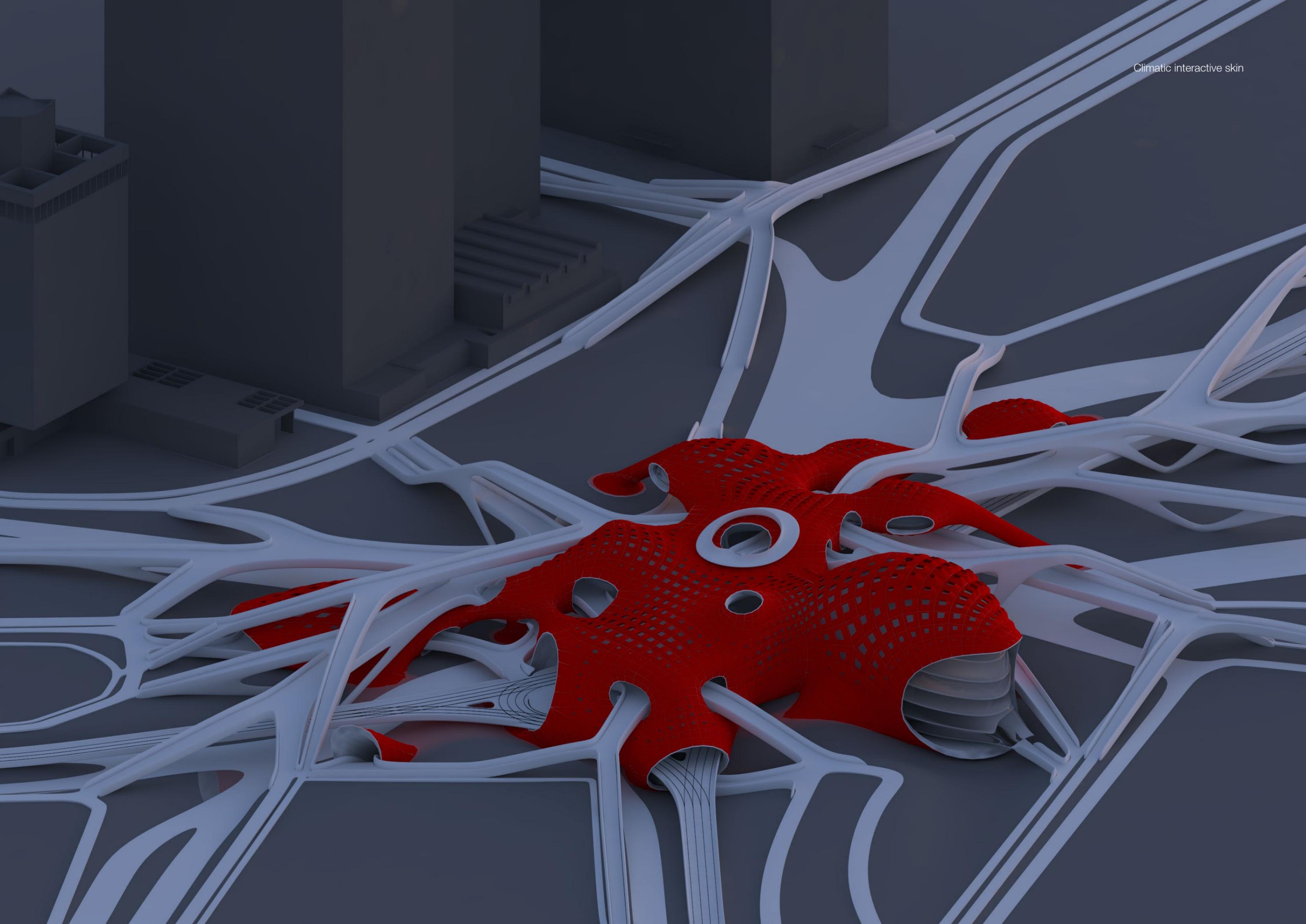


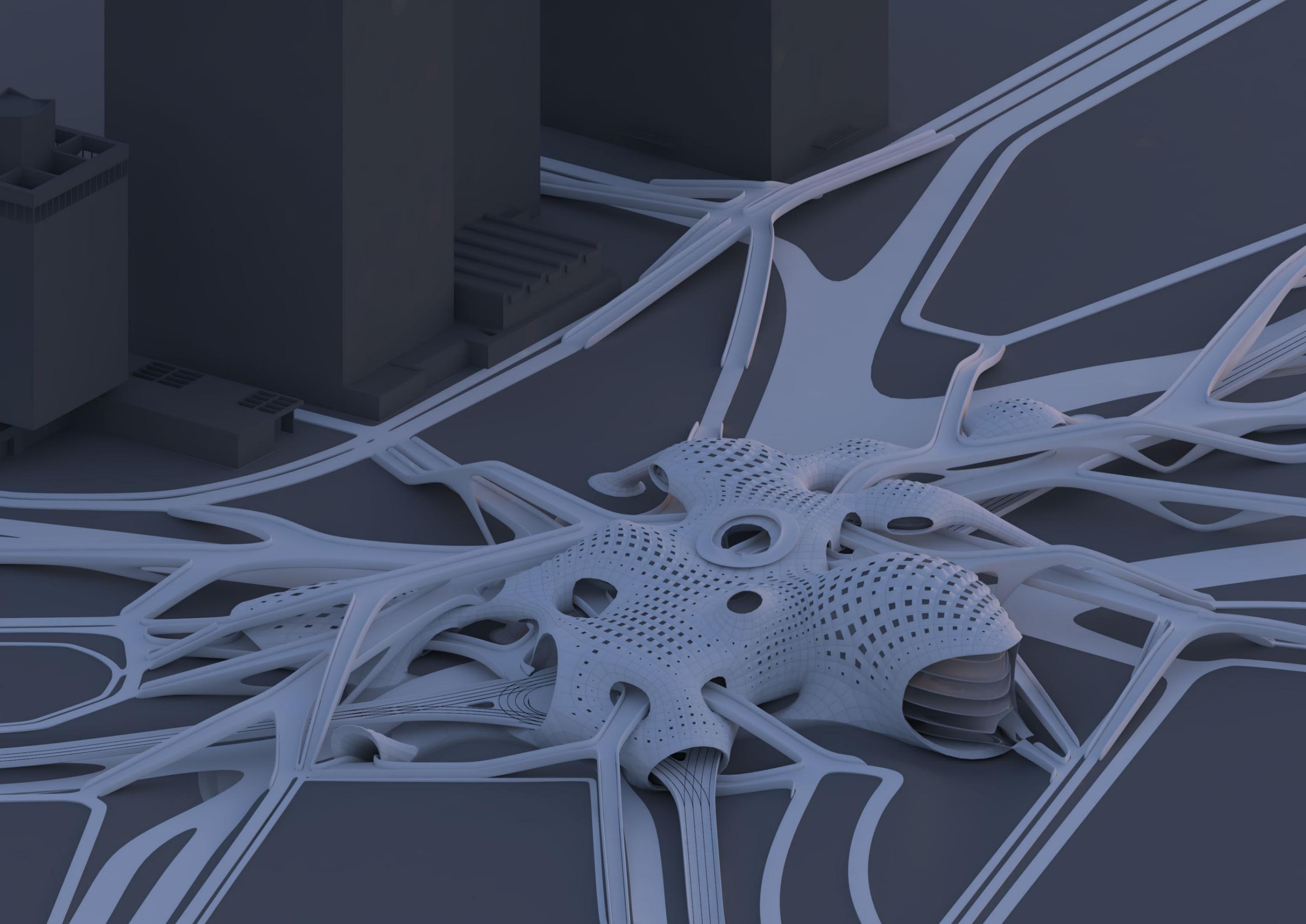


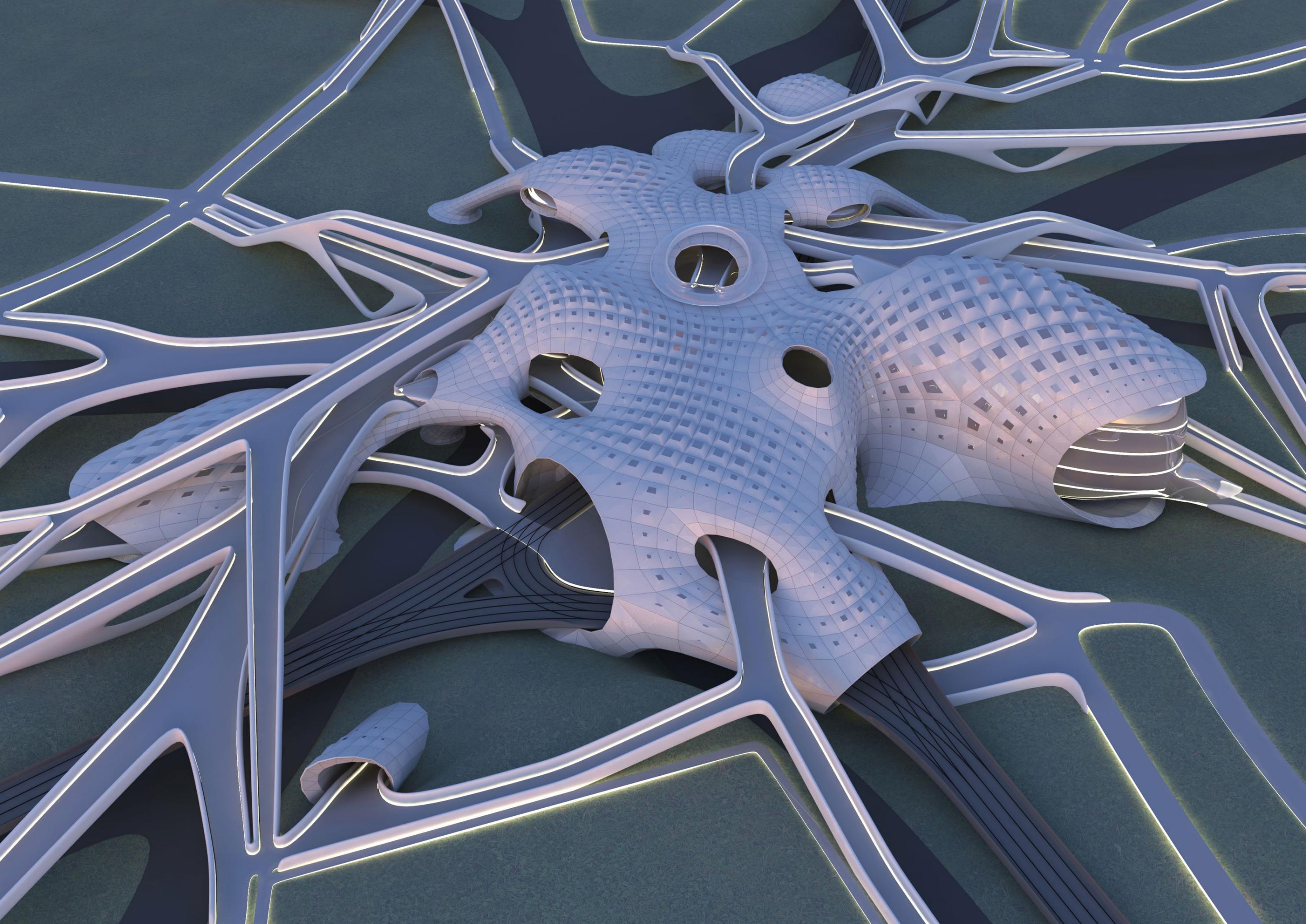
Envelope structure boundary

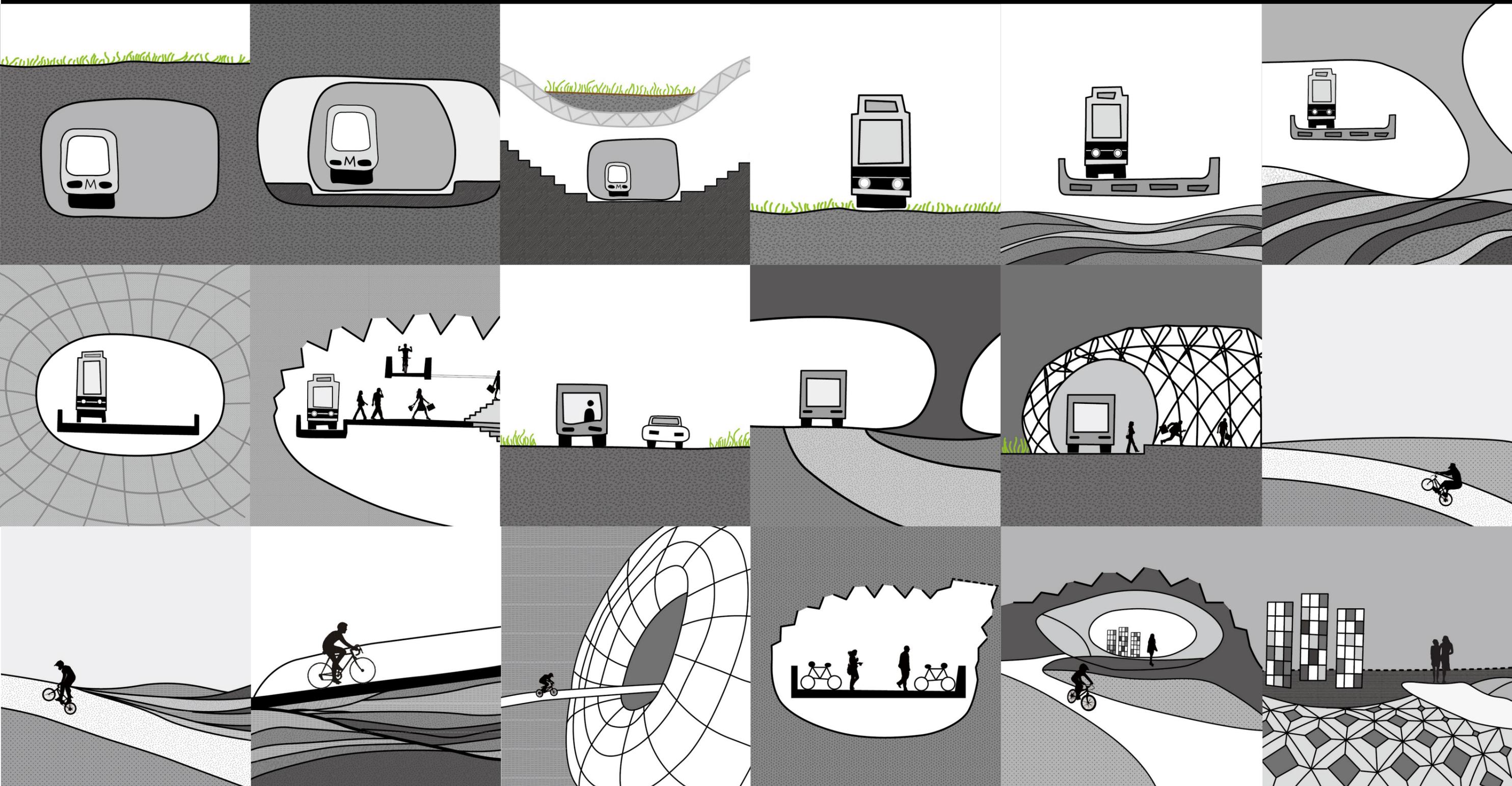




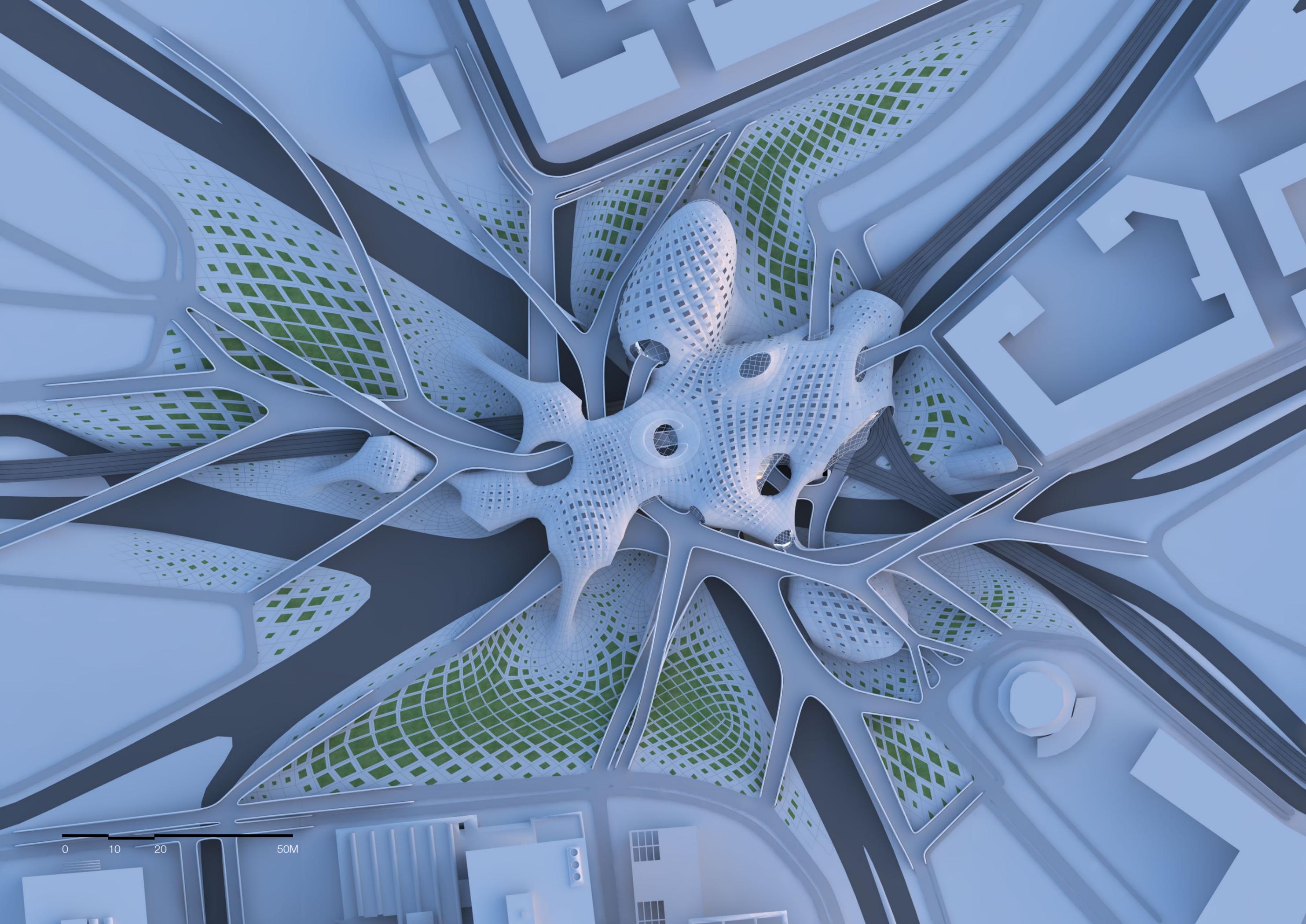




