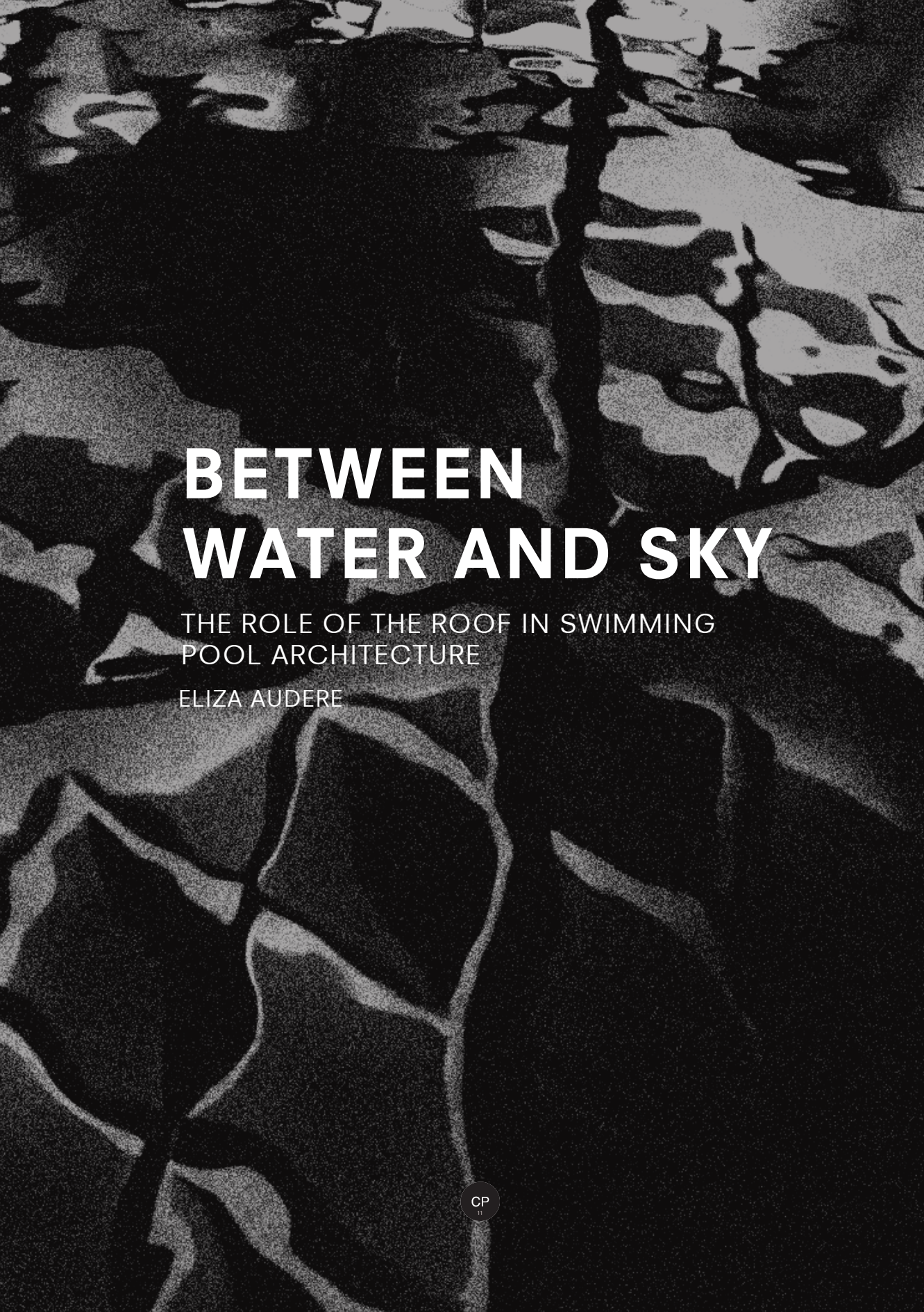




BETWEEN WATER AND SKY

THE ROLE OF THE ROOF IN SWIMMING
POOL ARCHITECTURE

ELIZA AUDERE

26/11/2025 dalle ore 12:15

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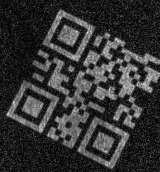
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First tutor
Benjamin Groothuijse

Second tutor
Hrvoje Smidihen

Studio tutor
Martin Grech

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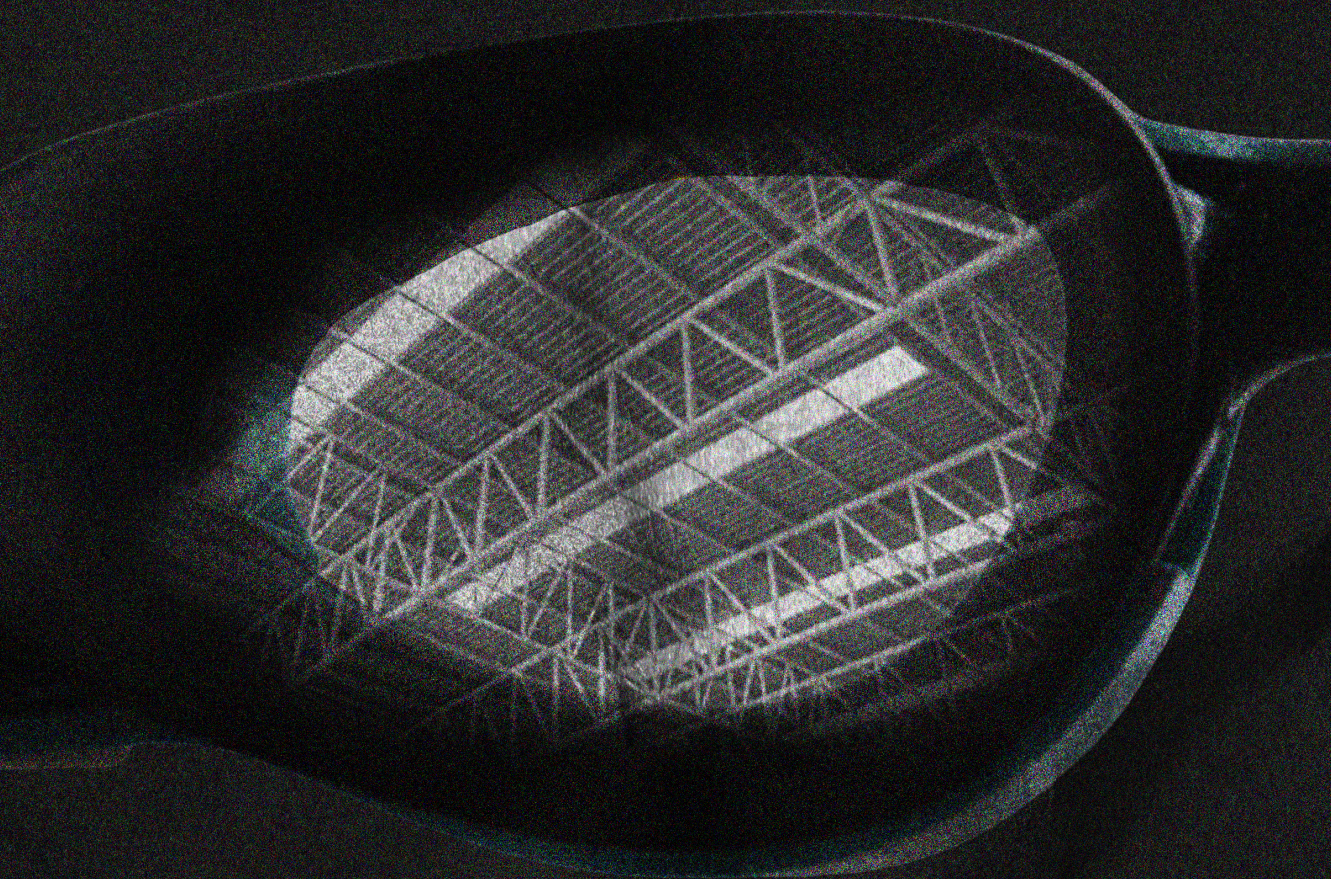
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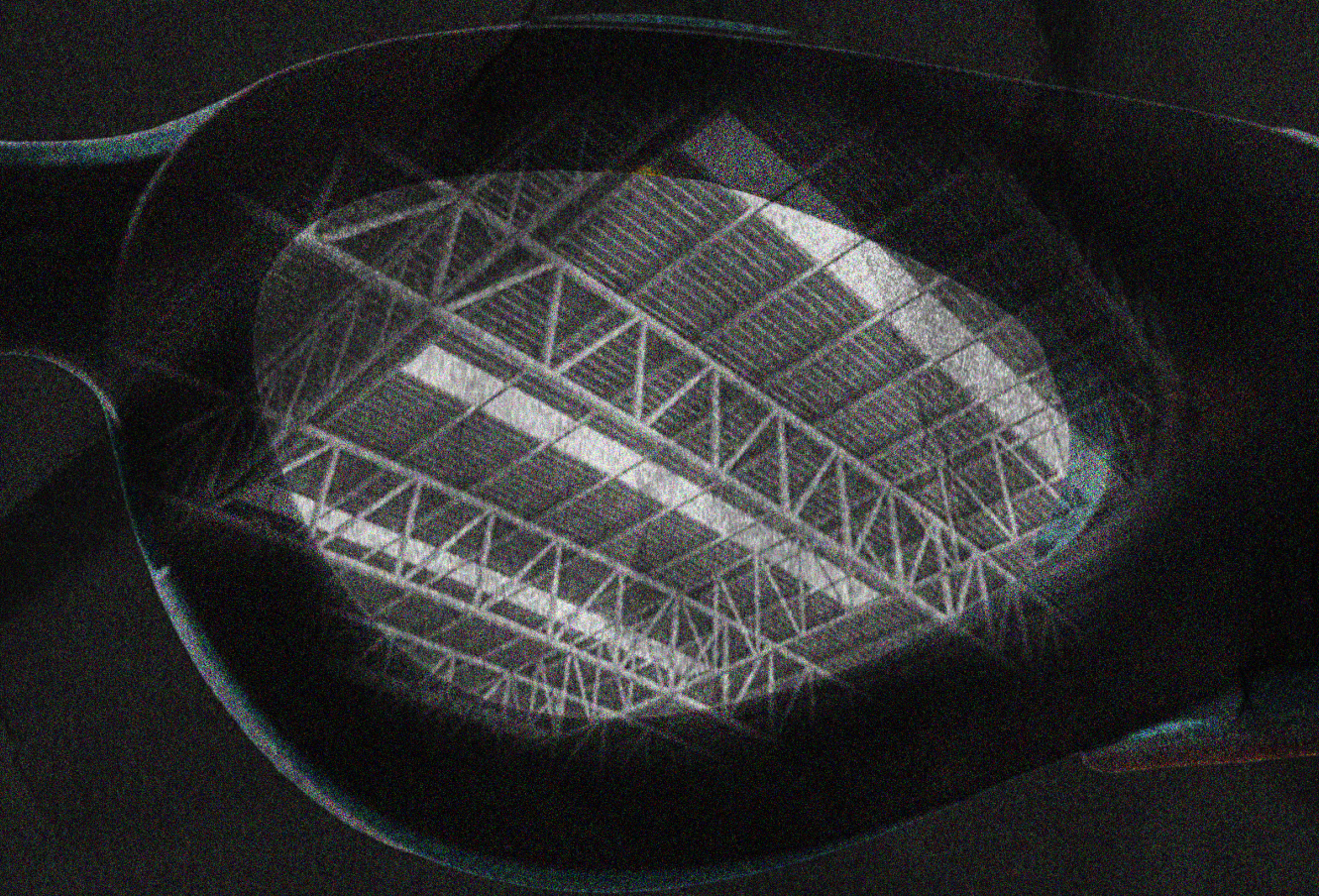
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INTRODUCTION



01



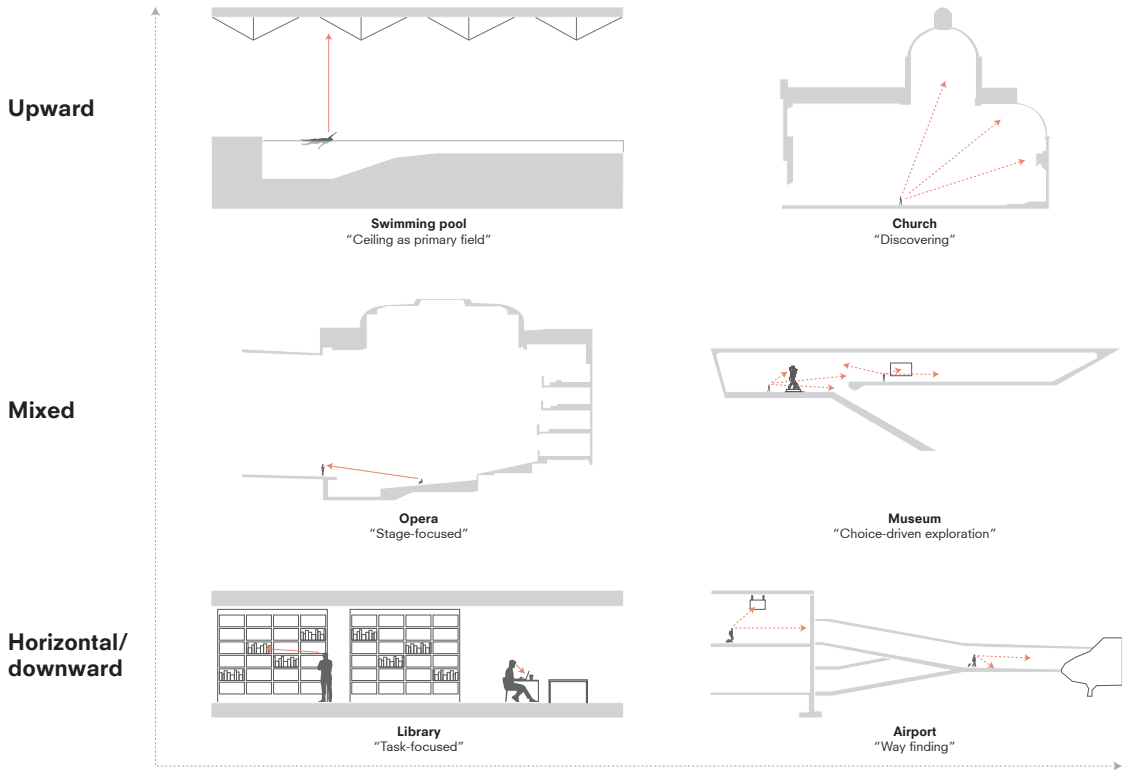
PROBLEM STATEMENT

There is no doubt that all components of architectural design are essential in any public building. However, depending on why the user is there, how long they will be in the space, and whether they will stay static or move constantly, different elements receive varying degrees of user attention.

Swimming appears to be an interesting case in which the user's attention is directed up or down while constantly moving through the water. This brings an opportunity for the roof to become a more active spatial element in the pool.

Historically, roofing served as protection from natural elements such as the sun and rain. However, as architecture evolved, so did the roof. It gradually developed a more complex role, becoming one of the tools for shaping space. Nevertheless, in the architecture of sports facilities, especially swimming pools, roofing is often treated primarily as a technical necessity rather than an architectural element.

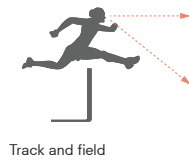
This thesis project proposes a hypothesis that the roof can serve as a "main organizing element" that influences space, program, and user experience. The main challenge is to design it for a swimming pool building, where the roof must be both strong and spatially expressive. The idea is to test whether the roof can enhance the experience of people using the pool.



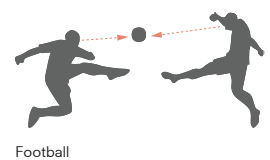
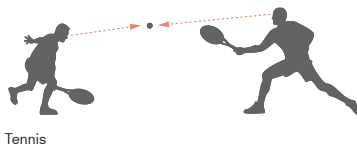
Single-direction

Multi-directional

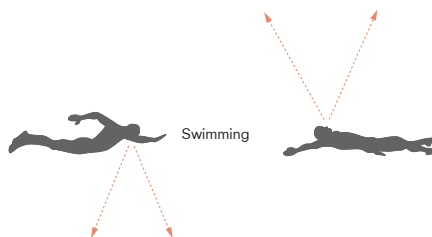
Straight and downward gaze



Target gaze



Upward or downward gaze



RESEARCH AND DESIGN QUESTION

HOW CAN THE ROOF FUNCTION AS AN **ORGANIZING
ARCHITECTURAL ELEMENT** TO SHAPE AND IMPROVE USER
EXPERIENCE IN SPORTS FACILITIES, PARTICULARLY SWIMMING
POOLS?



RELEVANCE

The project's relevance can be understood through the context and pool relevance in Milan.

As a dense European city with limited access to natural bodies of water, Milan relies heavily on public sports infrastructure to provide recreational and health spaces. Public swimming pools, therefore, play an important role in the everyday life of the city. Even though Milan has experienced two periods of rapid swimming pool development over the past century, these pools are now in serious decline due to age and limited resources, leading to the overall decline of the public pool system. On the other hand, all across Europe, more and more policies focus on reconnecting with water, rediscovered or lost. Therefore, it creates an opportunity window for Milan to become one of those cities in the future (Milan: Home to Italy's Most Beautiful Pools. Almost, 2025).

The project is located in Milan and focuses on the design of a public swimming pool. It proposes expansion of the existing site, allowing the building to be reconsidered as an expanded part of the urban block rather than an isolated object.

The project design works across multiple scales (urban, architectural, and technical) with particular attention to spatial transitions and the relationship between movement and perception. Rather than treating the roof as a secondary or pure technical component, the project uses it as a central design tool to explore how architectural form can influence user experience within a sports facility.

OBJECTIVE AND MOTIVATION

The main goal of the graduation project is to develop an architectural proposal for a public swimming pool. The project aims to show how a roof can structure a space, define program logic, and shape users' flow and experience.

What drives this way of thinking is a curiosity about how small changes to a space can have a big impact on how it feels. This concept is seen in David Hockney's painting, *A Bigger Splash*, which shows a simple scene - a modern house, a pool, and a clear sky - but with one sudden movement, everything changes. The idea is that even the smallest action can create a strong sensation, and this is what inspires this approach. By making tiny changes to a space, a whole new experience can be created, and that's what makes it so interesting. This painting depicts no people, which is untypical of the author's work. However, the painting's atmosphere is conveyed through suggestion; the details are what bring this piece to life (Blog - David Hockney a Bigger Splash: Understanding the Painting - Artalistic, n.d.).

The interplay between stillness and movement, presence and absence, is especially interesting to swimming pool architecture. In Hockney's painting, the pool is experienced in this particular way due to the interaction between water, surroundings, and body, or in this specific case, the absence of it.







APPROACH

02



METHODS

This project is based on the “research by design” methodology, in which architectural design serves both as a means of research and as the main result of research. Instead of following a linear process, the project simultaneously develops theoretical research, analytical work, and design development, which constantly complement each other. The central hypothesis of this project is that the roof can serve as the primary architectural element that shapes the impression of swimming pools.

Applied research methods include literature review, precedent analysis, and site analysis, combined with on-site observation and group analysis. The study of literature creates a conceptual and theoretical basis for the project. Furthermore, the study of precedent cases provides deeper knowledge of how it has been done, using constructed examples, and extends the theoretical basis. Site analysis, site visits, and group analysis help to understand the swimming pool from the user’s point of view. Observations are documented using photographs and diagrams.

Design research is a key research tool. Analytical drawings, diagrams, and models are used to transform concepts into spatial representations in further stages of the project. This approach makes design solutions not only a result but also a tool for evaluating and clarifying a research hypothesis.

The theoretical basis of the project centers on the roof as a fundamental architectural element and its potential to shape spatial perception.

The starting point of this research was Gottfried Semper's book "The Four Elements of Architecture", in which the roof is considered as one of the main components of the architecture, conceived initially as protection from environmental forces. Over time, the roof has evolved from a necessity into a spatial element capable of defining isolation, hierarchy, and atmosphere.

This understanding was further developed in Thomas Thiis-Evensen's book *Archetypes in Architecture*, in which architectural elements are considered in accordance with the qualities they create for perception. Classifying roofs into five basic typologies helps understand the fundamental differences among them in relation to the spaces they create. These concepts support using the roof in the project not as a neutral surface but as an active factor shaping the architectural image. The project also investigates the specific technical conditions of swimming pools as a building typology. Literature on swimming pools, written by Philip H. Perkins, provides insight into the importance of large spans, strict climatic requirements, controlled lighting, and acoustic nuances in public swimming pools.

The study of precedents is an essential part of the theoretical framework. Selected swimming pools and public buildings are analysed to understand how the project's geometry affects spatial organization and user convenience, and to help study the swimming pool program. These use cases are examined through plans, sections, and photographs, with a focus on the relationships among roof shape, circulation, and program. Study precedents are used analytically to identify architectural strategies and tools relevant to the project. Moreover, analysing the program of similar-scale swimming pools, the program was initially based on Piscina Mincino and subsequently extended. Precedent cases

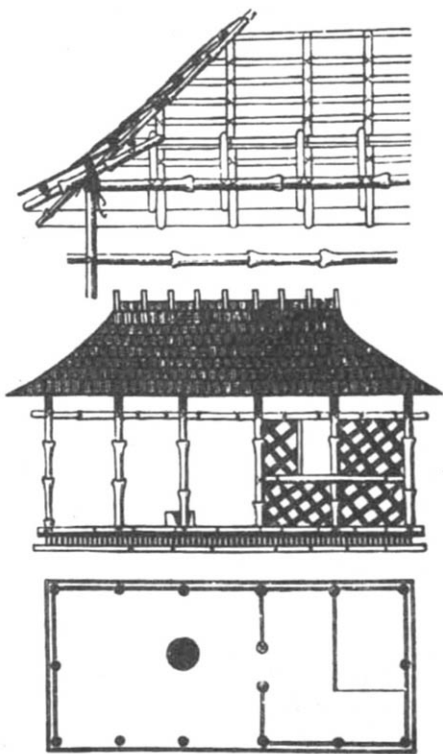
helped fill in additional spaces in the proposal and expand the area of some existing spaces.

The theoretical studies are complemented by pre-design studies conducted through site analysis and fieldwork in Milan, analysing Piscina Mincio by Pier Luigi Nervi. When drawing analytical maps, the project's position in the urban context is studied at three levels: the city (L), the district (M), and the block (S).

Piscina Mincio is located in a dense residential district in Milan. It is located near multiple public transport facilities and therefore has a good connection to the city center. In the neighbourhood, there are multiple educational and governmental institutions. The majority of the buildings are residential, with some retail located on the ground floor. The culture of swimming pools in Milan further underscores the importance of the pool in the neighbourhood, especially during hot summer days. The current site is fully exposed to hot southern sunlight and moderate underground water levels.

To better understand the existing project and the spatial character it creates in terms of public buildings, the group analysed the flows within the given public buildings. This helped see that, in the swimming pool in particular, there is a long series of compressed spaces until the user reaches the main hall, and the space decompresses.

