cappa+stauber
& Maurizio Trovatelli

POLIS Business Center, St. Petersburg

Concept design
31.01.2014



Brief

1.1

The brief is to build a Business Center in St. Petersburg (Russia) and to develop a creative concept of construction harmoniously entered into existing housing of Moskovoskiy prospectus.
The Client's main vision for this project is to build an innovative, high quality, functional and sustainable building. Exclusiveness of the design and originality reflect the idea of "Move Forward".
It is envisaged that the building floor plate will have a floor area of around 600 square meters.

In the building complex have to be integrated the following functions:

Public area:
- Showroom of sales & Comfortable holding area
- Hall - Reception
- Recreation Zone & Restaurant

Private area:
- Offices - Conference Hall
- Gym Hall & SPA
- Residence of the owner
- Parking

Business Center



Offices



Recreation Zone



Gym Hall



Conference Hall

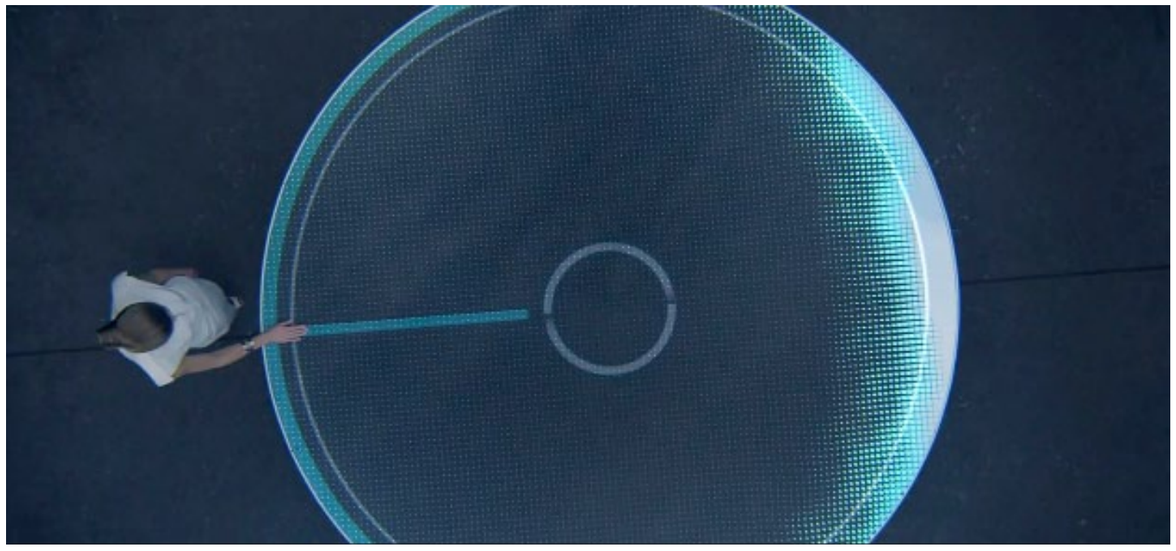


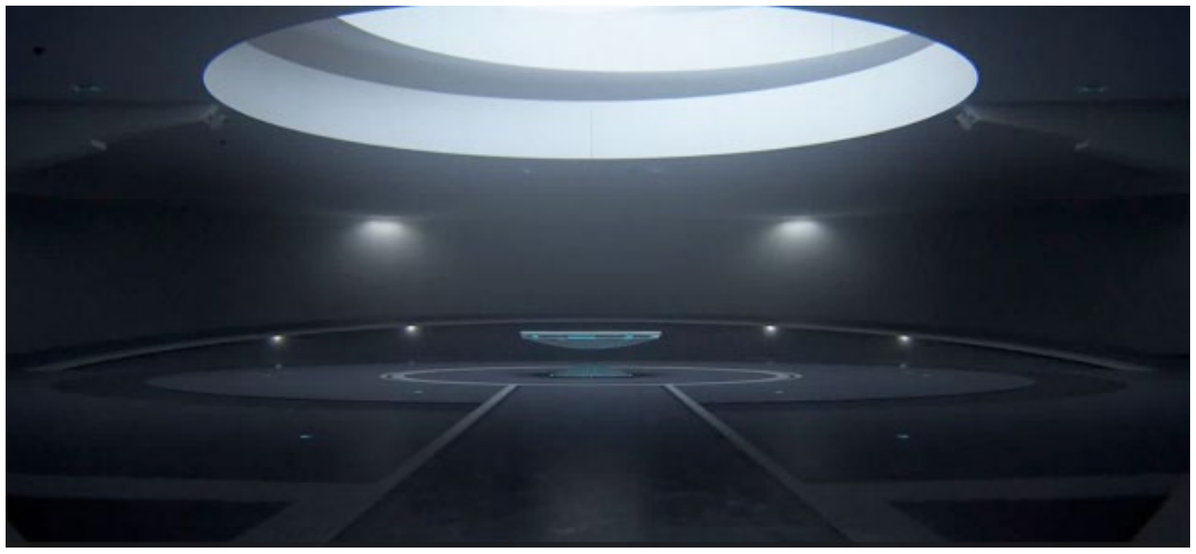
POLIS GROUP

Manner of representation of the company

1.2

Polis Group reflects in its new web site the message “Moving forward”. The image of the company is futuristic and uses elements like light and nature (birch trees).









Site

2.1

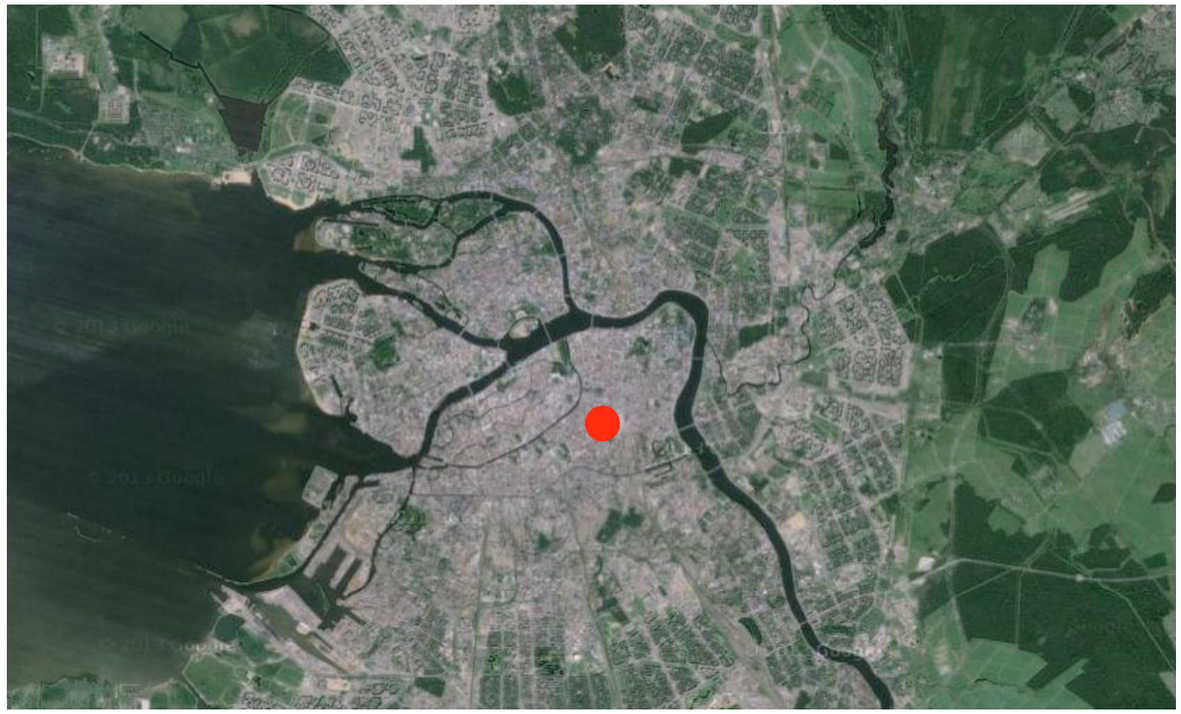

Mar Glaciale Artico
AMERICA SETTENTRIONALE
EUROPA
ASIA
AFRICA
AMERICA MERIDIONALE
Oceano Atlantico
Oceano Pacifico
OCEANIA
Oceano Indiano
Stretto di Drake

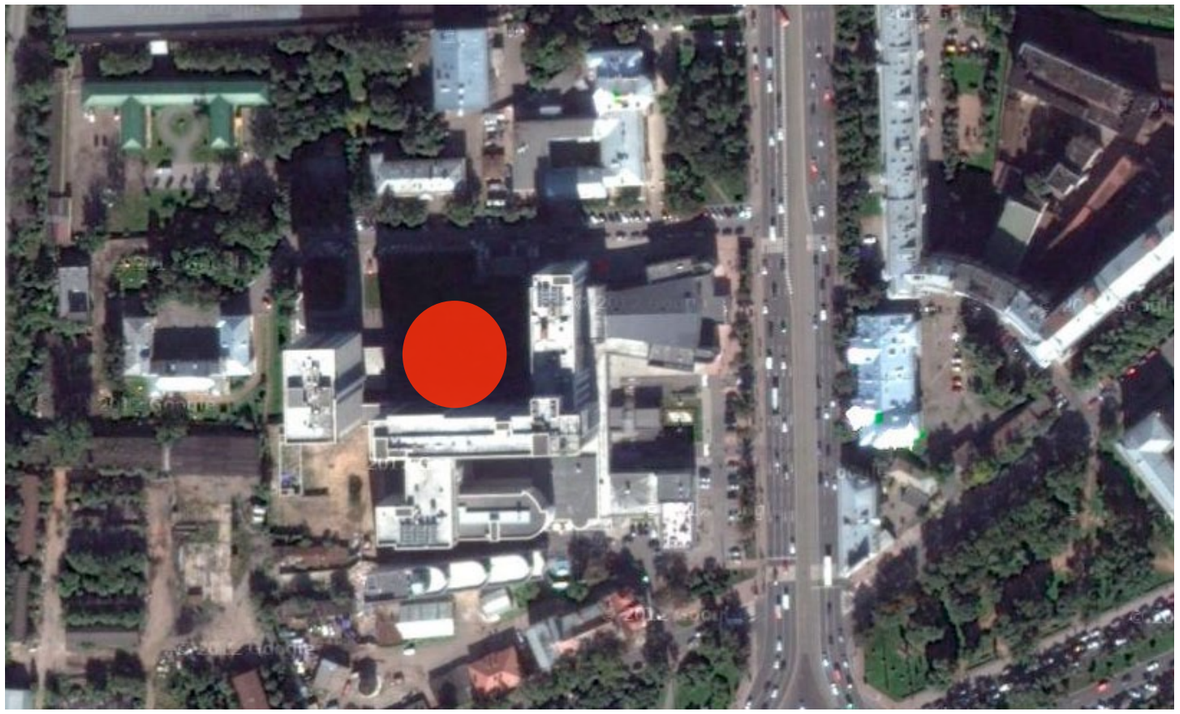


Site

2.2

LTd “Polis” is going to be located in St. Petersburg (Russia), Moskovoskiy prospectus, building 97, letter M.





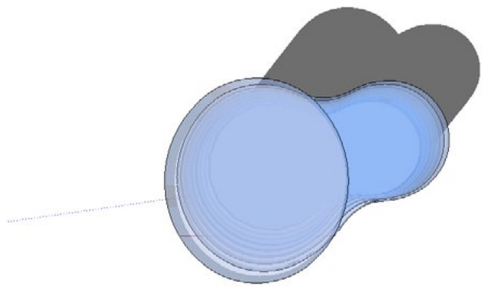
Key Design and Model

3.1

The building reacts with its fluid form to the rigid surrounding, creating a new place. The business complex is conceived as building in the park with the garden and light flowing through.

The new shape establishes a smooth transition between outside and inside.
A pattern on the glass facade creates privacy inside the penthouse and the business center. A light cone brings natural light inside the building.

Specifically, the perception of the project changes along the street, as the curve of the building shifts in relation to it. The resulting curved facade, which is experienced from both the exterior and interior of the building, establishes multiple orientations and permits a variety of views.