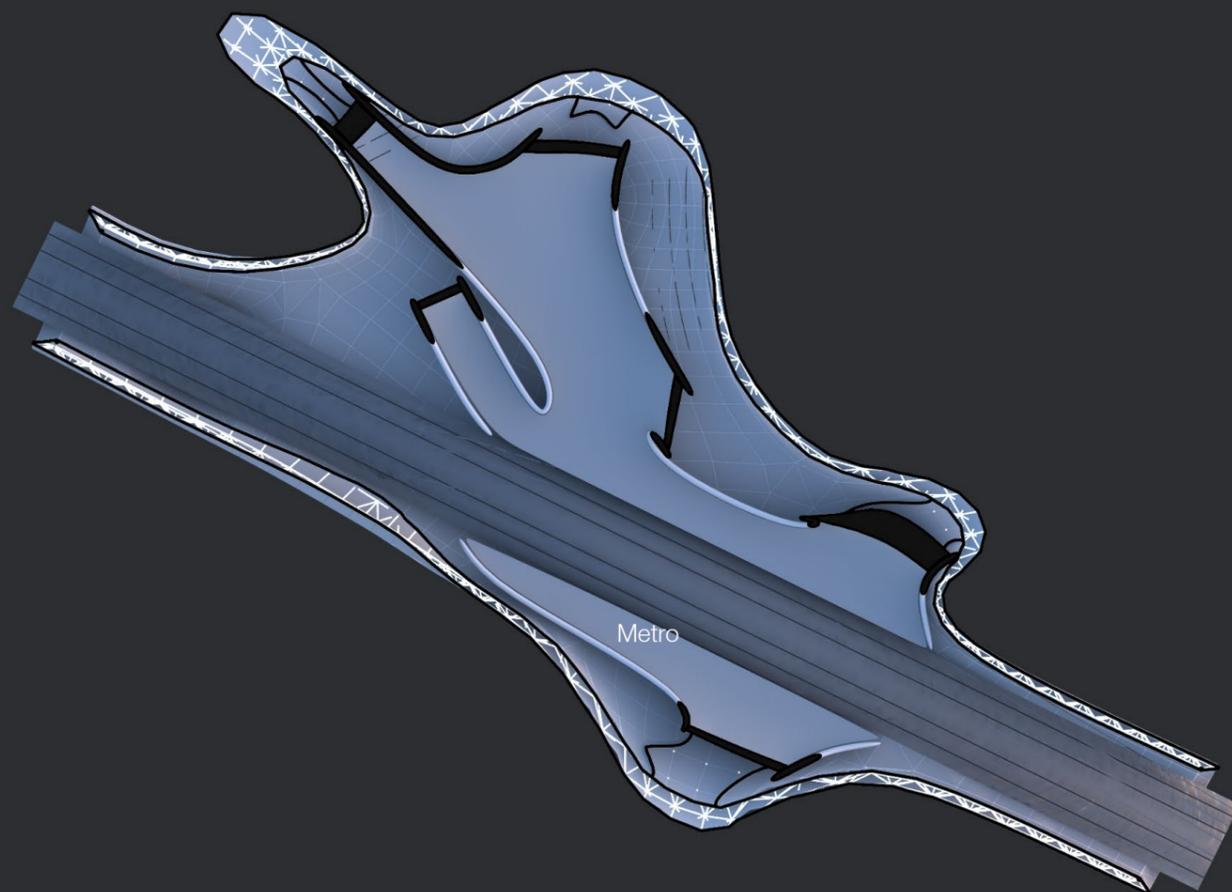




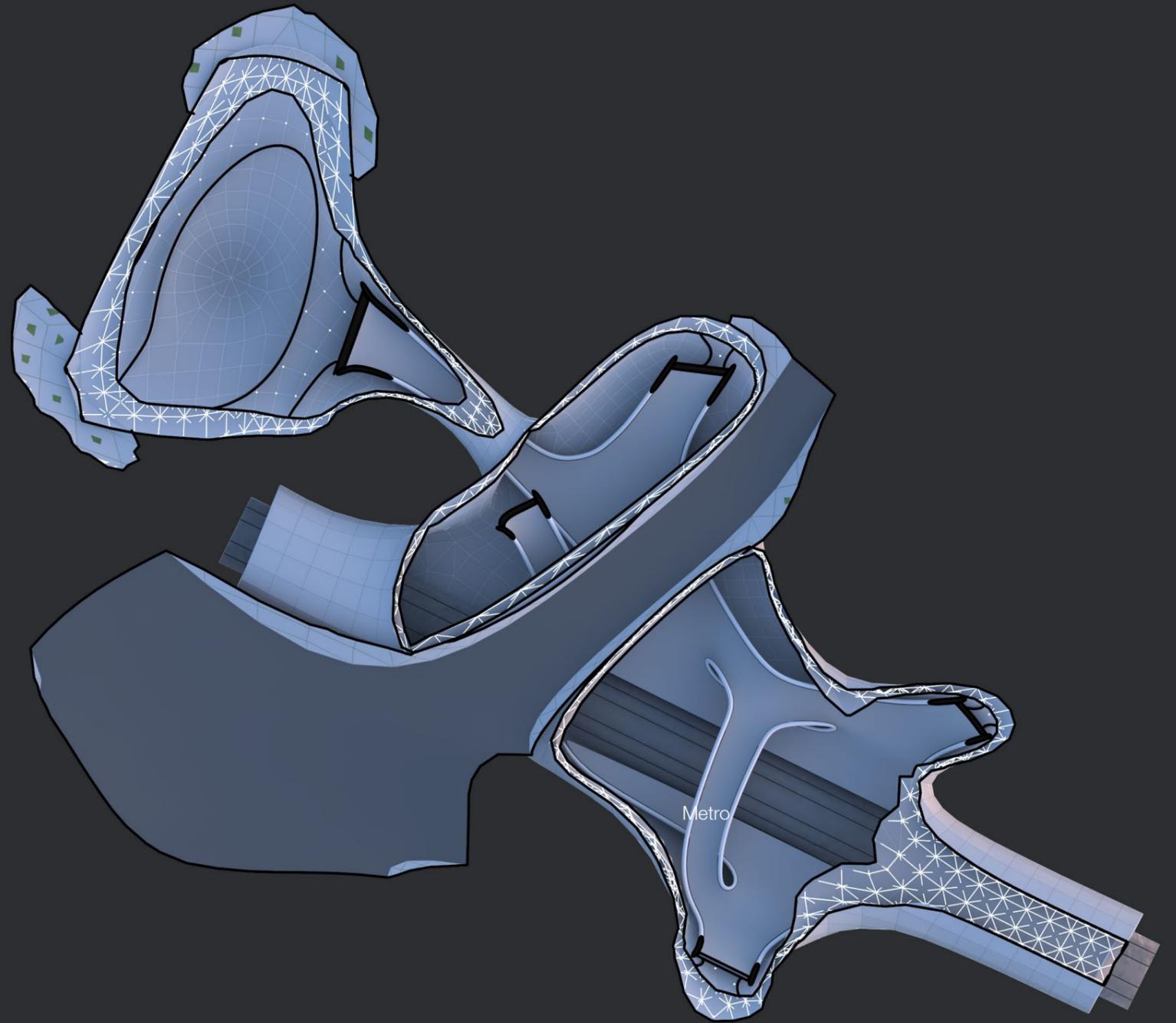
movie



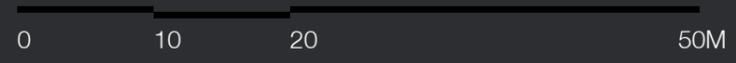
0 10 20 50M

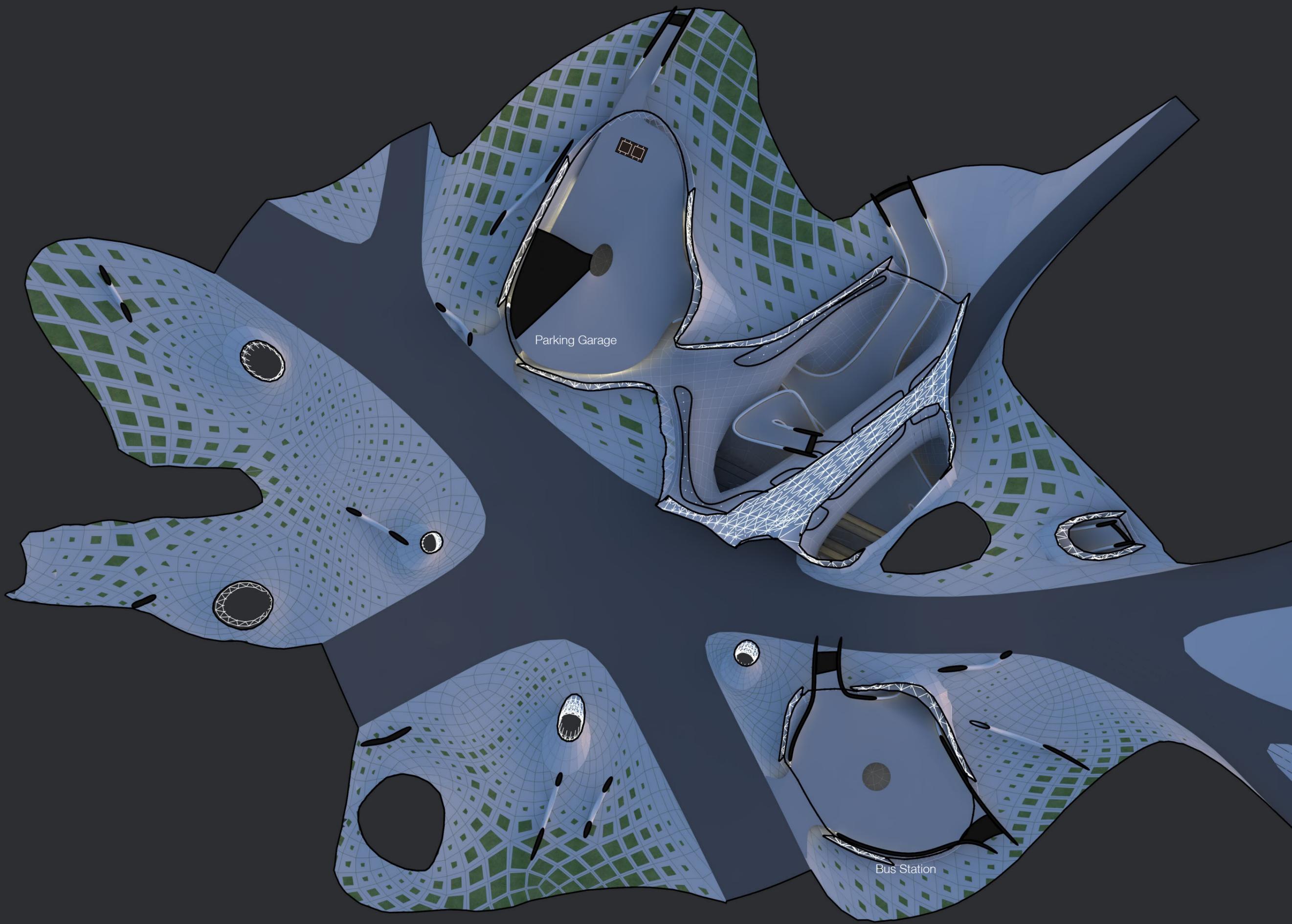


0 10 20 50M