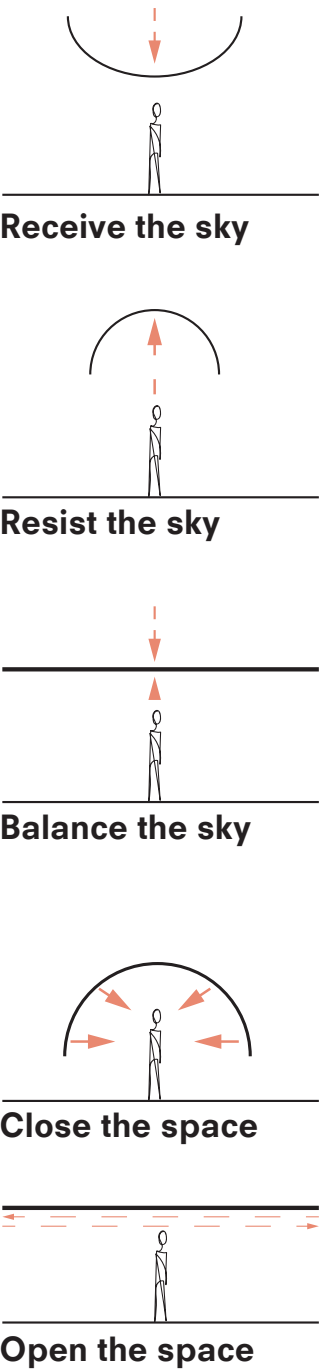
ROOF AS SHELTER

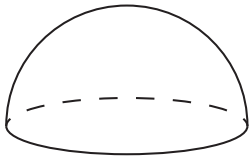


The Roof

Provides physical protection from the elements (rain, sun, wind) and is linked to the craft of carpentry and joinery

THE ROOF BEYOND THE SHELTER

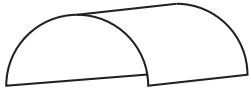




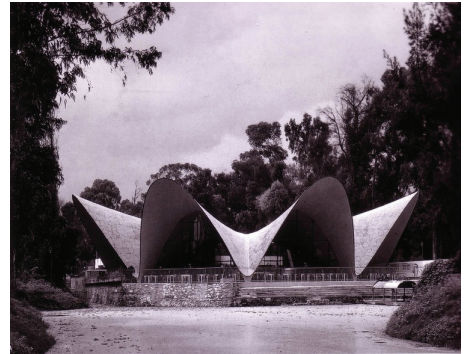
DOME



Palazzetto dello Sport



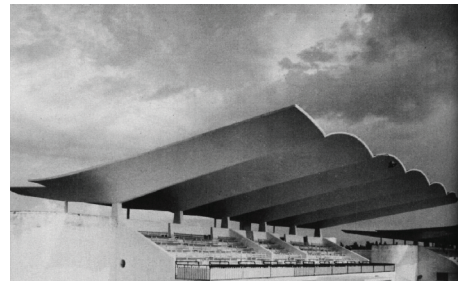
**BARREL
VAULT**



Los Manantiales



**GABLE
ROOF**



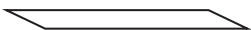
Hipódromo de la Zarzuela



**SHED
ROOF**



Berlin state library



**FLAT
ROOF**

**ROOF
TYPES**

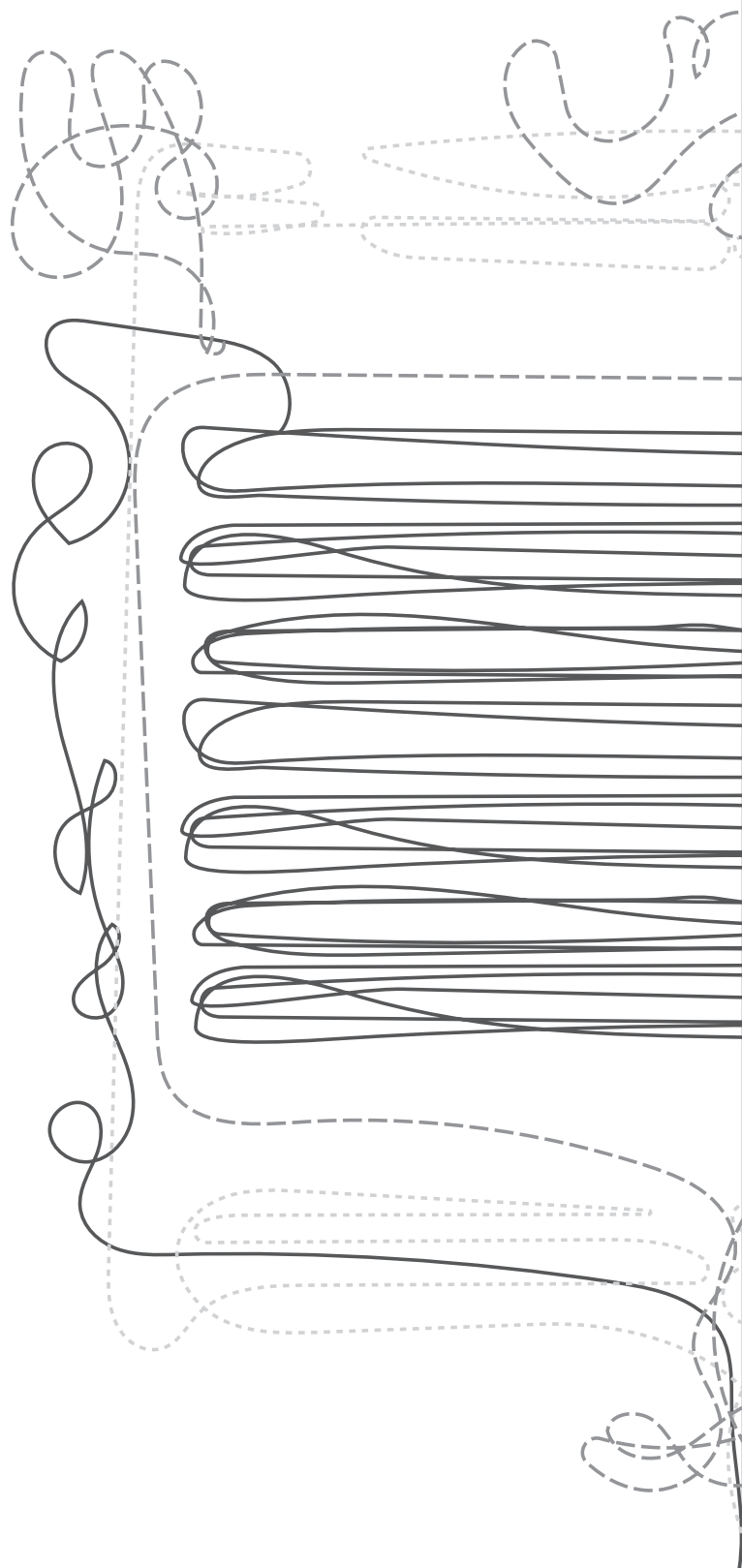
STUDIO THEME - BODIES AND BUILDINGS

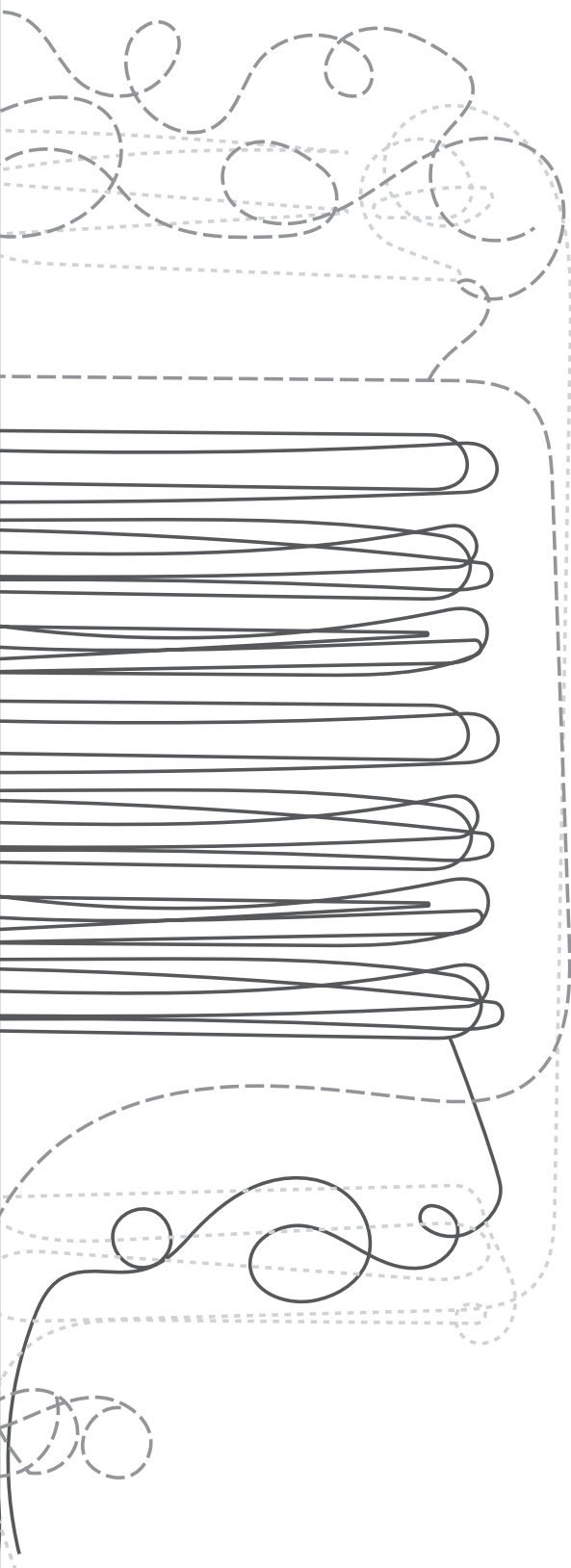
The way people move and feel in a building is just as important as the building itself. Thinking about architecture, it is often forgotten that it's not just about the physical structure, but about how people interact with it. The space inside a building is like a journey, where each step and each glance shape the experience.

By looking at how bodies move through a space, and how the world around is perceived, buildings can be designed more than just static objects - they can be living, breathing entities that respond to people's needs and emotions. The way architectural elements like doors, windows, and corridors guide users, frame views, and enhance sensations can completely change how a building is perceived. It's all about creating a spatial sequence that unfolds as we move through it, one that is constantly activated by the people using the space.

The swimming pool is an interesting example of a specific kind of space. When a person is in a pool, their body is doing things it doesn't normally do - they are moving around horizontally, they are underwater, and their senses are affected in different ways. This changes how people think about designing spaces, and it makes some elements, like the roof, really important because it's often the one thing that stays constant and remains visible. Designing pools means taking these unique conditions into account, and that's what makes them so fascinating.











1. Central Station
2. Library
3. Stadium
4. Opera
5. Courthouse
6. Hospital
7. Airport
8. Museum
9. Swimming pool

SWIMMING POOL MORPHOLOGY

One of the defining elements of the building, in this case, is, without a doubt, the swimming pool itself. Before the design process began, it was necessary to understand what a practical difference is and the typical sizing of swimming pools.

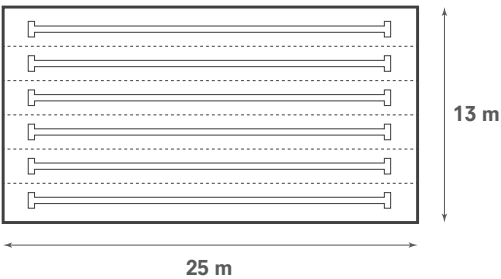
The Olympic-Sized Pool

An Olympic-sized pool is the standard for competitive swimming, officially acknowledged by the International Swimming Federation. A typical “Olympic-sized” pool is equipped with 10 lanes, each 2.5 m wide and a minimum depth of 2 m.

Short Course Swimming Pool (SCM)

A 25-meter pool, or short-course meters (SYM), is used in international competitions and training. These pools allow for more turns, making them distinctive in training.

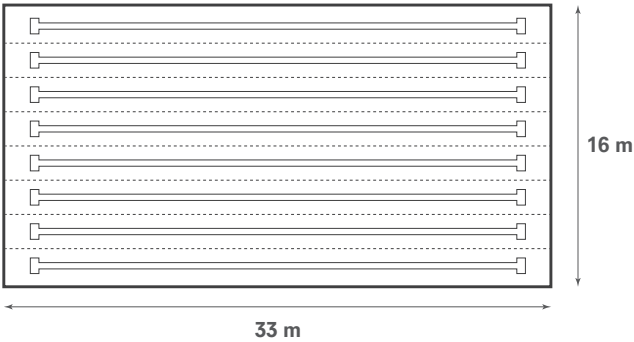
Short Course Swimming Pool



33 1/3 Meter Pool

The 33 1/3-meter pool is less common but is used for some competitive events and specialized training. It suggests a middle ground between 25-meter and 50-meter pools. Additionally, 33 1/3 Meter pools provide a unique training environment. Swimmers practice turns more repeatedly in a 50-meter pool and swim longer distances than in a 25-meter pool.

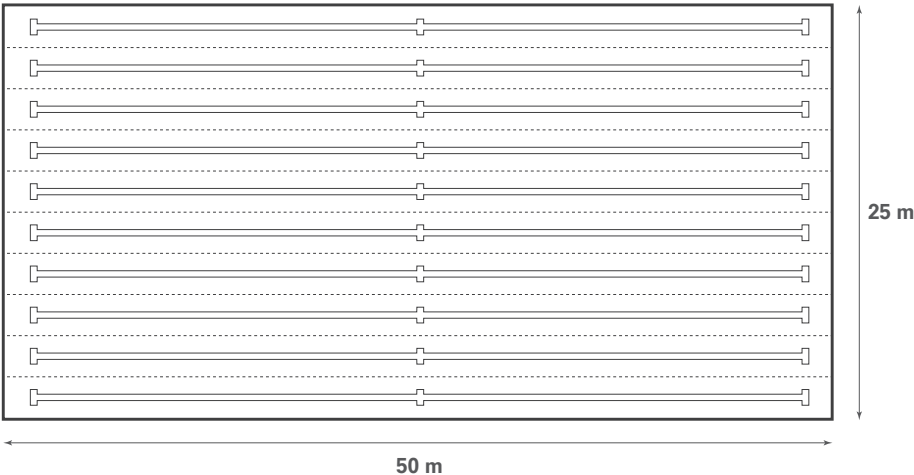
33 1/3 Meter Pool



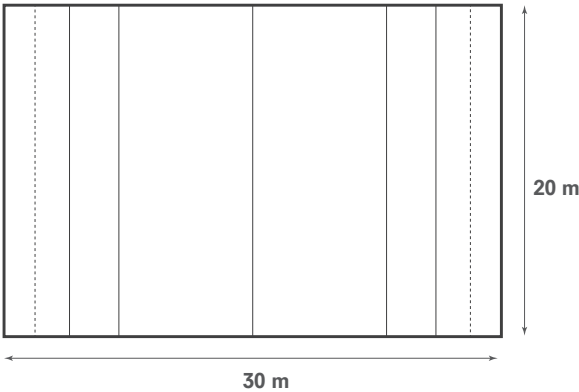
Water Polo Swimming Pool

A 30-meter pool is primarily associated with water polo. These pools often lack traditional swimming lanes but are marked for water polo play, including the goal line, halfway line, 2-meter line, and 5-meter line (Palumbo, 2025).

The Olympic-Sized Pool



Water Polo Swimming Pool







HISTORICAL CONTEXT

The Milanese pool culture had two significant periods in its history: the Fascist era and the economic boom of the 1950s and 60s. The municipal technical office designed the majority of the pools in both periods; first in charge was Luigi Lorenzo Secchi, and then Arrigo Arrighetti. Therefore, Milan's pools can be classified into two distinguishable styles: Secchi's early 20th-century, open pools and Arrighetti's modernist pools.

3 main pools which were built during fascist era are the "Romano" (1929), outdoor pool in front of which three symmetrical pavilions served as entrance and set the stage for bathing rituals; the "Bagni Misteriosi" (Old name "Caimi") (1937-1939) also an outdoor pool set in between the streets of Milan; and finally, the "Cozzi" (1933-1935), the biggest of out three with its Olympic-sized pool, and the most avant-garde with skylights highlighting its monumental barrel vault.

Arrighetti's works, on the other hand, include the organically shaped outdoor pool "Argelati" (1962), where both the volume of the entrance-bar and the pool's corners are rounded, designed for leisure rather than competition; and the "Solari" (1963), an indoor pool with a circular shape. Moreover, there were more swimming pools built during the same period by separate architects, such as the "Scarioni" (1958) by Bozzetti and Nichelli, and Pier Luigi Nervi's "Mincio" (1964), with its concrete ceiling floating on a glass façade of the first floor (Milan: Home to Italy's Most Beautiful Pools. Almost, 2025). The latter becomes the main reference project of this graduation.

● 1929

● 1933



● 1937

● 1958

● 1964

● 1963

● 1962







PISCINA MINCIO

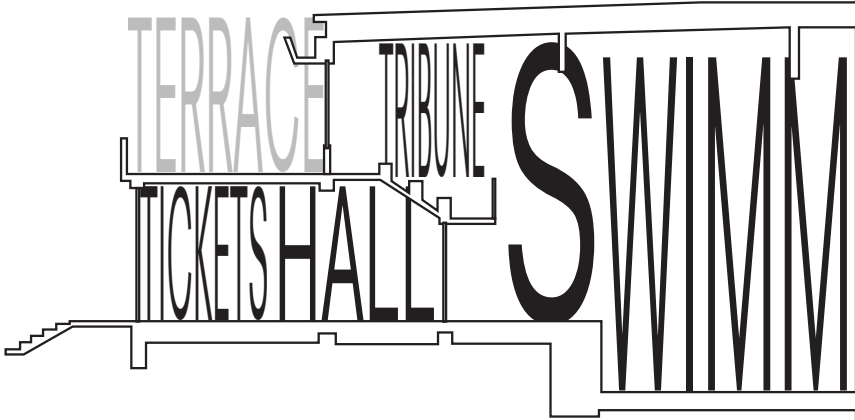
The Mincio Pool was built in 1964 in the southeast of Milan, on a block bounded by the current Viale Brenta, Via Oglio, Via Bessarione, Via Mincio, and Corso Lodi. The swimming pool currently serves as one of the venues of the MILANOSPORT public network of sports centers and offers swimming, water polo, synchronized swimming, and aquatic fitness classes. However, what draws the most attention to the pool is its architect, Pier Luigi Nervi, and the architectural idea that he has put into the building.

Nervi was a “pure modernist” who rejected superficial decor, famously stating: “Beauty does not come from decorative effects but from structural coherence. Formal beauty and technical perfection are inseparable.” (Mink, 2019) At the Mincio pool, this is evident in the iconic roof. The structure appears to “float” atop a continuous perimeter glass strip, flooding the interior with natural light. This mirrors his work on the Palazzo del Lavoro in Turin, where he used transparency to integrate the building into the urban landscape (Itinerari Di Architettura | Ordine Architetti Milano, n.d.).

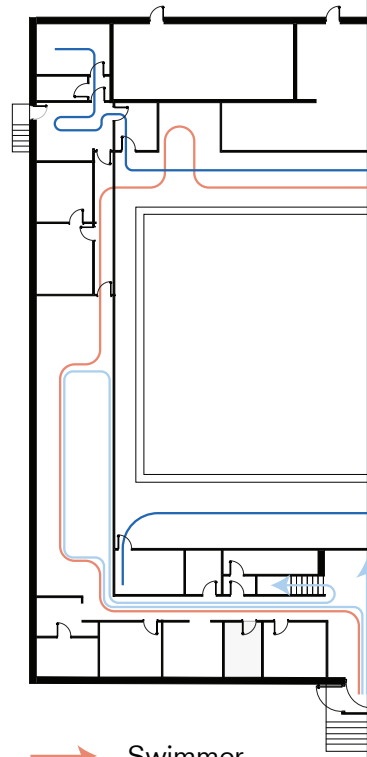
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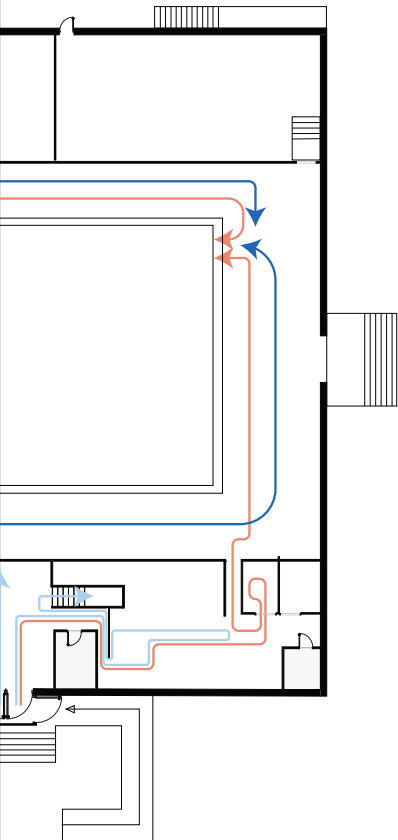
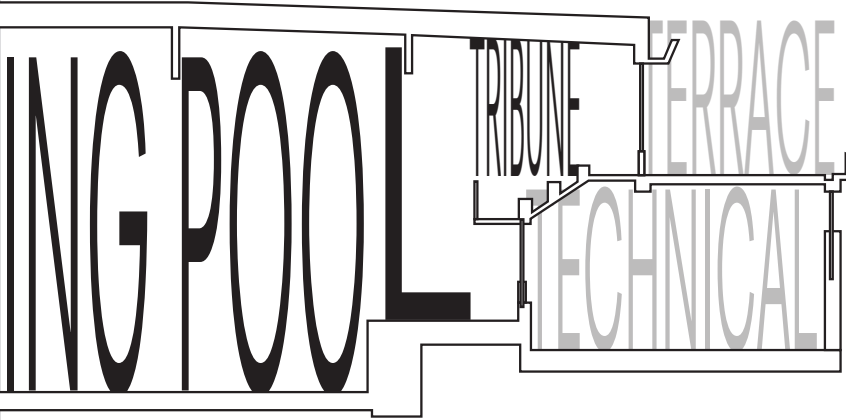
GROUP ANALYSIS ON FLOWS

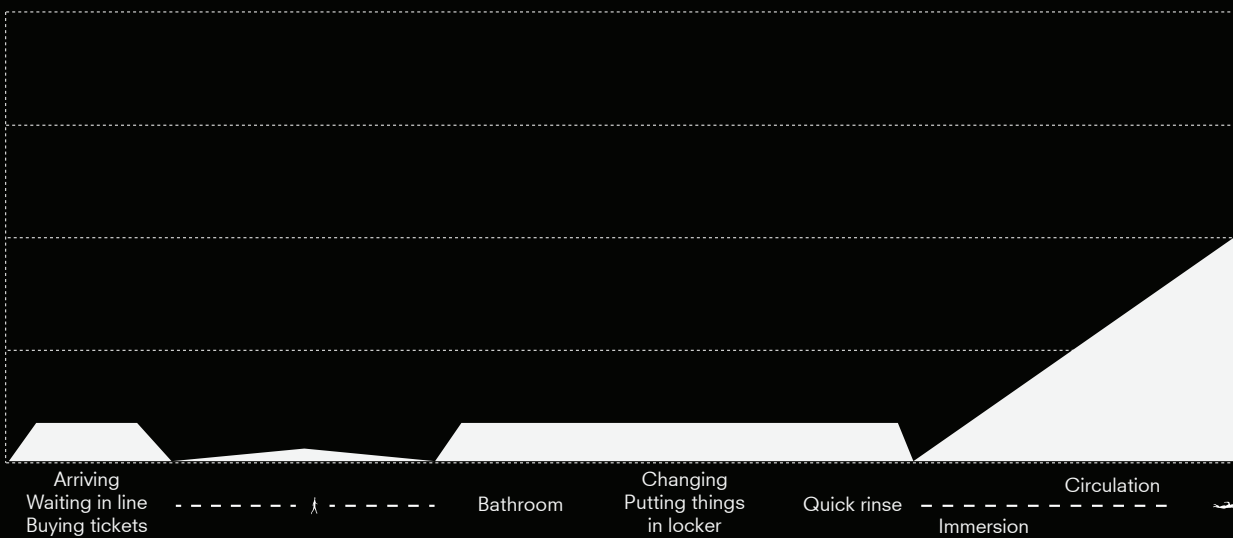
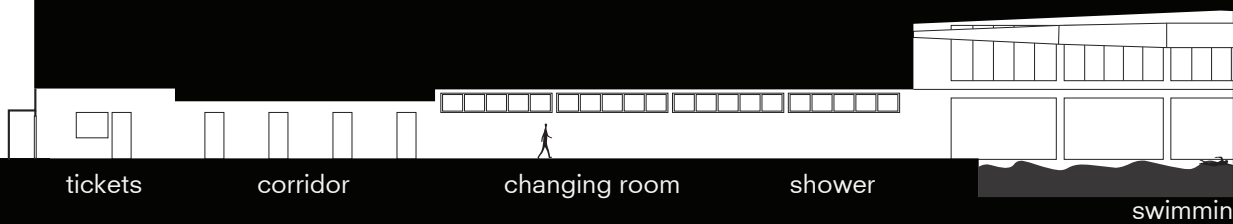


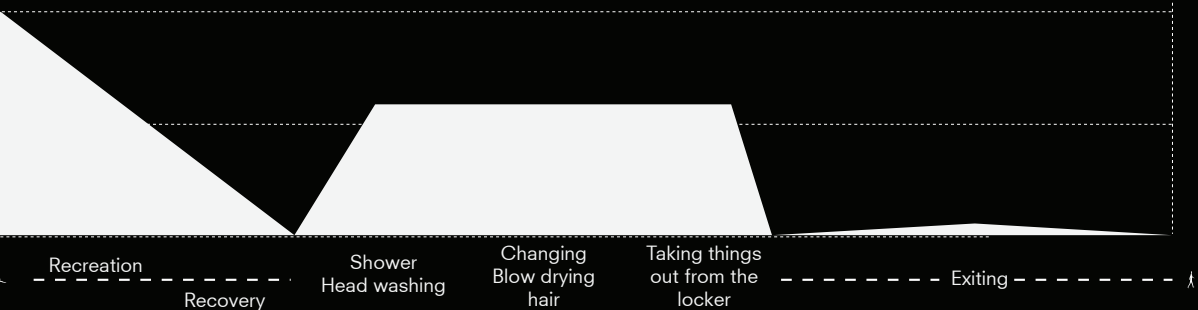
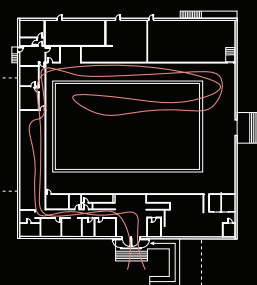
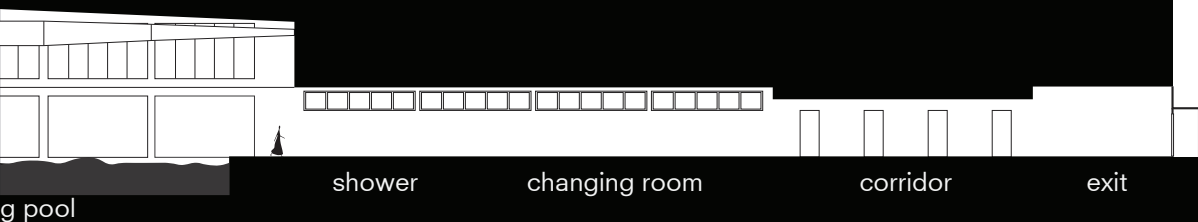
- Front of the House
- Back of the House



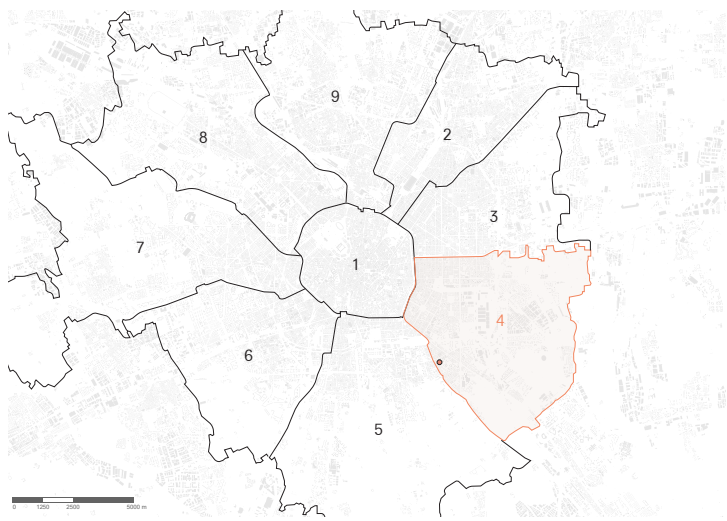
- Swimmer
- Parent
- Coach





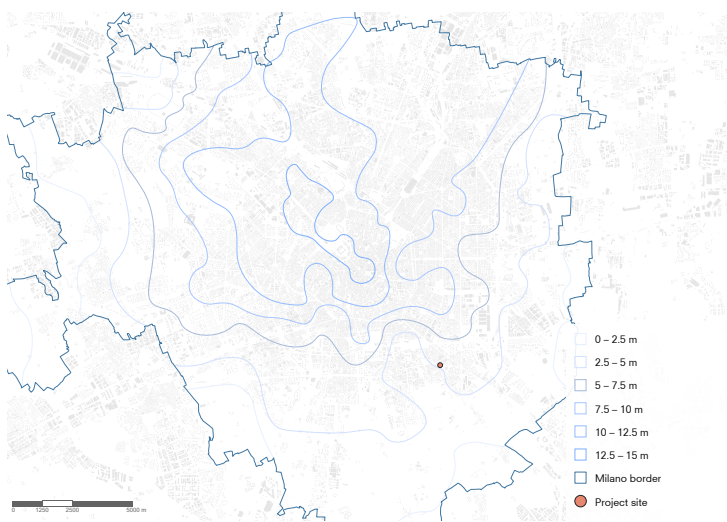


SITE



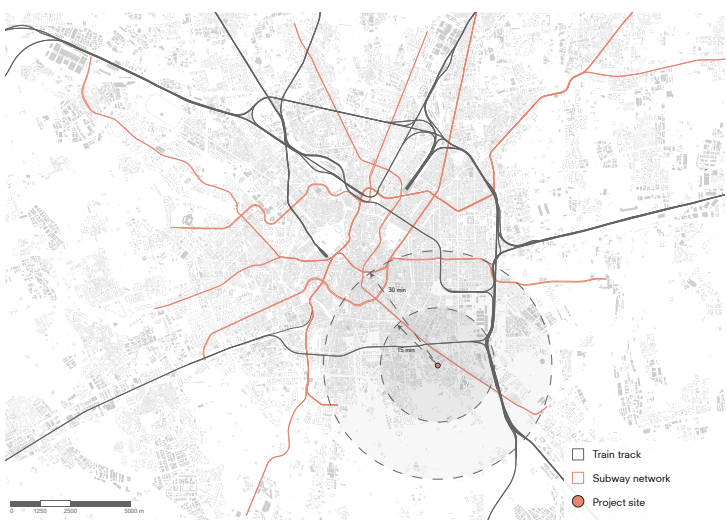
SITE LOCATION

Piscina Mincio is situated in Municipio 4, a dynamic district in southeastern Milan. The site sits within a dense residential fabric that transitions between the historic city core and the expanding southern urban periphery.



