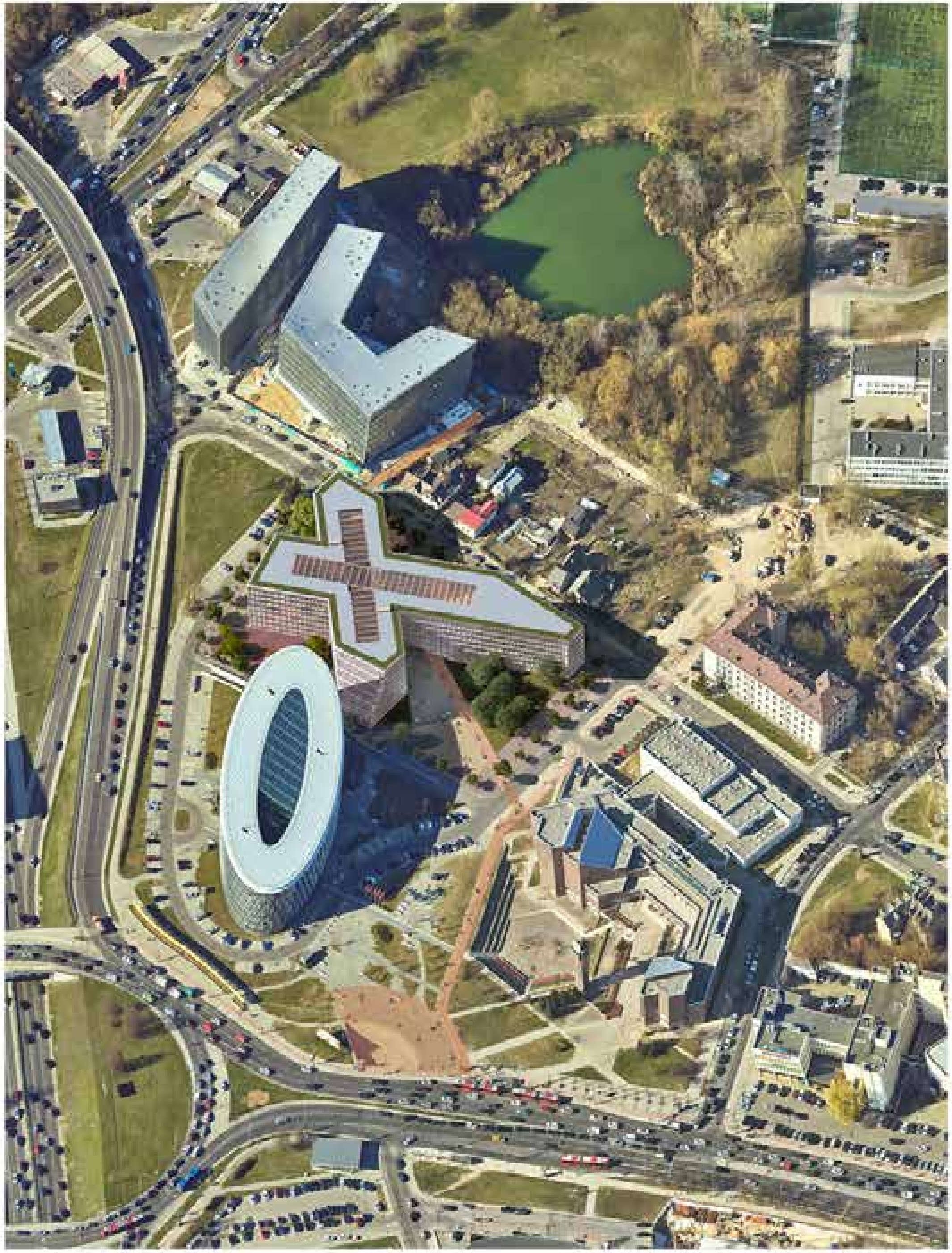
International Invited Design Contest of Business Centre Complex
Lvivo g. 68A, Vilnius

931110

Project X
Explanatory notes

A new business centre for one of Europe's most modern capitals.



Foreword

Project X presents a novel and visually stunning addition to Vilnius' burgeoning Central Business District. Breaking free from the mono-functional mold of 20th century office buildings, its program and activities weave themselves into the fabric of the office park, and surrounding urban context, with a functional and flexible dexterity that also makes space for public activities and future growth. Its attendance to stringent sustainability standards in building materials, and its low carbon footprint, including such strategic measures as its compact column grid (reducing embodied carbon), and highly tuned façade system, will ensure that it achieves BREEAM and Well certifications, and reduce operational costs in the long-term.

This not only attracts A-level tenants, and future buyers, but also generates a kind of urbanity that has multifaceted returns, creating the right mix of conditions and connections that make a space a place, supporting creativity, and vibrancy, as well as enhancing quality of life and the local environs through connections to green networks.

Project X

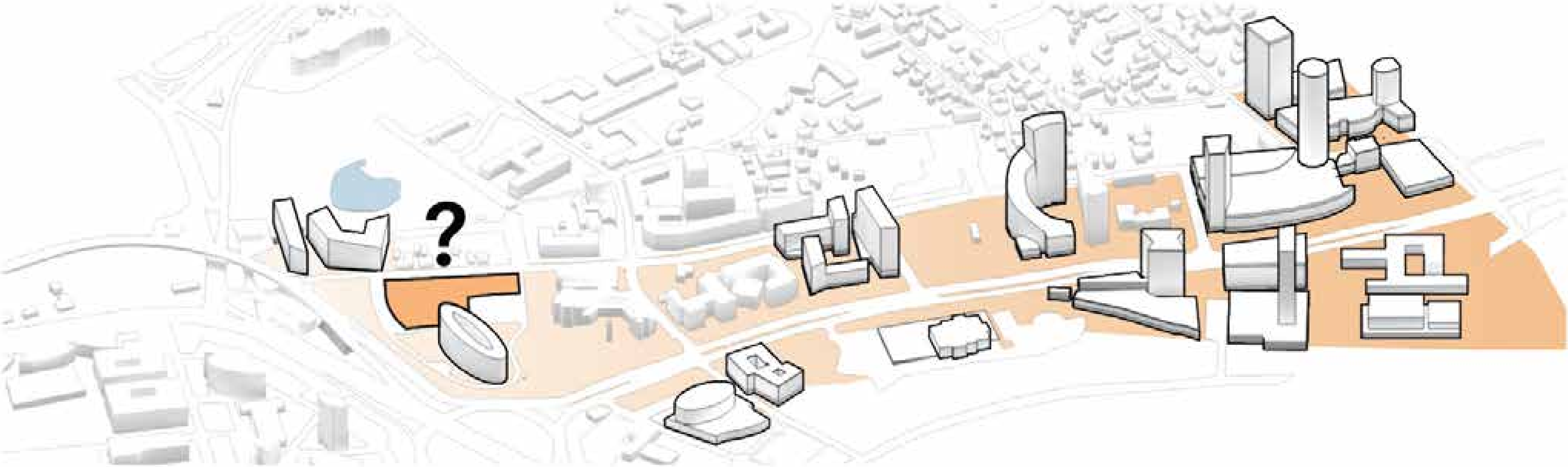
Urban idea

Project X: the CBD’s new place to be
Urban analysis
Ambitions

1

Project X: the CBD's new place to be

A new centre for Western European business, Vilnius' CBD boasts a wide range of quality Class A offices, attracting a range of financial, legal, and tech service providers. Due to the nature of their work, and employees, well-developed infrastructure, in a convenient and amenity-rich location is integral to attracting the talent and clients they require. Buildings that are not only modern, efficient, and environmentally friendly, but also offer a range of program, and high quality, attractive interior environments appealing to the caliber of commercial tenants Vilnius aims to anchor in the district.



Konstitucijos CBD

Urban analysis

Integration in the context

Creating a strong sense of place requires environmental and human-scale integration into the area’s rich natural context. Maintaining sight lines ensures orientation, while retaining and enhancing physical connections to the city, and public areas, including the Japanese garden in the north, engenders convenience, and activity.

Generating green connections

Connections also facilitate the continuity of the city’s green pathway system, and in complement, biodiversity, animal habitat, and natural air purification systems, while ensuring convenience and accommodating alternative, slow-mobility transport.

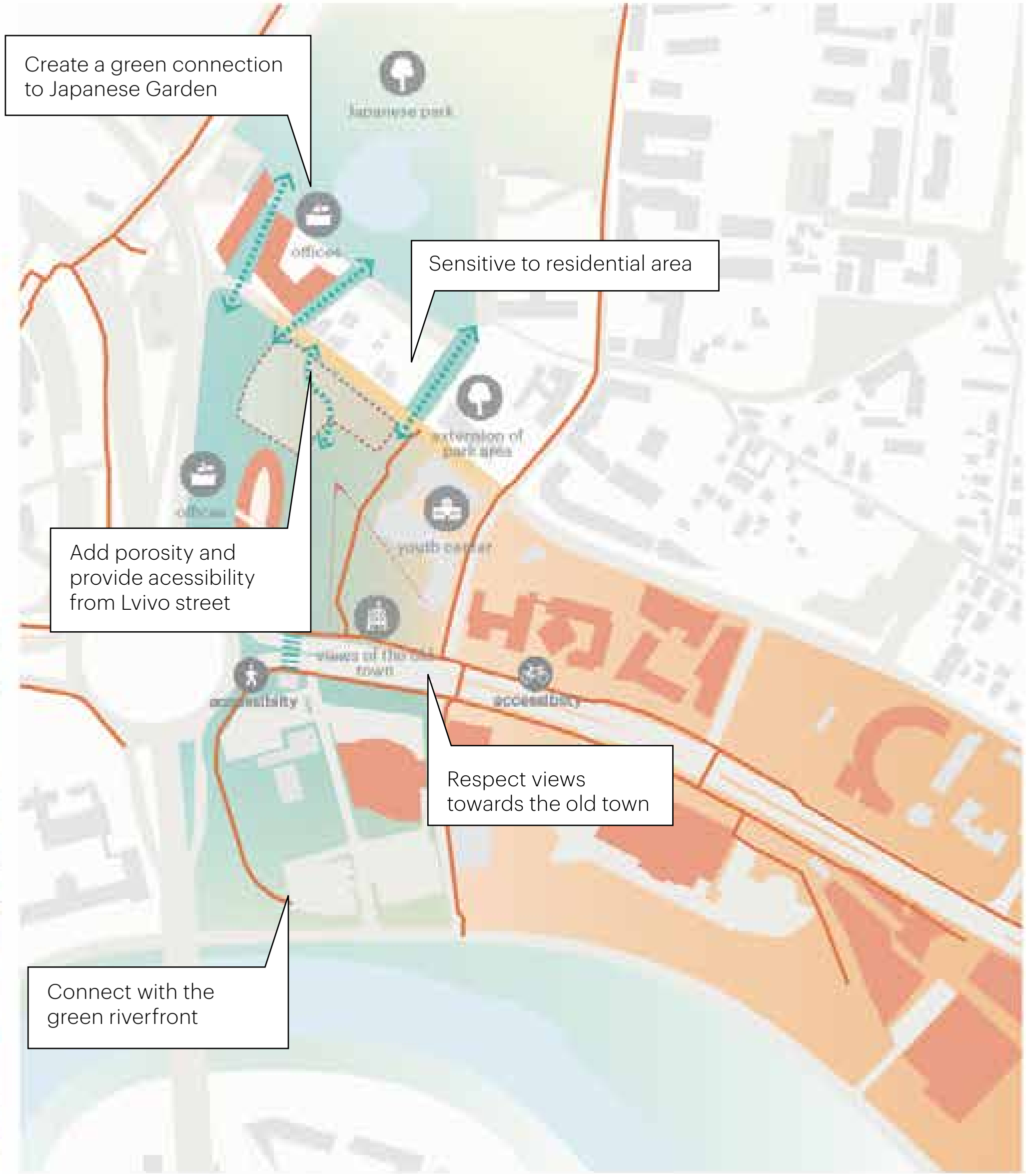
“Vilnius is going green: We envision a new business center that will contribute to it by adding new public spaces and promoting green connections in the city.”


Strong pedestrian networks


Strong connections to major infrastructure


Strong vehicular networks


Strong pedestrian networks below ground



Ambitions

Strengthening Vilnius' central business district to complement the richness of the old city, and further attract people, support activities, and create a sense of place also requires a carefully articulated urban realm that capitalizes on the city of Vilnius' greatest assets: its people, its natural green beauty, and its proclivity for business innovation.

1 Sustainable

2 Integrated

3 Connected

4 Place-making

5 Innovative and adaptable

6 Realistic and buildable

Sustainable
By integrating sustainability at the onset of the process, the design will ensure integrated proposal for a healthier and greener development.

Integrated
Environmentally and people-friendly integration of the design into the existing context, anchoring the building in its environment by maintaining existing views and sightlines.

Connected
Retaining existing links and offering new public connections to the city and public areas as the planes Japanese garden in the north.

Place-making
Through programmatic diversity and a holistic approach to accessibility, the new business centre can create attractive public and commercial spaces that make the area a focal point.

Innovative and adaptable
A future proof design provides originality, innovation, and adaptability in its functional layout, creating an enduring building, and ensuring return on investment.

Realistic and buildable
The design benefits from local building practices and resources to ensure a seamless construction, with standardized components, while introducing both new and demonstrated technologies, aiming for best value for money, within economic means.

Architectural idea

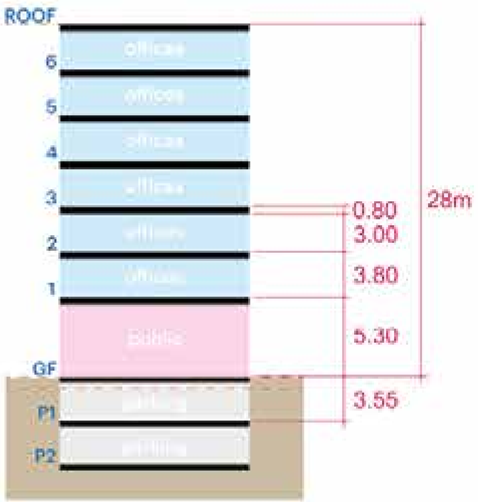
Intensity of the plot
Step story
Panorama photos
Landscape
Facade strategy
Intersecting atrium

2

Intensity of the plot

Generous floor to ceiling heights on the ground-floor create quality interior environments for a wide range of commercial program; however, this reduces GFA available to dedicate to commercial office spaces. Create a vibrant place to be requires both, and merging the offices and public program in the ground floor can generate vibrancy, while also maximizing the use of space, creating a win-win situation.

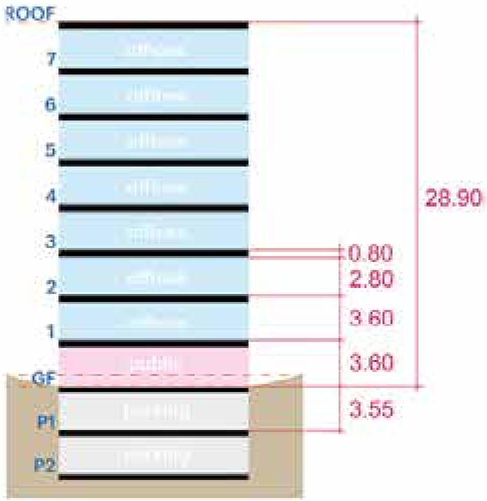
"... the quality of the ground floor facades we pass close by at eye level is particularly important to enhance environmental sustainability, enrich the quality of life and promote equity and social inclusion."
– Dr. Joan Clos, UN-Habitat



7 floors
h: 3.8 m office
h: 5.3 m ground floor

Pros:
Better performance (class AA+, Breeam)

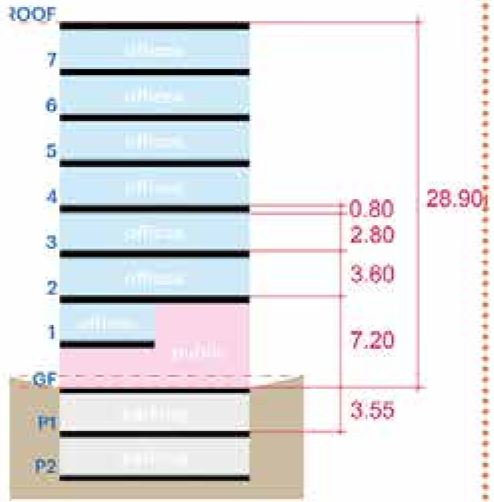
Cons:
Does not reach full intensity (3.5) area



8 floors - Lowered Ground
h: 3.6 m office
h: 3.6 m ground floor

Pros:
Added area (towards 3.5 intensity)
Better overall efficiency

Cons:
Worse performance Breeam



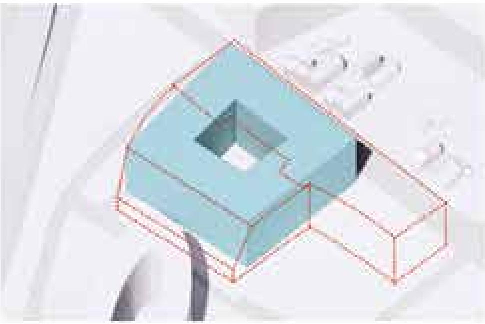
8 floors - Double Height
h: 3.6 m office
h: 3.6/7.2 m ground floor

Pros:
Added area (towards 3.5 intensity)
Better efficiency

Cons:
Larger ratio of public program
Offices on ground floor

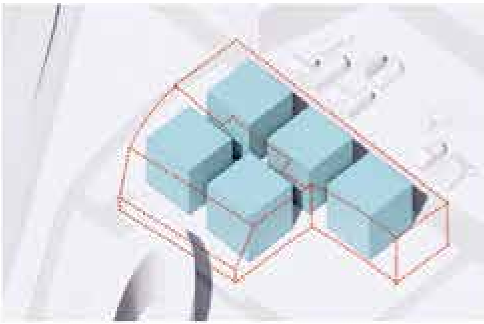
selected direction

Intensity of the plot



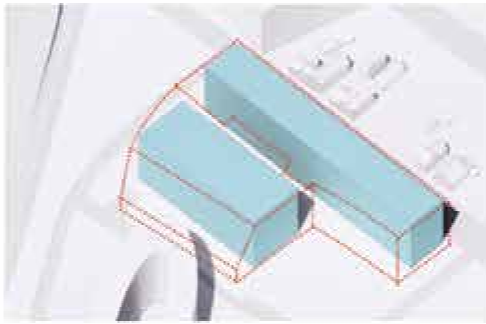
7 Floors
GFA = 26,688 m²
UFA = 22.684 m²
Intensity = 2.87

8 Floors
GFA = 30.501 m²
UFA = 25.926 m²
Intensity = 3.28



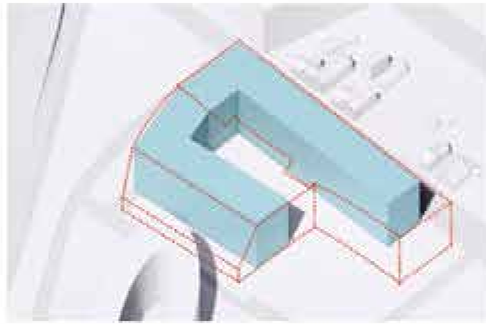
7 Floors
GFA = 21,875 m²
UFA = 18.593 m²
Intensity = 2.35

8 Floors
GFA = 25.000 m²
UFA = 21.250 m²
Intensity = 2.68



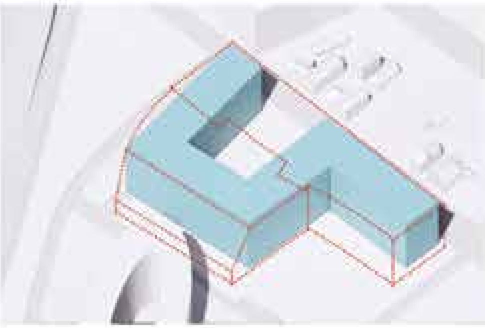
7 Floors
GFA = 27,547 m²
UFA = 23.414 m²
Intensity = 2.95

8 Floors
GFA = 31.482 m²
UFA = 26.759 m²
Intensity = 3.38



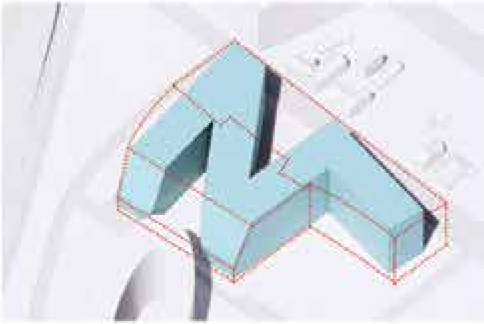
7 Floors
GFA = 25,892 m²
UFA = 22.008 m²
Intensity = 2.78

8 Floors
GFA = 29.591 m²
UFA = 25.152 m²
Intensity = 3.18



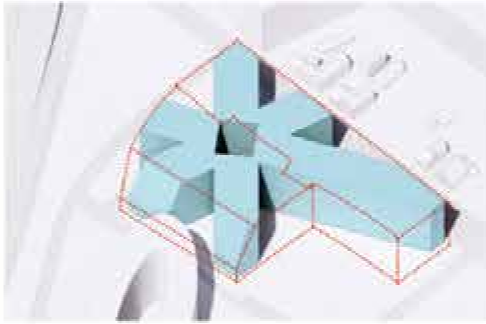
7 Floors
GFA = 26,620 m²
UFA = 22.627 m²
Intensity = 2.86

8 Floors
GFA = 30.422 m²
UFA = 25.858 m²
Intensity = 3.26



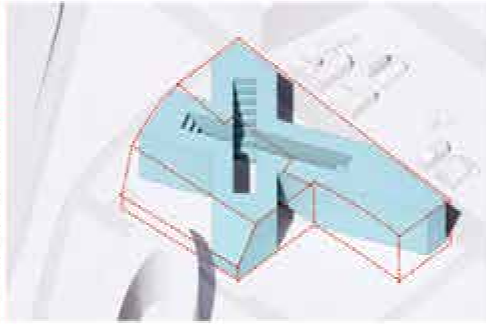
7 Floors
GFA = 28,877 m²
UFA = 24.545 m²
Intensity = 3.10

8 Floors
GFA = 32.497 m²
UFA = 27.622 m²
Intensity = 3.49



7 Floors
GFA = 29,922 m²
UFA = 25.433 m²
Intensity = 3.21

8 Floors
GFA = 34.045 m²
UFA = 28.938 m²
Intensity = 3.65



7 Floors
GFA = 27,109 m²
UFA = 23.855 m²
Intensity = 3.02

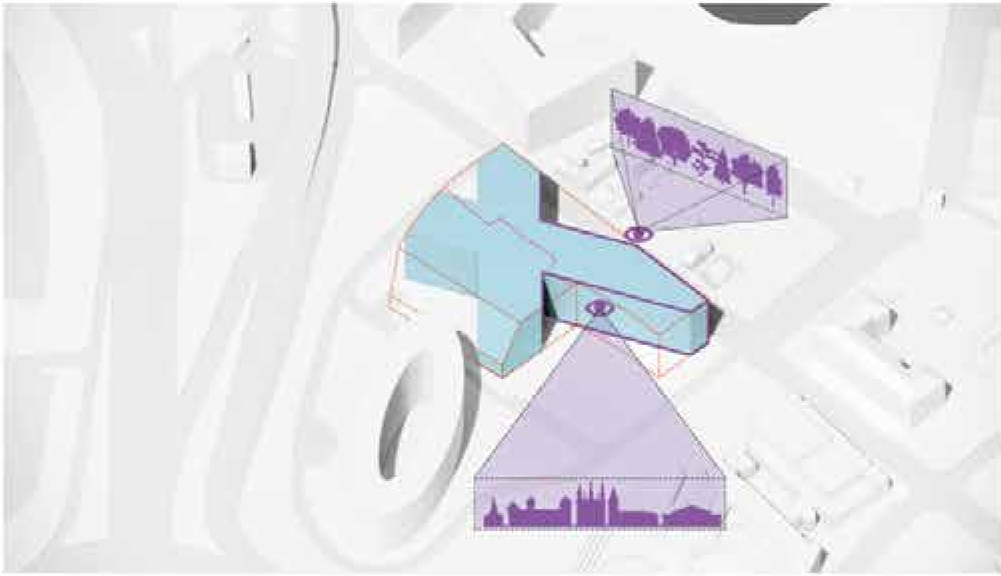
8 Floors
GFA = 31.131 m²
UFA = 27.322 m²
Intensity = 3.45

selected direction

Step story

Rather than creating separate buildings on Lot 1 and Lot 2 respectively, the concept merges two maximum building GFAs in a single form to generate a multitude of spatial, programmatic, and functional outcomes. This solution creates new possibilities for site coverage and focuses intensity and density within a distributed, but coherent form. This facilitates a range of leasing models – supporting a multi-tenant strategy - and attracts diverse user groups with greater potential for a broadened program offer. It also generates "pocket" environments within the building creases immediate landscape, as well as connections to the wider urban environment, further activating the surroundings and creating a robust sense of place.