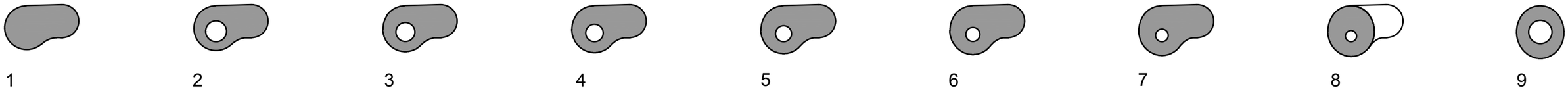




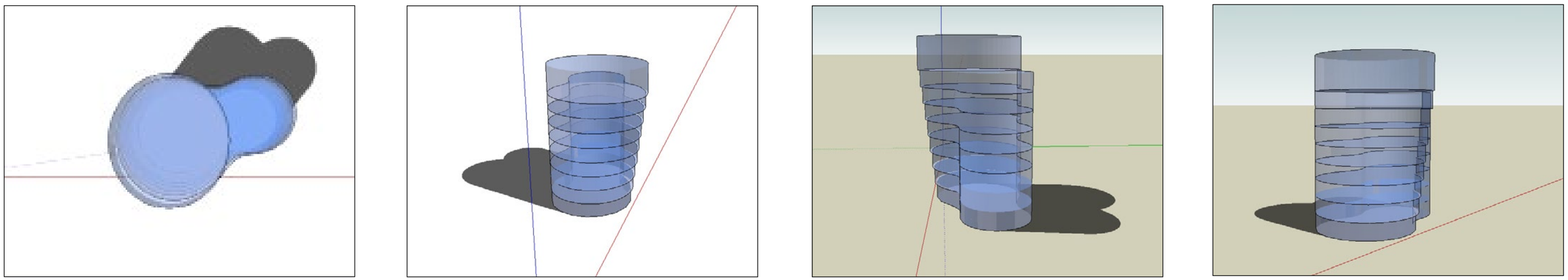
Key Design and model

3.2

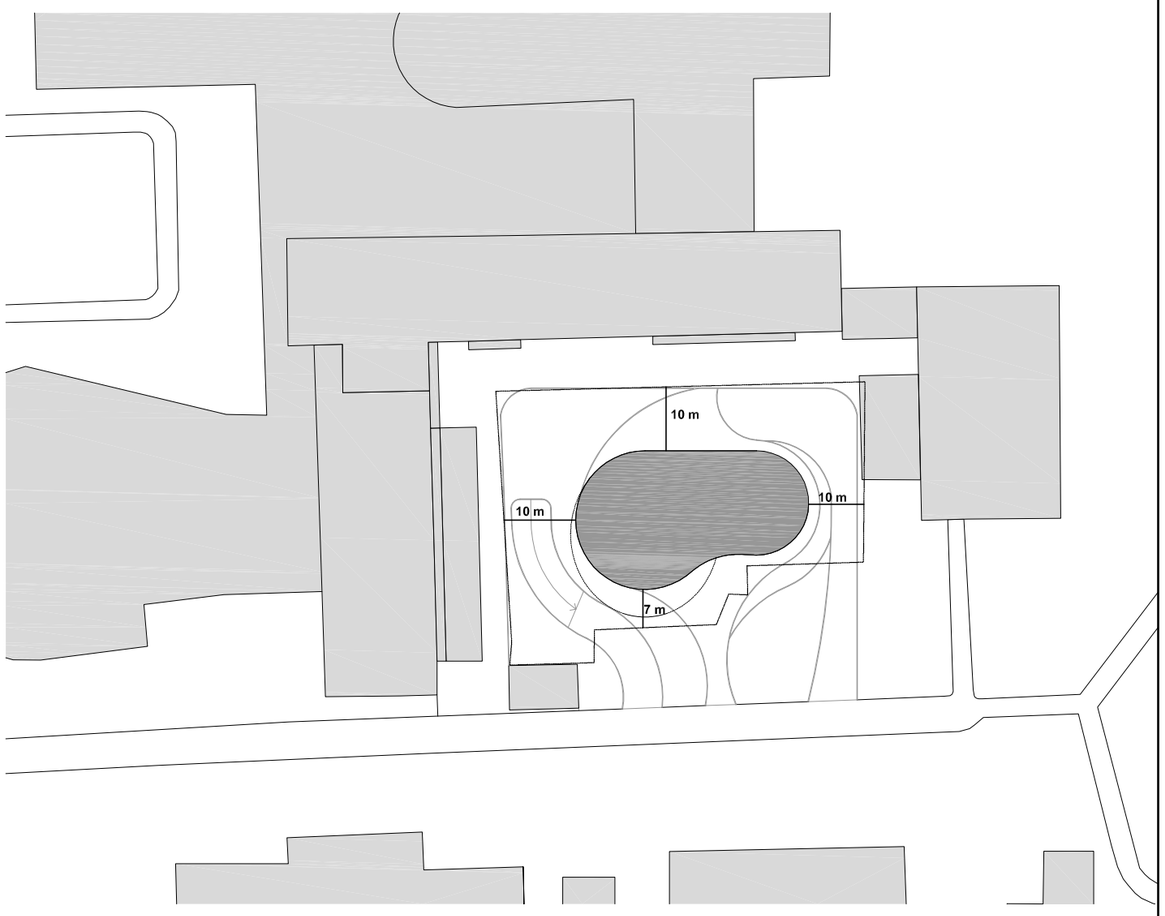
The transformation of the building from the first floor to the penthouse.



