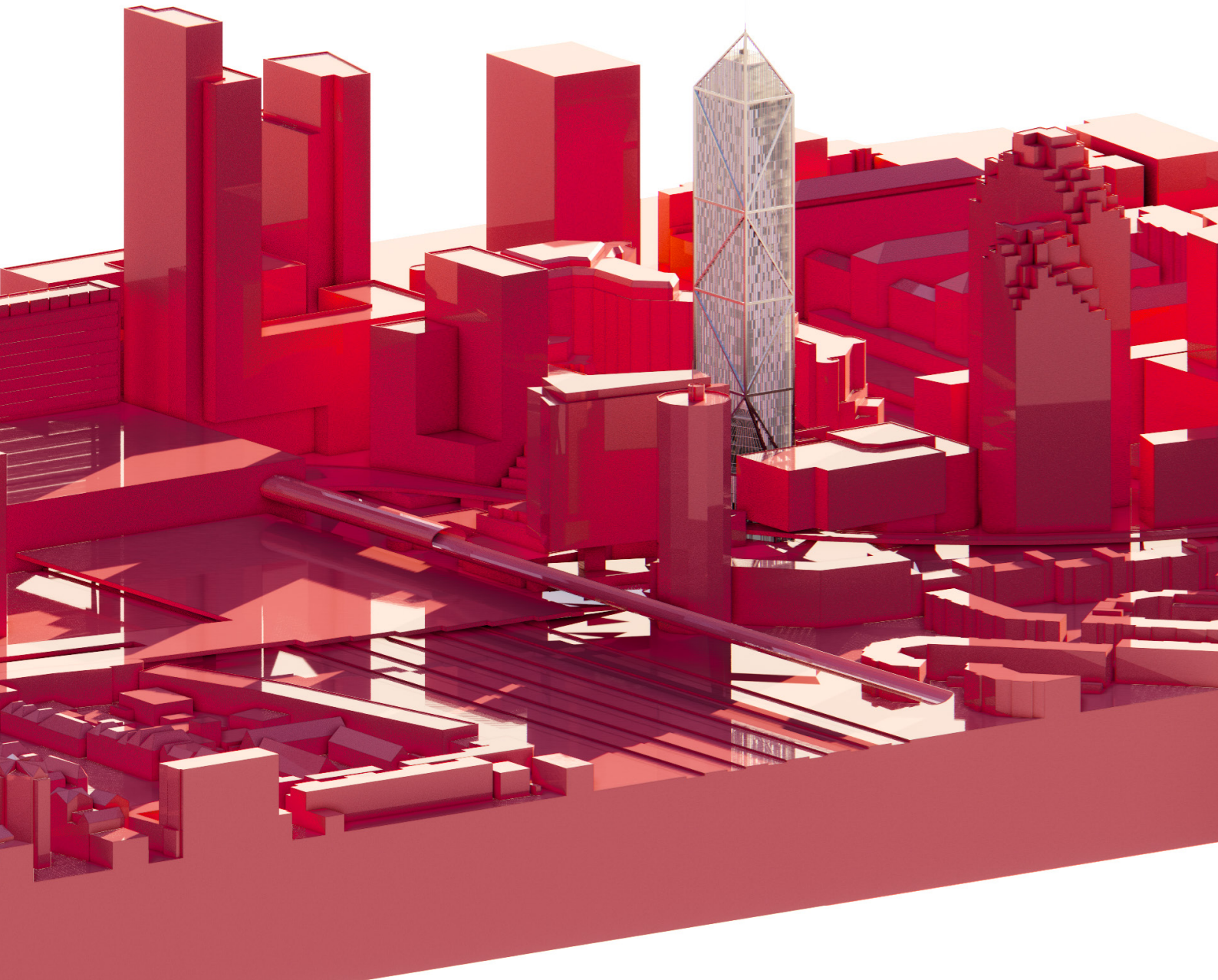
DESIGN JOURNAL

AMBER ROSE HEIJDENS



XXI CENTURY WUNDERKAMMER

DESIGN JOURNAL

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mentor 3: dr. Sang Lee ns

WUNDERKAMMER XXI

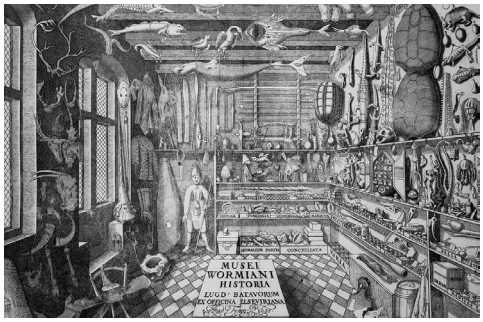
wunderkammer

or cabinet of curiosities

NOUN

Wunderkammer; plural noun: Wunderkammern

a place where a collection of curiosities and rarities is exhibited.

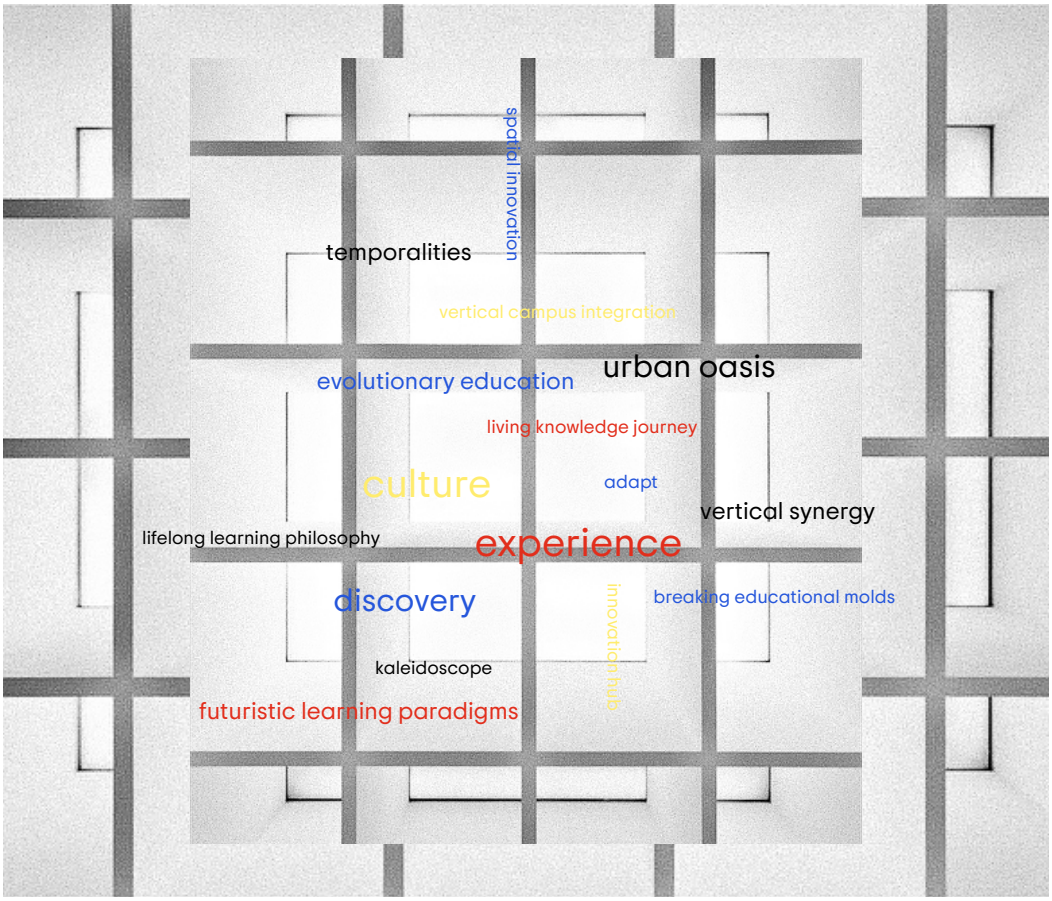


cabinet of curiosities

knowledge, exploration, and the blending of science and art

inspire

CONNECTING WORDS



CAMPUS OF THE FUTURE

“The Campus of the Future” is an architectural marvel, blending a kaleidoscopic range of activities and experiences – a XXI century wunderkammer.

THE CONCEPT OF WONDER AND ITS INFLUENCE ON EDUCATION

The concept of exploration throughout a high-rise university building like Wunderkammer XXI plays a pivotal role in stimulating intellectual growth and enhancing the learning process. This architectural design promotes a unique form of physical and cognitive engagement that traditional horizontal campuses often lack. By encouraging students to navigate vertically through a series of specialized learning environments, the high-rise structure transforms the act of moving between classes into an opportunity for discovery and exploration.

Exploration within a high-rise educational building involves more than just moving between floors; it is an immersive experience that integrates learning into every aspect of the student's journey. Each level or section of the building can be dedicated to different disciplines or themes, creating a series of interconnected yet distinct learning environments. As students ascend or descend through the building, they are exposed to a variety of educational stimuli, from interactive displays and multimedia installations to hands-on laboratories and collaborative workspaces. This continuous exposure to diverse learning settings keeps the mind engaged and curious, fostering a deeper connection to the material being studied.

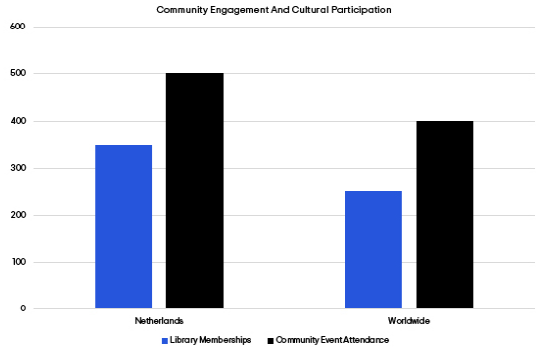
The physical act of exploration encourages students to break out of the confines of traditional, sedentary learning. It transforms passive reception of information into an active quest for knowledge. For instance, a student might move from a floor dedicated to environmental sciences, complete with interactive ecosystems and sustainability labs, to a floor focused on digital innovation, featuring state-of-the-art technology and maker spaces. This movement not only reinforces learning through varied sensory inputs but also allows students to draw connections between different fields of study, promoting interdisciplinary thinking and problem-solving skills.

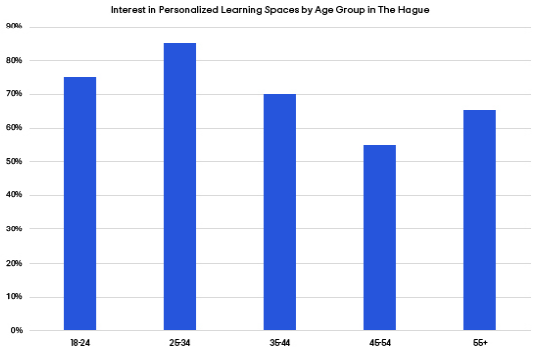
Furthermore, the high-rise design inherently encourages regular physical activity, which has been shown to have numerous cognitive benefits. Walking between floors, navigating through different spaces, and engaging in physical exploration can improve concentration, enhance memory retention, and reduce stress. The architectural design can incorporate features such as open staircases, transparent elevators, and strategically placed observation points to make this movement visually stimulating and intellectually rewarding.

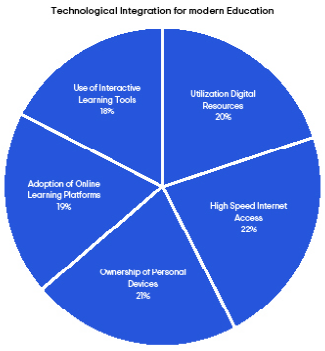
Exploration throughout the building also fosters a sense of community and collaboration among students. Common areas, informal gathering spaces, and vertical gardens or terraces provide opportunities for spontaneous interactions and discussions. These interactions can lead to the sharing of ideas, collaborative projects, and a more vibrant academic community. By creating a dynamic environment where students are encouraged to explore and interact, the high-rise university design promotes a culture of continuous learning and intellectual curiosity.

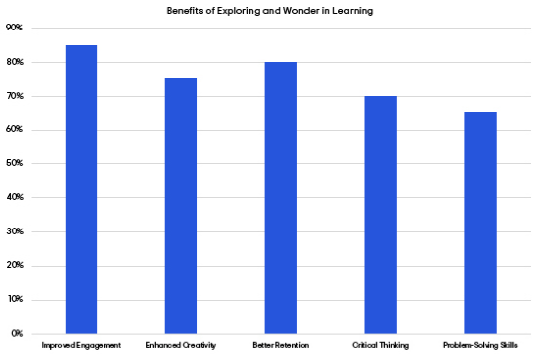
In conclusion, the integration of exploration throughout a high-rise university building like Wunderkammer XXI significantly enhances the educational experience. It transforms the physical space into a dynamic and interactive learning environment that stimulates the mind and body. By encouraging students to explore diverse learning settings and engage with their peers in new ways, this architectural approach fosters a more engaged, curious, and holistic approach to education. This not only improves academic outcomes but also prepares students to navigate and thrive in an ever-evolving world.

RESEARCH

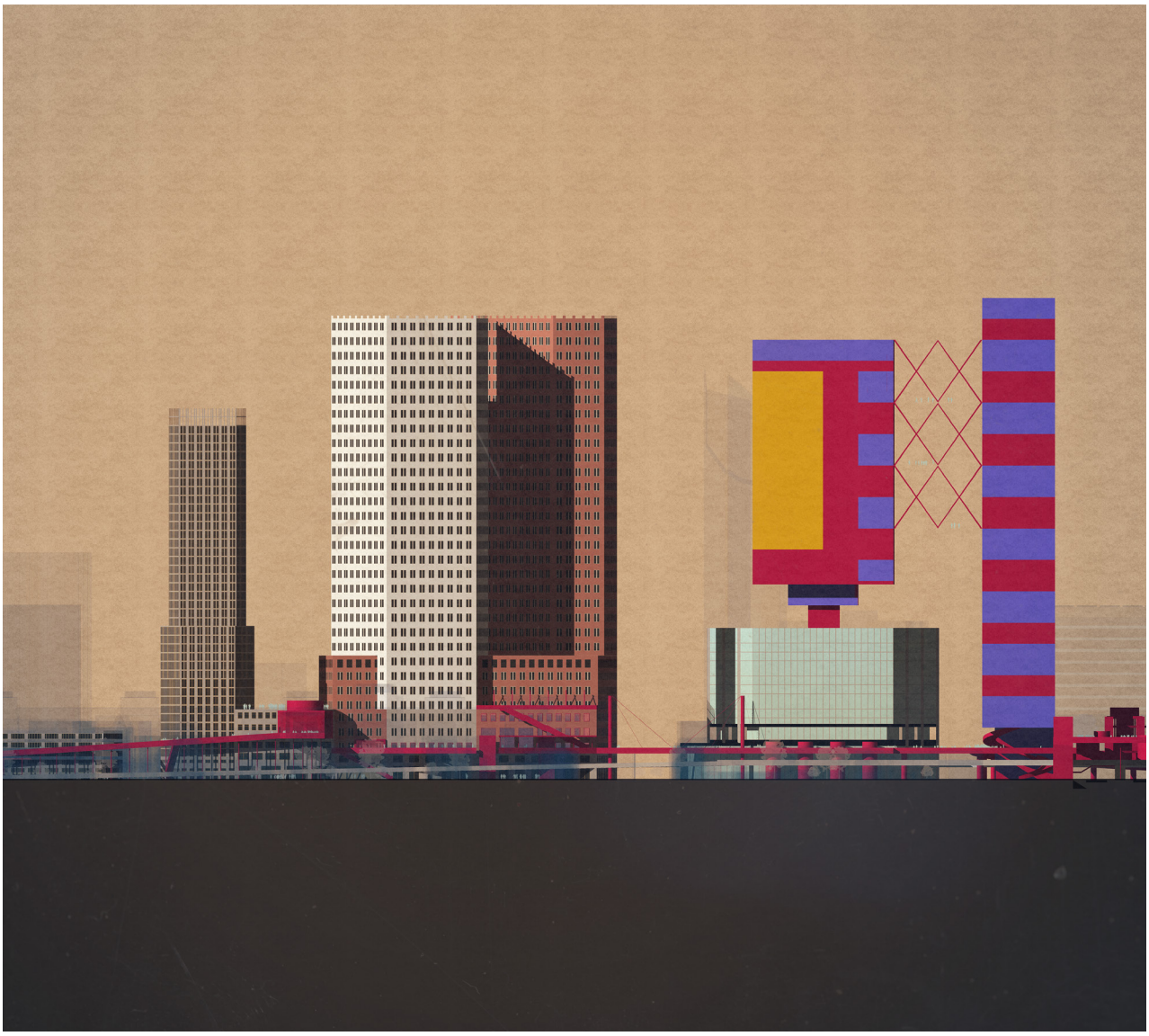

Community Engagement And Cultural Participation
600
500
400
300
200
100
0
Netherlands
Worldwide
Library Memberships
Community Event Attendance


Interest in Personalized Learning Spaces by Age Group in The Hague
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
18-24
25-34
35-44
45-54
55+


Technological Integration for modern Education
Use of Interactive Learning Tools 18%
Utilization Digital Resources 20%
Adoption of Online Learning Platforms 19%
High Speed Internet Access 22%
Ownership of Personal Devices 21%

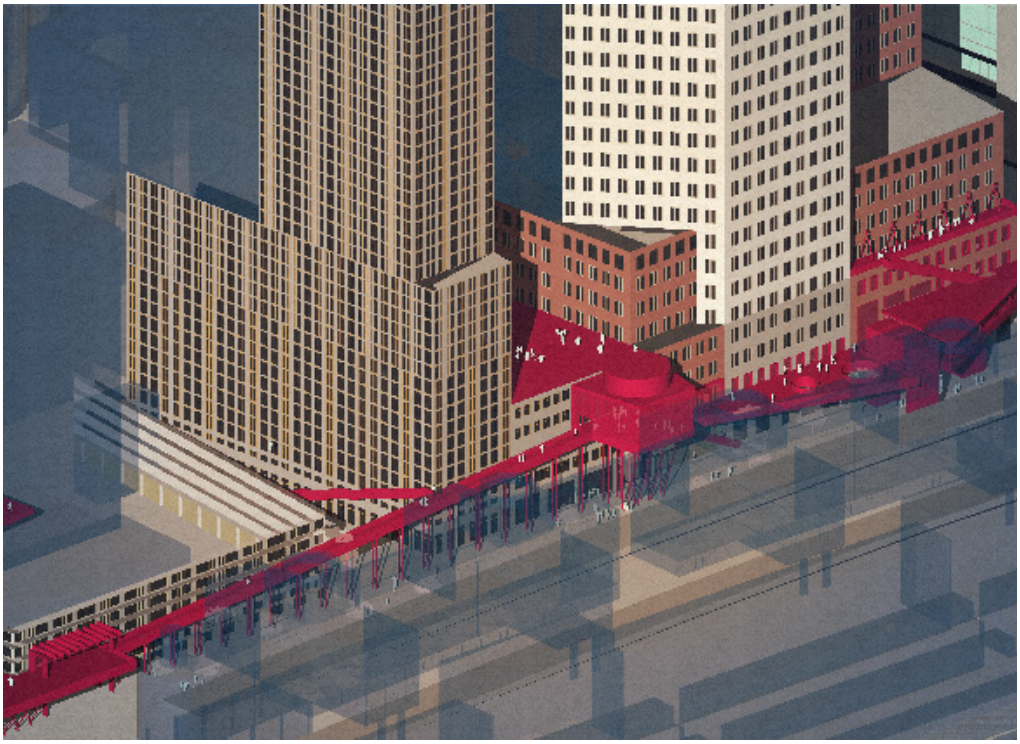

Benefits of Exploring and Wonder in Learning
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Improved Engagement
Enhanced Creativity
Better Retention
Critical Thinking
Problem-Solving Skills

HORIZONTAL BRIEF

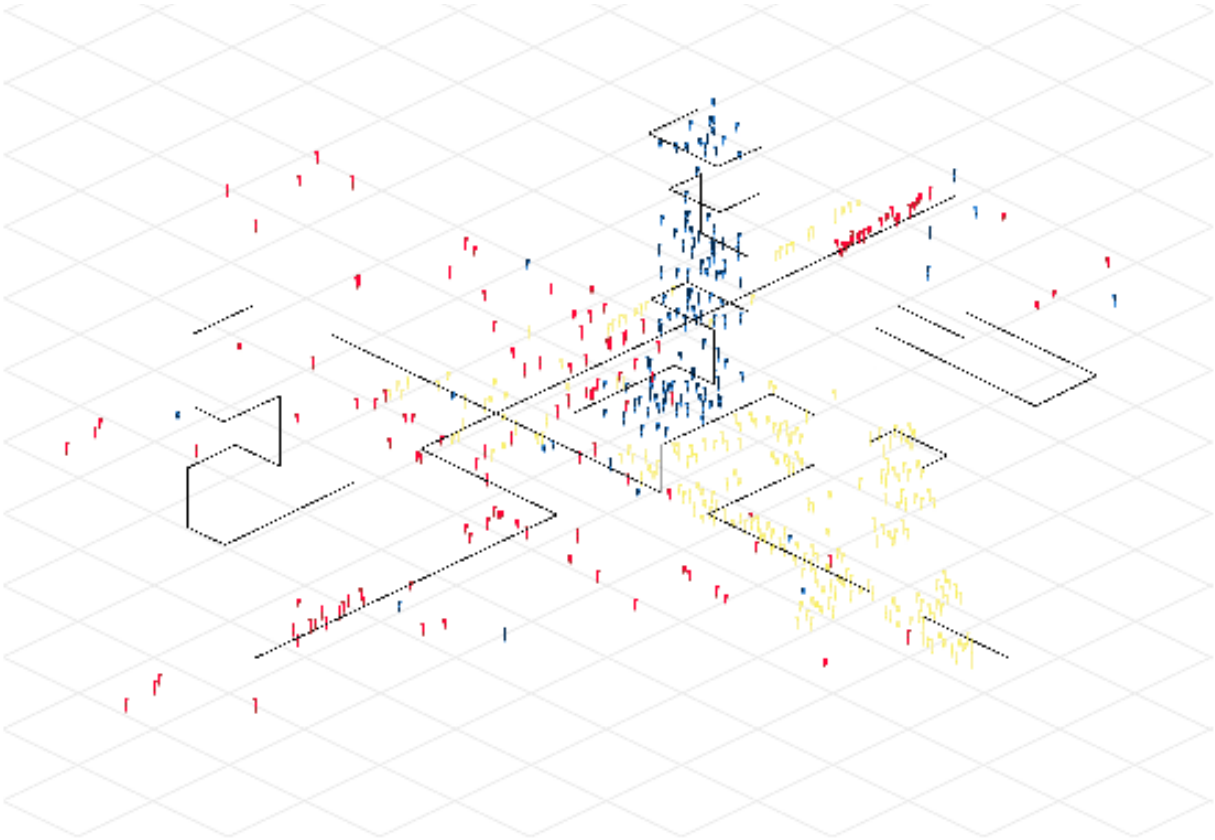


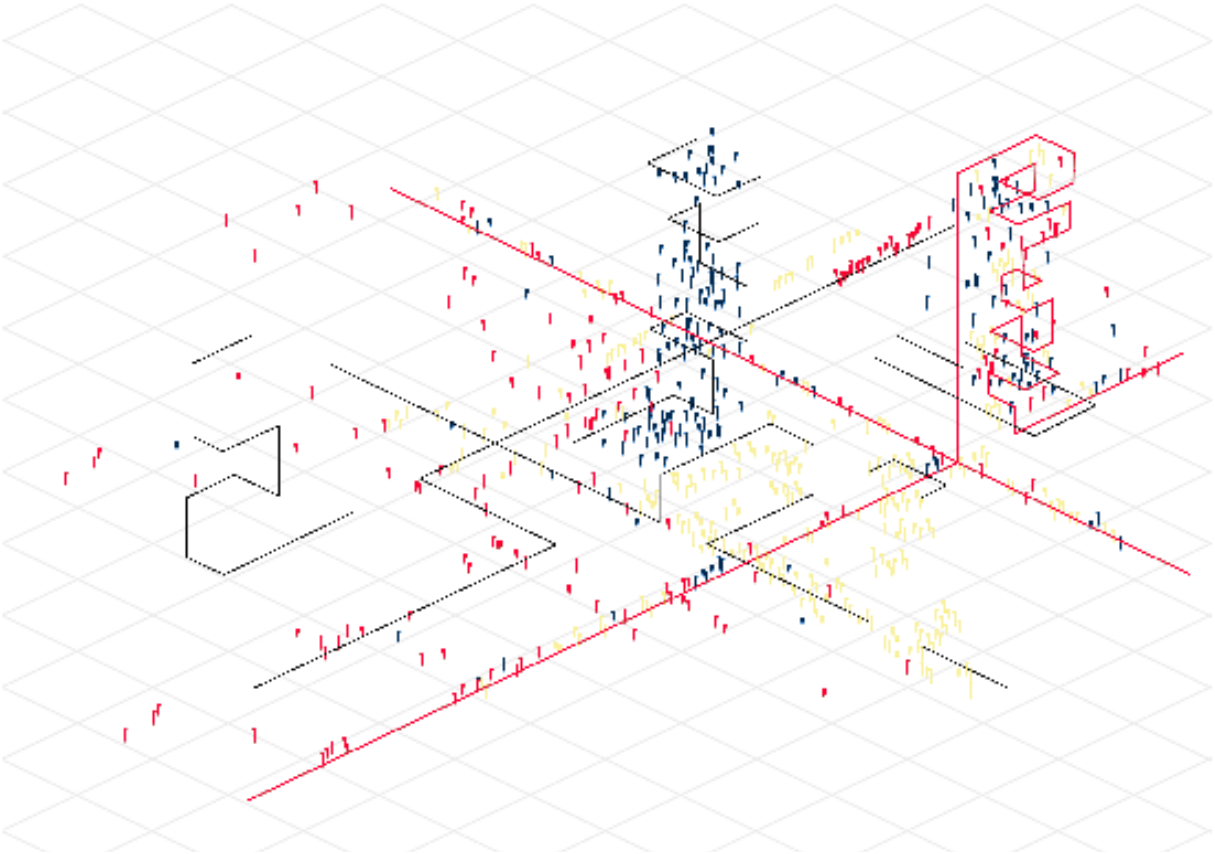
The proposed pedestrian-centric promenade in The Hague represents a visionary approach to urban design, emphasizing the importance of pedestrian mobility and social interaction in creating sustainable and vibrant cities. By elevating the pedestrian experience and integrating seamlessly with the existing urban fabric, this design concept offers an innovative solution to enhancing urban connectivity, fostering social cohesion, and promoting environmental sustainability.

This elevated walkway, with its continuous and crinkling path, provides a practical and enjoyable means of navigating The Hague while adding a dynamic and interactive layer to the urban landscape. It exemplifies how thoughtful urban design can blend new and existing elements to create spaces that are both functional and enriching for the community, aligning with The Hague's goals of sustainability and inclusivity.