SUBSIDENCE OF THE WATER GROUND

The local water table is located at a depth of 5–7.5 meters. This groundwater level is a technical aspect that will directly influence the swimming pool's technical design.



TRANSPORTATION

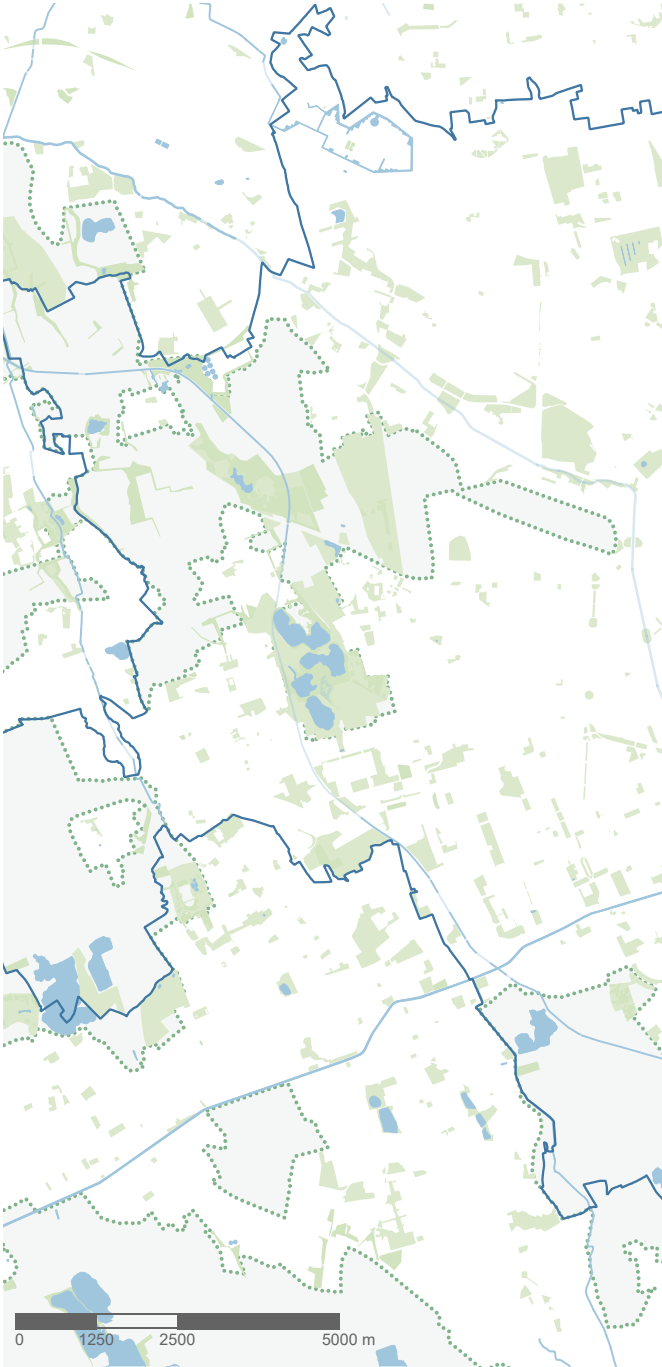
The project is highly accessible via Milan's transit network; the proximity to the M3 (Yellow) Metro line and local bus routes ensures the city center is reachable within 30 minutes.

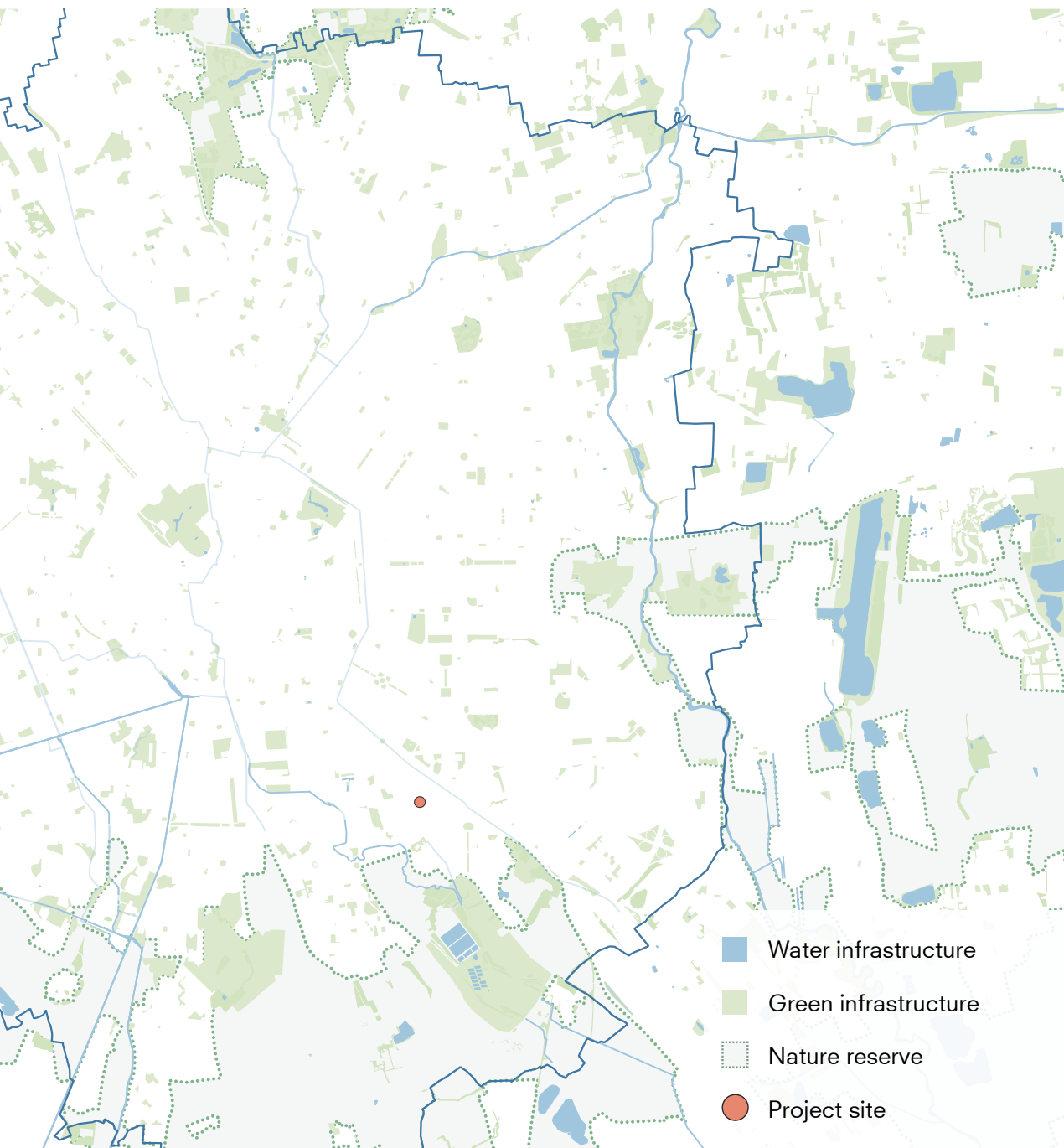
GREEN-BLUE INFRASTRUCTURE

Among the multiple layers through which the site has been analyzed, two are interconnected and play a significant role in the project’s relevance.

The first layer is Milan’s landscape. It is interesting to note that, compared to other big European cities, Milan lacks large natural water bodies. This led Milan to create a network of canals (navigli) between the 12th and 17th centuries. As a result, the canal system is connected to two rivers: the River Ticino on the west and the River Adda on the east, with the so-called Cerchia Interna (The Inner Ring).

The last traces of the canal system can be found in the Navigli area in south-west Milan. The majority of the canals did not survive rapid modernization at the beginning of the 20th century, when cars and trains replaced boats due to their speed, and an Inner Ring was buried under concrete (Tyson, 2022).



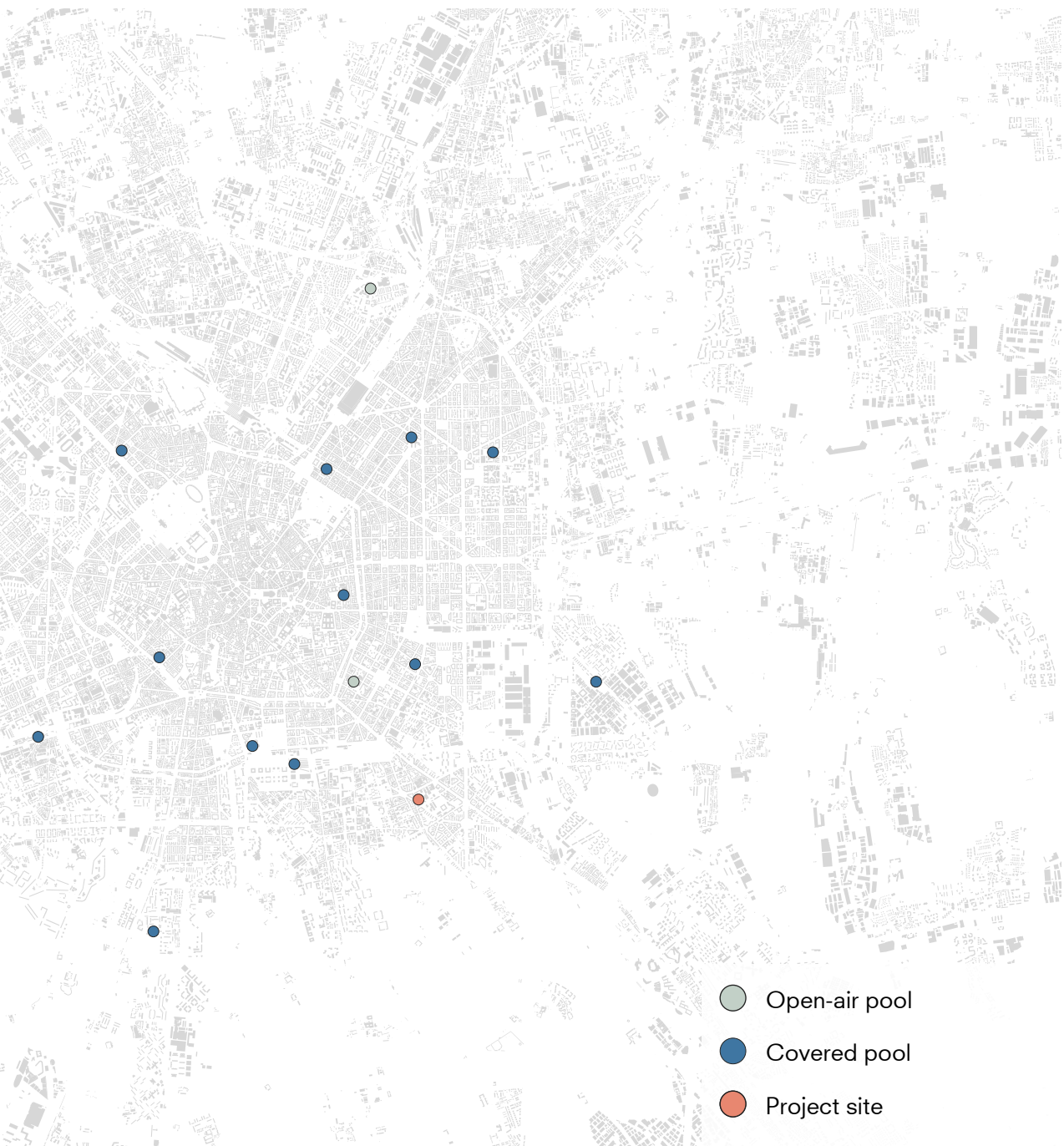


SWIMMING POOLS IN MILAN

Therefore, it is not surprising that since the 20th century, Milan has experienced a huge development boom in public swimming pools.

With approximately 20 public swimming facilities distributed across the city, Milan has a well-established culture of aquatic sports, ranging in size and both indoor and outdoor building typology.





M SCALE



URBAN MORPHOLOGY

The neighborhood represents moderate porosity, typical of Milan’s modern expansion. The urban fabric is a rhythmic alternation between solid built masses and open communal voids.



URBAN DEVELOPMENT PLANS

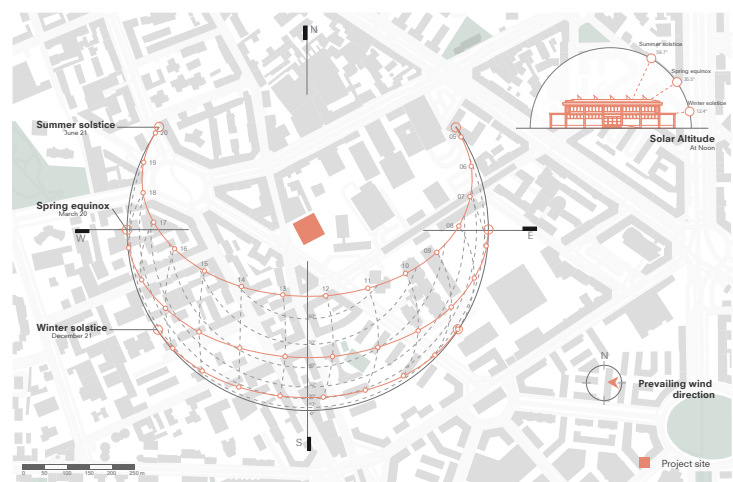
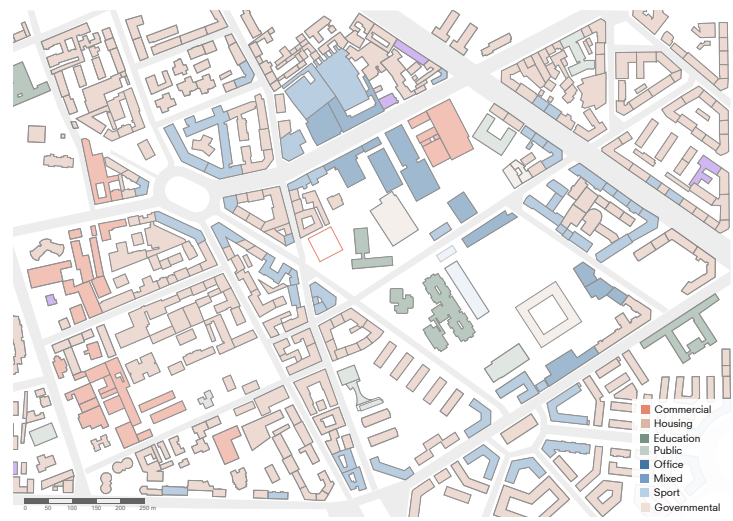
The site’s geometry is a direct result of the Pavia-Masera Plan, an early 20th-century strategy that structured Milan’s expansion.



TRANSPORTATION

The project is situated within a high-permeability zone, where local streets intersect with major transit lines, ensuring the facility remains well integrated into the community.

S SCALE



DESIGN BRIEF

FUNCTIONS

While the neighborhood is predominantly residential, the block around the pool is surrounded by schools and the central administrative building for Municipio 4. Therefore, the pool is the part of “services island.” block of the neighborhood.

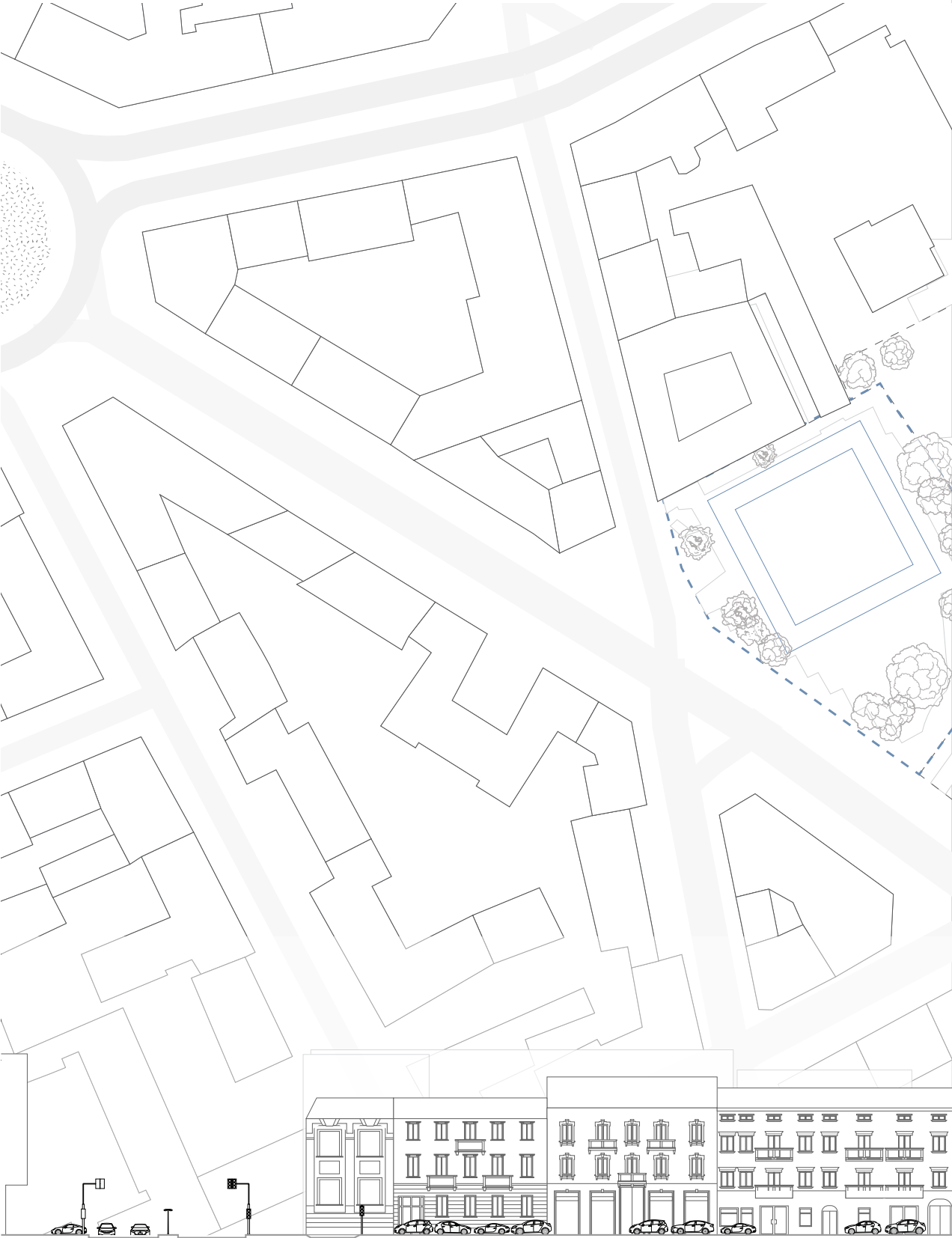
HEIGHT

There is a distinct vertical contrast at the site: while the surrounding residential blocks maintain a consistent height of 20–30 meters (6–8 stories), the Piscina Mincio remains a low-profile volume.

SUN PATH

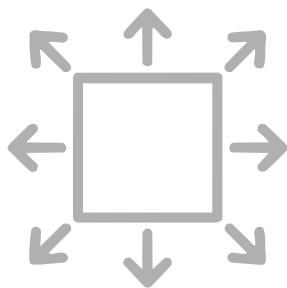
Positioned at a prominent street crossing with an open southern aspect, the site benefits from uninterrupted solar gain.

THE SITE

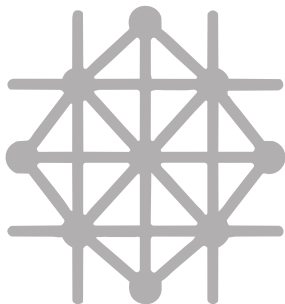




SITE AMBITION



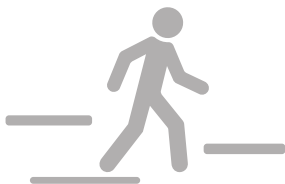
**EXPAND THE
SITE**



**FINISH URBAN
LOGIC**



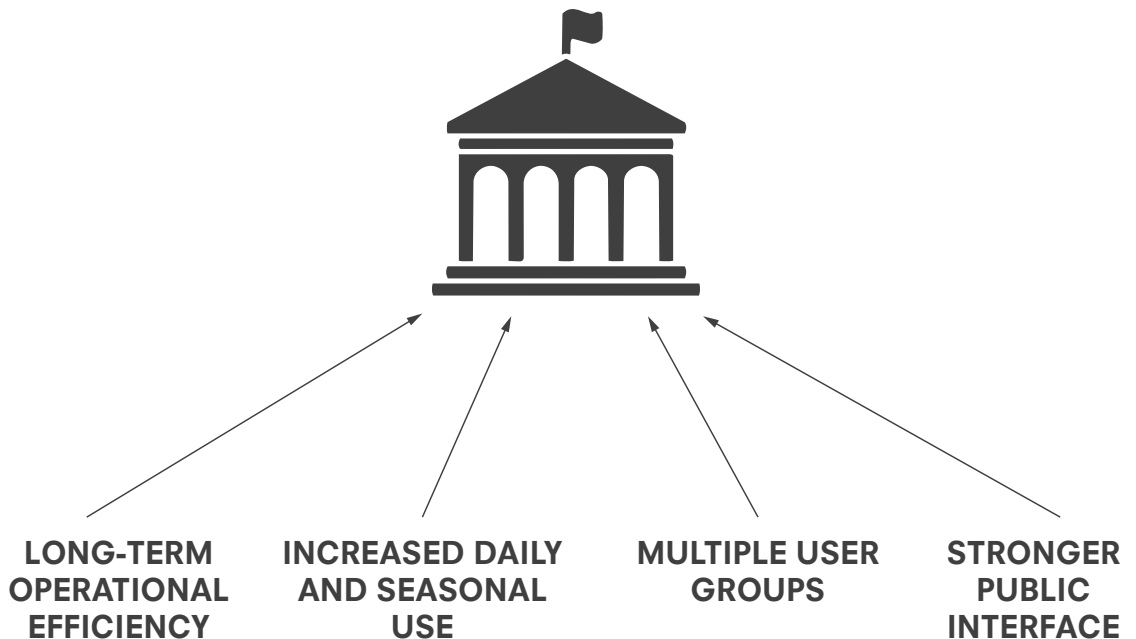
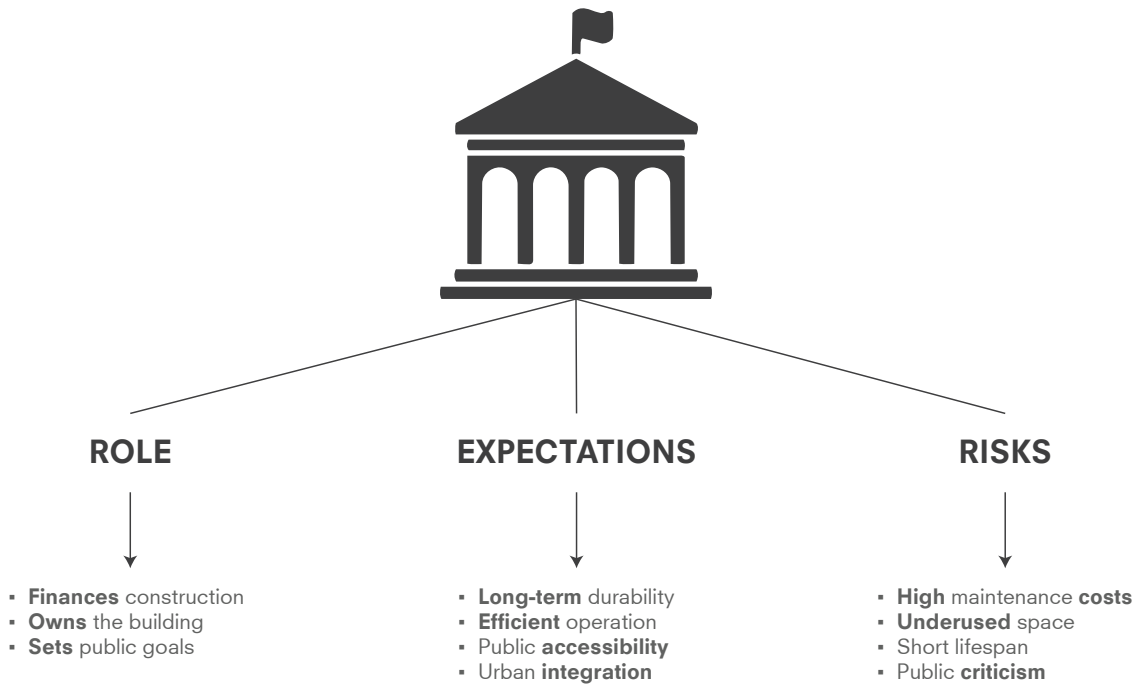
**SHAPE
BUILDING IN
THE CITY**



**INTERACT
WITH
PASSER-BYS**



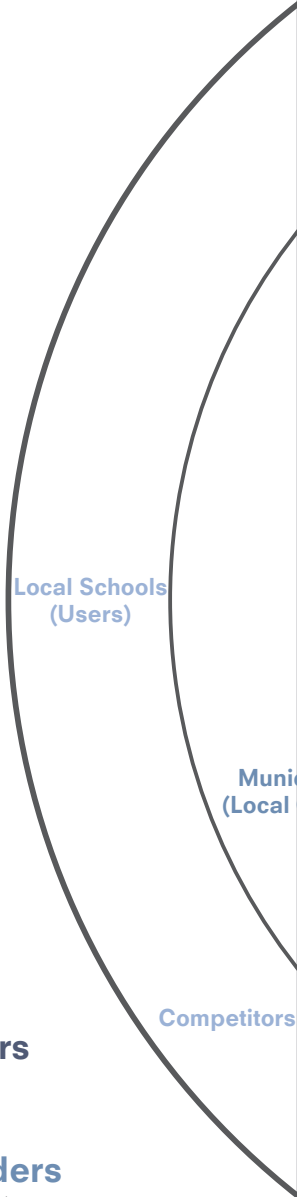
CLIENT



The project’s client is the Municipality of Milan, represented at the local level by Municipio 4, which is responsible for providing well-functioning public sports infrastructure. The client’s goal is to ensure the pool is up to date, meets current public-use standards, is easy for everyone to access, and runs smoothly.