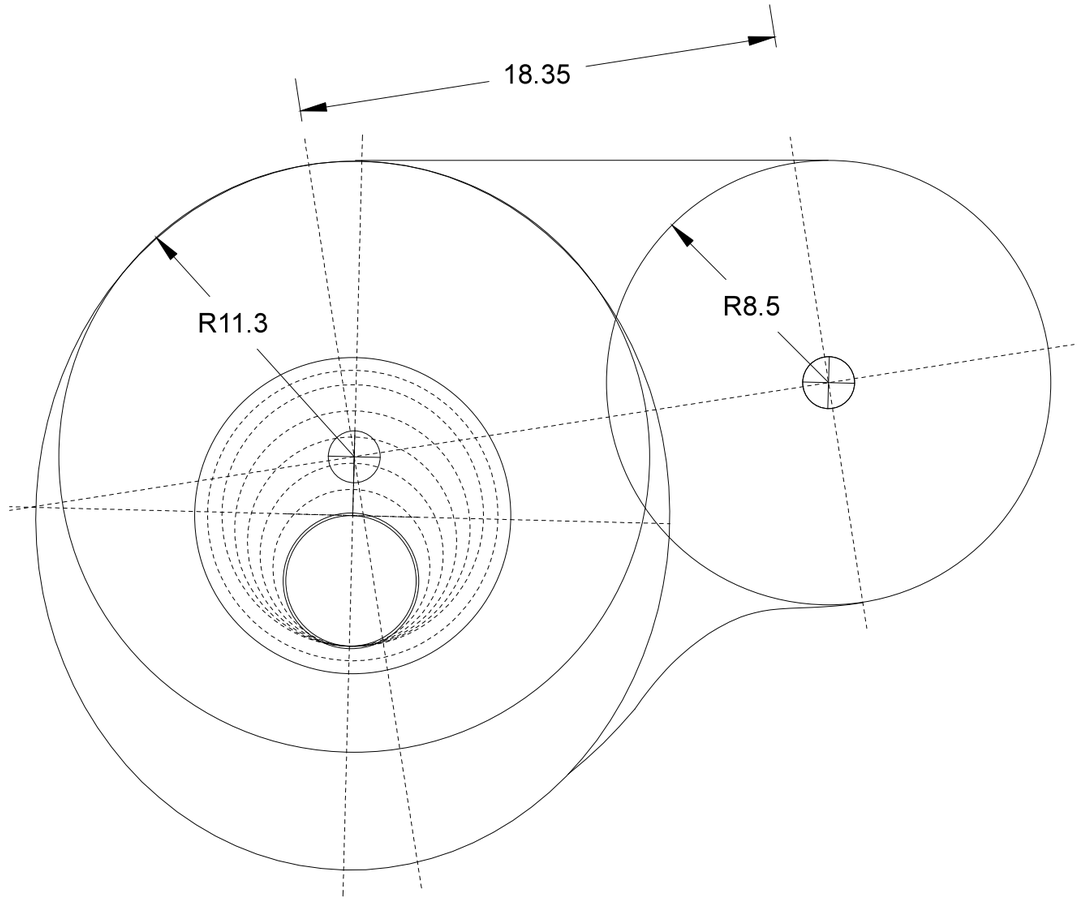
Volume studies



The position of the building related to the property

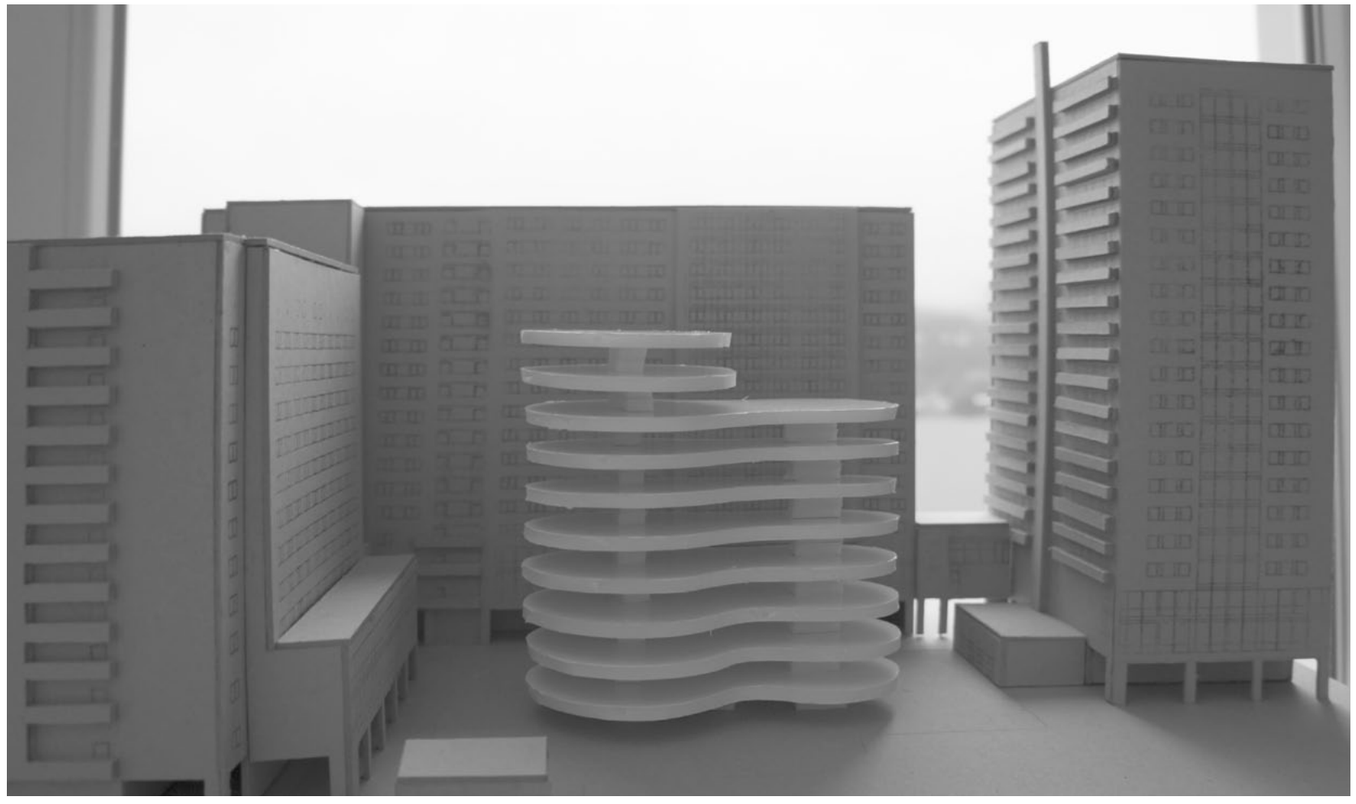


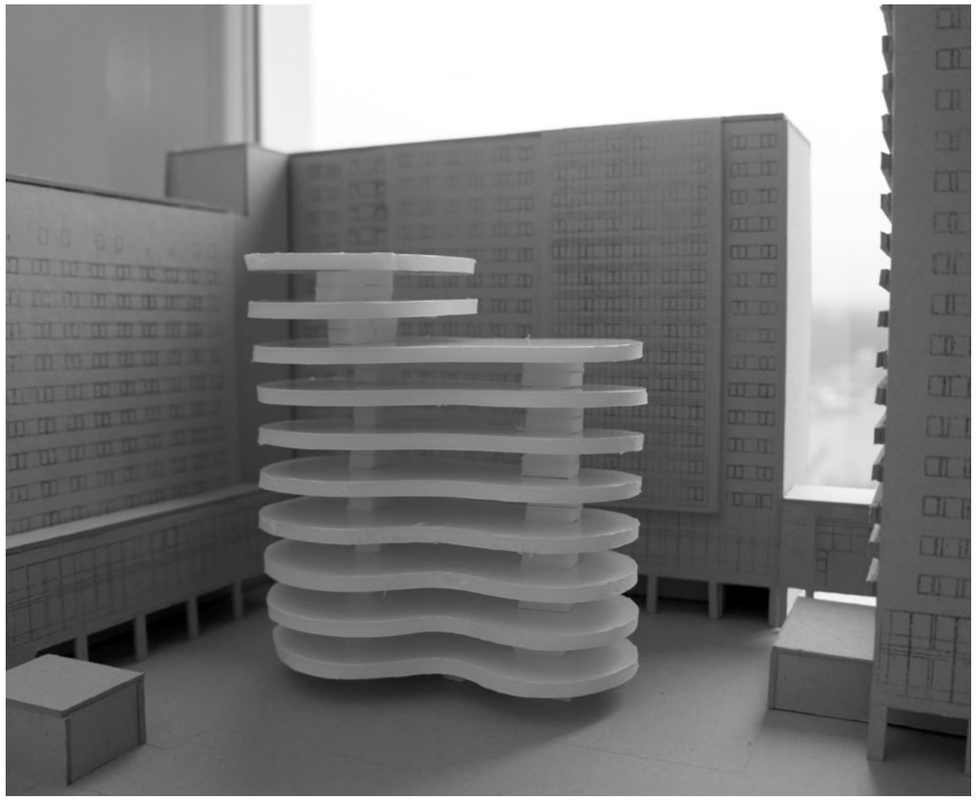
The geometry of the building



3.3

With several models we studied the form of the building in this particular surrounding. This rigid contest of the neighborhoods demands a free, organic form of the new building.

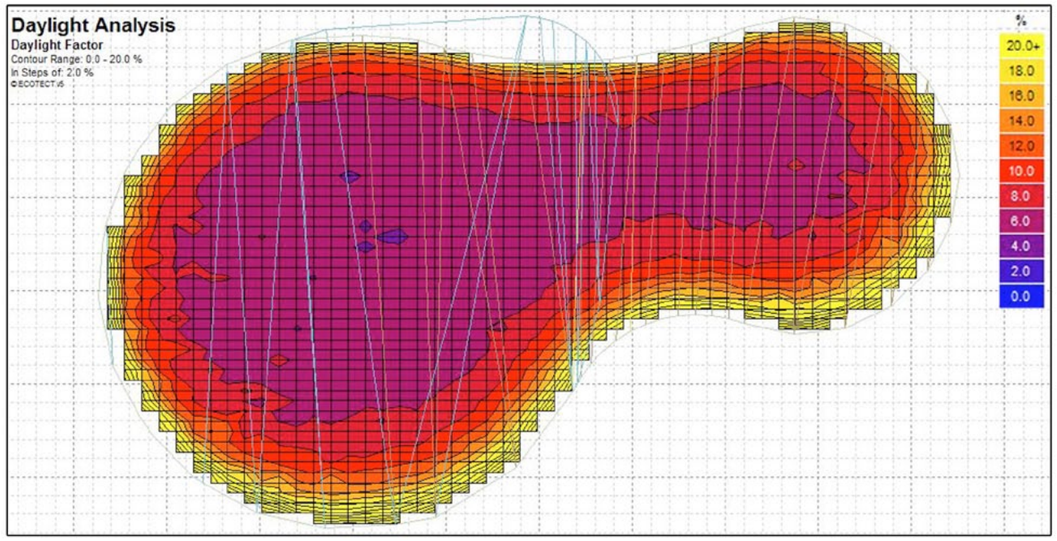




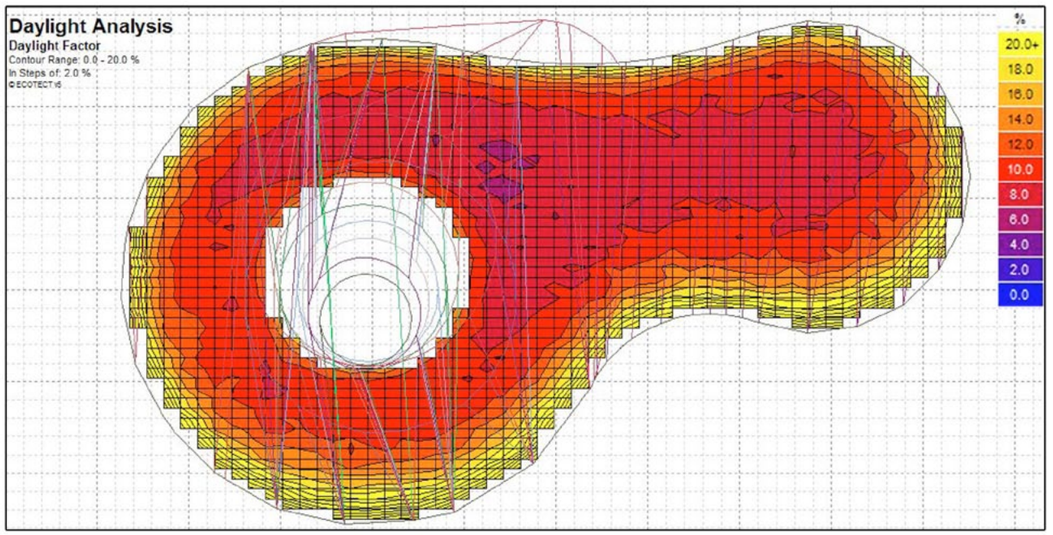
Daylighting

3.4

Improving daylight for lighting and views is one of the key aim of the design. A series of preliminary daylightng analysis were carried out to support the architectural proposal. A three dimensional model of the building was used to simulate lighting levels throughtout the year and to compare various technical solutions. The proposed design incorporates a vertical tall void throgh located in the middle of the floor plate which presents an opportunity to bring natural light deeper into the building, creating a sense of connection to the outside world and helping to reduce lighting energy requirements through daylighting. Computer simulations clearly show how daylighting levels are drastically enhanced by the use of the atrium. This will have a positive effect on workplace satisfaction and productivity as well as reducing the lighting energy.



Office levels - Daylighting simulation with no atrium



Office levels - Daylighting simulation with atrium - Enhanced solution

Rendering of the POLIS Business center



Rendering of the POLIS business center



Rendering of the showroom on the first floor



Rendering of the wintergarden of the penthouse

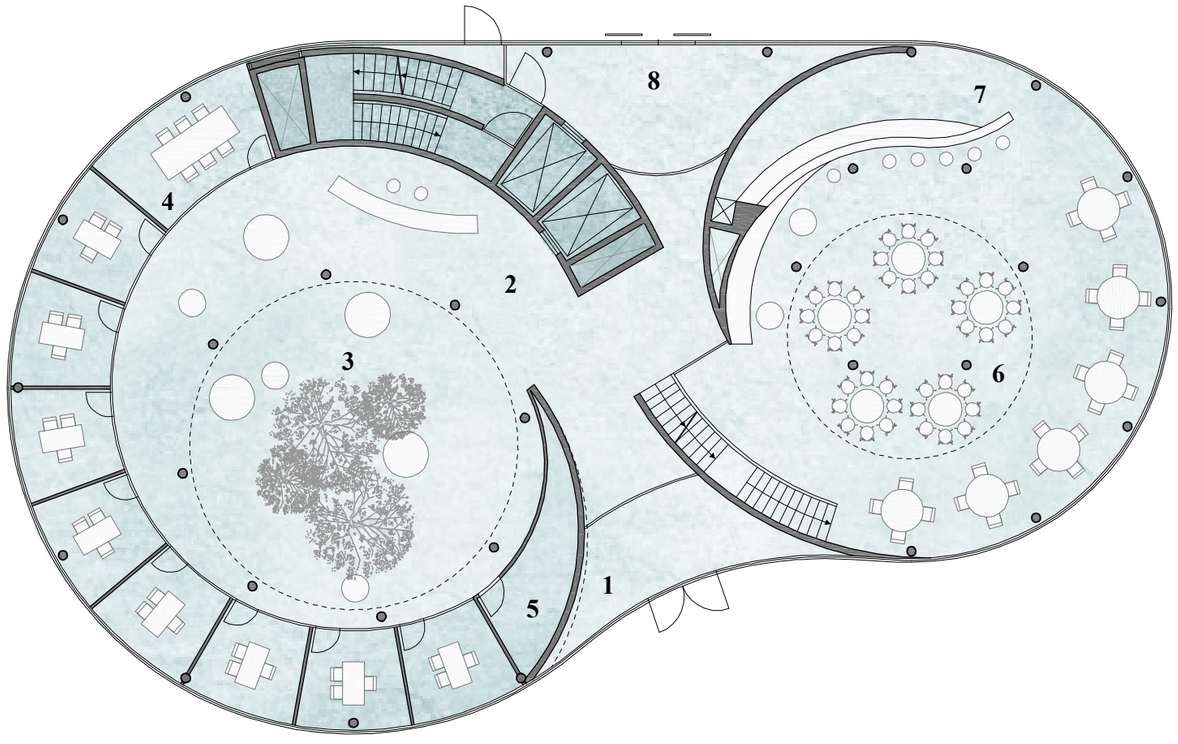


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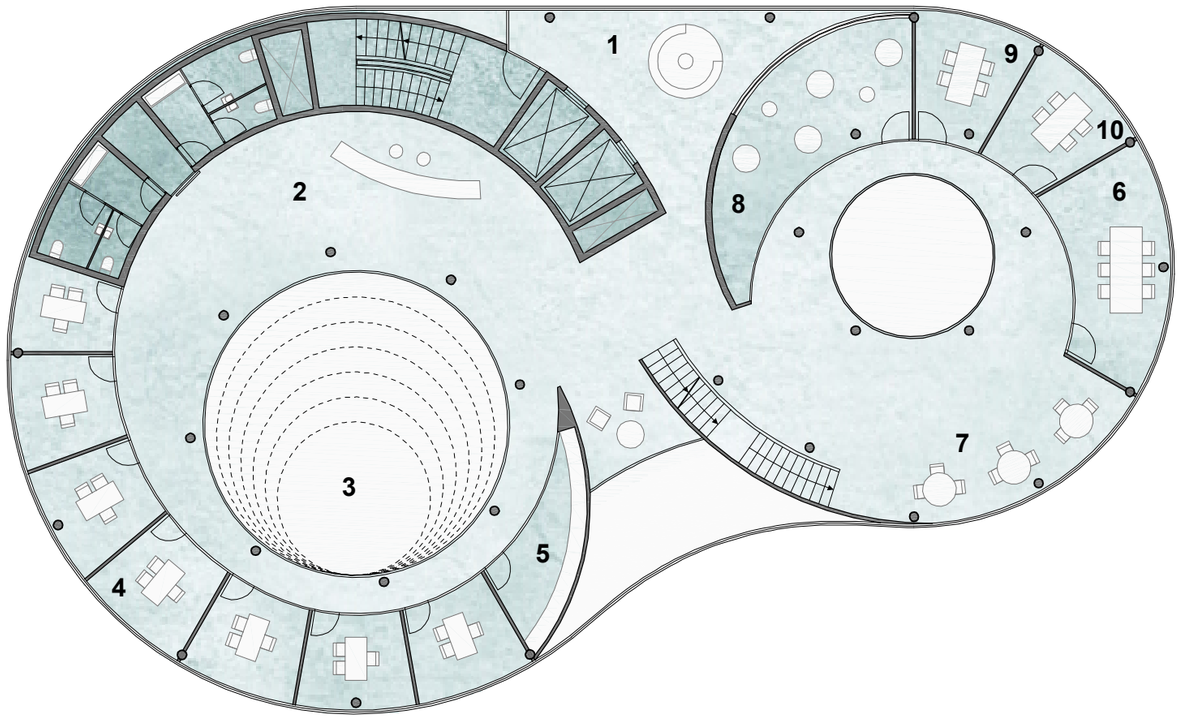
Planimetry

1 Controlled main entrance
2 Showroom of sales department
3 Green Courtyard
4 Holding area
5 Archive
6 Restaurant
7 Bar
8 Secondary entrance for
Penthouse and office