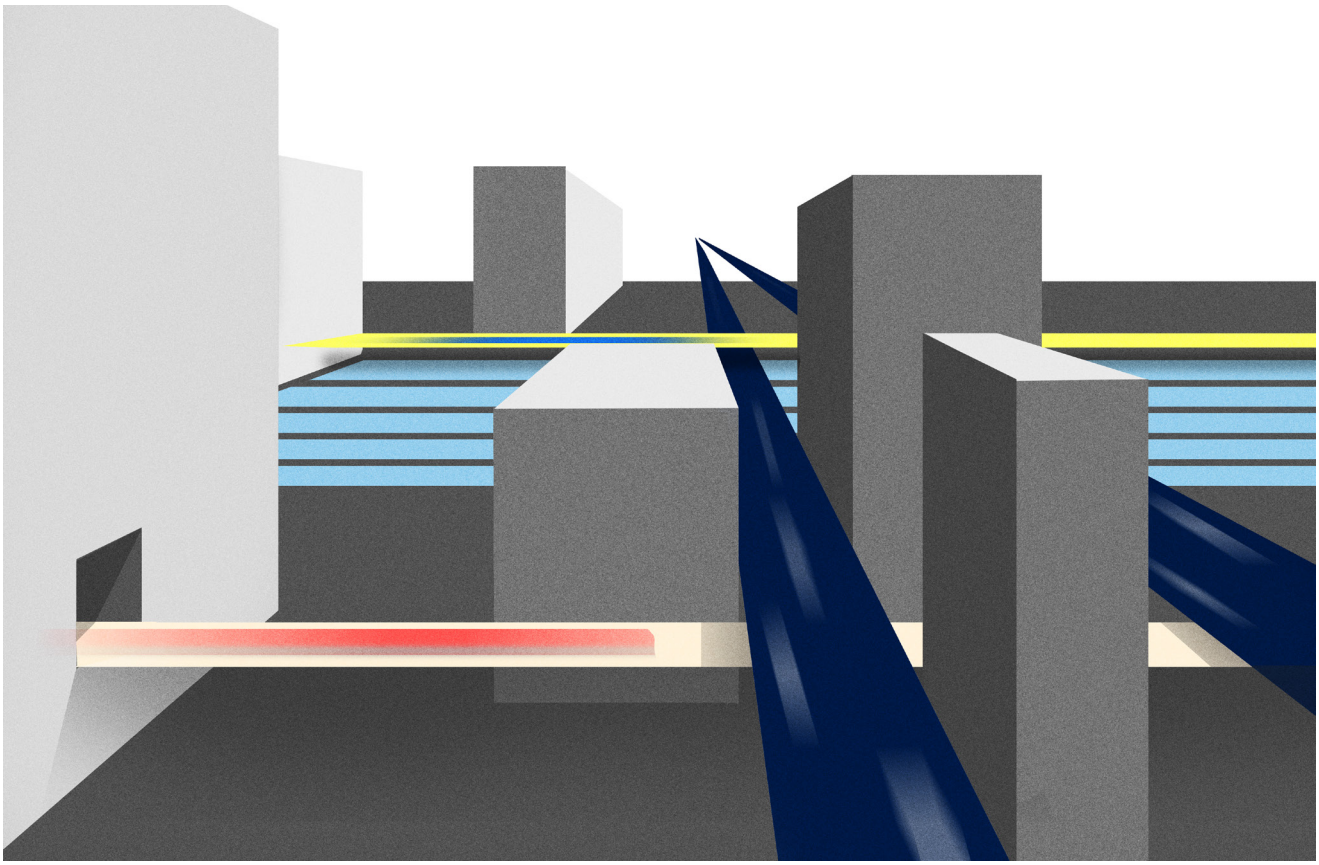


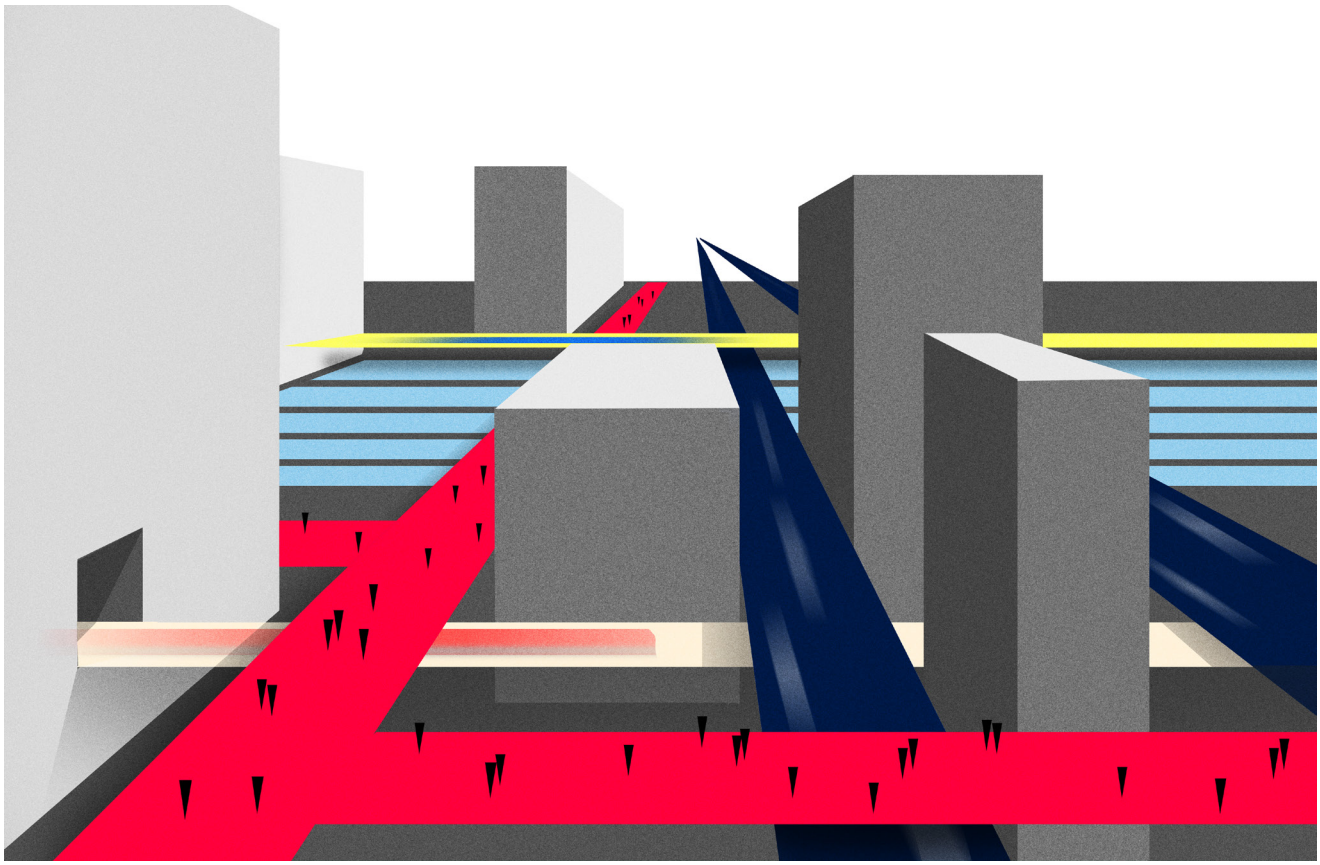
MISSING LAYER



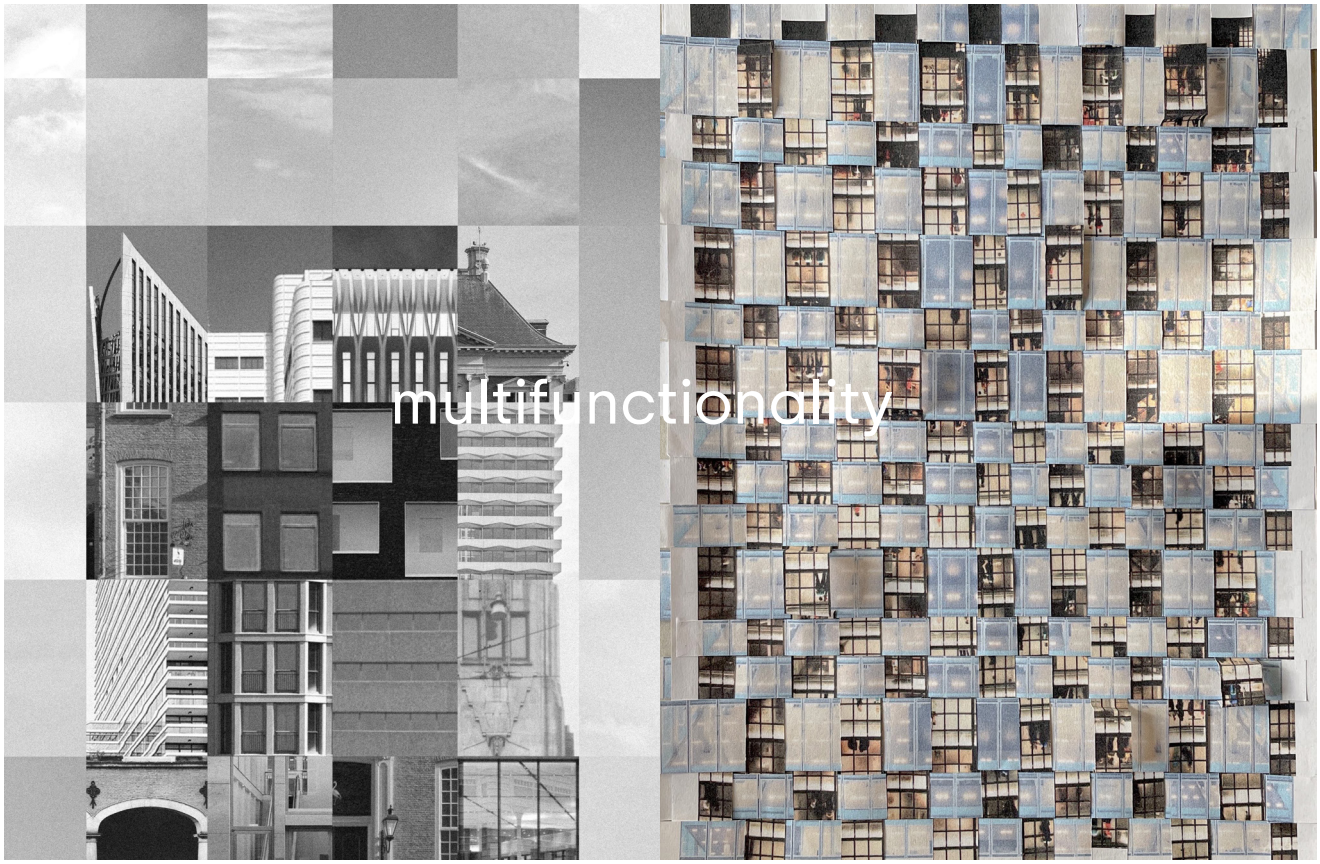


MISSING LAYER






old vs new


multifunctionality

URBAN CONTEXT

nolli map: buildings

green

water

pedestrian and bicycle

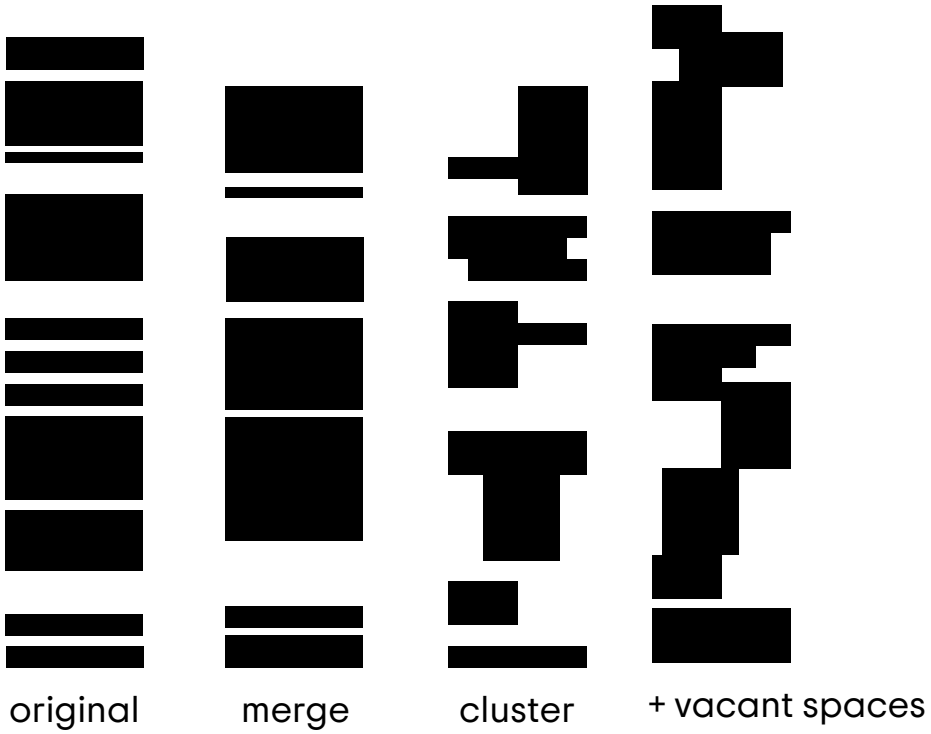
public transport

highways

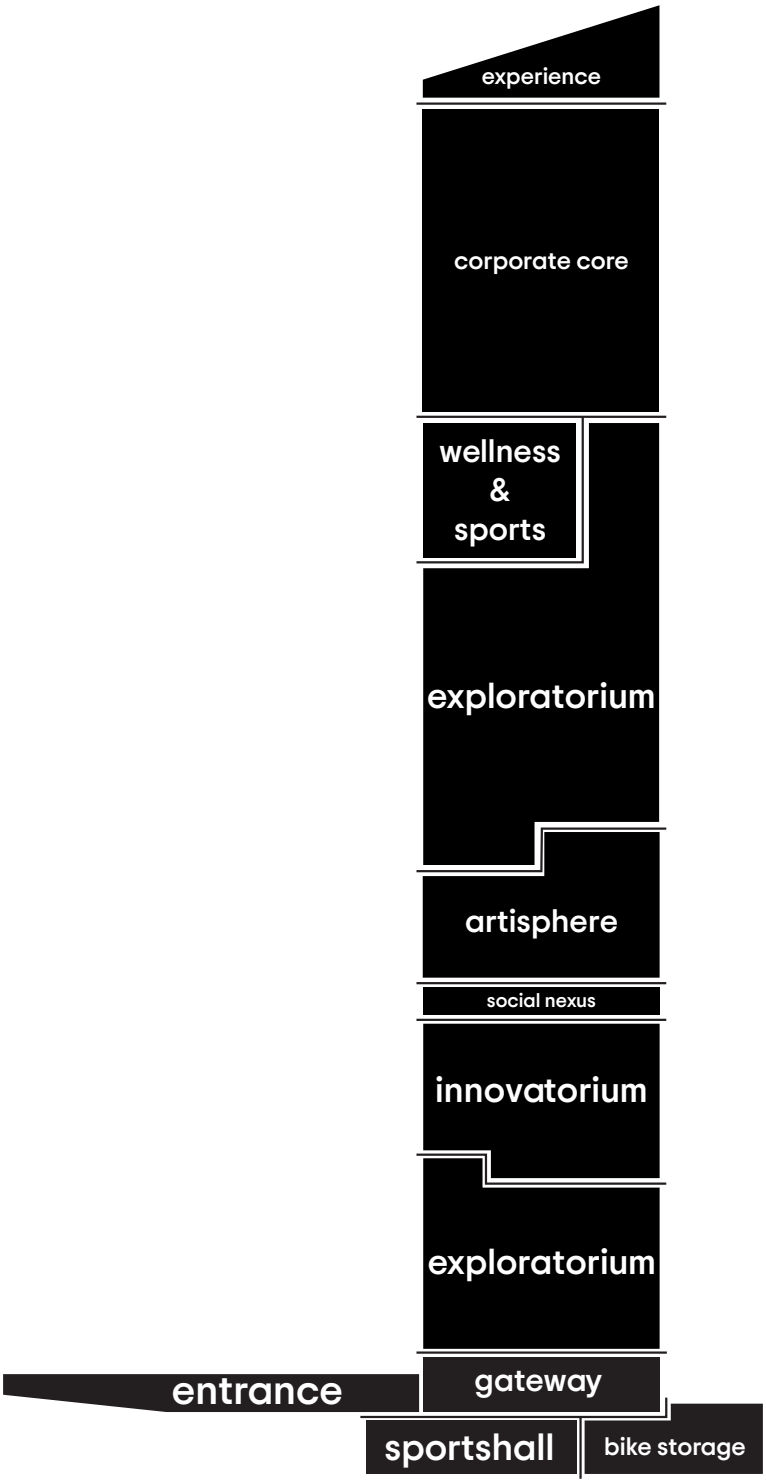
CLUSTERS

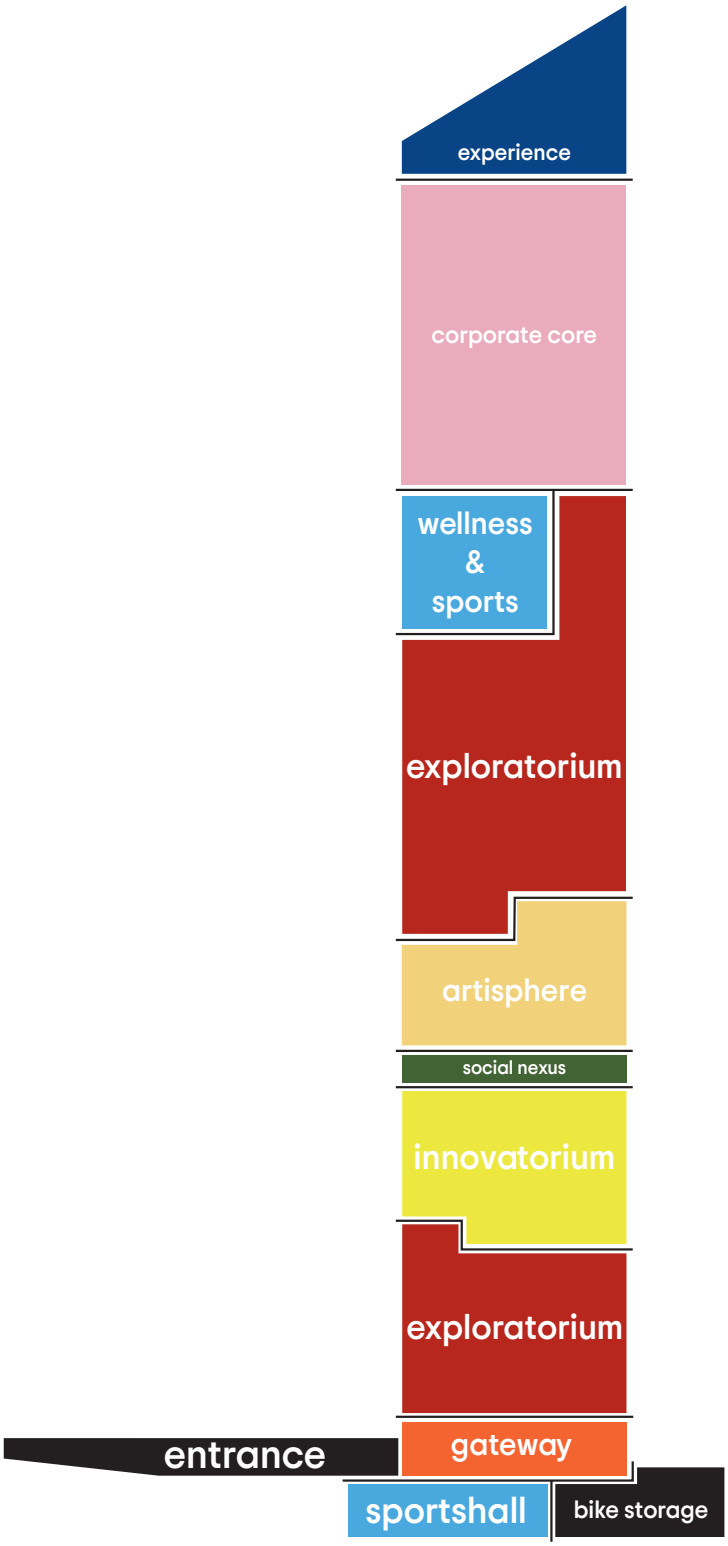
CLUSTER PROGRAM

In designing the high-rise tower, the original program was strategically clustered and merged to create multifunctional spaces that can be utilized throughout the day, enhancing space efficiency and sustainability. This approach not only reduces the overall square footage required but also maximizes the utility of each area, aligning with sustainable design principles. The clustered programs were then arranged to interlock like a puzzle, ensuring that each cluster is optimally placed based on factors such as daylight exposure, height, and connectivity to the building's horizontal axes. This thoughtful organization enhances the functionality and comfort of the spaces. Additionally, vacant areas were incorporated to form atriums and flexible spaces, providing room for future adaptations or various users' needs. This dynamic design allows the high-rise to evolve over time, maintaining its relevance and utility while fostering a vibrant, adaptable urban environment.



OVERALL LAYOUT



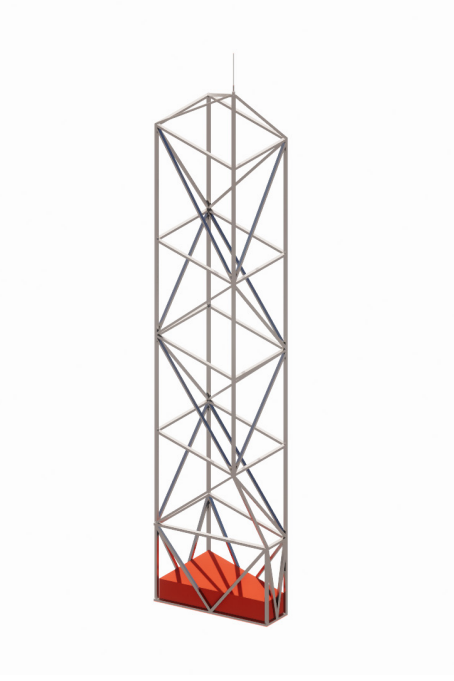

experience
corporate core
wellness & sports
exploratorium
artisphere
social nexus
innovatorium
exploratorium
entrance
gateway
sportshall
bike storage

CHART

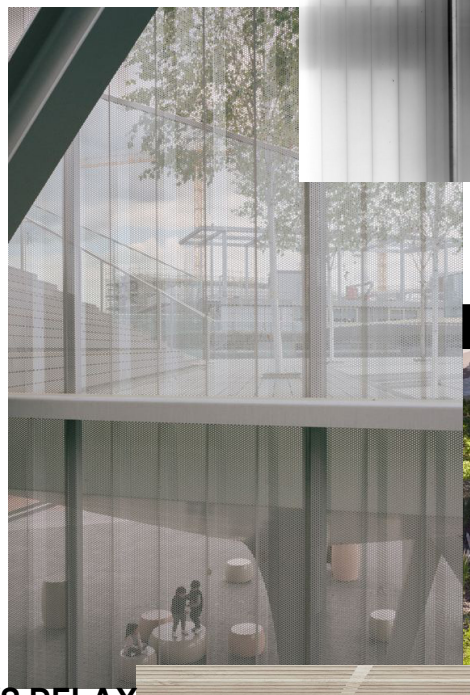
	function	space design	special element
the gateway	entrance, plinth, connection exisiting library and outside	open space, high ceilings, one lobby and one free zone	connection square
the exploratorium	classrooms, meeting rooms, and library	a mix of smaller and bigger spaces	connection existing building and reuse of old library
the innovatorium	labs and workspaces	big working space with connecting personal workshops	terraces
the social nexus	demonstration space, and stage	open space in the heart of the building	central located in the building
the artisphere	art gallery, and exhibition space	haning space with high ceilings	hanging construction
wellness and sports	sports spaces	scattered spaces in the building	underground sportshall and scattered sports functions
corporate core	offices, and meeting rooms	3m high open and more private spaces	wintergardens with plants
the experience	lookout spot, and cinema	top 2 floors	sky cinema with lookout by day and cinema by night
flex zones	vacant space for the future	-	multipurpose reusable space

For each cluster, the functions, space design and special element are displayed.

1. GATEWAY



At ground level, the edifice unveils a hospitable portal, serving as the principal ingress, promptly enveloping guests in an engaging ambiance. This tier hosts an array of gastronomic establishments, each affording unique culinary encounters. Engineered to cater to a spectrum of palates, these dining venues range from casual bistros to refined epicurean destinations. The ambience within each eatery is meticulously curated, seamlessly melding comfort with a hint of sophistication, ideal for an array of dining occasions. Thus, this level, with its amalgamation of an inviting entrance and diverse culinary spaces, evolves into a vibrant social nucleus, enticing both locals and tourists alike for memorable epicurean sojourns nestled at the epicenter of the edifice.

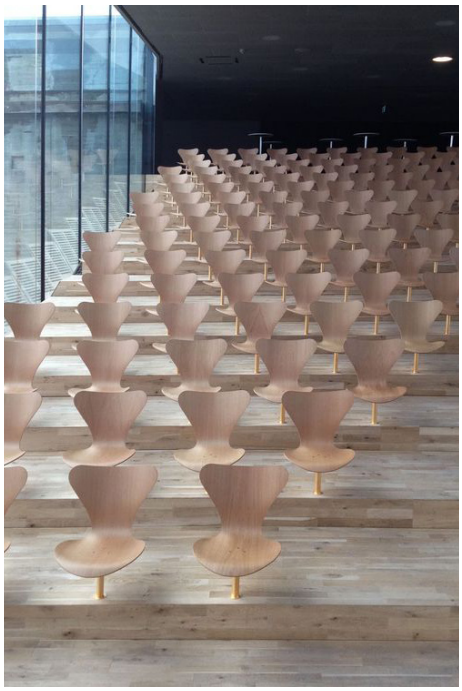


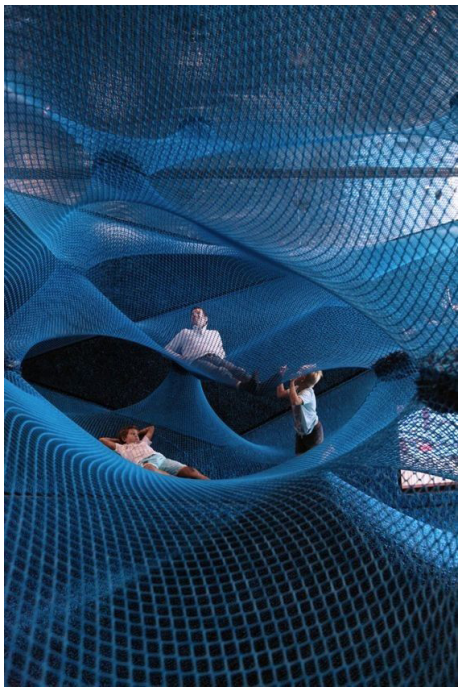
DAYLIGHT

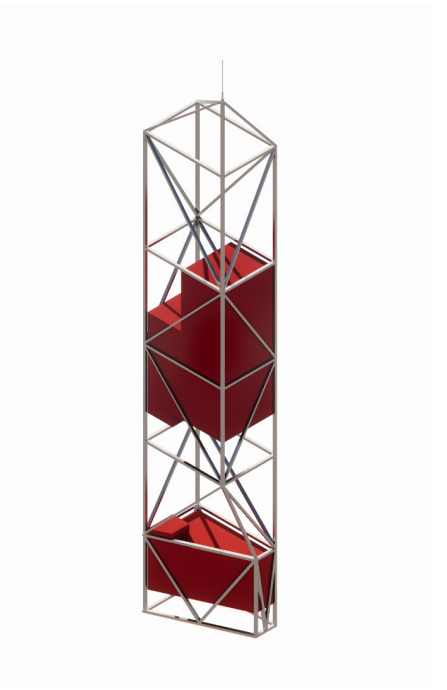
PRIVATE VS RELAX

HIGH CEILINGS

2. EXPLORATORIUM

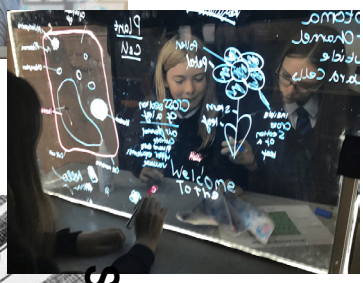






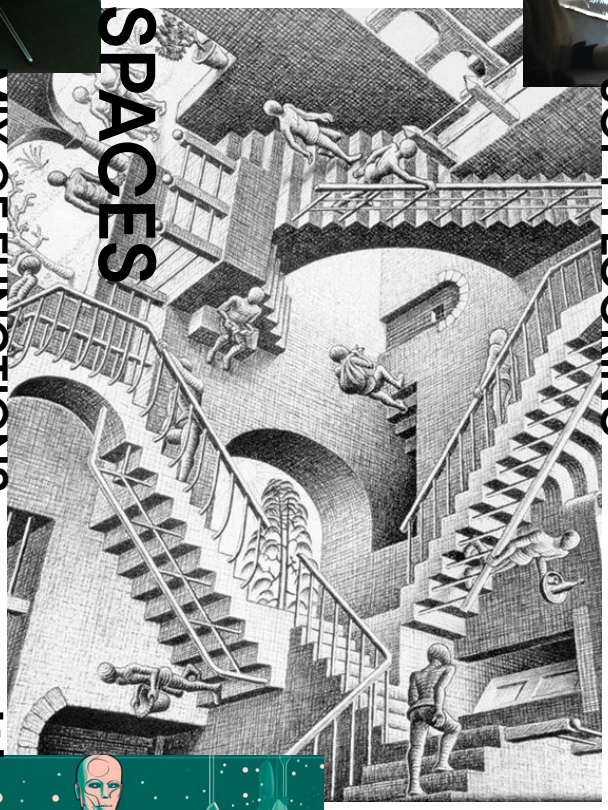
Situated within the architectural confines, the exploratorium serves as a nucleus for discovery and educational pursuits. Crafted to ignite curiosity, this dynamic locale facilitates an interactive odyssey spanning various domains of inquiry. Replete with tactile exhibits and immersive presentations, it beckons individuals of all age groups to participate and delve into the realms of knowledge. Converging at the juncture of science, art, and technology, the exploratorium engenders a distinctive educational milieu, one that champions exploration and experimentation beyond traditional paradigms. It stands as a bastion for those inclined toward continuous learning and inquiry, fostering an environment conducive to creativity and the cultivation of a lifelong passion for knowledge acquisition.

SMALLER&BIGGER SPACES



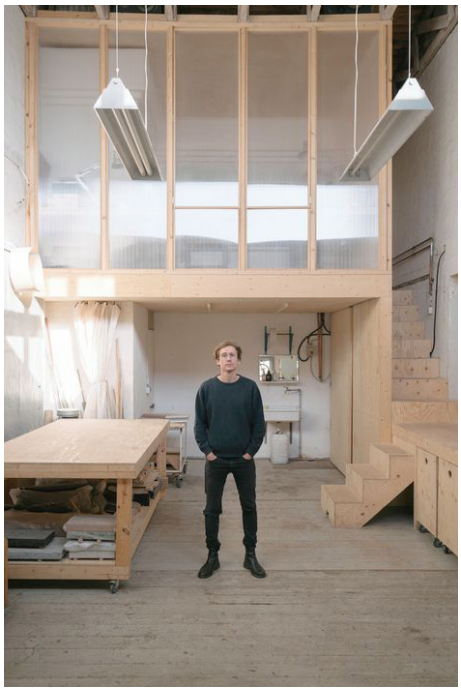
SOFT FLOORING

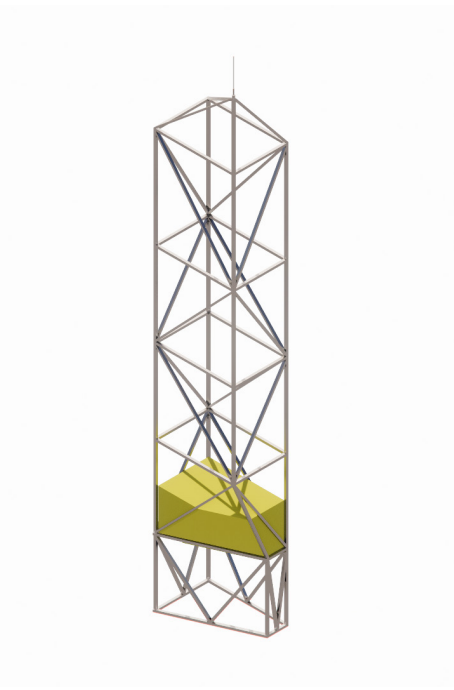
MIX OF FUNCTIONS



EXPERIENCE

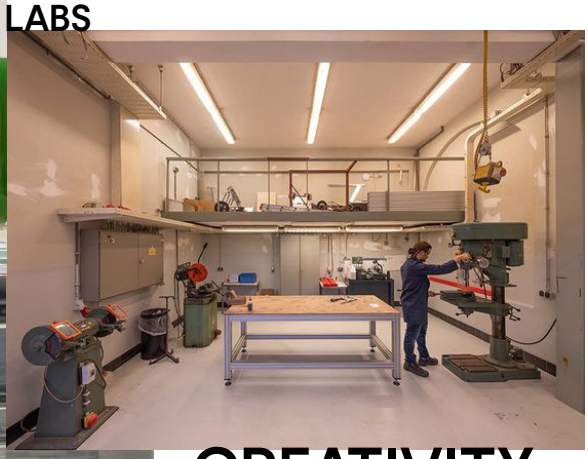
3. INNOVATORIUM



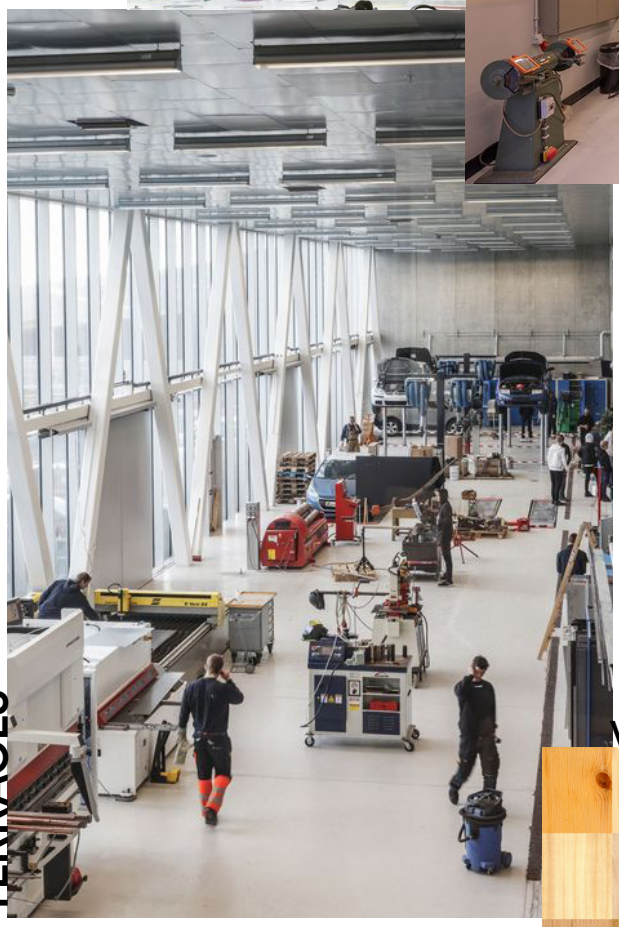


The innovatorium constitutes an avant-garde enclave within the architectural ensemble, specifically engineered to catalyze innovation and creativity. Conceptualized as a nexus for ideation, fabrication, and visionary pursuits, it is structured to facilitate collaborative endeavors among intellectuals, artisans, and trailblazers, aimed at actualizing novel concepts. Endowed with state-of-the-art technology and multifaceted resources, the innovatorium proffers a dynamic milieu conducive to experimentation and advancement. Seamlessly integrating workshops, laboratories, and communal zones, it furnishes an optimal backdrop for both individual exploration and collective ventures. Here, conventional boundaries are transcended, giving rise to groundbreaking solutions and fostering an ecosystem conducive to forward-thinking initiatives. As a pivotal resource for progressive ideation, the innovatorium emerges as a principal catalyst for innovation and ingenuity within the community, propelling advancement and inventive endeavors.