Public swimming pools in Milan play a significant role not only as recreational facilities, but also as spaces for health and social interaction across different age groups and user profiles.

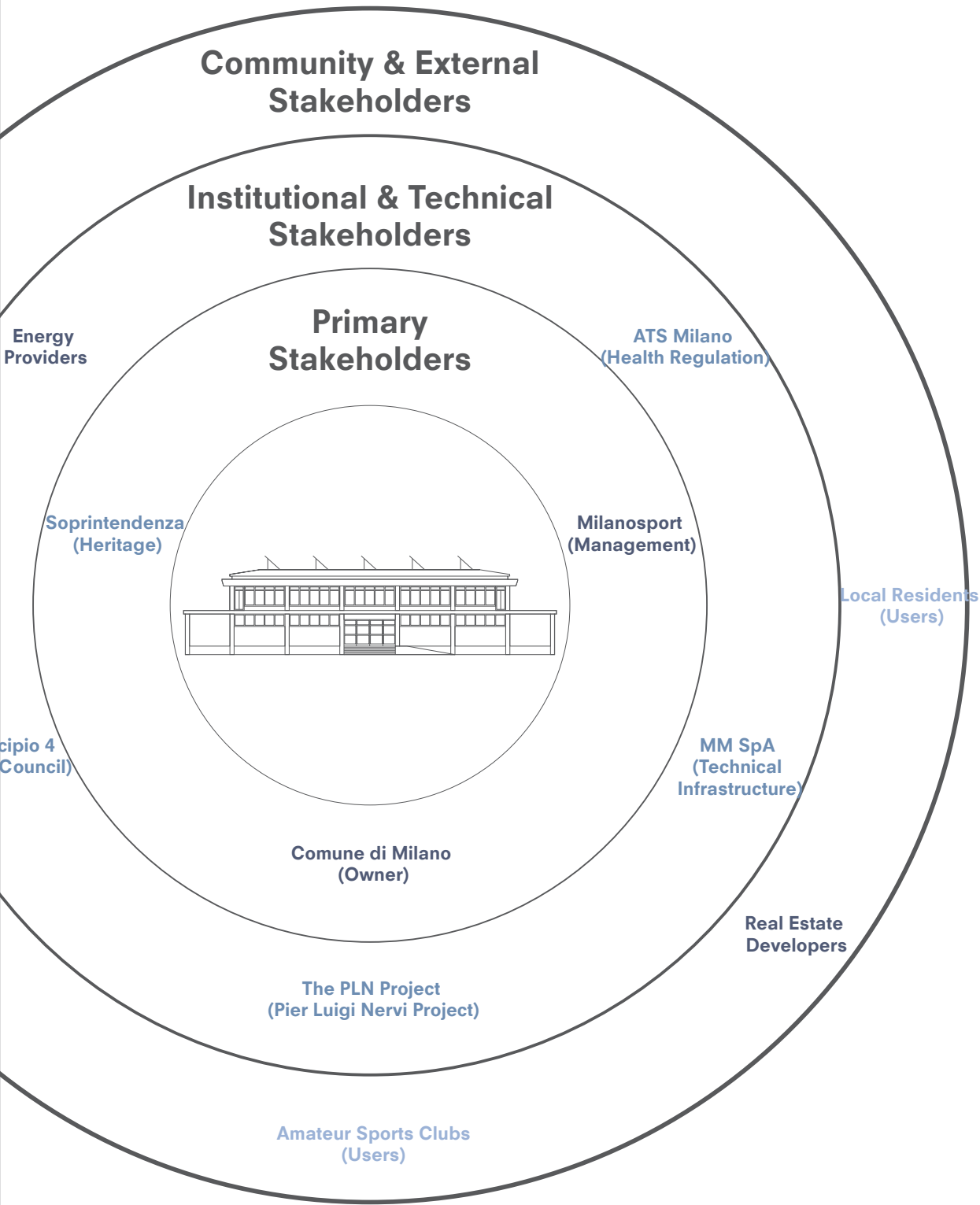
It’s important to create a space that’s comfortable and easy to navigate, whether you visit the pool as a swimmer or a spectator. This means finding a balance between ensuring the pool is functional and making it a place where users want to stay. By doing this, public swimming pools can be a great resource for the community, where people can come to relax, get some exercise, and socialize.



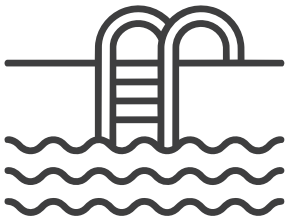
Financial Stakeholders
(Who pays?)

Regulatory Stakeholders
(Who makes the rules?)

Beneficiaries
(Who uses it?)



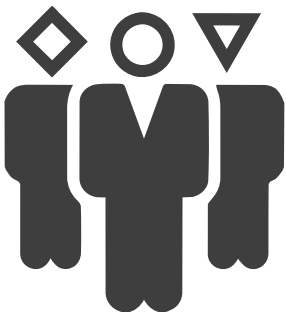
CLIENT AMBITION



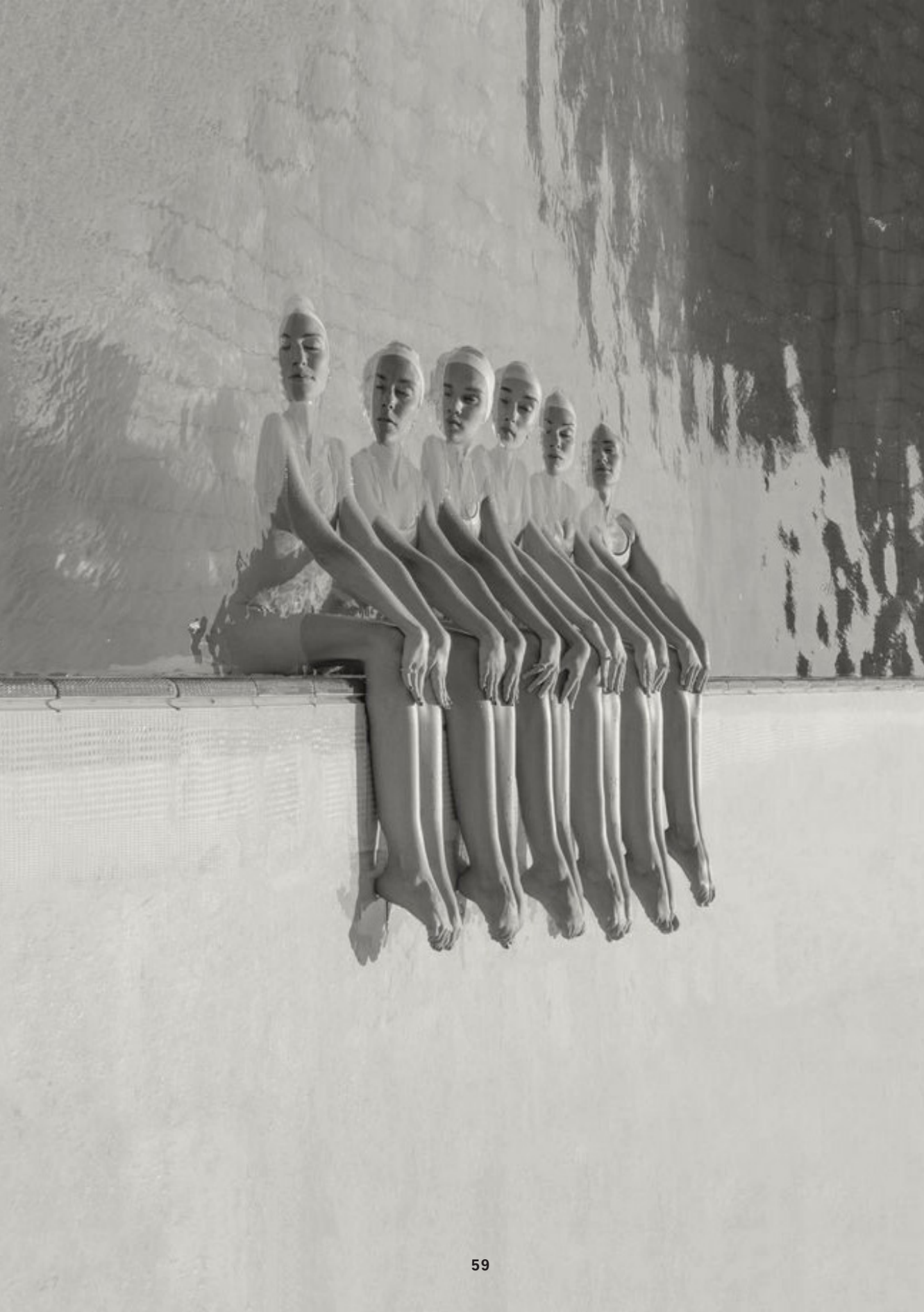
CREATE DISTRICT POOL



INCREASE VISITOR INTAKE



DIVERSIFY VISITOR GROUPS

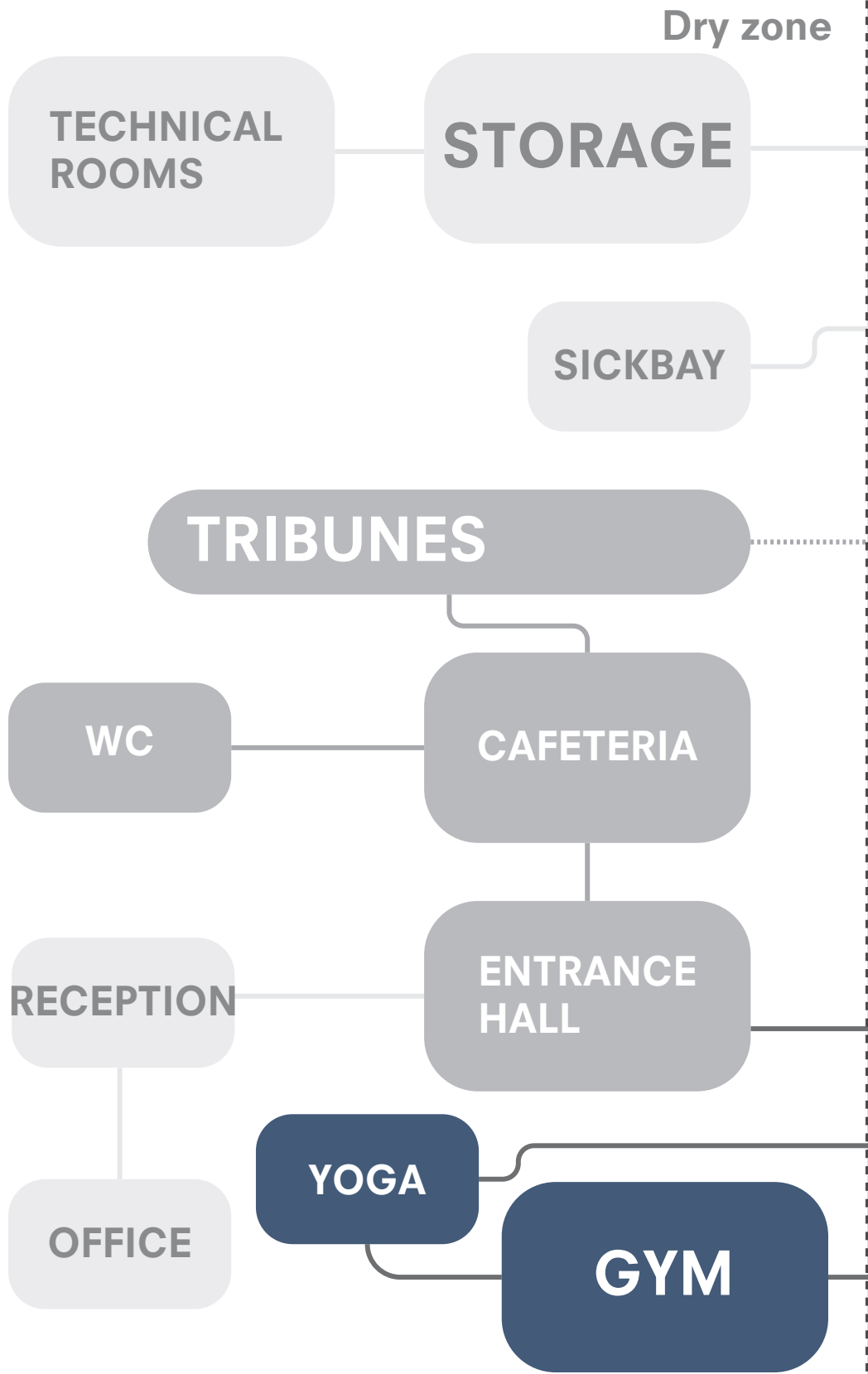


PROGRAM

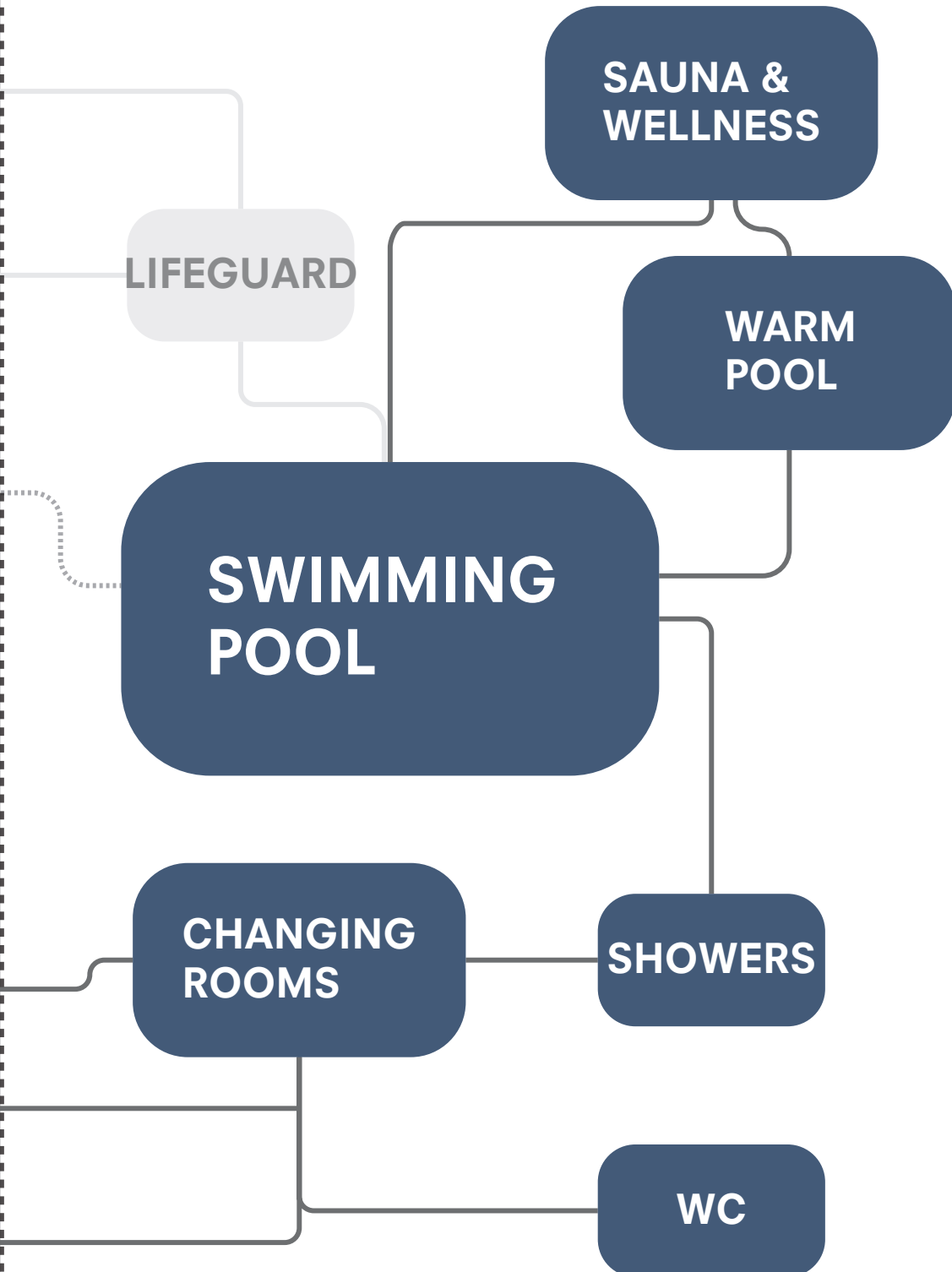
The program of the project is based on the requirements of a contemporary public swimming facility, combining spaces for sport, training, leisure, and social interaction. At its core, the building houses a large-scale swimming hall, with additional pools and supporting functions arranged around it that serve different user groups and activities.

The building should be organized so that dry and wet areas are clearly separated. It's not just about swimming; there are also spaces for training, relaxing, and socializing so that the building can be used all day for a wide range of activities. This helps create a dynamic, flexible space that adapts to diverse needs and activities. By including these additional areas, the building becomes more than just a sports facility.

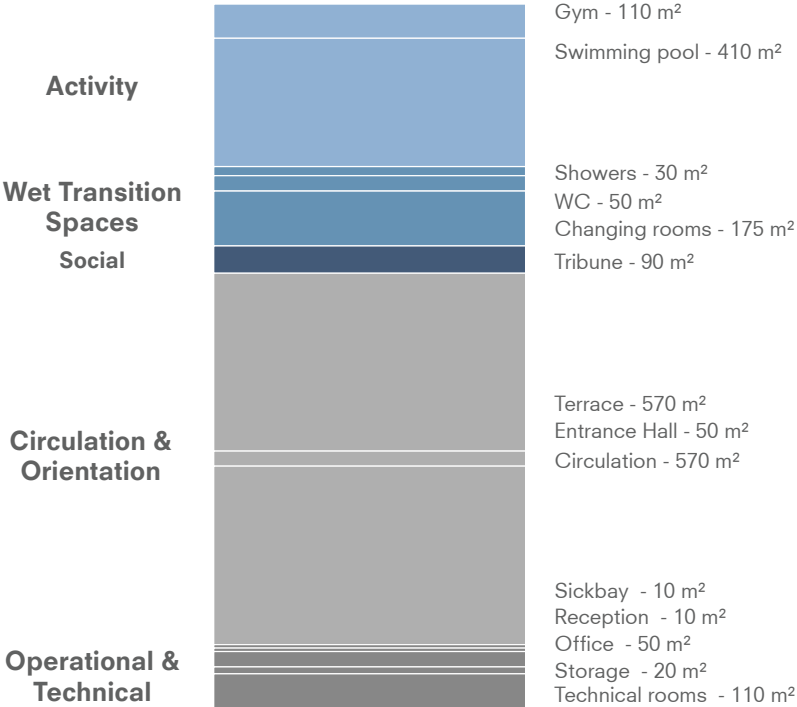
RELATION DIAGRAM

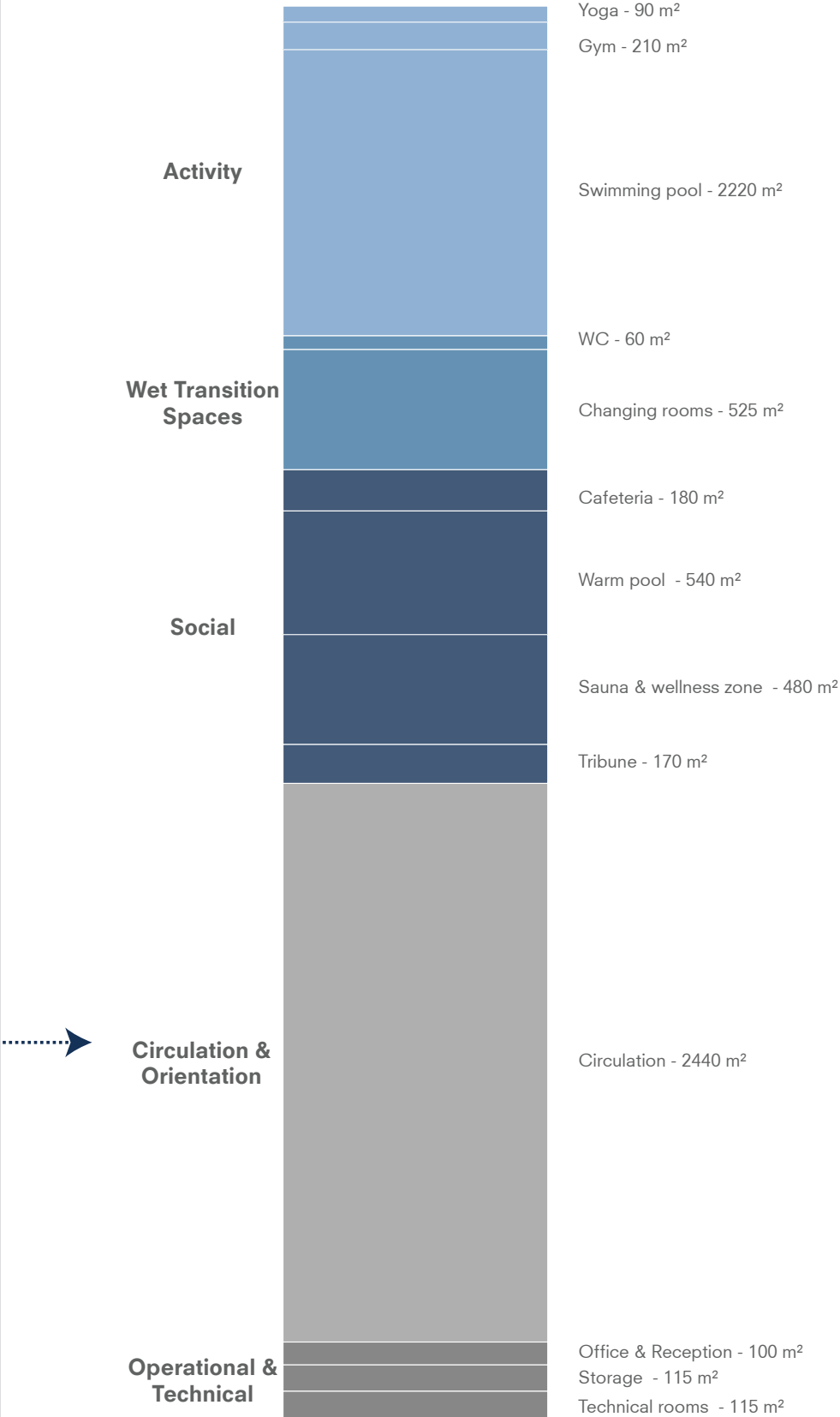


Wet zone



PROPOSED PROGRAM





PROGRAM AMBITION



INTUITIVELY GUIDE A USER



SEPARATING DRY AND WET ZONES

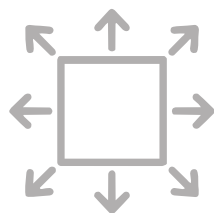


ADD MORE SOCIAL FUNCTIONS

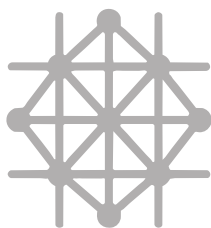


CONCLUSION

PROJECT AMBITIONS



EXPAND THE SITE



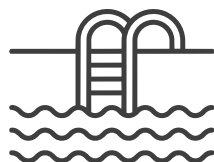
FINISH URBAN LOGIC



SHAPE BUILDING IN THE CITY



INTERACT WITH PASSER-BYS



CREATE DISTRICT POOL



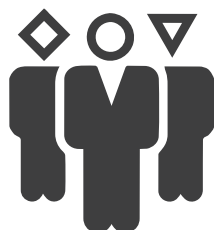
INTUITIVELY GUIDE A USER



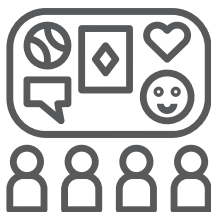
INCREASE VISITOR INTAKE



SEPARATING DRY AND WET ZONES



DIVERSIFY VISITOR GROUPS



ADD MORE SOCIAL FUNCTIONS

WHAT IF PISCINA MINCIO NEVER EXISTED?