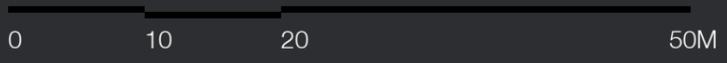
Metro

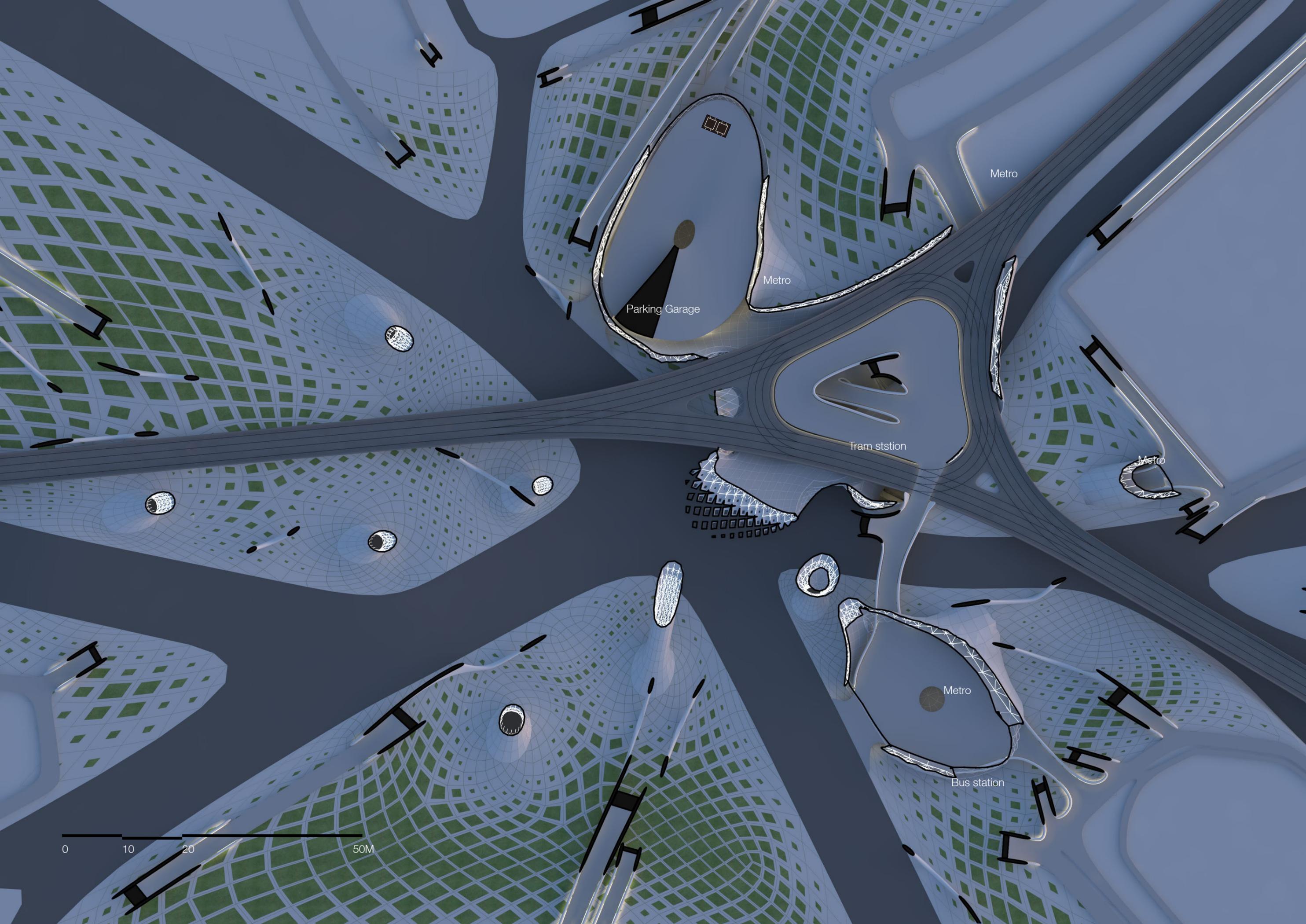




Parking Garage

Bus Station





Parking Garage

Metro

Metro

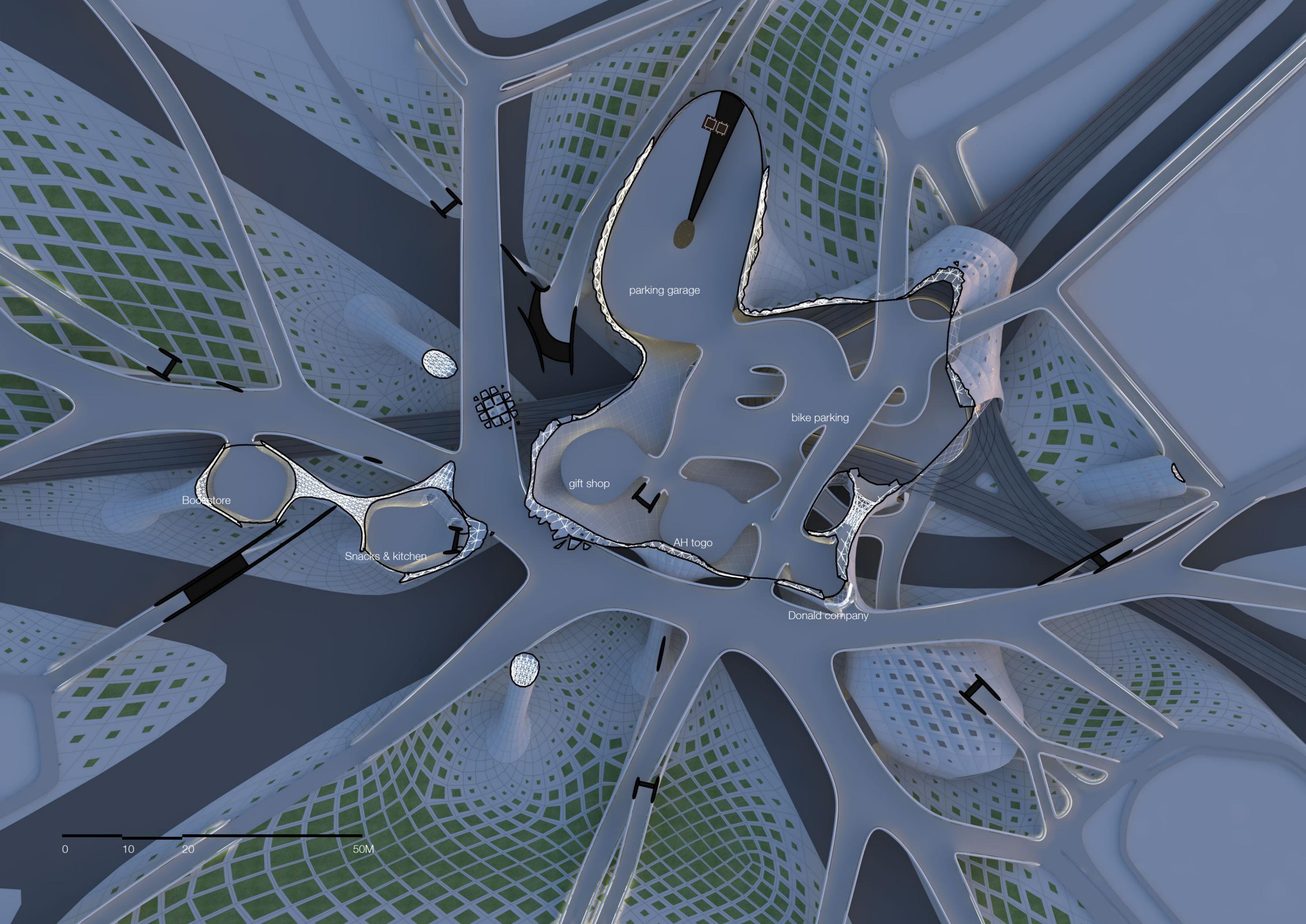
Tram station

Metro

Metro

Bus station

0 10 20 50M