1 Determine maximum building envelope for the two plots

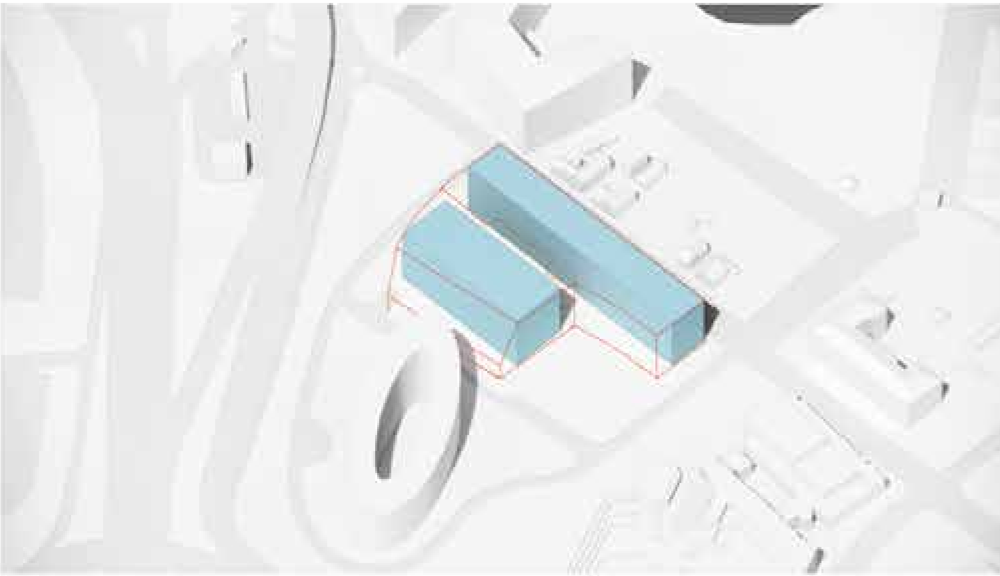


4 Enhance views

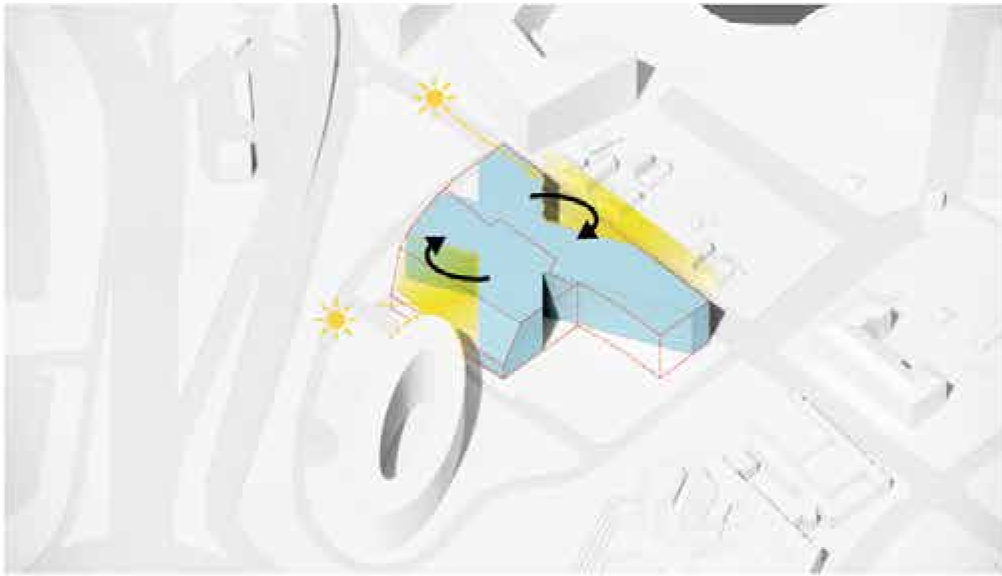
Building form
Business Centre Lvivo's multifaceted X-form embraces its surroundings at multiple vantage points, drawing strong urban connections at a human scale, as well as visual and mobility connections at a city scale. At once a part of the office park context, and a distinct building form within it, its volume height steps down from the hill of surrounding buildings to complete the skyline, while offering a new kind of building personality within the CBD. It fits in with the textures and qualities but also steps out with a form that invites interest and activity. A stretched "x-form" with external creases that naturally frame a variety of pockets of public spaces, its folding façade creates decisive connections between building program and the urban realm.

Building program
Public plinth programming that combines existing residential area and commercial needs activates the urban realm, ascribing distinct qualities and activities to each outdoor area, and includes such attractions as a conference centre, gym, and food and beverage purveyors. Plinth programming on the southeast corner of the building facing the children's playground activates this sunny green pocket with terraces flowing out of ground-floor hospitality establishments, generating liveliness and attracting patrons to create a public-park like feel.

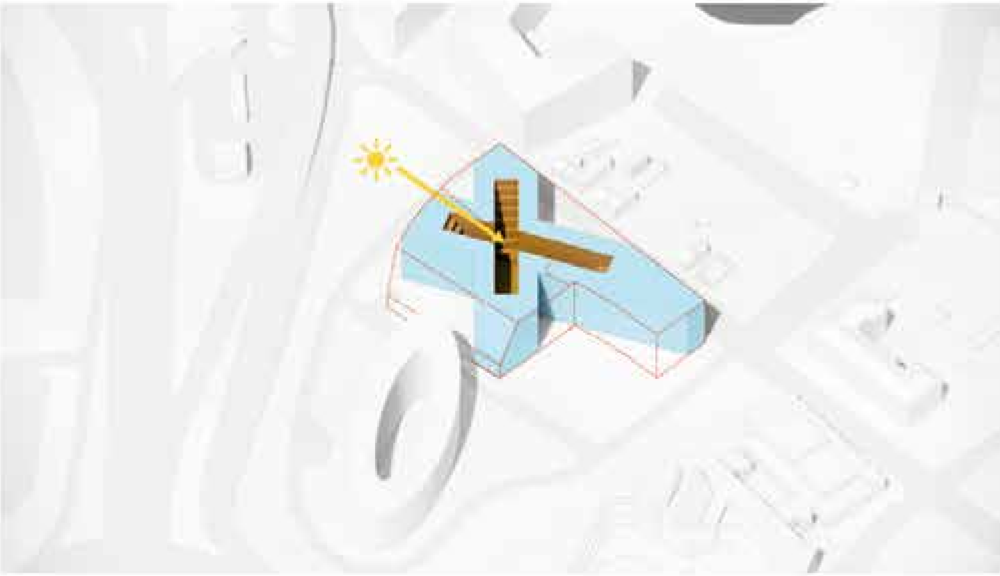
Step story



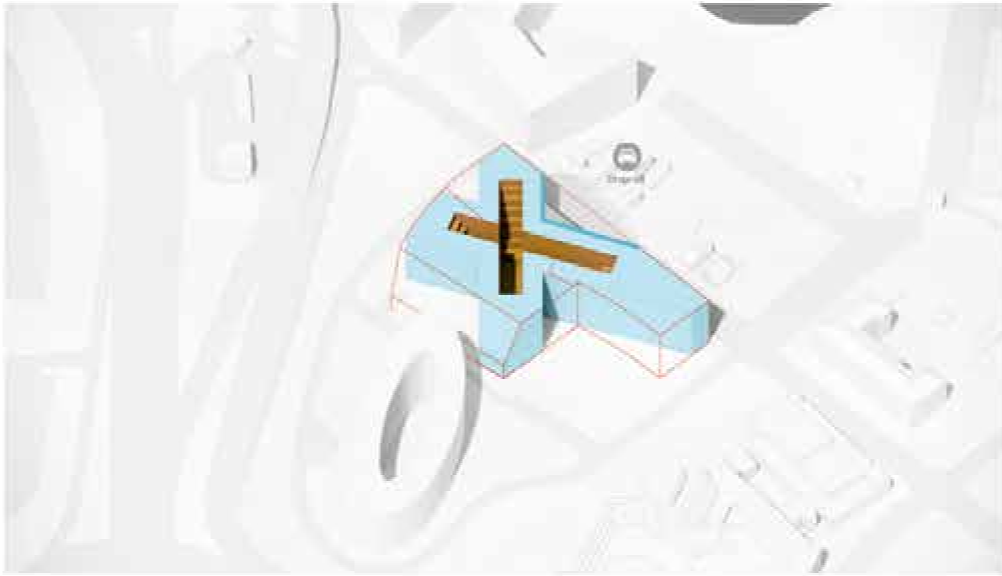
2 Positioning massing of maximum intensity of plot



3 Maximize GFA in one form and enhance daylighting respecting residential area insolation.



5 Insert atrium to reduce depth of floorplate and maximize daylight penetration



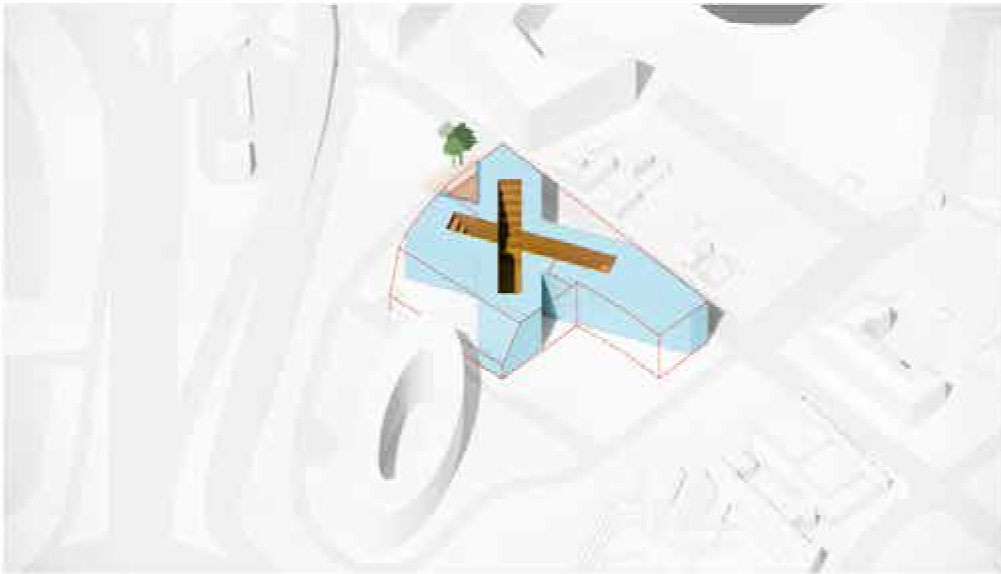
6 Create sheltered pockets, in the north the most urban with drop-off area and access to main lobby.

Step story

Project X's design emphasizes permeability. In as much as perimeter connections to a range of city mobility systems, including transit, cycling, and pedestrian paths make this building accessible and connected, pathway connections provide access from multiple vantage points. A dominant path stretches across and through the site to the belowground pedestrian corridor drawing a desire line across the site, through the building to the nearby Japanese garden in the north. This generates a new green thread, drawing pedestrians into visual connection with the lively building program, while providing convenient access to a key area attraction, creating public conduits rather than imposing proprietary limitations. Situating the building thus plants it in its urban setting, and into the public life of the city, tightening immediate and wider city threads of connection.

Interior

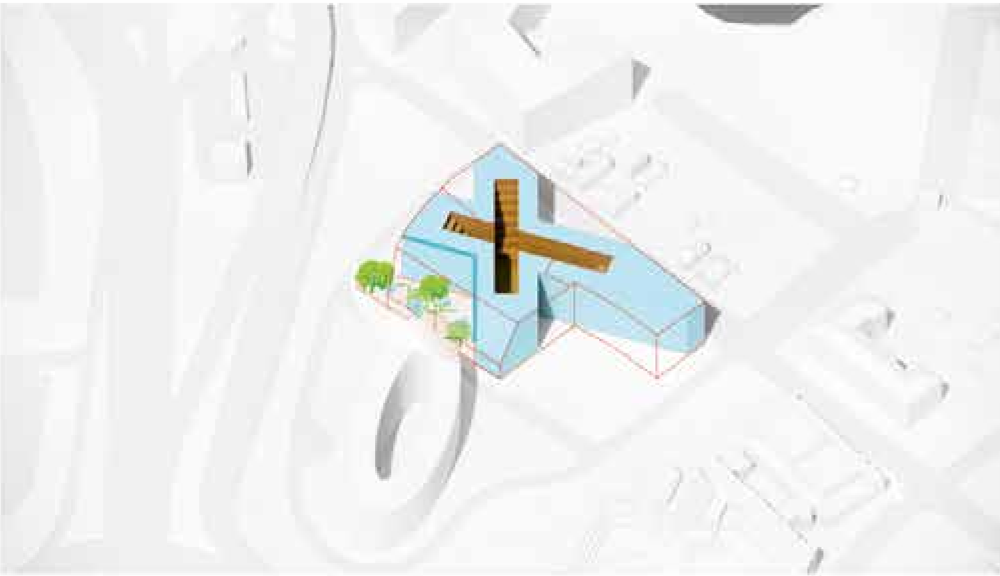
The distributed form generates four building wings, and each have an articulated theme (social wing, meeting wing, lookout wing, green wing), occupancy, and finishing materiality that defines the nature of activities that they support, and the features they contribute to the total building presentation.



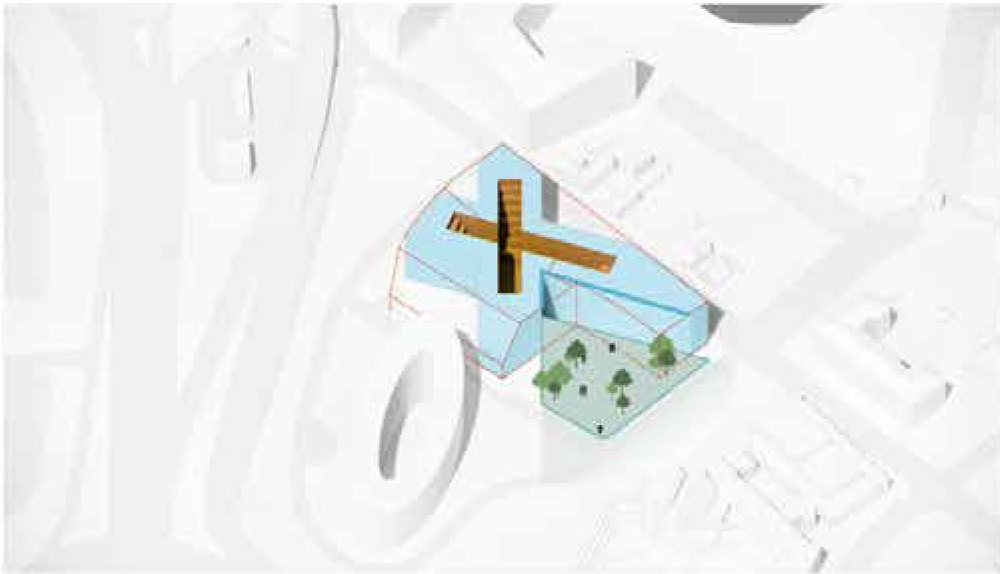
7 Pocket of trees to reduce traffic noise from highway

10 The passage through the building and below atrium emphasizes landscape-building connection.

Step story



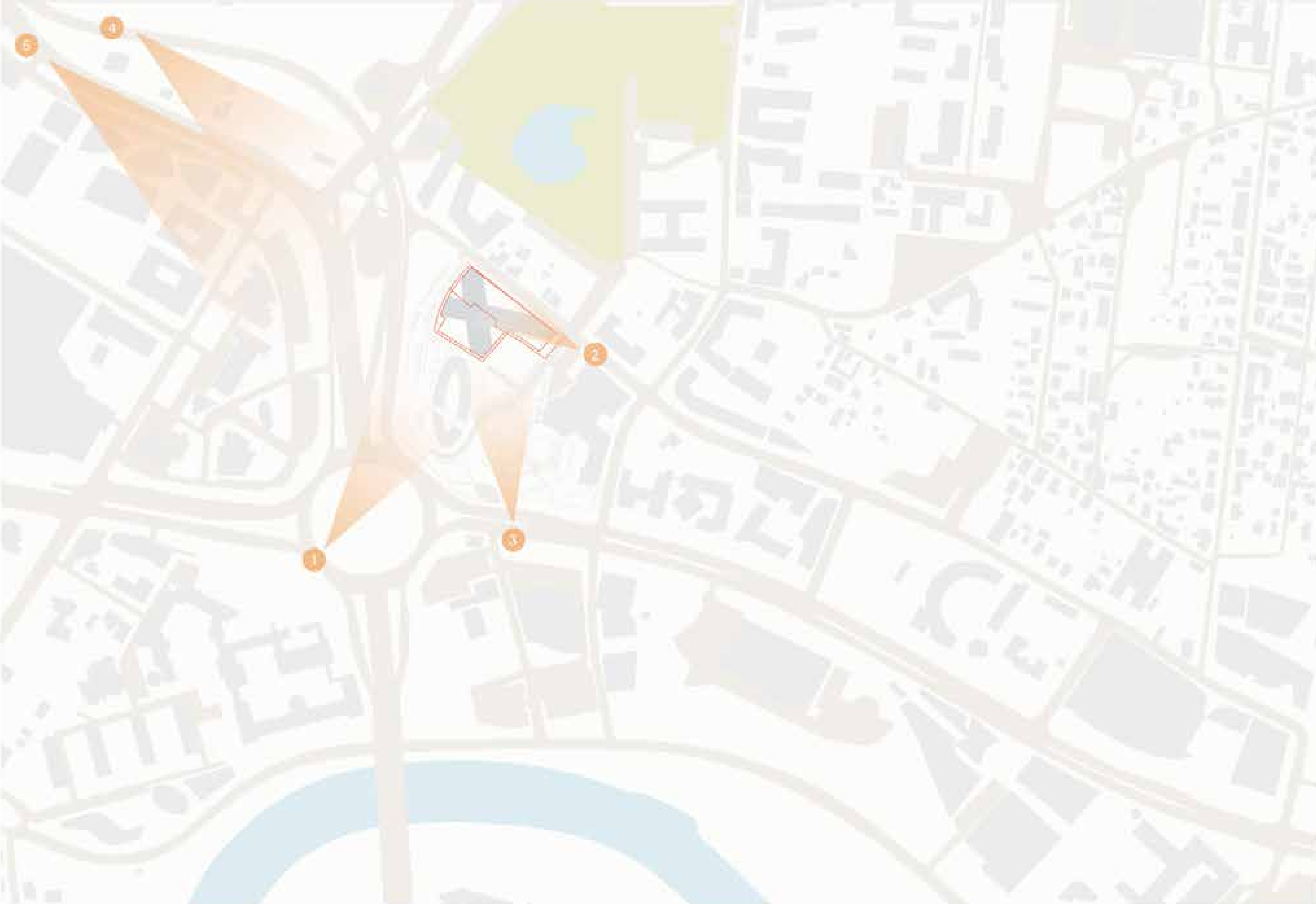
8 Pocket for wetlands and water collection



9 The social pocket accommodates outdoor terraces and children's play area

11 The public connection to the city and public areas including the Japanese garden in the north.

12 Project X


1
2
3
4
5

Panorama photos

Panorama photo 01

Panorama photos

Panorama photo 02

Panorama photos

Panorama photo 03

Panorama photos

Panorama photo 04

Panorama photos

Panorama photo 05

Landscape

The building's creased form creates sheltered pockets in the landscape, which in turn celebrate different themes. While strategically integrating drop off and logistical access, the surroundings accommodate outdoor terraces, where they connect with interior food and beverage establishments, an activated public space and children's play area, in connection with the existing play apparatus, as well as an area for wetlands and water collection, and treed areas for noise protection where the site abuts a major roadway. With its creases, the building façade is less barricade and more invitation.
This is not a 'tower in a park', but a building that exists in physical, environmental, and social complement with its landscape. The passage through the building and below the atrium further emphasizes the fluency of this landscape-building connection.