RESULTS

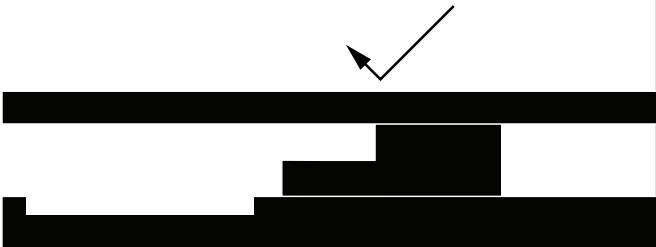
03



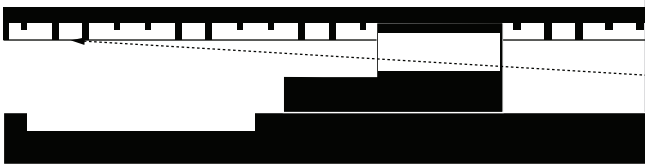
**FROM RESEARCH TO DESIGN
CONCEPT**

The study began with the hypothesis that the roof can serve as the main organizing element of a swimming pool.

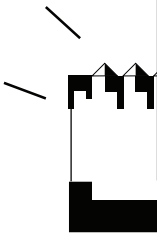
Research on the theory and the context itself served as the basis for the decision to start the design process, not from the plan, but from the roof itself. Instead of treating the roof as a consequence of the program, the project changed the sequence of actions and allowed the roof geometry to shape the spatial organization below it.

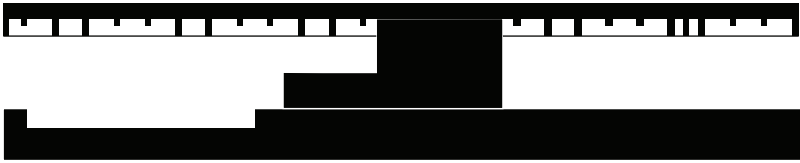


COVER

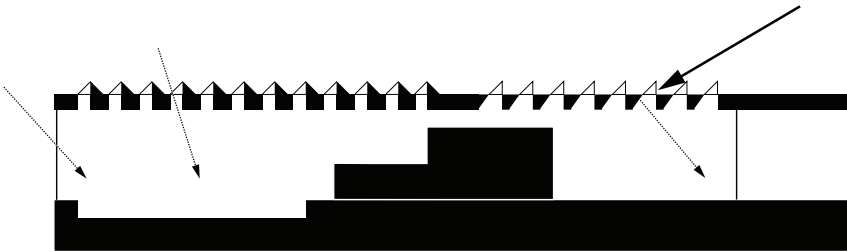
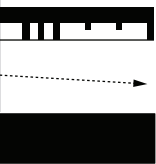


WAY-FINDING

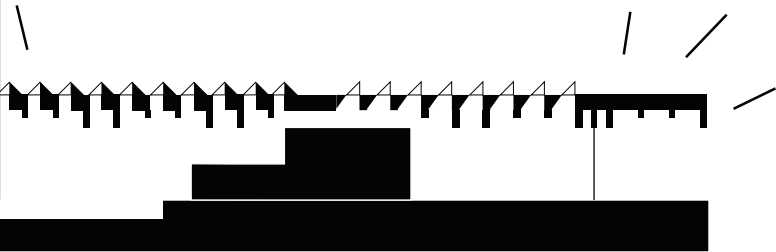




STRUCTURE



DAYLIGHT



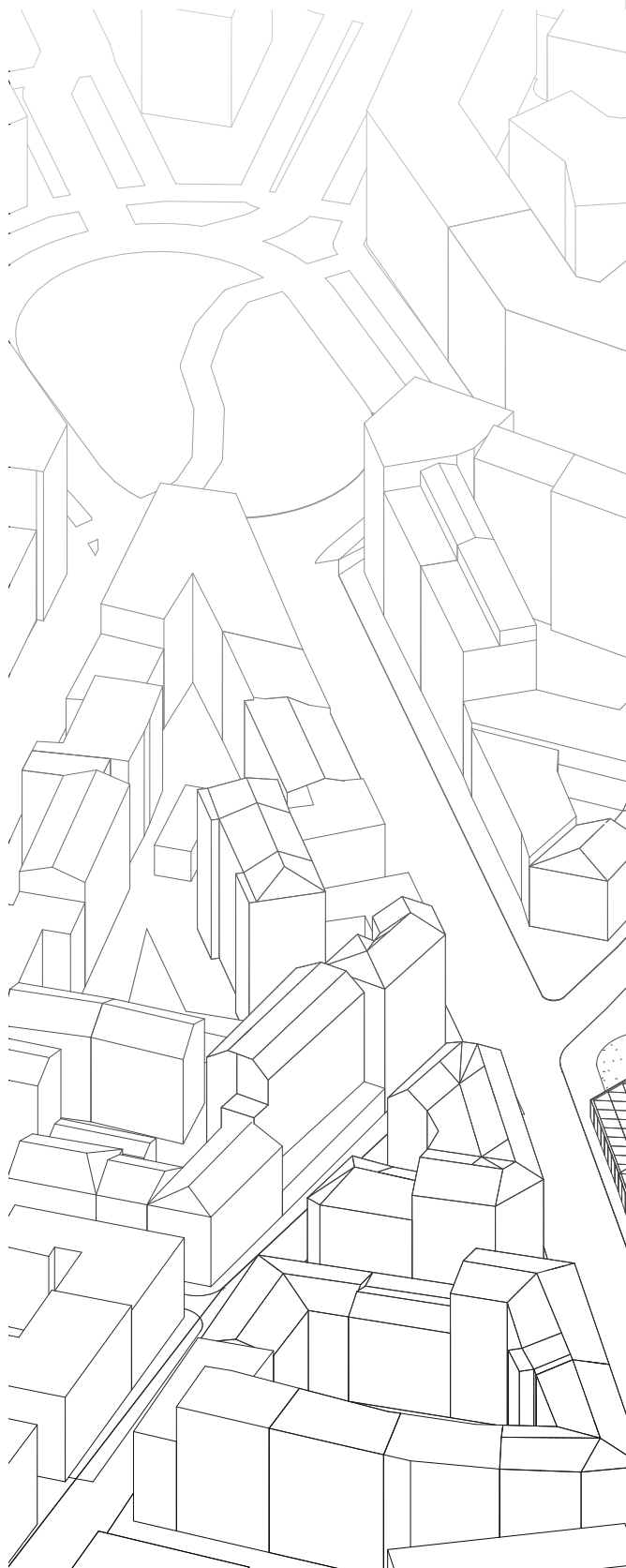
IDENTITY

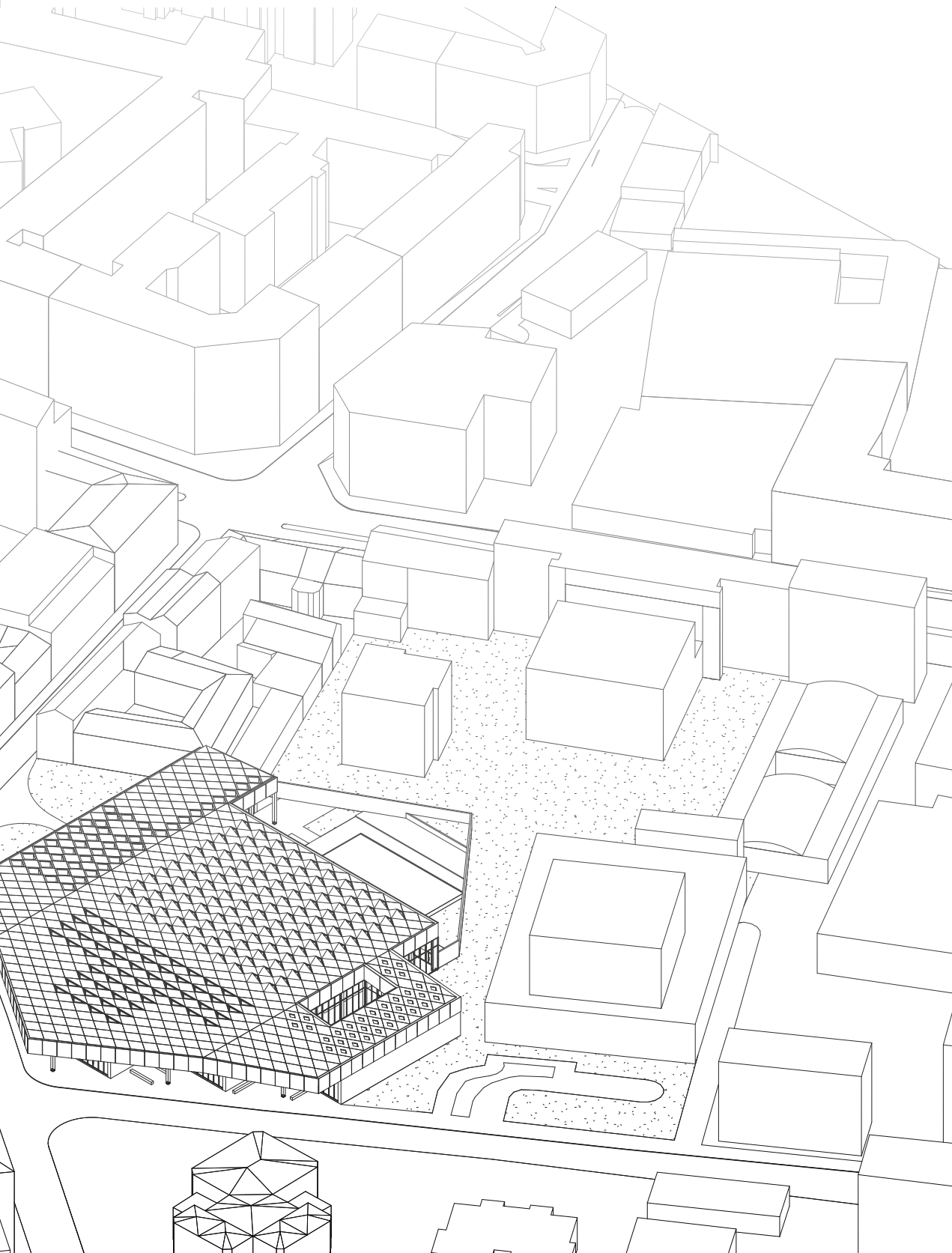
URBAN INTEGRATION

One of the first design studies focused on the relationship between the pool and the surrounding urban area. The existing Piscina Mincio functions mainly as an isolated facility on its site. Based on an analysis of pedestrian traffic and public facilities around the project, the possibility of expanding the building's public role beyond its current function was identified.

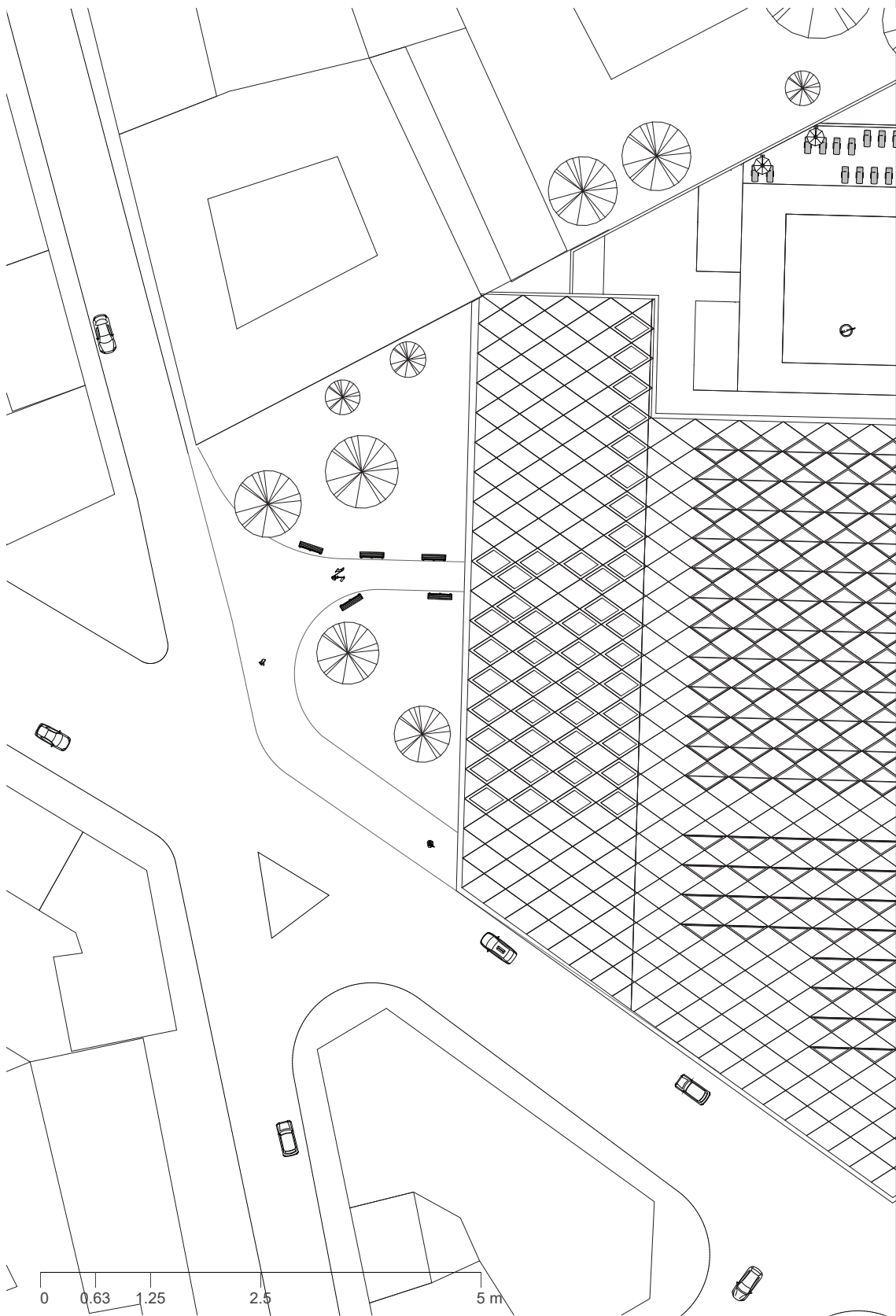
Thus, the project expands the existing territory and redefines the swimming pool as part of a larger urban development. New public spaces are emerging around the building, creating closer links with nearby streets and passersby. Instead of serving only as a destination for swimmers, the building becomes a landmark for the area and a meeting place.

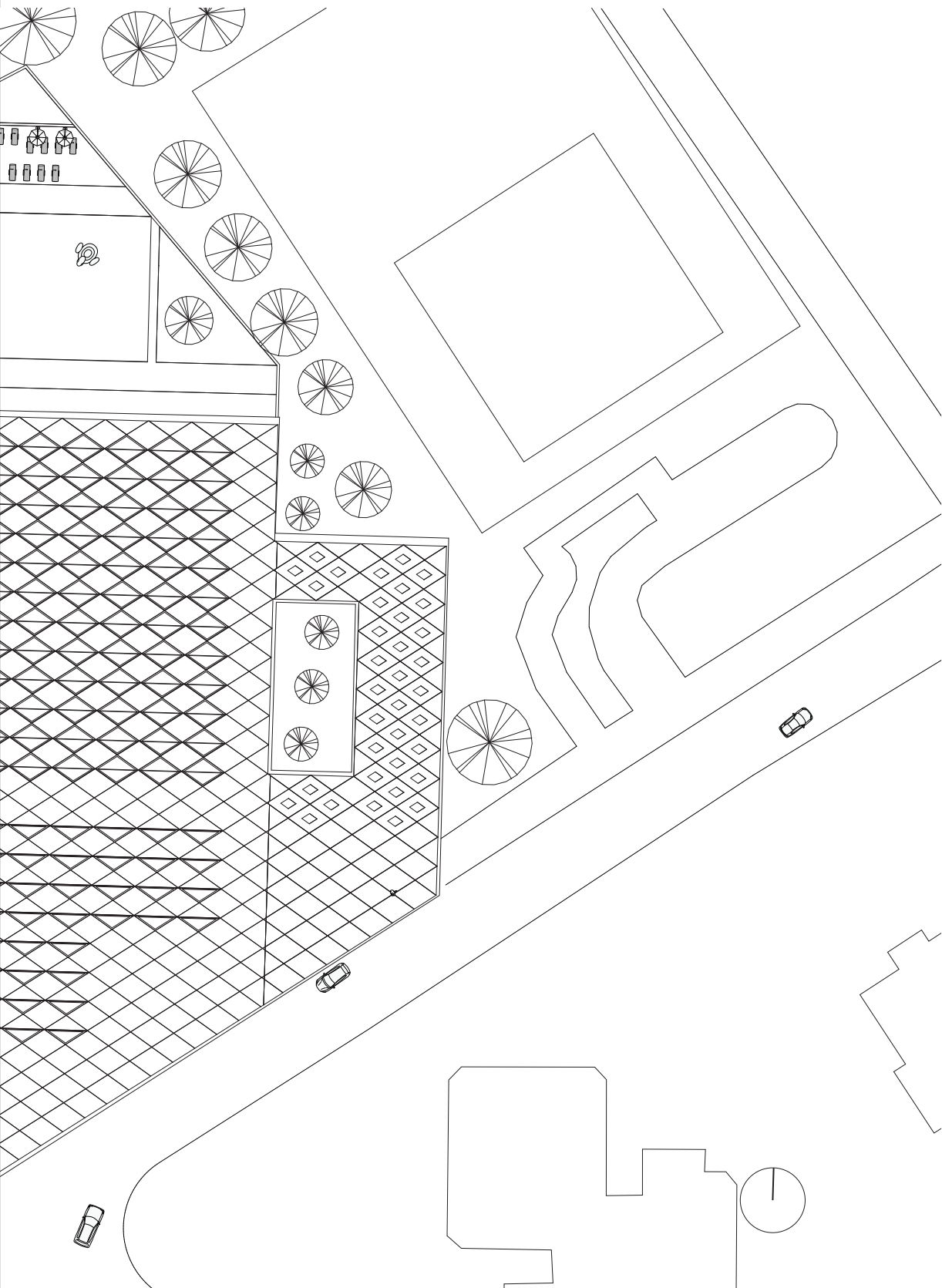
The roof directly contributes to this urban strategy. Its geometry extends beyond the building's façades, creating covered exterior areas and a noticeable architectural presence at the road intersection through visual symmetry. As a result, the roof operates simultaneously at the scale of the city and that of an individual user. Moreover, transparent façades parallel to the pool aim to catch passersby's attention and invite them in. At the same time, perpendicular concrete walls restrict the visibility to only designated areas, framing the overall view. That creates a feeling of exploring the building, the longer you go, without knowing what comes next. This way, the building interacts with even pedestrians who are just passing by, with no intention of swimming.

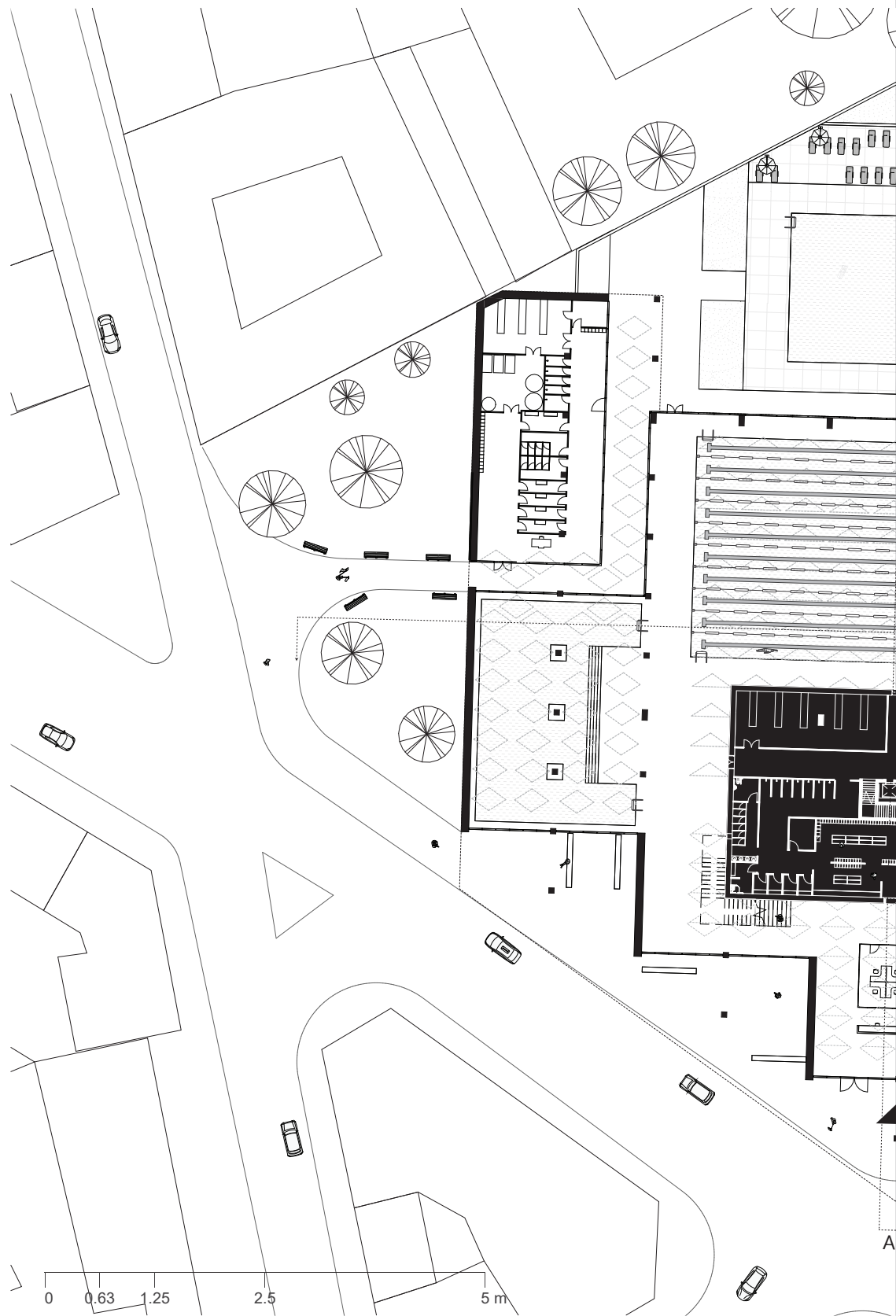


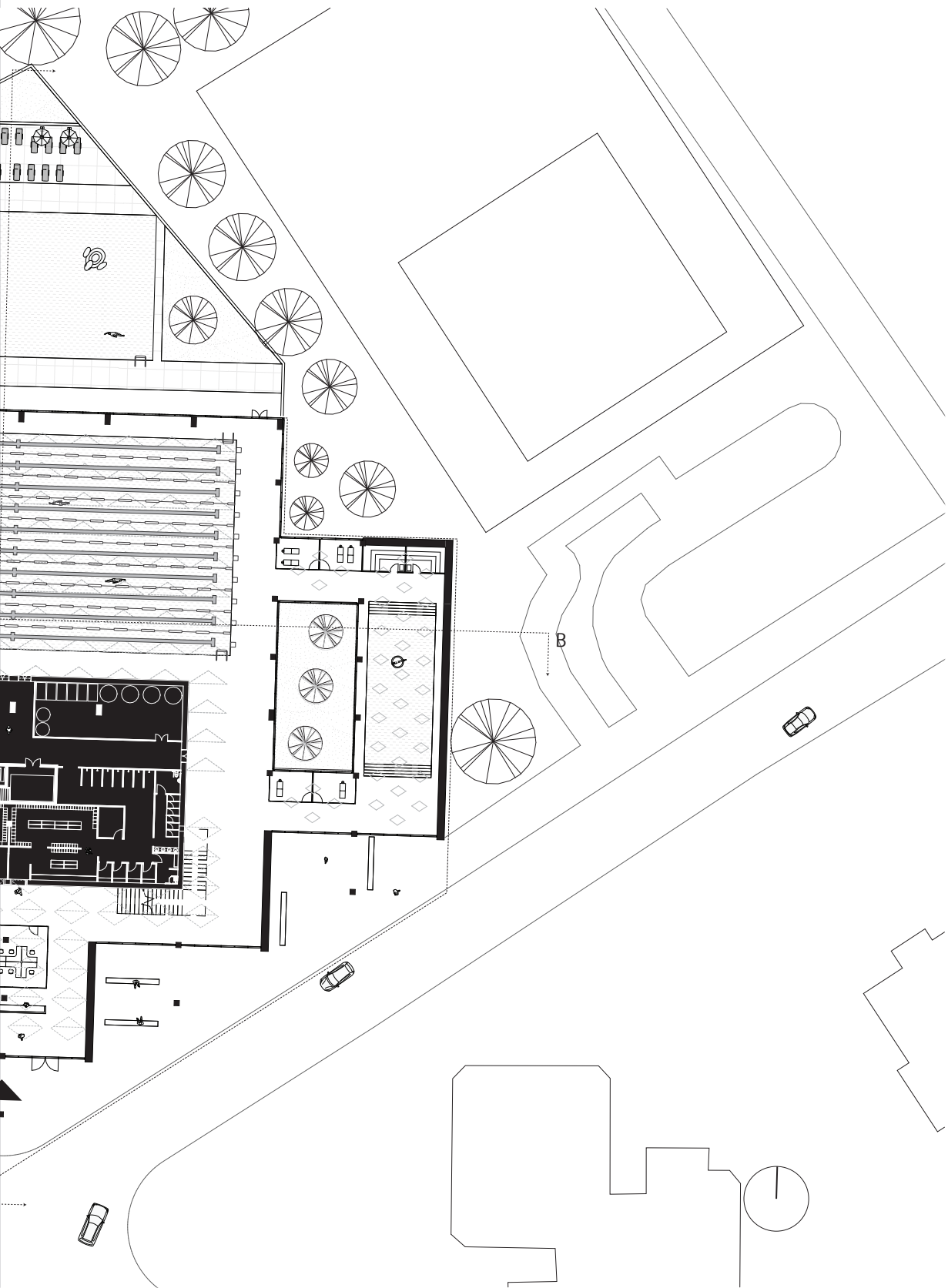


SITE PLAN

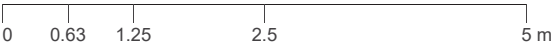


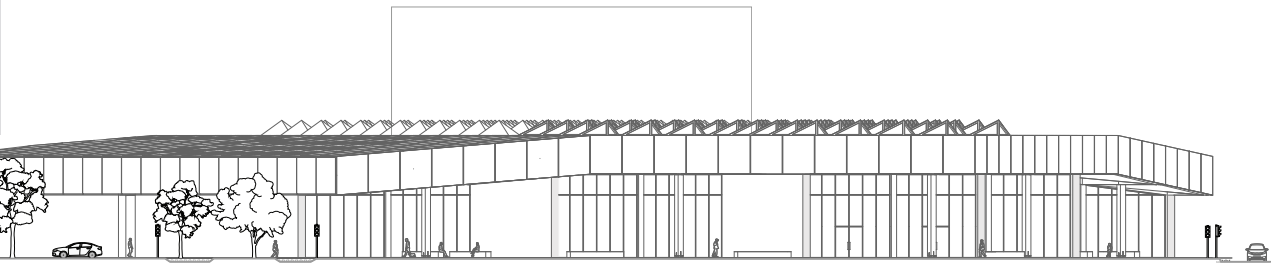
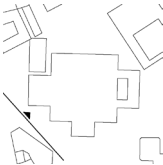