LABS



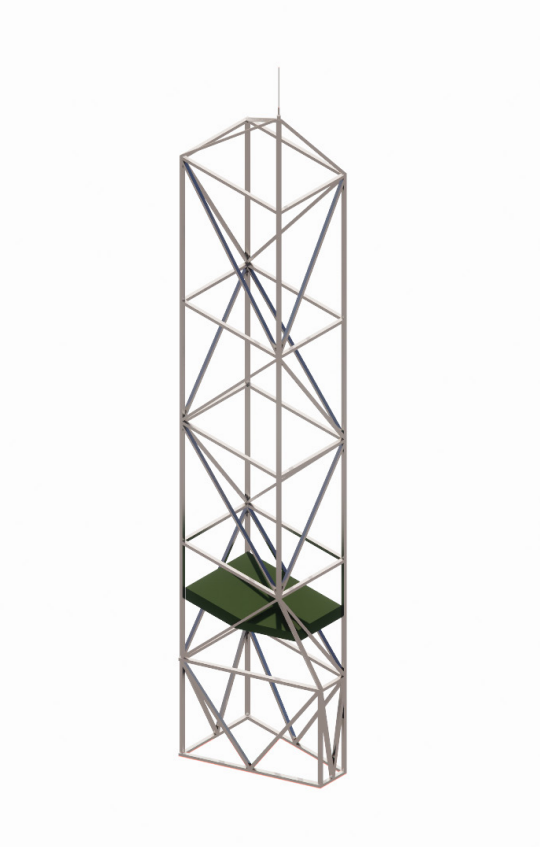
CREATIVITY



TERRACES

VENTILATION

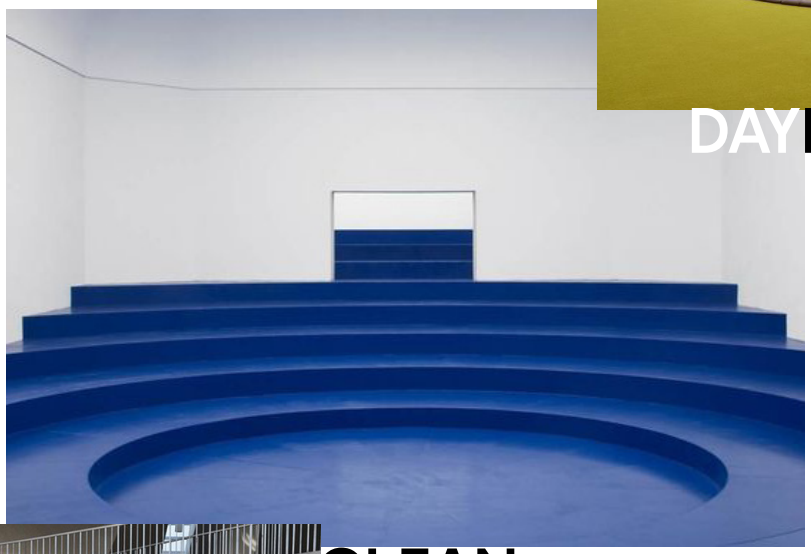
4.SOCIAL NEXUS



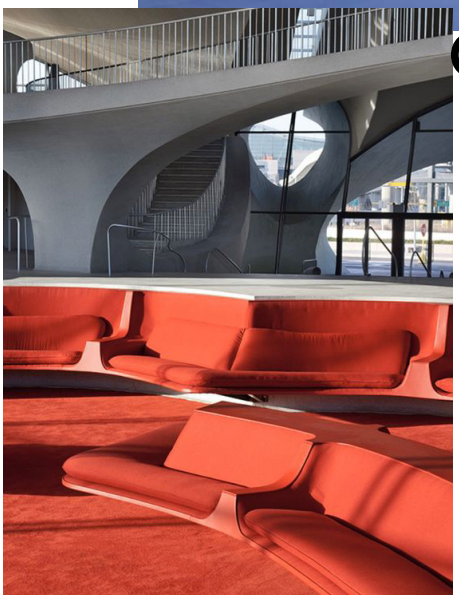
Within the high-rise tower, the social nexus serves as a quintessential example of how thoughtfully designed communal spaces can foster social cohesion and a sense of belonging among residents. Strategically located for maximum accessibility, this space combines modern and traditional architectural elements to appeal to diverse tastes. Its defining feature, a sunken area, creates an intimate zone within the larger space, encouraging both informal and formal gatherings. Meticulously maintained for cleanliness and equipped with state-of-the-art amenities, the social nexus accommodates a range of activities, from community meetings to casual interactions. This formal yet welcoming environment not only promotes social interaction but also ensures safety and inclusivity, making it a pivotal element in enhancing the overall well-being of the high-rise community.

FORMAL

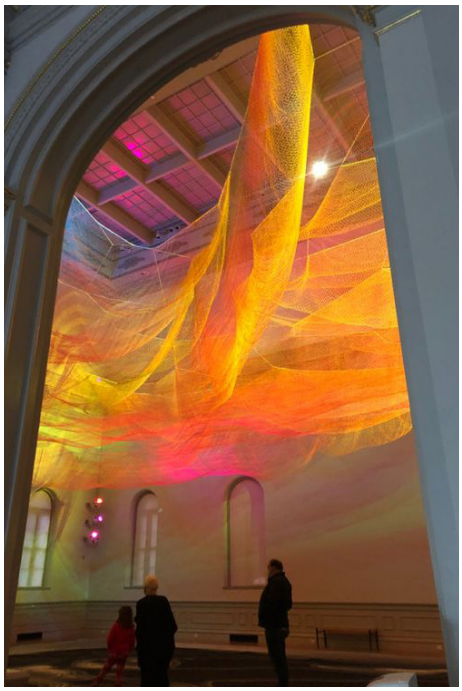
DAYLIGHT

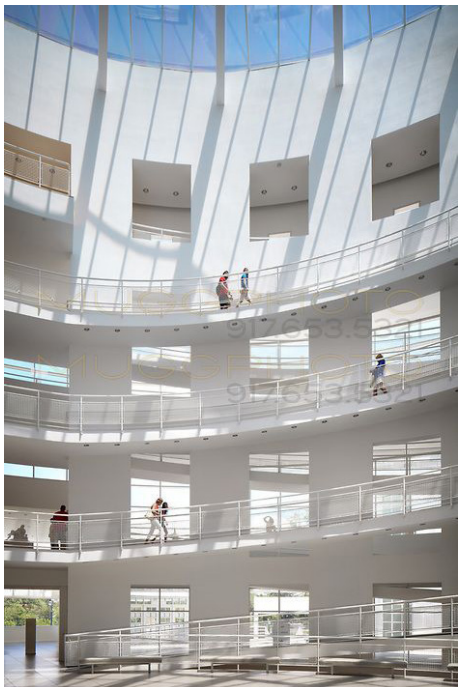


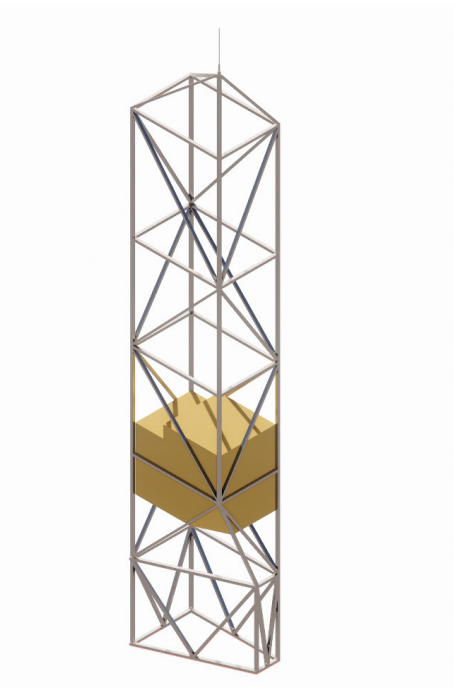
CLEAN



5. ARTISPHERE

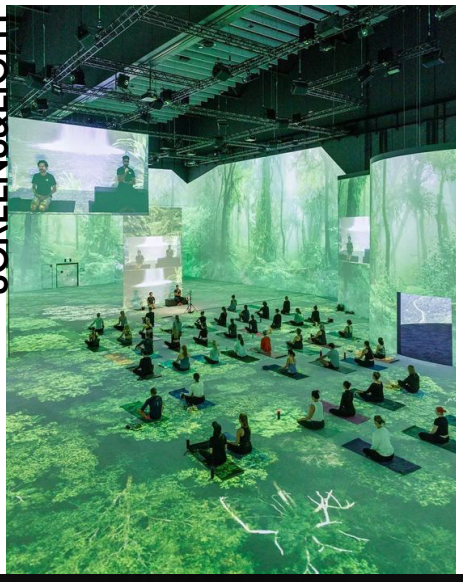






The artisphere nestled within the architectural confines stands as an enthralling enclave devoted to the exaltation of artistry across diverse modalities. It constitutes a vibrant nexus for both local and international artists to showcase their oeuvres, encompassing a dynamic amalgam of gallery spaces and performance venues. Engineered for adaptability, the artisphere caters to an array of artistic manifestations, ranging from exhibitions and installations to live enactments. Beyond its role in augmenting the aesthetic allure of the edifice, the artisphere assumes the mantle of a cultural epicenter, harmonizing art aficionados, creators, and the broader populace. Here, art transcends mere exhibition, metamorphosing into a visceral encounter where patrons are beckoned to engage not only with the art but also with one another, thereby cultivating a milieu rife with vibrancy and ingenuity.

SCREENS&LIGHT

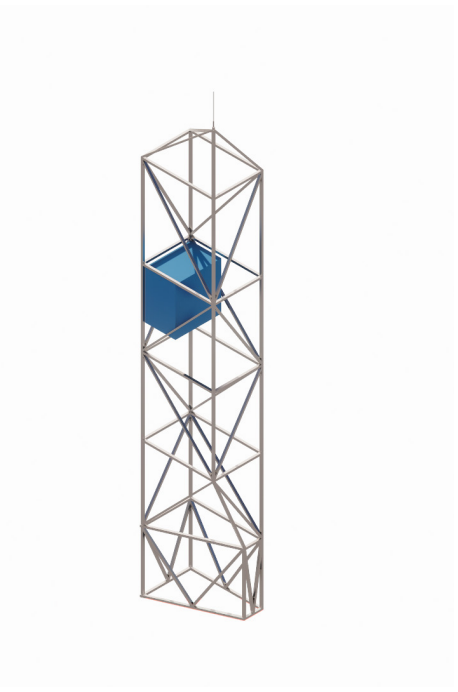


EXHIBITIONS

INTERACTIVE ART

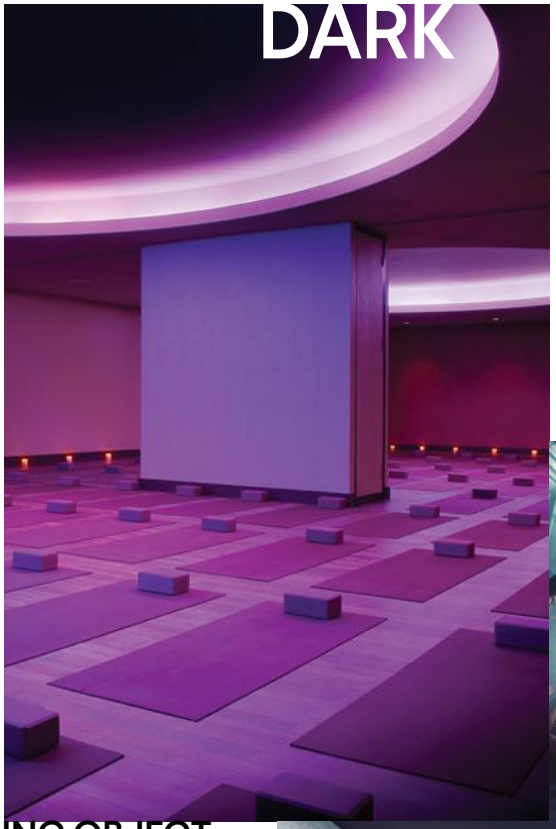
PATHWAY

6. SPORTS/WELLNESS



The sports and wellness center embedded within the premises stands as a bastion for health and fitness devotees, proffering a comprehensive suite of amenities. These include cutting-edge gym apparatus, designated yoga sanctuaries, and venues for collective fitness sessions. The architectural blueprint is meticulously orchestrated to instill a motivating ambiance conducive to vitality cultivation, empowering individuals to pursue their fitness aspirations. In tandem with physical exertion, the center underscores holistic wellness, furnishing spaces for repose and mindfulness exercises. It transcends mere exercise provision, evolving into a holistic haven dedicated to nurturing physical, mental, and emotional equilibrium. This nucleus assumes a pivotal role in propagating a well-rounded lifestyle ethos, thus constituting an indispensable facet of the building's community-oriented amenities.

DARK

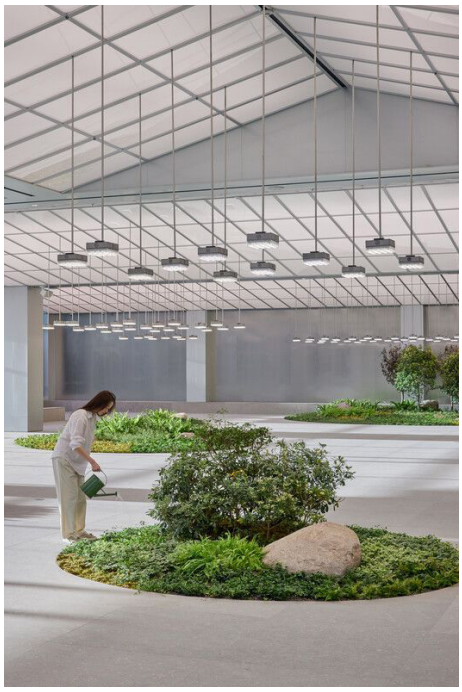


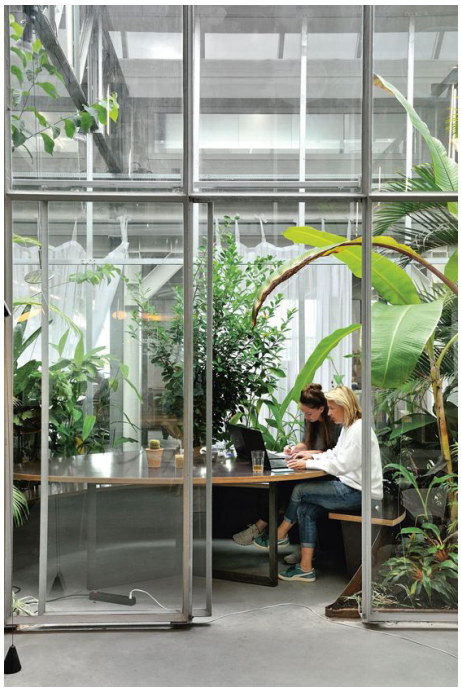
METAVERSE VR

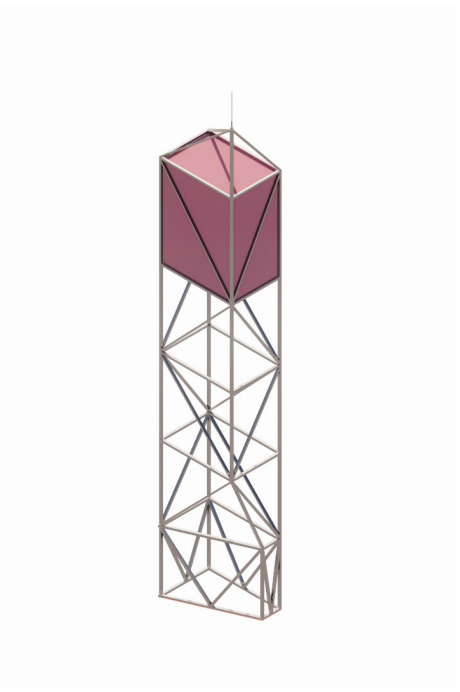
HANING OBJECT

UNDERGROUND SPORTSHALL

7. CORPORATE CORE





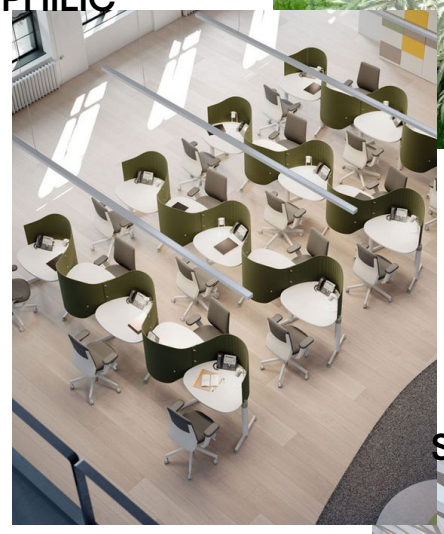


The corporate nucleus of the edifice serves as a focal point for professional endeavors, meticulously tailored to accommodate the exigencies of diverse businesses and organizations. This zone encompasses contemporary office suites, meeting chambers, and conference venues, outfitted with cutting-edge technological infrastructure to ensure optimal operational efficacy. The spatial arrangement is intricately devised to foster synergistic productivity and collaborative ventures, while concurrently providing secluded zones conducive to concentrated endeavors. More than a mere physical workspace, the corporate core epitomizes a dynamic nexus of commercial activity, nurturing an environment conducive to innovation and expansion. It serves as a convergence point where professionals spanning myriad sectors converge, engendering a robust network of cooperation and prospects within the multifarious community inhabiting the premises.

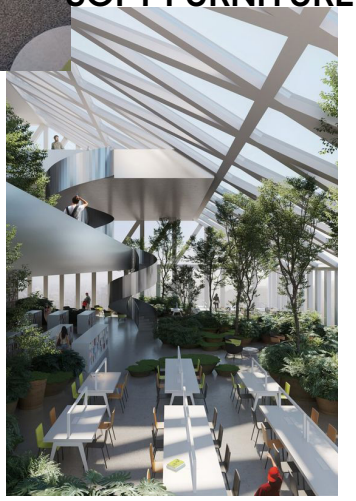
FLEXIBLE

COOL WHITE LIGHT

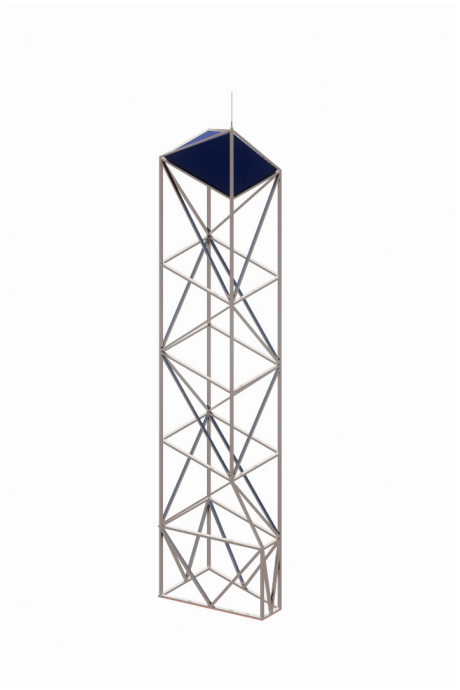
BIOPHILIC



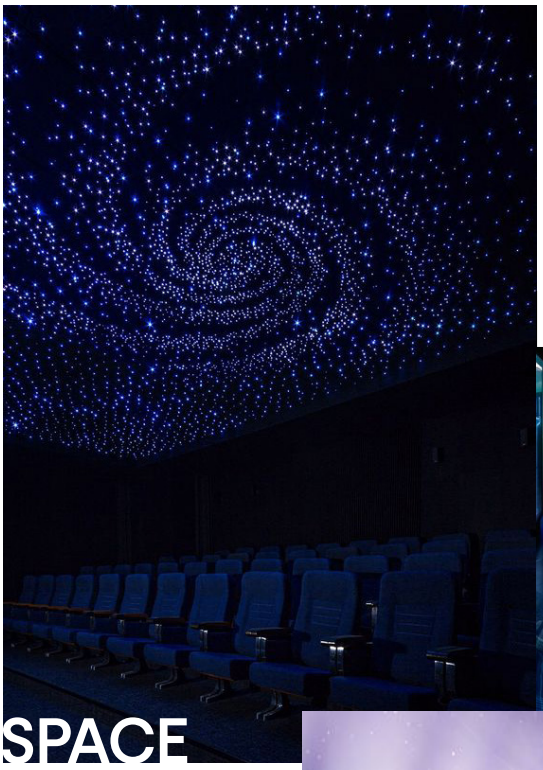
SOFT FURNITURE



8. THE EXPERIENCE



Perched at the top of the building, the space offers an incredible panoramic view of the whole city. It's more than just a spot – it's a place to reflect and be amazed. As you reach this high point, you're greeted with an amazing sight stretching across the cityscape. The design of the Experience is made to make the most of this visual journey, with plenty of spots to take in the view and comfy areas to relax. Moreover, the upper floors will feature a planetarium. Imagine stepping into a darkened dome and being transported to the depths of space, exploring distant galaxies and marveling at the wonders of the universe. It's a unique opportunity to learn and be inspired, right in the heart of the campus. Being up here, away from the city's hustle and bustle, gives you a peaceful and almost magical feeling. It's a spot to truly appreciate the city's beauty, giving you a moment of calm and a fresh perspective on the urban scene below.



BIG SPACE

EDUCATIVE

INTERACTIVE

DARK

OVERVIEW

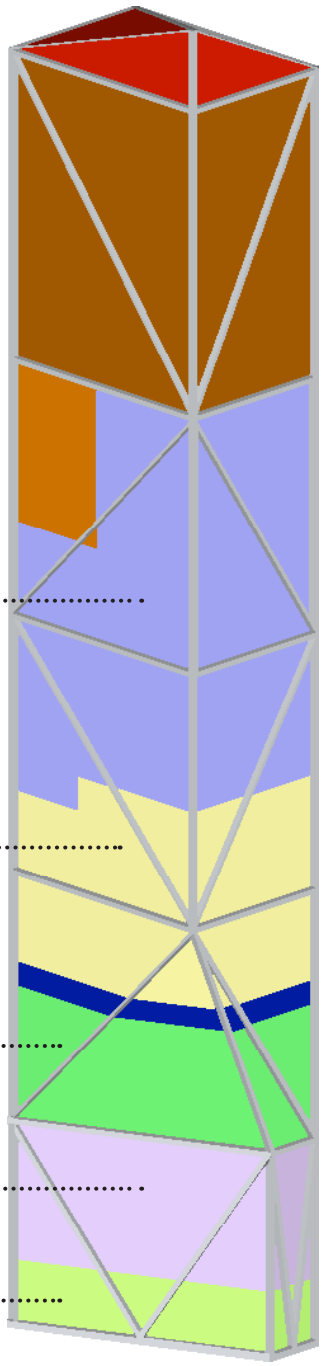
the exploratorium 2

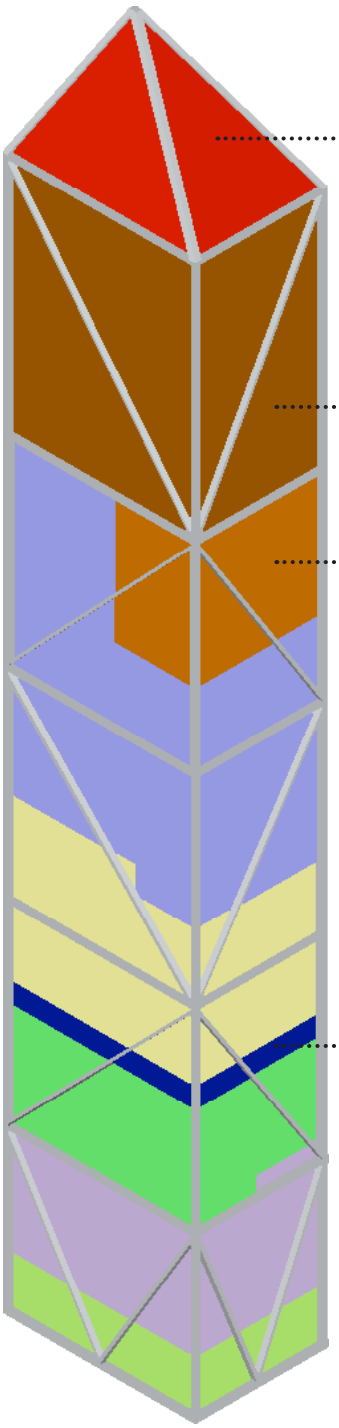
the artisphere

the innovatorium

the exploratorium 1

the gateway





the experience

the corporate core

wellness & sports

the social nexus

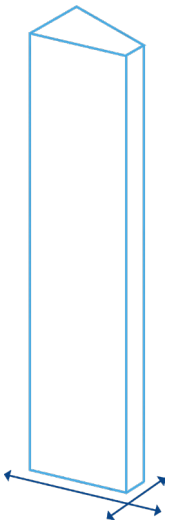
DESIGN

FORM

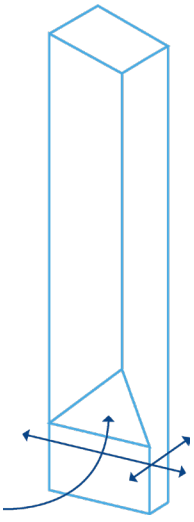
The design of the high-rise building in The Hague reflects the city's architectural identity, characterized by its prominent towers in the city center. The site-specific constraints and opportunities guided the design process, starting with a strategic massing that both integrates with the existing urban fabric and asserts its unique form. The building's footprint is deliberately compact, measuring approximately 6 meters in width by 27 meters in length, to accommodate an above-ground metro track that traverses the site. This compact base ensures minimal disruption to the surrounding infrastructure while optimizing land use. As the structure ascends, it expands in size, culminating at a height of 150 meters, which allows for increased floor space and functionality at higher levels. The cut at the base of the building is mirrored at the top to create a distinctive crown, enhancing the building's aesthetic appeal and contributing to a visually dynamic silhouette. This vertical expansion and crowning not only provide additional usable area but also create a unique architectural feature that enhances the cityscape. The design effectively balances connectivity with existing structures and the creation of a distinctive architectural presence, contributing to The Hague's skyline while addressing site-specific challenges and opportunities.

FORMAL EVOLUTION

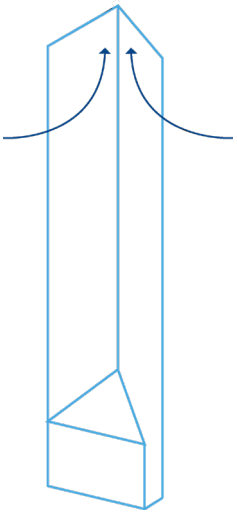
mass



cut



edge



crown

THE WUNDERKAMMER EFFECT

The high-rise tower in The Hague is meticulously designed to balance elegance and neutrality on its exterior with a rich, experiential interior. The building's sleek and streamlined facade integrates seamlessly with the city's architectural context, presenting an understated elegance that contrasts with the dynamic urban environment. The exterior's minimalistic design ensures the structure blends harmoniously with its surroundings, while its vertical expansion and mirrored crown at the top provide a distinctive and refined silhouette. This careful consideration of external aesthetics not only enhances the building's visual appeal but also contributes to the overall coherence of The Hague's skyline.

Interior Experience and Conceptual Inspiration

Inside, the high-rise tower transforms into a "Wunderkammer" or cabinet of curiosities, where each cluster within the building is designed to evoke a sense of wonder and discovery. These clusters are strategically organized to create multifunctional spaces that can be utilized throughout the day, enhancing both efficiency and engagement. Each cluster represents a different element of the building's program, much like the diverse items within a traditional Wunderkammer. This conceptual approach ensures that each area within the tower offers a unique and multifaceted experience, inviting occupants to explore and interact with their environment in meaningful ways.

Multifunctional Clusters as Micro-Wunderkammers

The clustering of spaces within the tower not only reduces the overall footprint, promoting sustainability, but also enriches the user experience by creating vibrant, multifunctional environments. Each cluster can be seen as a micro-Wunderkammer, showcasing various aspects of its designated function. For example, a cluster dedicated to learning might include lecture halls, interactive study spaces, and technology-driven labs, each offering different perspectives and utilities related to education. Similarly, clusters intended for community activities might feature flexible event spaces, cultural exhibition areas, and collaborative work zones. This layered approach ensures that each cluster is not only efficient but also engaging, providing a diverse array of experiences and uses within a single cohesive space.

The Wunderkammer Effect on Different Visitors

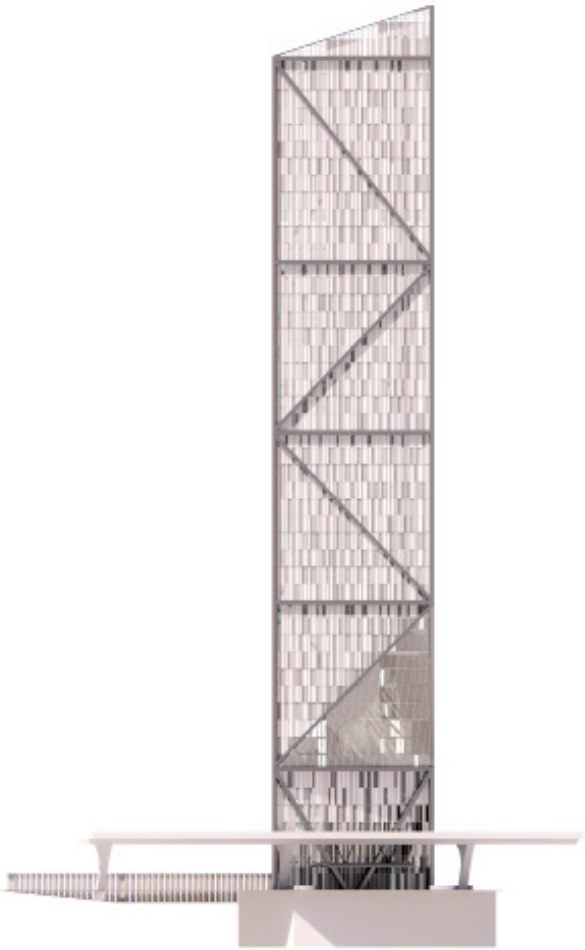
The Wunderkammer effect within the building is designed to captivate a wide range of visitors, including students, inhabitants, tourists, and others. For students, the varied and dynamic environments support diverse learning styles and foster creativity. The interactive and multifunctional spaces promote collaboration and innovation, making the educational experience more enriching and stimulating.

