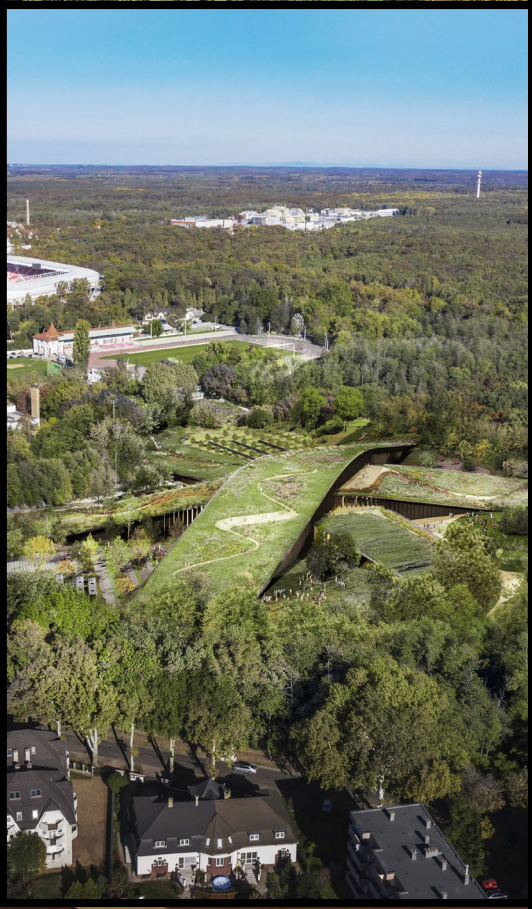
ARCHITECTURAL DESIGN COMPETITION
FOR A NEW EXHIBITION BUILDING OF THE
HUNGARIAN NATURAL HISTORY MUSEUM IN DEBRECEN

HUNGARIAN NATURAL HISTORY MUSEUM

A MUSEUM AS AN ECOTONE: WHERE WORLDS COLLIDE



HUNGARIAN NATURAL HISTORY MUSEUM

A museum as an Ecotone: Where worlds collide

The Hungarian Natural History Museum is moving from Budapest to Debrecen as part of the "Debrecen 2030" development program. This initiative seeks to establish Debrecen as a key hub in Hungary's eastern region, driving progress in the economy, transportation, education, culture, and urban growth. The museum's relocation plays a vital cultural role in this vision, providing a new, leading-edge, home for exhibitions, scientific research and public education.

Debrecen is located in the heart of the Great Hungarian Plain, the largest and flattest geographical region of Hungary. This vast expanse of lowland terrain, characterized by its open grasslands, agricultural fields, and scattered wetlands, defines both the landscape and the cultural identity of the region. The Natural History Museum will be located within the Great Forest (Nagyerdő), a centuries-old oak forest that serves as the city's green heart. The new museum will be an integral part of the Culture Park along with other recreational and scientific facilities, fostering a closer connection between the natural environment and the community.

We envision the Hungarian Natural History Museum as a unique ecotone - an interface between the built and natural environments. Neither entirely artificial nor purely natural, the museum seamlessly integrates with its surroundings. Charred timber panels emerge from the ground, forming gentle curves that extend from the forest, blurring the boundary between architecture and wilderness. A living roof, teeming with native plants, attracts pollinators and provides a haven for urban wildlife, enriching local biodiversity. Sculpted as a man made hill on the Great Plain, the museum offers uninterrupted views over treetops and rooftops, creating a dynamic, immersive natural experience within Debrecen's public realm—a gift to the city and its citizens.

Three pragmatic programmatic ribbons radiate outward, intertwining the building with the natural landscape, overlapping at the center to foster connectivity. Positioned strategically, they adapt to the surroundings, offering access from all directions—neighborhood, forest, transportation hub and culture park—ensuring seamless integration with the surrounding.

Exhibition spaces, event facilities, office and workshops all converge in a vibrant public center, promoting social encounters and blurring the boundaries between the different functions and user groups. Following the hill-shaped building section, the exhibitions spaces offer variable ceiling heights, flexible to house diverse curations from large scale artefacts to immersive audio-visual experiences. The interior and exterior spaces are closely connected, allowing the exhibitions to extend into the landscape and offering views to the surrounding forest from transitional spaces, providing moments of calm between immersive experiences. The two landscape pockets facing the urban context and primary arrival in the south, form an inviting entrance plaza and functional logistics yard respectively, while those facing the forest integrate exhibitions with nature, deepening the connection between visitors and environment.

While recognizing that the museum construction will have an environmental impact, the design is guided by a deep commitment to responsible conservation with a goal to leave the site in better condition than we found it. What is removed, will be restored, with even greater value—for both people and nature. The museum's structure, made from mass timber with a facade of locally sourced charred wood significantly reduces embodied carbon. Thoughtfully integrated into the landscape, the semi-buried design leverages the earth's thermal mass as well as the landscaped roof to maintain a stable indoor climate, reducing heating and cooling demands. Renewable energy systems, including a geothermal loop for heating and cooling and photo-voltaic panels for electricity generation, will meet the remaining energy needs, ensuring a low-carbon footprint and long-term sustainability.

ecotone

"a transitional area between two ecosystems or ecological communities. Ecotones can be natural or man/made, and can occur at many scales."