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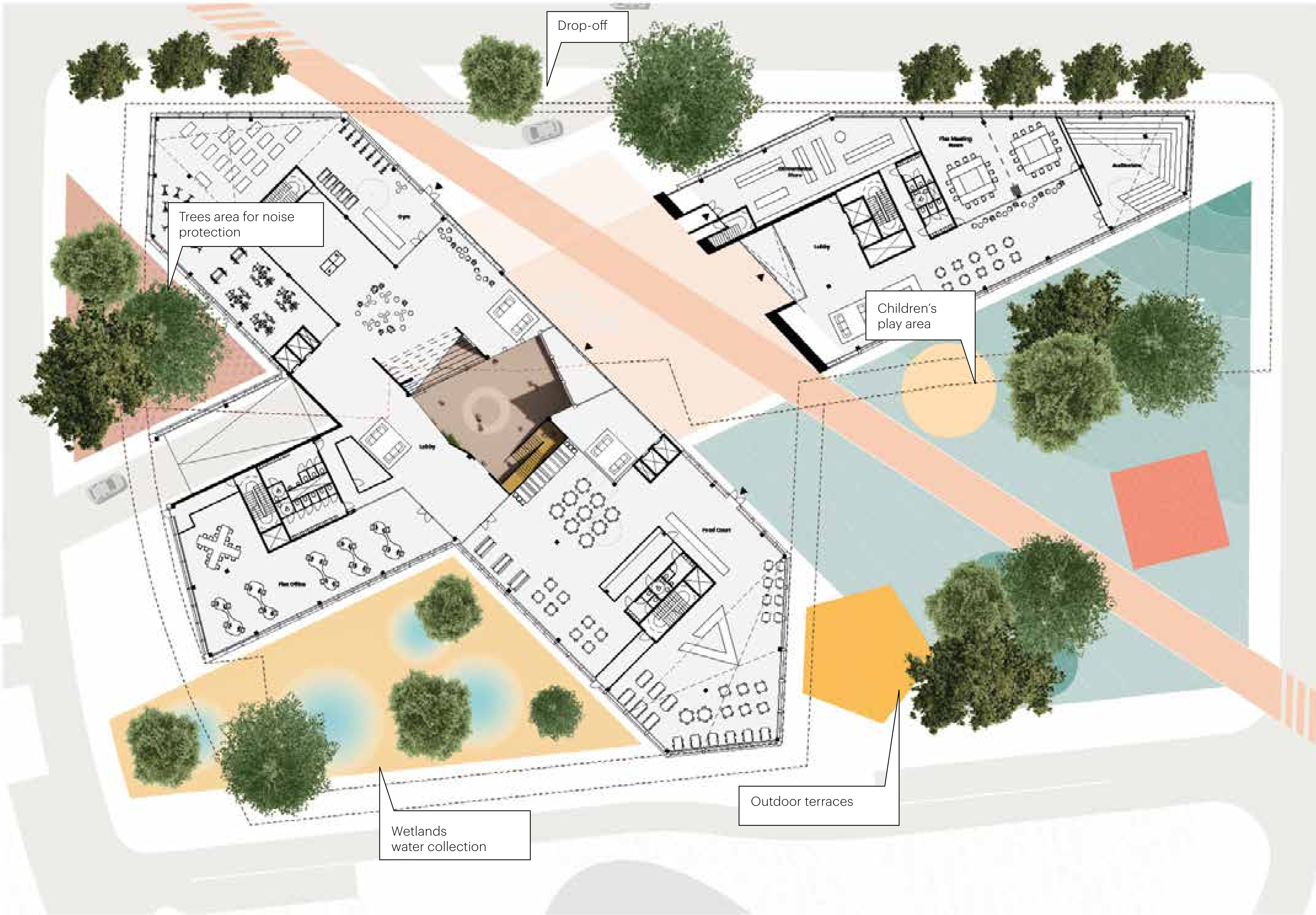
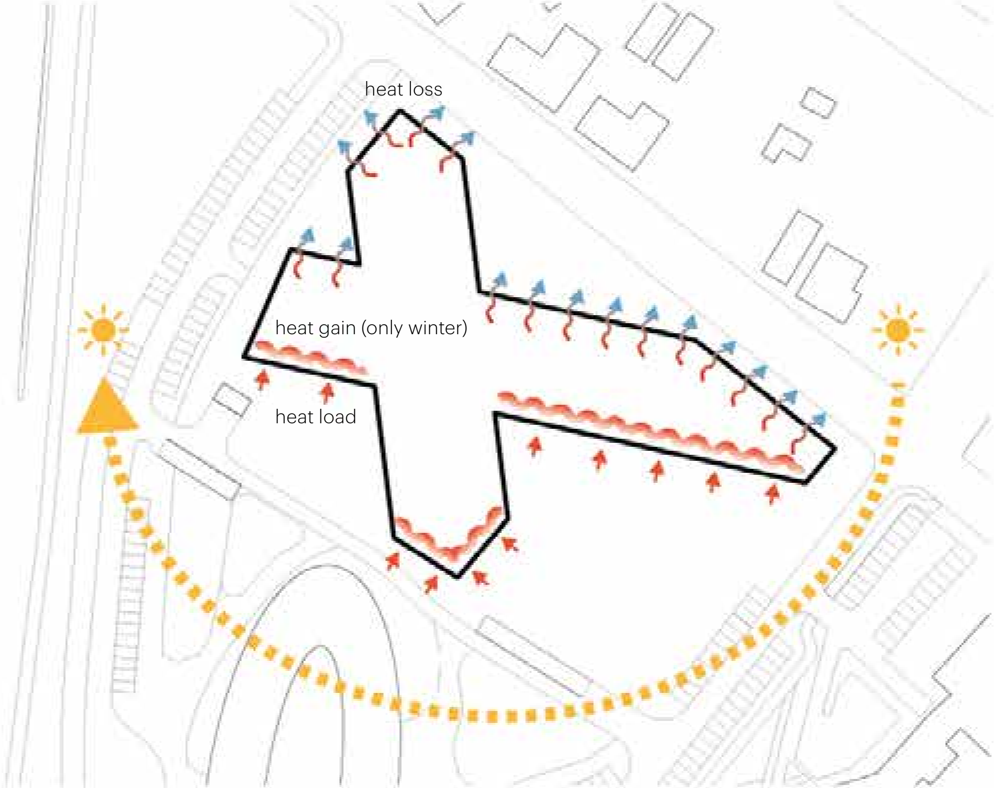
Situation plan


Drop-off
Trees area for noise protection
Children's play area
Outdoor terraces
Wetlands water collection

Façade strategy

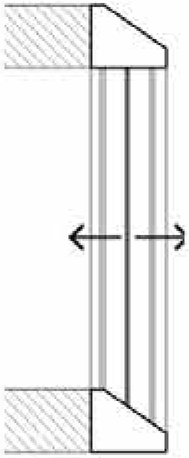
The building's folding form creates multiple faces, and 'tuning' them to the immediate context increases occupant comfort, enhances experiences with strong visual connections, mitigates environmental challenges – such as noise from the adjacent roadways – and improves the building's operational performance, according to solar gain and heat loss, ultimately reducing costs overtime.

Taking into consideration optimum amount of daylight, views, heat load, and heat gain according to building orientation, as well as glare, noise reduction, and ventilation the design study resulted in a finely tuned envelope solution.

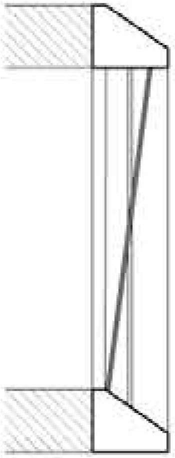


Facade performance regarding orientation

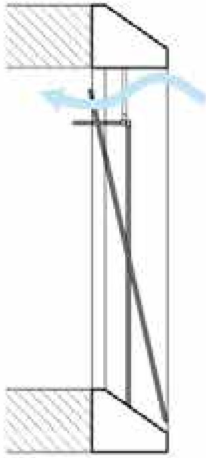
Façade strategy



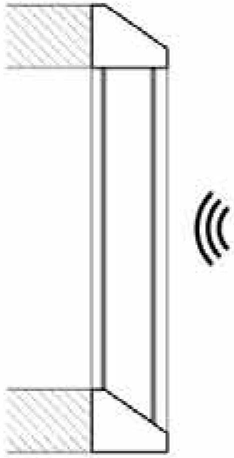
Glass Panel Position Heat Load



Glass Panel Angle - heat load and glare



Opening Ventilation



Double Skin - Noise Protection

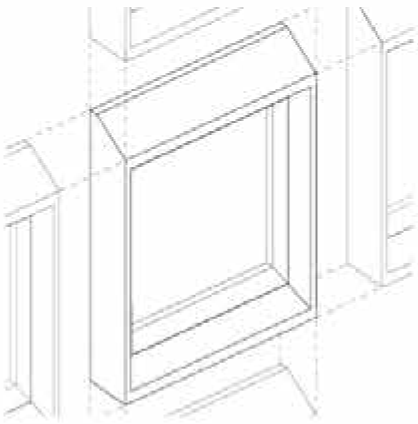
The main facade concept is flexible in order to meet the different performance requirements thanks to the X-shaped mass of the building. Each facade has a different orientation, so the heat load requirements for each 'face' and section range.

Future-proof concept
Following ''the flexibility based on performance'' concept, and incorporating circular objectives, the materials are lightweight and low carbon, and the entire façade can be fully demounted and reused. Furthermore, it is possible to prefabricate the façade components in order to reduce carbon footprint by about 40%, improve safety of production and installation, speed, and control quality, reduce waste, facilitate construction and quickly build a watertight envelope to begin work on interiors.

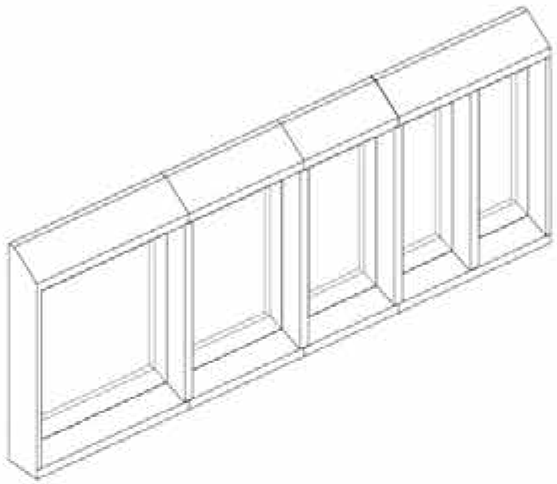
Façade panels
Façade panels offer maximum flexibility and achieve BREEAM criteria. To ensure this, the design employs the same kind of fully insulated façade cassettes across its expanse. While they will be consistent in cross-section, they will vary in width to respond to heat load and privacy variables. As a result, it will be possible to dismantle façade cassettes and repurpose them. Glass panels in the cassettes will have different depths to address the differentiation of the heat load along the façade; they retract to the slab edge where the heat load is higher, and are close to the façade edge when the heat load is lower.

Façade details
It is possible to include glass panels, though the section of the cassettes are tapered
It is possible to include double skin where noise is an issue
Cassette depth is approximately 500mm
Fire compartmentalization is not an issue provided the façade is not accessible for occupants (it is possible to prevent access via furniture systems that block movement or by attaching a platform to the slab)

Flexible Facade Module

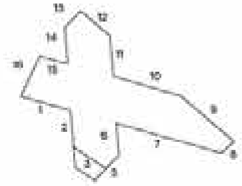


Glass Panel Position Heat Load

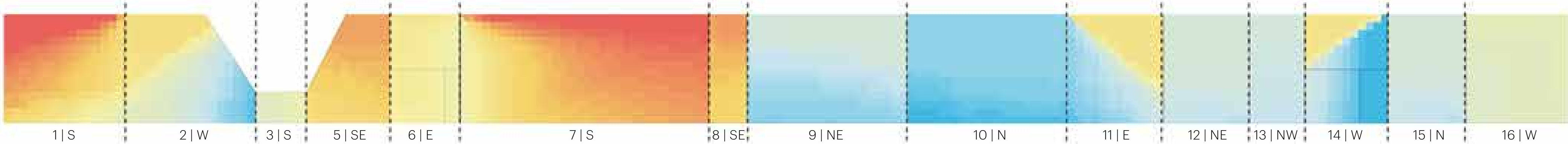


Different Intervals (Privacy and Heat Load)

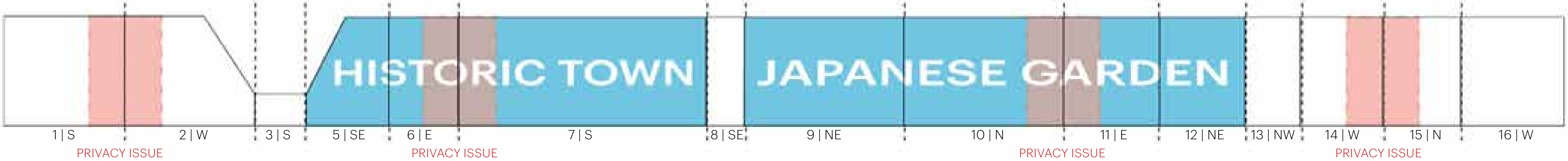
Façade maps



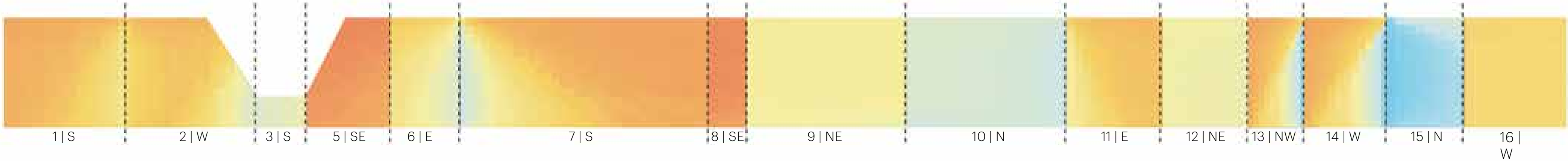
1 Daylight
Map based on Sunlight duration



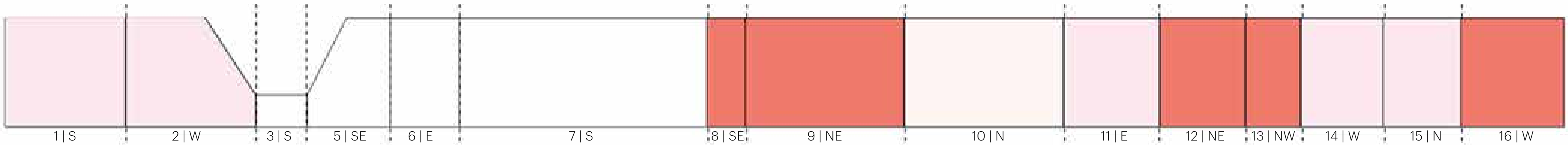
2 View
Map based best views and privacy issues



4 Heat load
Map based on radiation analysis as an indication. For more accurated map, materialization to be considered.

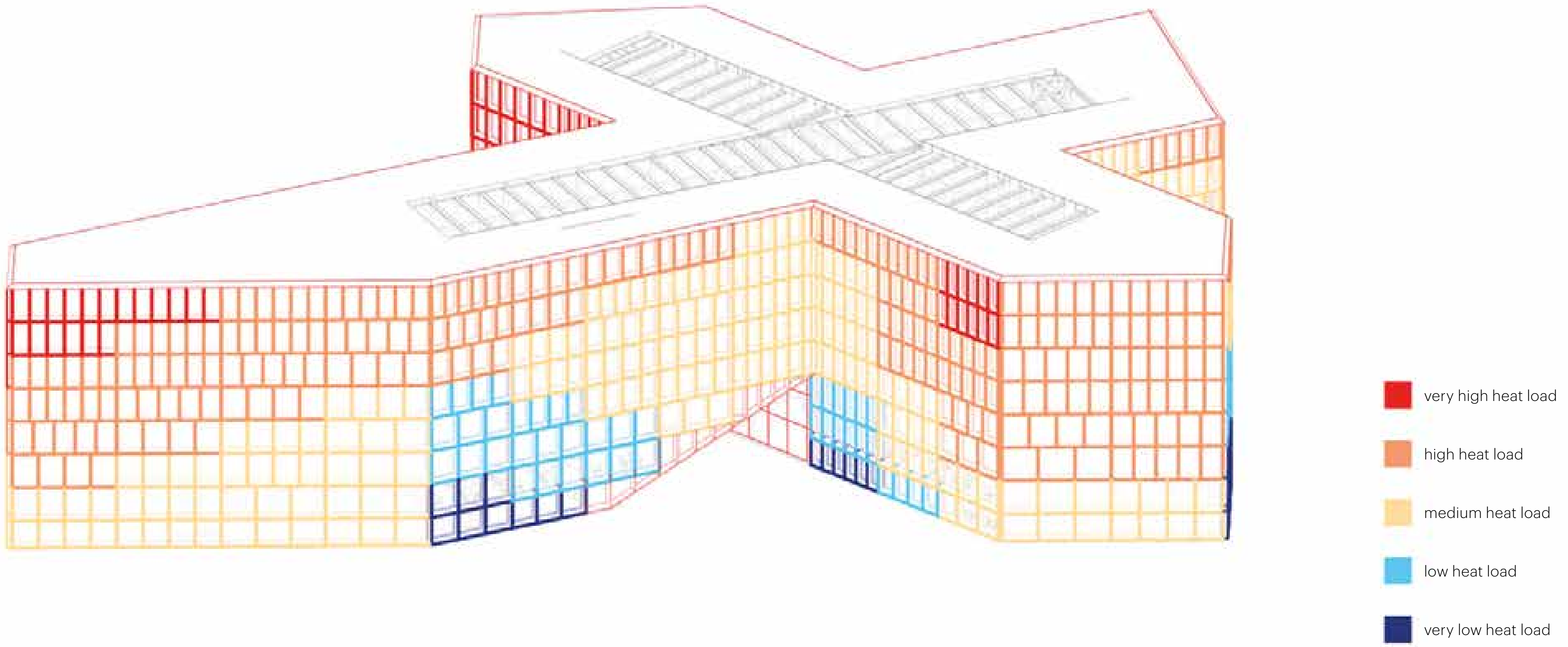


8 Noise
Map based on facade areas closed to roads of higher traffic flows or bigger street pofile.



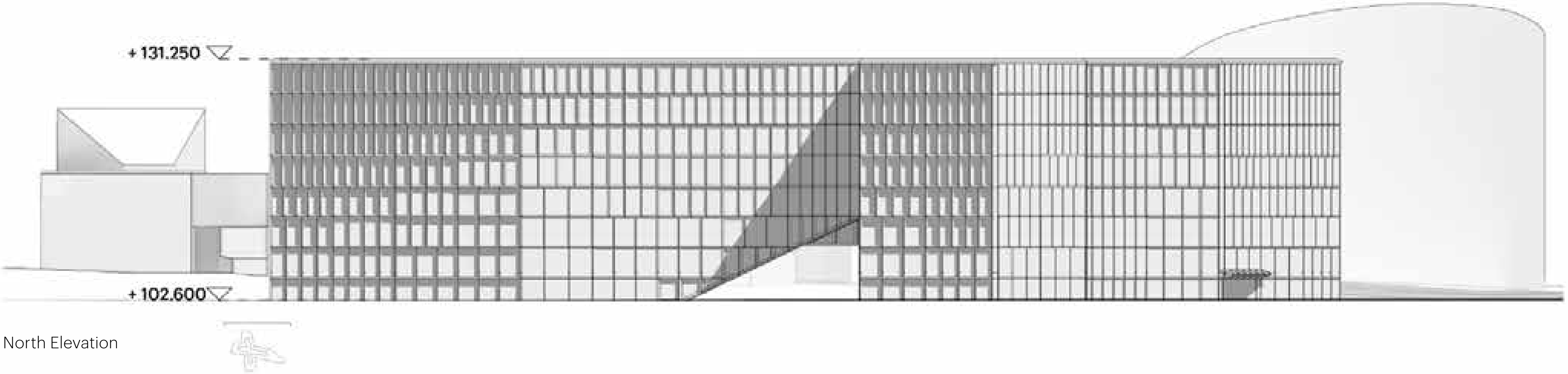
Façade maps

Facade panels offer the maximum flexibility to be ahead in the BREEAM criteria, whose position is established by daylight, view, glare, heat load, heat gain, heat loss, ventilation and noise parameters.