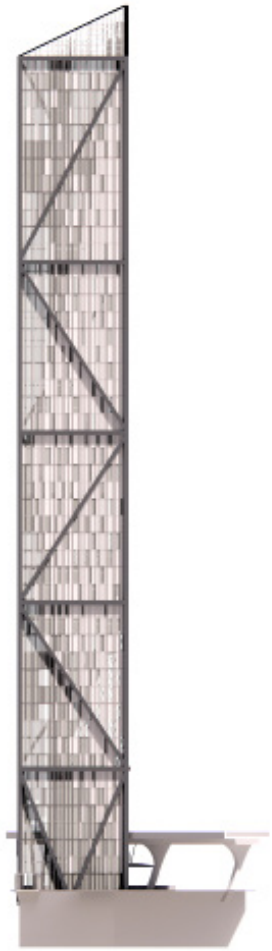
Inhabitants and regular users of the building benefit from the diversity of functions and activities available within each cluster. The seamless integration of different programmatic elements creates a vibrant community hub that supports both personal and professional development. The building becomes a place where people can learn, work, socialize, and engage with cultural activities, all within a single cohesive structure.

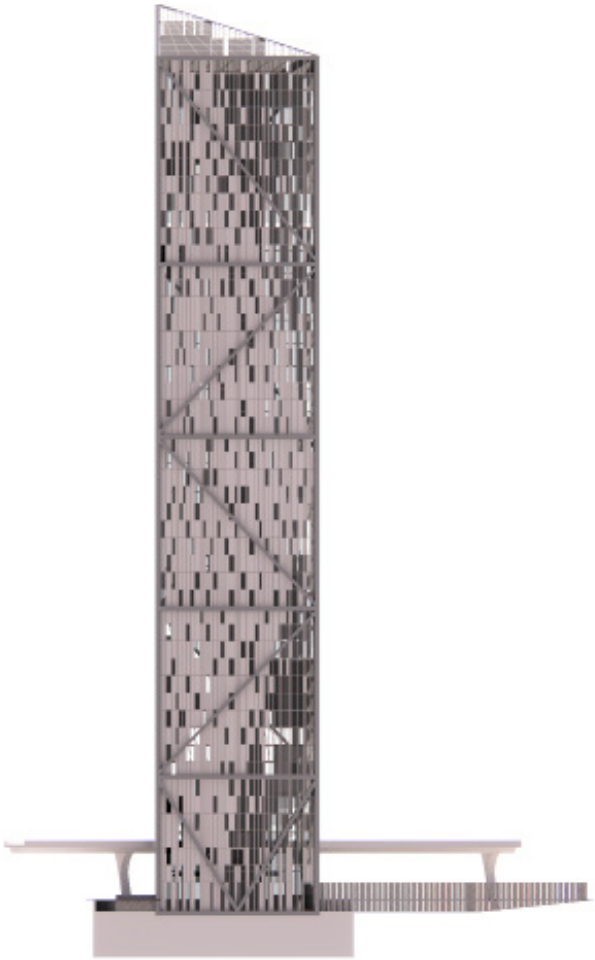
Tourists and occasional visitors are invited to explore the building's unique spaces, each offering a different perspective on the overall theme. The Wunderkammer effect transforms the building into an architectural journey, where every turn reveals new and unexpected experiences. The diverse clusters create a sense of discovery and intrigue, encouraging visitors to engage with the building on multiple levels.

Overall, the high-rise tower's design embodies a duality of refined exterior aesthetics and a rich, engaging interior. By presenting a neutral and elegant facade, the building harmonizes with The Hague's urban fabric, while its interior clusters, inspired by the concept of a Wunderkammer, offer a complex and immersive experience. This innovative design approach not only maximizes functional efficiency but also fosters a sense of wonder and curiosity, making the tower a significant architectural and experiential landmark in the city. The multifunctional clusters within the tower cater to a wide array of visitors, each finding unique and enriching experiences that enhance their interaction with the building and the broader urban environment.

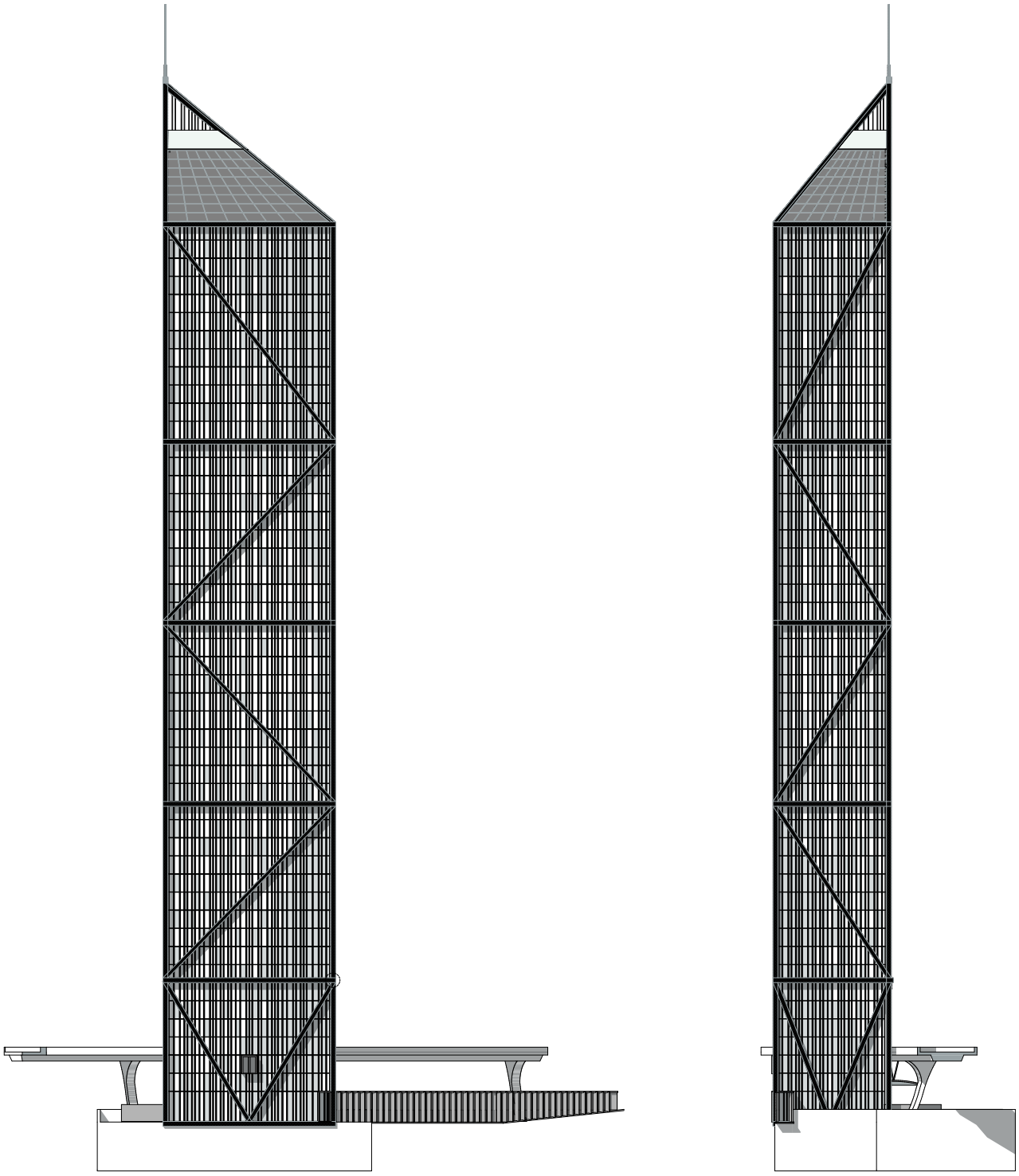
VIEWS

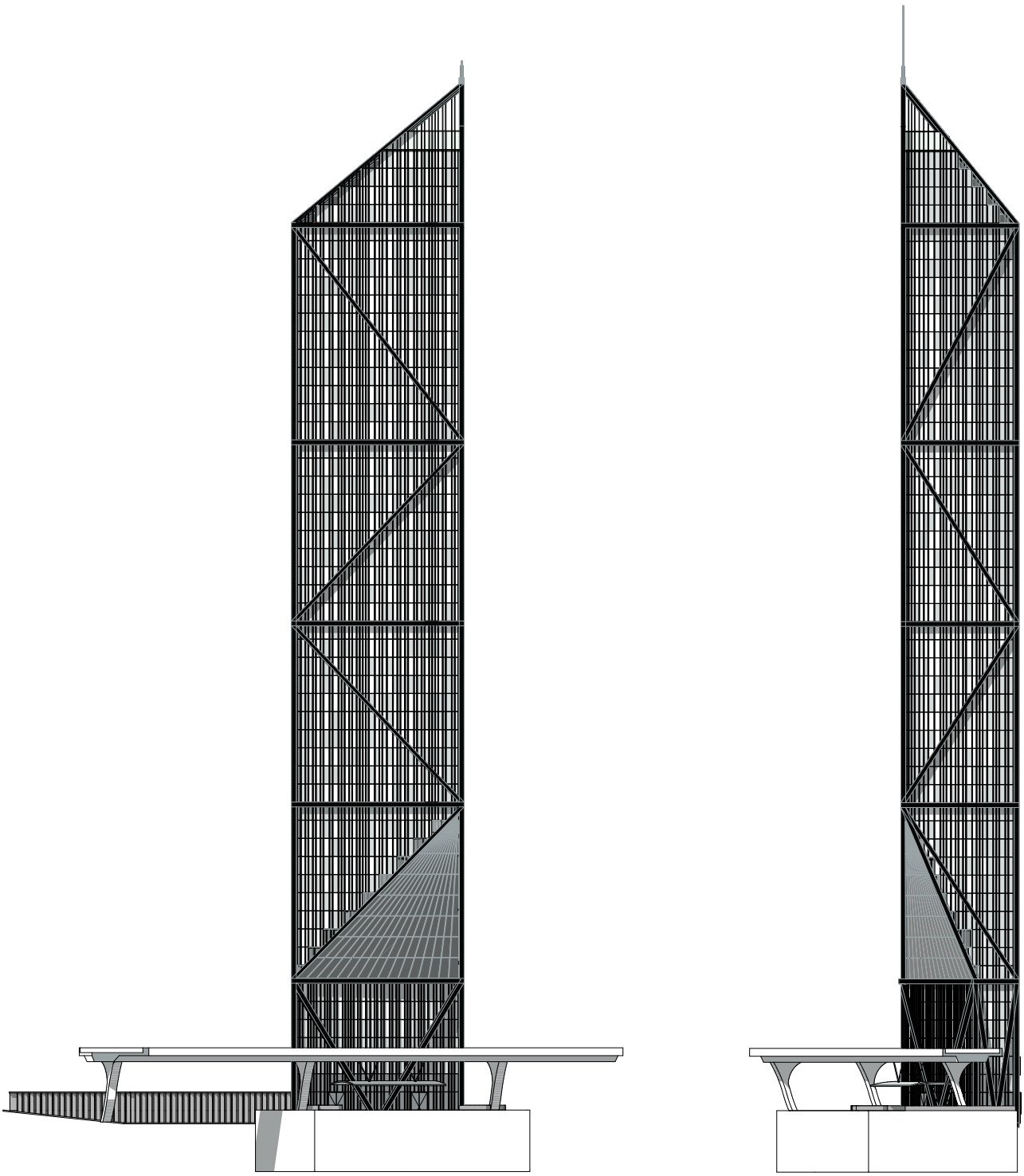




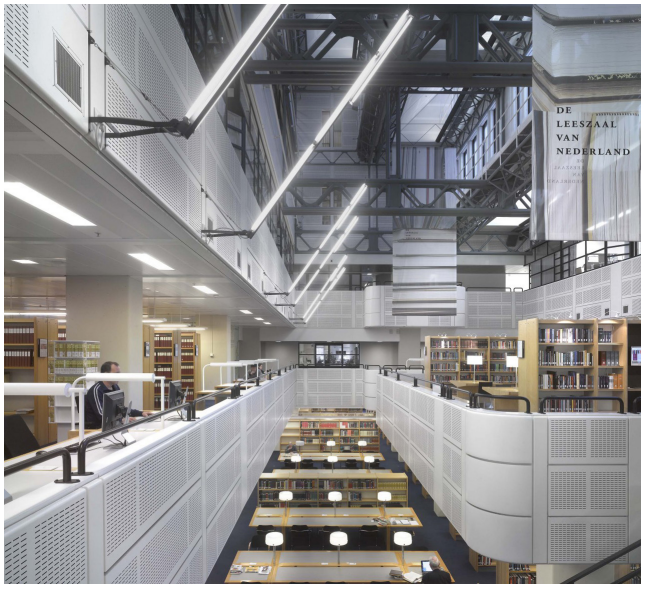


VIEWS





ROYAL LIBRARY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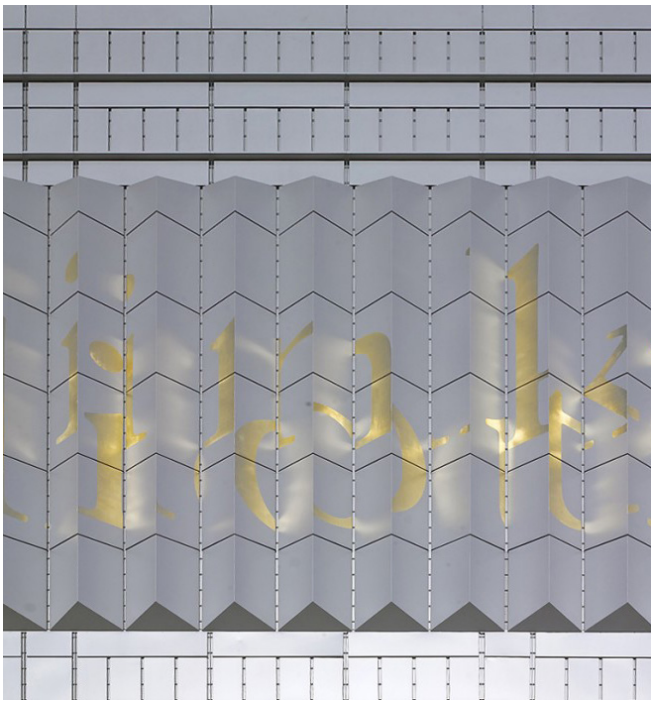
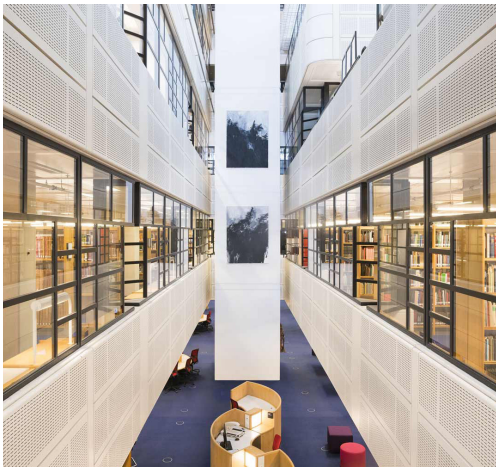


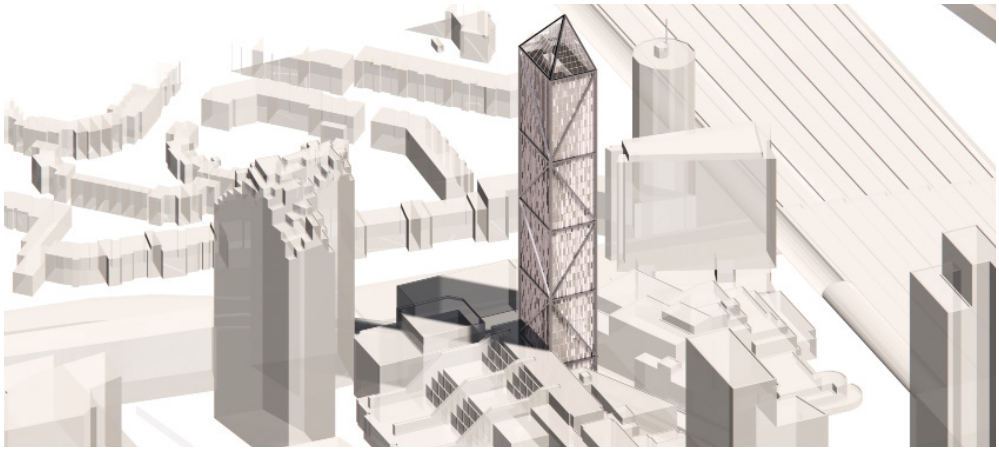


HISTORY

In 1973, the State Buildings Agency commissioned architects A. Hagoort, P.B.M. van der Meer, and A.J. Trotz of Bureau OD205 to design a new building, construction of which commenced in 1977. Since 1982, the library has been housed in a modern facility located at Prins Willem Alexanderhof in The Hague, adjacent to The Hague Central Station. The entire complex comprises approximately 55,000 m² of net area and 78,000 m² of gross area (with a gross volume of 305,000 m³). The building, characterized by 5,200 white aluminum panels cladding the facades, features rounded corners and recessed facade planes, situated adjacent to the National Archives. Within the building, facilities also accommodate the Literature Museum, the Children's Book Museum, RKD (Netherlands Institute for Art History), and the offices of Europeana, DEN (Digital Heritage Netherlands), LIBER (Association of European Research Libraries), and IFLA (International Federation of Library Associations and Institutions). Additionally, the CDNL Secretariat is housed within the KB building. Previously, the library was located in the former city palace Huis Huguetan on Lange Voorhout (1821 to 1982), prior to which it resided in the Mauritshuis (1807 to 1821) and a location on the Binnenhof (1798 to 1807).

In June 2018, it was announced that the library (at least its public section) would relocate to the city center of The Hague, from its current location on the opposite side of the Central Station. The relocation is planned for the area designated as 'Campus Boulevard', with the University of Leiden establishment at Wijnhaven serving as its focal point.

In May 2022, it was announced that the library's storage facilities would relocate to a new, modern storage facility in the Harnaschpolder, near Den Hoorn in the municipality of Midden-Delfland. Unlike the current storage facility, the new warehouse will be almost entirely automated. A robotic system will retrieve and return collection items from the warehouse. The new warehouse is scheduled to be operational by 2028.



REUSE PARTS

With the relocation of the Hague Royal Library to a new site, a unique opportunity arises to repurpose the vacated space in a way that enhances educational and community connectivity within the city. This proposal advocates for the adaptive reuse of the former library space, transforming it into a dynamic extension of the newly planned educational tower. The adaptive reuse of the former Hague Royal Library can serve as a catalyst for educational synergy, providing a multifunctional space that complements the educational tower. This transformation aligns with sustainable urban development principles by repurposing existing infrastructure to meet contemporary needs.

Educational Integration

The former library space can be reimagined as an annex to the educational tower, providing additional classrooms, study areas, and collaborative workspaces. Advanced technological installations, including state-of-the-art laboratories and digital learning environments, can be integrated to support modern educational methodologies.

Community and Cultural Hub

The space can host community-oriented programs, cultural events, and public lectures, fostering a vibrant intellectual and cultural atmosphere. Exhibition spaces and galleries can be created to display academic research, art, and cultural artifacts, enriching the educational experience and engaging the wider community.

Connectivity and Accessibility

Physical and visual connections between the educational tower and the repurposed library space can be established through pedestrian walkways, atriums, and transparent facades. Accessibility features, such as elevators and ramps, will ensure that the space is inclusive and user-friendly for all individuals.

Benefits and Impact

By providing additional space and resources, the repurposed library can enhance the educational infrastructure of The Hague, supporting a diverse range of learning activities. The integration of flexible and adaptive spaces promotes innovative teaching and learning practices. Repurposing the existing library structure aligns with principles of sustainability, reducing the need for new construction and preserving the historical and architectural significance of the building. The adaptive reuse of the building contributes to the city's efforts to create resilient and sustainable urban spaces. The transformed library can become a central hub for community engagement, promoting lifelong learning and fostering a culture of knowledge sharing. By hosting public events and cultural activities, the space can strengthen community ties and enhance the social fabric of The Hague.

MATERIALS

FACADE

The building's material composition combines glass, concrete, and metal elements to create a unified facade design. Glass panels are strategically positioned to provide transparency and visual connectivity, allowing natural light to permeate the interior spaces. These sections of glass contribute to a contemporary aesthetic and promote an open atmosphere within the building.

Complementing the glass panels, sections of the facade are clad in concrete, enhancing structural integrity and imparting a sense of solidity and permanence to the exterior. The concrete cladding creates a striking contrast with the transparency of the glass, adding visual interest and texture to the overall facade.

Overlaying both the glass and concrete elements is a metal skin, which serves to unify the disparate materials and provide additional protection and durability to the facade. The metal skin enhances the aesthetic cohesion of the building while offering a sleek and modern finish.

It is noteworthy that the diagonal parts in the cut and crown of the building are left without the metal skin. These unique architectural features remain exposed, adding character and distinction to the overall design. By preserving these elements in their natural state, the building's individuality and architectural identity are accentuated, further enriching its visual appeal.

FACADE COLOURS

polar white - GR01
matt - FI01

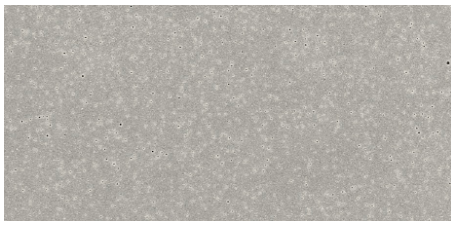
polar white - GR01
ferro light - FI02

polar white - GR01
ferro - FI03

off white - GR02
matt - FI01

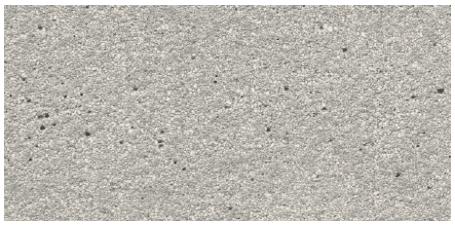
off white - GR02
ferro light - FI02

off white - GR02
ferro - FI03



ivory - GR03
matt - FI01

ivory - GR03
ferro light - FI02



ivory - GR03
ferro - FI03

cotton - NS03
matt - FI01

cotton - NS03
ferro light - FI02

cotton - NS03
ferro - FI03

vanilla - NS04
matt - FI01

vanilla - NS04
ferro light - FI02

vanilla - NS04
ferro - FI03

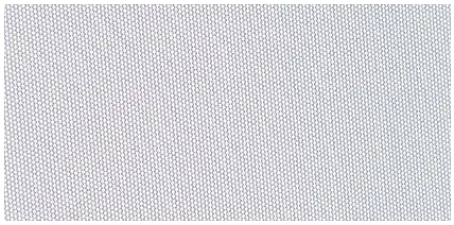
sahara - NS01
matt - FI01

sahara - NS01
ferro light - FI02

sahara - NS01
ferro - FI03

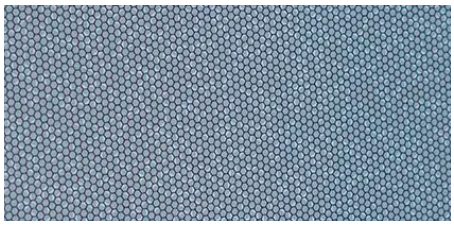
SOLARIX

Wit - Wit volvlak
W-688



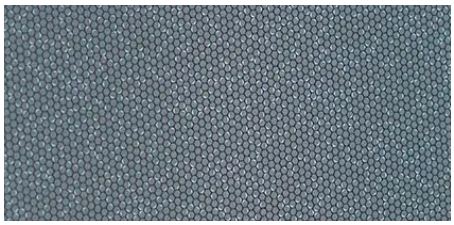
Wit - Wit
W-689

Metallic - Zilvergrijs
nr ME-600626C



Effect - Licht graniet
E-214

Mono - Donker graniet
M-637



Effect - Donker graniet
E-621

ADVANTAGES OF PV PANELS IN THE FACADE

Integrating photovoltaic (PV) panels into the facade design of a high-rise tower is a crucial step towards achieving sustainable urban development and energy efficiency. The facade of a high-rise building offers substantial surface area that can be harnessed for solar energy capture, transforming the building into a significant generator of renewable energy. This integration not only reduces the building's dependency on non-renewable energy sources but also contributes to lowering greenhouse gas emissions, aligning with global sustainability goals. Furthermore, PV panels can be seamlessly incorporated into the aesthetic design of the facade, enhancing the building's modern and innovative appearance while maintaining architectural integrity. The energy produced by these panels can be utilized to power the building's operations, reducing operational costs and increasing energy resilience. Additionally, integrating PV panels into the facade supports the concept of decentralized energy production, which can contribute to grid stability and energy security. Overall, the inclusion of PV panels in the facade design of the high-rise tower exemplifies a forward-thinking approach that combines functional efficiency with environmental responsibility, positioning the building as a model for sustainable architecture.

FACADE DESIGN

In dense urban environments, architectural design plays a crucial role in shaping the cityscape while addressing the functional and societal needs of its inhabitants. The facade design of a high-rise university tower in The Hague exemplifies this integration of architectural elegance and sociological considerations. This narrative examines the overarching concept and implications of the facade design within its urban context.

Architectural Explanation:
The gradient facade design of the university tower, characterized by varying panel widths and translucency levels, is a testament to meticulous architectural planning aimed at achieving both visual distinction and functional efficiency. In a densely populated city center, where towering structures converge, the tower stands out as a beacon of elegance amid the urban density.

Visual Distinction and Integration:
The gradient facade gracefully transitions from translucent to transparent panels across five distinct sections, creating a refined appearance that harmonizes with the surrounding architectural landscape.
This gradual transition allows the tower to assert its presence without imposing on the neighboring structures, striking a delicate balance between visual distinction and contextual integration.

Light and View Management in Urban Density:
The facade design optimizes natural light penetration, essential in a densely built environment where sunlight may be scarce. Translucent panels at lower levels provide diffused light, enhancing interior comfort, while transparent panels at higher levels offer unobstructed views and abundant daylight.
By balancing privacy and transparency through varying panel widths and translucency levels, the design caters to the diverse needs of urban inhabitants while maintaining a cohesive architectural expression.

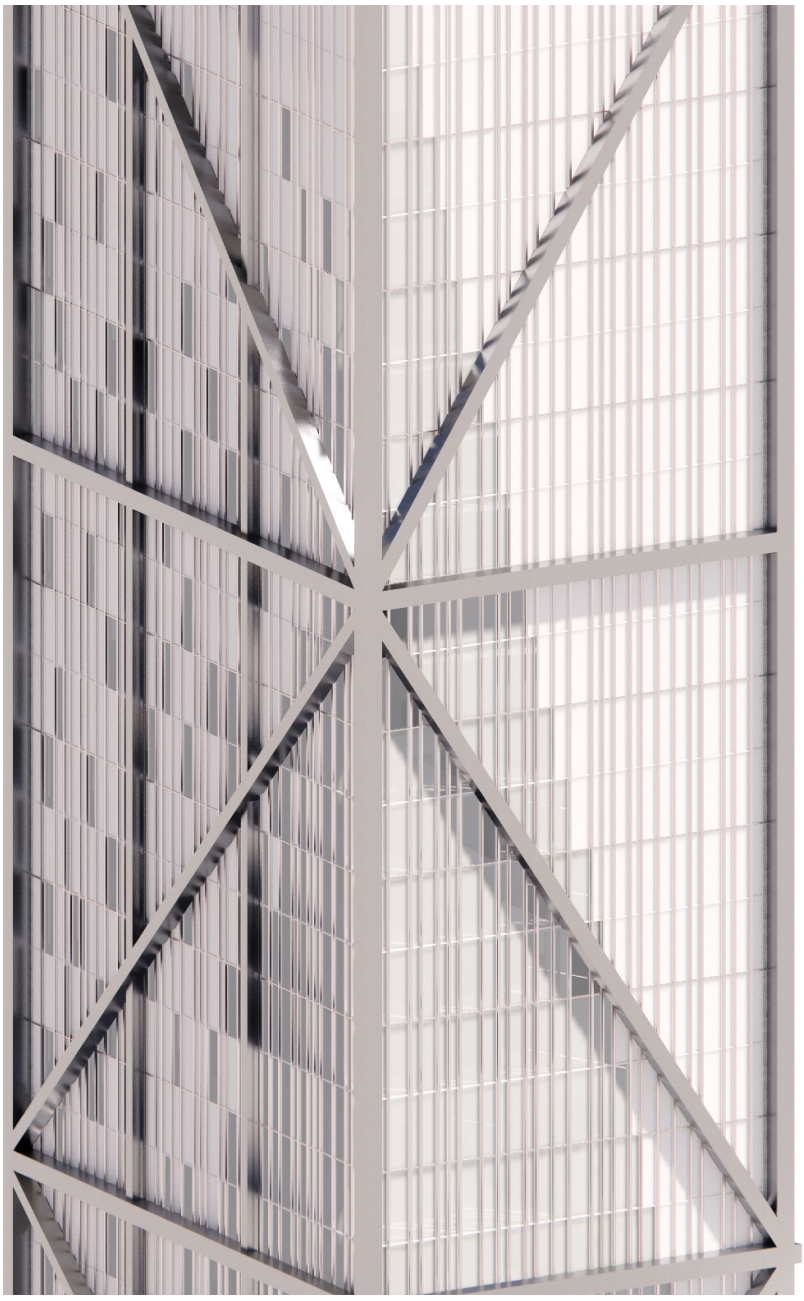
Symbolic Representation and Urban Identity:
The gradient facade serves as a symbolic representation of educational ascent and clarity, echoing the university's mission to foster intellectual growth and discovery.
As an urban landmark, the tower embodies The Hague's identity as a center of knowledge and culture, contributing to the city's narrative of innovation and progress.

Sociological Explanation:
The facade design of the university tower extends beyond architectural aesthetics, encapsulating broader sociological implications within the urban fabric.

Inclusive and Inspiring Spaces:
The inviting facade fosters community engagement and interaction, transforming the university into a welcoming hub within the densely populated city center.
By promoting a culture of continuous learning and intellectual exploration, the design cultivates an inclusive environment that transcends physical boundaries, inviting both students and the public to participate in the educational discourse.