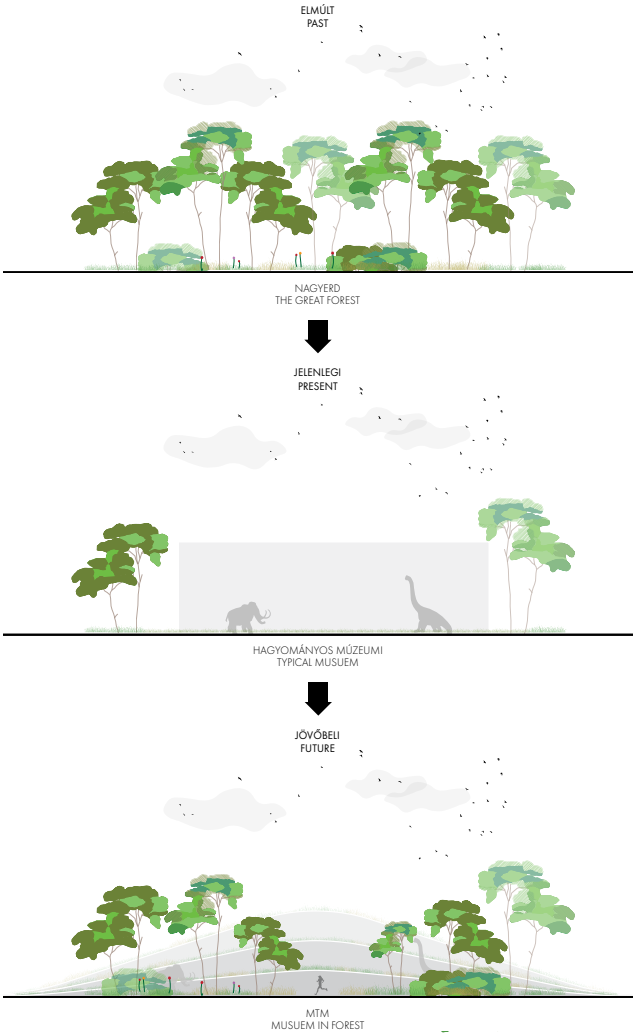
CONTEXT INTEGRATION

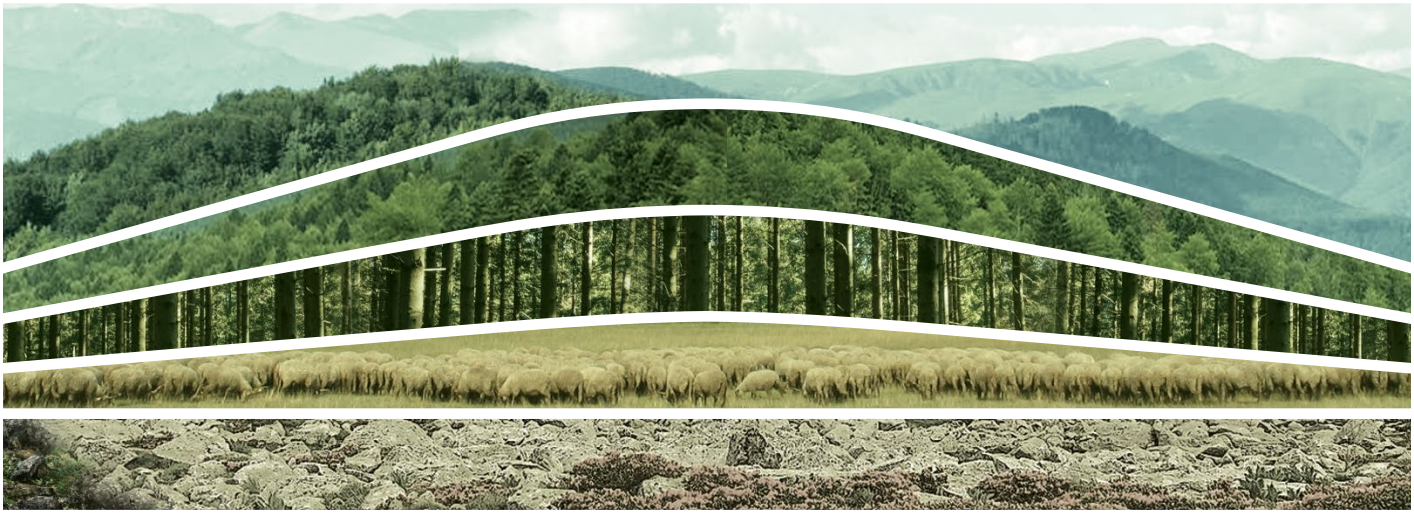
BUILDING IN GREAT FOREST

Hungary is home to a diverse range of ecosystems shaped by its unique geography and location in Carpathian Basin. Wealth of natural heritage of mountains, Great Plain and local forests is what the Hungarian Natural History Museum seeks to celebrate and protect. The museum not only preserves and celebrates Hungary's diverse ecosystems, but also redefines the relationship between humans and nature. The museum exhibition should starts before entering the building, the architecture needs to create an impact on the visitor questioning the human role in nature and coexistence.

The Hungarian Natural History Museum finds its new home in Debrecen, Hungary's second-largest city and a major cultural hub. Nestled within the Great Forest, the country's oldest public park, the museum integrates into a landscape rich in history and biodiversity. This cherished natural sanctuary, where the city and forest have gradually merged over time, houses several notable institutions, including the university, aqua-park, and stadium. The museum joins this dynamic environment as part of a larger vision to create a cultural and recreational complex, strengthening connections with the nearby zoo and amusement park.

The context of Great Forest defines the design strategy to get into a dialogue with surrounding. The new Hungarian



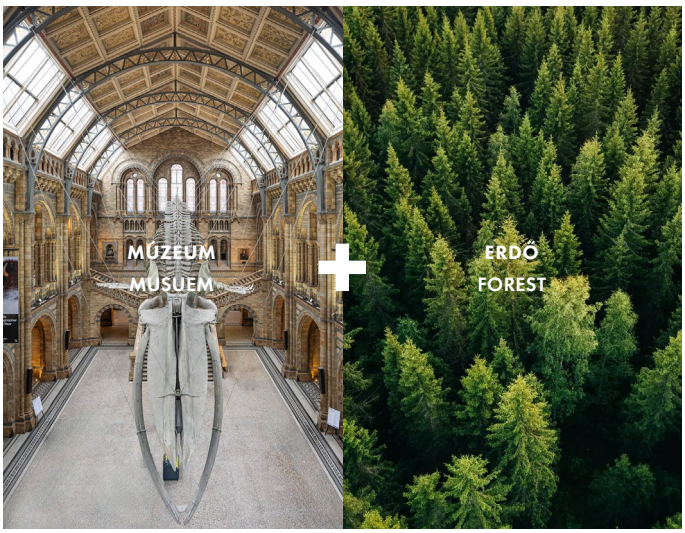


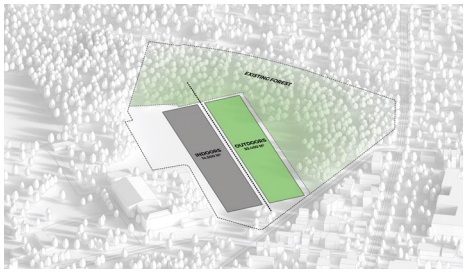
Natural History Museum is more than just a building—it is an ecotone, a place where the built environment and nature merge. Designed to blur boundaries, it seamlessly integrates with the landscape, creating a space that is neither entirely artificial nor entirely natural. Here, the museum meets the forest, the exterior merges with outdoor exhibitions, and science intertwines with story and spirit.

Recognizing that construction inevitably impacts the environment, the museum is designed with a responsible conservation mindset, aiming to leave the site better than it was before. What is taken from the land is returned with greater value—for both people and nature. A living roof, covered in native plants, extends the forest canopy, attracting fauna and flora to take back the piece of land that in the past was integral part of the Debrecen forest. The building itself rises from the ground, its charred timber façade emerging like an extension of the terrain, softening the transition between architecture and the wild.

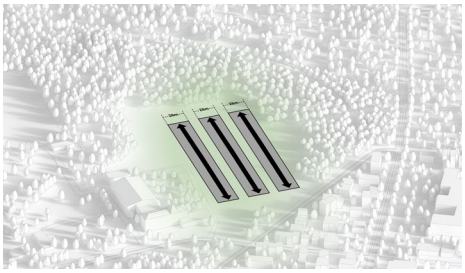
Modern museum is more than just an institution, it is a place where different people and disciplines meet to inspire. Beyond an exhibition space, the museum is a living, evolving place, where scientists meet the public, education meets community, and conservation meets innovation. It is a gift to the city—an institution that not only showcases natural history but also actively participates in its preservation, proving that architecture can be both a cultural landmark and a force for ecological restoration.