parking garage

bike parking

gift shop

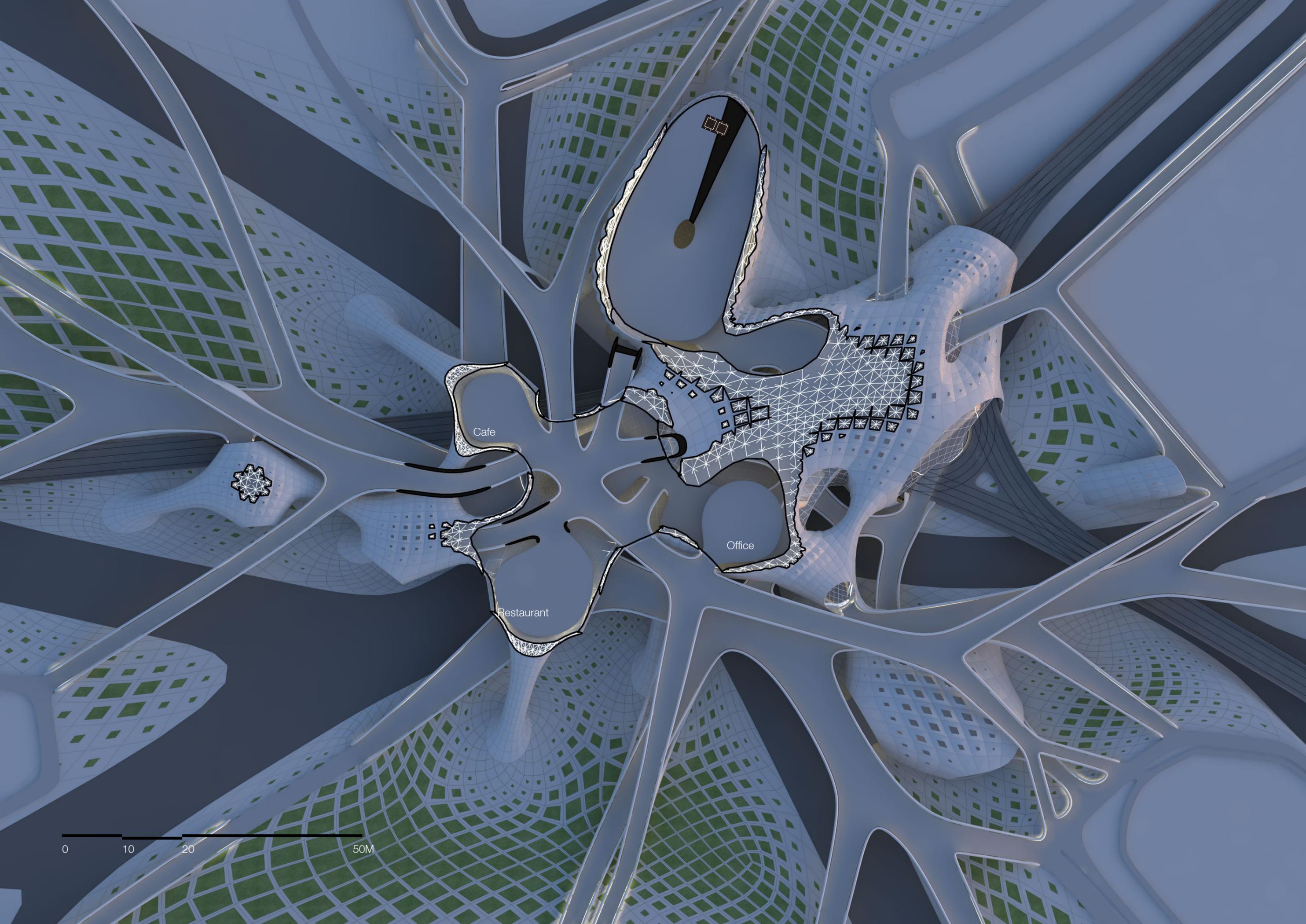
AH togo

Donald company

Snacks & kitchen

Bookstore

0 10 20 50M

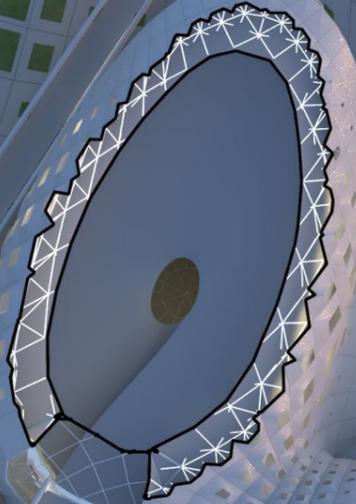
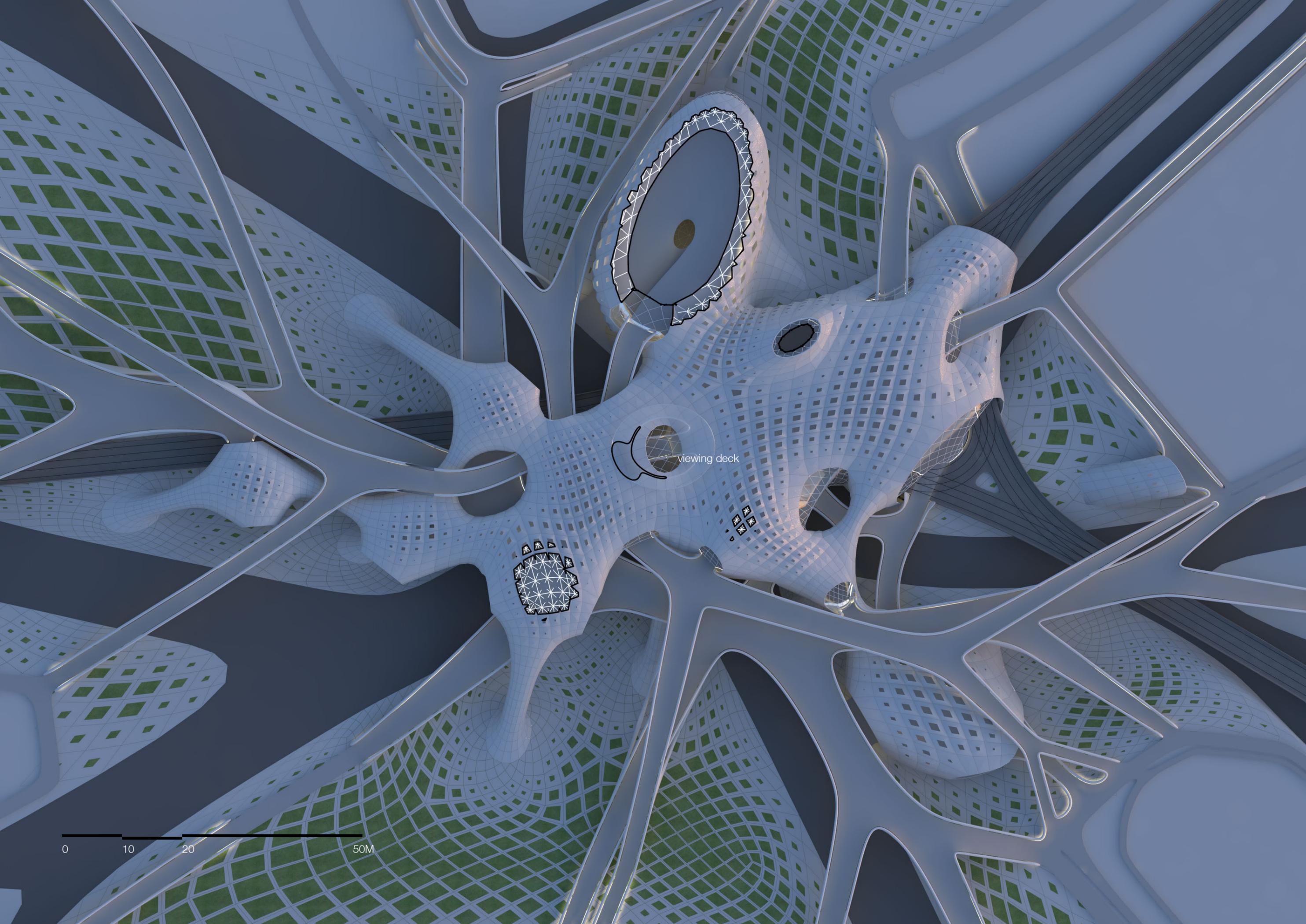