Historical and Cultural Context:
The integration of modern architectural elements with respect for historical context reflects The Hague's rich cultural heritage and progressive ethos. As a cultural landmark, the university tower bridges past and present, serving as a testament to The Hague's tradition of innovation and its commitment to shaping the future through education.

The facade design of the high-rise university tower in The Hague stands as a testament to the intricate interplay between architectural sophistication and sociological resonance within dense urban environments. It elegantly transitions from translucent to transparent panels across distinct sections, harmonizing with the surrounding cityscape while asserting its unique identity. This design not only optimizes natural light and privacy but also symbolizes intellectual ascent and urban vitality. As a welcoming beacon of knowledge and culture, it fosters community engagement and reflects The Hague's rich historical heritage amidst its forward-thinking ethos.



PV PANELS

Opbrengst per M2 (+/- 10%) = 118 WP

South Facade

1-10: 20% PV, 80% Glass
11-20: 30% PV, 70% Glass
21-30: 40% PV, 60% Glass
31-40: 50% PV, 50% Glass
41-50: 60% PV, 40% Glass

East Facade

1-10: 30% PV, 70% Glass
11-20: 40% PV, 60% Glass
21-30: 50% PV, 50% Glass
31-40: 60% PV, 40% Glass
41-50: 70% PV, 30% Glass

West Facade

1-10: 30% PV, 70% Glass
11-20: 40% PV, 60% Glass
21-30: 50% PV, 50% Glass
31-40: 60% PV, 40% Glass
41-50: 70% PV, 30% Glass

North Facade

1-10: 10% PV, 90% Glass
11-20: 15% PV, 85% Glass
21-30: 20% PV, 80% Glass
31-40: 25% PV, 75% Glass
41-50: 30% PV, 70% Glass

Average size panels 1,01 m2

147 x 27 = 3969 x 40 = 158.760 m2 / 1,01 = 158.760 x 118 WP = 18.733.680

147 x 12 = 1764 x 50 = 88.200 m2 / 1,01 = 88.200 x 118 WP = 10.407.600

147 x 27 = 3969 x 50 = 158.760 m2 / 1,01 = 58.760 x 118 WP = 6.933.680

147 x 18 = 2646 x 20 = 52.920 m2 / 1,01 = 52.920 x 118 WP = 6.244.560 +

total = 42.319.520

PV PANELS

Building Specifications

The public building under consideration is a 150-meter high tower with a footprint of approximately 18 by 27 meters. The building, designed for public use without residential occupancy, has the following dimensions and area:

- Height: 150 meters
- Footprint: 18 meters x 27 meters
- Average Floor Height: 3 meters
- Total Number of Floors: 50 floors
- Floor Area per Level: 486 square meters
- Total Building Area: 24,300 square meters

Annual Energy Consumption Estimate

To estimate the annual energy consumption, we use typical values for public buildings, which range from 150 to 250 kWh per square meter per year. For this analysis, an average value of 200 kWh per square meter per year is applied.

- Energy Consumption per Square Meter: 200 kWh/year
- Total Energy Consumption:

\text{Total Building Area} \times \text{Energy Consumption per Square Meter} = 24,300 \, \text{m}^2 \times 200 \, \text{kWh/m}^2/\text{year} = 4,860,000 \, \text{kWh/year}

PV System Output Calculation

The potential energy yield from the photovoltaic (PV) panels installed on the building facades has been calculated as follows (see calculation).

Based on these configurations, the total annual energy production from the PV panels is calculated as follows:

- Total WP (Watt-Peak): 42,319,520 WP (Watt-Peak)
- Conversion to kWh/year: Assuming an average of 1,000 kWh per kWp per year

\text{Total Annual Output} = 42,319.52 \, \text{kWp} \times 1,000 \, \text{kWh/kWp} = 42,319,520 \, \text{kWh/year}

Comparison and Analysis

The estimated annual energy consumption of the building is 4,860,000 kWh/year, while the annual energy production from the PV panels is projected to be 42,319,520 kWh/year. Therefore, the PV system would not only cover the building's energy needs but also generate a significant surplus.

- Building Energy Needs: 4,860,000 kWh/year
- PV System Output: 42,319,520 kWh/year

The surplus energy production indicates that the PV system is more than sufficient to meet the energy demands of the building, contributing significantly to its sustainability and potential energy independence.

REFERENCES

The Oppo Technology and research Tower
name architect

Clarion Hotel
Mosa

CONSTRUCTION

CONSTRUCTION

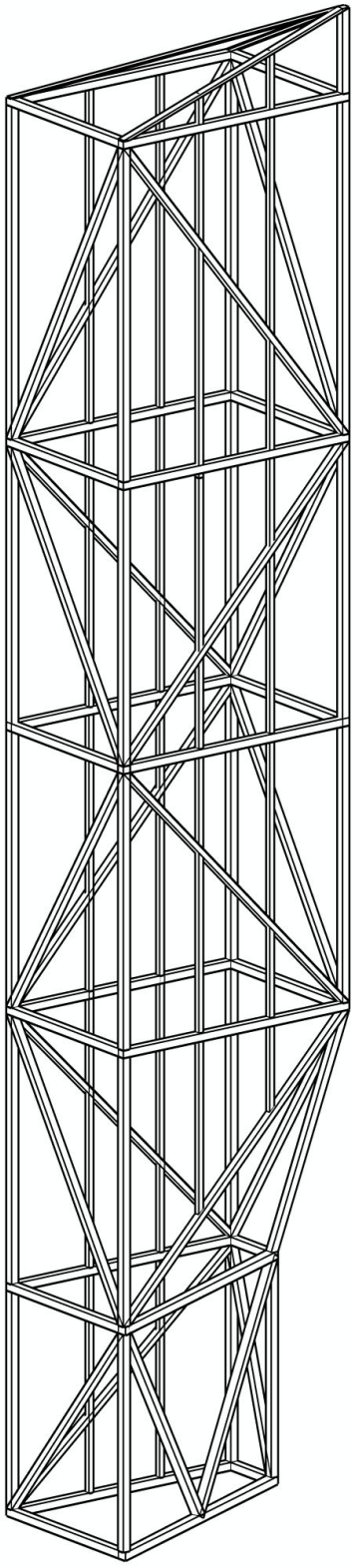
The building construction comprises a steel framework with a concrete core serving as the primary structural system. This combination of materials provides strength, stability, and durability to the overall structure. The steel construction offers flexibility in design and facilitates efficient construction processes, while the concrete core reinforces the building's load-bearing capacity and enhances its resilience.

The floors of the building will feature hybrid construction, integrating wooden elements with a concrete topping. This hybrid floor system not only optimizes structural performance but also enhances sustainability by utilizing renewable materials. Wood contributes to a warm and inviting interior ambiance, while the concrete topping adds strength and fire resistance, ensuring compliance with safety standards.

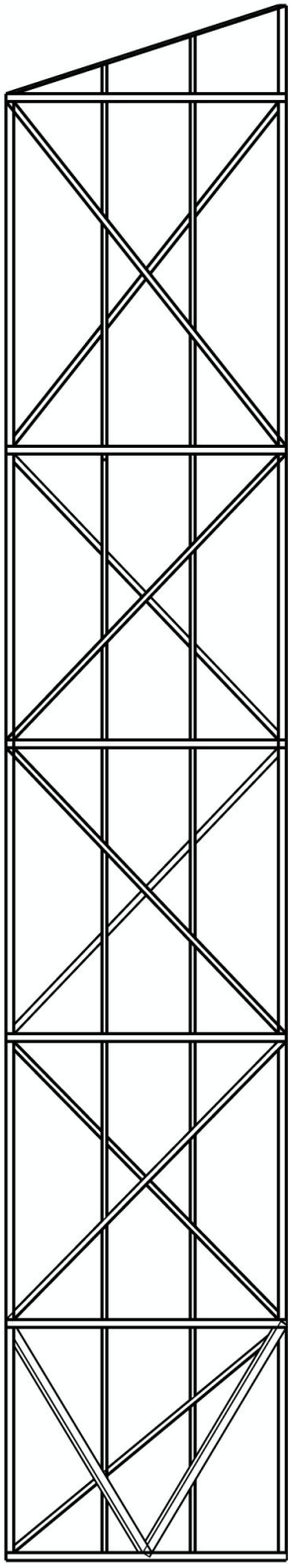
Internally and between the floors, the building will showcase hanging objects crafted from a wooden framework. These objects, constructed from sustainably sourced wood, serve both functional and aesthetic purposes, providing spatial delineation and visual interest within the interior spaces. Notably, the facade cladding of these hanging objects consists of re-used white aluminum panels sourced from the existing royal library. This reuse of materials not only minimizes environmental impact but also pays homage to the building's heritage, creating a sense of continuity and connection with its past.

Overall, the building construction materiality reflects a thoughtful integration of steel, concrete, wood, and recycled aluminum, prioritizing structural integrity, sustainability, and aesthetic coherence. This harmonious blend of materials contributes to the building's identity and reinforces its commitment to environmental stewardship and design innovation.

1ST AXO



1ST SW FACADE



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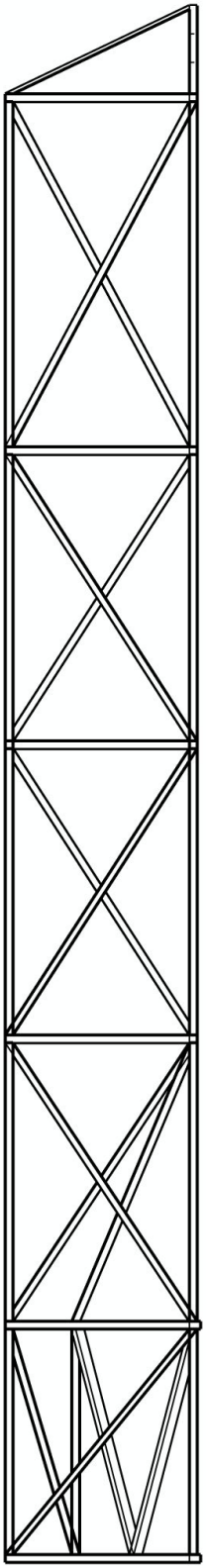

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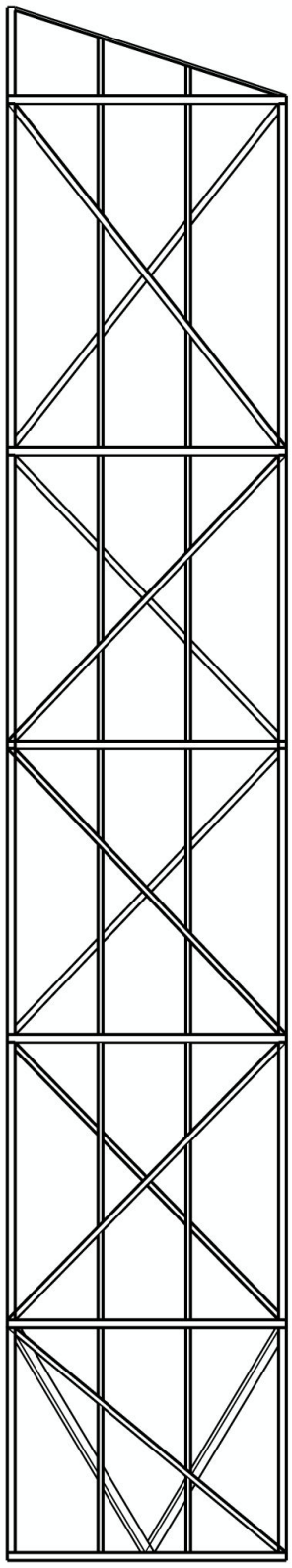

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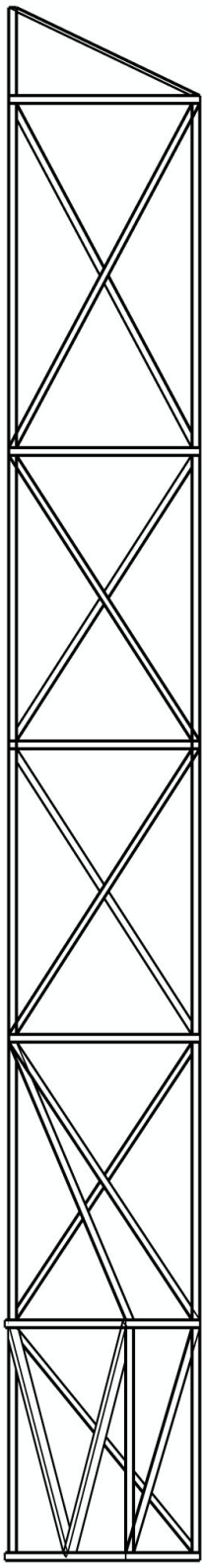

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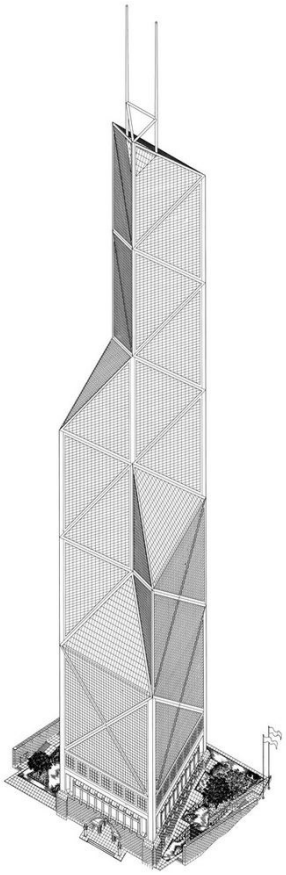
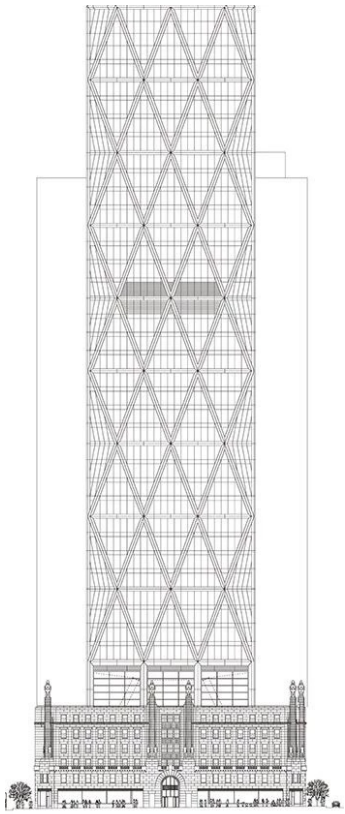
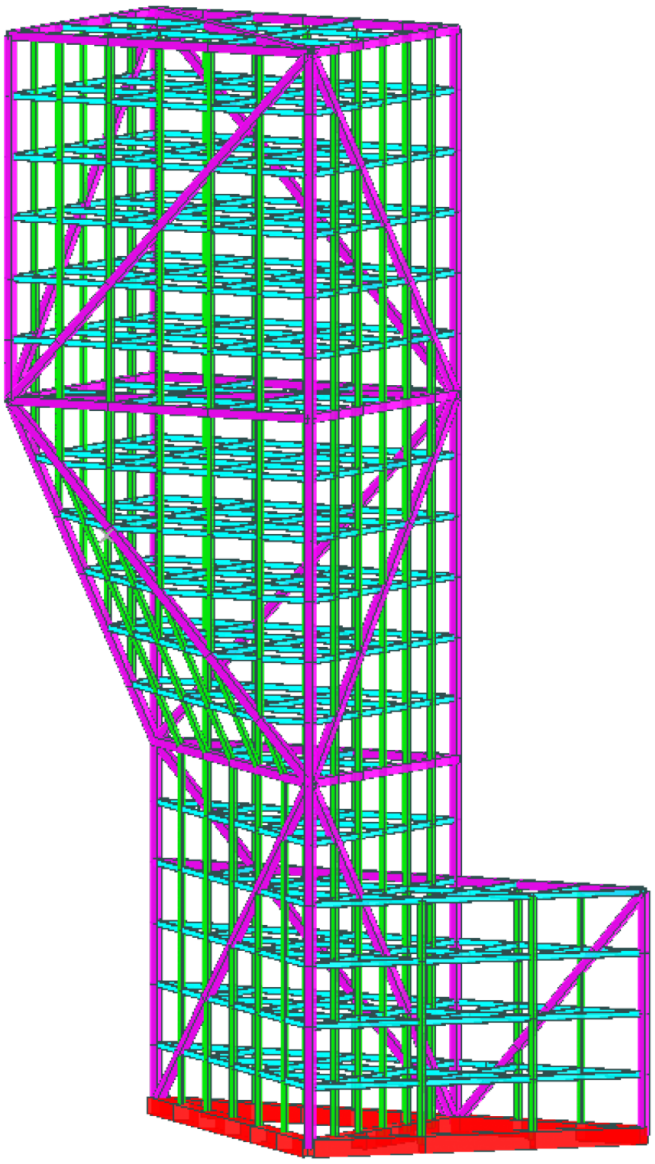


Bank of China
by I. M. Pei



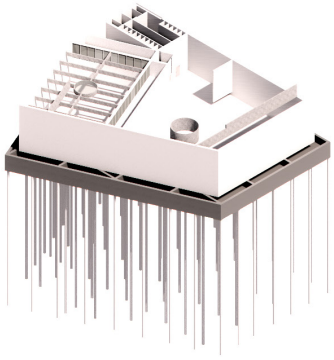
Hurst Tower
by Norman Foster



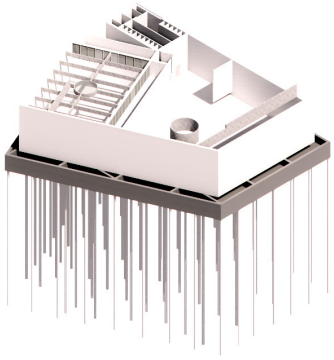
Black Swan
Studio Ninedots

STRUCTURE

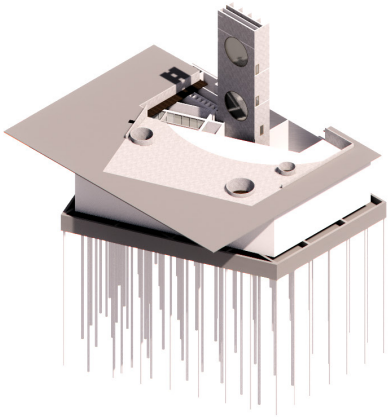
foundation



basement



core



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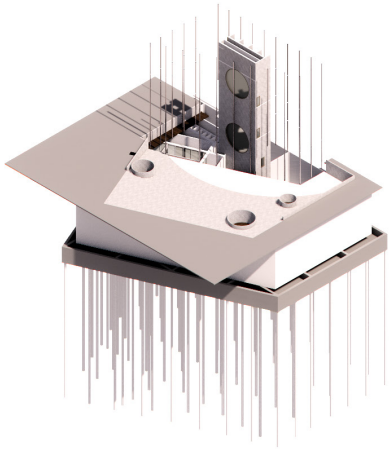

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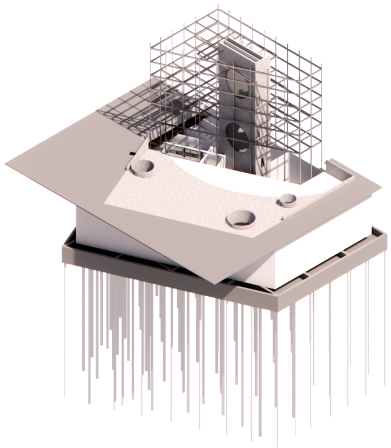
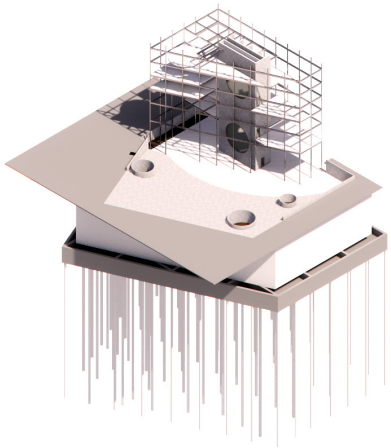
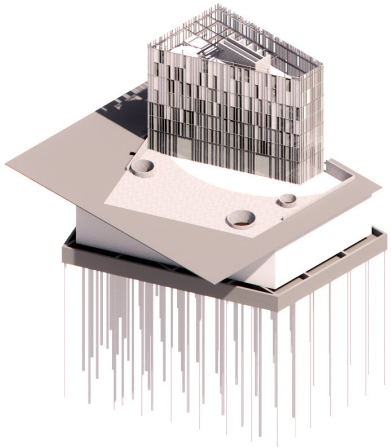


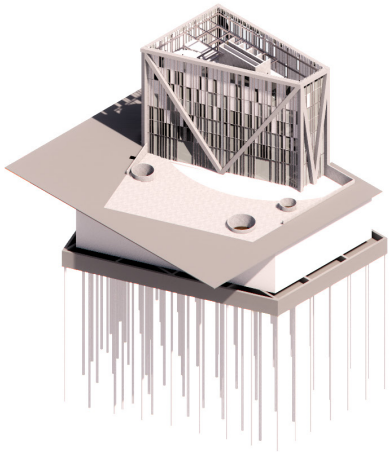
beams



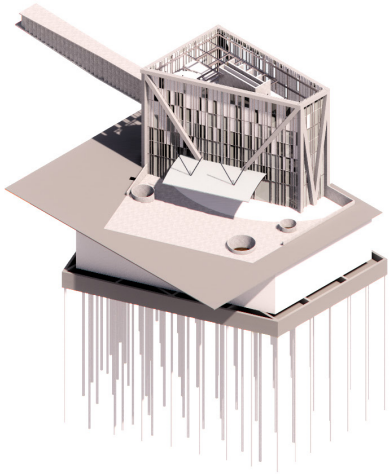
floors



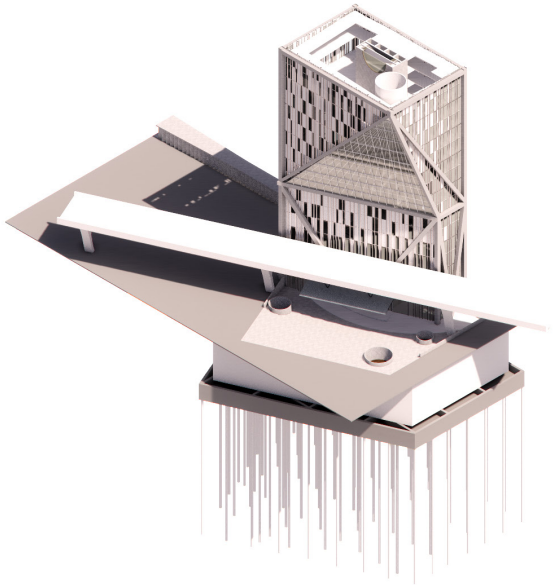
facade



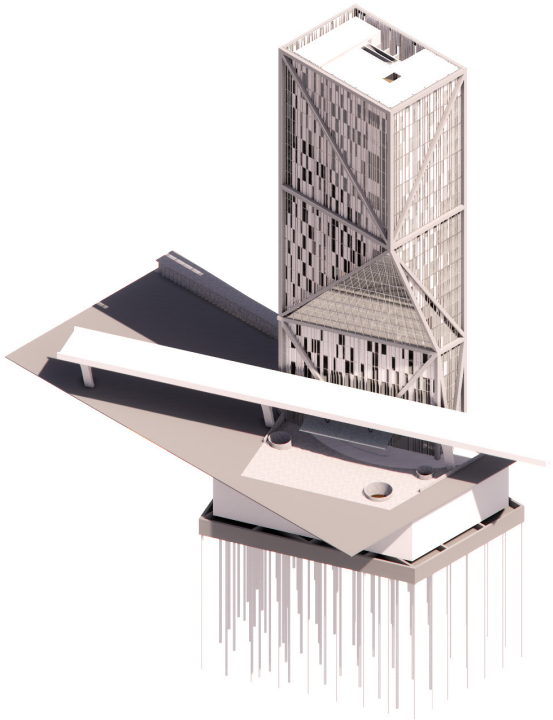
exo skeleton



entrances

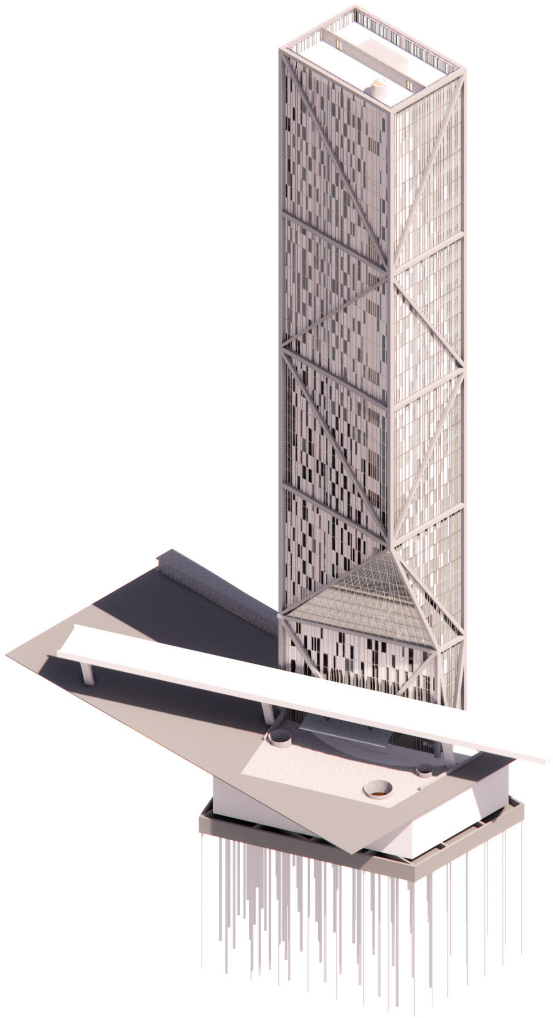


repeat stept for each section

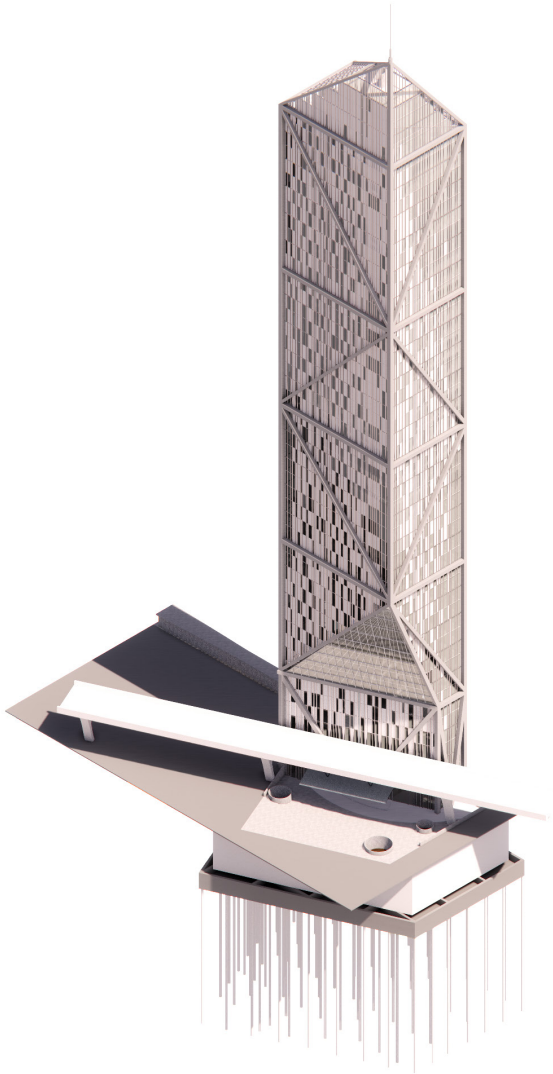


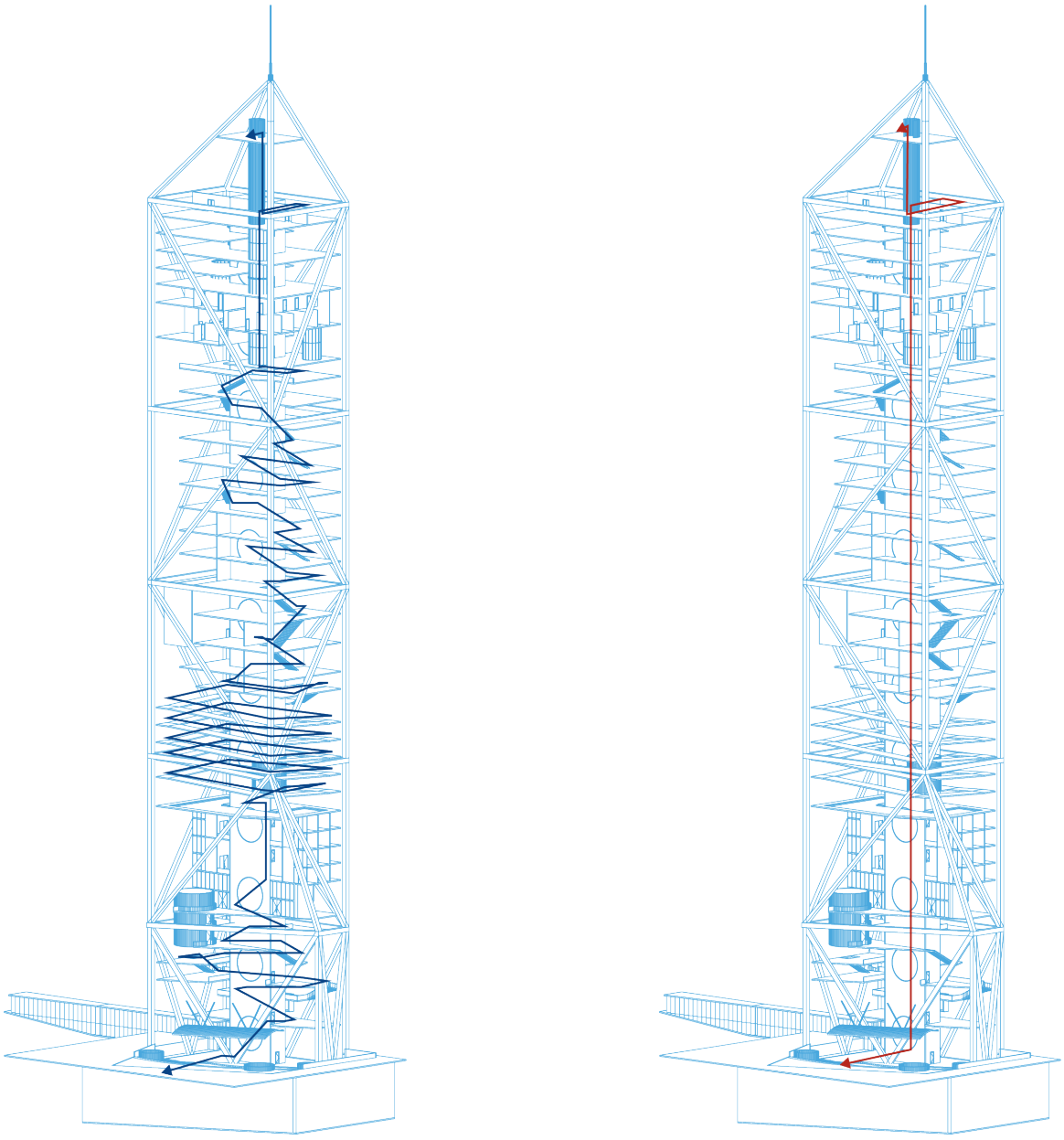
repeat steps for each section

repeat steps for each section

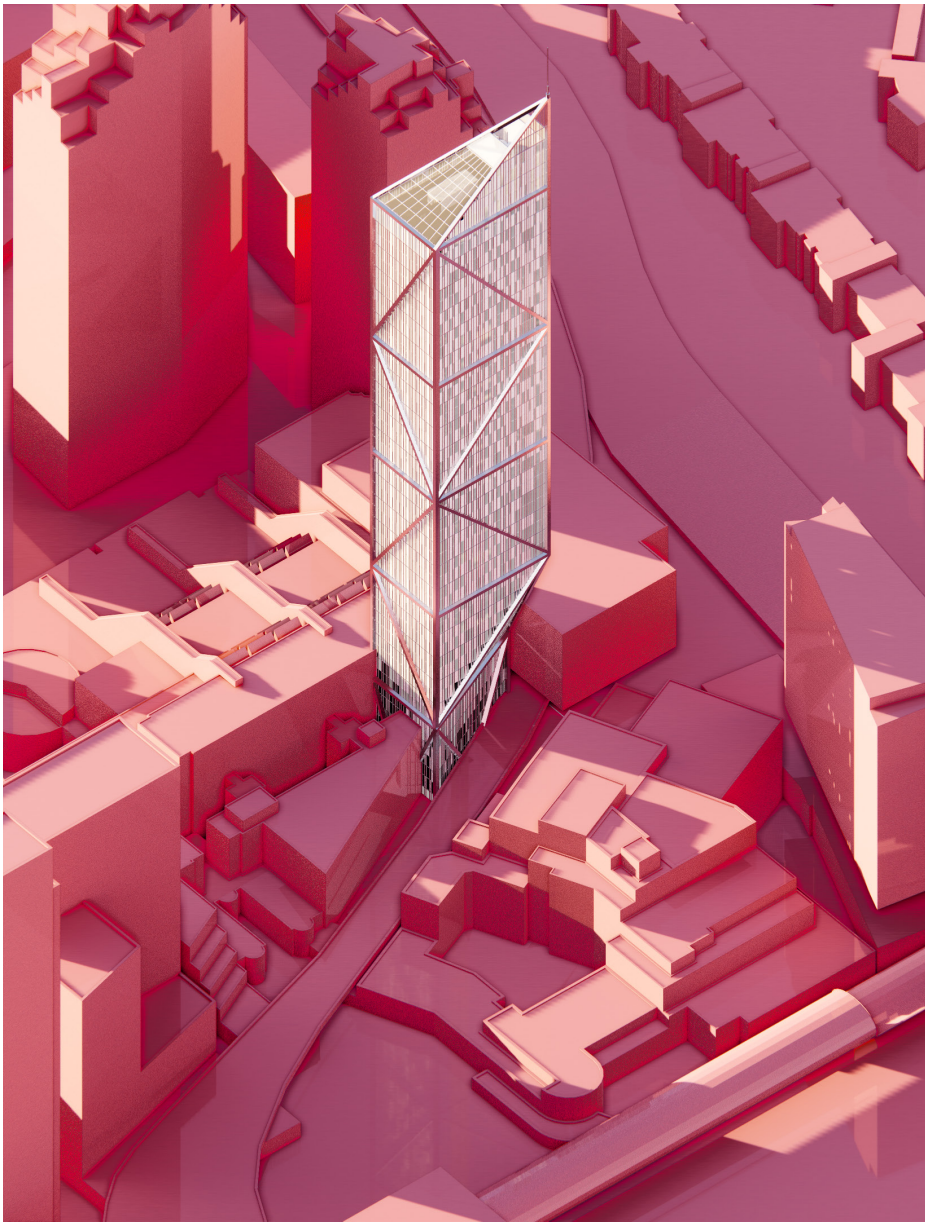


repeat steps for each section





walkthrough



the building connects on certain points to the existing library, and parts of the facade are reused for the exterior of some spaces