Designed for site with 360-degree accessibility, the museum design aims to connect to all public arrival points, planned public transport links and planned pedestrian bridge, allowing visitors to approach museum from all directions. The arrival sequence is carefully orchestrated through a series of functional pockets that enhance public engagement. The arrival plaza, an urban gateway, gently slopes toward the entrance, featuring cafés, outdoor exhibitions, and community spaces nestled among the trees. Beyond, a natural park extends into the forest, utilizing existing vegetation and dirt paths to create a public space that blends with the museum's outdoor and indoor experience areas.

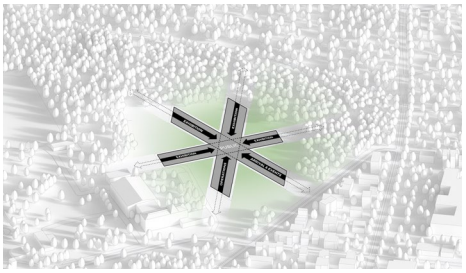




INDOOR & OUTDOOR PROGRAM



PRAGMATIC PROGRAM DIVISION



RADIAL ORGANIZATION

ARCHITECTURE

BUILDING FORM AND SPATIAL ORGANIZATION

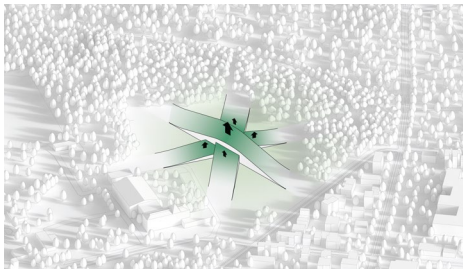
The museum's architectural massing and functionality respond directly to its natural surroundings. Inspired by nature and immidet context the overlapping ribbons in an asterisk-shaped footprint responds to both - site and brief program. The design interweaves indoor and outdoor spaces, fostering fluid connections between wings of exhibition halls and the landscape pockets. Ribbon-like structures emerge from the ground, their curved forms resembling the natural topography of a hill adapting to the scale of the exhibits and program requirements. Partially sunken into the terrain, these structures create a controlled environment for sensitive artefacts while ensuring a seamless transition between the built and natural worlds.

Exhibition spaces are arranged radially, optimizing flexibility and future adaptability. The layout consists of six independent wings, five dedicated to exhibitions and one reserved for public programs and events. This configuration allows visitors to explore each exhibition independently or follow a curated sequence that blends narratives across themes. A central core serves as a focal point, where overlapping levels give an unique architectural image of the museum and providing visual connections between exhibition halls and functional floors on the upper levels.

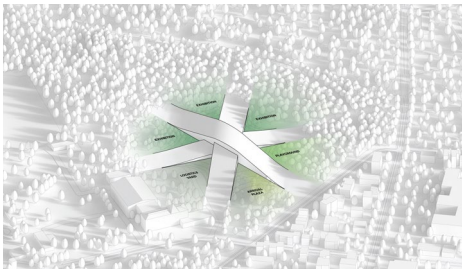
The museum's total program spans 23,000 m², encompassing four permanent exhibition halls, a temporary exhibition space, reception and public areas, as well as offices and collection care rooms. Main functional zones are located closely to the centre benefiting from the high ceiling volumetry and space flexibility. Each of main public area is paired with its own dedicated back-of-house and supported spaces. Additionally, in areas with tailored height to suit specific programs, the museum's administration offices and collection care workshops are strategically placed, ensuring efficient operations, daylight from skylight for workers comfort and integration within the building's overall design.

The basement level essential back-of-house functions are located, including logistics delivery with indoor docking area, museum and operation storages, and technical areas. Technical and operational support of exhibition spaces is provided via independent cores with control rooms and freight lift for the collection objects movement. Staff and visitor parking are located in underground without interfering with operations circulation. The main exhibitions are located on one level that features high-ceiling spaces. The central core connects overlapping levels, enhancing spatial fluidity for visitors arriving from all directions. The first level is dedicated to educational programs, with a focus on families and children. The second level features public amenities, including a restaurant and library, extending into outdoor terraces for panoramic views of the forest.

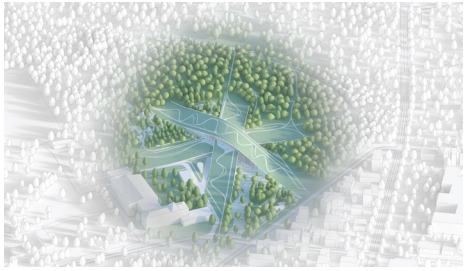
Beyond its function as an exhibition space, the museum is envisioned as a sustainable landmark, embodying the principles of symbiosis with nature. The design restores the site by integrating green pockets and a living roof, programmed with museum outdoor facilities and pavilion of independent program such us accommodations and public services creating new complex in Debrecen Great Forest.