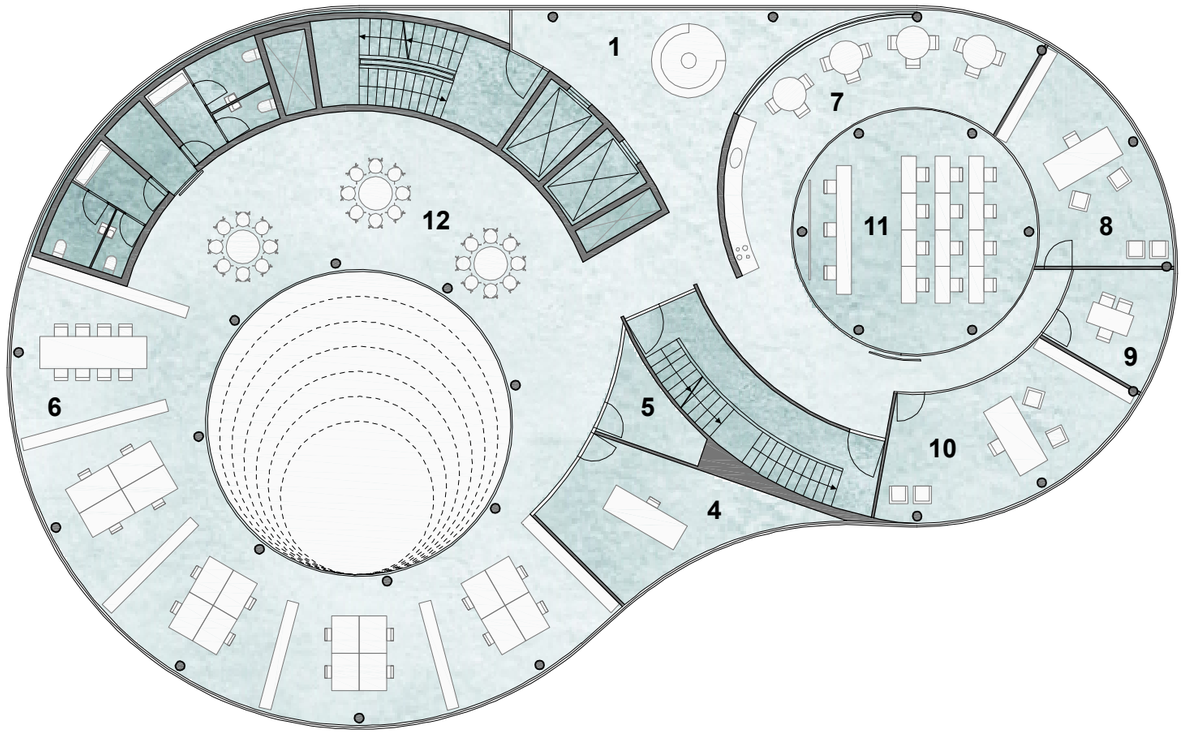
First Floor

1 Reception
2 Showroom of sales department
3 Green Courtyard
4 Holding area
5 Archive
6 Office for insurance
7 Bar
8 Child care
9 Notary
10 Office for loans



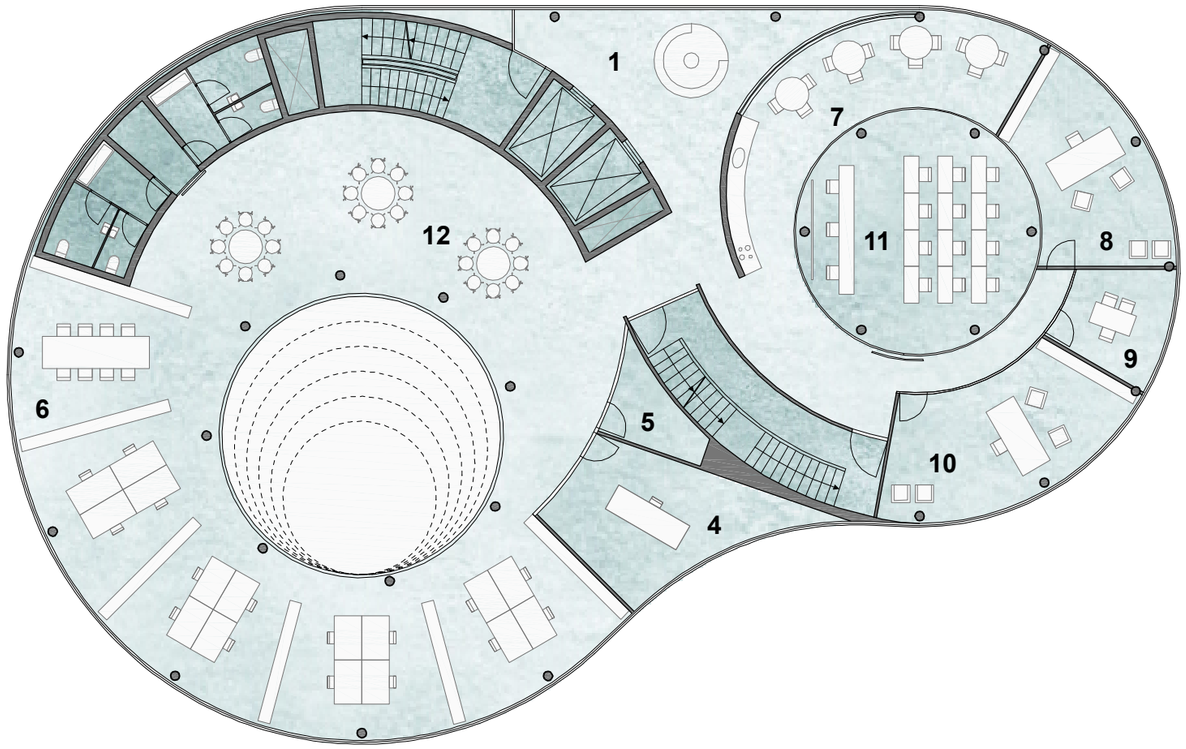
Second Floor

1 Reception
4 Segretary
5 Fotocopy
6 Offices open space
7 Kitchen
8 Director 2
9 Segretary
10 Director 1
11 Conference
12 Hall



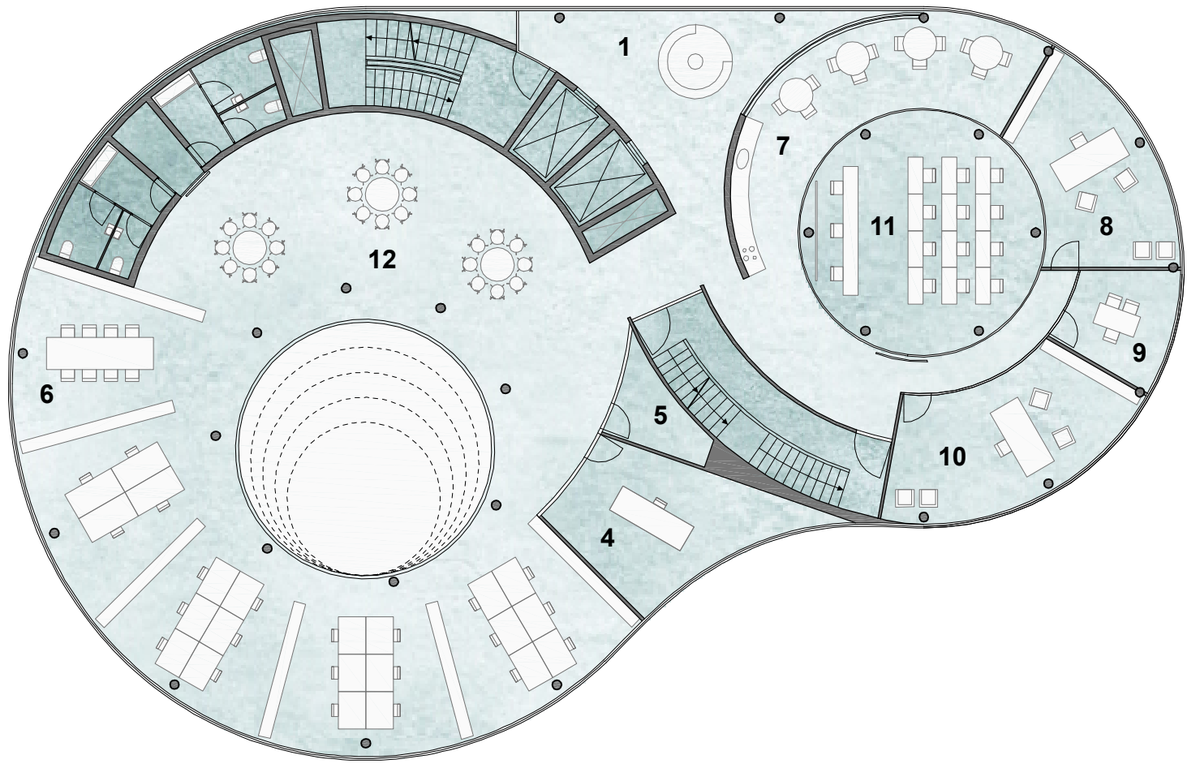
Third Floor

1 Reception
4 Segretary
5 Fotocopy
6 Offices open space
7 Kitchen
8 Director 2
9 Segretary
10 Director 1
11 Conference
12 Hall



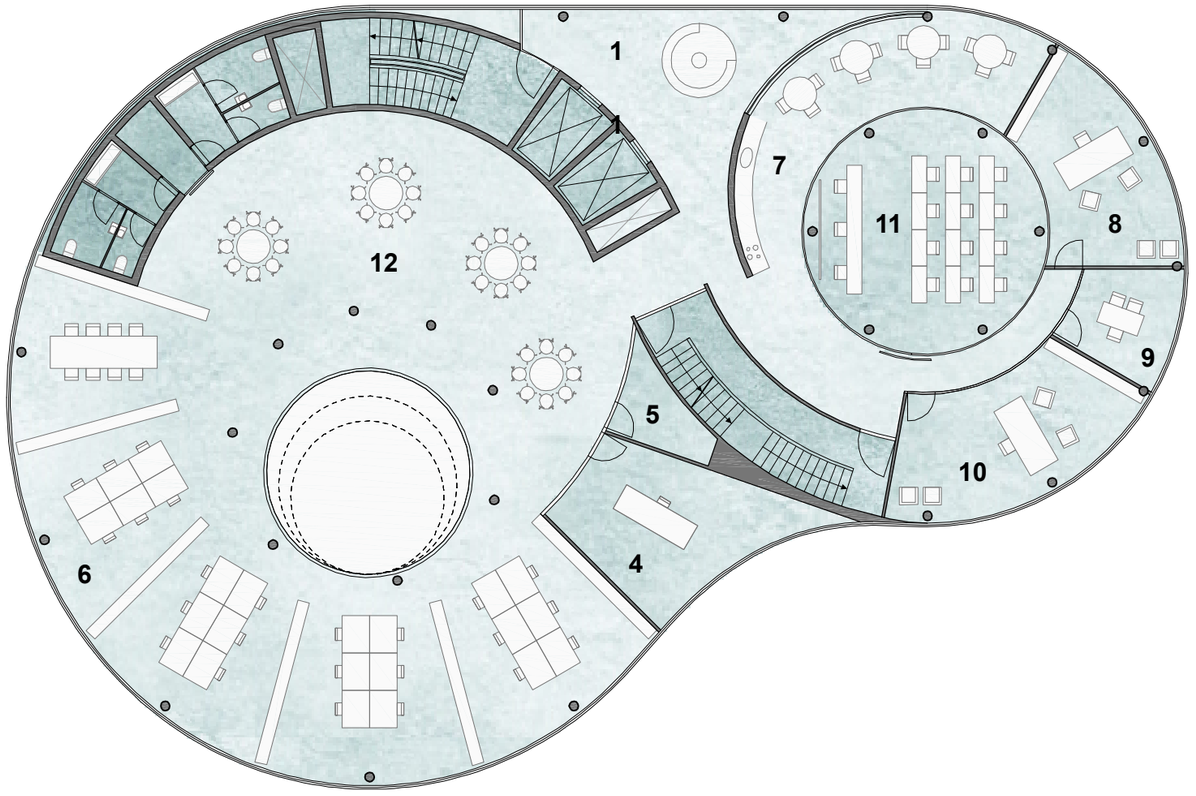
Fourth Floor

1 Reception
4 Segretary
5 Fotocopy
6 Offices open space
7 Kitchen
8 Director 2
9 Segretary
10 Director 1
11 Conference
12 Hall