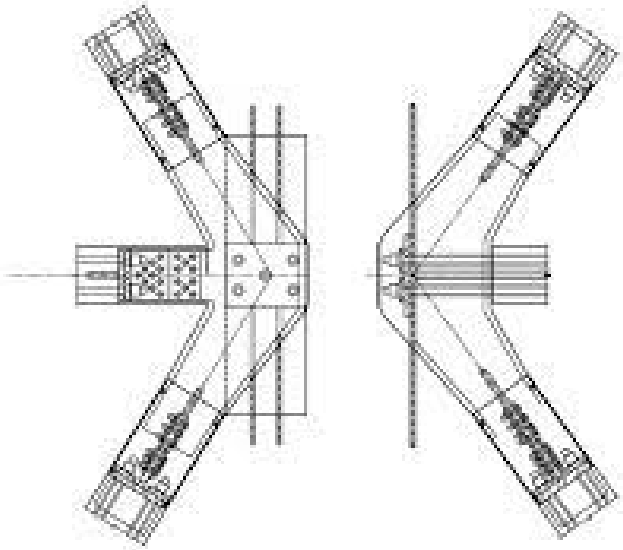
ADJUSTMENTS

The construction of the high-rise tower in The Hague utilizes an exposed primary frame that serves both structural and aesthetic functions. At the lower levels, the primary frame features large beams arranged in a V-shape, emphasizing the robust and rugged nature of the supporting structure. This densification of beams at the base not only enhances the structural integrity, necessary for supporting the substantial load of the upper floors, but also visually communicates the strength and stability foundational to the tower's design. As the structure ascends, the frame transitions into triangular formations for each subsequent section above. These triangular configurations provide optimal load distribution and stiffness, contributing to the overall stability and resilience of the tower.

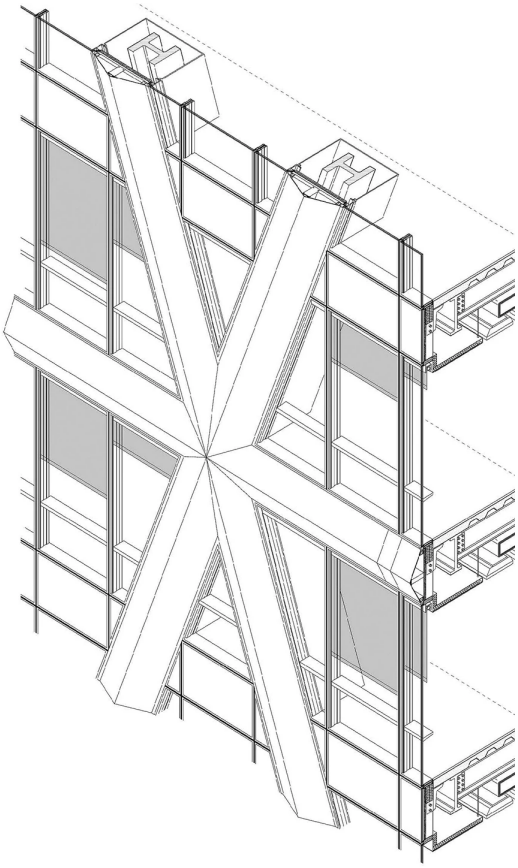
The connections within this primary frame are executed in steel, ensuring durability and strength at critical junctions. To enhance the aesthetic appeal and provide a finished look, caps are placed over the beams. These caps can be equipped with integrated lighting to emphasize the structure, highlighting the geometric patterns and creating a visually striking facade, especially during nighttime. The contrast between the V-shaped beams at the base and the triangular patterns higher up creates a dynamic visual progression, symbolizing the transition from the strong, grounded foundation to the lighter, more refined upper levels. This structural approach maximizes the internal floor space by minimizing the need for internal load-bearing walls, thereby enhancing the flexibility and usability of interior spaces.

Additionally, the integration of these geometrically distinct forms into the facade not only optimizes the building's structural performance but also creates a compelling architectural expression that reflects both the physical and conceptual foundations of the tower. The meticulous design of the primary frame underscores the tower's innovative approach to blending structural necessity with aesthetic ambition, positioning it as a landmark of modern engineering and architectural design.

CONNECTIONS

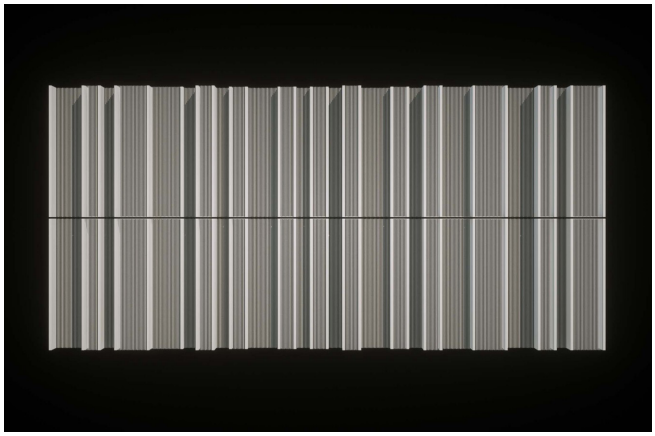


Detail junction

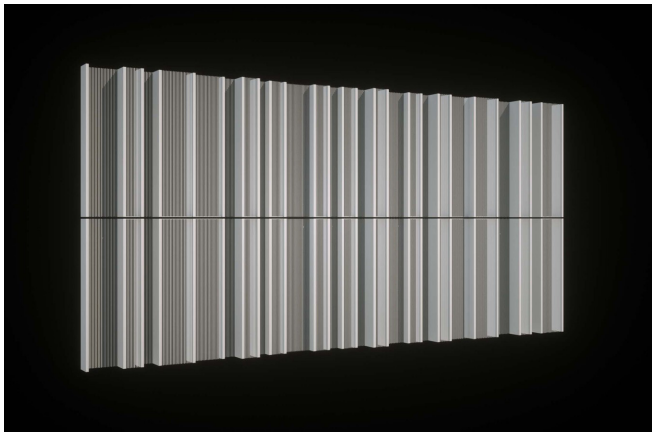


Part of Facade

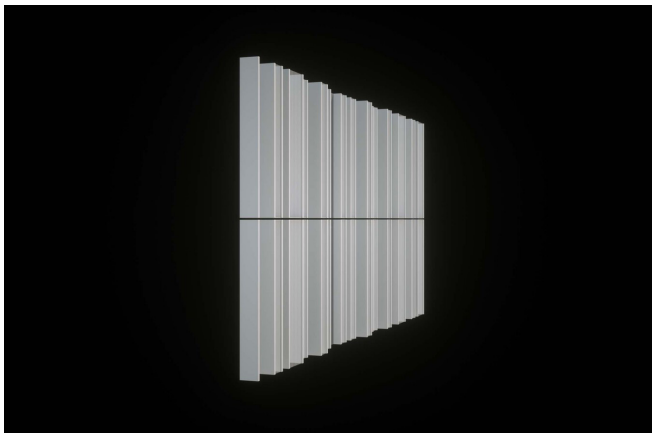
PANELS



panel sizes
400 x 3.000
900 x 3000
650 x 3.000



prefab size
6.000 x 3.000



FACADE PANELS

The construction industry is continuously evolving, seeking innovative solutions to enhance efficiency, sustainability, and quality. One such innovation that has gained significant traction is the use of prefabricated panels. Prefabrication involves the off-site manufacturing of building components, which are then transported to the construction site for assembly. This method is particularly advantageous when using standardized panel sizes such as 12000mm x 6000mm and 6000mm x 3000mm. This paper explores the benefits and implications of using prefabricated panels in modern construction, emphasizing their role in achieving superior construction outcomes.

Enhanced Quality Control

Prefabricated panels are manufactured in controlled factory settings, where stringent quality control measures can be consistently enforced. This controlled environment ensures precision and high-quality production standards that are often difficult to achieve on a conventional construction site. Factory production allows for the integration of advanced technologies and materials, resulting in panels that meet exact specifications and performance criteria. The consistency in quality reduces the likelihood of defects and enhances the overall durability and longevity of the construction.

Increased Construction Speed

The off-site fabrication of panels significantly reduces on-site construction time. Once the panels are delivered, they can be swiftly assembled, thereby accelerating the overall construction process. This rapid assembly is particularly beneficial for projects with tight deadlines or those situated in urban areas where minimizing disruption is crucial. The use of standardized panel sizes, such as 12000mm x 6000mm and 6000mm x 3000mm, further streamlines the construction process. These sizes are designed to optimize transport logistics and ease of assembly, ensuring that construction progresses efficiently and on schedule.

FACADE PANELS

Cost Efficiency

Prefabrication can lead to substantial cost savings throughout the construction lifecycle. The controlled factory environment allows for more efficient use of materials and labor, reducing waste and lowering labor costs. Additionally, the speed of on-site assembly minimizes labor expenses and reduces the duration of project-related overhead costs. Standardized panel sizes contribute to these savings by simplifying design and construction processes, minimizing errors, and reducing the need for on-site adjustments and rework.

Improved Safety

Safety is a paramount concern in construction, and prefabrication significantly enhances on-site safety conditions. By moving a substantial portion of construction activities off-site, the risks associated with on-site construction, such as falls, equipment accidents, and exposure to hazardous materials, are significantly reduced. The factory setting is typically safer and more controlled, with fewer variables that can lead to accidents. As a result, the overall safety of the construction process is improved, protecting workers and reducing the likelihood of costly safety incidents.

Environmental Benefits

Prefabricated construction offers notable environmental advantages. The precision manufacturing process inherent in prefabrication leads to less material waste compared to traditional construction methods. Off-cuts and excess materials can be more effectively managed and recycled in a factory setting. Moreover, the reduced construction time and optimized transportation logistics contribute to a lower carbon footprint. The factory environment also allows for better energy efficiency and waste management practices, further enhancing the sustainability of the construction process.

Design Flexibility and Consistency

The use of standardized panel sizes, such as 12000mm x 6000mm and 6000mm x 3000mm, provides significant design flexibility while ensuring construction consistency. These sizes are versatile and can be adapted to a wide range of building designs and architectural styles. They allow for creative freedom while maintaining the efficiencies of prefabrication. Consistency in panel sizes simplifies the design and assembly process, reducing the potential for errors and ensuring high-quality outcomes. This uniformity also facilitates easier maintenance and future modifications or expansions.

FLOORS

The building construction comprises a steel framework with a concrete core serving as the primary structural system. This combination of materials provides strength, stability, and durability to the overall structure. The steel construction offers flexibility in design and facilitates efficient construction processes, while the concrete core reinforces the building's load-bearing capacity and enhances its resilience.

The floors of the building will feature hybrid construction, integrating wooden elements with a concrete topping. This hybrid floor system not only optimizes structural performance but also enhances sustainability by utilizing renewable materials. Wood contributes to a warm and inviting interior ambiance, while the concrete topping adds strength and fire resistance, ensuring compliance with safety standards.

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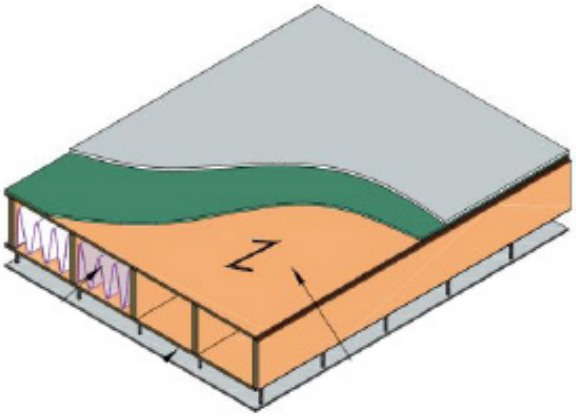
Overall, the building construction materiality reflects a thoughtful integration of steel, concrete, wood, and recycled aluminum, prioritizing structural integrity, sustainability, and aesthetic coherence. This harmonious blend of materials contributes to the building's identity and reinforces its commitment to environmental stewardship and design innovation.

FLOORS RESEARCH



Metsa Group
Kerto Ripa

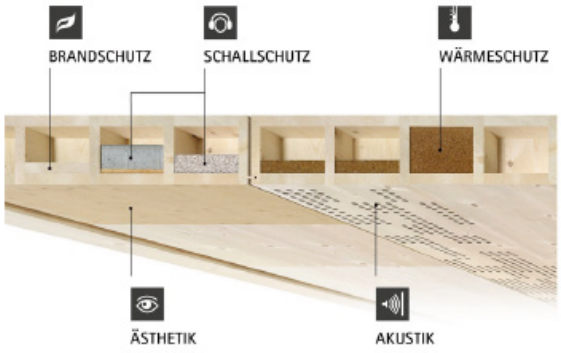
The Kerto-Ripa panel is a structural engineered timber building element made from glued Kerto members. It is used to create the ground, intermediate floors and roofs of residential, commercial and public buildings. Kerto-Ripa can be used in both Thermo insulated structures and non-insulated structures.

Lignatur
System Element (LFE)

LIGNATUR surface elements are the ideal solution for multi-storey residential, office or school buildings. Their covering width is 1000 mm, the maximum length is 16 m, excess lengths are possible on request. Choose element heights of between 90 and 360 mm to satisfy your needs. LIGNATUR surface elements can be modified for spans up to 12 m depending on the fire protection and sound insulation, sound absorption and heat insulation requirements.

Lignatur
Box Element (LKE)

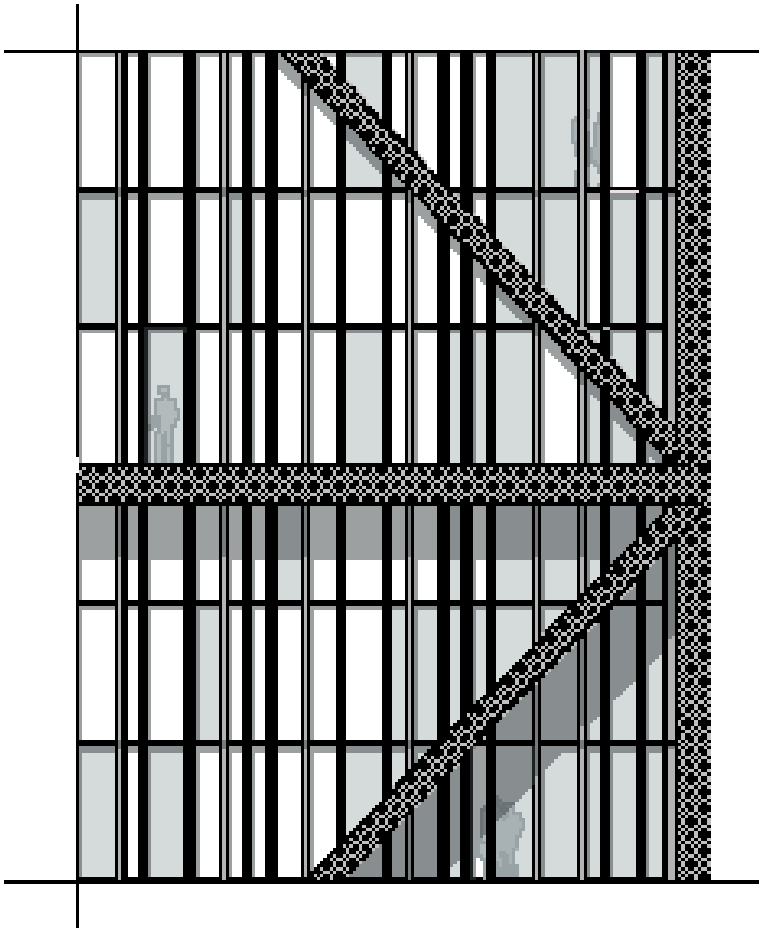
LIGNATUR box elements have a covering width of 200 mm, are lightweight and can be laid by hand. The running meter weighs only approx. 7 kg – ideal for redevelopments. The maximum length is 12 m, excess lengths are possible on request. Choose element heights of between 120 and 320 mm to satisfy your needs. LIGNATUR box elements can be modified for spans up to 12 m depending on the fire protection and sound insulation, sound absorption and heat insulation requirements.

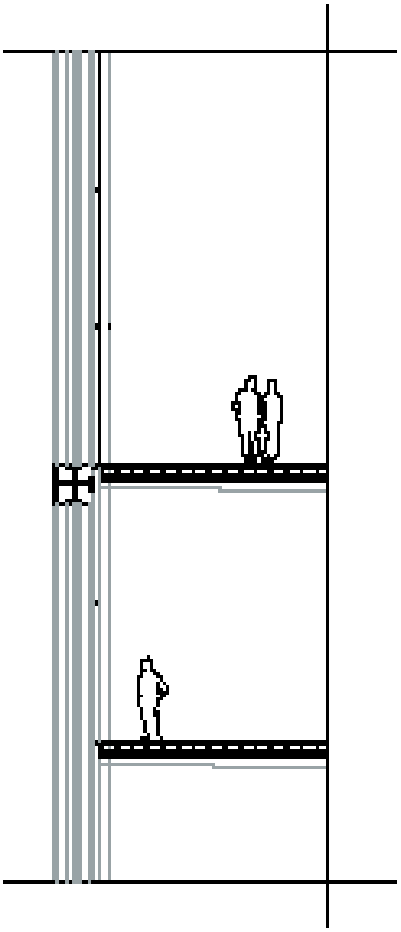


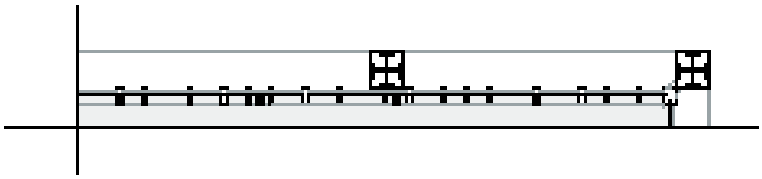
Lignatur
Lignatur

An element that combines most functions of a ceiling, a roof, in one. An element that needs no supports, even with a larger span, that effectively insulates sound, improves the room acoustics and satisfies strict fire protection regulations. An element that is produced and supplied to quality specifications for visible are as and can integrate technical installations.

FRAGMENT







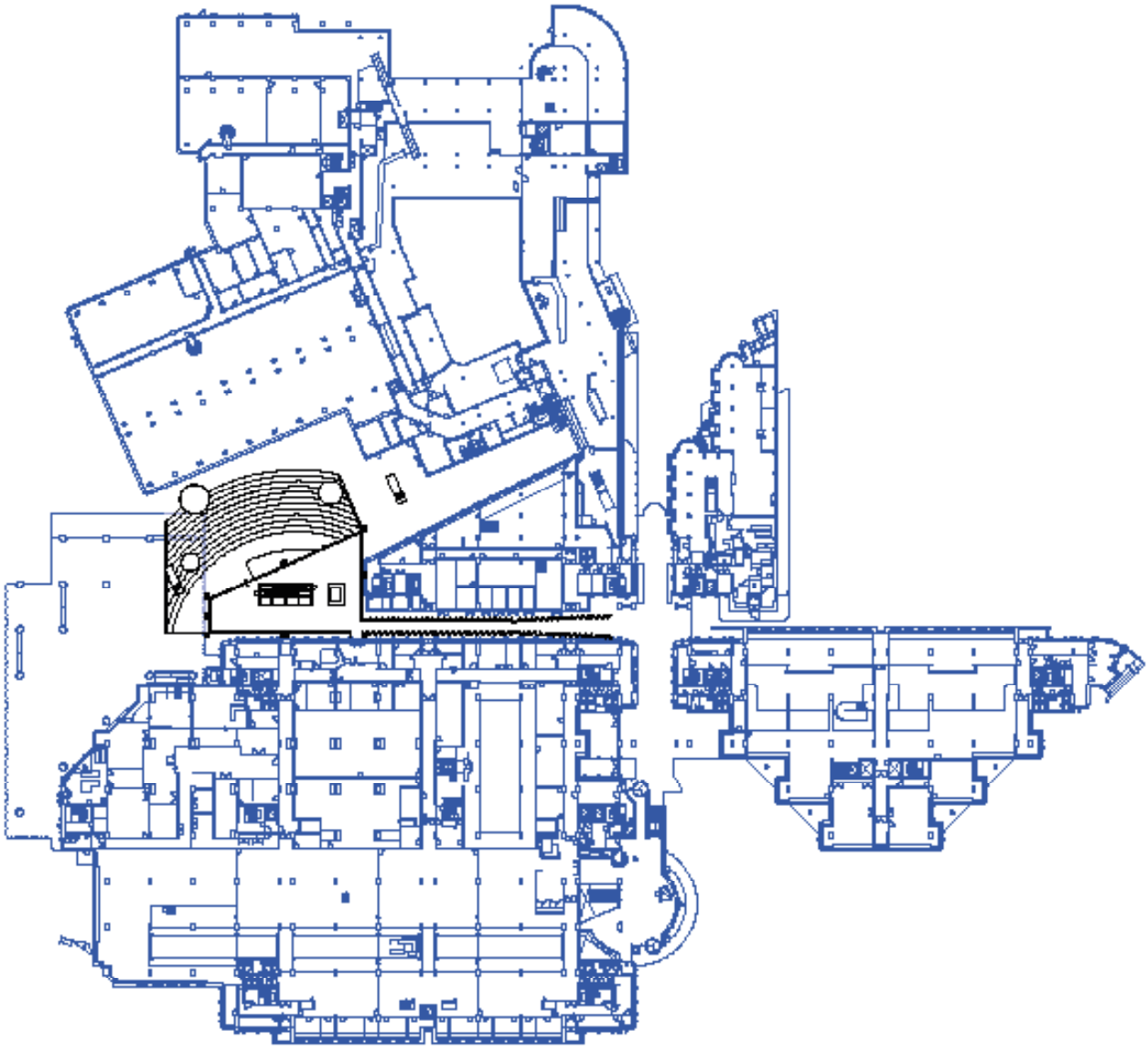
CLIMATE DESIGN

The building's material composition combines glass, concrete, and metal elements to create a unified facade design. Glass panels are strategically positioned to provide transparency and visual connectivity, allowing natural light to permeate the interior spaces. These sections of glass contribute to a contemporary aesthetic and promote an open atmosphere within the building.
Complementing the glass panels, sections of the facade are clad in concrete, enhancing structural integrity and imparting a sense of solidity and permanence to the exterior. The concrete cladding creates a striking contrast with the transparency of the glass, adding visual interest and texture to the overall facade.

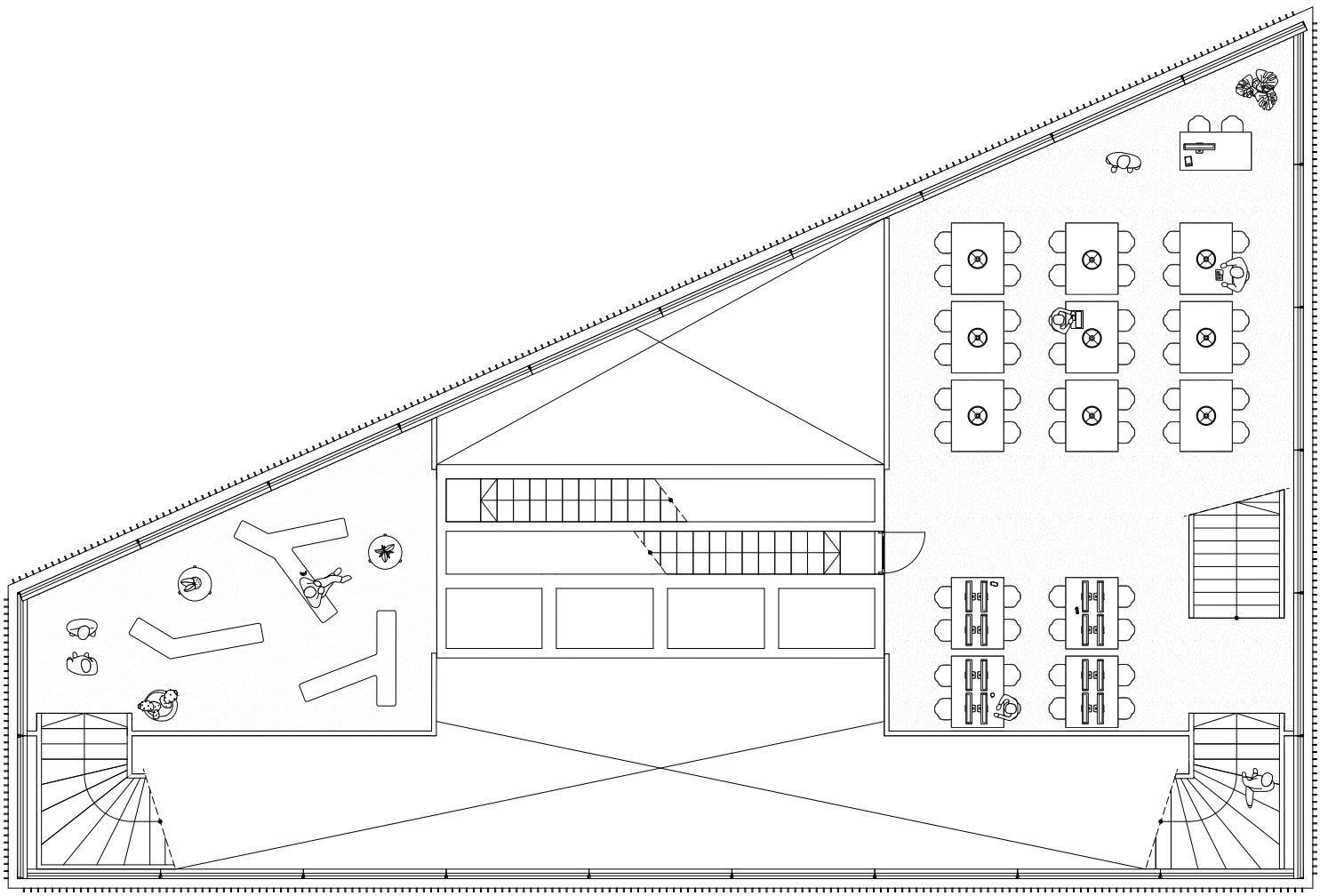
Overlaying both the glass and concrete elements is a metal skin, which serves to unify the disparate materials and provide additional protection and durability to the facade. The metal skin enhances the aesthetic cohesion of the building while offering a sleek and modern finish.
It is noteworthy that the diagonal parts in the cut and crown of the building are left without the metal skin. These unique architectural features remain exposed, adding character and distinction to the overall design. By preserving these elements in their natural state, the building's individuality and architectural identity are accentuated, further enriching its visual appeal.