Cafe

Office

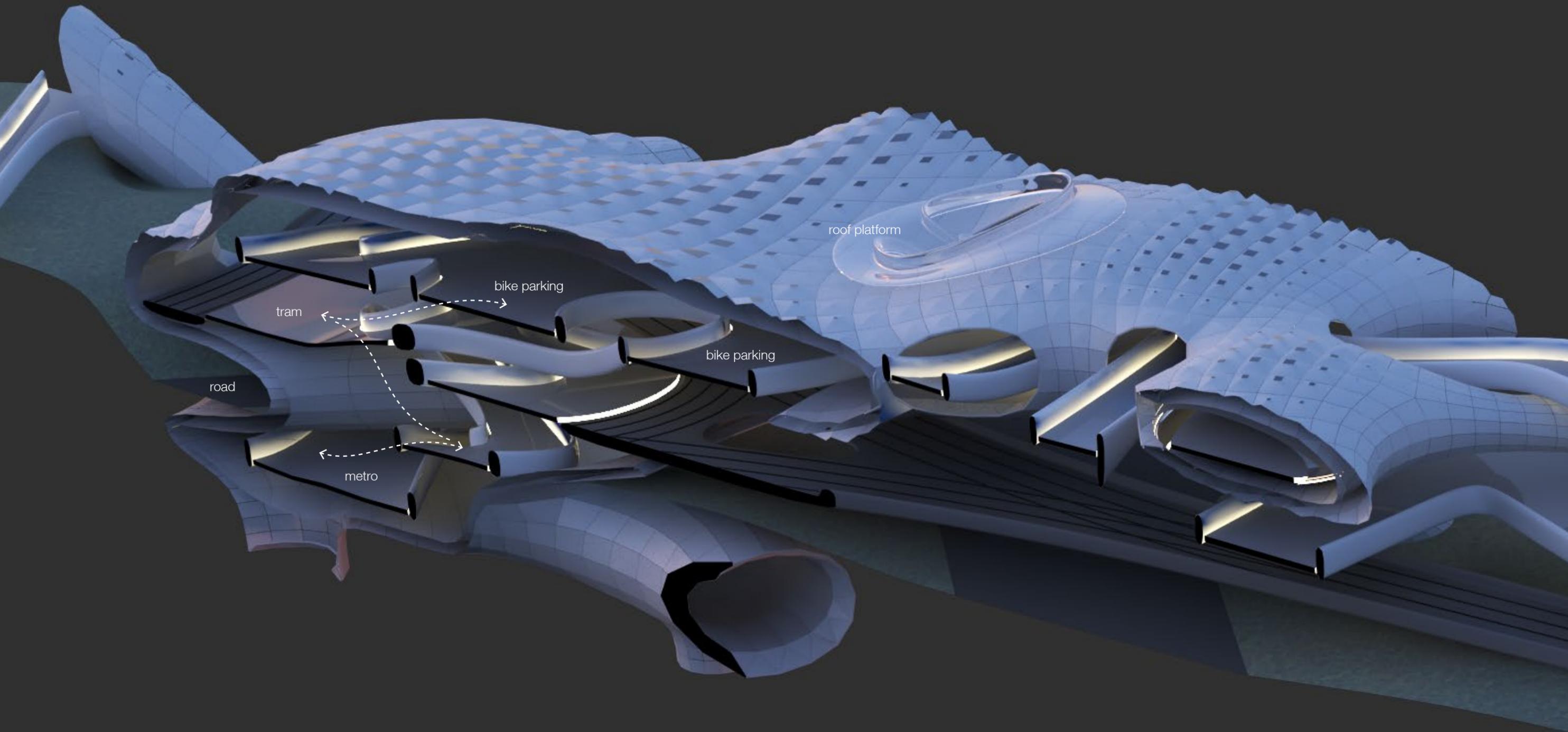
Restaurant

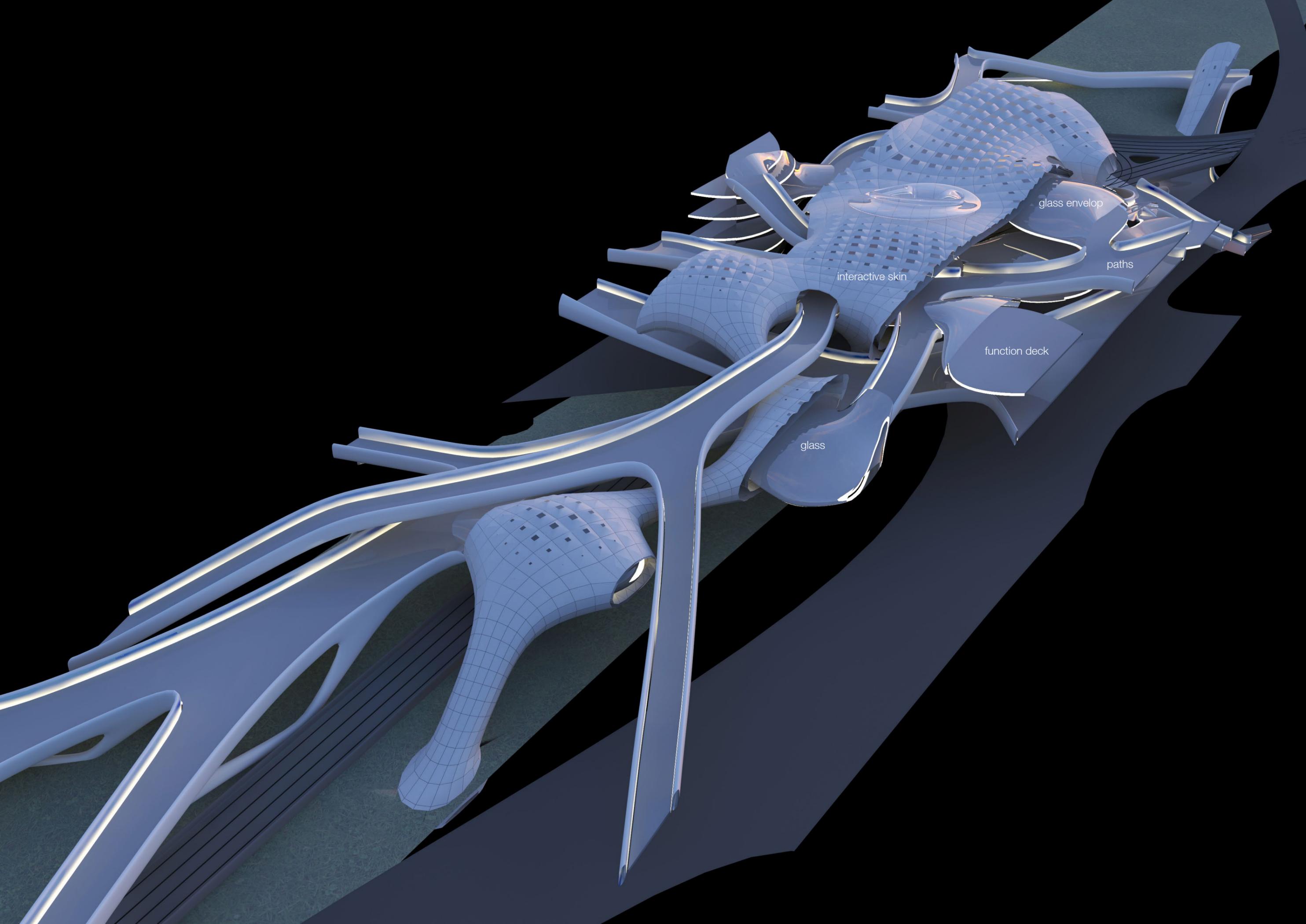
0 10 20 50M



0 10 20 50M







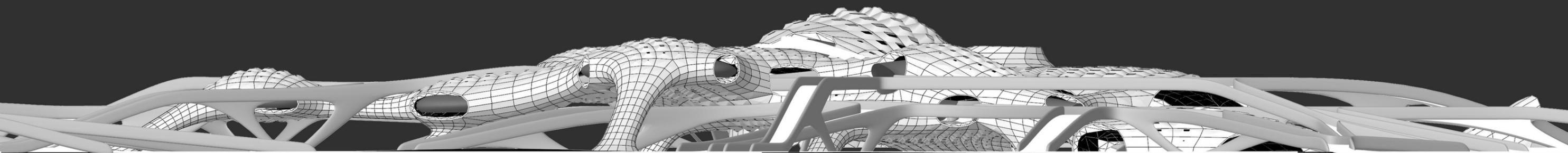
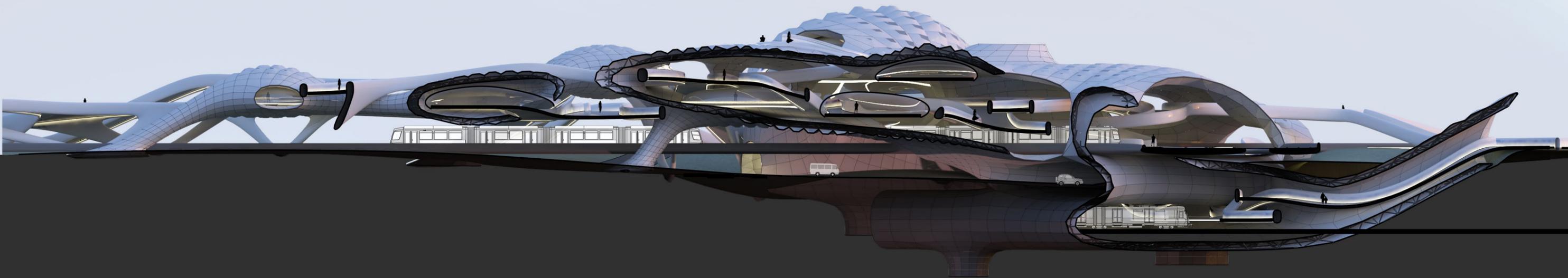
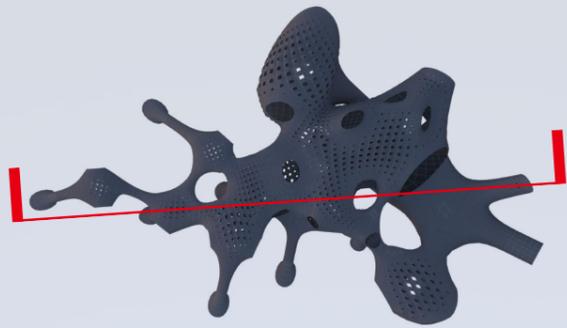
glass envelop