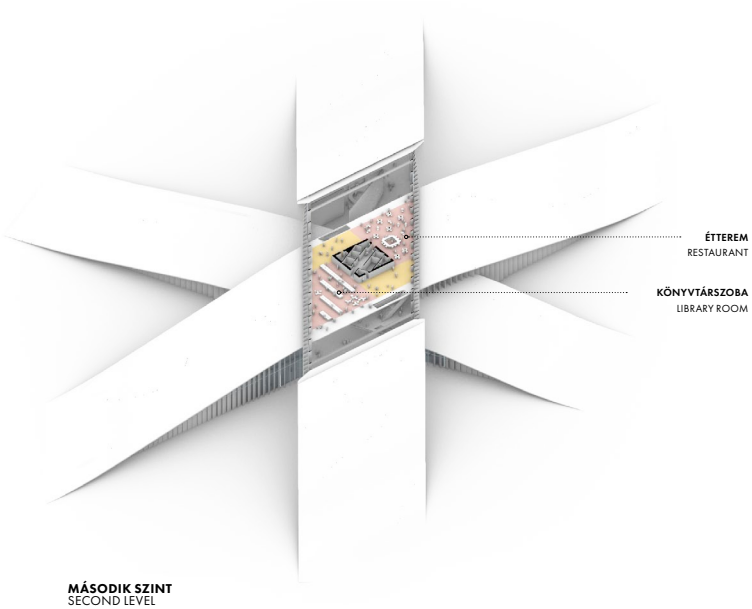
CONTEXT INTEGRATION



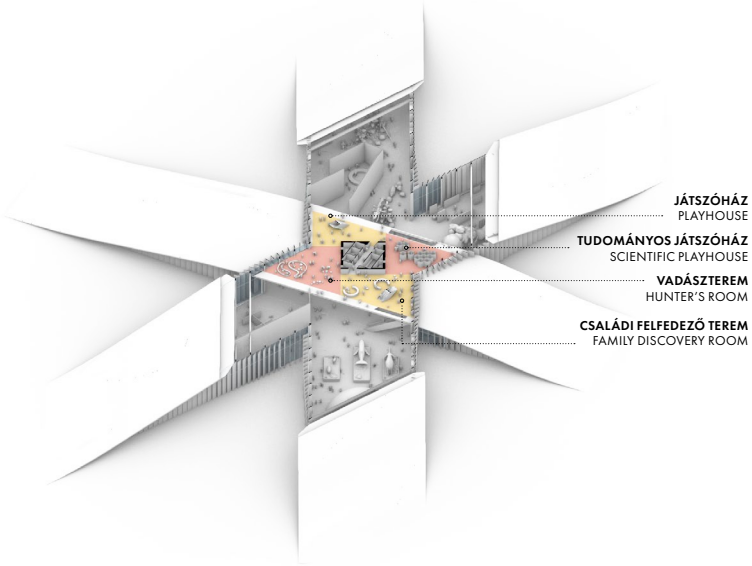
GIVING BACK TO FOREST



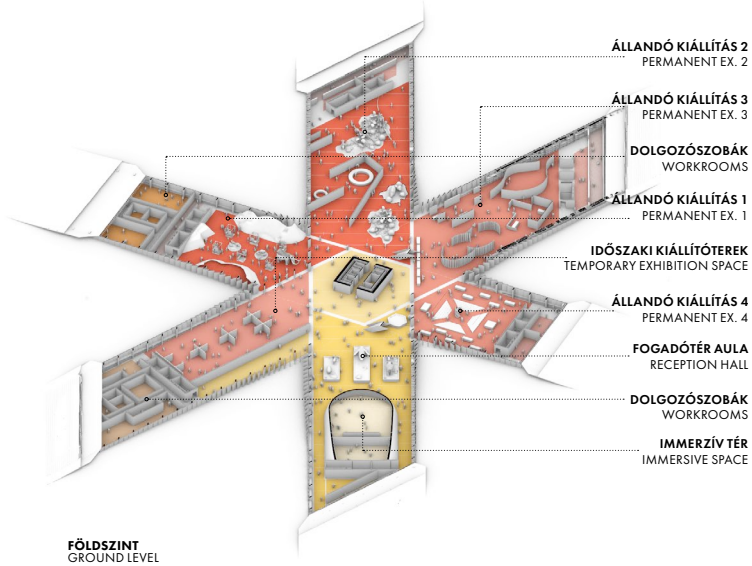
MUSEUM FOR ALL, INSIDE & OUT



MÁSODIK SZINT
SECOND LEVEL



ELSŐ SZINT
FIRST LEVEL



FÖLDSZINT
GROUND LEVEL

EXHIBITIONS

VISITORS JOURNEY

The museum invites visitors to go on a transformative journey. Begins with a radical rethinking of the relationship between humans and nature, in which it is made clear that we are a species that is a part of nature, not outside, but with immense agency to alter the environments we share with the rest of the life on earth. The museum design is a statement where its concept and architecture becomes part of the narrative of new Hungarian Natural History Museum.

From Science...

Recognizing our capacity to notice, observe and devise the methods and principles to understand the world and our place in it.

...to story...

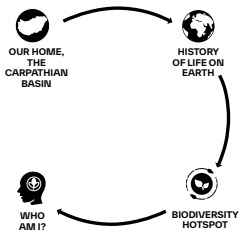
developing the narratives that allows us to communicate the wonders of our natural world as well as it's challenges and inspire people to learn more and further our understanding of nature.

...to spirit.

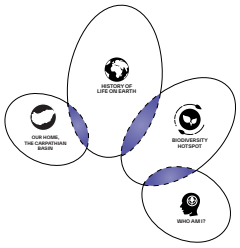
Promoting a change in attitude, to instil the spirit of conservation
and generate responsible attitudes to care and conserve our natural world.

The exhibition design offers a dynamic and immersive visitor experience, creating a cohesive narrative. The permanent galleries establish a deep connection between science, storytelling, and conservation, guiding visitors through the wonders of nature and humanity's role within it.

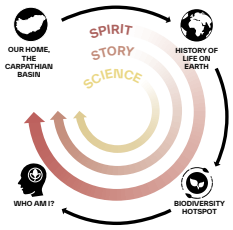
Thoughtfully designed spaces encourage exploration, reflection, and engagement, where exhibitions unfold as immersive environments rather than static displays. Layered storytelling, interactive elements, and multi-sensory experiences create a journey that is both educational and emotional, inspiring curiosity, awareness, and a lasting connection to the natural world.



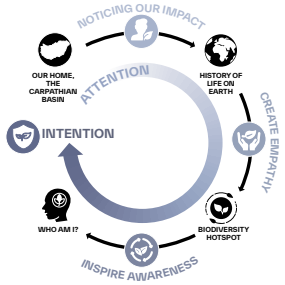
EXHIBITION SEQUENCE



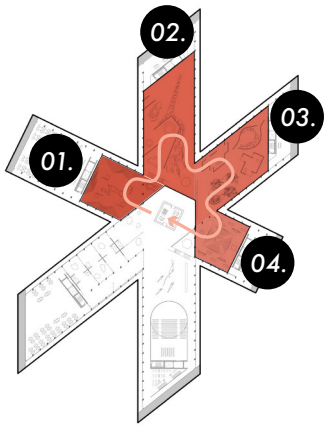
EXHIBITION ECONTONES



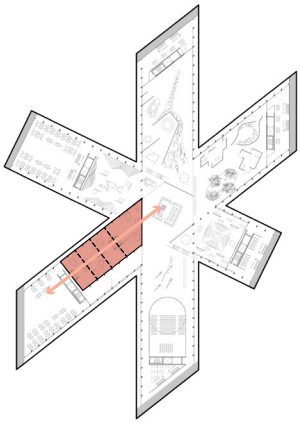
NARRATIVE



VISTIORS EXPERIANCE



PERMANENT EXHIBITIONS



TEMPORARY EXHIBITIONS

As we step inside the museum, we are welcomed by an array of displays housed in open storage cabinets, evoking the origins of natural history collections—the cabinets of curiosities.

On the ground floor, we encounter series of temporary exhibition spaces, a lively lobby, and variety of community bonding programs.

The reception hall exudes a sense of excitement and iconic presence, directly connecting to the heart of the building. A panopticon arrangement offers glimpses into all exhibition halls, inviting exploration. Natural light filters through louvers, casting a warm glow on the wooden structural frames and energizing the activity below—a space where curiosity is ignited, ideas are exchanged, and connections are made.

01. Our home the Carpathian Basin
We start looking at our immediate surroundings, here, now. We notice things we want to explore further, dig deeper, trace back all the way to the origins of the universe.

02. History of Life on Earth
We go back to the big bang and take a quantum leaps from the creation of the universe to the creation of Earth and understand the events that shaped the world we see today.

03. Biodiversity Hotspots
We travel the world and are amazed to learn about the fragility of life and our impact on it.

04. Who am I
Together with other visitors we reflect on own existence and are inspired to take action for the restoration and conservation of the natural world.