FLOORPLANS

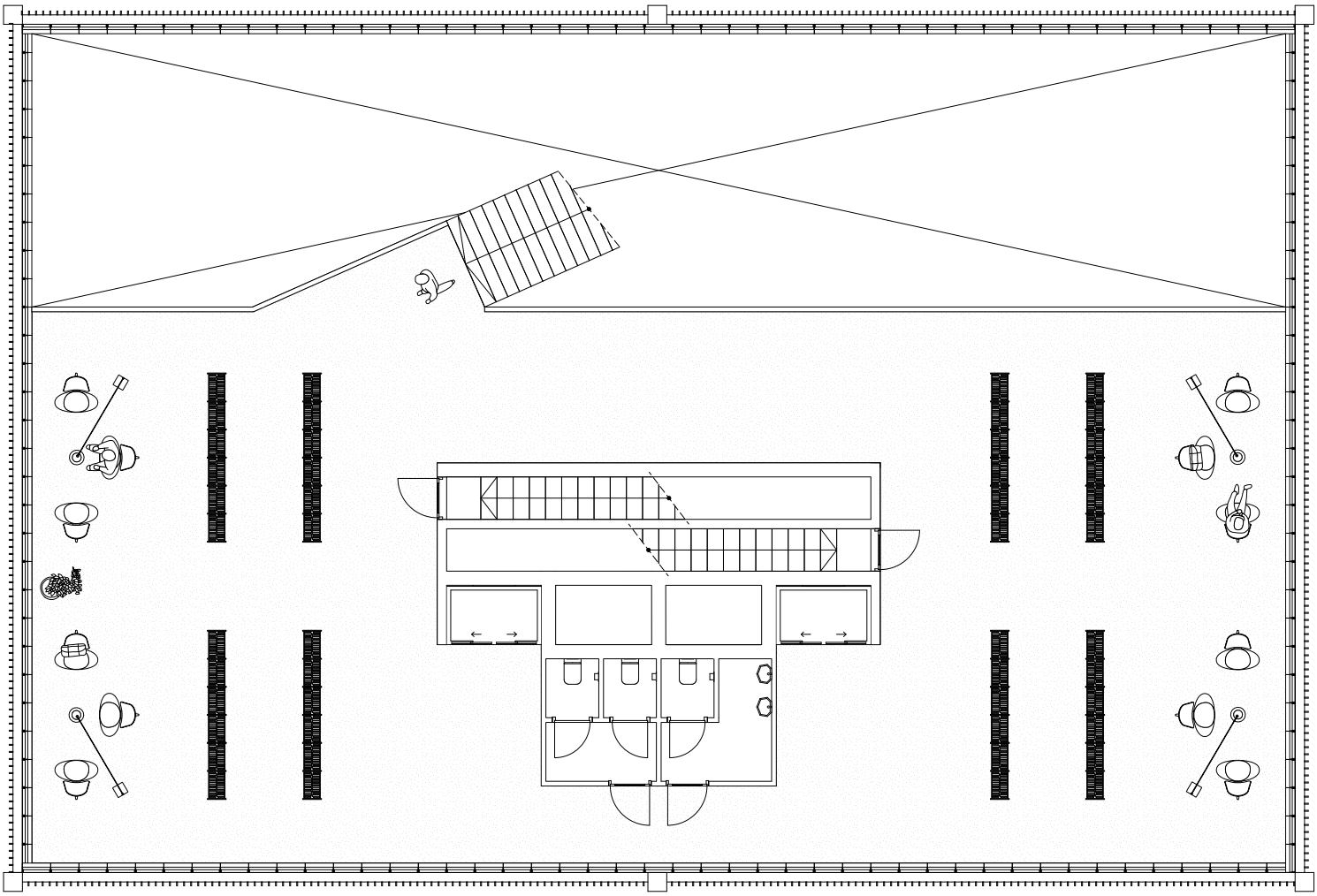
GATEWAY



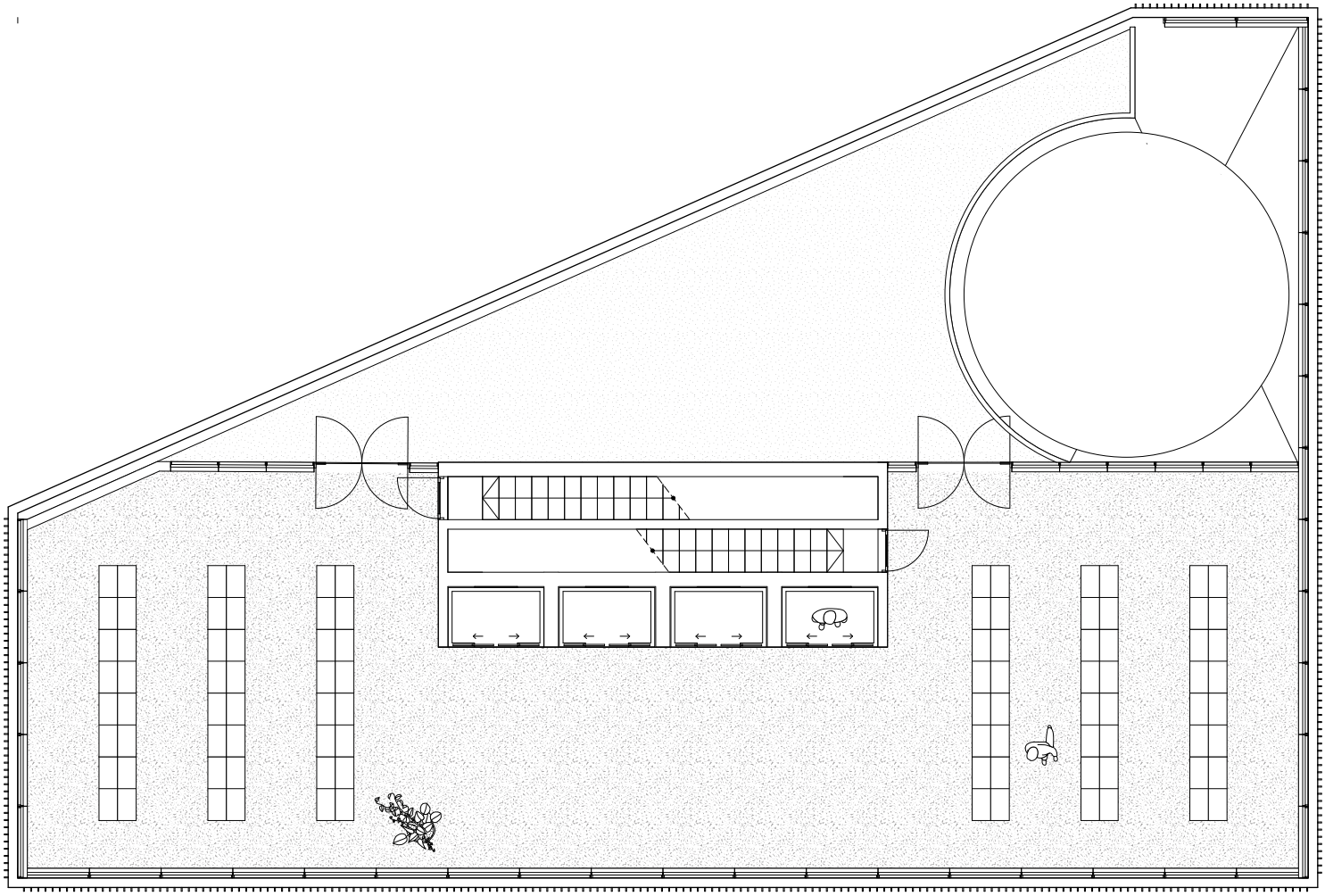
EXPLORATORIUM



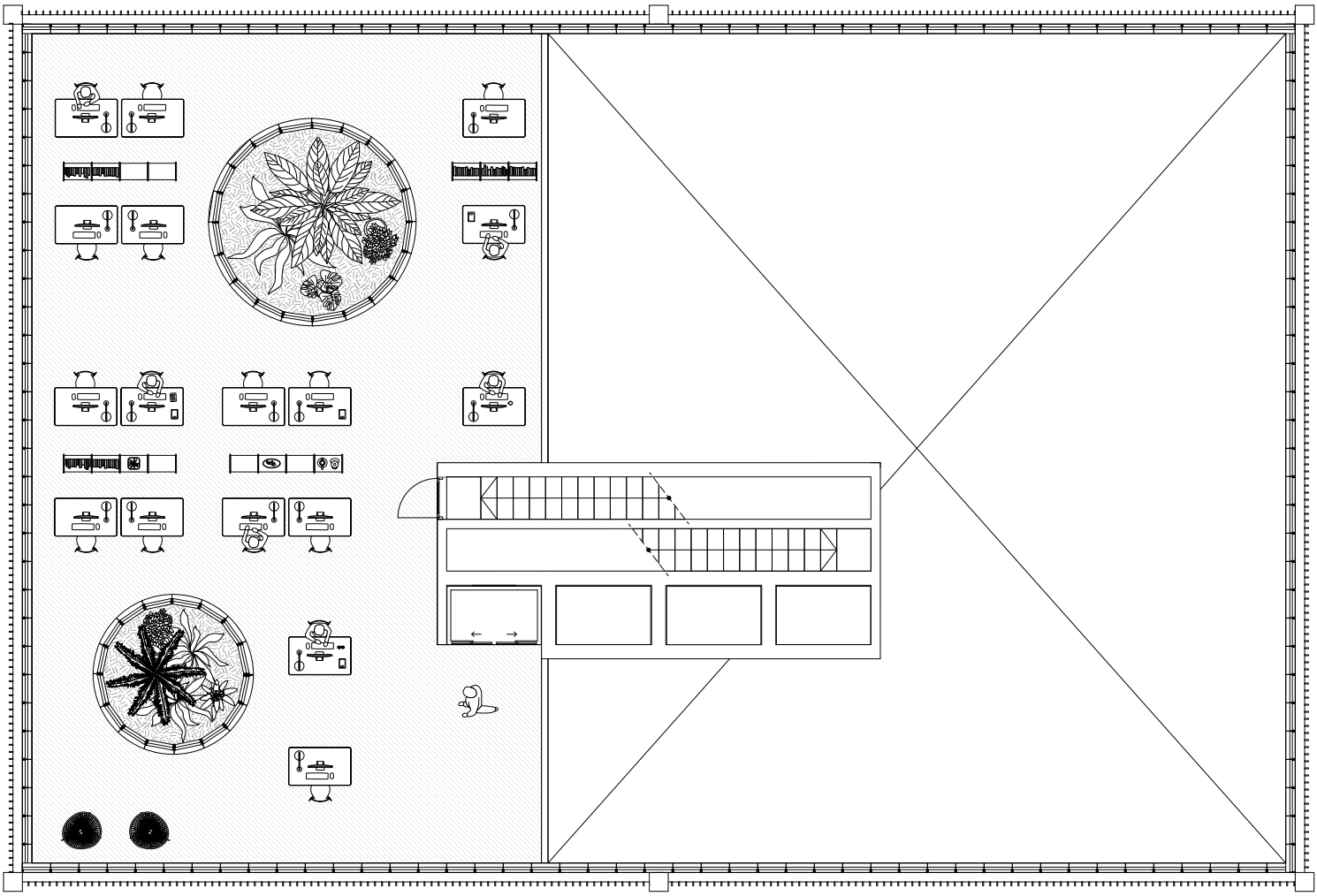
EXPLORATORIUM



INNOVATORIUM

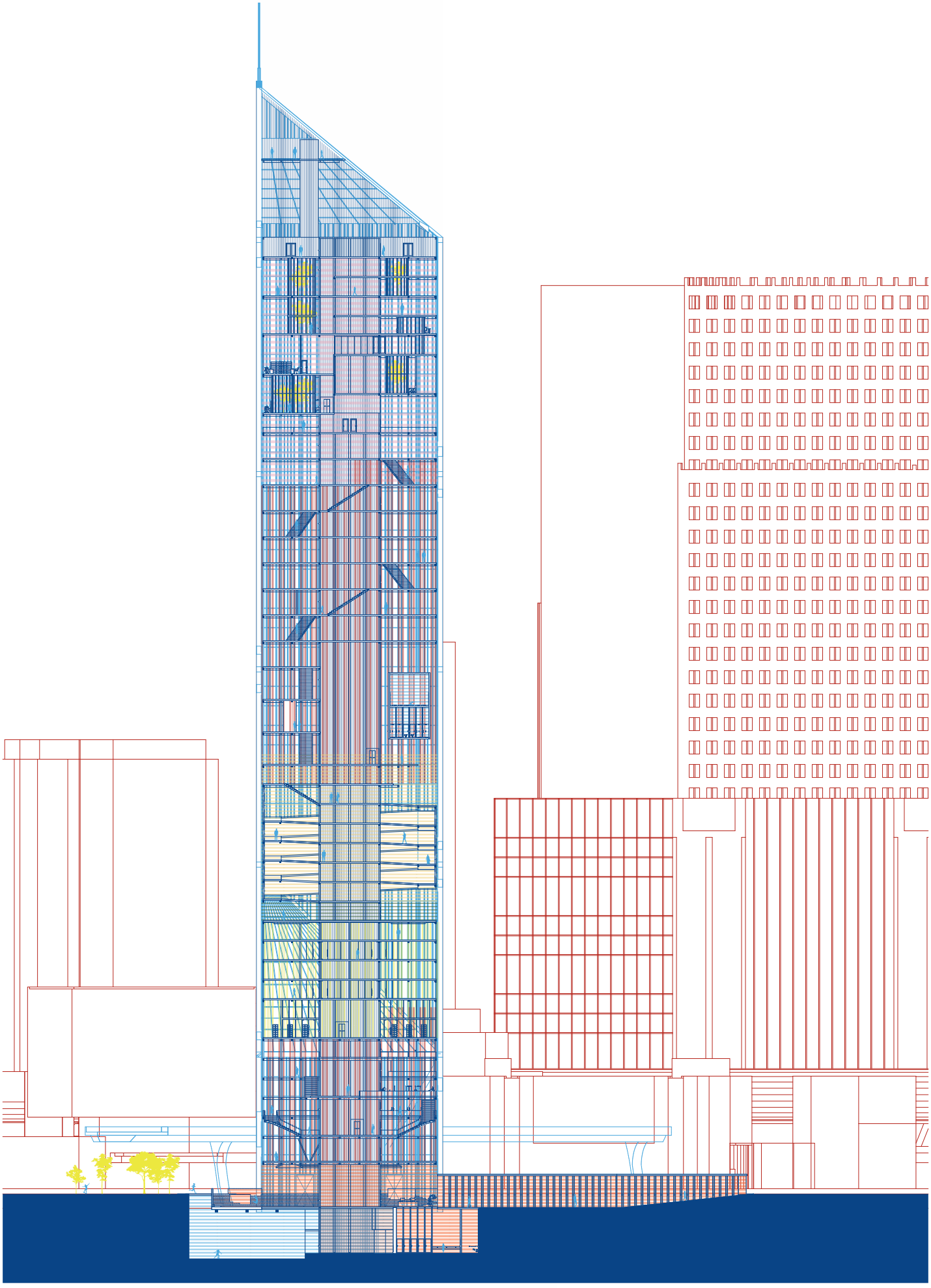


CORPORATE CORE

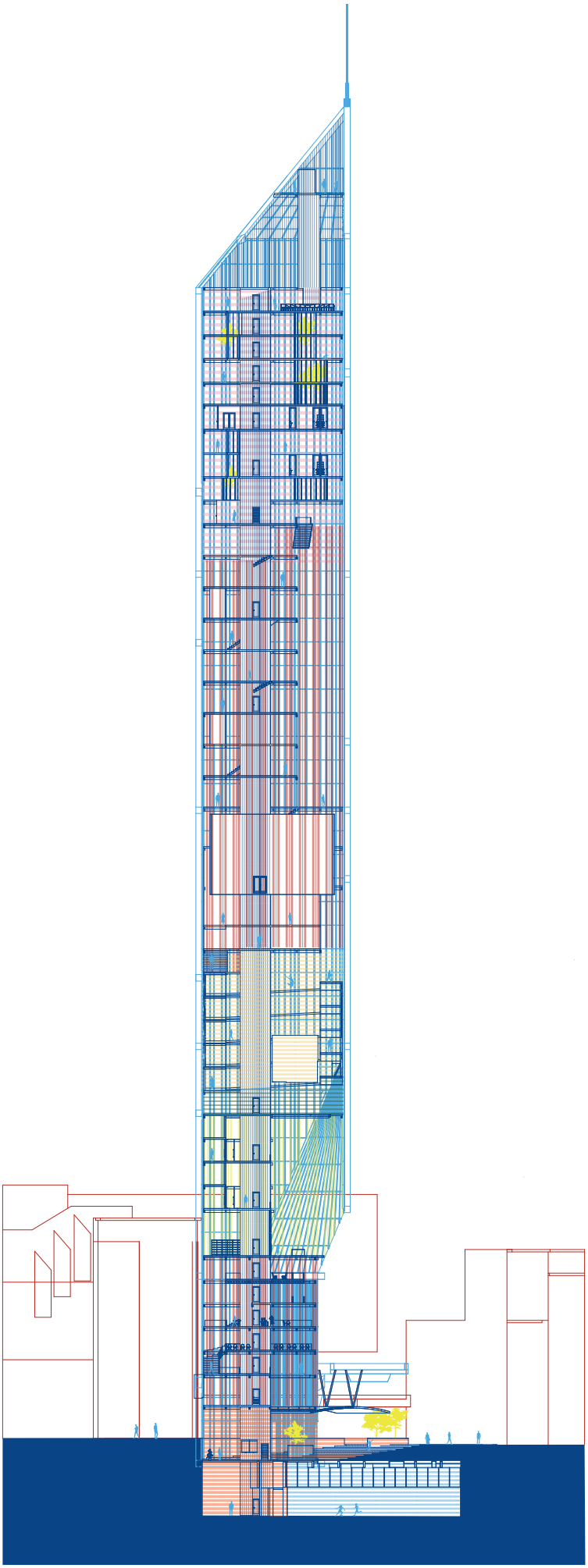


SECTION

SECTION A-A

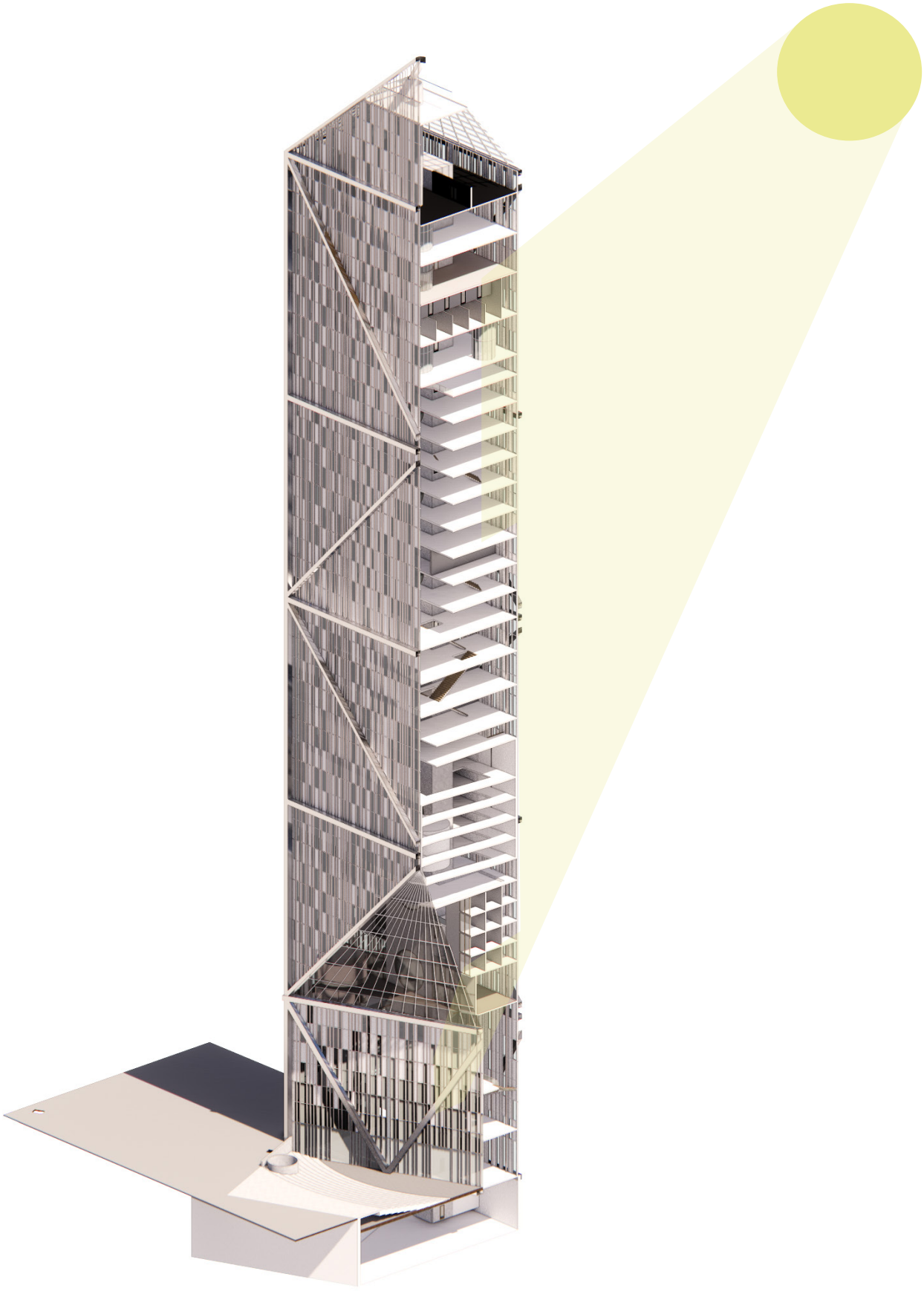


SECTION B-B

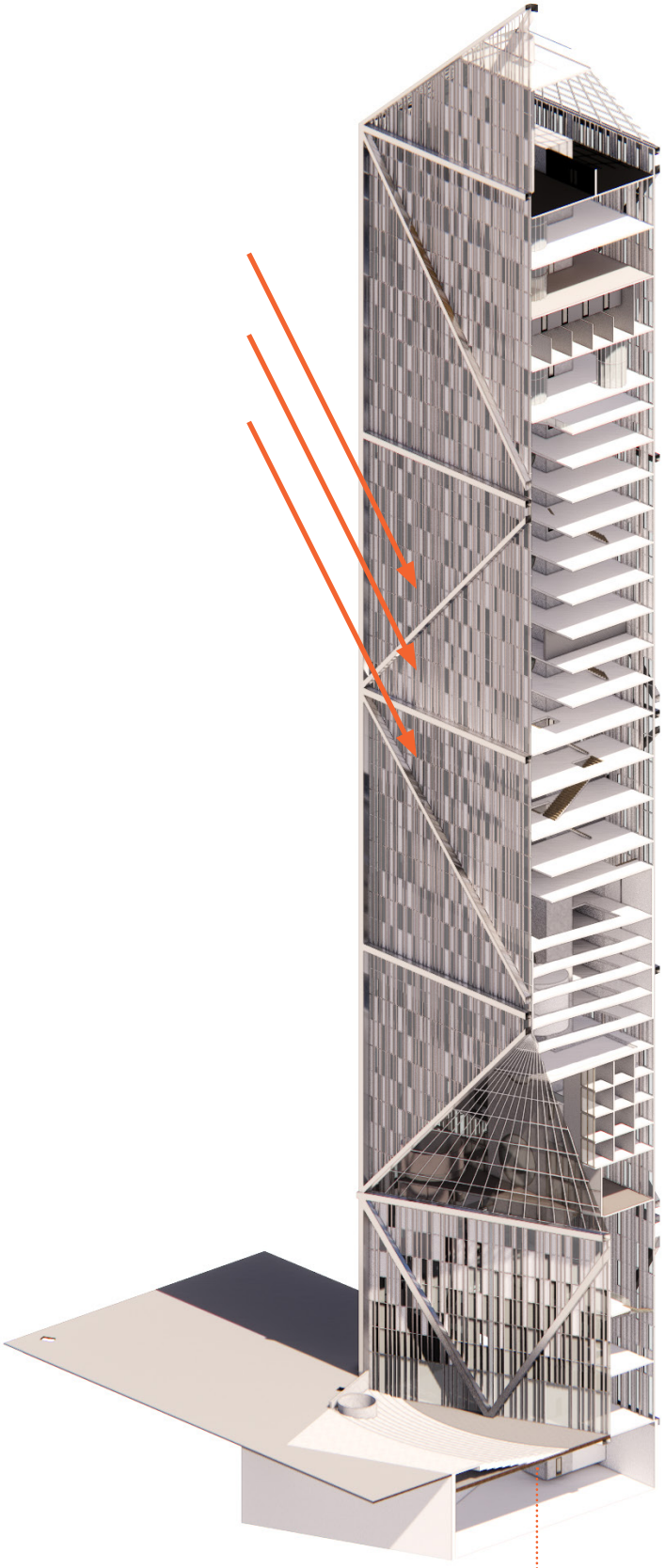


SUSTAINABILITY

small footprint

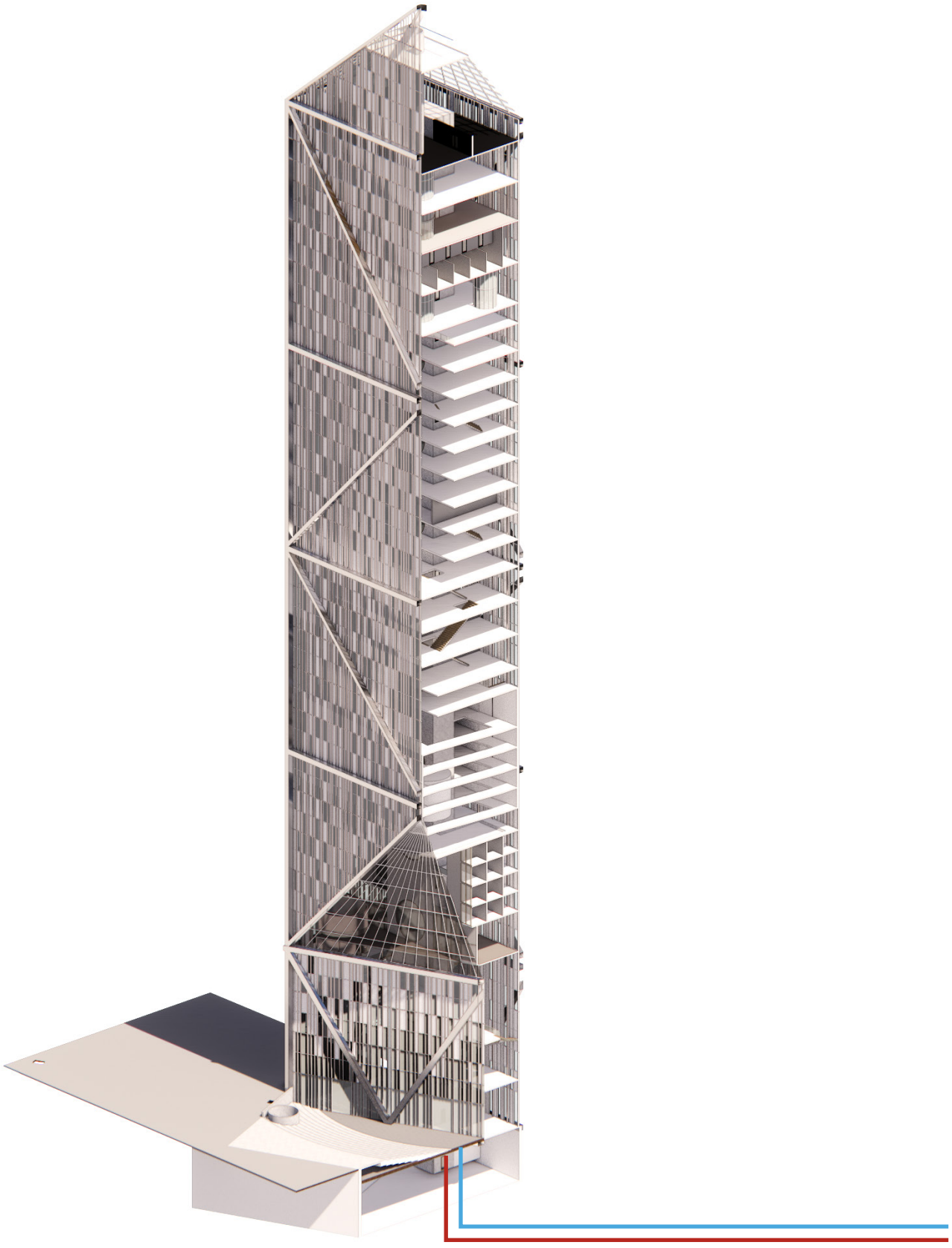


improved natural daylight



the hague battery

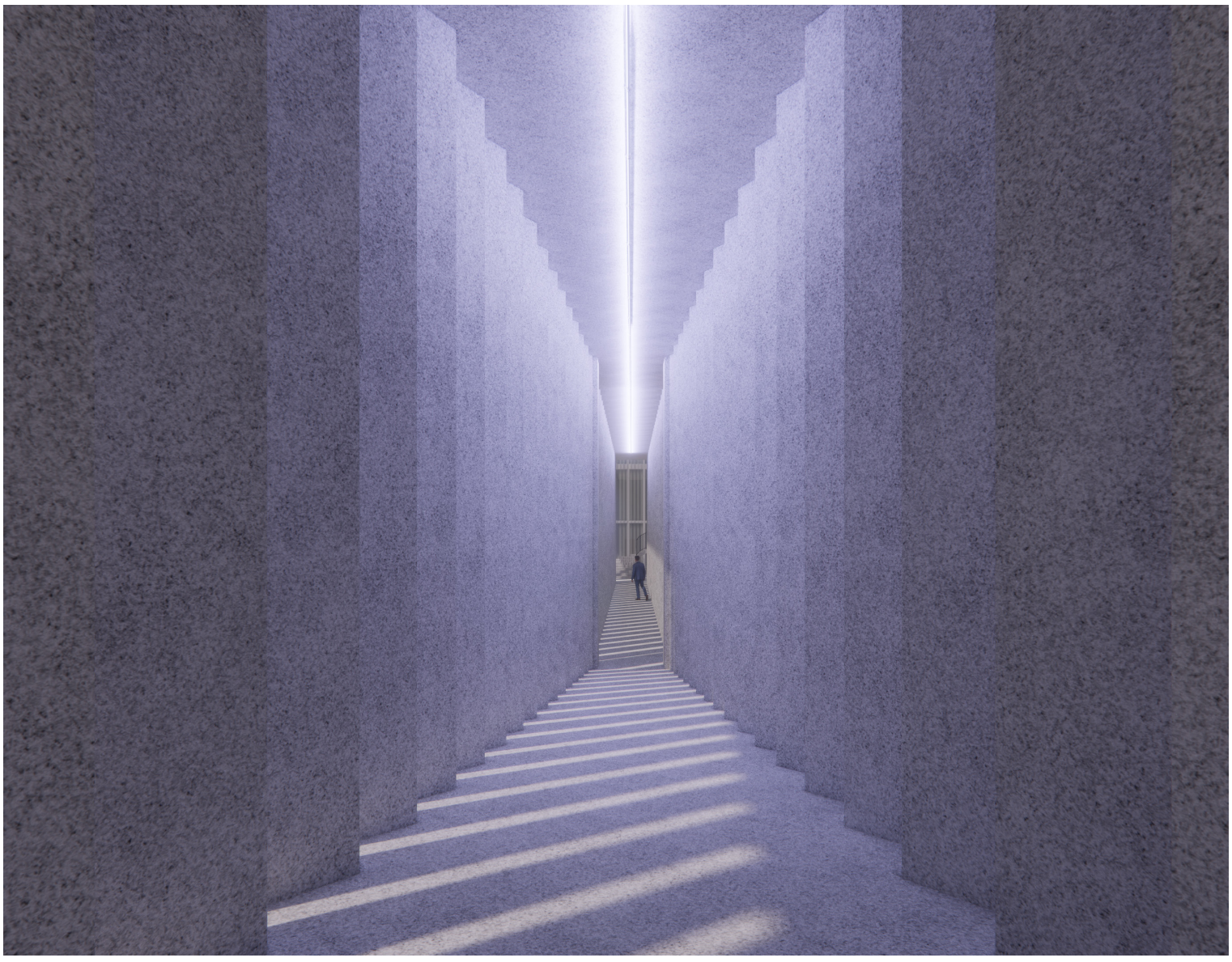
renewable energy source



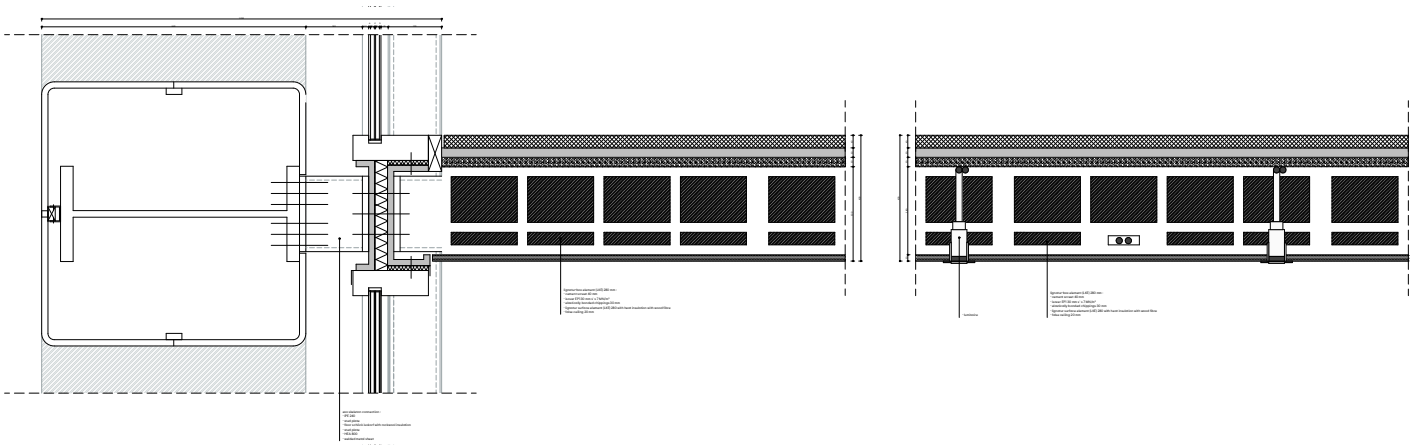
ground source heatpumps

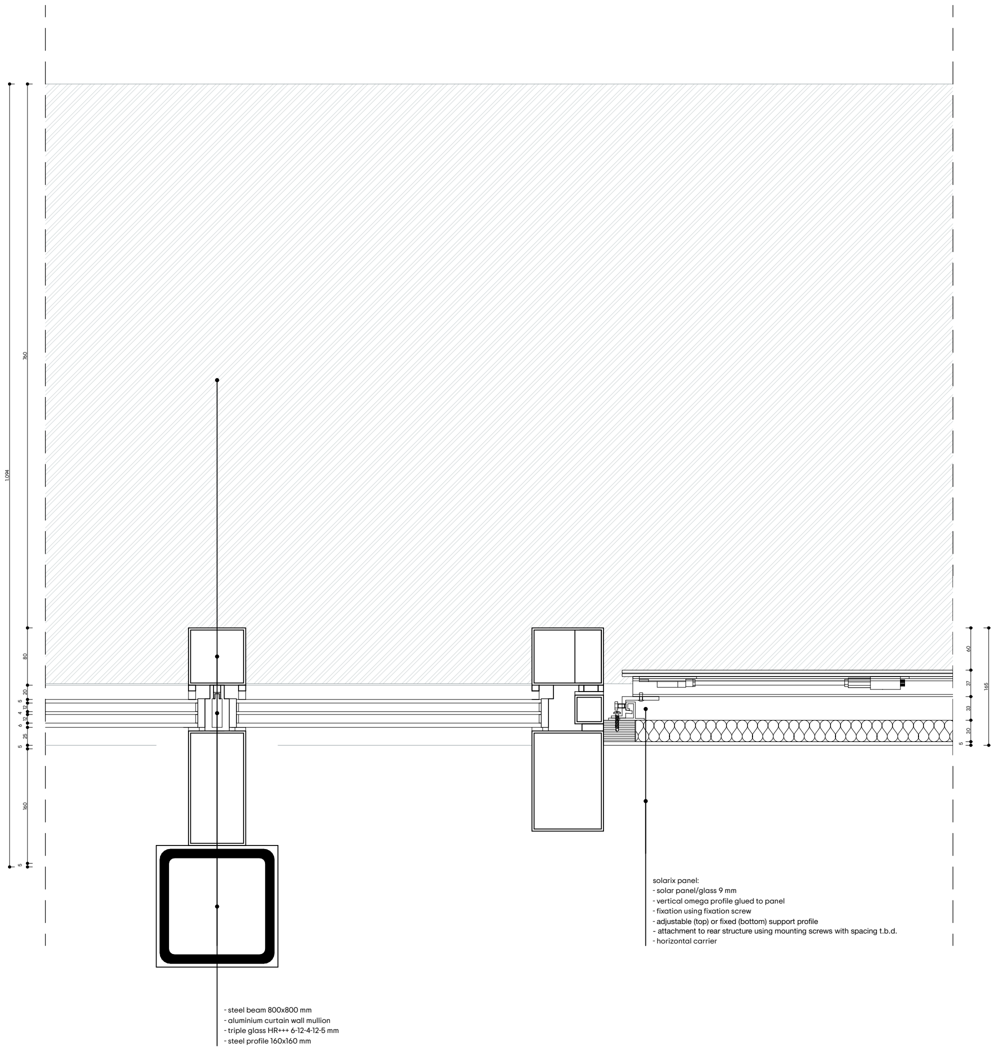
Sustainability in high-rise tower design necessitates a multifaceted approach to address both environmental impact and occupant comfort throughout the year. During the summer months, effective heat exhaust systems and natural cross-ventilation are crucial for reducing reliance on mechanical cooling, thereby lowering energy consumption. The use of robust, locally sourced materials enhances the building's durability and minimizes the carbon footprint associated with transportation. Adaptive reuse of existing structures or materials contributes to resource efficiency and reduces construction waste. In winter, heat reclamation systems capture and reuse warmth generated within the building, improving overall energy efficiency. Enhanced natural daylighting strategies reduce the need for artificial lighting, while ground source heat pumps provide a sustainable heating solution by leveraging stable underground temperatures. Integrating photovoltaic (PV) panels into the facade not only generates renewable energy but also contributes to the building's thermal regulation year-round. These strategies collectively foster a high-rise design that is resilient, energy-efficient, and environmentally responsible.

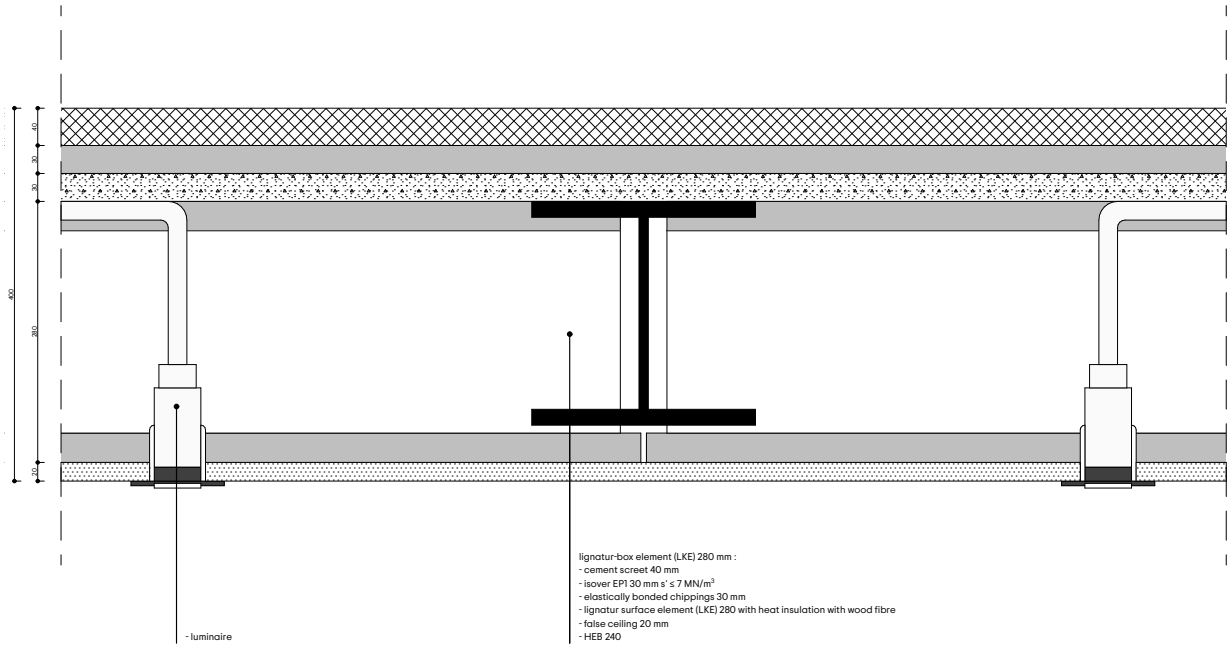
RENDERS

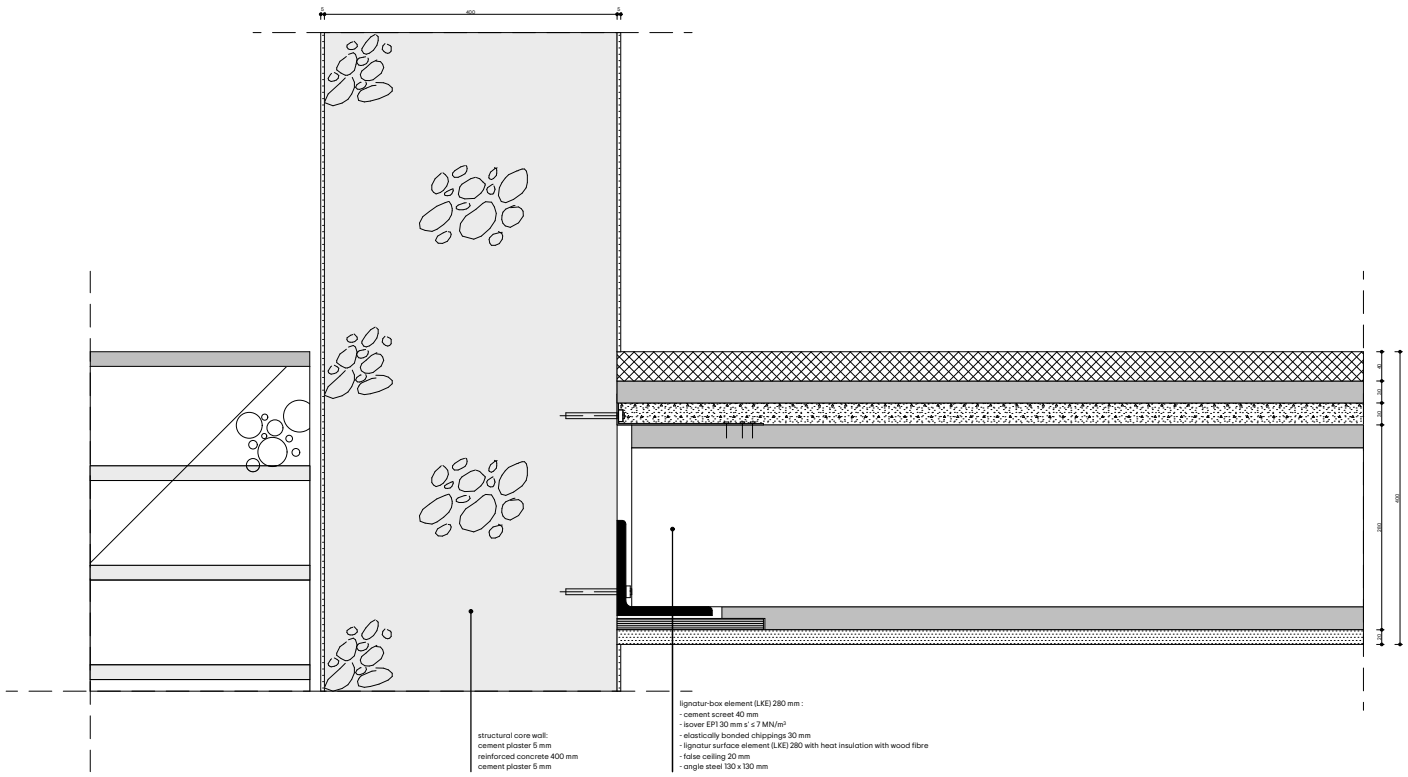


DETAILS




solarix panel:
- solar panel/glass 9 mm
- vertical omega profile glued to panel
- fixation using fixation screw
- adjustable (top) or fixed (bottom) support profile
- attachment to rear structure using mounting screws with spacing t.b.d.
- horizontal carrier
- steel beam 800x800 mm
- aluminium curtain wall mullion
- triple glass HR+++ 6-12-4-12-5 mm
- steel profile 160x160 mm


40
30
30
280
20
400
- luminaire
lignatur-box element (LKE) 280 mm :
- cement screet 40 mm
- isover EP1 30 mm s' ≤ 7 MN/m³
- elastically bonded chippings 30 mm
- lignatur surface element (LKE) 280 with heat insulation with wood fibre
- false ceiling 20 mm
- HEB 240


structural core wall:
cement plaster 5 mm
reinforced concrete 400 mm
cement plaster 5 mm
lignatur-box element (LKE) 280 mm :
- cement screet 40 mm
- isover EP1 30 mm s' ≤ 7 MN/m³
- elastically bonded chippings 30 mm
- lignatur surface element (LKE) 280 with heat insulation with wood fibre
- false ceiling 20 mm
- angle steel 130 x 130 mm

REFLECTION P3 & P4

Student: Amber Rose Heijdens
Student Number: 5656702

The reflection on the "XXI Century Wunderkammer" project aims to provide a comprehensive evaluation of the research and design processes involved in creating adaptable academic spaces within a vertical campus. This project, developed as part of the MSc Architecture, Urbanism & Building Sciences (AUBS) program, integrates theoretical knowledge and practical skills from the "Campus of the Future" and "Public Building" studios. The reflection will explore the alignment of the project with the academic objectives of the AUBS program, the interplay between research and design, the effectiveness of the methodologies employed, the academic and societal implications, and the transferability of the project's outcomes. Additionally, the reflection will address the project's impact on user engagement and educational outcomes, and how sustainability considerations have been integrated. By answering these questions, the reflection aims to provide a detailed account of the project's development, its successes, challenges, and the lessons learned, ultimately guiding the final phase of the graduation period.

1. What is the relationship between your graduation project topic, your master track (A, U, BT, LA, MBE), and your master programme (MSc AUBS)?

My graduation project, titled "XXI Century Wunderkammer," is deeply interconnected with the "Campus of the Future" studio, the "Public Building" studio, and the "Architecture" master track within the MSc Architecture, Urbanism & Building Sciences (AUBS) program. The project aims to design adaptable academic spaces within a vertical campus, encapsulating the modern interpretation of a Wunderkammer. This aligns with the studio's objective of envisioning innovative educational spaces and the master track's focus on pioneering architectural solutions.

- Campus of the Future Studio: The project's emphasis on creating adaptable learning environments directly reflects the studio's mission of exploring progressive educational spaces that address contemporary and future needs.
- Public Building Studio: The vertical campus functions as a public building serving educational purposes, aligning with the studio's focus on dynamic and accessible public structures.
- Architecture Master Track: The project involves applying fundamental architectural principles, such as spatial design, functionality, and aesthetic considerations, which are central to the Architecture track. It requires integrating theoretical knowledge with practical design skills to create a sustainable and innovative educational facility.

2. How did your research influence your design/recommendations and how did the design/recommendations influence your research?

Research Influence on Design:

The research significantly informed the design process through several key phases:

- Literature Reviews and Case Studies: These provided a foundational understanding of adaptable academic spaces and the Wunderkammer concept, leading to the development of design principles.
- Comparative Analysis: Identifying successful elements from existing adaptable spaces helped refine the design to meet educational needs.
- Field Research: Insights from The Hague's local context informed specific design adaptations to ensure relevance and practicality.

Design Influence on Research:

- Design Iterations: Initial design prototypes, based on the research principles, were tested and evaluated, leading to refined research questions and methodologies. Iterative testing allowed for continuous feedback and improvement, ensuring that the design was both practical and innovative.
- Research by Design: This methodology was crucial in bridging theory and practice. By engaging in design as a form of research, practical challenges encountered during the design process highlighted

areas needing further investigation, enriching the research framework. This approach allowed for real-time testing of hypotheses and immediate application of findings, fostering a dynamic and responsive design process.
- Collaborative Feedback: The iterative design process was enriched by feedback from mentors, peers, and stakeholders. This collaborative approach ensured that diverse perspectives were considered, and the design remained aligned with educational goals and user needs.
- Integration of New Insights: Each design iteration provided new insights that informed subsequent research. For example, challenges in spatial configuration or material selection led to deeper investigations into innovative solutions, which were then incorporated into the design. This cyclical process ensured that the project was continually refined and improved.

The interplay between research and design was integral to the development of the "XXI Century Wunderkammer." The research informed the design through comprehensive literature reviews, comparative analysis, and field research, while the design process, particularly through the research by design methodology, provided practical insights that enriched the research framework. This dynamic and iterative approach ensured that the final design was both theoretically sound and practically viable, meeting the needs of modern educational environments.

3. How do you assess the value of your way of working (your approach, your used methods, used methodology)?

Approach and Methodology Assessment:

- Comprehensive and Iterative: The approach combined literature reviews, case studies, and field research, ensuring a thorough understanding of the topic. The iterative nature allowed for continuous improvement based on feedback and new insights.
- Integration of Theory and Practice: The methodology effectively bridged theoretical concepts with practical applications, resulting in a design that is both innovative and feasible.
- Collaborative: Engaging with mentors and stakeholders provided diverse perspectives and expertise, enhancing the project's depth and relevance.

4. How do you assess the academic and societal value, scope, and implication of your graduation project, including ethical aspects?

Academic Value:

- Contribution to Knowledge: The project advances understanding of adaptable learning environments within vertical campuses, offering new insights and principles applicable to future education and research.
- Educational Impact: It proposes innovative solutions for modern educational spaces, addressing the evolving needs of students and educators.

Societal Value:

- Urban Space Optimization: The design addresses urban space constraints by proposing a vertical campus model, enhancing land use efficiency in densely populated areas.
- Inclusivity and Accessibility: By creating adaptable and multifunctional spaces, the project promotes inclusive and accessible education for diverse user groups.

Ethical Aspects:

- Sustainability: The project emphasizes sustainable design practices, considering environmental impact and resource efficiency.
- Social Responsibility: The focus on creating public educational spaces reflects a commitment to social responsibility, aiming to improve community engagement and learning opportunities.

5. How do you assess the value of the transferability of your project results?

- Adaptability Principles: The developed principles for adaptable academic spaces can be applied to various educational settings beyond vertical campuses, making them widely transferable.