interactive skin

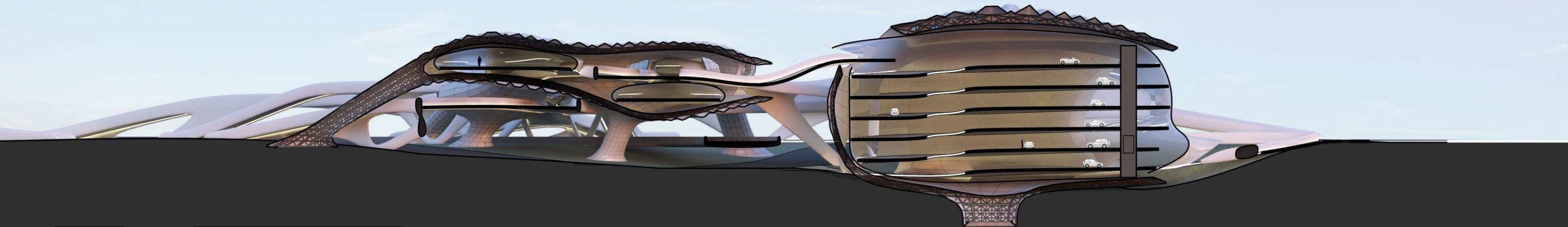
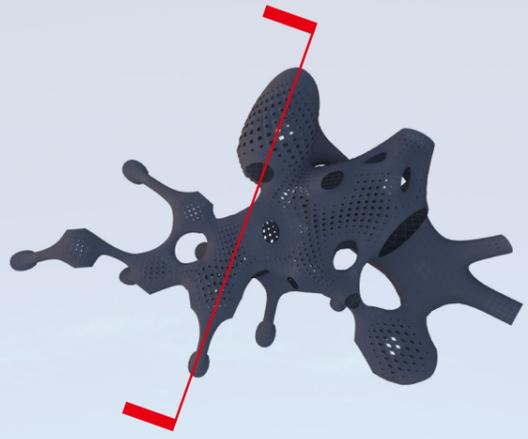
paths

function deck

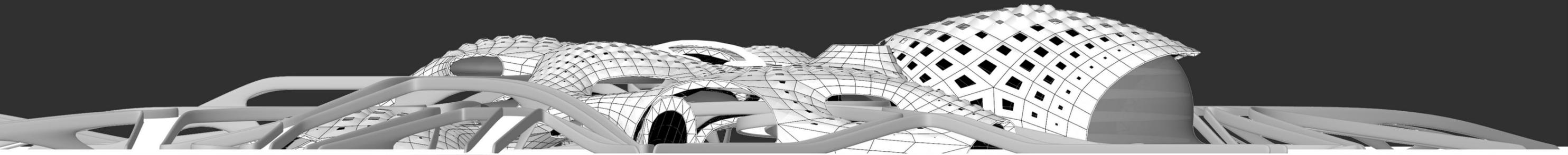
glass



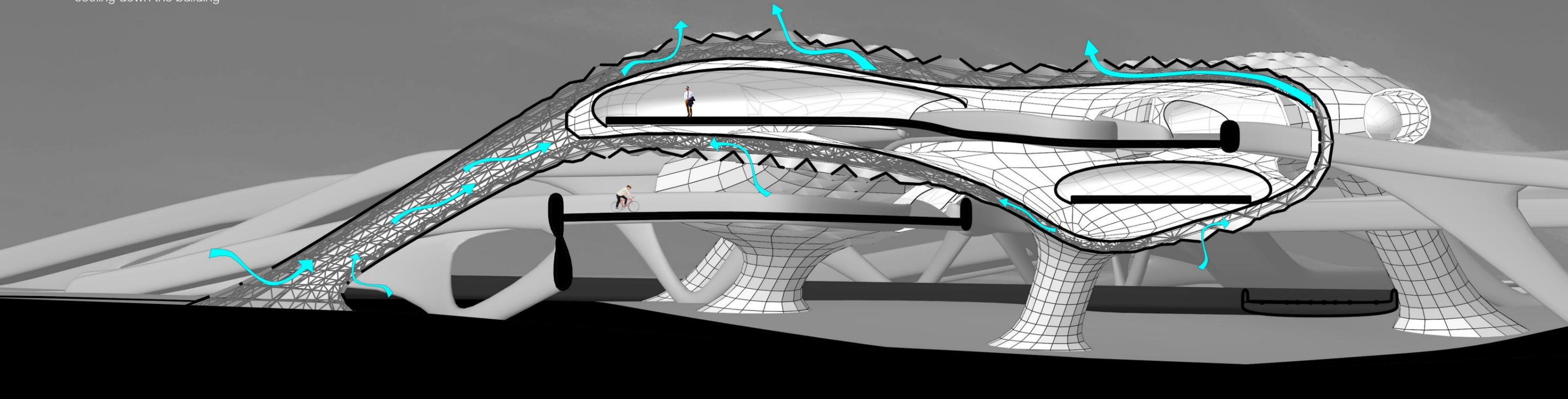
0 10 20 50M



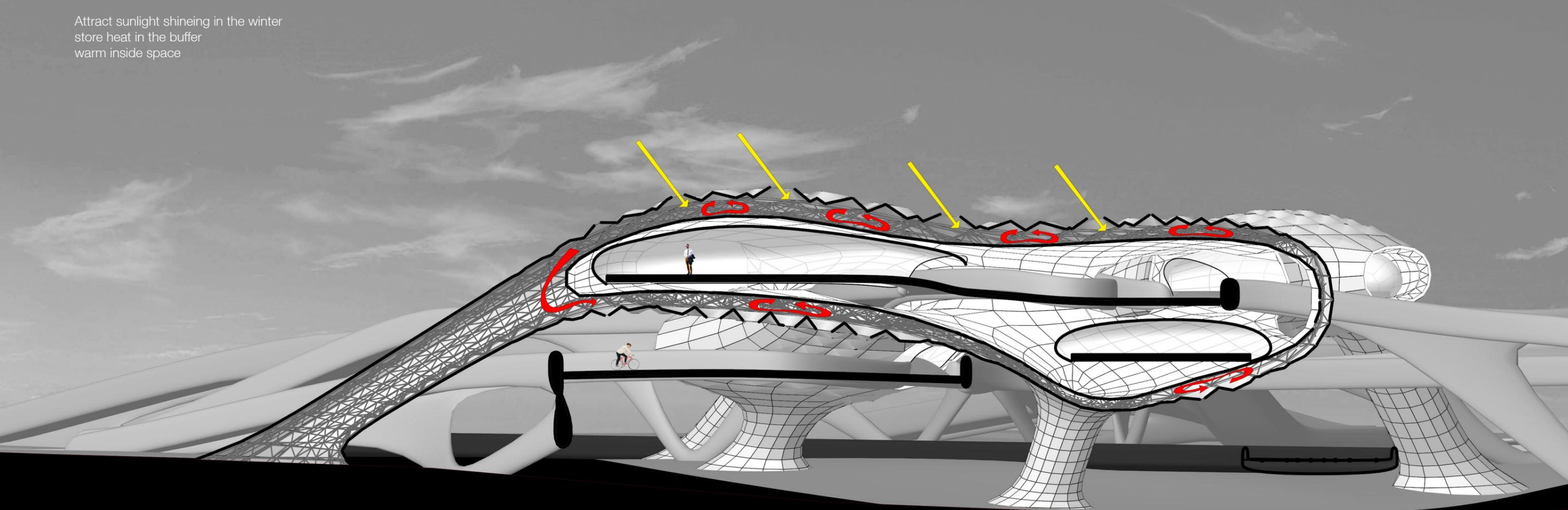
0 10 20 50M



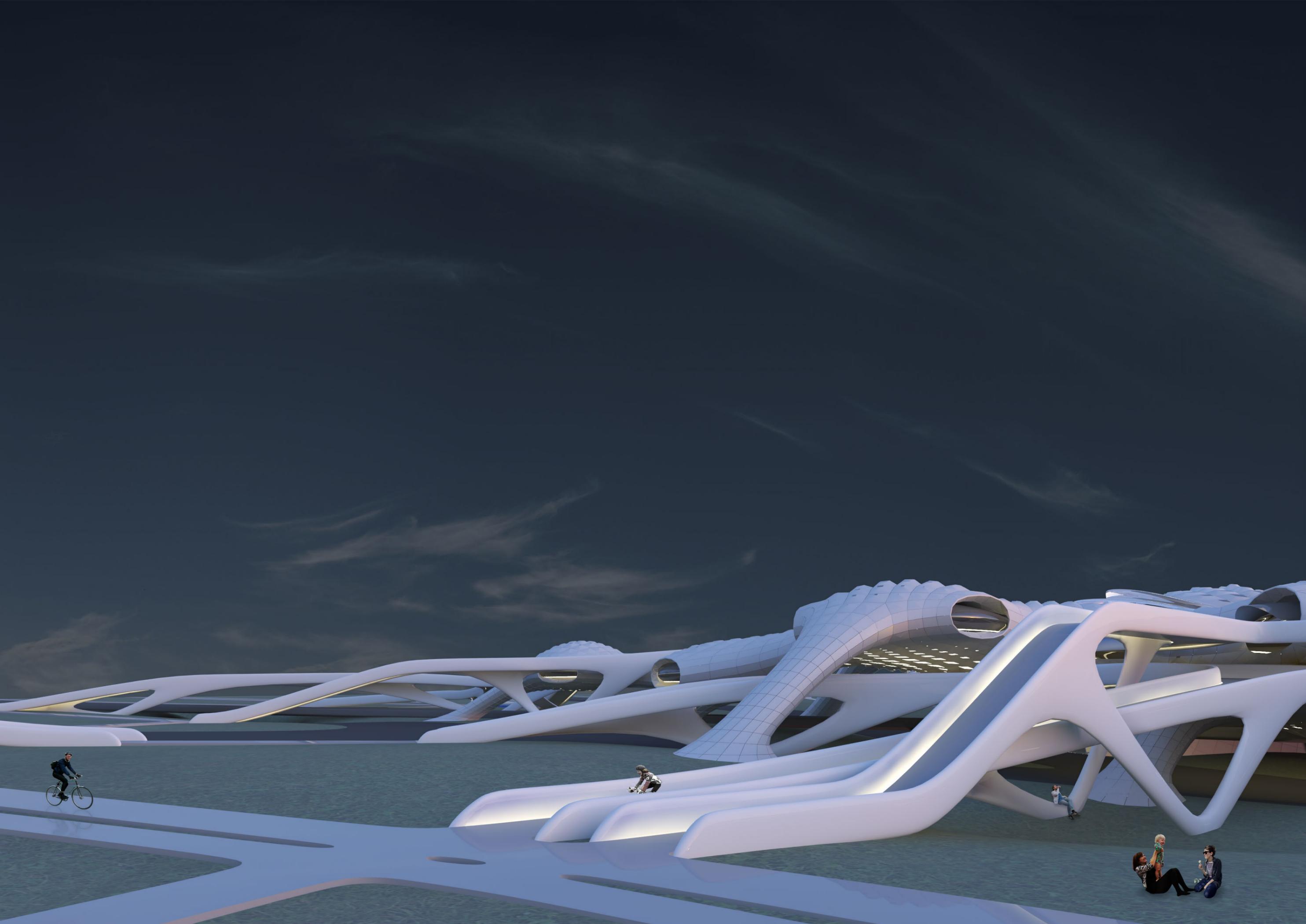
Climate control by interactive skin  
Double skin buffer  
Generate ventilation in the summer  
cooling down the building



Attract sunlight shining in the winter  
store heat in the buffer  
warm inside space