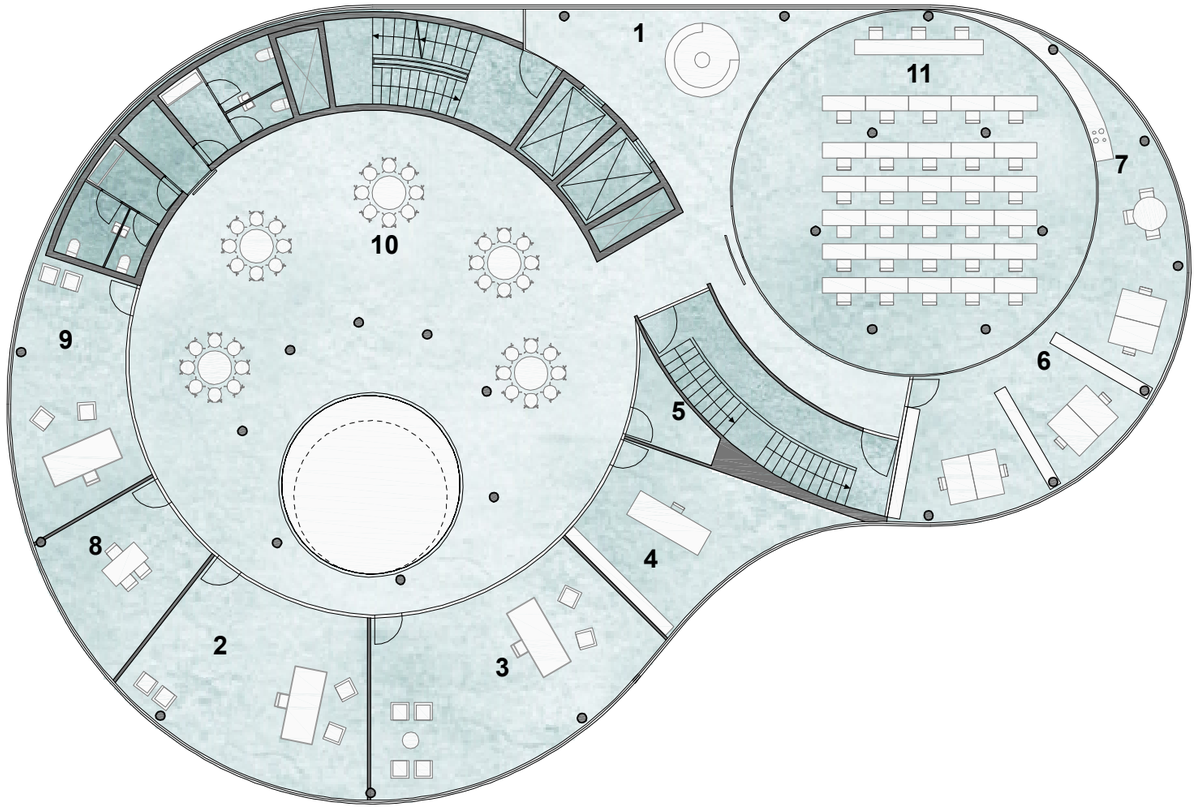
Fifth Floor

1 Reception
4 Segretary
5 Fotocopy
6 Offices open space
7 Kitchen
8 Director 2
9 Segretary
10 Director 1
11 Conference
12 Hall



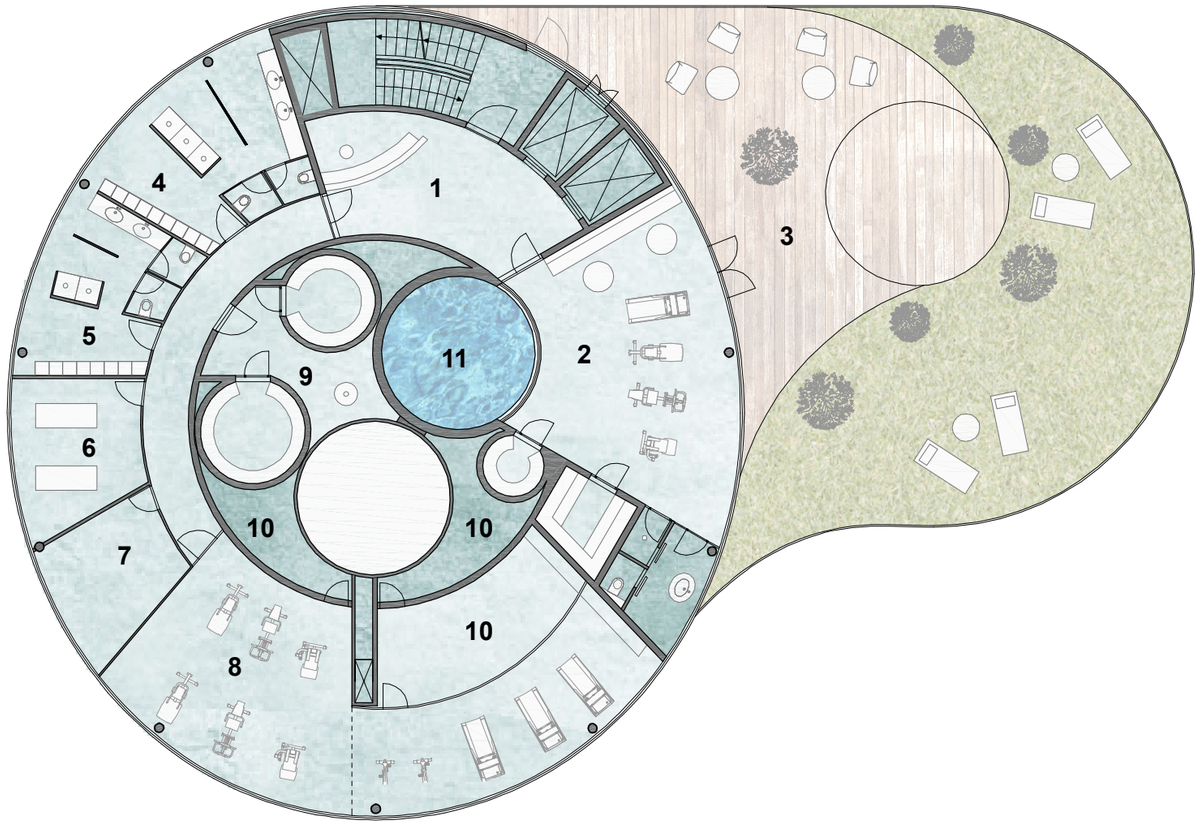
Sixth Floor

1 Reception
2 Director1
3 Owner Business Center
4 Secretary
5 Fotocopy
6 Office Open space
7 Kitchen
8 Director 2
9 Director 3
10 Hall
11 Conference room



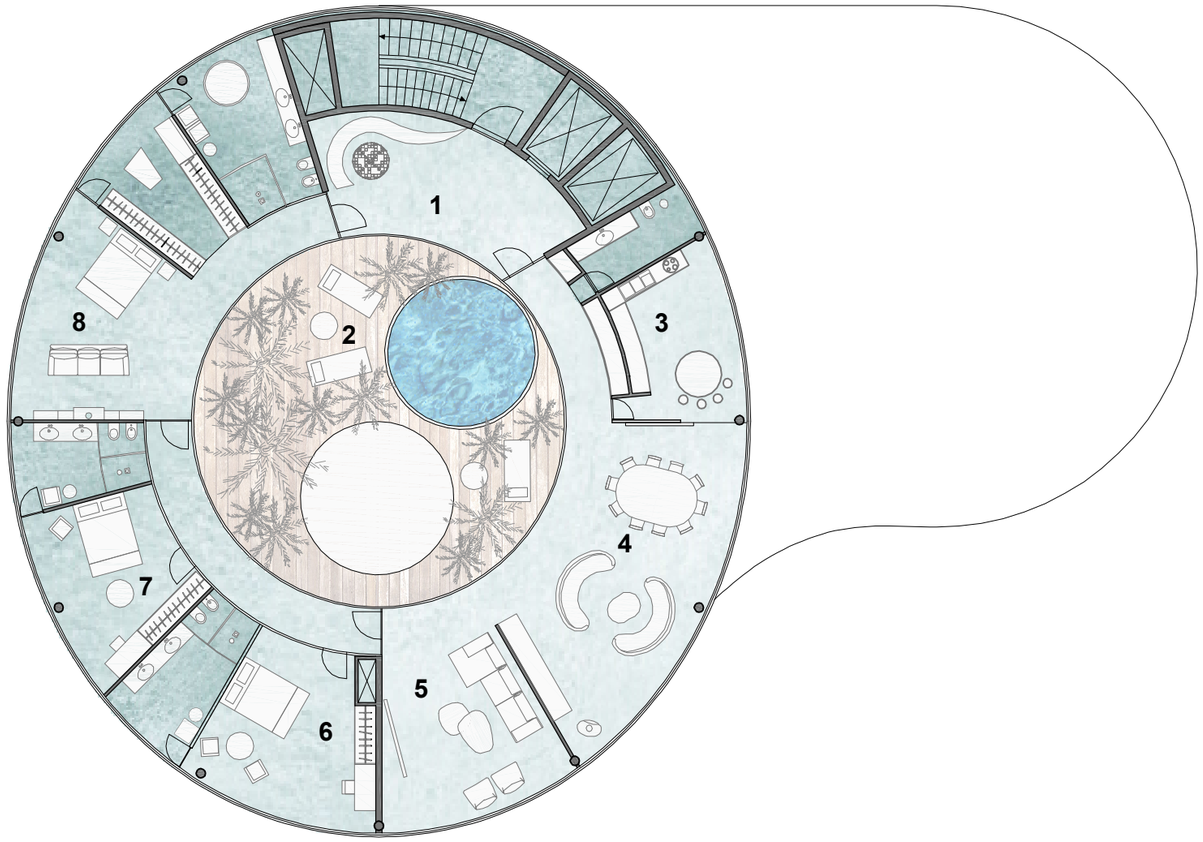
Seventh Floor

1 Hall
2 Priv. Gym / SPA
3 Priv. Terrace
4 Dressing room Woman
5 Dressing room Men
6 Massage
7 Classes
8 Gym
9 SPA
10 Technical plant
11 Water treatment plant



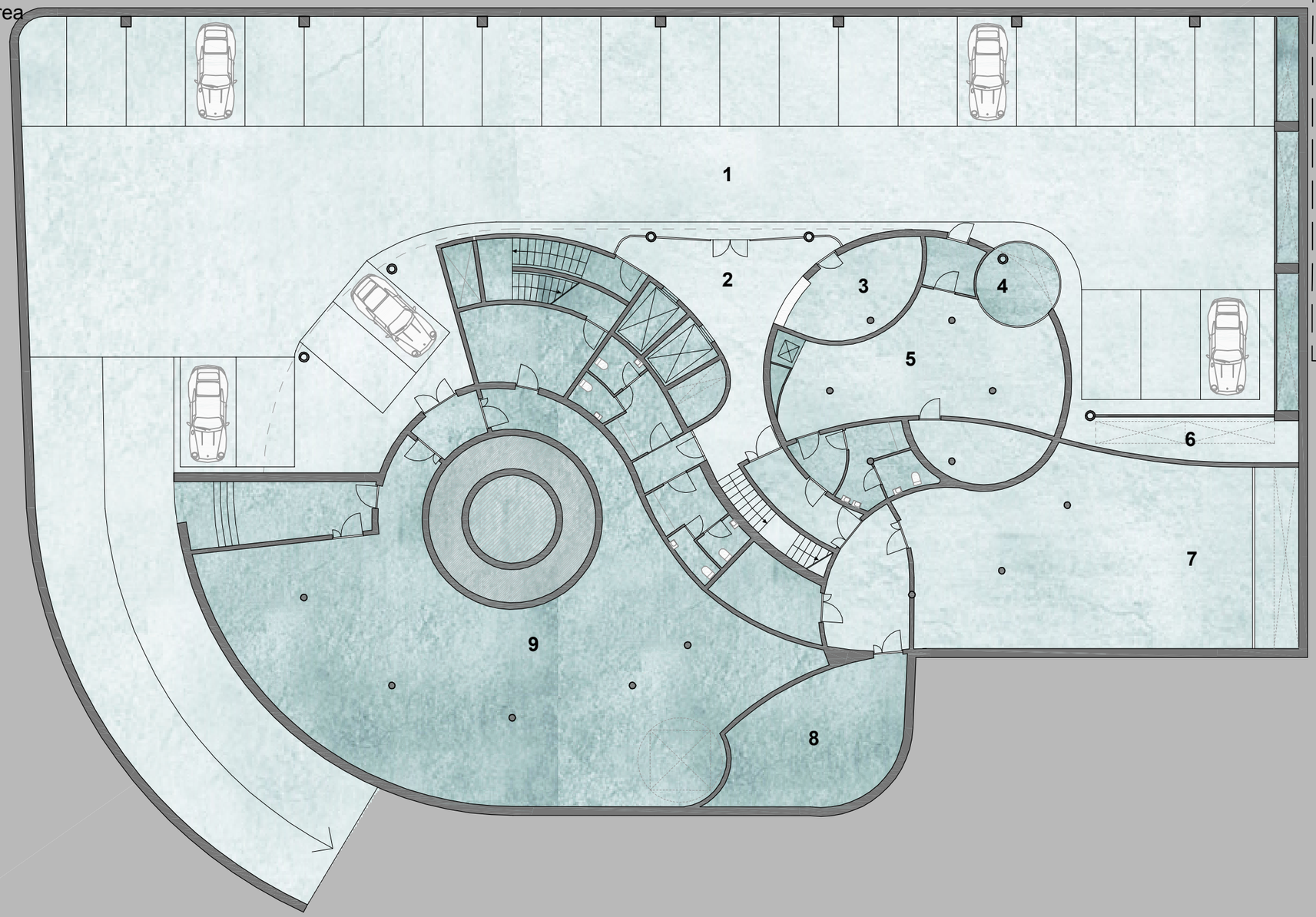
Eighth Floor: Gym / Spa Area

1 Hall
2 Winter garden
3 Kitchen
4 Living room
5 TV room
6 Bedroom 1
7 Bedroom 2
8 Master Bedroom



Ninth Floor: Penthouse

1 Underground parking
2 Lobby Lift Stair
3 Security
4 Ventilation
5 Bar restaurant kitchen
6 Ventilation
7 Archive and storage area
8 Server room
9 Technical area