- Educational Strategies: The integration of the Wunderkammer concept into learning environments offers a novel approach that can inspire future educational facility designs globally.
- Technological Integration: The incorporation of smart technologies, such as interactive digital displays, virtual reality stations, and adaptive lighting systems, provides a framework that can be replicated in different educational settings. This technological integration supports diverse learning styles and activities, ensuring the spaces remain relevant and engaging across various educational contexts.
- Long-Term Adaptation: The principles of adaptability ensure that the spaces designed today can evolve with future needs. This forward-thinking approach means that the project results are not only relevant for current educational paradigms but can also accommodate future changes in educational methods, technologies, and demographic trends.

Reflection Questions

1. How effectively do the final design prototypes foster a sense of wonder and continuous learning, as envisioned in the XXI Century Wunderkammer concept?

The final design prototypes have been meticulously evaluated to assess their ability to foster a sense of wonder and continuous learning, aligning with the XXI Century Wunderkammer concept. The following aspects were considered:

- Spatial Configuration: The adaptable nature of the spaces, including movable walls and modular furniture, allows for dynamic reconfiguration, promoting an environment of exploration and discovery. This flexibility ensures that the spaces can be tailored to various learning activities, encouraging continuous engagement and curiosity among users.
- Aesthetic and Design Elements: The inclusion of unique architectural features, such as double-height spaces, expansive windows with views of the cityscape, and strategically placed interactive exhibits, contributes to an inspiring and stimulating environment. These elements are designed to evoke a sense of wonder and encourage users to explore and engage with their surroundings actively.
- Integration of Technology: Smart technologies embedded within the design, such as interactive digital displays, virtual reality stations, and adaptive lighting systems, enhance the learning experience. These technologies support a variety of learning styles and activities, ensuring that the space remains engaging and relevant for a diverse user group.
- Feedback: Preliminary feedback from user testing and expert reviews indicates that the design successfully creates an environment conducive to continuous learning and wonder. Users have reported increased motivation and engagement, attributing this to the adaptable and stimulating nature of the spaces.

Overall, the design prototypes have effectively realized the vision of the XXI Century Wunderkammer, fostering an environment that supports ongoing exploration, engagement, and learning.

2. What impact do adaptable learning spaces have on user engagement and educational outcomes in a vertical campus setting?

The impact of adaptable learning spaces on user engagement and educational outcomes has been assessed through various qualitative and quantitative measures:

- User Engagement: Observations and surveys conducted during user testing sessions indicate a high level of engagement with adaptable learning spaces. Users have demonstrated a greater willingness to interact with the space, participate in collaborative activities, and utilize the provided resources. The flexibility of the spaces allows users to create personalized learning environments, which has

been shown to increase their investment in the learning process.

- Educational Outcomes: Preliminary data suggest that adaptable spaces positively influence educational outcomes. Users have reported improved focus, higher satisfaction with the learning environment, and a more positive overall learning experience. These factors contribute to better retention of information and enhanced learning outcomes.
- Collaborative Learning: The adaptable nature of the spaces facilitates collaborative learning by allowing for easy reconfiguration to support group work and interactive activities. This has been particularly beneficial in fostering a sense of community and enhancing peer-to-peer learning, which are critical components of the educational experience.
- Flexibility and Adaptability: The ability to quickly and easily reconfigure the spaces to suit different teaching and learning styles has proven invaluable. It allows educators to adapt the environment to meet the specific needs of their curriculum and students, leading to more effective and engaging teaching methods.
- Longitudinal Studies: Although long-term data are still being collected, early indicators suggest that the adaptability of the learning spaces will have a sustained positive impact on educational outcomes. Ongoing monitoring and evaluation will provide further insights into the long-term benefits of these adaptable environments.

In conclusion, adaptable learning spaces have significantly enhanced user engagement and educational outcomes within the vertical campus setting. The flexibility and innovative design of these spaces support a dynamic and interactive learning experience, contributing to the overall success of the educational program.

3. How have sustainability considerations been incorporated into your project, and what impact do they have?

Sustainability Considerations: Sustainability has been a core consideration throughout the development of the “XXI Century Wunderkammer” project. The design integrates several strategies to minimize environmental impact and promote sustainable practices.

- Material Selection: The use of sustainable and locally sourced materials reduces the project’s carbon footprint and supports local economies. Materials were chosen for their durability and recyclability, ensuring long-term sustainability.
- Energy Efficiency: The design incorporates energy-efficient systems, such as passive solar heating, natural ventilation, and LED lighting, to reduce energy consumption. Smart building technologies optimize energy use, further enhancing the building’s sustainability.
- Water Conservation: The project includes water-saving fixtures and a grey water system, ensuring efficient water use without the need for roof water collection. These measures contribute to overall water conservation.
- Integration with Existing Structures: By reusing parts of the existing Royal Library adjacent to the tower, the project minimizes material waste and preserves cultural heritage. This adaptive reuse reduces the environmental footprint associated with new construction.
- Photovoltaic (PV) Panels: PV panels integrated into the façade capture solar energy, contributing to the building’s renewable energy needs and reducing reliance on non-renewable energy sources.
- Small Urban Footprint: The compact design fits well within the urban tissue, optimizing land use in densely populated areas and reducing sprawl. This small footprint approach aligns with sustainable urban development principles.
- Adaptability and Longevity: The adaptability of the spaces ensures that they can evolve with changing needs, reducing the need for frequent renovations and associated waste. This long-term perspective promotes the sustainable use of resources over the building’s lifecycle.

Impact of Sustainability: The incorporation of sustainability considerations has several positive impacts on the project:

- Environmental Impact: Reduced energy and water consumption, combined with the reuse of existing structures and the incorporation of renewable energy, significantly lower the building’s environmental footprint, contributing to broader efforts to combat climate change.

- Economic Benefits: Energy and water efficiency result in cost savings over the building's operational life, making the project economically viable. The use of locally sourced materials and integration with existing structures further reduce costs.

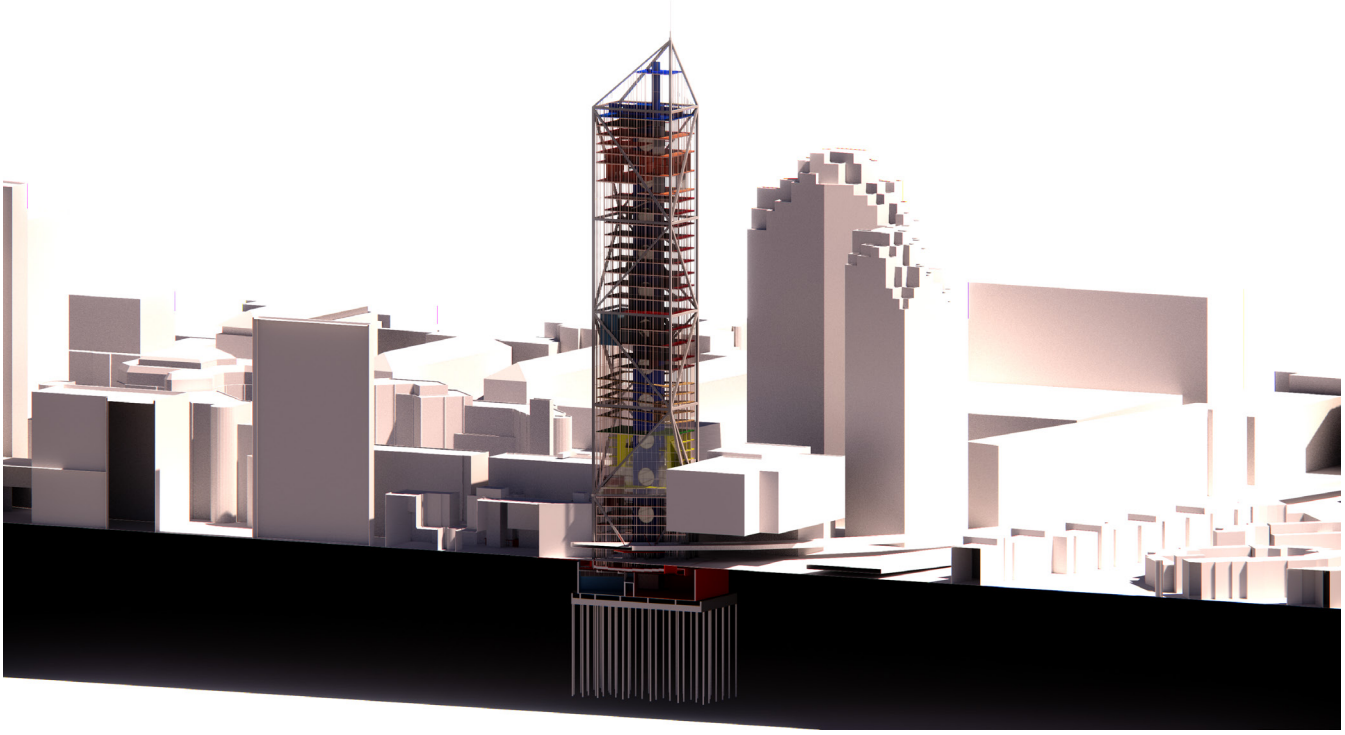
- Social Responsibility: Emphasizing sustainability demonstrates a commitment to responsible design practices, aligning with societal values and expectations for environmentally conscious development. The reuse of the Royal Library also reflects a respect for cultural heritage.

Ultimately, sustainability considerations have been thoughtfully integrated into the project, enhancing its environmental, economic, and social impact. These measures ensure that the "XXI Century Wunderkammer" is not only an innovative educational space but also a model of sustainable design.

In conclusion, the "XXI Century Wunderkammer" project has integrated the objectives and methodologies of the MSc Architecture, Urbanism & Building Sciences (AUBS) program. The alignment with the "Campus of the Future" and "Public Building" studios has been crucial in shaping a project that addresses contemporary educational needs through innovative architectural solutions. The research conducted has significantly influenced the design process, leading to adaptable and engaging learning spaces that foster a sense of wonder and continuous learning. The iterative and collaborative approach, combining theoretical insights with practical applications, has proven effective in achieving a comprehensive and adaptable design.

The project's academic and societal value is evident in its contribution to knowledge on adaptable learning environments and its potential to optimize urban spaces for educational purposes. Ethical considerations, particularly sustainability, have been thoughtfully integrated, ensuring that the project is environmentally, economically, and socially responsible. The adaptability principles and modular design solutions developed in this project demonstrate high transferability, making them applicable to various educational settings and urban contexts.

Reflecting on the project's development and outcomes, it is clear that the interdisciplinary approach has enriched the design, resulting in a model that supports dynamic and interactive learning experiences. The emphasis on sustainability and social responsibility further enhances the project's relevance and impact. As the project moves into the final phase, continued focus on these core principles will be essential to ensure its successful completion and long-term viability.



XXI CENTURY WUNDERKAMMER

DESIGN JOURNAL