SUSTAINABLE DNA

STRATEGIES

The proposal arises from a deep understanding that a natural museum must emerge from, and coexist with, nature itself. It is not a conventional building but rather a disruption on the terrain—an edifice that rises to create a habitable space within it. This building is seamlessly integrated with the forest; it seeks to minimize its environmental impact while working in tandem with the trees, which shield the structure during the warmer months and allow solar radiation during the winter, when the trees lose their foliage. It is a place where wildlife and fauna can develop naturally, while their history is preserved within its walls. The building excels in achieving quantifiable sustainable goals in terms of energy, water, and overall environmental impact.

The project is conceived as a ZEB (Zero Energy Building) under the European EPBD standards, combining bioclimatic passive strategies to reduce energy demand with highly efficient active strategies based on geothermal energy and solar PV production. All energy is produced from renewable sources, with no CO_2 or other pollutant emissions. Wood—the only material considered sustainable—is the primary material used in the building, enhancing the interior ambiance by blending with the surrounding forest.

In conclusion, the museum stands as a testament to the harmonious integration of innovative architectural design and environmental stewardship. More than merely a building, it is a living ecosystem where sustainable technologies and natural elements coalesce, creating a unique space that honors history while embracing the future. With its commitment to energy and water efficiency, eco-friendly materials, and minimal environmental impact, this project sets a benchmark in sustainable architecture and inspires a deeper connection between humanity and nature.

1. LAND USE AND ECOLOGY

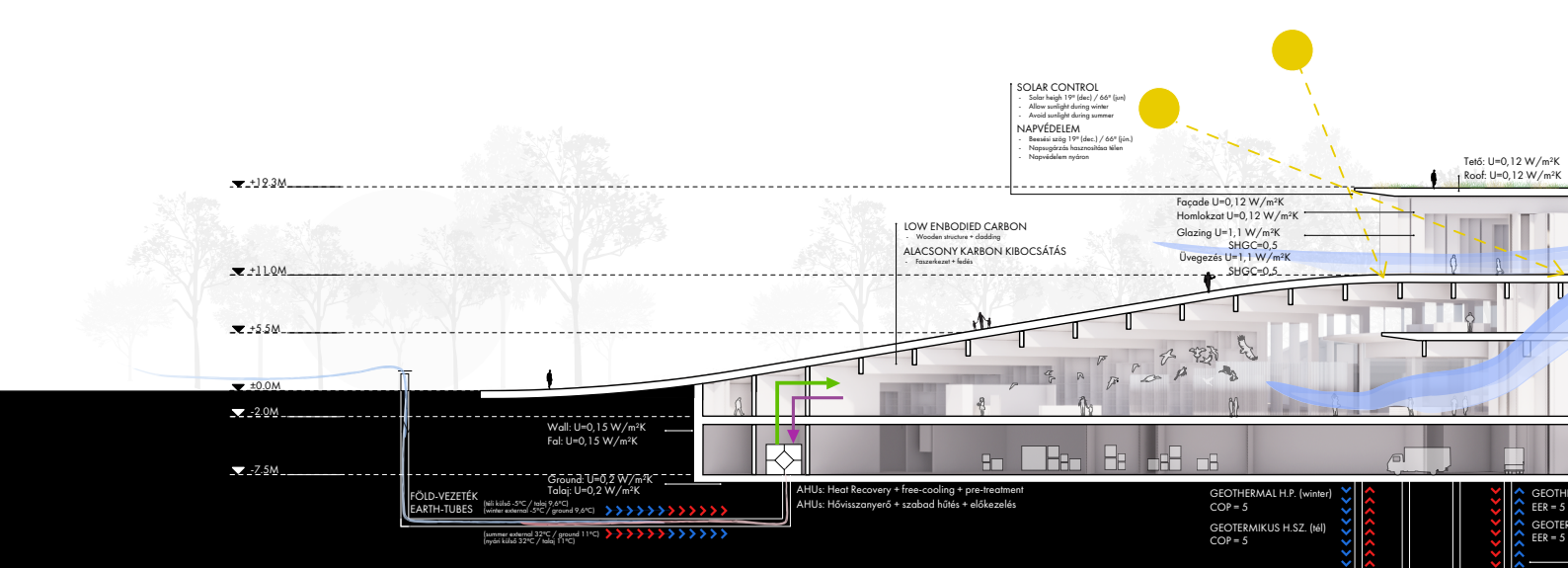
GOAL: Fully integrated

The museum's semi-buried design minimizes its visual and physical impact on the landscape, allowing it to coexist harmoniously with the local ecology. The integration of a green roof and landscape-sensitive design strategies encourages biodiversity by providing habitats for local flora and fauna. Native species are used in the surrounding landscaping to enhance ecosystem resilience and reduce maintenance requirements. Careful planning ensures that the natural topography is respected, and the building is designed to blend into the forest, preserving the historical and ecological integrity of the site. This approach not only protects the natural environment but also offers visitors a seamless connection between the built and natural worlds.

2. ENERGY AND COMFORT

GOAL: Zero Energy Building

The building is designed as a ZEB, integrating bioclimatic passive strategies with high-efficiency active systems. The semi-buried structure takes full advantage of the earth's thermal mass, reducing heating and cooling demands while ensuring a stable indoor environment. A combination of natural ventilation, high-performance insulation, and smart glazing maximizes daylight use and minimizes energy loss. Renewable energy systems—such as a geothermal heating/cooling loop and photovoltaic panels—supply the remaining energy requirements. These systems are complemented by an intelligent building management system that continuously monitors and adjusts indoor conditions for optimal thermal comfort, ensuring the museum is both energy-efficient and inviting for visitors year-round. The bioclimatic design respond to the external climate conditions by passive architectural



strategies, to reduce the energy demand by enhancing the indoor comfort conditions:

High insulation: High insulation in the thermal envelope to minimize heat loss, together with an airtight construction to reduce infiltration of cold air. This strategy is especially efficient for the cold months.

Solar control: A passive solar control strategy based on orientated vertical louvers and horizontal overhangs, allowing direct solar radiation during the winter period, while avoiding it during the warmer months. This strategy is being designed for the public areas, taking into account that many exposition areas will require specific hydrothermal and solar radiation control.

High thermal inertia: The use of high thermal mass materials will regulate indoor temperatures by absorbing excess heat in summer and storing heat in winter, acting as a passive thermal battery.

Natural ventilation: The design promotes cross-ventilation, that will be especially efficient during cooler evening and night hours in the summertime. This strategy will be focused on the non-exposition public areas.

Daylight: The design will minimize the artificial lighting needs by maximizing high daylight levels in all non-exposition public areas.

Vegetation and Landscaping: The semi-buried design, combined with a continuous vegetated roof, acts as a natural insulator during the summer, reducing heat gain and lowering cooling demands by providing shade and evaporative cooling, while the surrounding vegetation further mitigates temperature extremes. During winter, the strategic placement of the structure beneath the earth's surface harnesses the stable subterranean temperatures to reduce heating needs, and the deciduous elements of the landscaping allow maximum solar gain when foliage is absent.