Underground



Section

6

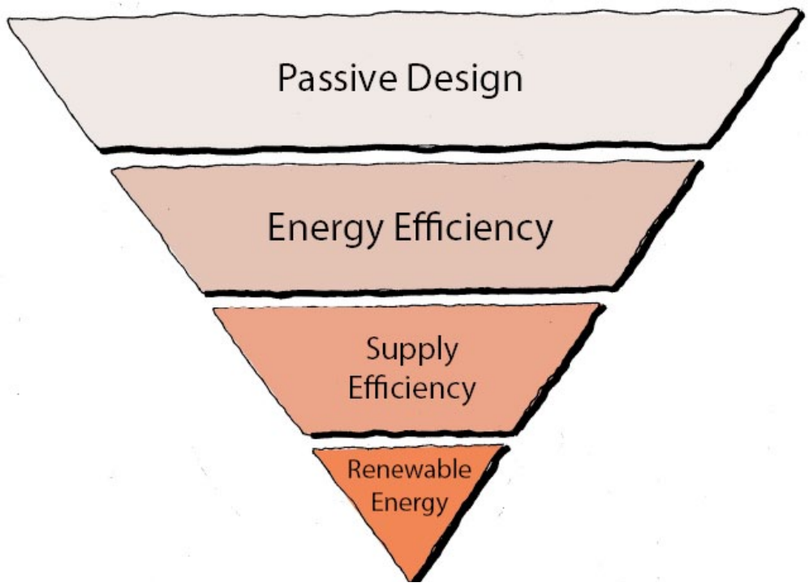
Environmental Strategy

6.1

The proposed headquarter building is designed to minimise its own energy demand through a variety of lean design techniques. The ‘Energy Hierachy’ diagram shows the process by which we will achieve this aim beginning with consideration of building form and passive design issues and then targetting maximum efficiency of systems.

The building form is optimised to respond to the external climate and built environment. Principally these factors will affect the orientation and fabric properties as well as the potential for daylight access. Shown at the top of the hierachy pyramid,these are the most important factors in reducing energy consumption on the path to Carbon Neutrality.
The next part of the chain is to optimising system selections of both mechanical services, controls, setpoints and lighting. This will have a next major influence on the energy performance of the building.

These ‘lean design’ techniques will reduce the carbon emissions associated with energy use to a much lower level. At this stage, no renewable energy technology has been included into the basic proposal. Nevertheless, by reducing the building energy demands in the first instance through lean design the requirement for renewable energy generation is minimised. As a result, the proposed strategy makes the use of renewables very viable. The building may achieve carbon neutrality status with very little extra costs. A building is carbon neutral when the energy for building operation is matched annually by an equal amount of renewable energy generation and/or carbon emissions reductions. All the remaining energy required will be generated either on site or off site from renewable energy systems so that overall Carbon Neutrality is achieved. This reduces the buildings overall energy burden, its running costs and is a key parameter in a broad approach to sustainability.



A comfortable office space

6.2



Comfortable working conditions will be achiveved within the proposed building in an energy efficient manner.
Daylighting, appropriate fabric properties and energy efficient heting and ventilation systems will be used to ensure that the effects of the cold external environment do not place too heavy an energy burden on the building. These measures count as passive design as illustrated previously and work in harmony with the requirement to provide a comfortable and engaging workplace.
The key factors to reduce energy consumption provide comfort:

• The building form and fabric can be optimised not only to improve comfort conditions but also have a significant impact on reducing energy use and associated carbon emissions.

Other factors that can have an effect on comfort are:

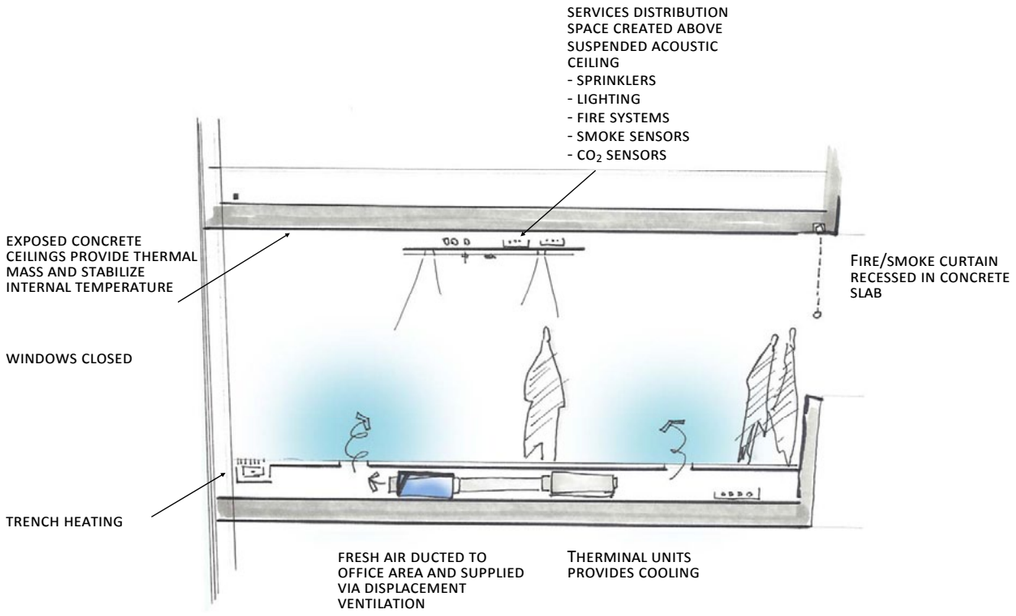
• Daylight and glare.
• Artificial lighting: intensity of illumination, glare, flicker, colour reproduction.
• Indoor noise: sound level, sound insulation and reverberation time.
• Outdoor noise: noise level at surrounding areas.
• Outdoor climate: air temperature, solar radiation, wind speed.
• Thermal indoor climate: air temperature, temperature of surfaces, air speed and humidity.
• Air quality: includes odour, volatile organic compounds (VOCs), micro-organisms (mould, bacteria, virus etc), fibres, dust, radon, and humidity.

Office Ventilation

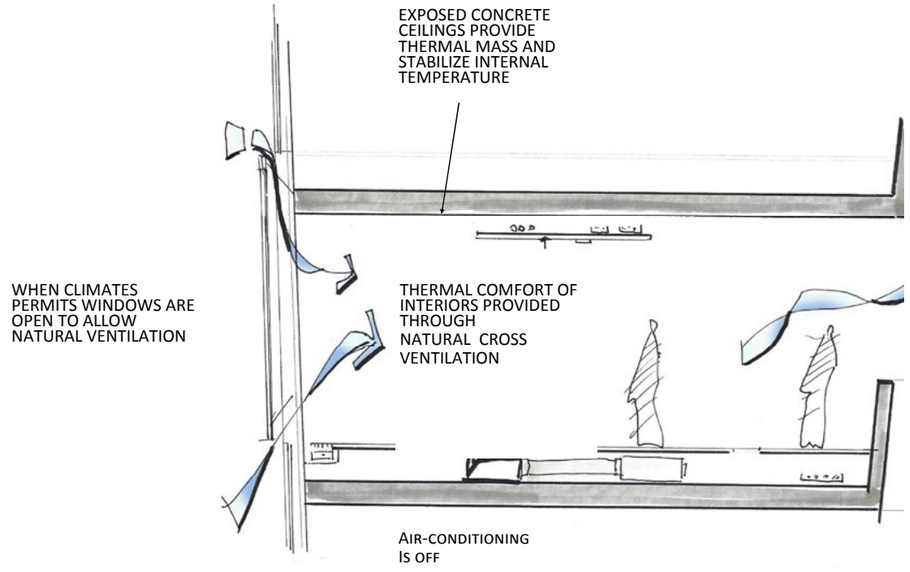
Low Energy Cooling/Heating Systems
Various mechanical air systems were considered during the development of the ventilation strategy for proposed building. Amongst these, we believe that an underfllloor supply system with fan assisted terminal units could be the most appropriate system to provide comfort whilst saving energy.

It is proposed that the offices are air conditioned by using underfloor displacement ventilation system (UDVS). UDVSs are the most energy efficient system to achieve significant energy saving in office buildings while providing very good comfort levels to the indoors. Filtered and temperate fresh air is supplied at very low velocity to office spaces via floor plenum from air handling units located in the plant rooms at basement level. Local terminal units linked with temperature and sensors (locally manaed by occupants) and located within the floor void provide additional cooling or heating to the space. When the air outside is close to ambient temperature it can be used directly for ‘free cooling’ which can be very energy efficient. To further reduce the energy consumption it is proposed that all AHUs will be fitted with energy recovery systems.

When climates permits occupants are allowed to open the facade and allow natural ventilation enter the building. The thermal mass of the exposed concrete ceiling will help stabilizing the internal temperature and therefore achieving better comfort levels while saving energy. In this case, the building management system will automatically shout down the air-conditioning system.