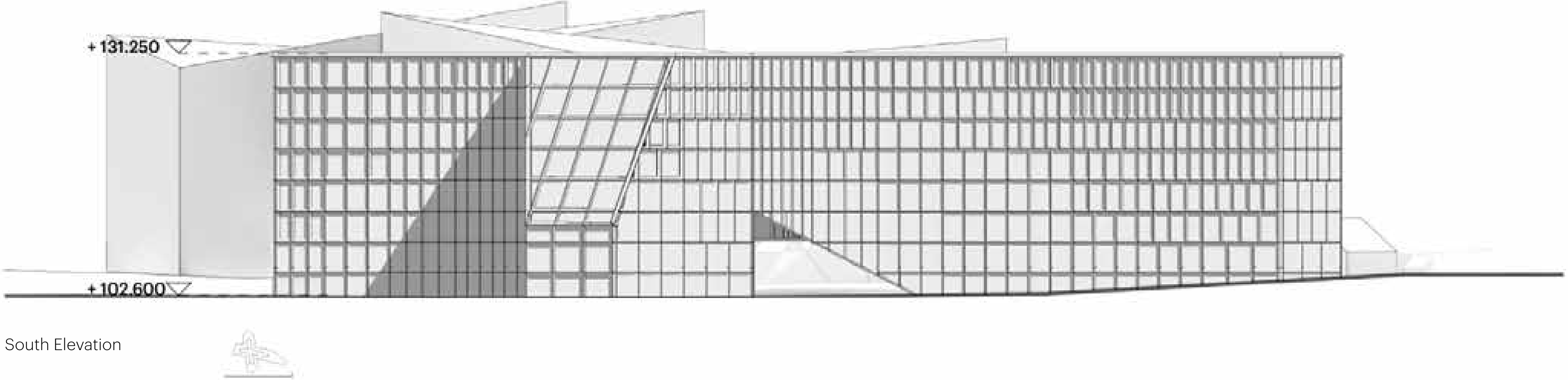


Southeast perspective

Elevations

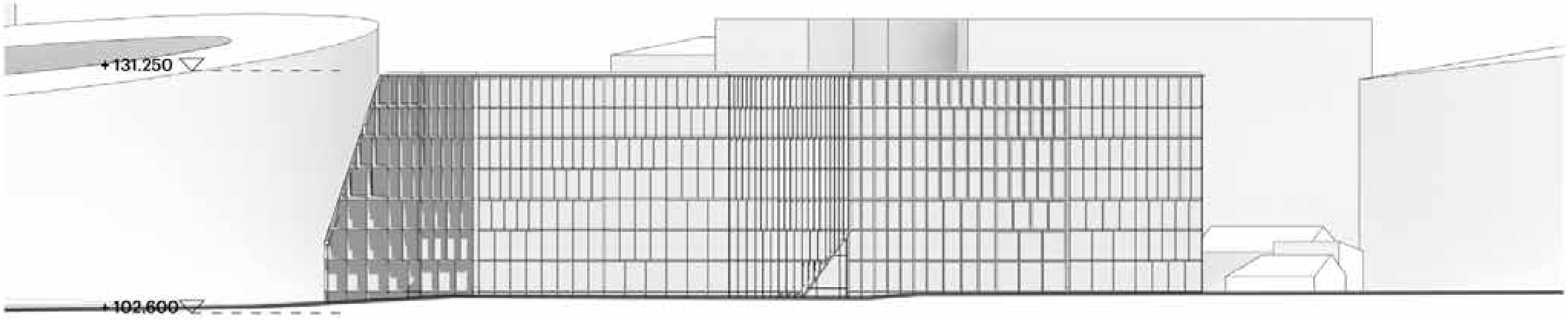


North Elevation

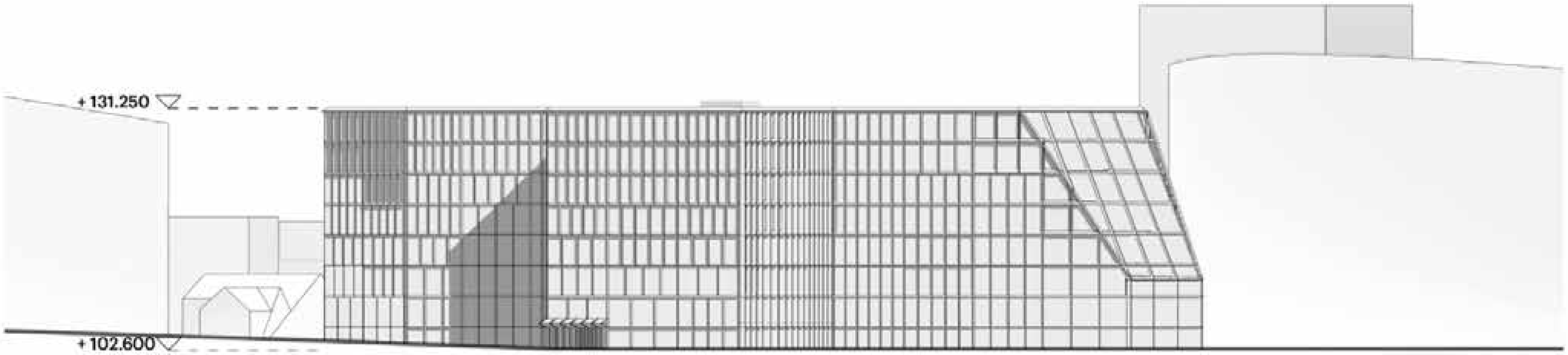


South Elevation

Elevations



East Elevation



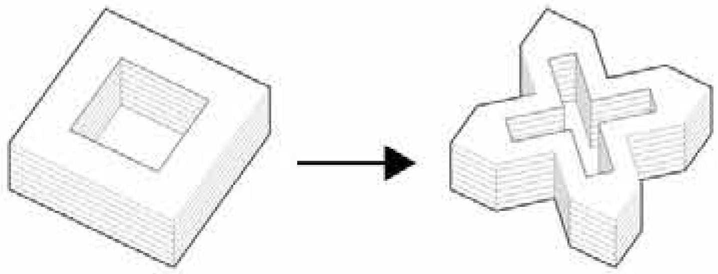
West Elevation

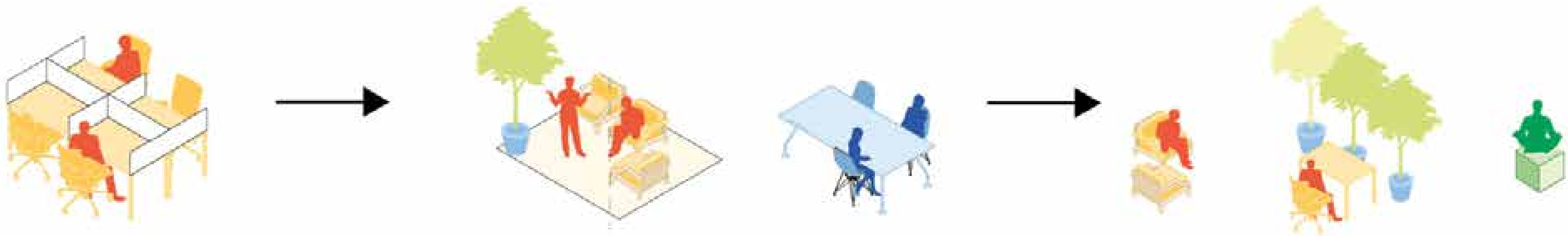
1 Caption


VAIKAI

Intersecting atrium

Inserting an atrium space in the centre of the intersecting form draws daylight deep into the core. Further elongating this space extends daylight's reach, while creating a dynamic interior environment, as well as a façade that invites visitors to approach and explore. The extended atrium space also creates an interior façade and by placing office program along its perimeter, facing the atrium, this ensures that workspaces have access to natural light, increasing productivity, vibrancy, and social connection. Ground floor ceiling heights of 7.2 m create a dramatic interior volume filled with air, light, and high visibility.





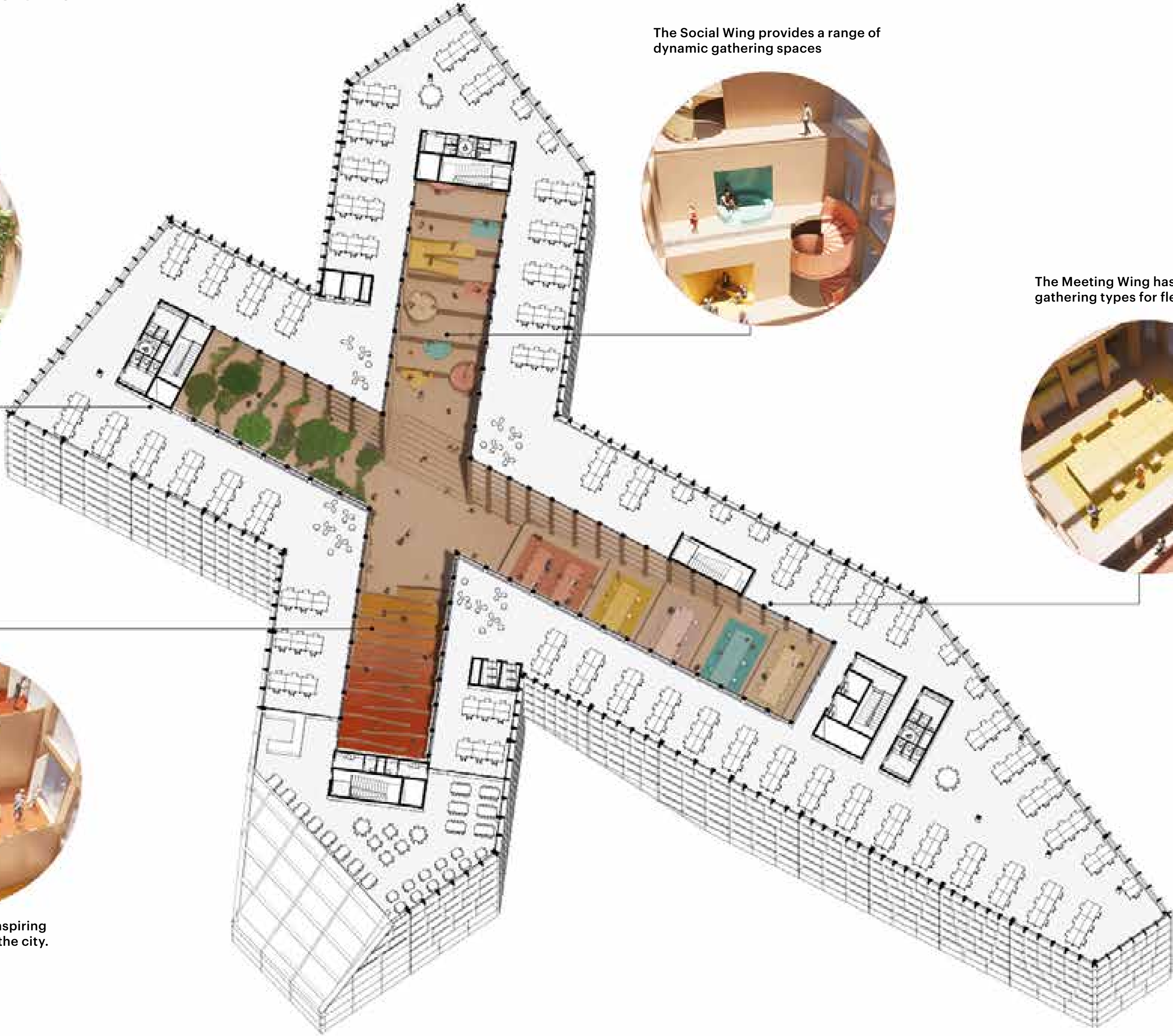
traditional office **contemporary office** **future office**

workspaces timeline

Intersecting atrium

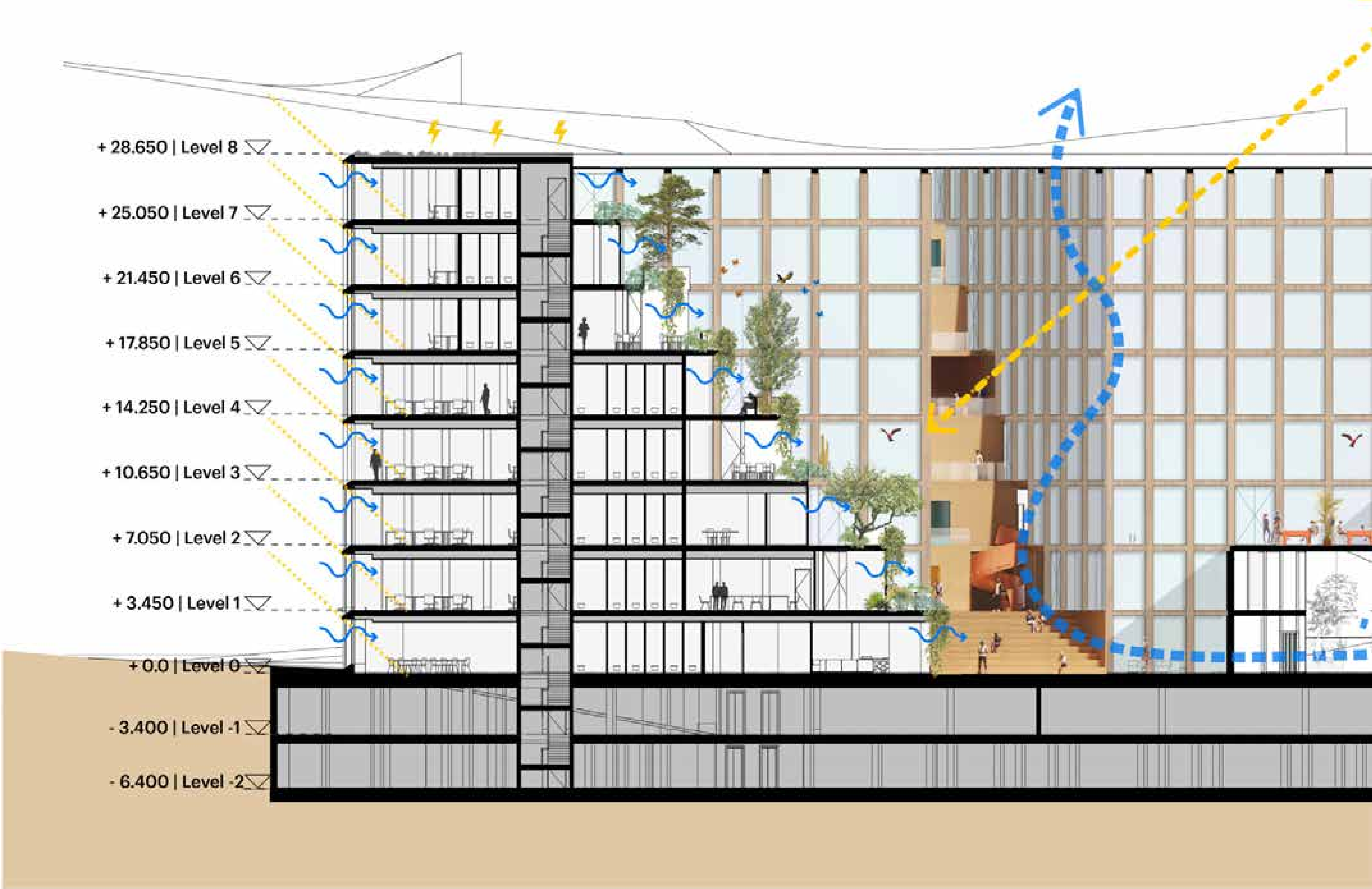
The Green Wing has lush planting, providing an envigorating reprieve

The Social Wing provides a range of dynamic gathering spaces

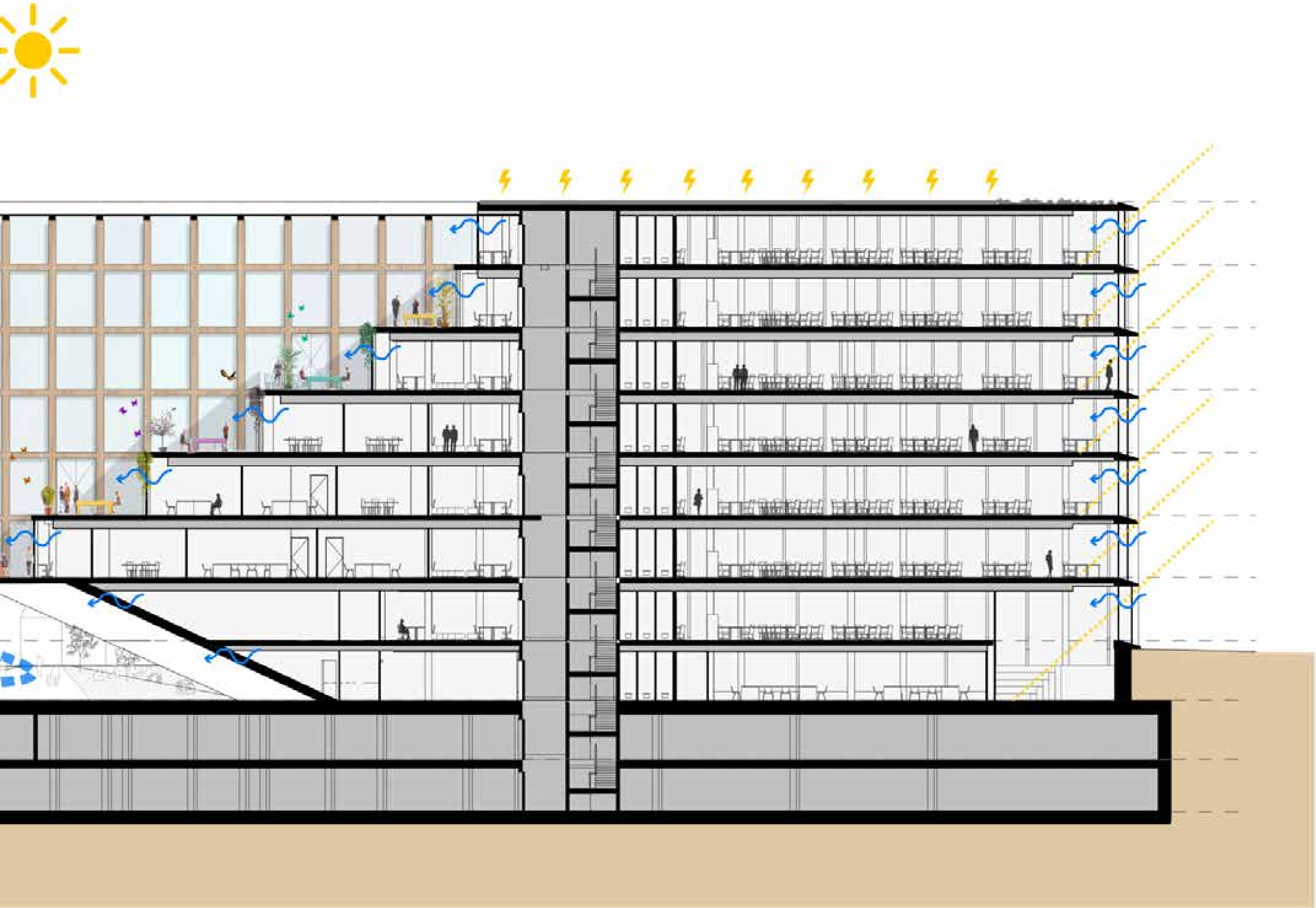


The Meeting Wing has different gathering types for flexible work

The Lookout Wing shares inspiring views over the atrium, and the city.



+ 28.650 | Level 8
+ 25.050 | Level 7
+ 21.450 | Level 6
+ 17.850 | Level 5
+ 14.250 | Level 4
+ 10.650 | Level 3
+ 7.050 | Level 2
+ 3.450 | Level 1
+ 0.0 | Level 0
- 3.400 | Level -1
- 6.400 | Level -2