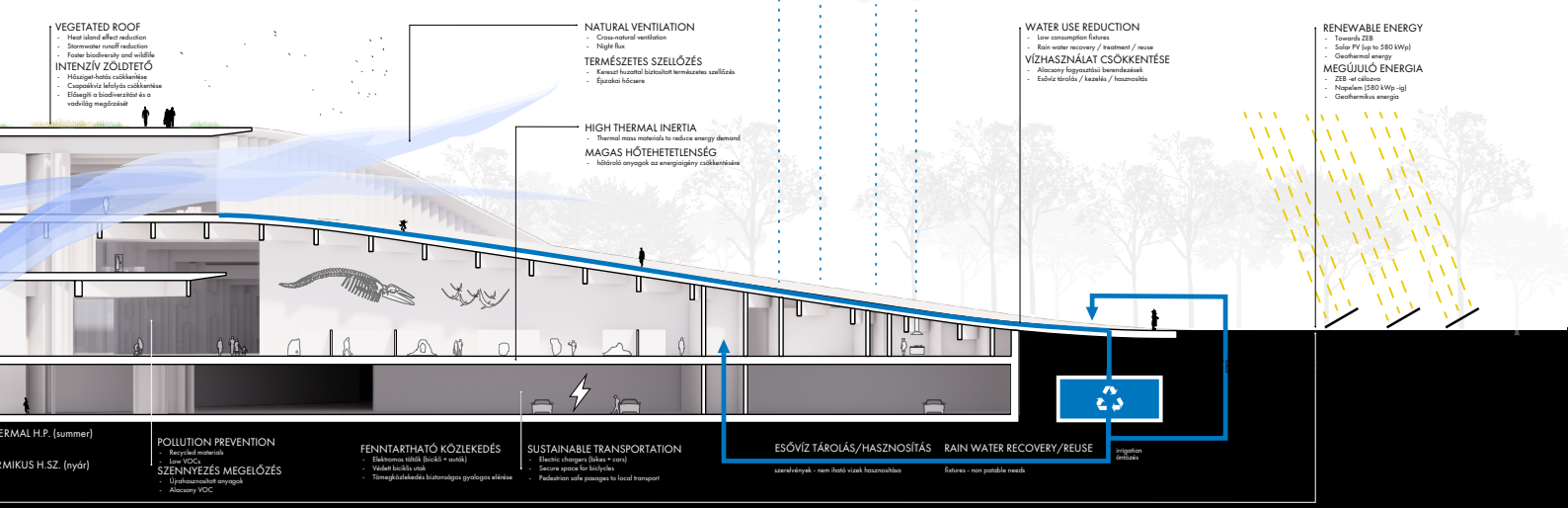
Once the energy demand is reduced by passive means, the MEP systems are designed to ensure energy efficiency, thermal comfort, and optimal conditions for the preservation of exhibits. The system includes air handling units (AHUs) with heat recovery and free cooling, combined with a geothermal heating and cooling system to leverage local energy resources and minimize the carbon footprint. Because of the annual thermal fluctuations due to the continental climate, the geothermal energy will benefit from the constant underground temperature, enhancing the COP/EER values of the system. The exhibition and conservation storage areas will also require a humidity control system to ensure the optimal hydrothermal conditions of the pieces.

Together with daylight optimization, the LED lighting system with automated controls and occupancy sensors will optimize energy consumption while minimizing the impact on displayed artifacts, and reducing possible harm risk for exposed items. The electrical system will feature solar panels for renewable energy generation, and for achieving the ZEB goal.

3. WATER EFFICIENCY

GOAL: no potable water for non-potable water applications

Water conservation is achieved through the integration of low-flow fixtures (up to 50% of potable water demand reduction), efficient irrigation systems, and comprehensive rainwater harvesting. The building's design capitalizes on on-site water collection, storing rainwater for use in flushing systems, landscape irrigation, and other non-potable applications. The semi-buried nature of the structure and the vegetated roof further enhances water retention in the surrounding soil, reducing runoff volume, promoting local groundwater recharge and reducing local water treatment needs.



4. MATERIAL USAGE

GOAL: Minimum environmental footprint

The primary construction material is wood - a renewable, low-embodied-energy resource - that blends harmoniously with the surrounding forest. The design prioritizes the use of certified sustainable wood and incorporates modular construction techniques that reduce waste, that will be use for the structure and facade cladding.

Wherever feasible, recycled and recyclable materials are integrated into the design, ensuring that the building's material footprint is minimized. This approach not only enhances the aesthetic connection between the interior spaces and the forest environment but also contributes to a circular economy model in construction.

5. POLLUTION PREVENTION

GOAL: No pollution emissions

Pollution prevention is a guiding principle throughout the design and operation of the museum. The project employs renewable energy sources to eliminate CO_2 emissions during the operation phase, and careful material selection ensures low levels of harmful emissions during construction and throughout the building's life-cycle.

Additionally, the design minimizes storm water runoff and prevents soil contamination through effective water management and the use of non-toxic construction materials. These measures collectively ensure that the museum not only minimizes its environmental impact but also serves as a model for sustainable building practices.

6. TRANSPORTATION SOLUTIONS

GOAL: Planning

To minimize the museum's overall carbon footprint, sustainable transportation solutions are integrated into the project's planning. The site features ample secure bicycle parking and electric vehicle charging stations, encouraging visitors and staff to choose low-emission transportation options. Additionally, the building's design contemplates the exiting local public transportation networks, promoting walkability through pedestrian-friendly access points, together with green corridors that connect the museum with surrounding natural and urban areas, further reducing reliance on fossil-fuel-powered vehicles.

7. WASTE MANAGEMENT

GOAL: Reduce, Recycle, Reuse

A comprehensive waste management strategy is embedded within the project, focusing on both construction-phase and operational waste reduction. During construction, strategies such as prefabrication – especially regarding the wooden structure - and just-in-time material delivery minimize waste generation and improve site efficiency. On-site sorting and recycling stations are planned to manage waste during daily operations, and partnerships with local recycling facilities ensure that any waste generated is processed responsibly. The museum also serves as an educational platform, showcasing innovative waste reduction and management practices that inspire visitors to adopt similar sustainable habits in their communities.

8. ACCESSIBILITY

GOAL: Universal accessibility

Accessibility is at the core of the design philosophy, ensuring that the museum is inclusive and welcoming to all visitors. The layout and circulation paths are carefully planned to provide barrier-free access to all public spaces, with gentle slopes, ramps, and tactile guidance systems for the visually impaired. Indoor wayfinding is enhanced with clear signage and intuitive spatial design that naturally guides visitors through the exhibits. Outdoor areas, integrated seamlessly with the landscape, include level paths and rest areas, ensuring that everyone, regardless of physical ability, can enjoy the natural and educational experiences offered by the museum.