Office levels - Mechanical ventilation mode



Office levels - Natural ventialtion mode

Basement plantrooms - Primary plant rooms will be located within the basement level. The incoming utility services will enter at high level and terminate in separate utility plant rooms.
At this design stage an adequate space has been allocated for the following primary plant:

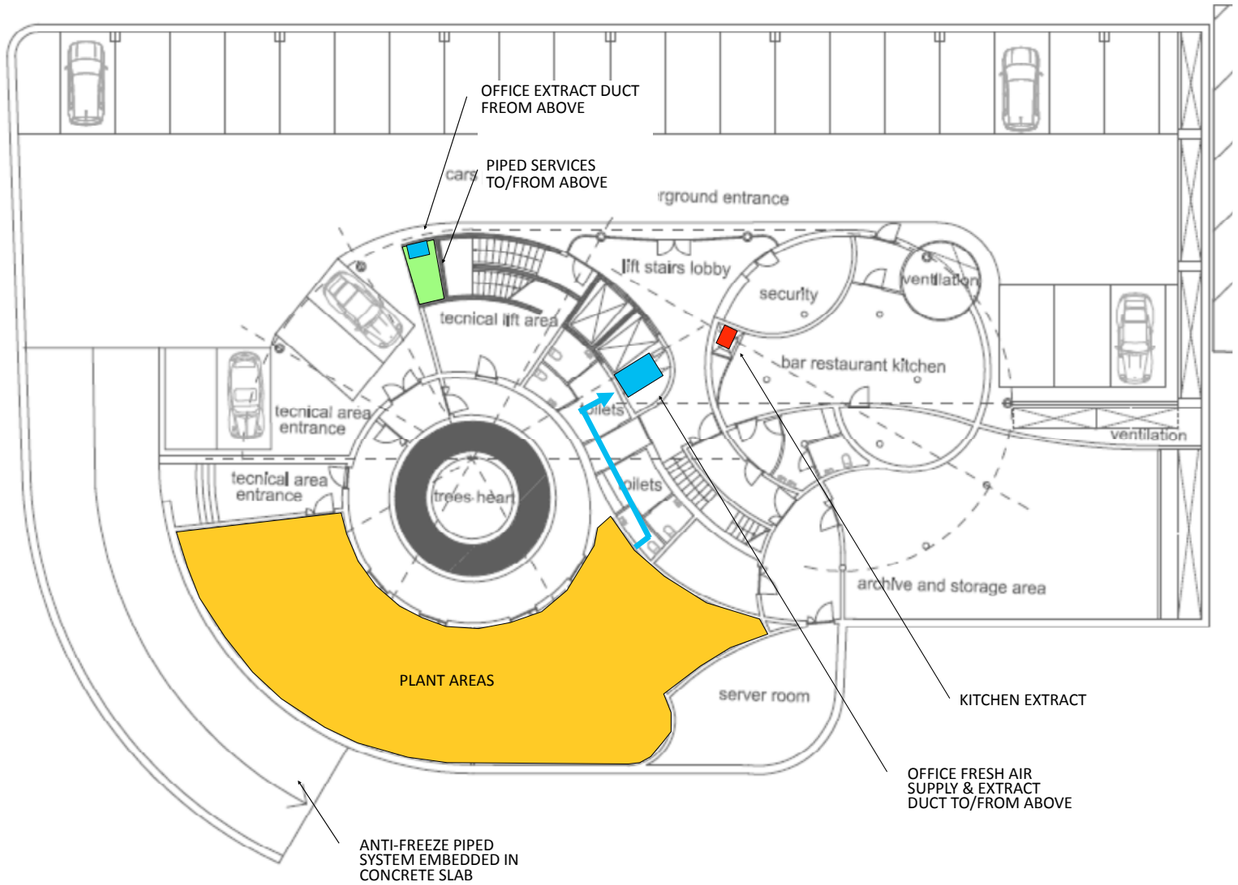
- mechanical air handling units plant rooms;
- round source heat pump system coupled with heat storage;
- domestic hot water heaters and storage plant;
- potable water tanks;
- water recycling plant;
- sprinkler tanks and pump room;
- electrical plant rooms.

At this stage no double height spaces have been considered for the plantroom. In addition it assumed that the car park is naturally ventilated via openings located at ground level. Both the above will be subjects to further investigation during the next design stage. Fresh air will be provided to air handling plants via louvred intake located at ground floor. Air exhaust from ventilation plant rooms will be discharged at ground floor level.

Additional ventilation plant to serve Gym and Spa areas are provided at level located at gym level. Air inlets and outlets are provided along the facade at high level. At the Gym level, further plant rooms are provided: smoke extract ventilation plant serving the building atrium and pool water treatment plant.

Dedicated ventilation plant serving the penthouse levels are located at the roof level. The latter will be protected against the external elements as well as will be completed with acoustic absorbtion systems.

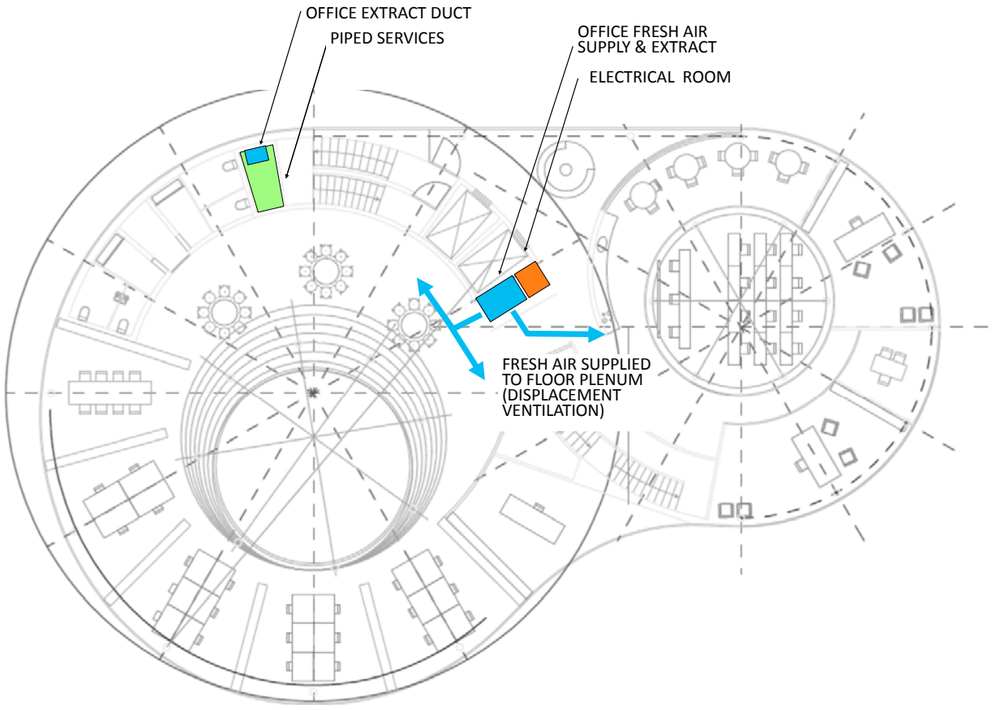
Basement level - Plantrooms and services distribution



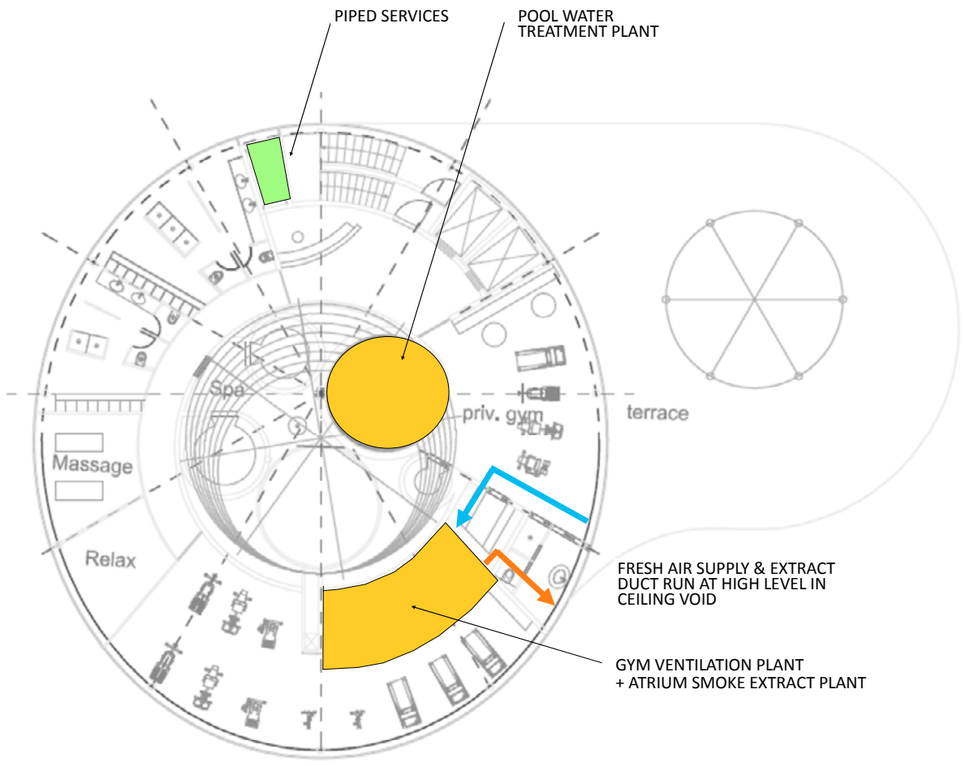
Servicing and Plant Area Strategy

6.5

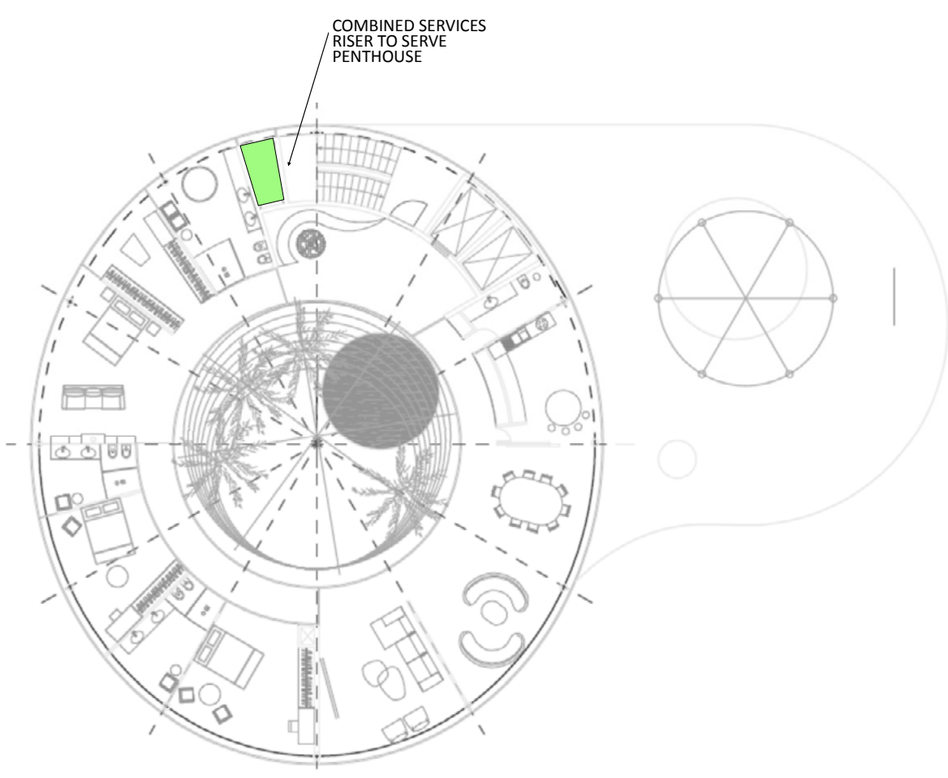
Office levels - Services distribution



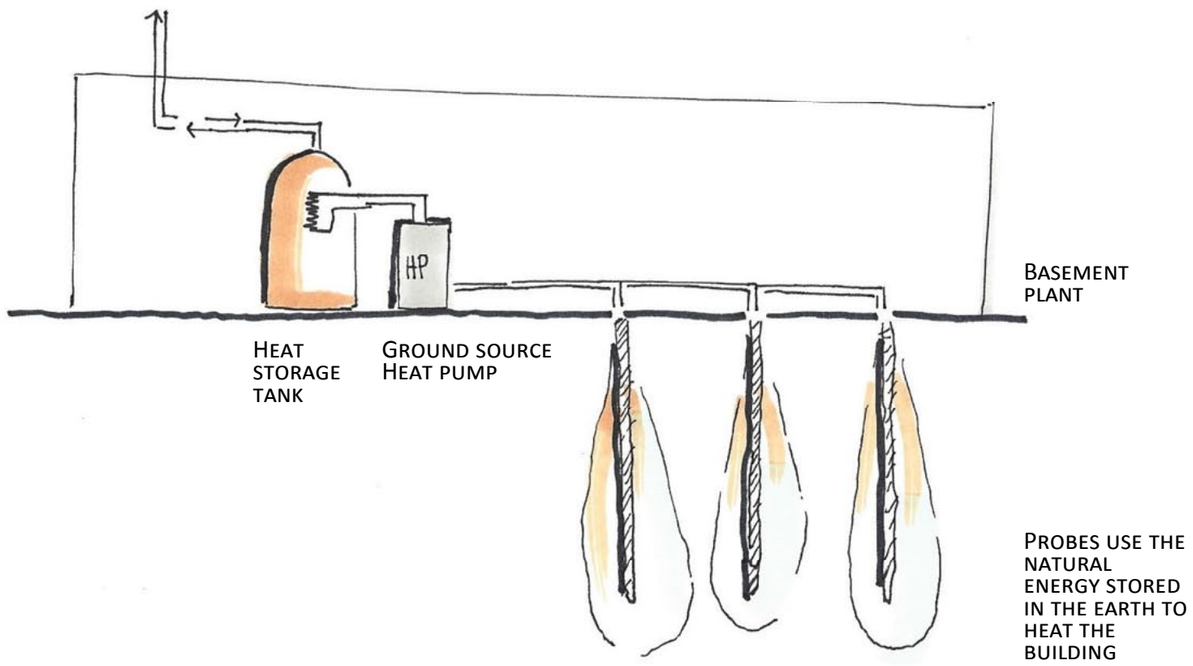
Gym level - Plantrooms & Services distribution