Atrium themes

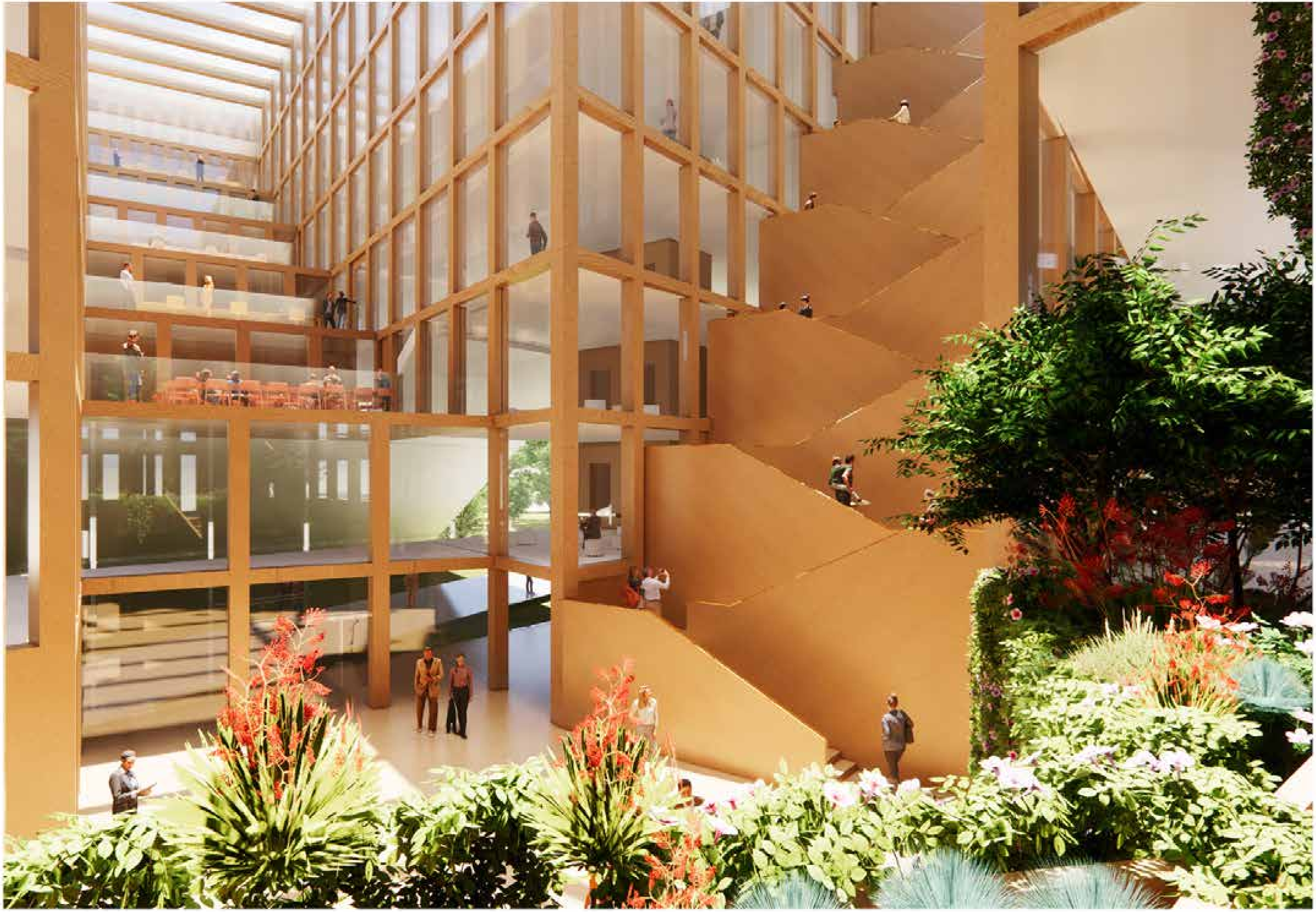
1 The Meeting Wing

2 The Social Wing

Atrium themes

3 The Green Wing

4 The Lookout Wing



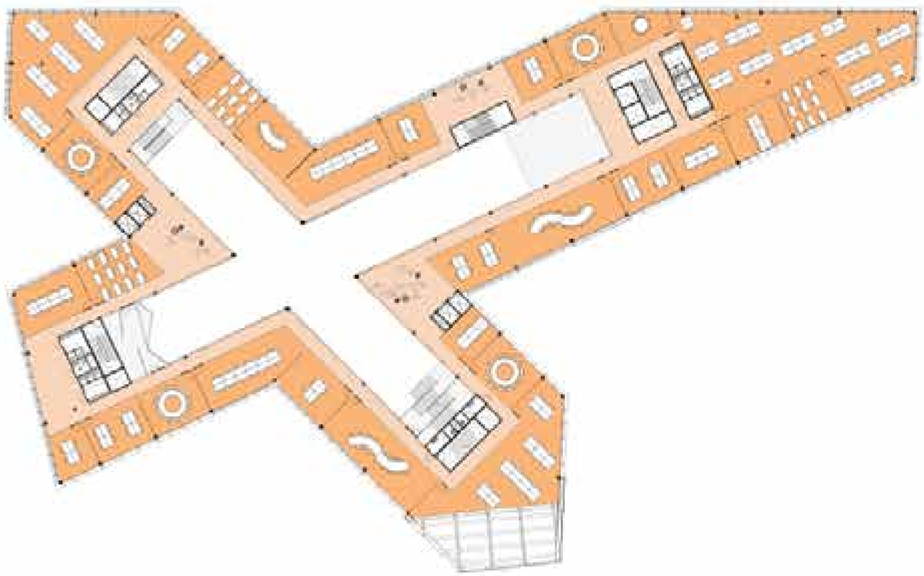
Functional planning

Office layout flexibility
Floor plans

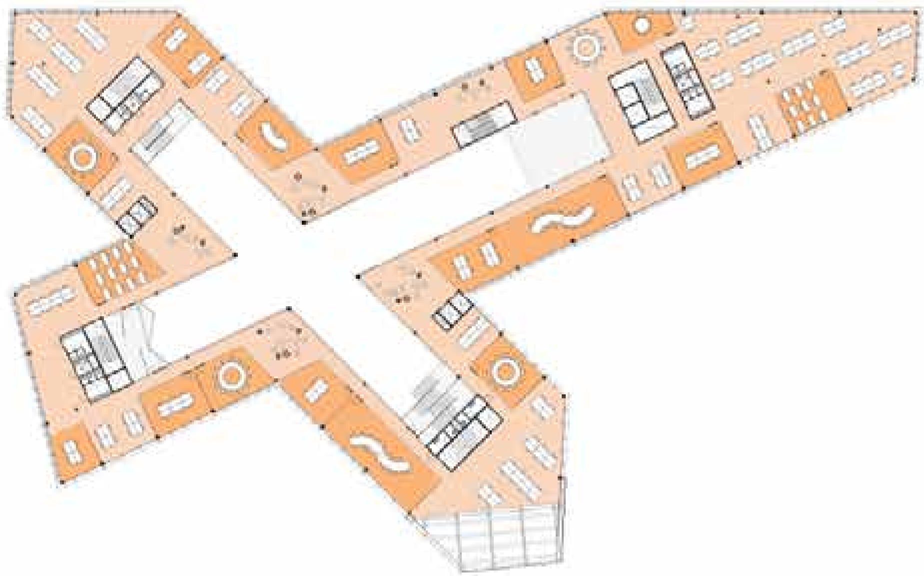
3

Office layout flexibility

According to BREEAM Outstanding requirements, the space of each floorplate is as flexible as possible. This means that as future needs change, or tenancies change, it is possible to create new partitions without having an impact on functionality.

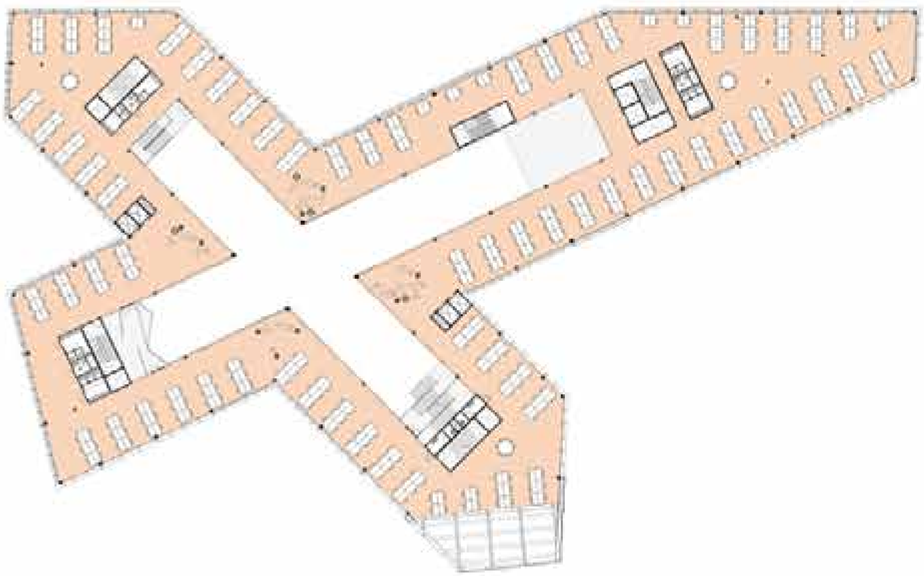


a. Partitioned Office Layout

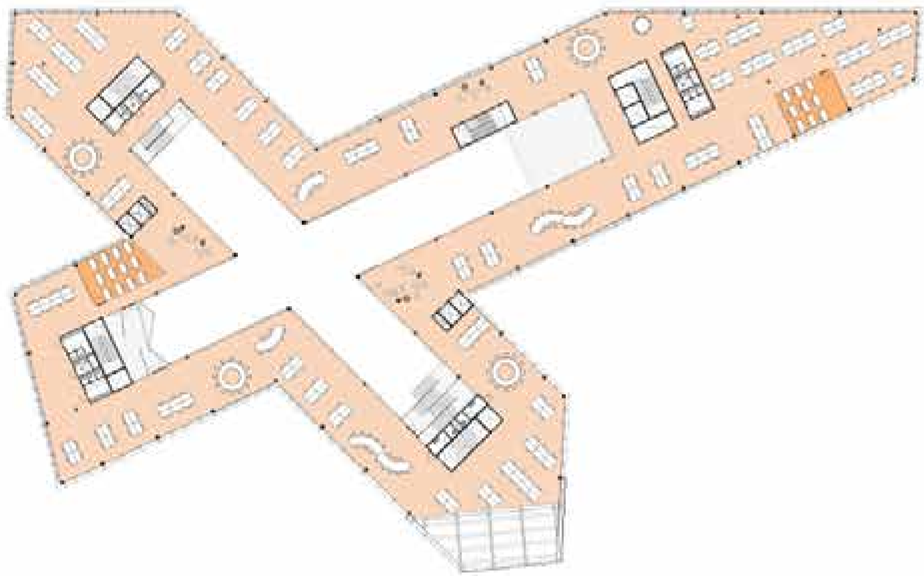


b. Mixed Office Layout

Office layout flexibility

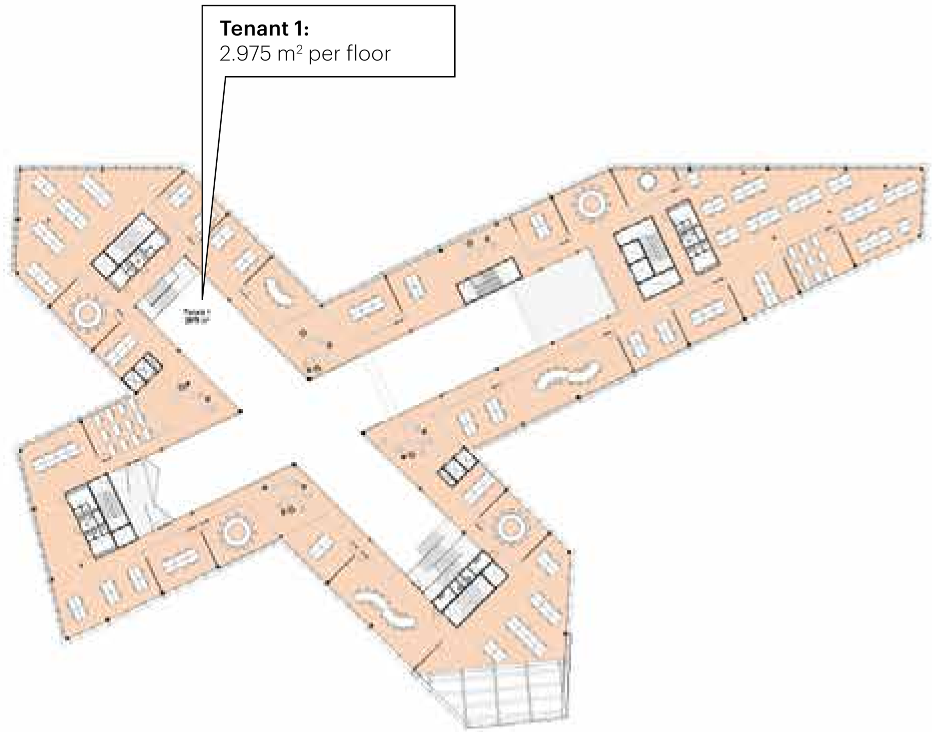


c. Open Office Layout



b. Creative Hub Layout

Office layout flexibility



a. Single tenant variant

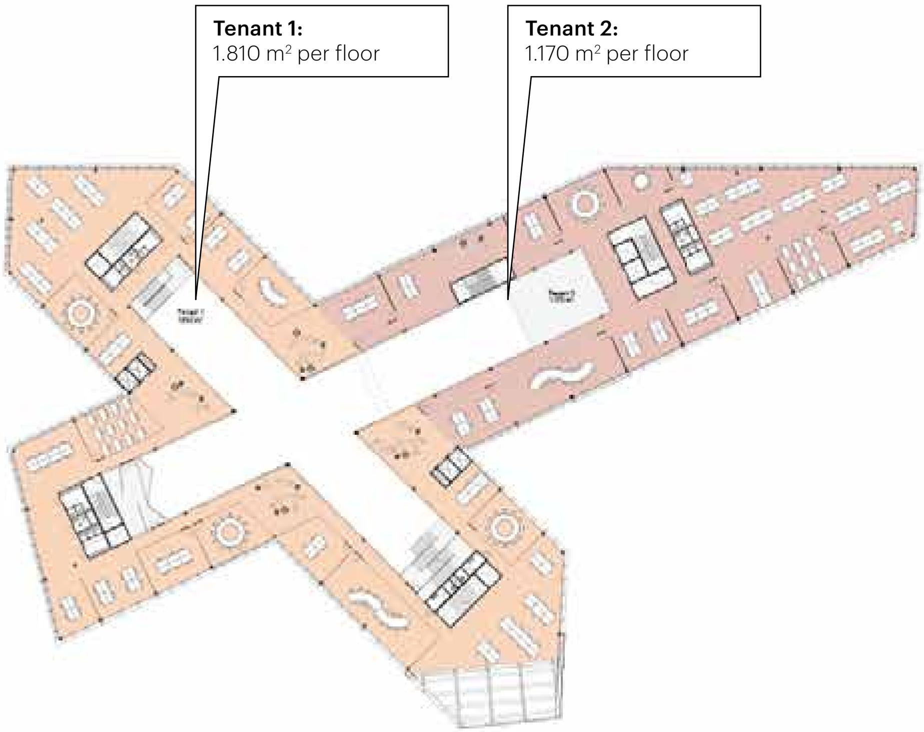
Future-proofing
In as much as the building form combines different atmospheres in the four wings' diverse programs and experiences, these also facilitate an interior logic that adheres to the same principles. Each wing contains the same spatial components: workspaces at the façade for daylighting, informal spaces in the elbow of each wing, and terraces with a visual connection to the atrium. As each wing offers a consistent quality, it is possible to partition these at cores, enabling tenants to lease out individual wings, and / or entire floors.

Perimeter workspaces
The office floor plate is slender, with one external façade, facing the larger city, and the internal façade facing the atrium. This ensures abundant daylighting, which facilitates productivity, and a vibrant, and comfortable work environment. Locating desk spaces along the external façade provides direct access to ever-changing city views. Dedicating the inside track to circulation makes wayfinding to multiple cores, and restrooms unimpeded.

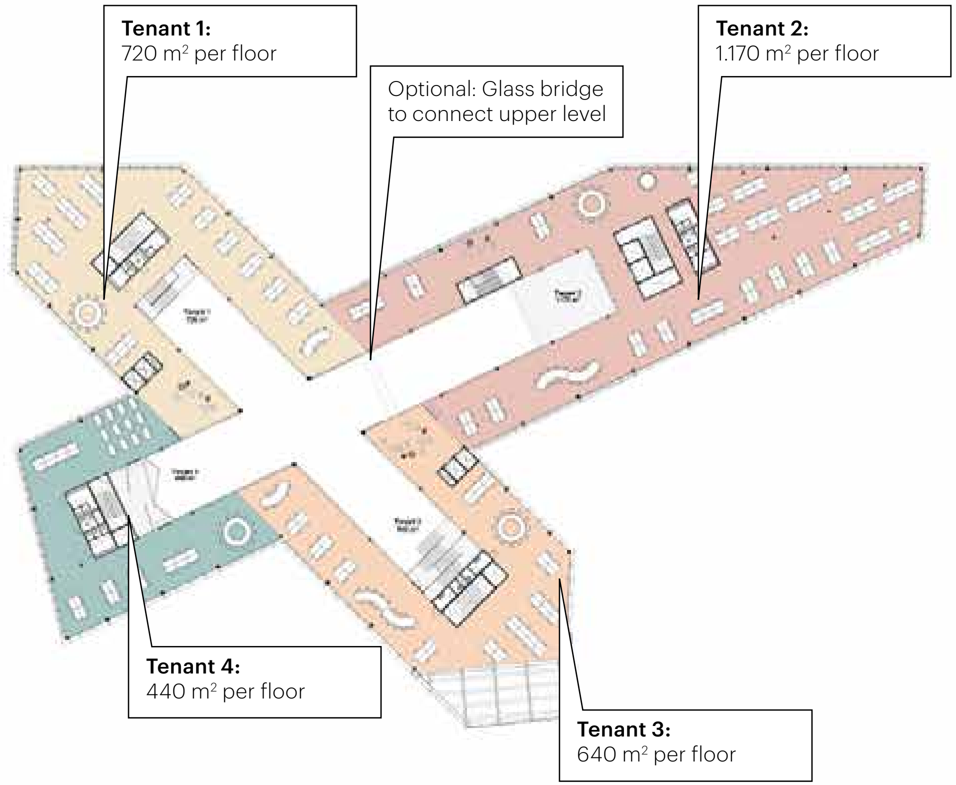
Informal workspaces
Moving from the outside in, nested in each end wing is a larger informal workspace for social gathering and interaction that is more dynamic and group-oriented, enabling creative seating arrangements and furniture.

Social spaces
Moving from the informal workspace into the atrium are terraces with office canteens catering to the needs of each section's occupant group.

Office layout flexibility

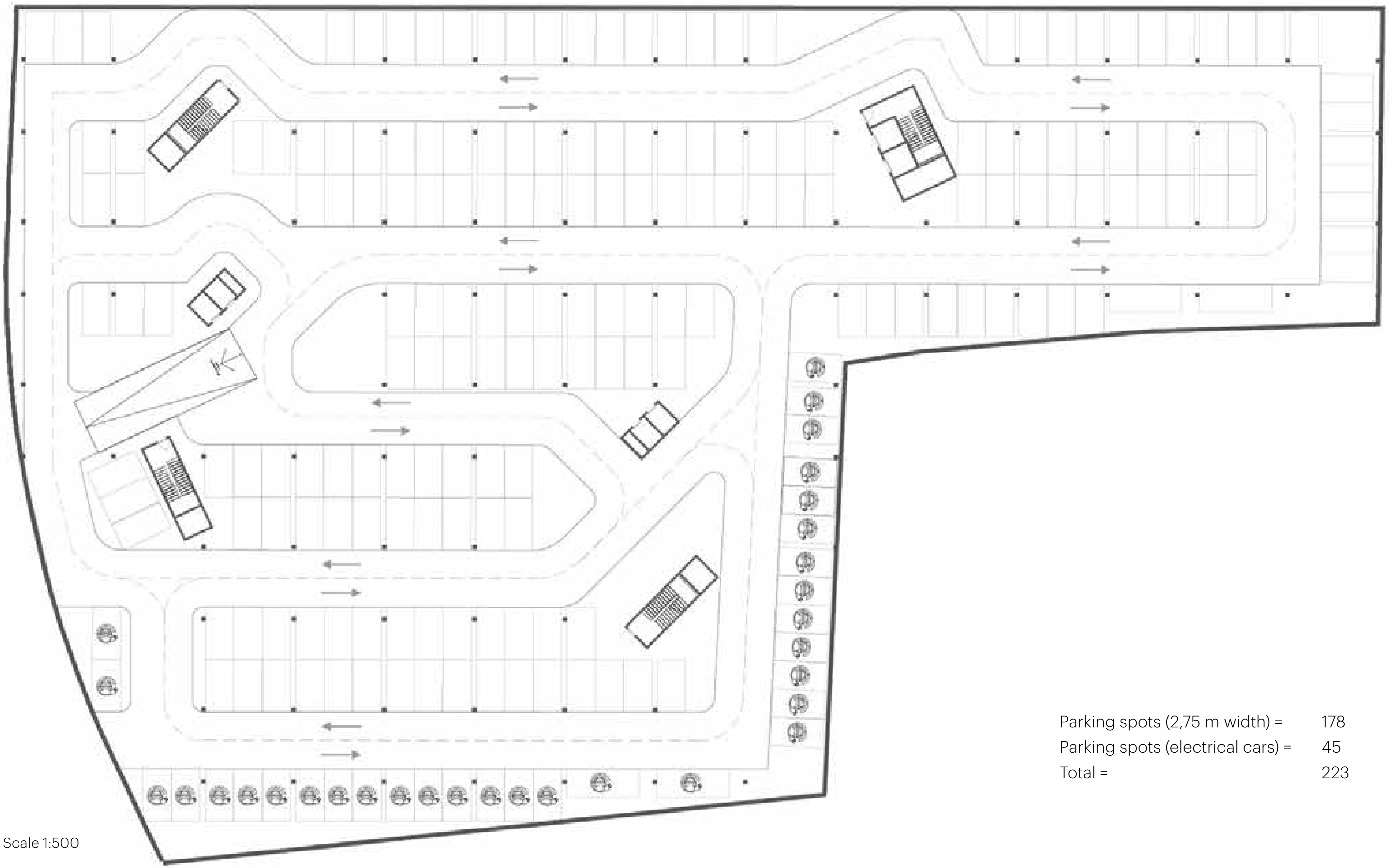


b. Multi tenant variant (2 partitions)



c. Multi tenant variant (3 partitions)

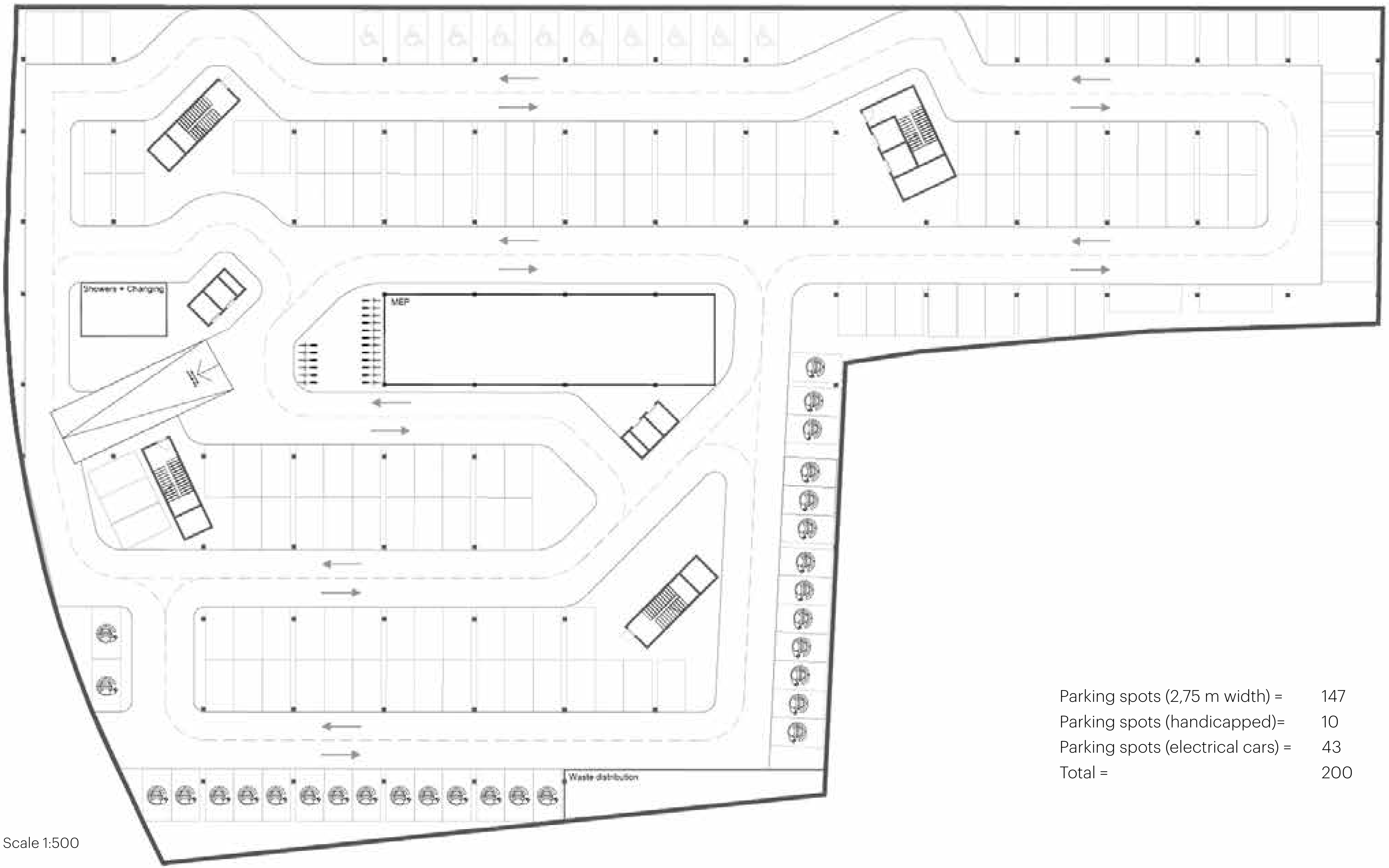
Floor -2



Parking spots (2,75 m width) =		178
Parking spots (electrical cars) =		45
Total =		223