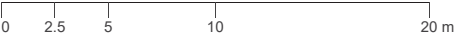
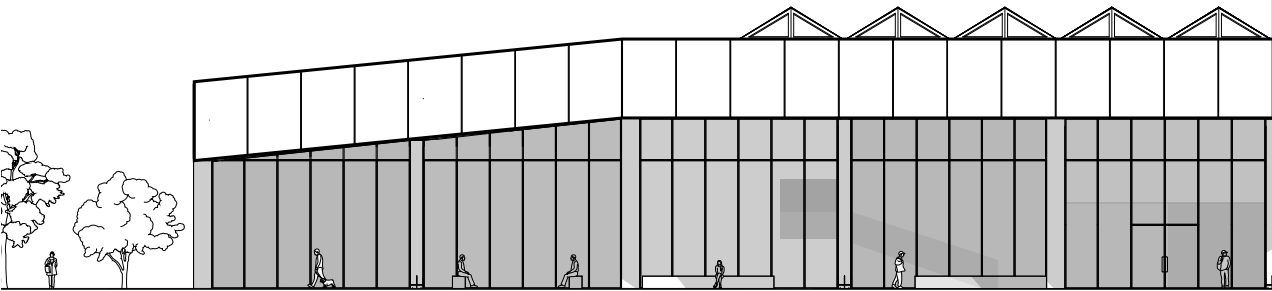


URBAN ELEVATION

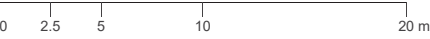
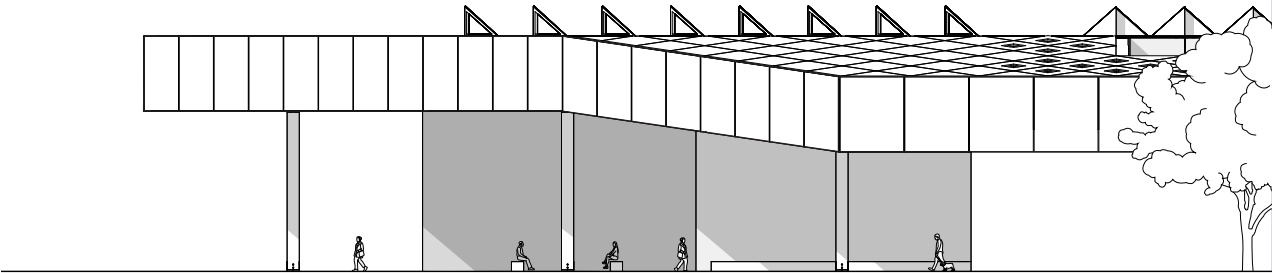


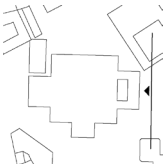
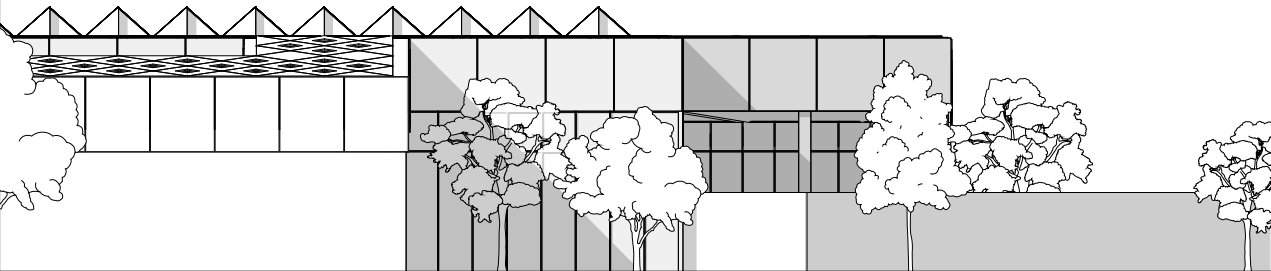
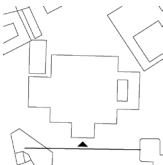
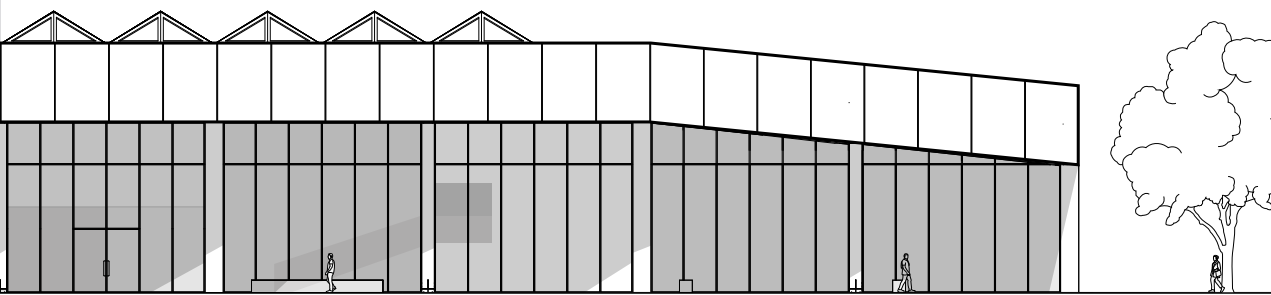


SOUTH ELEVATION



EAST ELEVATION





STREET PERSPECTIVE





STREET PERSPECTIVE





STREET PERSPECTIVE





ROOF GEOMETRY DEVELOPMENT

At the center of the design research was the development of a roof capable of organizing both space and movement.

Various roof configurations were tested using sketches and physical models. Early research explored how changes in height, slope, and structural rhythm can affect the perception of movement in a building. The final geometry of the roof creates several visual levels: the primary beam structure, the most massive one, visually outlines the space perpendicular to the main pool, guiding the visitor through the entire building. Instead of relying on signs to orient within the building, the project uses the architectural form itself to control movement. Because all functions besides swimming are concentrated in a single core, called “the stone,” and the roof visually penetrates it, making the visitor intuitively go through to explore further.

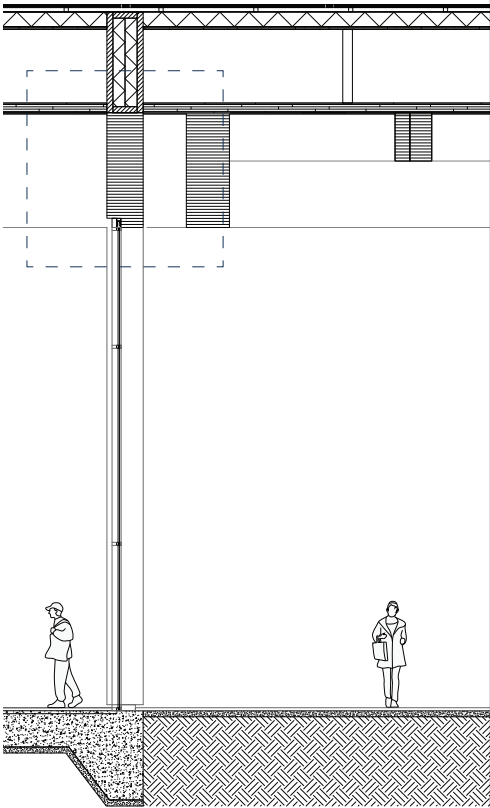
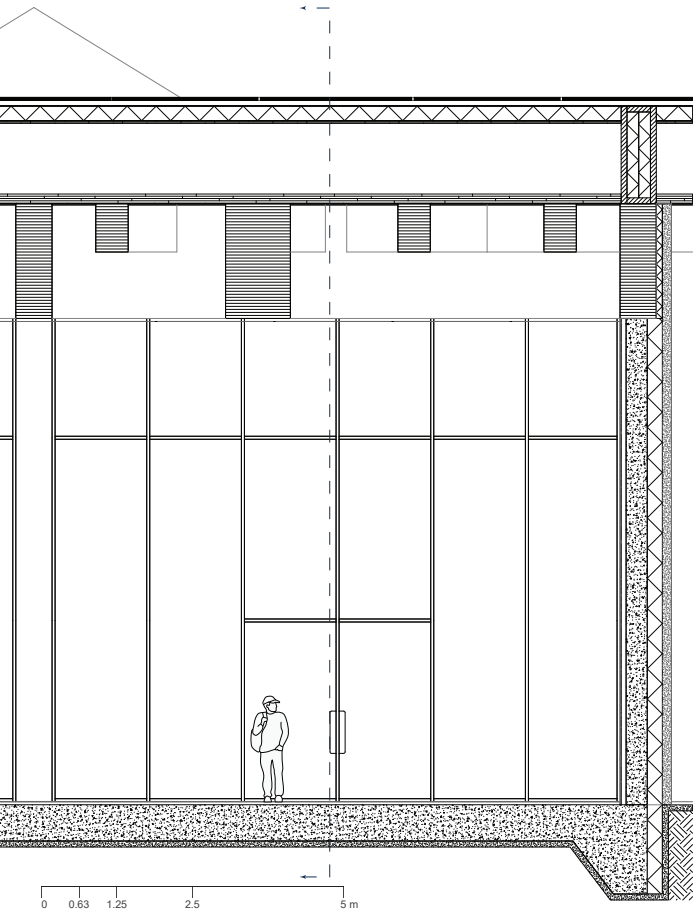
The secondary beam structure visually divides larger spaces into smaller ones. As a result, due to its triangular shape, it creates a feeling of “waves” under the roof and is fully apparent in a direct upward view. It connects even further with the same tile-and-opening pattern on the roof itself. It makes the pattern visually interesting to the user while swimming.

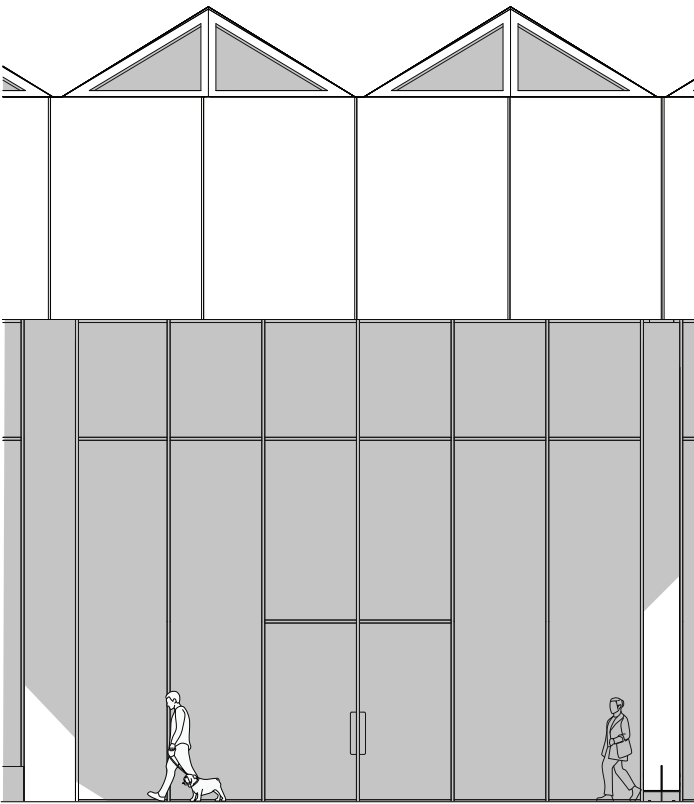
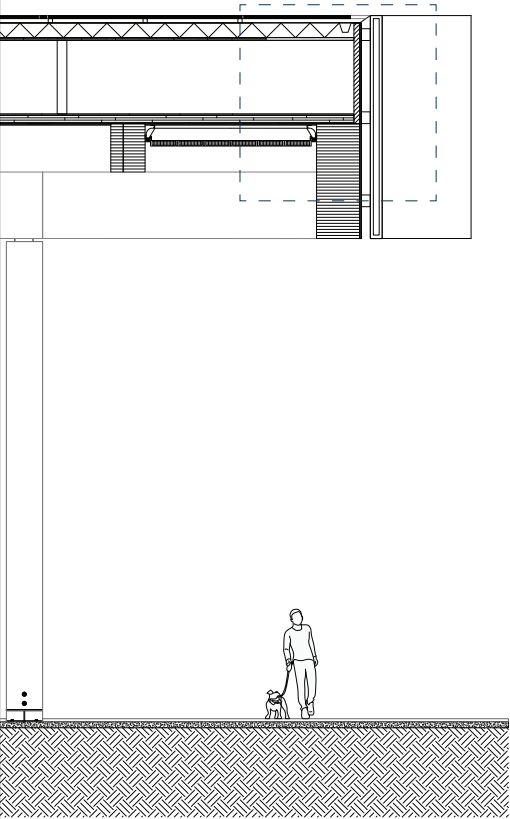
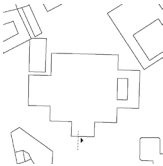
Therefore, depending on the user’s position in the space, the roof is perceived differently and conveys a different story.





ENVELOPE FRAGMENT



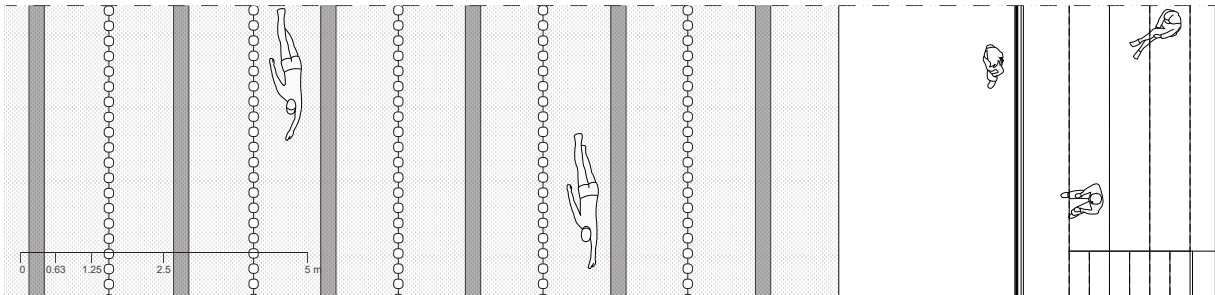
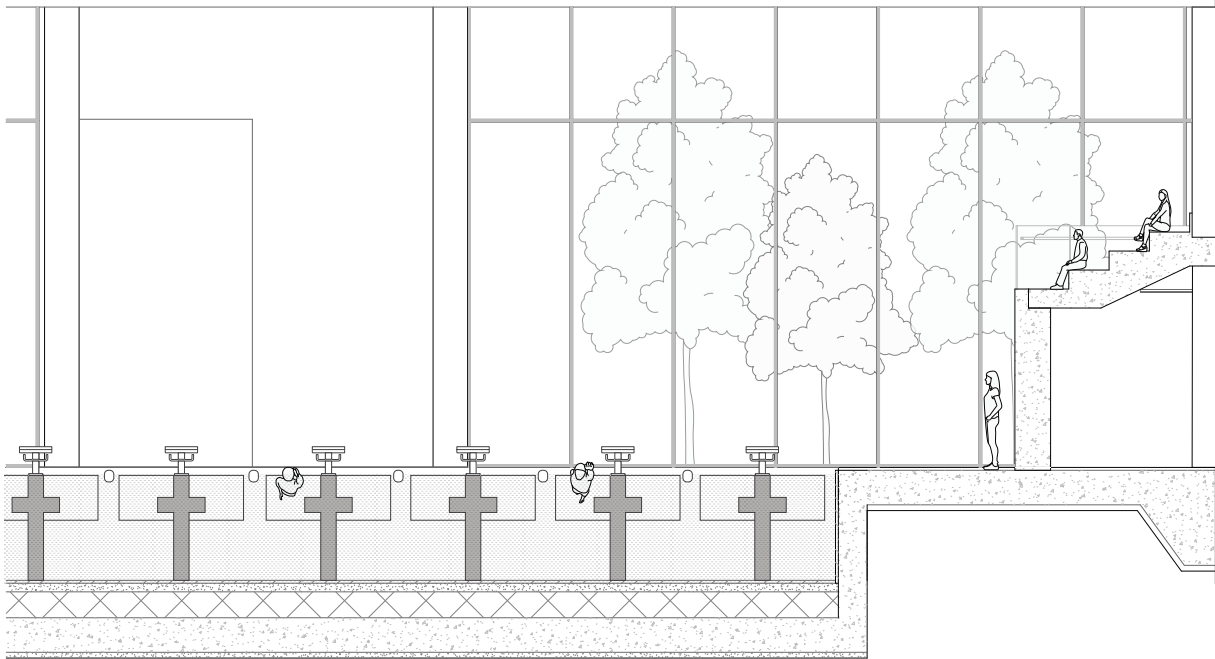
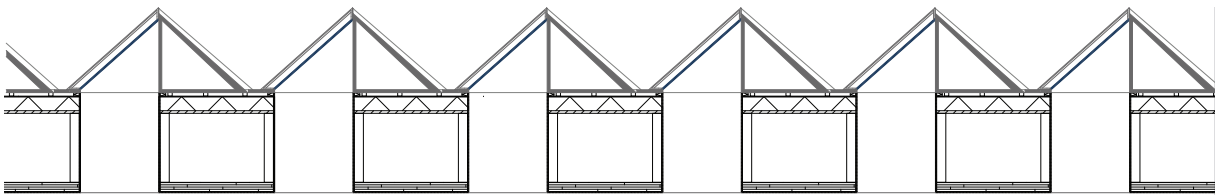
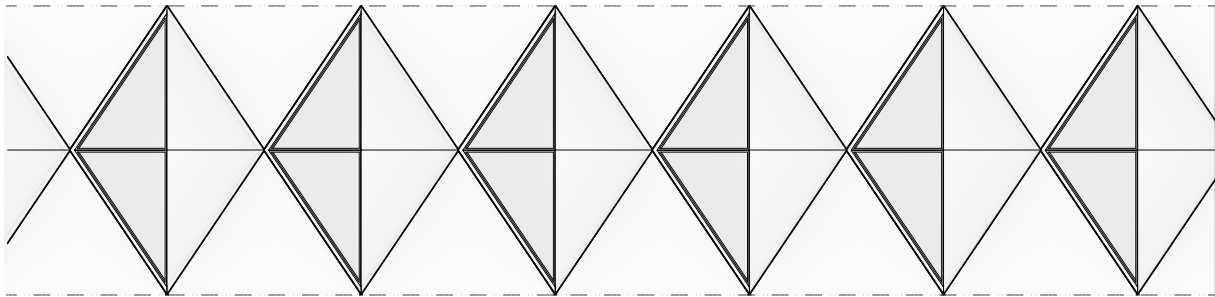