Penthouse level - Services distribution

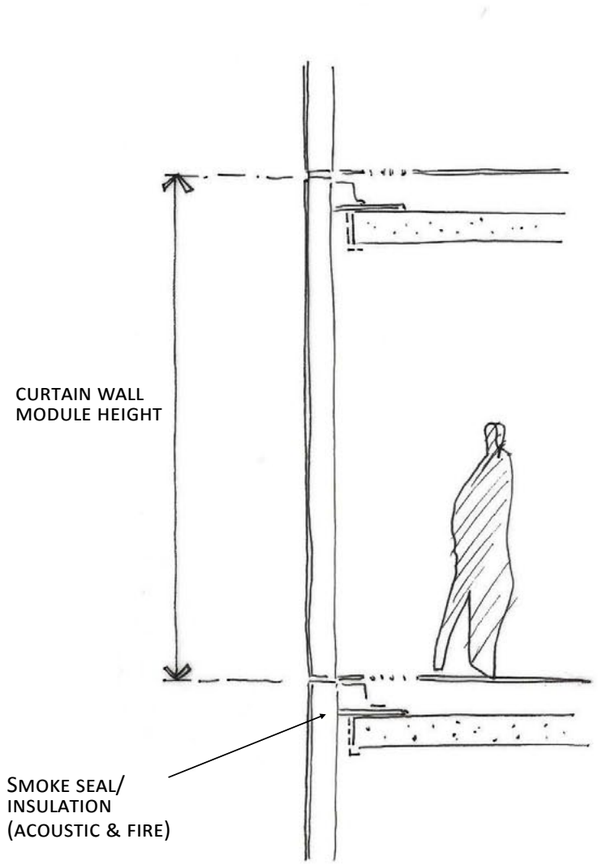


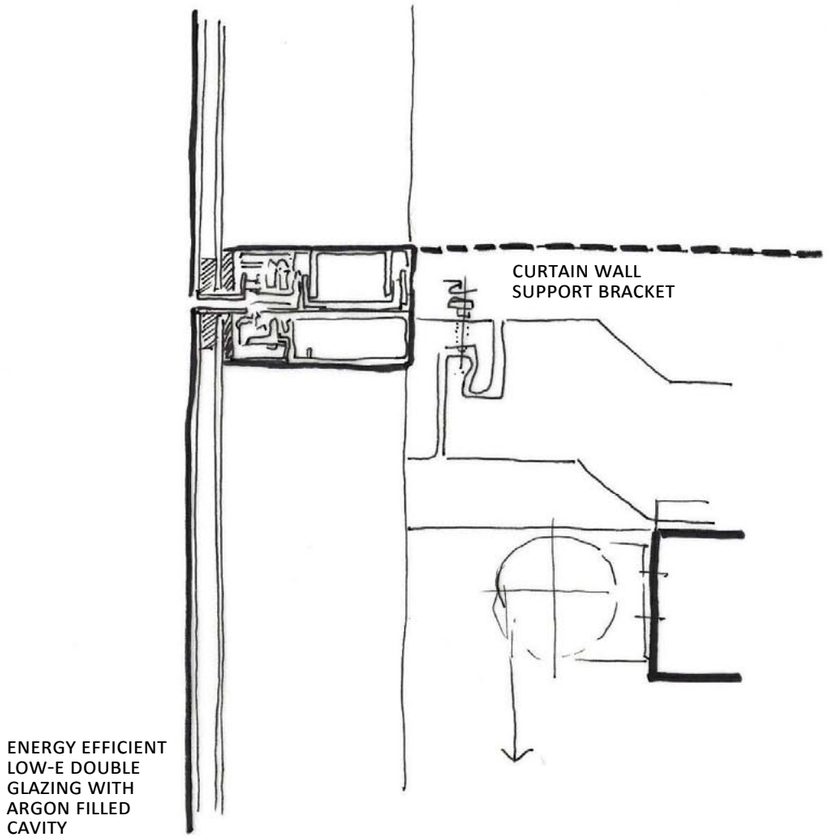
Ground source heat pump sytem couple with heat storage

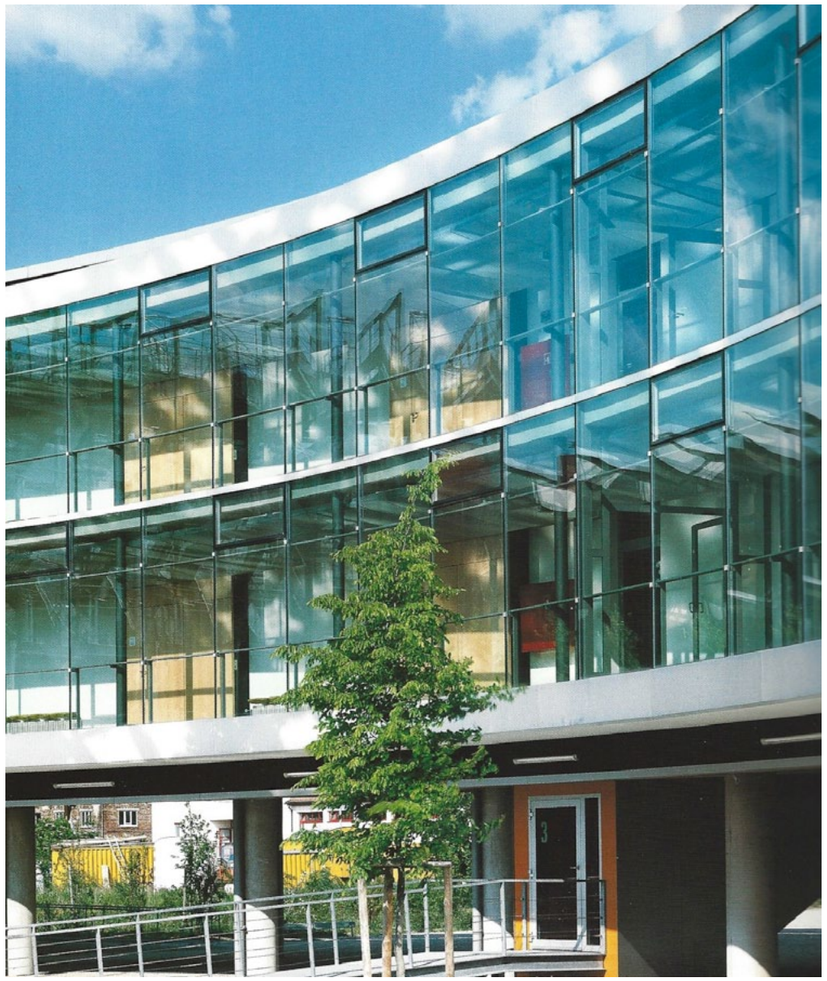


6.7

Based on the priliminary study carried our the concept stage, it is envisaged that the façade will comprise vertical and inclined glass walls on all elevations, consisting of curtain wall system low-e coated high efficient double glazed with argon filled cavities.
The façade units will span full height, floor to floor, and will also incorporate full height double glazed units without any intermediate transoms. The double glazed units will be structurally silicone sealed to an aluminium cassette frame to achieve a flush façade, without the presence of external glazing beads and capping.







Building envelope

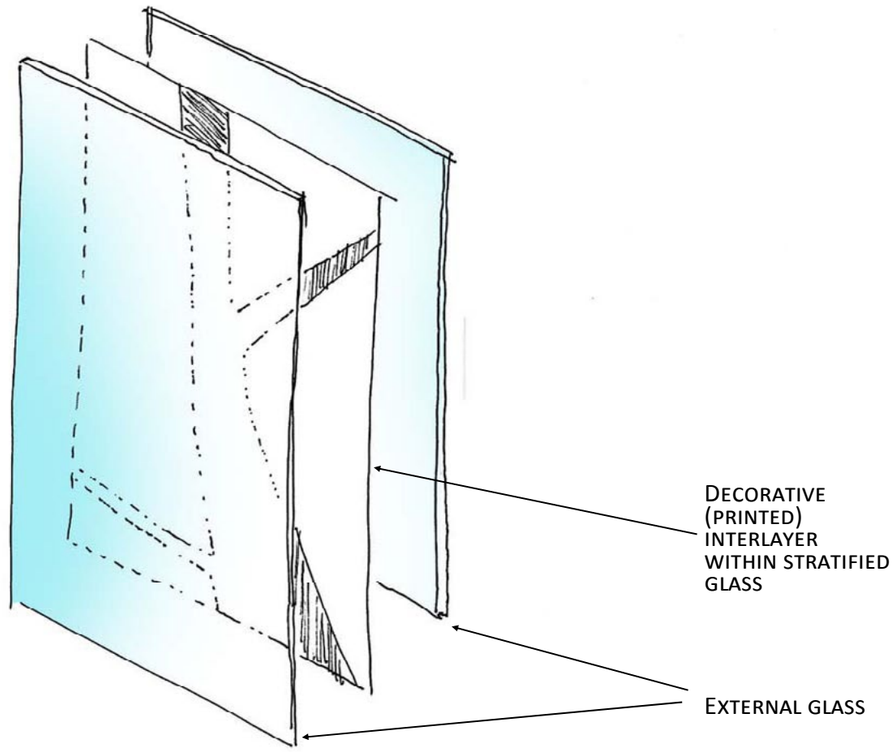
6.8

A printed texure on PVB interlayer (in stratified glass) is envisaged for all the building envelope. The texture will give astrong character to the building while helping reducing glare problem within the office floors.

Proposed building facade with printed texture



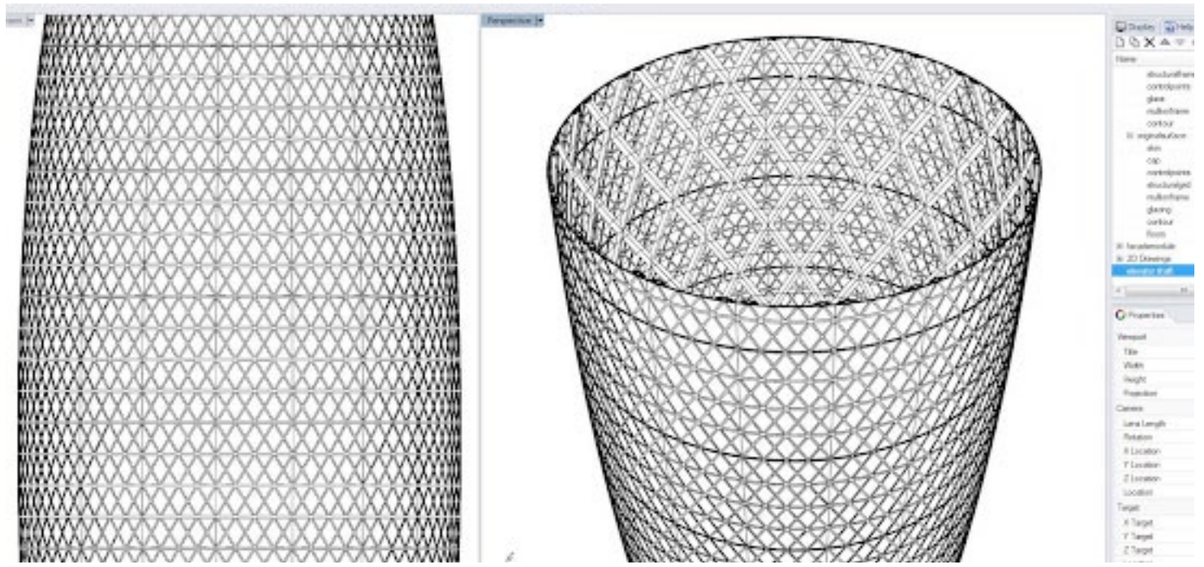
Printed texture on the facade



Facade geometry optimisation - The proposed double curved building will be optizised during next design stages. Based on our previous experience, even complicated geometry may be created by using a very little number of modular elements. This is achievable thanks to the use of specialist computer tools which help us to define an optimum curves and panelisation. Below there a picture taken from a similar envelope study.

As a result the proposed double curved building envelope becames technically and financially feasible.

Building facade panneling study - precedents



cappa+stauber

& Maurizio Trovatelli

Cappa + Stauber Architects
Via Torno 42
22100 Como
Italy
Mob: +39 339 3205364
elke.stauber@cappastauber.com
www.cappastauber.com