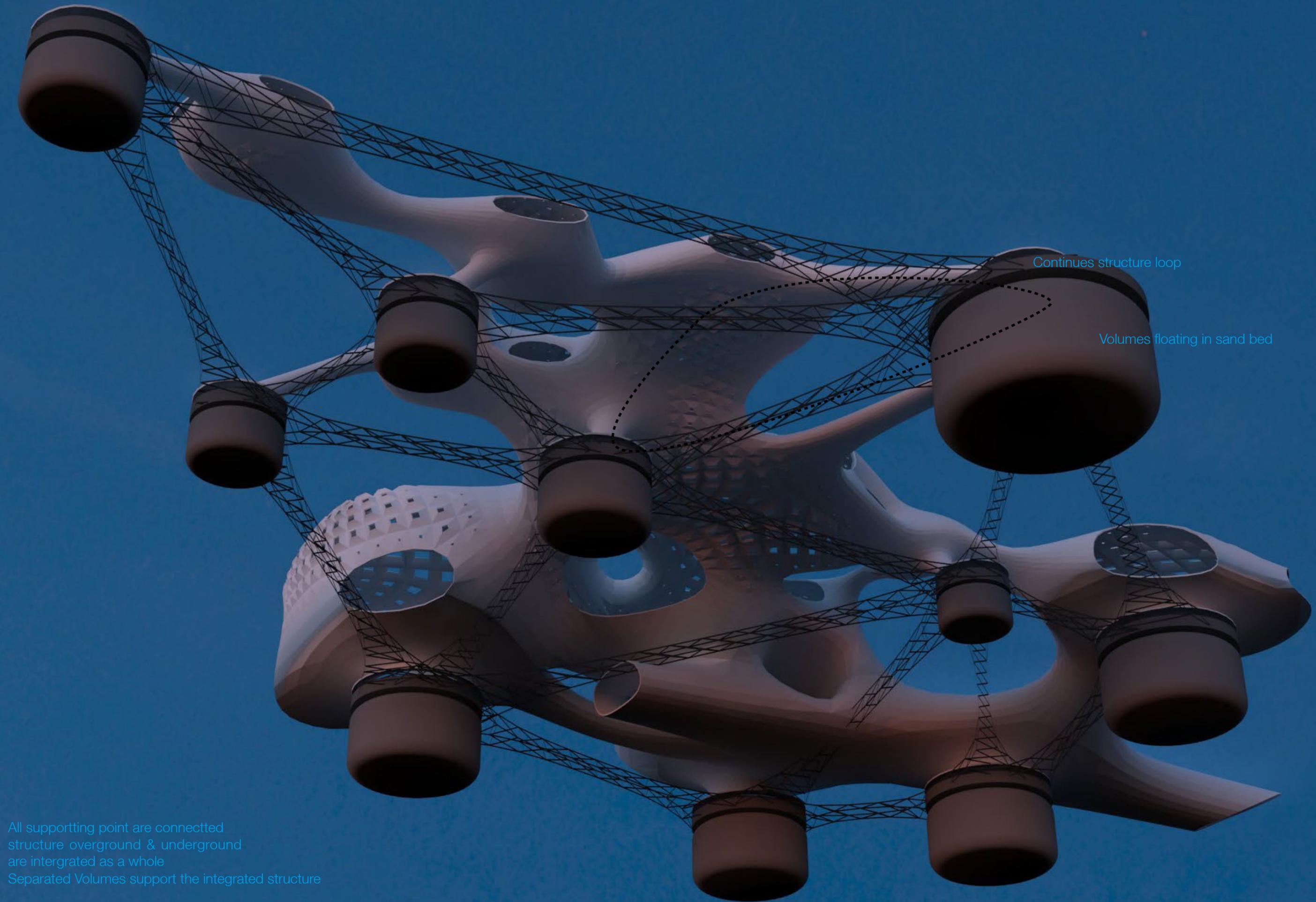


0 5 10 20M





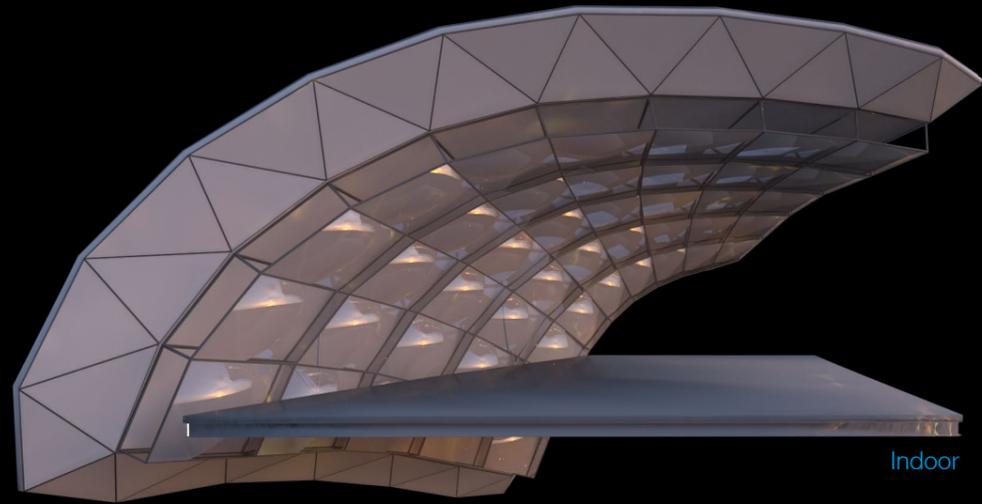
View from underground  
11 supporting points  
each volume has a one



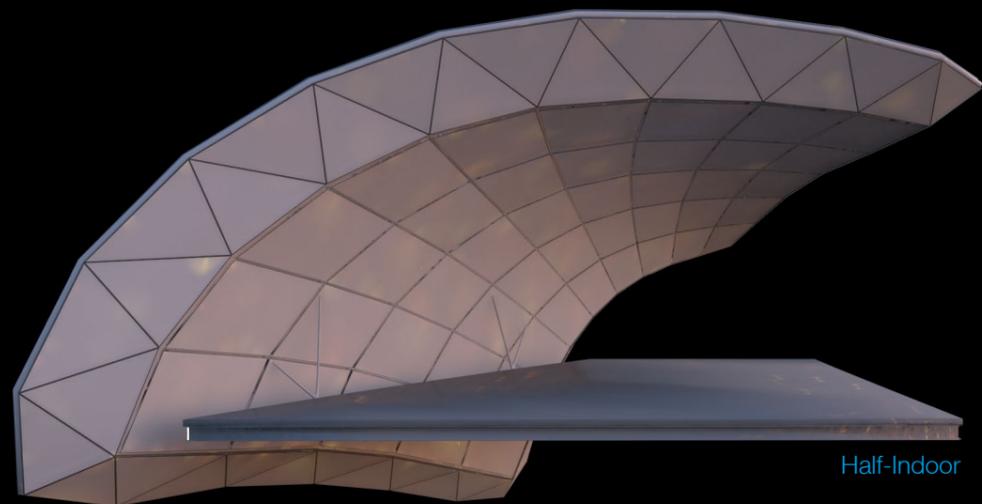
Continues structure loop

Volumes floating in sand bed

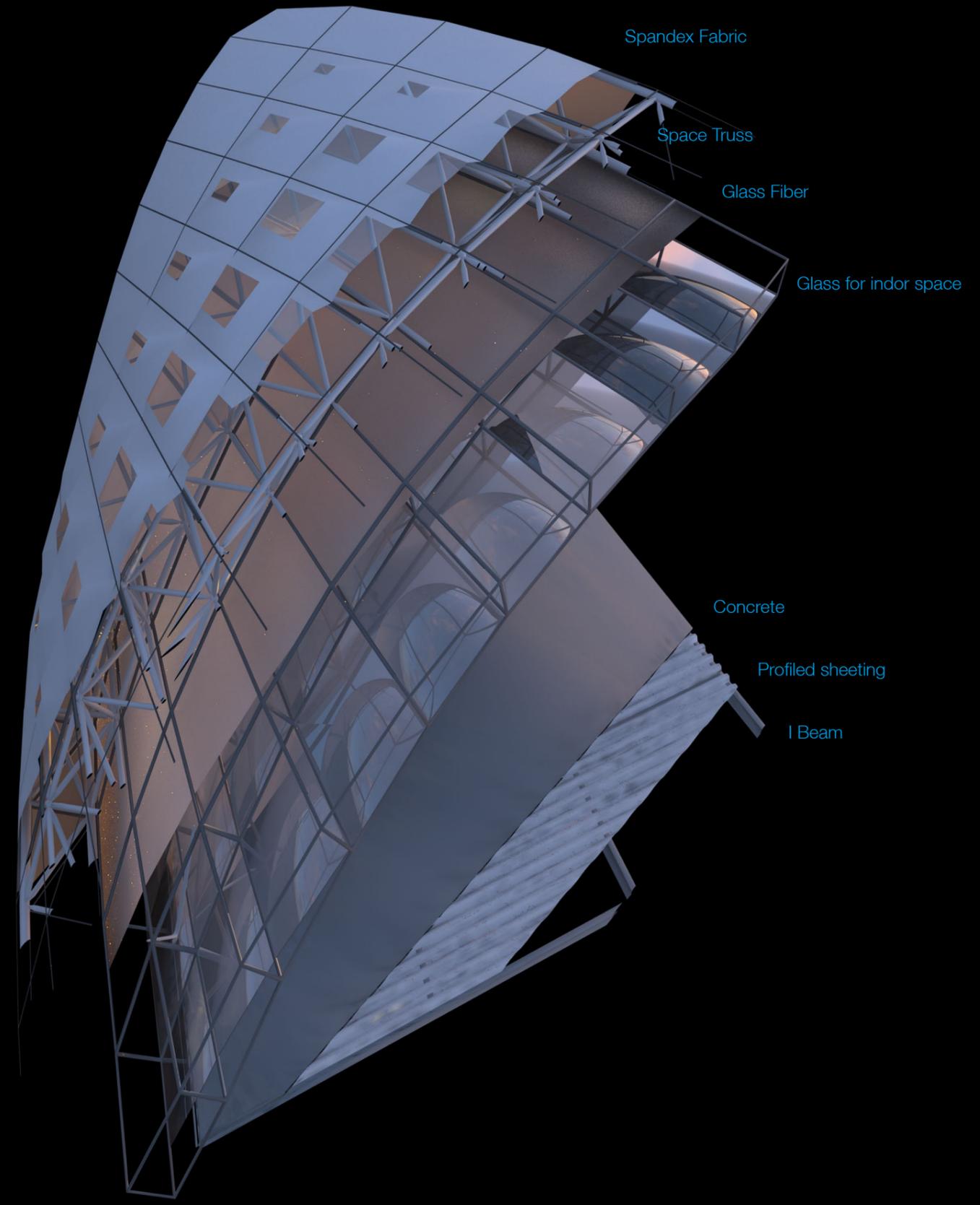
All supporting point are connected  
structure overground & underground  
are intergrated as a whole  
Separated Volumes support the integrated structure



Indoor



Half-Indoor



Spandex Fabric

Space Truss

Glass Fiber

Glass for indoor space

Concrete

Profiled sheeting

I Beam

Spandex Fabric (super elasticity)