9. COST-OPTIMAL DESIGN

GOAL: Lifecycle cost

The building will be designed following a cost-optimal design methodology that integrates the optimization of both construction and operational elements through dynamic energy simulations. During the design phase, a multi-parameter design approach will be employed to evaluate various alternatives, taking into account the costs associated with construction and operation. This strategy will ensure the identification of cost-optimal solutions in accordance with the criteria established by the European EPBD, guaranteeing that each design decision contributes to energy efficiency and economic viability without compromising quality or environmental sustainability.

CONSTRUCTION

STRUCTURE

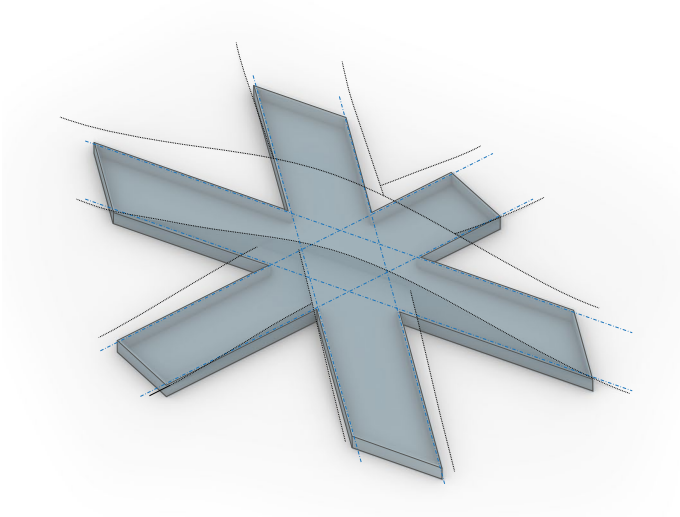
The building structure consists of two main components - reinforced concrete plinth forming the foundation and basement and timber superstructure with rectangular CLT columns and beams. The timber framework establishes a rhythmic spatial arrangement in the exhibition halls while integrating with the interior facades covered with open storage exhibits display. Beyond its architectural character, the timber structure enhances sustainability, with its CO_2 absorption offsetting the building's carbon footprint.

Lower plinth from the foundation to the level of the ground level, in which the structure is reinforced concrete base on regular grid, with retaining walls from which the upper structure starts. The reinforced concrete structure provides very adequate conditions of strength, stiffness and durability for current ground condition and stability of the construction. The above-ground construction a timber superstructure with rectangular columns and beams supporting CLT panels, topped with a reinforced concrete layer for structural continuity and waterproofing. Timber construction offers a sustainable, efficient, and aesthetically appealing solution with numerous advantages. As a renewable resource, wood has a significantly lower environmental impact than steel or concrete and acts as a carbon sink, helping to reduce greenhouse gases. Its lightweight nature makes it easier to transport and install, lowering construction costs and enabling use in diverse terrains.

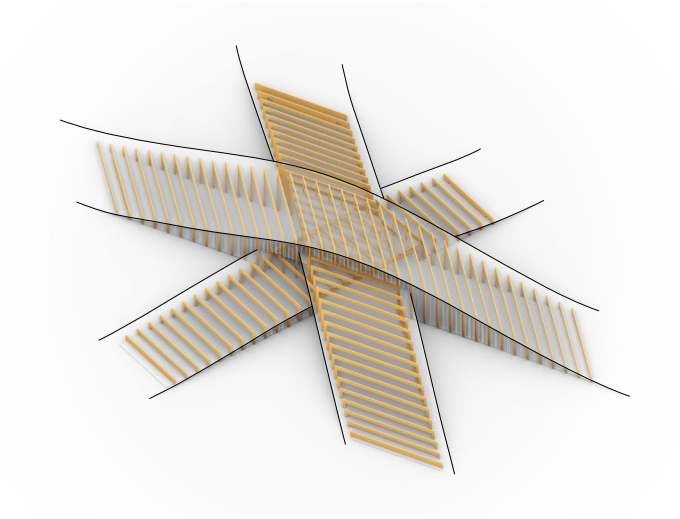
Wood's versatility allows it to be used structurally and as an interior or exterior finish, while its thermal and acoustic insulation properties enhance energy efficiency and indoor comfort by maintaining stable temperatures and reducing noise. Additionally, timber achieves fire resistance through surface charring, forming a protective insulating layer that meets safety standards without additional coatings.

Aesthetically, wood provides a warm, natural character that suits both rustic and modern designs, fostering a strong connection to nature. Research suggests that timber interiors promote well-being by creating calming environments. Prefabricated timber systems enable rapid and precise assembly, reducing labor costs and construction time. When properly treated and maintained, wood structures demonstrate remarkable durability, with a design lifespan of 100 years.

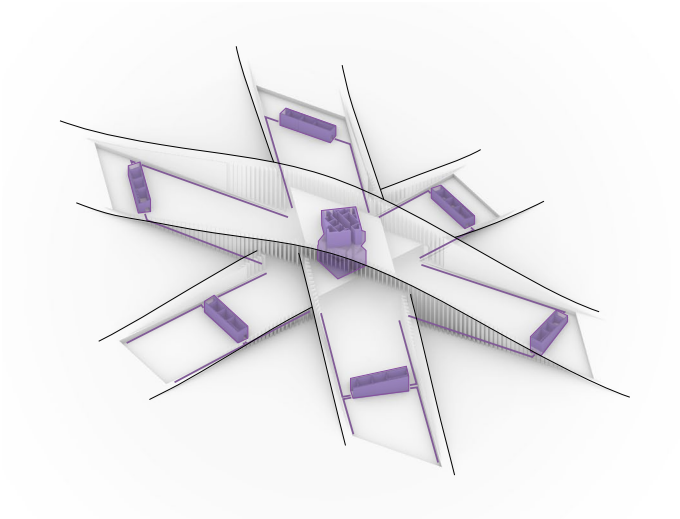
CONCRETE PLINTH



TIMBER FRAMES



CORES & MEP DISTRIBUTION

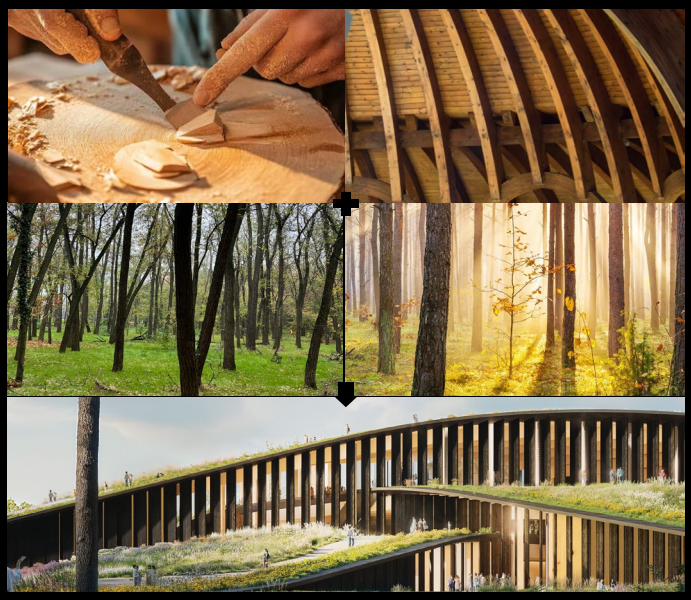


TECHNOLOGY
MEP, FACADE & INNOVATIVE SOLUTIONS

The planetary crisis, driven by climate change, biodiversity loss, and pollution, presents significant challenges for future generations. The design of the new museum goes beyond creating an iconic landmark, serving as a model for sustainable solutions and the responsible use of local resources. Every aspect, from overall vision to structural details, finishes, and long-term operations, is carefully considered to minimize environmental impact. Life Cycle Assessment (LCA) in later design phases will ensure full control over the building's footprint throughout its lifespan. This approach informs a climate-responsive facade that mitigates overheating while harnessing winter sunlight, low-maintenance exterior finishes such as charred wood and green roofs, and the use of locally sourced timber and stone for interior finishes and furnishings, reinforcing the museum's commitment to sustainability.