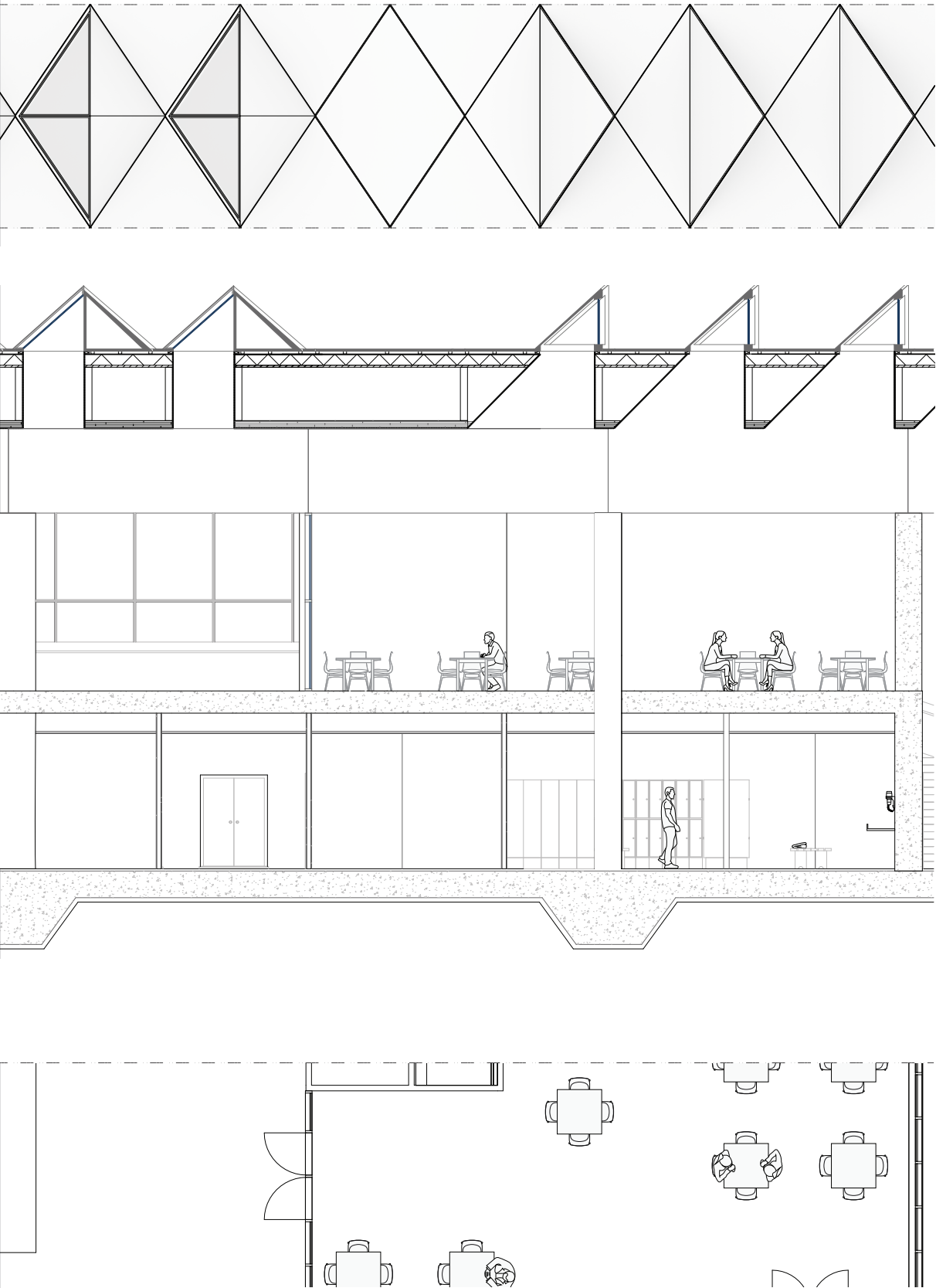
PEDESTRIAN PERSPECTIVE





INTERIOR FRAGMENT



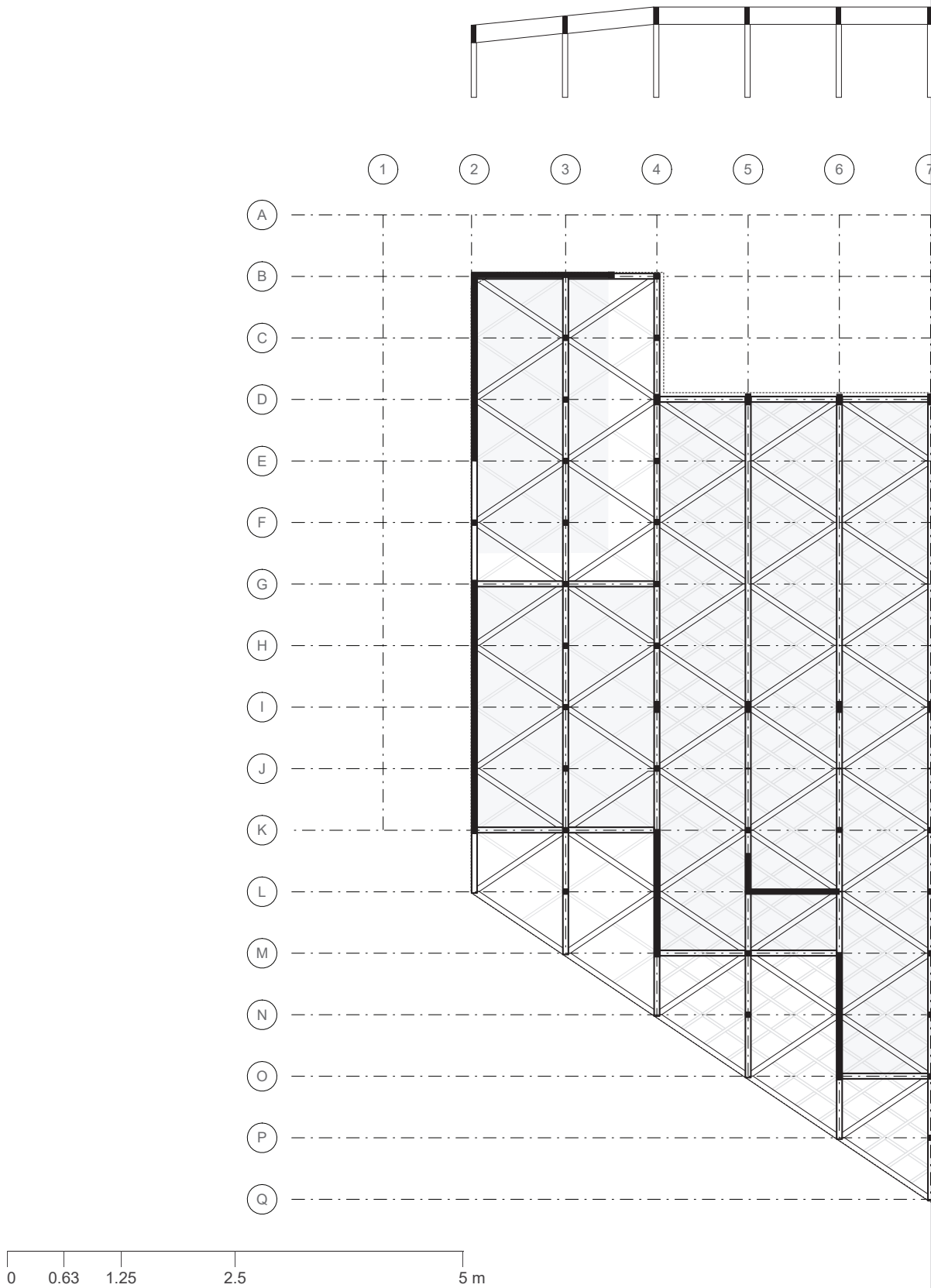


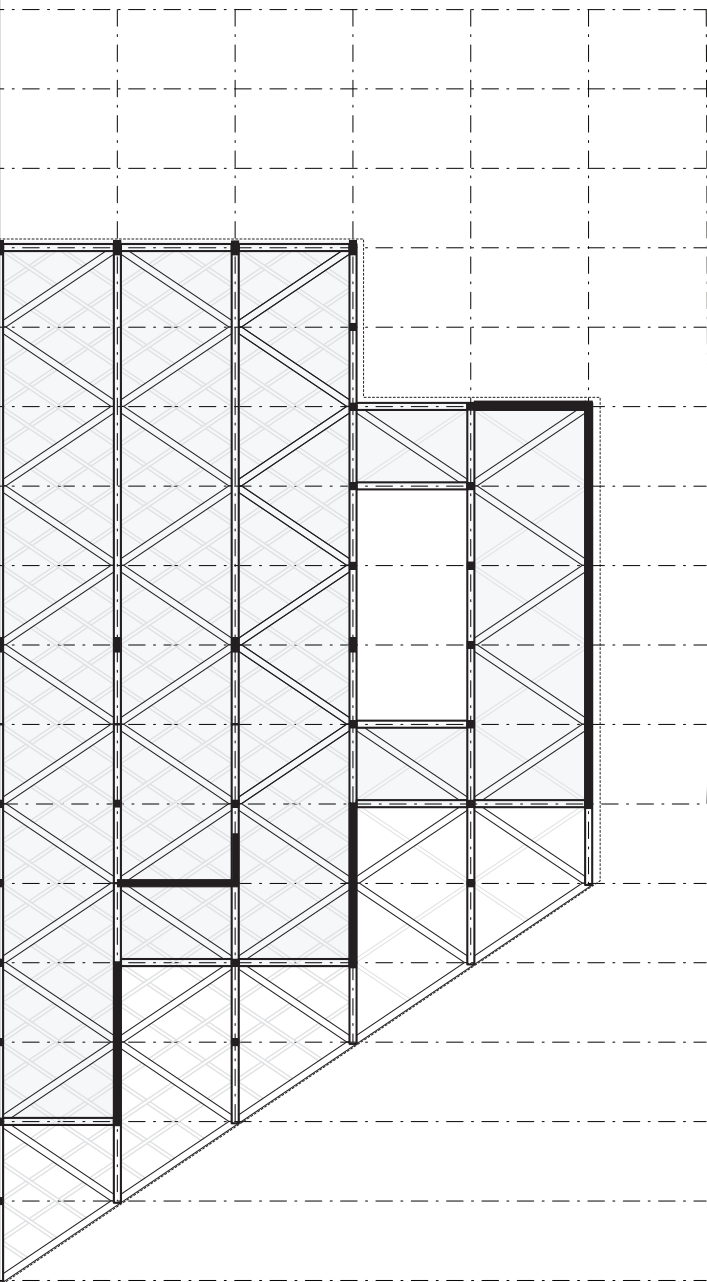
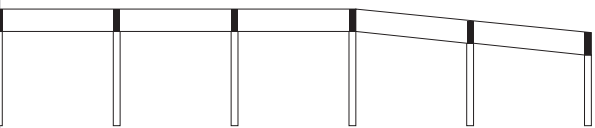
SPECTATOR'S PERSPECTIVE



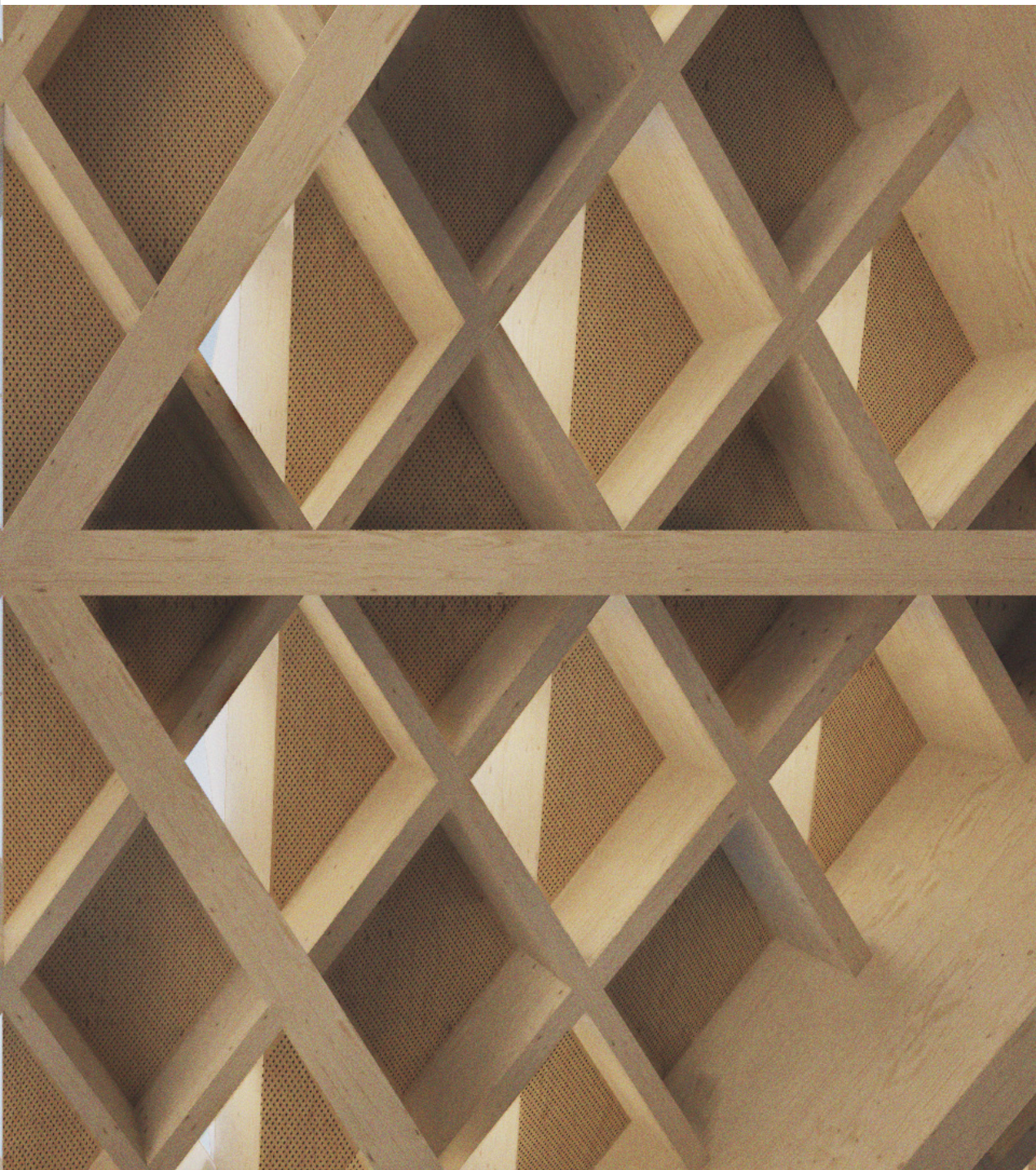


STRUCTURAL PLAN









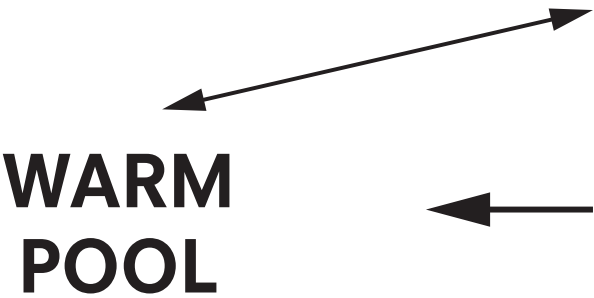
PROGRAM ORGANIZATION

The program's organization corresponds to the logic embedded in the roof. The orthogonal grid on which the entire program is based is directly connected to the roof grid.

Within the program, there are two prime spatial volumes: the main swimming pool and "the stone". The stone is the visual core of the building, providing all the functions needed for the user from entering the building to going for a swim; moreover, within the stone, there is a separation between dry and wet spaces, which was one of the main program challenges in the pool. The ground-floor functions are dedicated to users who come there for a swim. On the other hand, the first floor is a dry area, divided into areas for visitors and for pre- and post-swim activities.

The swimming area itself is also divided into 3 areas: a main Olympic-sized swimming pool, a warm pool with standing depth used for water training, and a hot pool, which is part of the wellness and spa area. All 3 areas surround the main stone and can be visited in sequence or separately.

Moreover, the program also takes into account two scenarios of the Milan climate: summer and winter. The winter scenario would represent what was described earlier; however, the summer scenario adds additional functions. From the main swimming pool, users can, during the summer, get into the outdoor swimming pool, located in an enclosed area at the back of the building. This design also considers the scenario in which users would only like to use the outdoor pool, without going through the main building. In that case, there is a separate entrance through the park on the west, and an additional building which is equipped with private changing rooms and showers. That building, from the outside, is enclosed from users, but its inner façades fully open to the main pool, making it a unified system.



**SWIMMING
POOL**



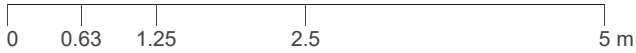
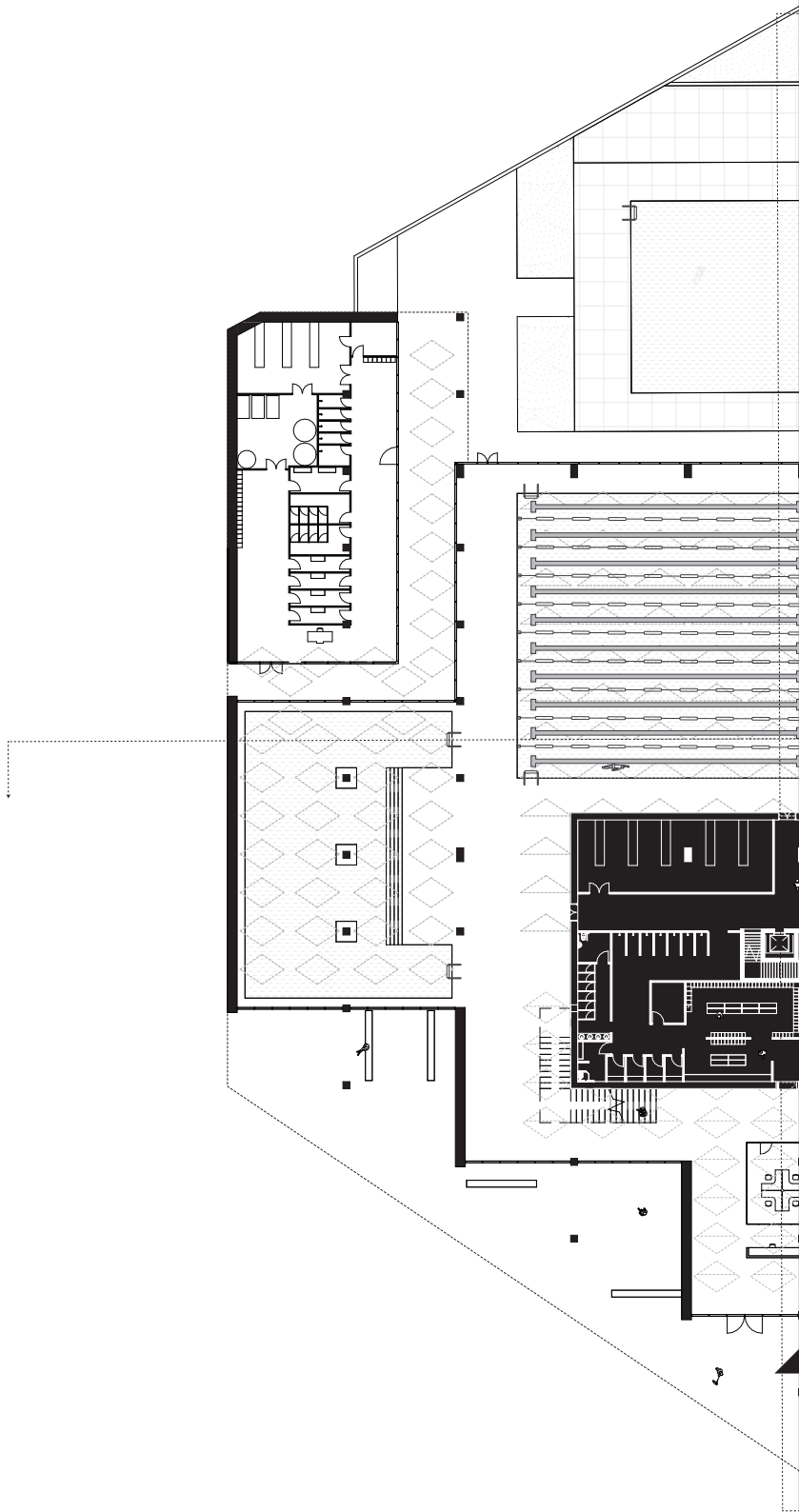
**HOT
POOL**

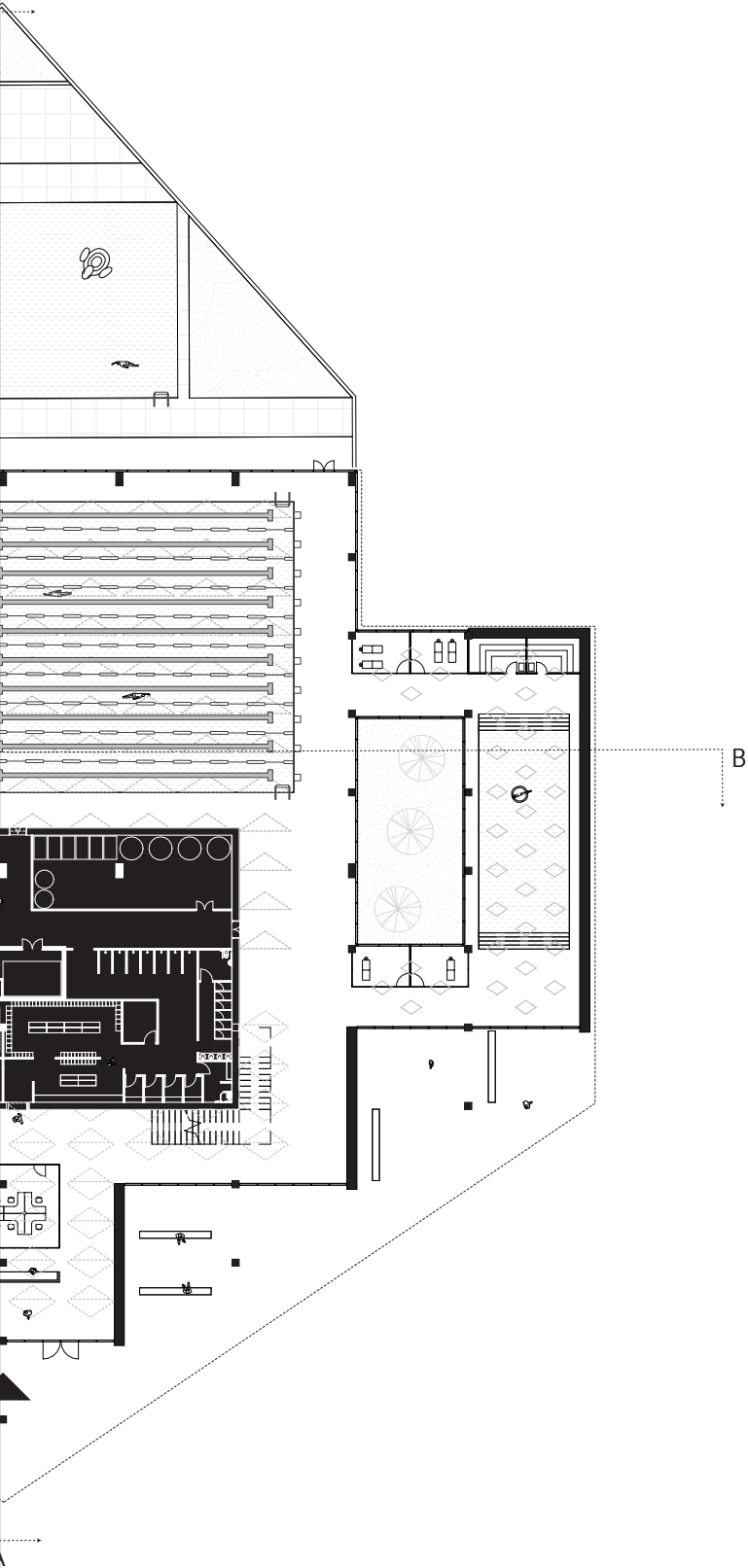
**TRIBUNES
TECHNICAL STORAGE
CHANGING
YOGA WC GYM
CAFETERIA GYM**



ENTRANCE HALL

GROUND FLOOR



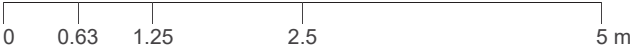
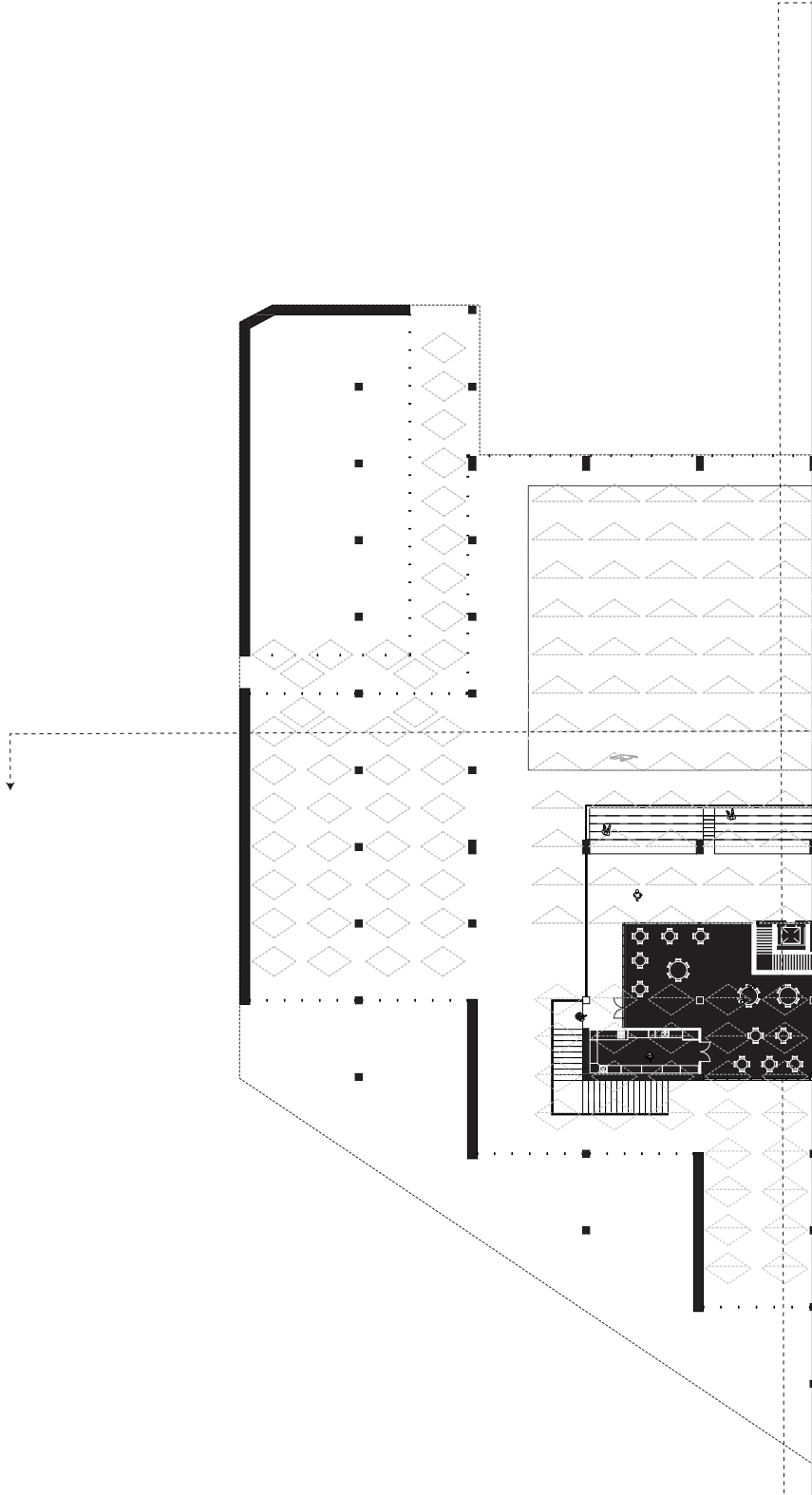