Scale 1:500

Floor -1



Scale 1:500

Parking spots (2,75 m width) =	147
Parking spots (handicapped)=	10
Parking spots (electrical cars) =	43
Total =	200

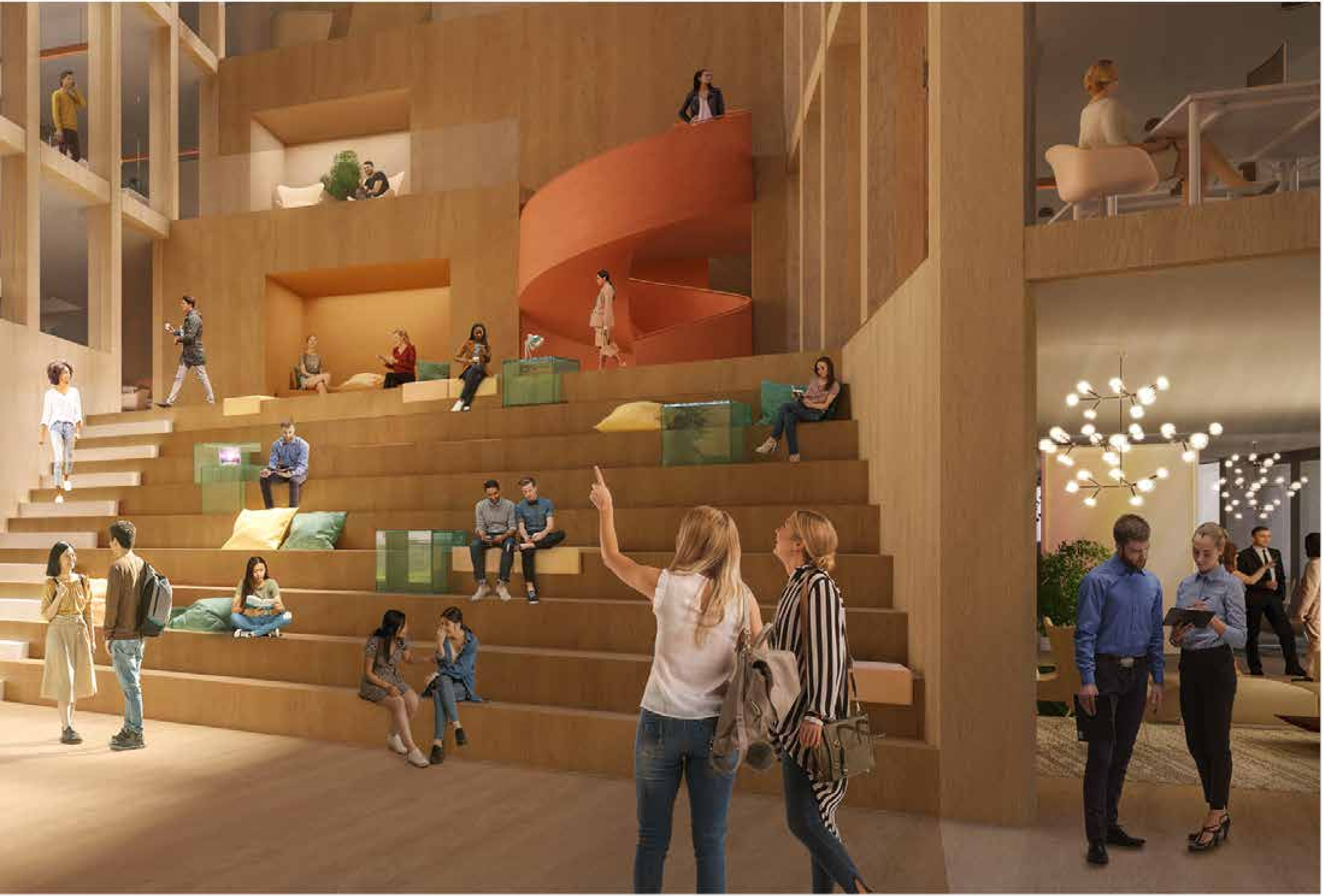
Floor 0

Scale 1:500

Floor 1

Scale 1:500


7
Offices
6
Offices
5
Offices
4
Offices
3
Offices
2
Offices
1
Offices
0
-1
Parking
-2
Parking



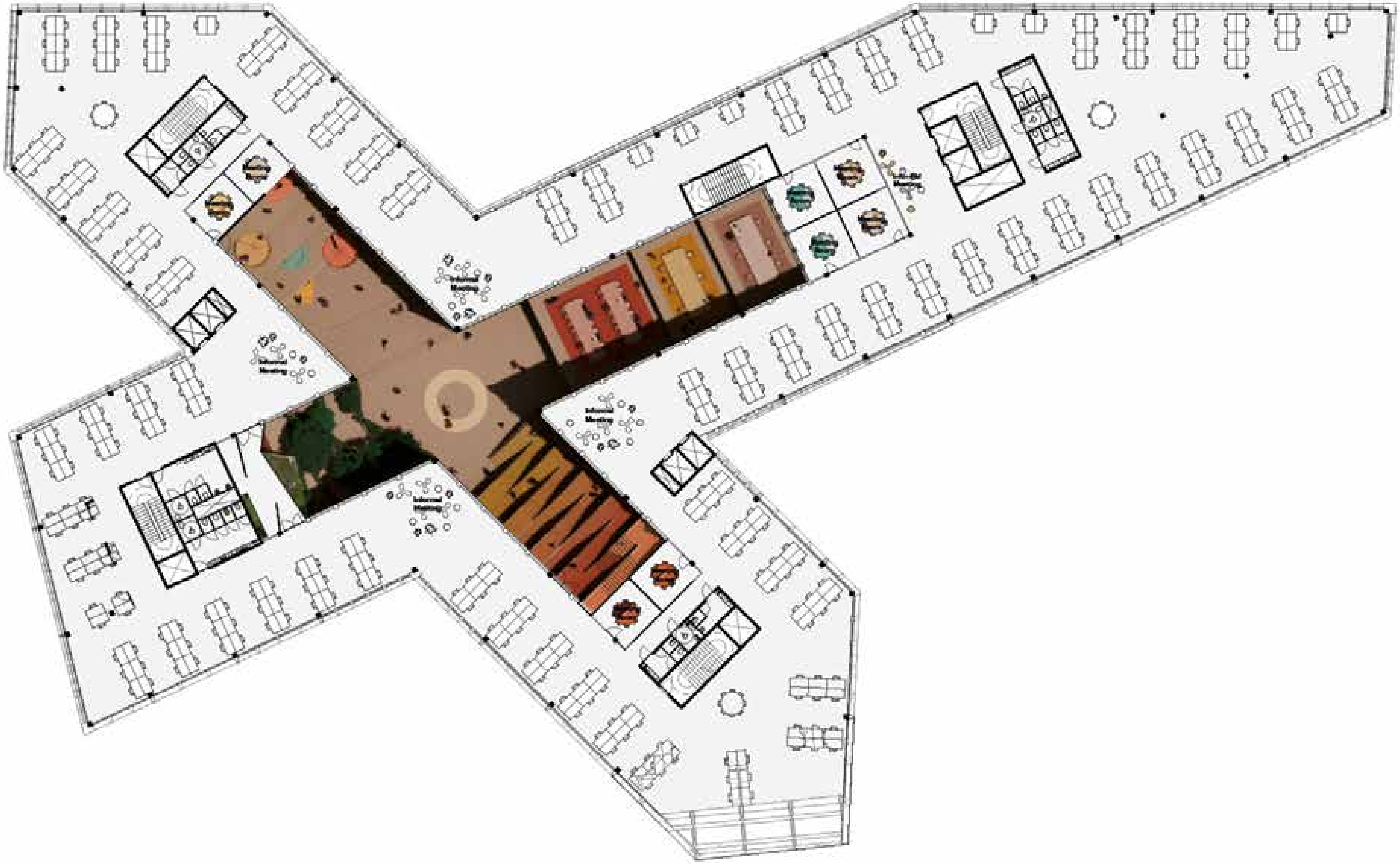
Floor 2

Scale 1:500

Floor 3

Scale 1:500

Floor 4



Scale 1:500

Floor 5

Scale 1:500

Floor 6

Scale 1:500

Floor 7

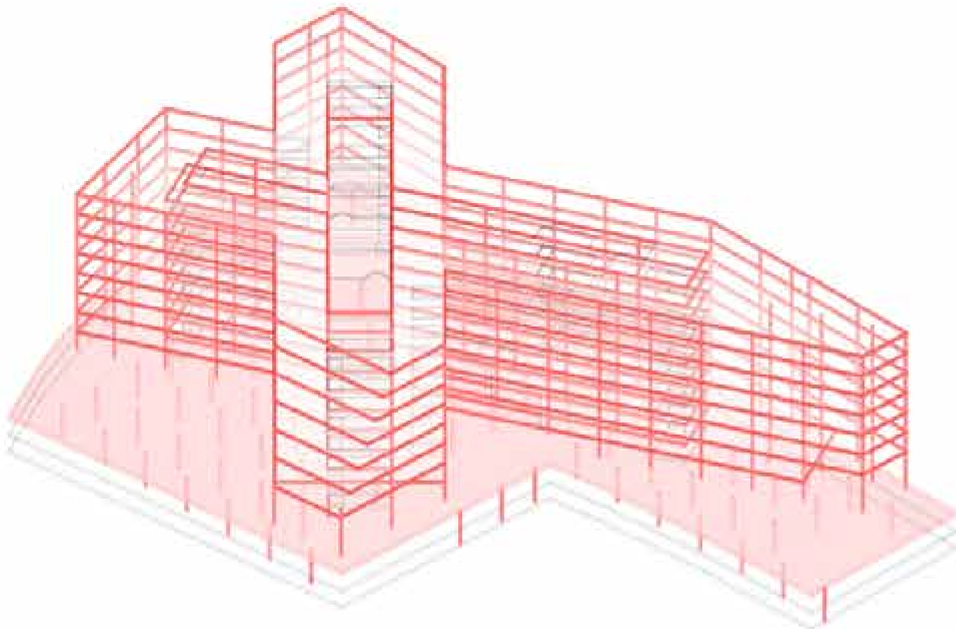
Scale 1:500

Building materials

Structure
Facade
Interior
Circulation
Overview

4

Structure



The building structure comprises **steel** and **prefabricated elements**. The slab of the building is prefabricated concrete and that in the wings of the atrium is steel (for **maximum flexibility**), though it may be possible to **explore wood** or hybrid as a structural material also.

The structural members will be **demountable** to produce new forms, reconfigure, and extend material life, **reducing** the building's **total carbon footprint**, and ensuring **long-term flexibility**.

Facade

The highly tuned façade's technical solution responds to discrete **environmental conditions**, with **enhanced features** and **functions** in specific locations, such as additional **sound proofing** in facades facing the roadways, all in order to achieve **the greatest building performance**.

The design ensures a **low carbon footprint** with a lifespan beyond current use.

Prefabrication potential, **recycling facility**, and **durability** are all factors influencing the selection of these materials. For instance, the façade comprises **prefabricated cassetes** of **vacuum glass** – which is light in weight and frame - and a **composite from crushed seashells**. It is possible to source local seashells, and since they have the same chemical structure as marble, the frames will resemble terrazzo panels.

This combination makes the panels extremely light, demountable and may be repurposed, and adherent to the **BREEAM Outstanding** criteria for locally sourcing.

Materiality

- Vacuum glass is used because it is **1/3 lighter** than the triple glazing. Reducing the weight load has a significant effect on the ecological footprint of the facade. The general size of this material is 1500*2300mm although it can vary as long as the total area of the panels is the same. This ticks the box of innovative facades, note - this may result in a more limited procurement routes so I would advise getting advice from a range of suppliers early.
- It looks like centre pane performances can reach 0.45W/m^2K which is comparable to triple glazed.
- Vacuum panels also offer a **higher acoustic performance** for the thickness compared to standard double glazing
- Glass panels can be double and single glazed in the areas where double skin is needed.
- **Lamination of glass externally** will be required for safety to prevent falling glass if a pane breaks. Internal pane would be recommended to be laminated for safety where it provides a barrier to fall.
- Cassette either to be composite stone made of processed seashells and bio-resin or recycled aluminum. This makes them lighter and has a **low ecological footprint**.

After this decision, stone cladding is no longer feasible. Terracotta option is also not suggested as it requires a special way to attach it to the cassette structure.

A supporting structure of steel/aluminium/ stainless steel, dependent on conditions and position of the weatherline, will be used to support the facing material. Design to be optimized to be as light as possible.

Note if there is a cavity in the slab edge detail it will need to be filled with insulation/ have a cavity barrier installed for fire regulations

Interior

LR_Prezidentura_by_Augustas_Didzgalvis_CC_BY_SA_40.jpg

Pilies_Street_at_dusk,_Vilnius,_Lithuania_-_Diliff_CC_BY_SA_30.jpg

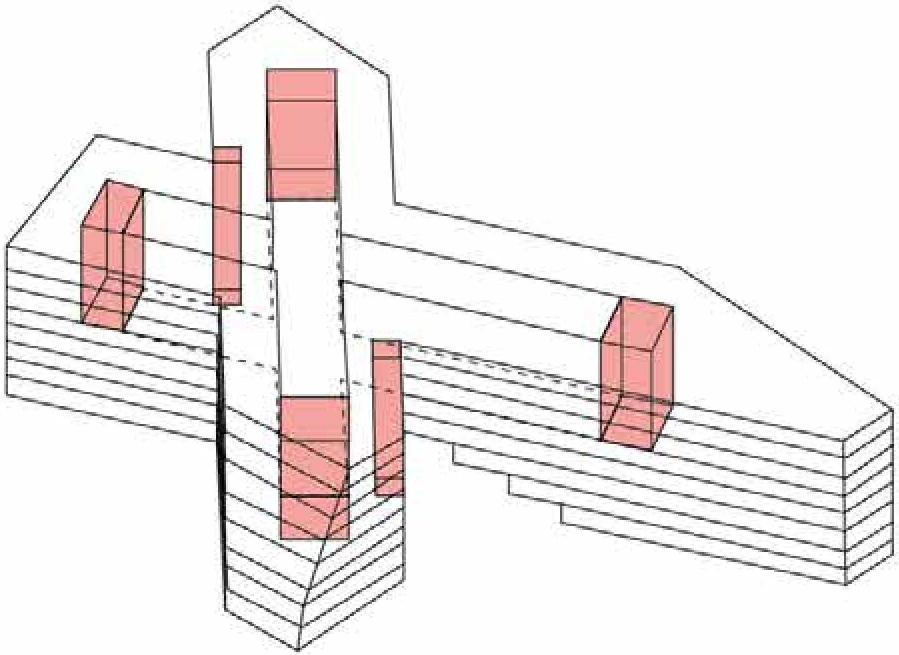
Just as the building form invites the city in to explore, the interior palette invites the tapestry of the city in its colours, tones, and textures.

Using natural finishing materials such as **wood**, and incorporating the old city's soft colours, the interior is warm and inviting, communicating the essence of Vilnius. United in tones, the four wings express different characters and offer different experiences for occupants.

Bio-based materials in the office spaces mitigate off-gassing, ensuring a healthy interior environment, with r**aised cork-based carpeting**, and **bio-based wall coatings**.

In the event of area partitioning, these will comprise wood or a bio-based alternative.

Circulation



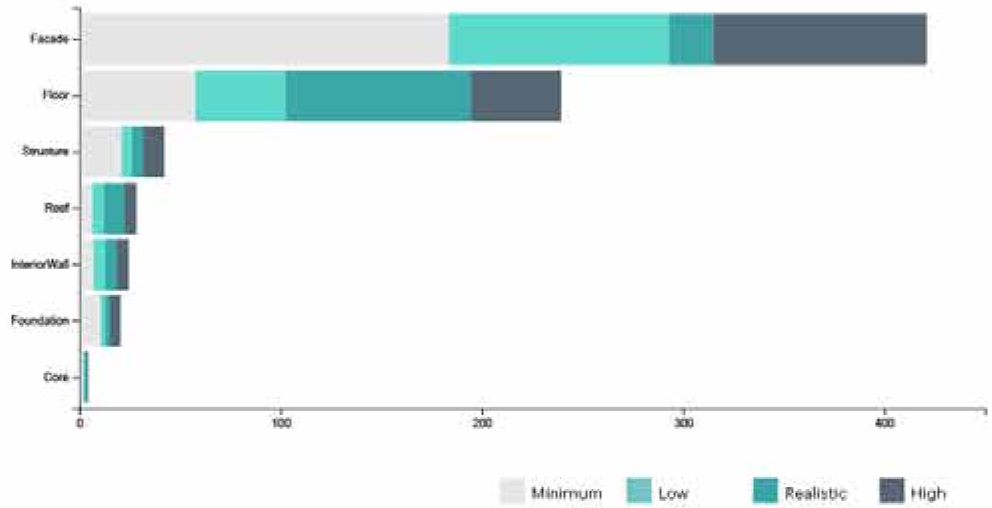
Circulation spaces with also comprise prefabricated, demountable concrete elements.

Overview

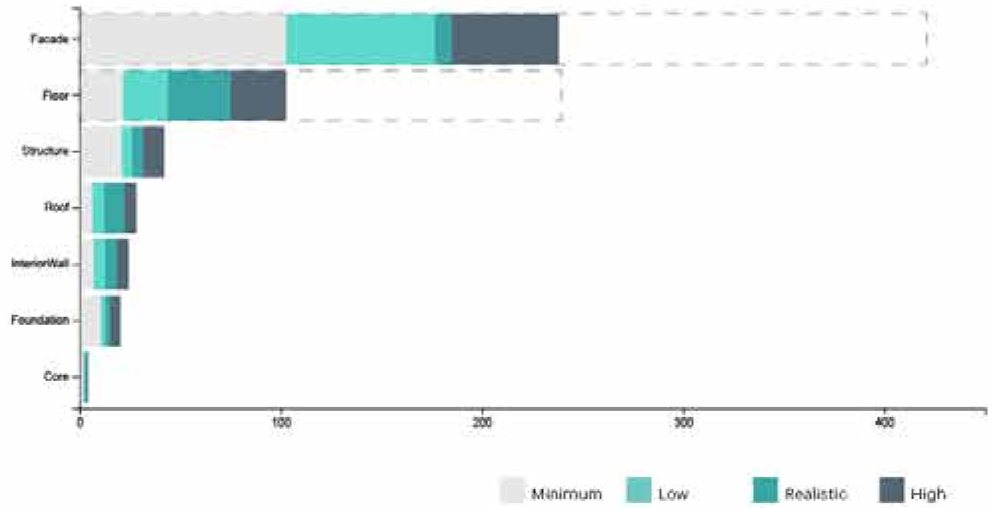
To show the impact of how chosen materials bring down the carbon footptint diagrams a. and b. are shown.

Diagram a. captures the use of traditional materials on elements like facade and floor slab. Traditional facade is usually triple glazing which scales up the weight of the whole structure and enlarges the carbonfootprint. As for the traditional floorslab - it is usually usually poured concerete.

Diagram b. illustrates how carbon footprint can be brought down to almost a half by using recycled composite material for facade. For the floorslab it is considered o chose for either prefabricated concrete plates or a steel+concrete structure.



a. carbon footprint with traditional facade and floor materials



b. carbon footprint with optimized facade and floor materials

Transport and pedestrian flows

5

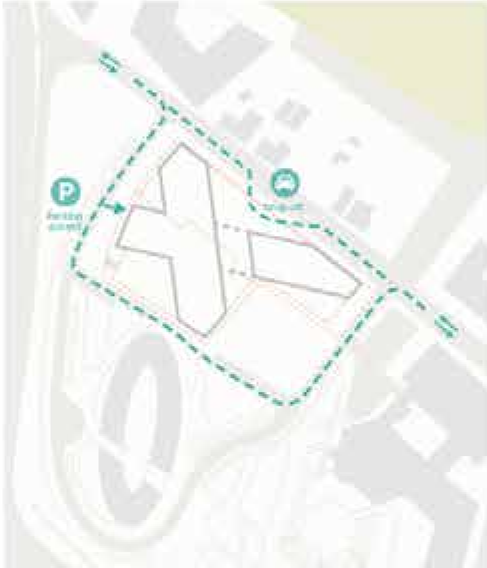
Transport and pedestrian flows

In as much as perimeter connections to a range of city mobility systems, including transit, cycling, and pedestrian paths make this building accessible and connected, pathway connections provide access from multiple vantage points. A dominant path stretches across and through the site to the belowground pedestrian corridor drawing a desire line across the site, through the building to the nearby Japanese garden in the north. This generates a new green thread, drawing pedestrians into visual connection with the lively building program, while providing convenient access to a key area attraction, creating public conduits rather than imposing proprietary limitations. Situating the building thus plants it in its urban setting, and into the public life of the city, tightening immediate and wider city threads of connection.