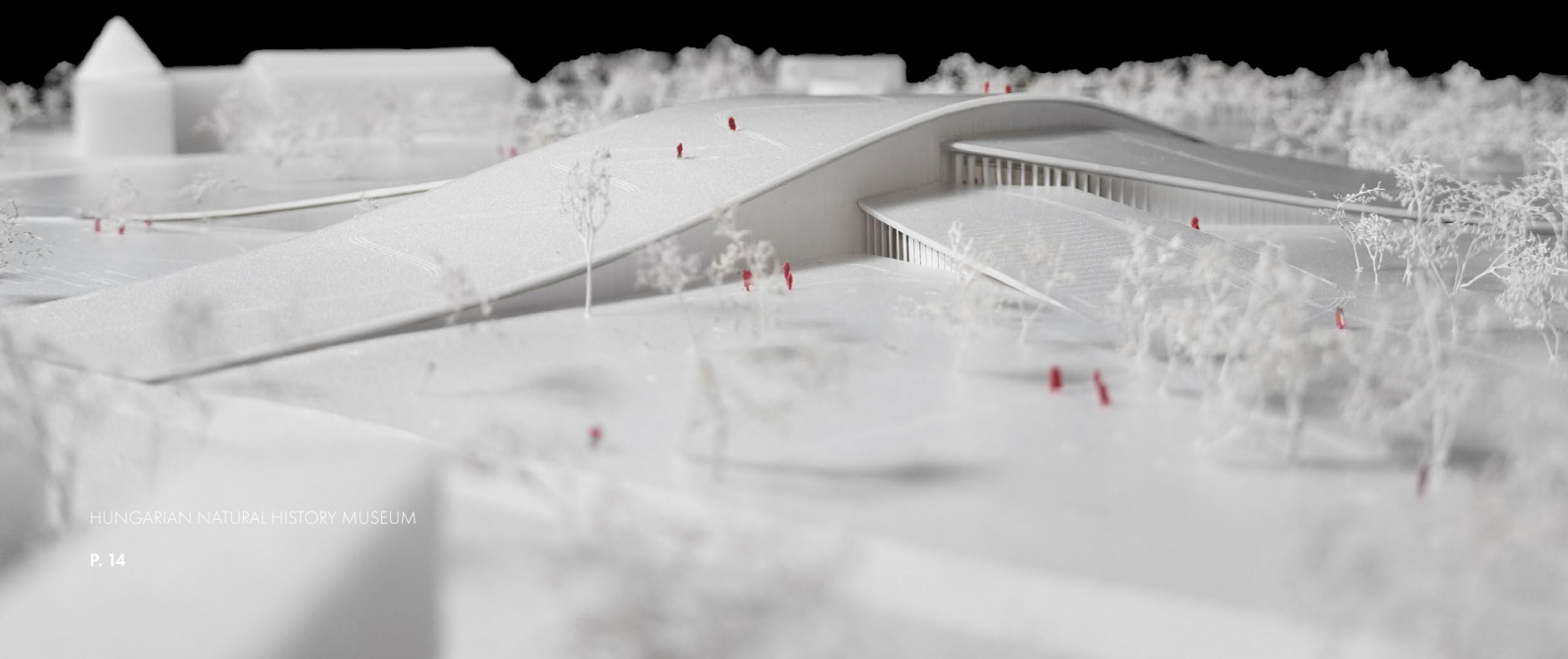
The building industry is responsible for 39% of global CO_2 emissions annually. To reduce this impact, the construction method has been selected based on a comparison of typical building materials. For the proposed design, wood is the preferred material due to its lowest carbon footprint.

The museum's façade features burnt wood cladding, a technique that chars the surface to enhance resistance to fungi, mold, and solar exposure. This durable material requires no maintenance and has a lifespan of approximately 80 years.



The museum's design embraces the local tradition of wood in architecture, featuring a timber structure and interior finishes. Combined with stone floors and cores, these natural and locally sourced materials provide an authentic backdrop for the museum's exhibitions.

Inspired by the cabinets of curiosity, the museum's interior reinterprets open storage, transforming its walls into a vast display of specimens. This approach showcases the extensive collection of the Hungarian Natural History Museum, making it fully visible and accessible to the public.



For the natural history museum project in Debrecen, Hungary, we propose a comprehensive MEP system designed to ensure energy efficiency, thermal comfort, and optimal conditions for the preservation of exhibits. The system will include air handling units (AHUs) with heat recovery and free cooling, combined with a geothermal heating and cooling system to leverage local energy resources and minimize the carbon footprint.

Additionally, an LED lighting system with automated controls and occupancy sensors will optimize energy consumption while minimizing the impact on displayed artifacts.

For humidity control, crucial in a museum environment, dehumidifiers and humidifiers will be integrated into critical areas.

The electrical system will feature solar panels for renewable energy generation, while the plumbing system will incorporate rainwater harvesting and reuse solutions. The entire setup will be managed through a centralized Building Management System (BMS) to maximize operational efficiency and simplify maintenance.

To accommodate the museum's technical installations, the main service spaces are located in the basement, with additional cores and support areas in each wing.

A central core, raised flooring, and systems integrated along the façade ensure efficient distribution of services throughout the building.

MUSUEM TECHNOLOGY

The museum integrates advanced technical solutions to enhance flexibility, sustainability, and visitor experience. A modular suspension system with a two-layer structural grid allows for adaptable exhibition layouts, supporting AV, lighting, and suspended installations. A raised access floor provides concealed cabling and service distribution, ensuring a clutter-free environment with easy maintenance access. AV and cabling systems are designed for long-term adaptability, incorporating energy-efficient solutions and integrated maintenance pathways.

The semi opened center of the building allows natural light to interior design incorporates strategies that balance daylighting with UV and photon filtration, preserving exhibits while creating a dynamic, immersive atmosphere that connects visitors with the surrounding forest. Dedicated of each exhibition control rooms manage lighting, climate, and audiovisual systems, optimizing performance while reducing energy consumption.