Space Truss

Glass Fiber

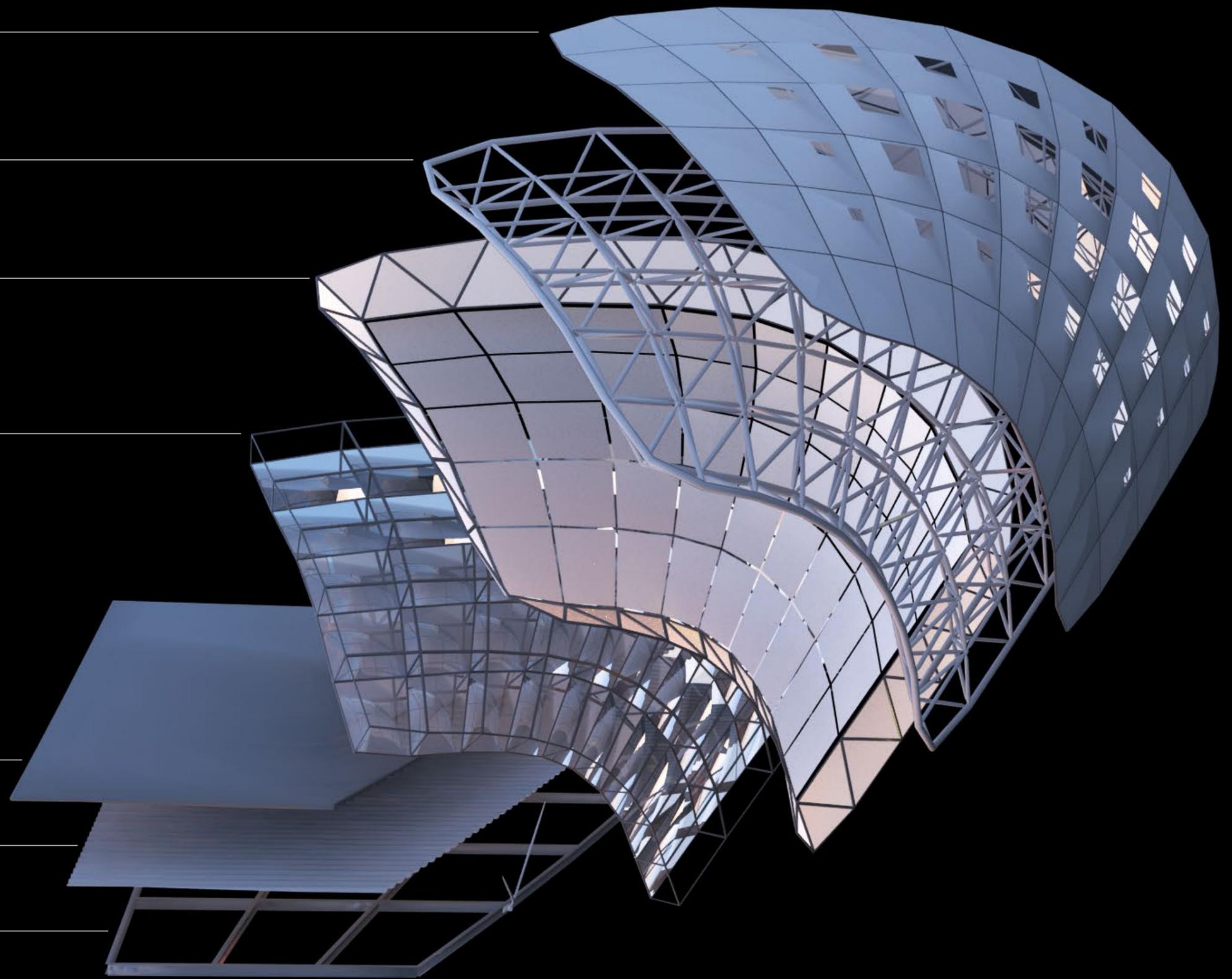
Translucent glass fibre inner membrane  
acts as a diffuser to spread natural light  
Hide structure  
Glow the skin  
Feel the weather through nature light

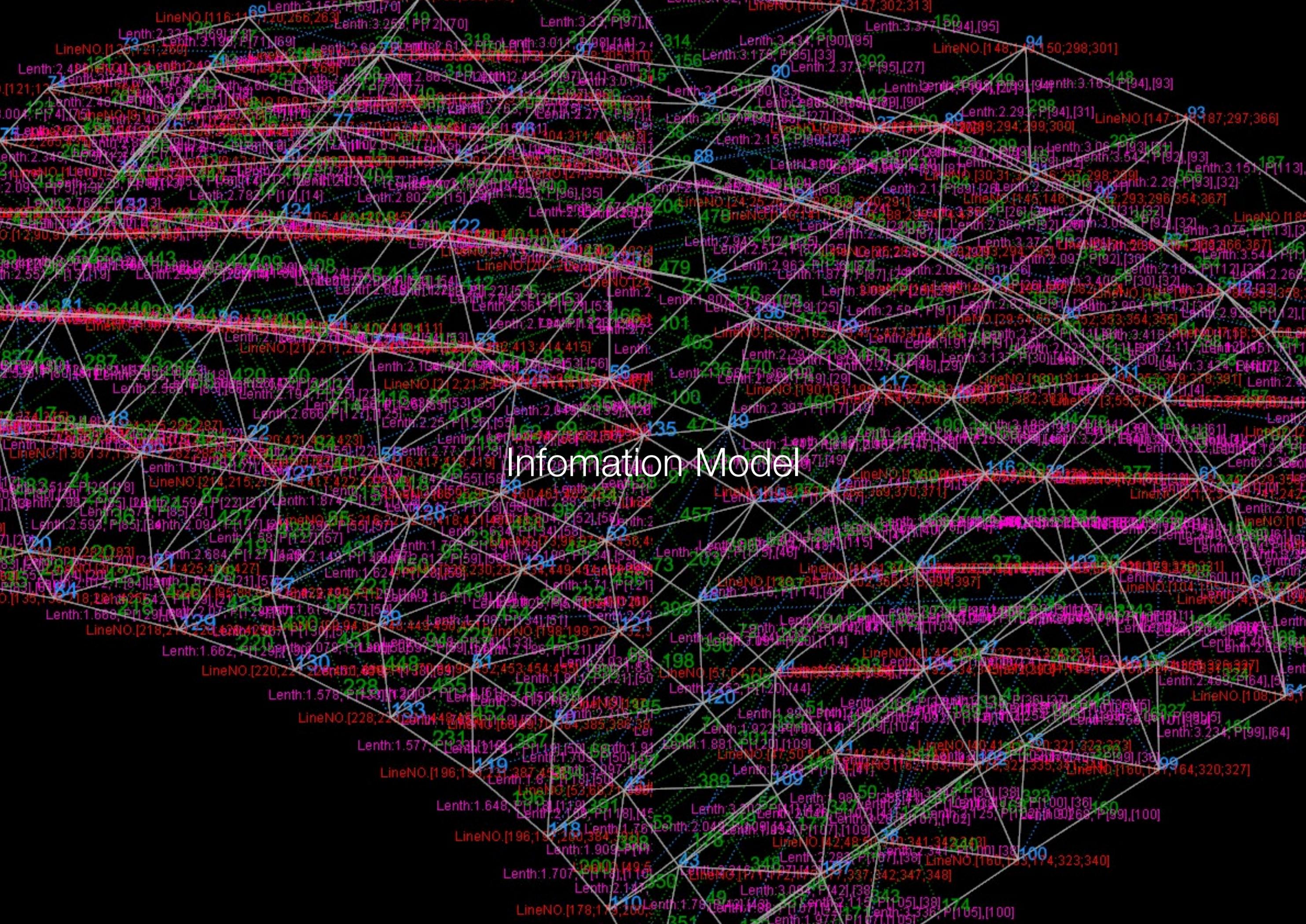
Glass for indor space

Concrete

Profiled sheeting

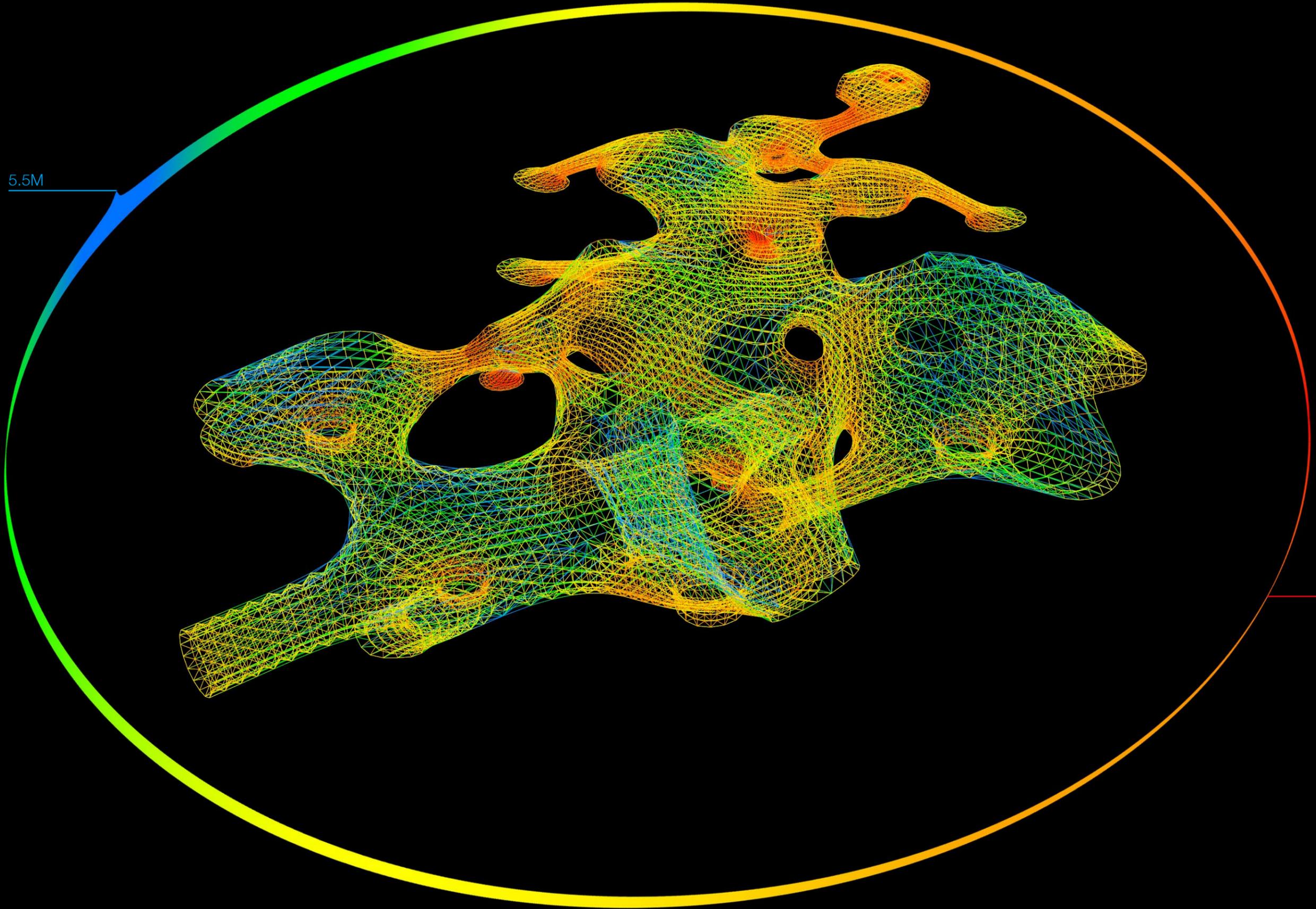
I Beam





# Information Model

5.5M



0.5M

14,000 Segments