While strategically integrating drop off and logistical access, the surroundings accommodate outdoor terraces, where they connect with interior food and beverage establishments, an activated public space and children's play area.

Pedestrian accessibility

Bike accessibility



Car accessibility

Service accessibility

1 Caption

2 Caption

Use of solutions for the building A++

Green solutions
Energy concept
HVAC
Productive roof
Functional atrium
Healthy office space
Facade performance
BREEAM checklist

6

Green solutions

One of the essential considerations of the proposed design was sustainability. All of the proposed technologies are well integrated in the design of the building and increase the overall performance of the building and achieve **BREEAM Outstanding** score.

CORE SDGs

FOCUS SDGs

Comfort & Energy Concept achived by implemented renewables energy technologies and health-inclusive design proposal

Carbon neutral building achived predominantly by prefab. structure and use of recycled materials and energy efficient concept

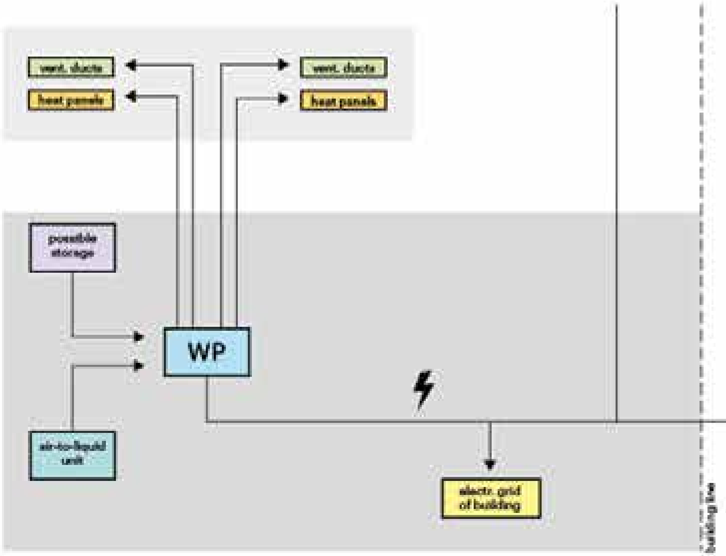
CO_2

Healthy Happy Office achieved by creating well ventilated rooms with optimal amount of daylight, great views and enough recreational spots to maintain a healthy environment

Flexible Use and Structure that allows easy demountability and/or extension of structural elements as well as facade ones. At the same time flexible spaces for either working, recreation and/or meetings

BREEAM Outstanding building with 86% score that provides a new view on conventional office buildings

Energy Concept



The proposal of energy use and management systems is illustrated in the provided diagram.

It is possible to use geothermal energy on the plot thus we will have two options of powering the building.

First option being geothermal well that will pump soil water into the **Water Pump (WP)** unit from where it will be distributed in 4-pipe system for heating and cooling of the building.

Second option is air-to-liquid unit which would be installed on the premises of the site in order to ensure efficient heating and cooling for the building. Any excess energy will be transferred into storage units. The expected power usage is 75% of renewable energy and 25% of centralized heating from city line.

PV panels are installed on the roof in the most effective way with a new way of positioning. By placing them horizontal we maximize the amounts of PV-panels and the efficiency of the panels is secured by using new generation of PV-panels. If CO_2 is desired by the client more PV will be integrated in the facade design (this has been taken into account).

The building will use smart grid technologies for peak shaving.

All **MEP systems** are placed at the end of each core leg which allows for an easy distribution of connections in the floorplates and vertically through the shafts of the cores. MEP would be placed under a flexible steel or steel/wood structure which would allow for easy maintenance and modification possible in the future.

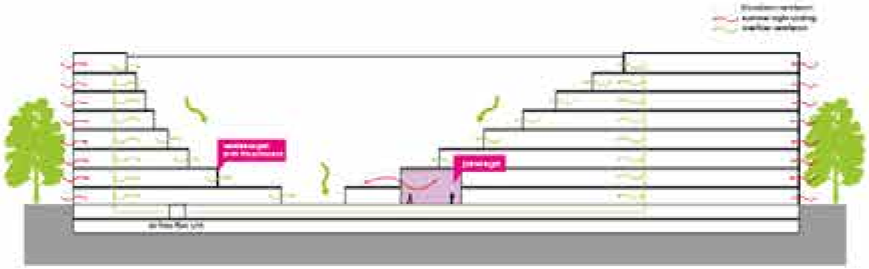
MEP units are located on the -1 level under the center of the atrium allowing equal distances to all of the cores.

Basement units include:

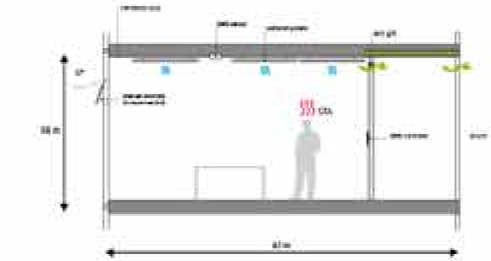
- AHU (air handling unit)
- ER (electrical room)
- DR (data room)
- HP (heat pump)

These units are all separate rooms and could be repositioned/enlarged in the future in case the building gets extended.

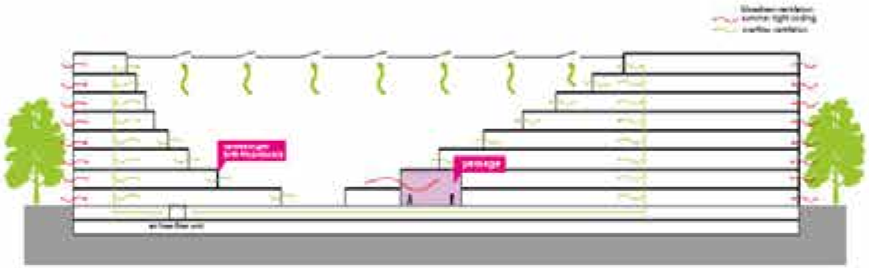
HVAC



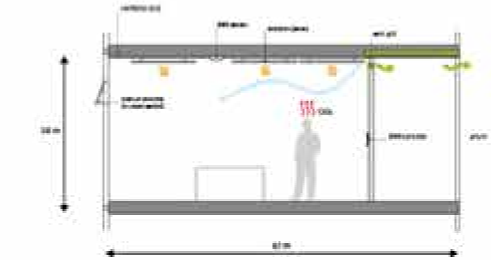
a. summer/winter ventilation



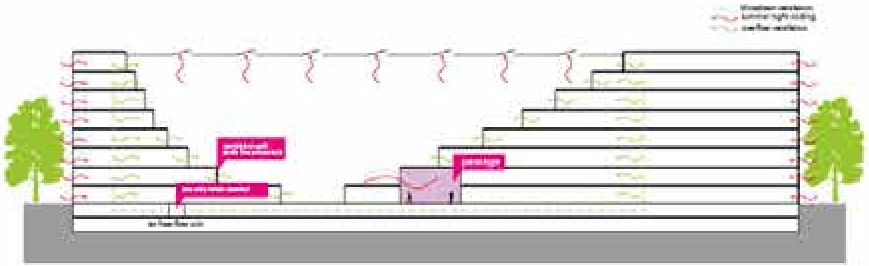
d. cooling and natural ventilation



b. summer night ventilation



e. heating and MEP ventilation



c. spring/fall ventilation

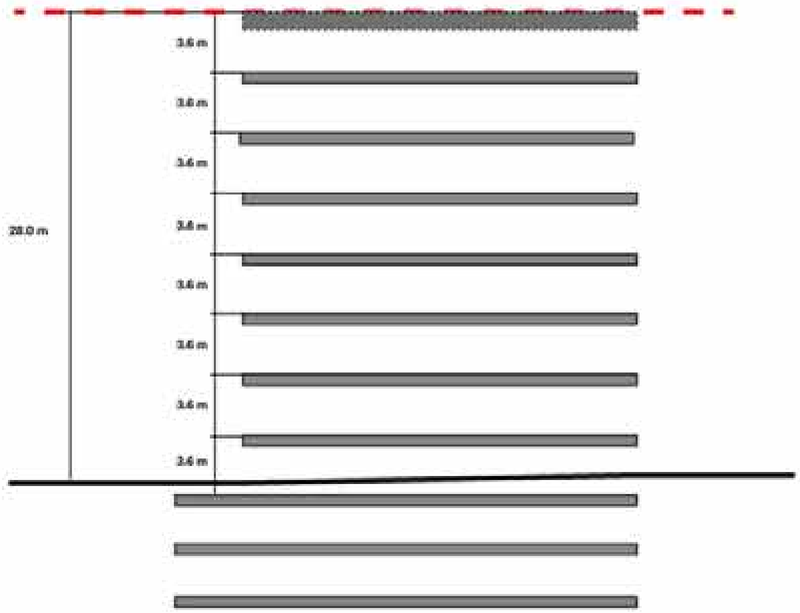
f. double skin facade ventilation

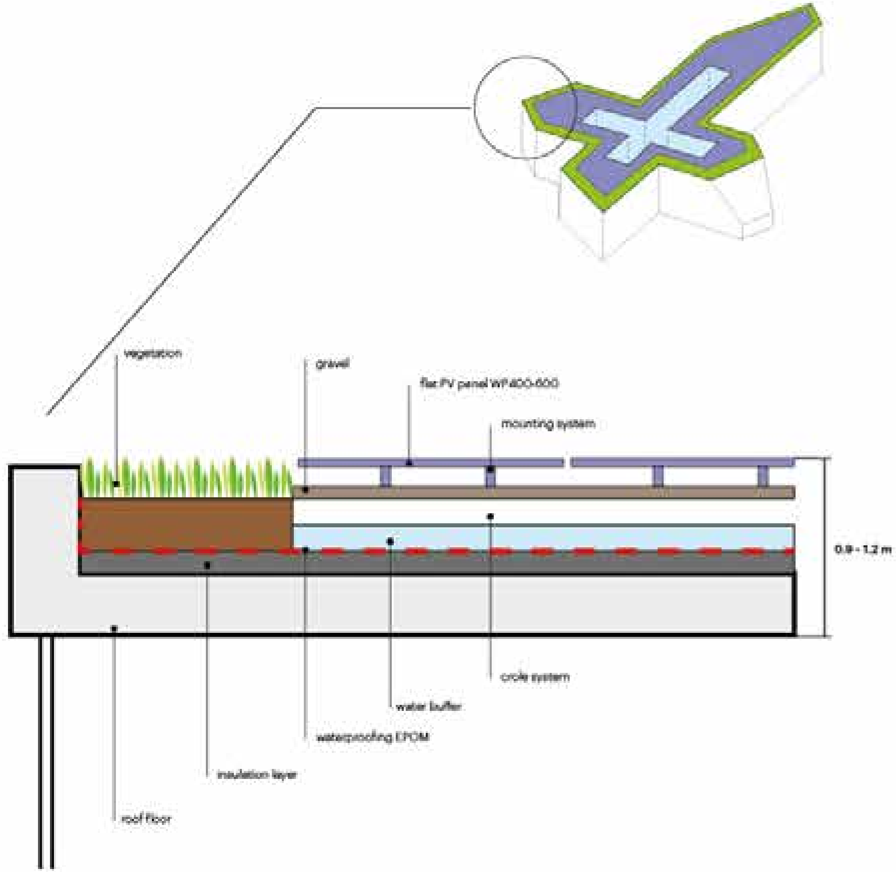
The office spaces are cooled and heated by **radiant ceiling panels** which provide the highest possible comfort and also make control per office part possible.
Ventilation in a natural way or a full-controlled way depending on the season and the outside conditions. This is controlled by sensors connected to the **BMS** (Building Management System).

The atrium is climatized through the **over-flow principle** with conditioned air coming from the offices. In this way we make the atrium fully usable in every time of the year. In extremes like summer we prevent the atrium from overheating by **heatload reduction** through the atrium roof. During summer nights the **thermal mass** inside the atrium is cooled down by **natural ventilation** which is controlled by the **BMS** (diagram b.).

Diagrams a., b. and c. illustrate different scenarios of building ventilation while diagrams d., e. and f. illustrate of heating/cooling and ventilation possiblities within the office spaces.

Productive roof



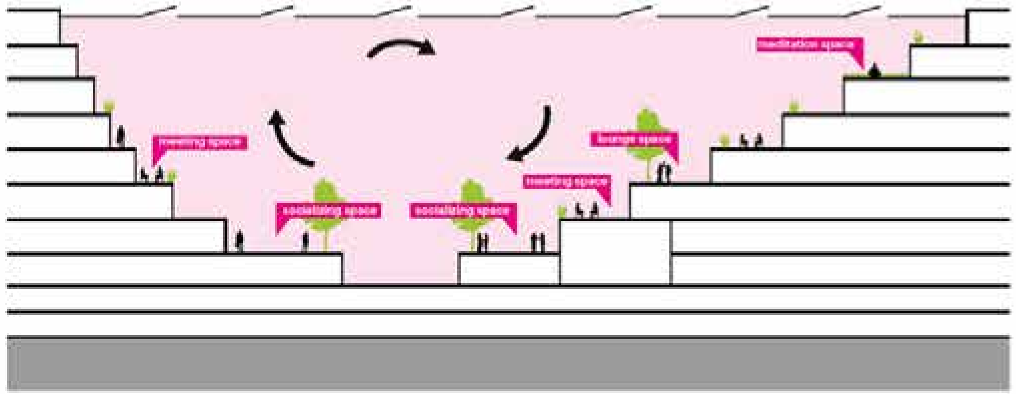


It was decided due to height limitation of 28m to use the roof for harvesting solar energy and rain water collection, hence getting an **energy neutral** and efficient building.

As seen on 3D the roof has 3 segments – vegetation layer at the perimeter to strengthen ecology, make it climate adaptive and reduce the heatload,

Effectively placed PV-panel layer which produces the energy for the building. The third layer underneath the PV-panels is a water collection system wihch stores the water and helps in the total climate adaptation of the building. The water will be fed in into the grey water circuit of the building.

Functional atrium



a. atrium flexibility

In this design the atrium is not only an aesthetical component but also health, **social, building organization** and **flexibility intervention.**

Conventional atriums normally have one function, the presented design proposal shows how an atrium can act as **a building inside of a building** having different functions and providing spaces for various activities during working hours as well as off-working hours. Which substantially extends the use of the building and makes the **use of the land** and **commodities** more efficient and therefore more sustainable.

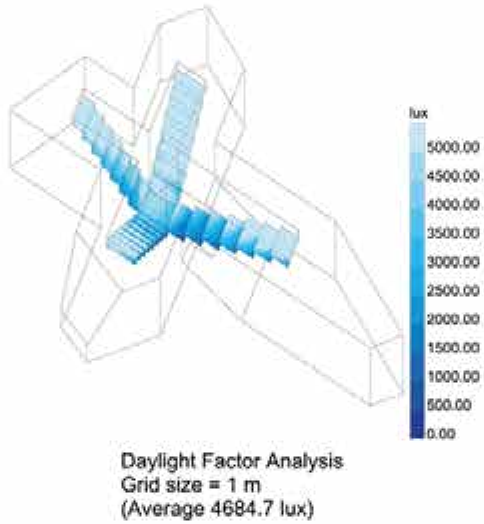
Atrium can be seen as a part of the office including different meeting, sporting or recreational spaces during working week.

In the evenings and weekends it can be rented out as an event space, sporting facility, night club or even a cinema. This gives an opportunity for the **24/7 use** of the building while conventional office building functions through Monday to Friday only.

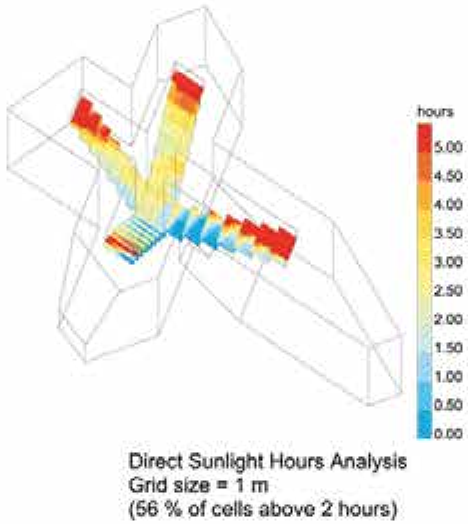
On top of that proposed structure for atrium is as flexible as possible with use of steel and prefabricated elements. This allows for the structure to be changed at any point in time when desired (e.g. new tenants, change in use/function, etc.) with minimal impact on the whole building and carbon footprint since all elements can be easily re-used or re-purposed.

Diagram a. captures how atrium terraces act as spaces for different purposes.

Diagrams b. and c. show how much daylight and sunlight the atrium is optimized in average on a day in June which proves that atrium spaces can be used even for working spots.

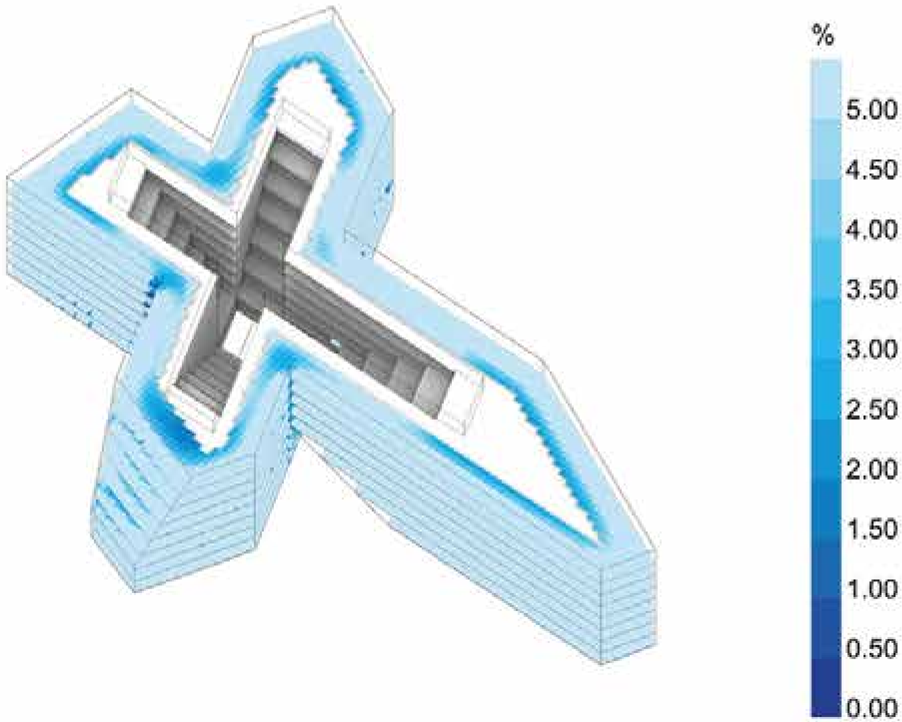


b. daylight in the atrium



c. sunlight in the atrium

Healthy office space



Daylight Factor Analysis
Grid size = 1 m
(83 % of cells above 2%)

Visual comfort plays an important role in a healthy work environment. In the design the views from every work spot are optimized by the building shape, this also makes daylight penetration possible which ensures 2% daylight factor.

Glare is prevented by the orientation optimized facade. The atrium plays an important role in these aspects of visual comfort.

The nature based climate comfort concept ensures a high level of air quealit with a desired level of control on heating, cooling and humidity.

To ensure the role of the building user all MEP can be controlled and overrided per office unit. The intergrated natural ventilation in the facade can also be controlled by the building user when desired.

The structure and used materials ensure the acoustic comfort inside the office.

The integration of green and even fauna (butterflies, birds) as a crucial element in the interior and exterior design contributes not only to the ecological structures but also to the physical, mental and spiritual well-being of people.

The meeting places located in the atrium stimulate social interaction and therefore contributes to the social cohesion and the social well-being of the people.

The special artificial lighting in combination with ambient lighting takes in account the biological clock of the building users and secures good working conditions.

All used materials are checked on health effects.

Facade performance

In order to achieve the best quality of healthy office spaces an extensive study was made on how to approach building's envelope. Taking into consideration: optimum amount of daylight and view, reduction of heat loss, prevention of heatload, optimization of heatgain and prevention of glare - as per building orientation. Noise reduction and ventilation were also used. The total resulted into a new facade concept.

Principle decisions

The main facade concept has to be flexible so that it can meet the different performance requirements thanks to the X-shaped mass of the building. Each facade has a different orientation and so the heat load requirements for each part are quite different.

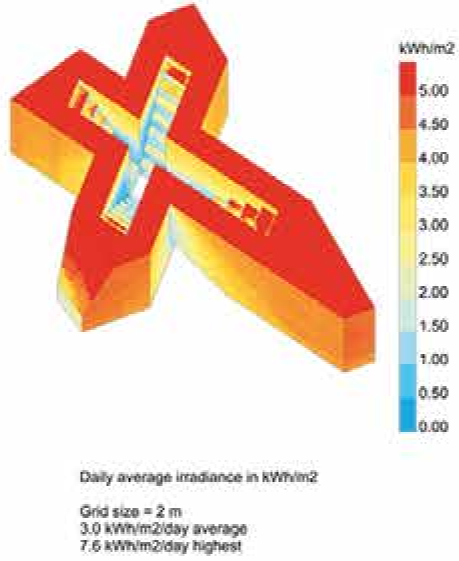
Following ''the flexibility based on performance'' concept the façade can be fully demountable and reusable. Circularity and retrofit are the keywords. Materiality should be lightweight and have a low carbon footprint.
Prefabrication is a priority as it reduces the carbon footprint by about 40%.

Further benefits of prefabrication include:

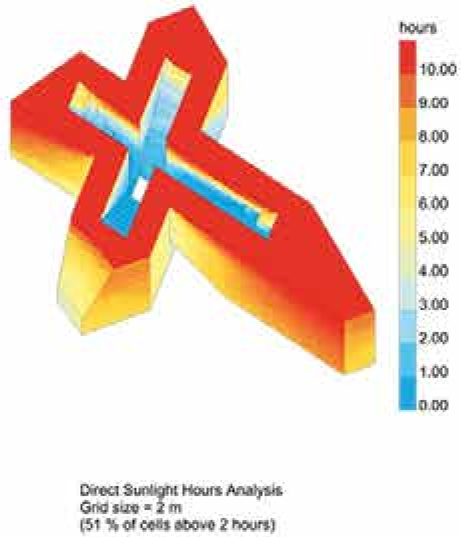
- Improved safety of production and installation
- Increased speed of installation
- Higher quality can be achieved with strict quality control and quality assurance processes especially on insulation and air-tightness
- Fewer site defects
- Less wastage in materials and inhouse recycling
- Modular design can bring cost reductions due to mass production of similar systems
- The building becomes watertight rapidly to allow internal works to begin

It has been decided that facade panels offer the maximum flexibility to be ahead in the BREEAM criteria. To achieve this, the same type of fully insulated facade cassettes will be used along the entire facade. They will be the same in cross section but may vary in width to respond to heat load and privacy. As a result, facade cassettes can be dismantled and reused according to the wishes of the user. Glass panels in the cassettes are placed in different depths to address the differentiation of the heat load along the facade. (They are retracted to the slab edge where the heat load is higher, while they are placed close to the facade edge where the heat load is lower.)

- Glass panels can be placed even though the section of the cassettes are tapered.
- Double skin can be applied where the noise is an issue.
- Depth of the cassettes is estimated to be 500mm.
- Fire compartmentalization is not an issue.
- Making cassettes walkable will make detailing more difficult. It is therefore preferable that users cannot walk into the cassettes, especially where the glass panels are closer to the facade line. There are several solutions that can be solved by incorporating furniture systems to block movement or by attaching a platform to the slab edge. However, the team will not address this issue as the competition phase is still early.

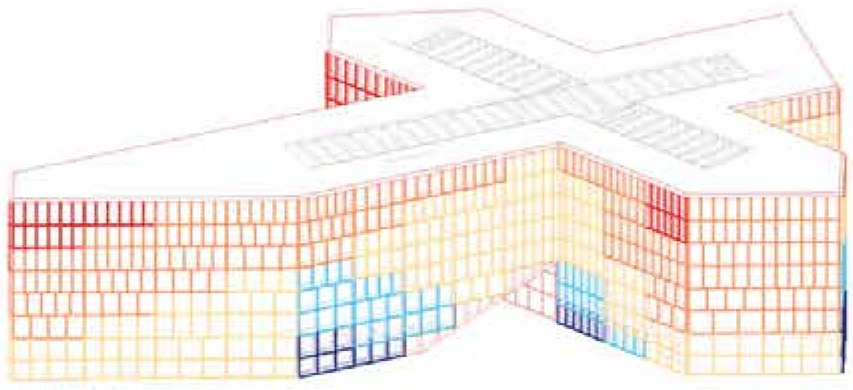


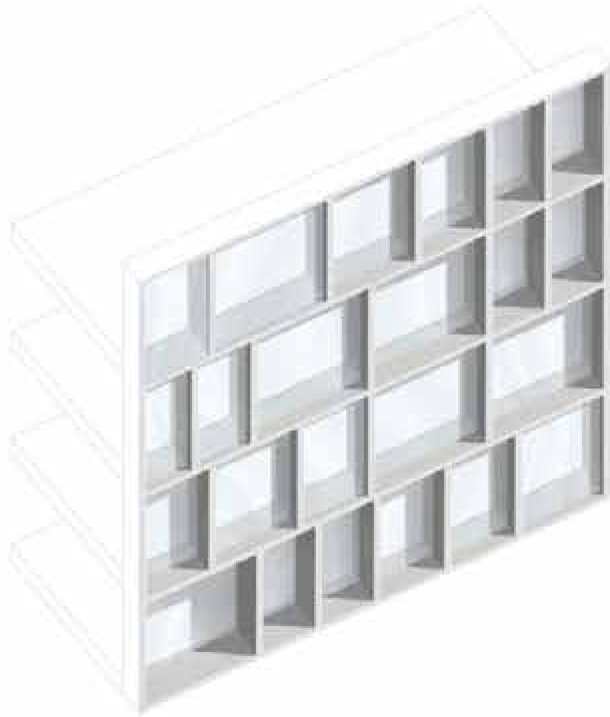
a. radiation



b. sunlight

BREEAM checklist

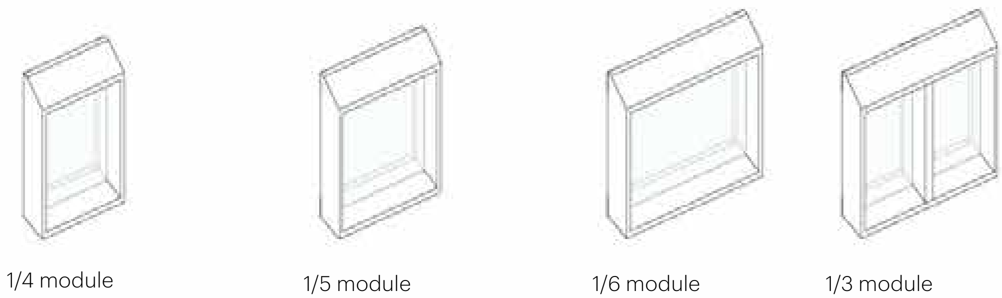




It has been decided that facade panels offer the maximum flexibility to be ahead in the BREEAM criteria. To achieve this, the same type of fully insulated facade cassettes will be used along the entire facade. They will be the same in cross section but may vary in width to respond to heat load and privacy. As a result, facade cassettes can be dismantled and reused according to the wishes of the user.

Glass panels in the cassettes are placed in different depths to address the differentiation of the heat load along the facade. (They are retracted to the slab edge where the heat load is higher, while they are placed close to the facade edge where the heat load is lower.)

- Glass panels can be placed even though the section of the cassettes are tapered.
- Double skin can be applied where the noise is an issue.
- Depth of the cassettes is estimated to be 500mm.
- Fire compartmentalization is not an issue.
- Making cassettes walkable will make detailing more difficult. It is therefore preferable that users cannot walk into the cassettes, especially where the glass panels are closer to the facade line. There are several solutions that can be solved by incorporating furniture systems to block movement or by attaching a platform to the slab edge. However, the team will not address this issue as the competition phase is still early.



Cassettes catalogue regarding width
Modules of structural grid of 8,1 m

BREEAM goals

The combination of the healthy office concept and the SDG approach has resulted in our specific BREEAM strategy. In this strategy we mainly focus on the health and environmental aspects.

For the operational performance of the building we made a choice for the client possible whether or not to become energy neautral, the energy performance is far above average but depending on the client's overall portfolio and energy strategy in that portfolio they can also strive for a centralized solution like investing in a 2,5 mW windmill which will produce enough energy for multiple buildings.

The centralized solution cannot be taken into account in the BREEAM systematics.

BREEAM checklist

	Assessment criteria	Credits points	
		Scenario I	Scenario II
Man1	Project brief and design	4	4
Man2	Life cycle cost and service life planning	4	4
Man3	Responsible construction practices	6	6
Man4	Commissioning and handover	4	4
Man5	Aftercare	3	3
subtotal		21	21
Hea 1	Visual comfort	1	1
Hea 2	Indoor air quality	5	5
Hea 3	Safe containment in laboratories		
Hea 4	Thermal comfort	3	3
Hea 5	Acoustic performance	1	1
Hea 6	Accessibility	2	2
Hea 7	Hazards	1	1
Hea 8	Private space	0	0
Hea 9	Water quality	1	1
		14	14
Ene 1	Reduction of energy use and carbon emissions	10	16
Ene 2	Energy monitoring	3	3
Ene 3	External lighting	1	1
Ene 4	Low carbon design	3	3
Ene 5	Energy efficient cold storage	3	3
Ene 6	Energy efficient transport systems	3	3
Ene 7	Energy efficient laboratory systems	0	0
Ene 8	Energy efficient equipment	2	2
Ene 10	Flexible demand side response	0	0
		25	31
Tra 1	Public transport accessibility	5	5
Tra 2	Proximity to amenities	0	0
Tra 3	Alternative modes of transport	2	2
Tra 4	Maximum car parking capacity	0	0
Tra 5	Travel plan	1	1
Tra 6	Home office	0	0

Wat 1	Water consumption	5	5
Wat 2	Water monitoring	1	1
Wat 3	Water leak detection and prevention	2	2
Wat 4	Water efficient equipment	1	1
		9	9
Mat 1	Life cycle impacts	5	5
Mat 3	Responsible sourcing of construction products	4	4
Mat 5	Designing for durability and resilience	1	1
Mat 6	Material efficiency	1	1
		11	11
Wst 1	Construction waste management	3	3
Wst 2	Recycled aggregates	1	1
Wst 3	Operational waste	1	1
Wst 4	Speculative finishes	1	1
Wst 5	Adaptation to climate change	1	1
Wst 6	Functional adaptability	1	1
		8	8
LE 1	Site selection	0	0
LE 2	Ecological value of site and protection of ecological features	2	2
LE 4	Enhancing site ecology	3	3
LE 5	Long term impact on biodiversity	2	2
		7	7
Pol 1	Impact of refrigerants	4	4
Pol 2	Nox emissions	2	2
Pol 3	Surface water run-off	5	5
Pol 4	Reduction of night time light pollution	1	1
Pol 5	Reduction of noise pollution	1	1
		13	13
Inn 1	Innovation	4	4
		116	122
		85,50%	90,90%

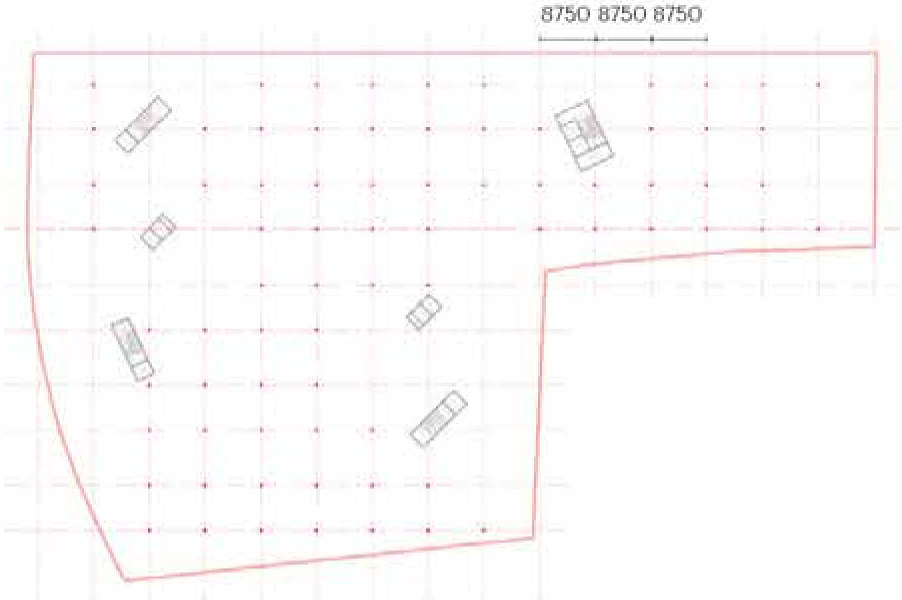
Structural solutions

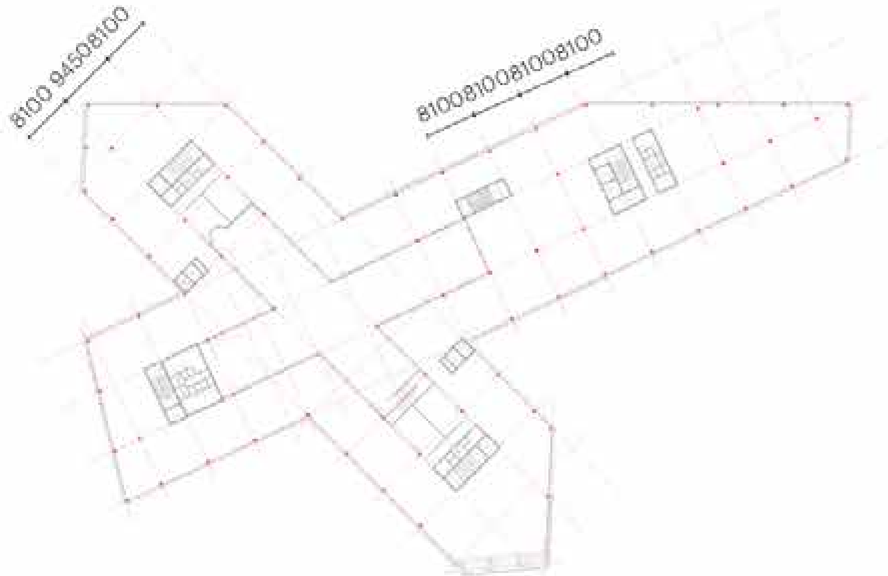
7

Structure

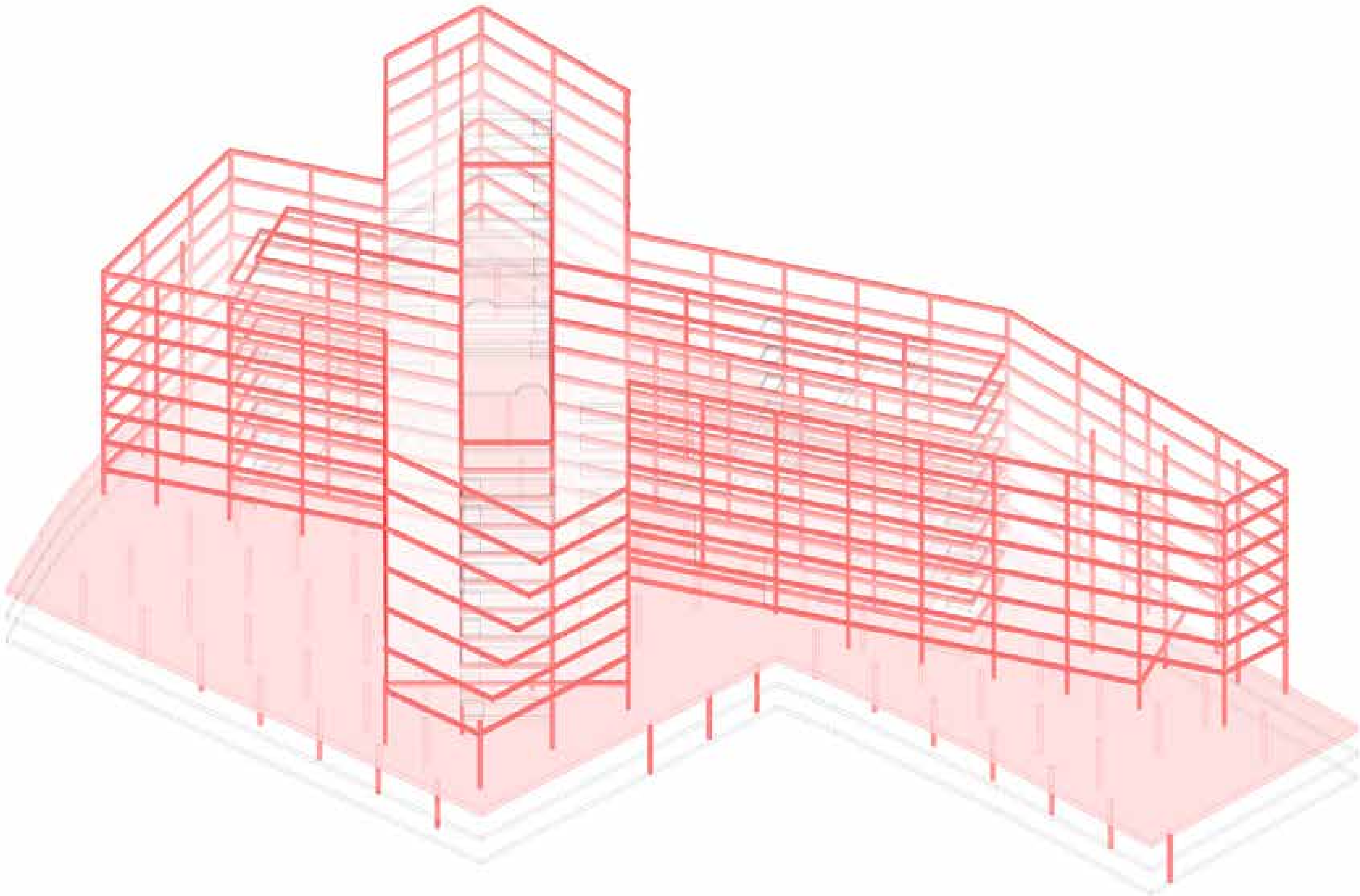
A grid of (8100x 8100) mm is established for all office levels, while in basemant, to efficiently plan 2750 mm width parking lots a transfer slab of 1100 mm thickness with strategical placed void formers to avoid an abundance of concrete and therefore weight. A solution that is also be beneficial from a sustainable point of view.

The atrium steel beams estimated as 360mm depth with PV cells with a separation of (8100/3=) 2700mm.





Structure



General building indicators

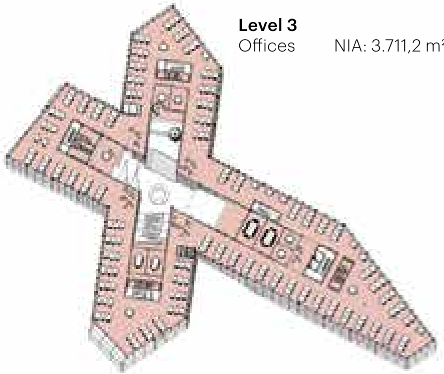
8

Indicators table

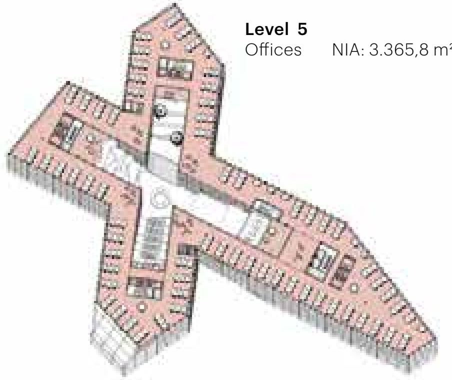
Plot area	7.911 m^2
Intensity of development of the plot	3,45
Density of development of the plot	59.4 %
Use of the building	Administrative Catering, retail, services and conference
Gross floor area	31.131 m^2
Useful floor area	27.322 m^2
Volume of the building	109.455 m^3
Number of storeys	8 (Ground floor + 7)
Building height	28 m

Level 0
Public NIA: 3.412,4 m^2
Flex offices NIA: 139.9 m^2

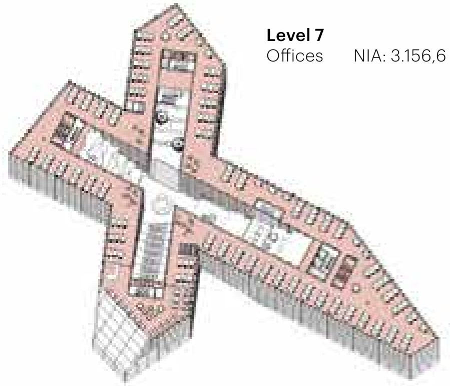
Level 3
Offices NIA: 3.711,2 m²



Level 5
Offices NIA: 3.365,8 m²

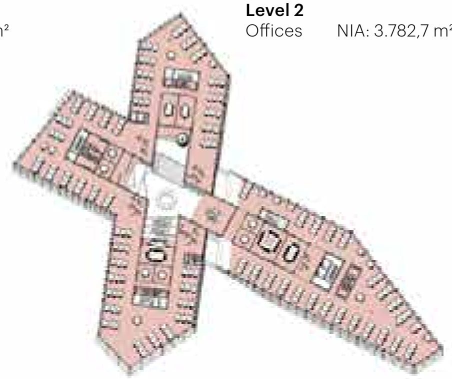


Level 7
Offices NIA: 3.156,6 m²

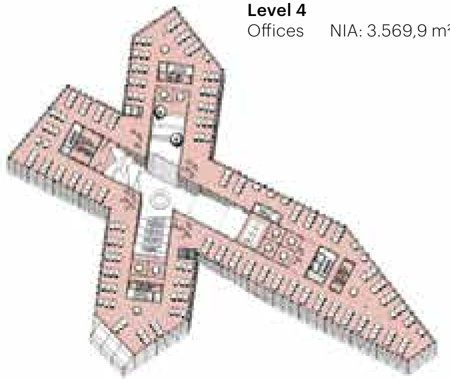


Level -1
Parking 7.910 m²
parking (units) 200
bycicle (units) 18

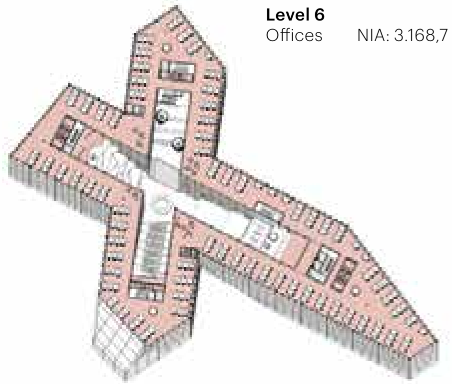
Level 2
Offices NIA: 3.782,7 m²



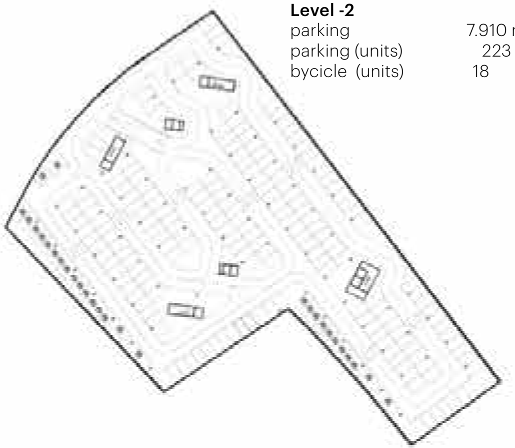
Level 4
Offices NIA: 3.569,9 m²



Level 6
Offices NIA: 3.168,7 m²



Level -2
parking 7.910 m² m²
parking (units) 223
bycicle (units) 18



Level 1
Offices NIA: 3.026,7 m²