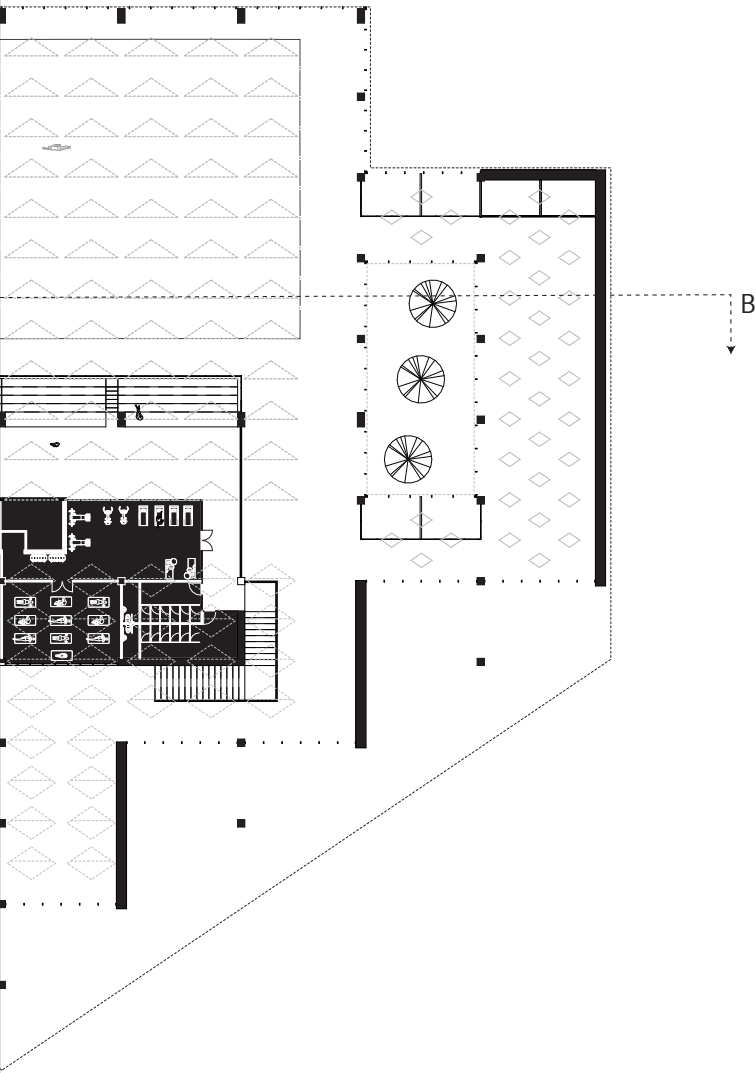
CHANGING ROOM





FIRST FLOOR

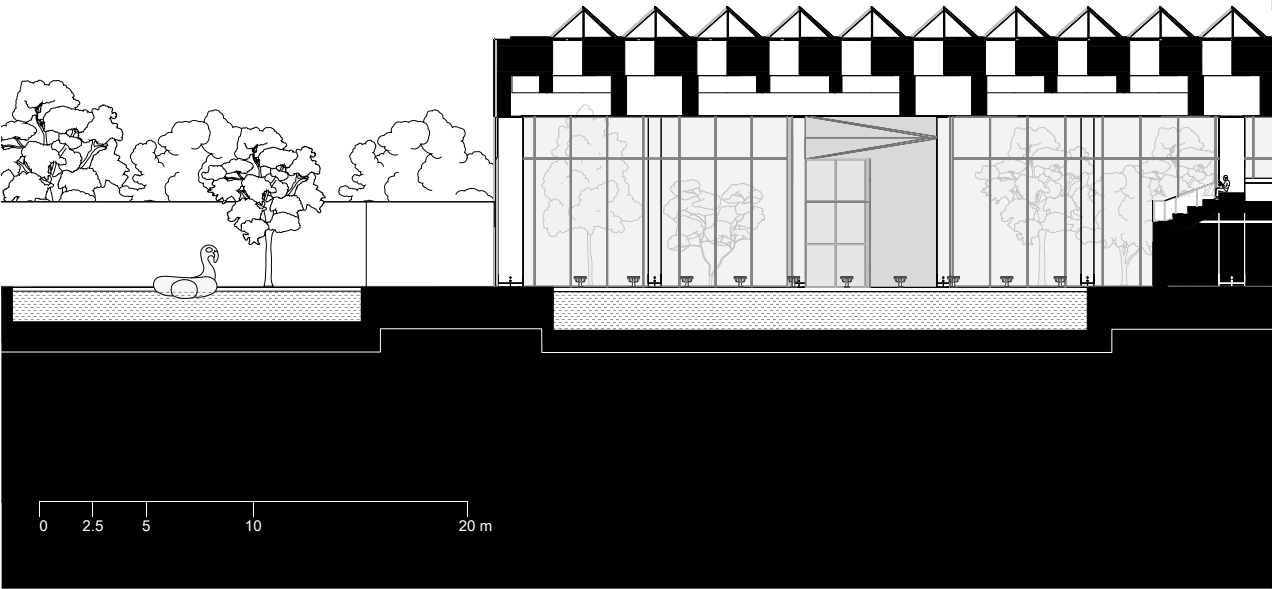


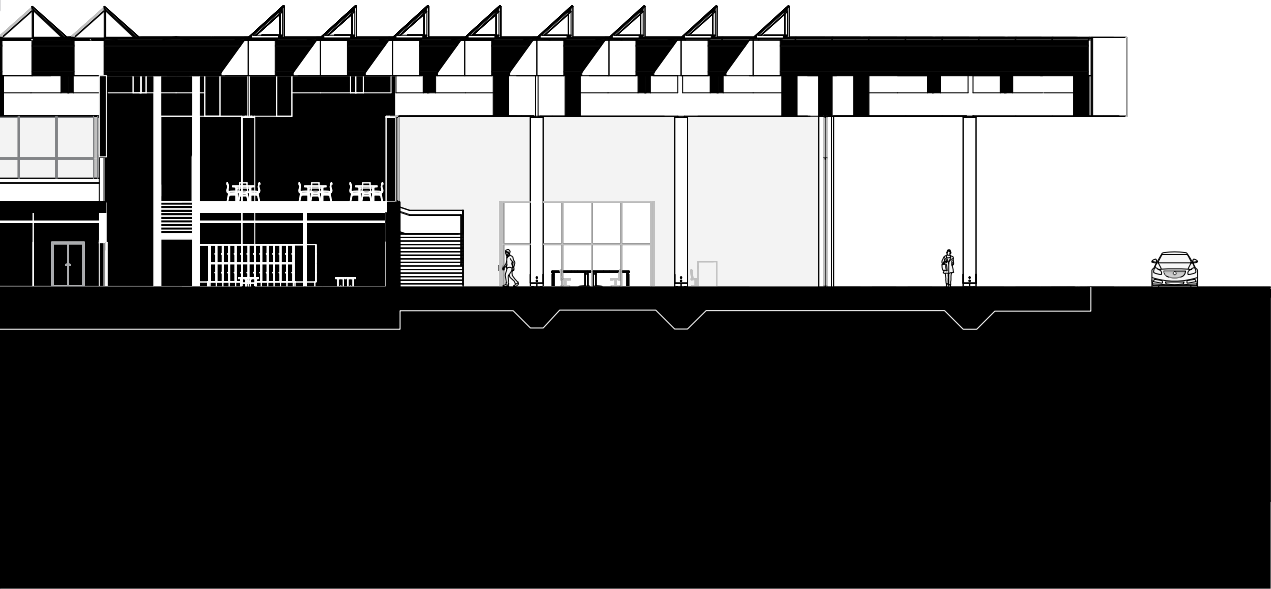
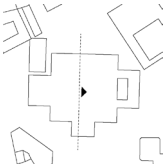




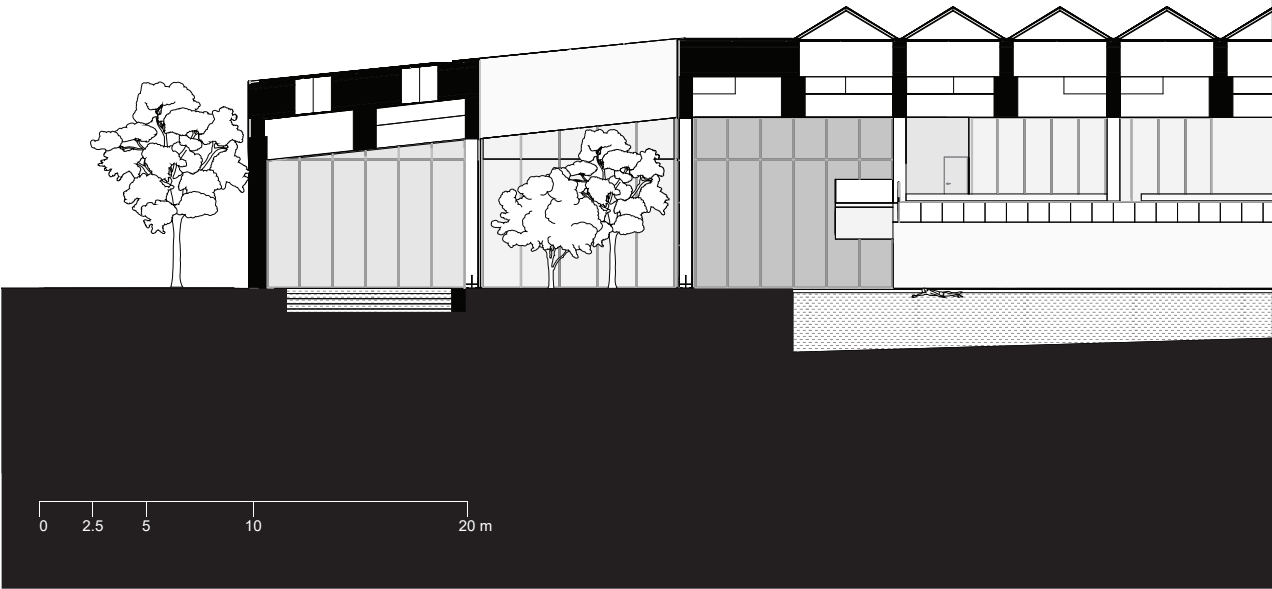


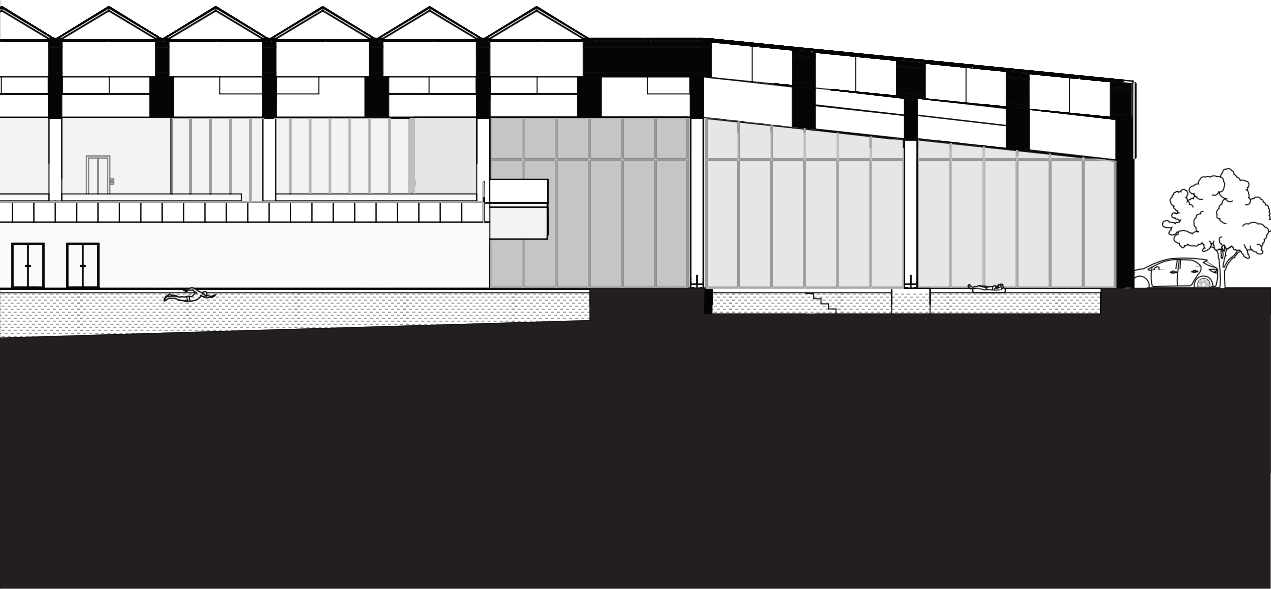
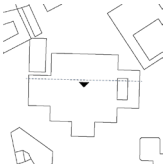
SECTION A





SECTION B





MAIN OLYMPIC-SIZED POOL





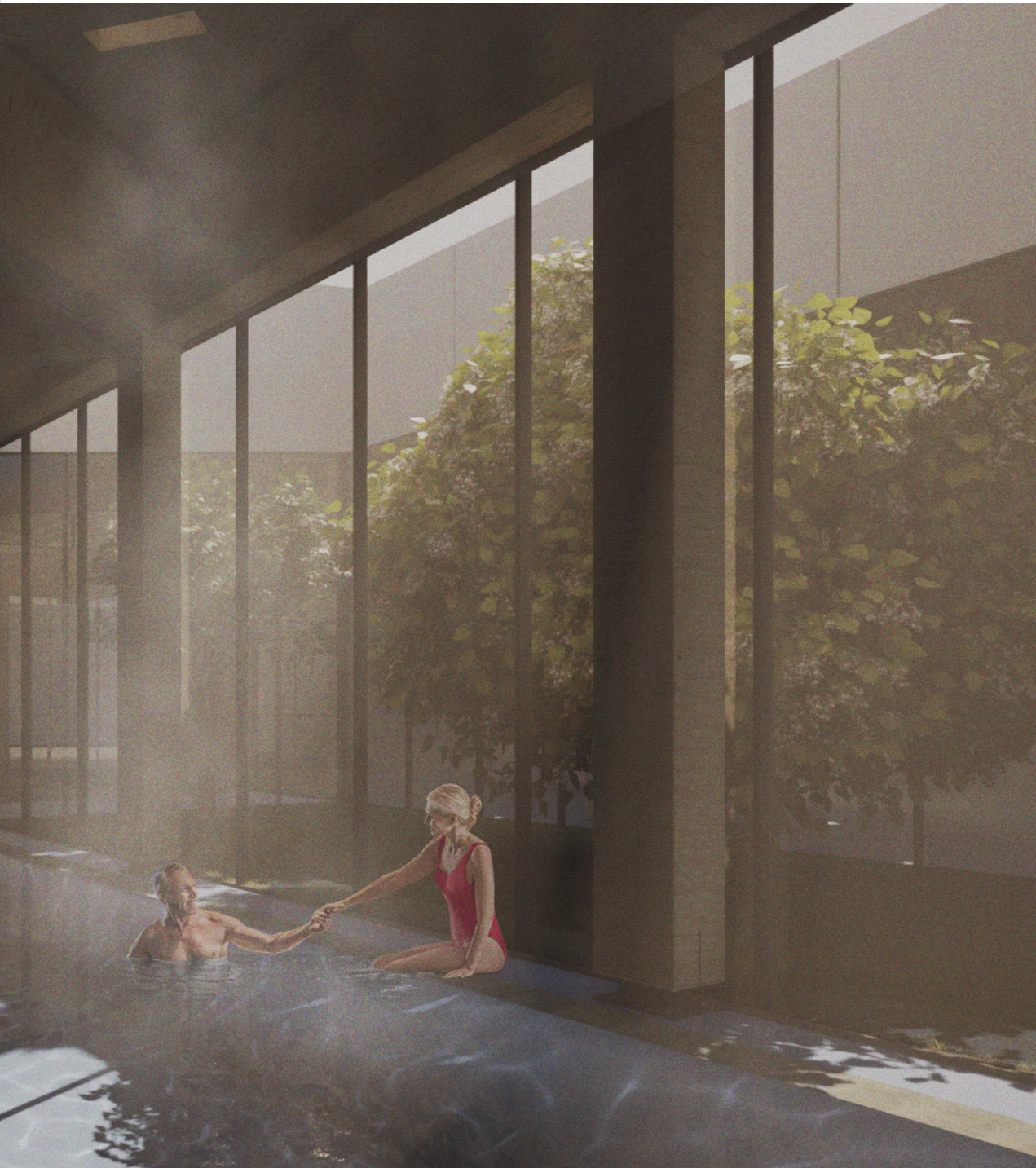
WARM POOL





HOT POOL

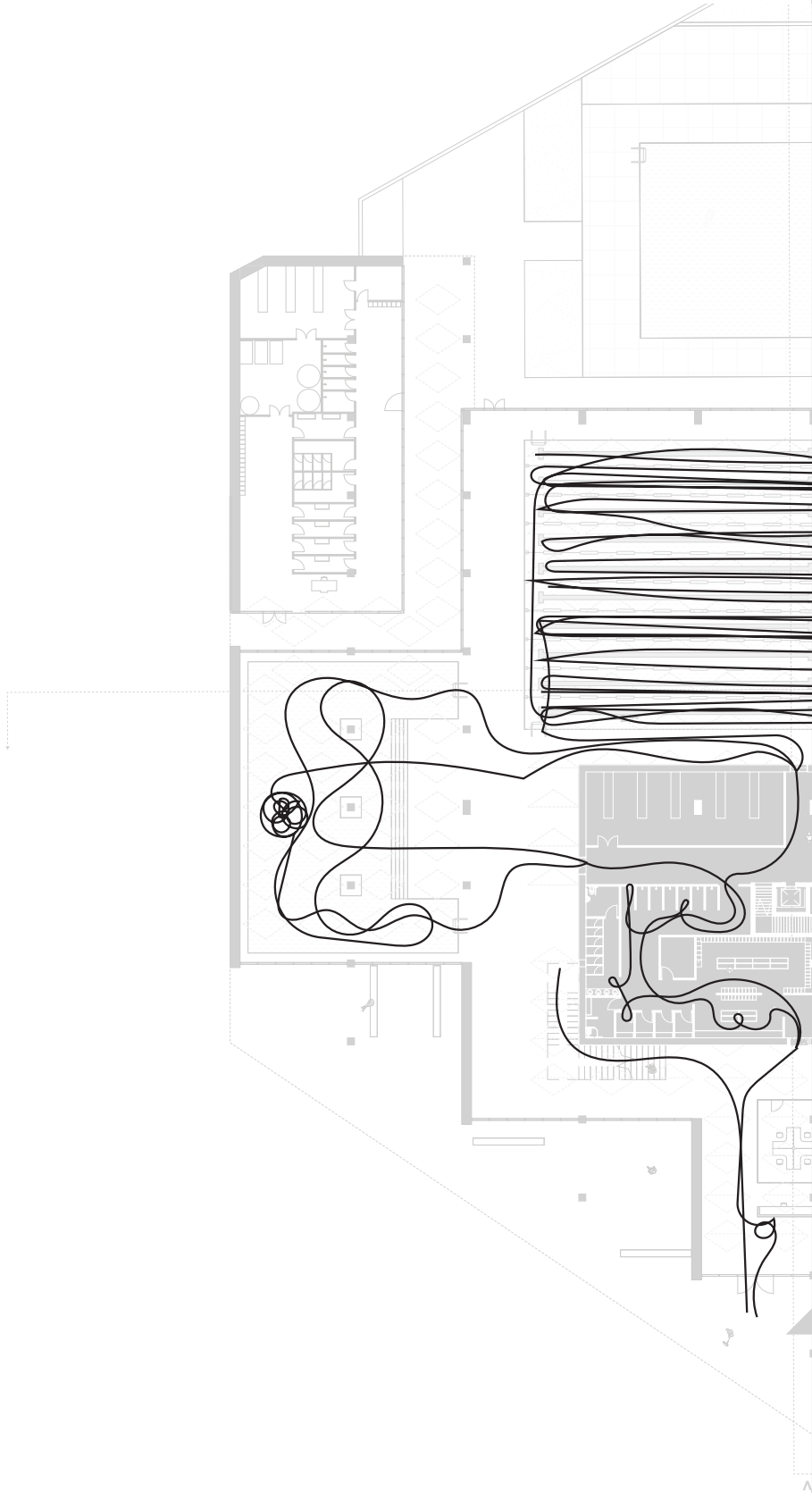


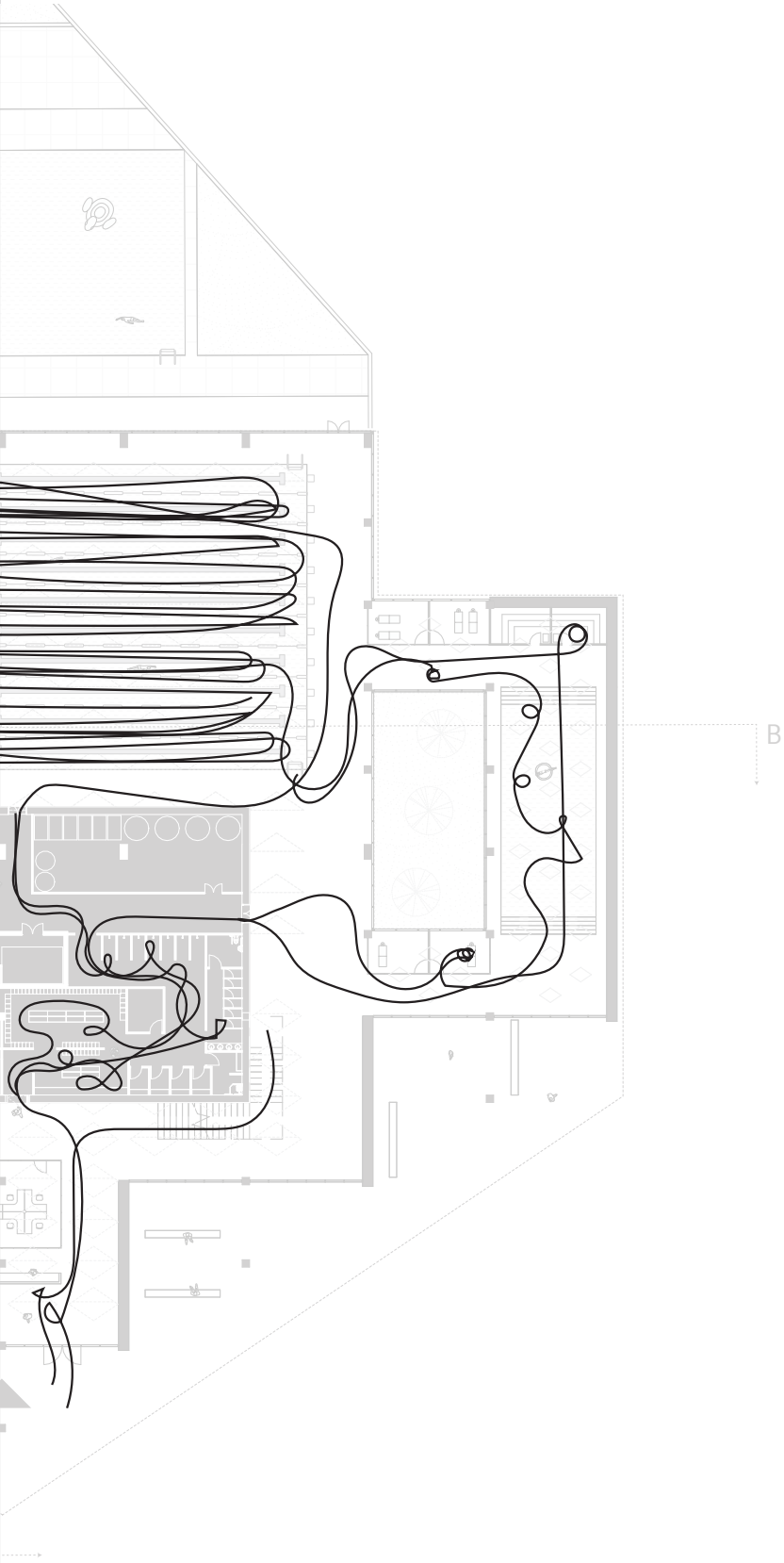


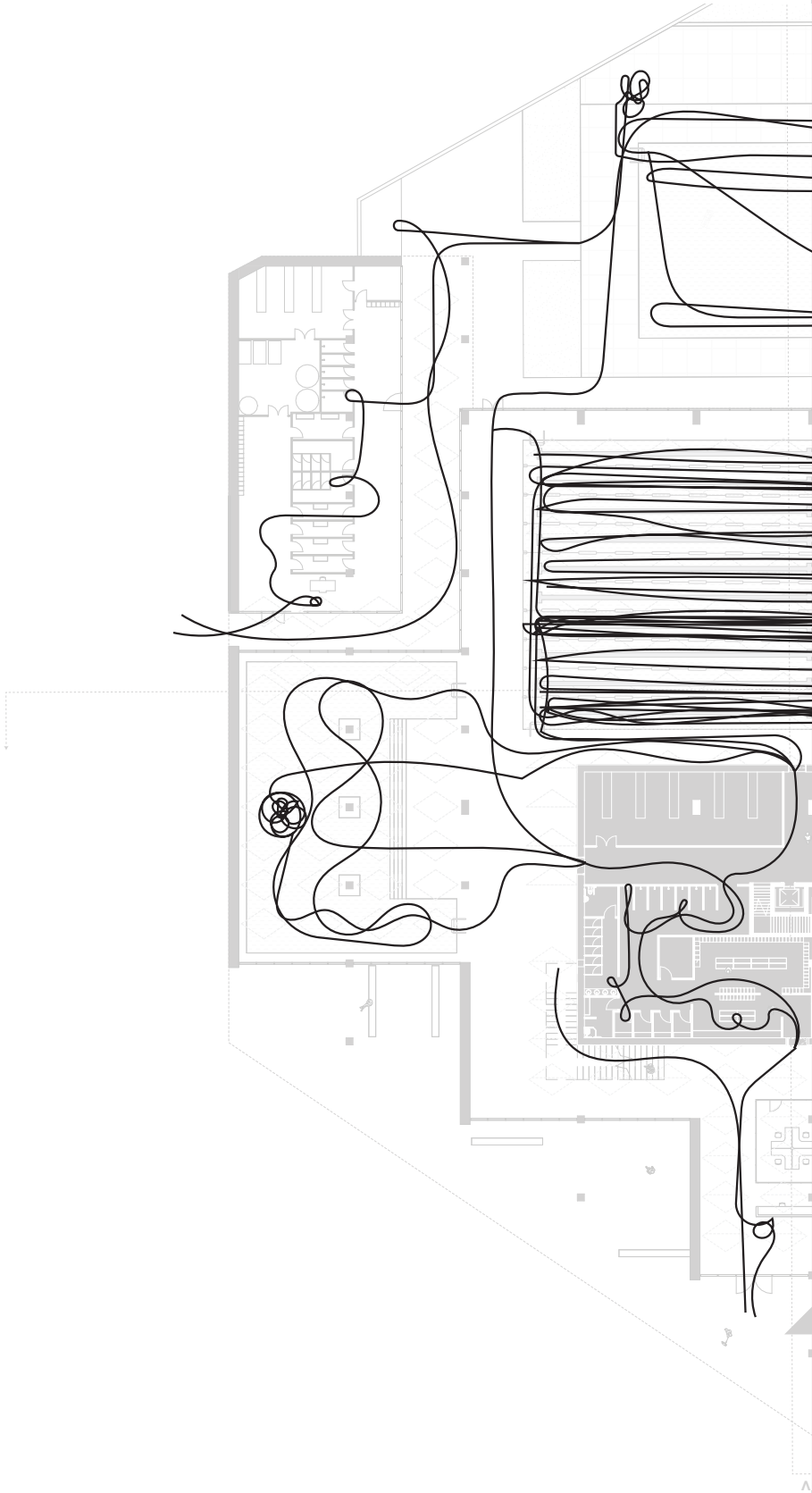
OUTDOOR POOL

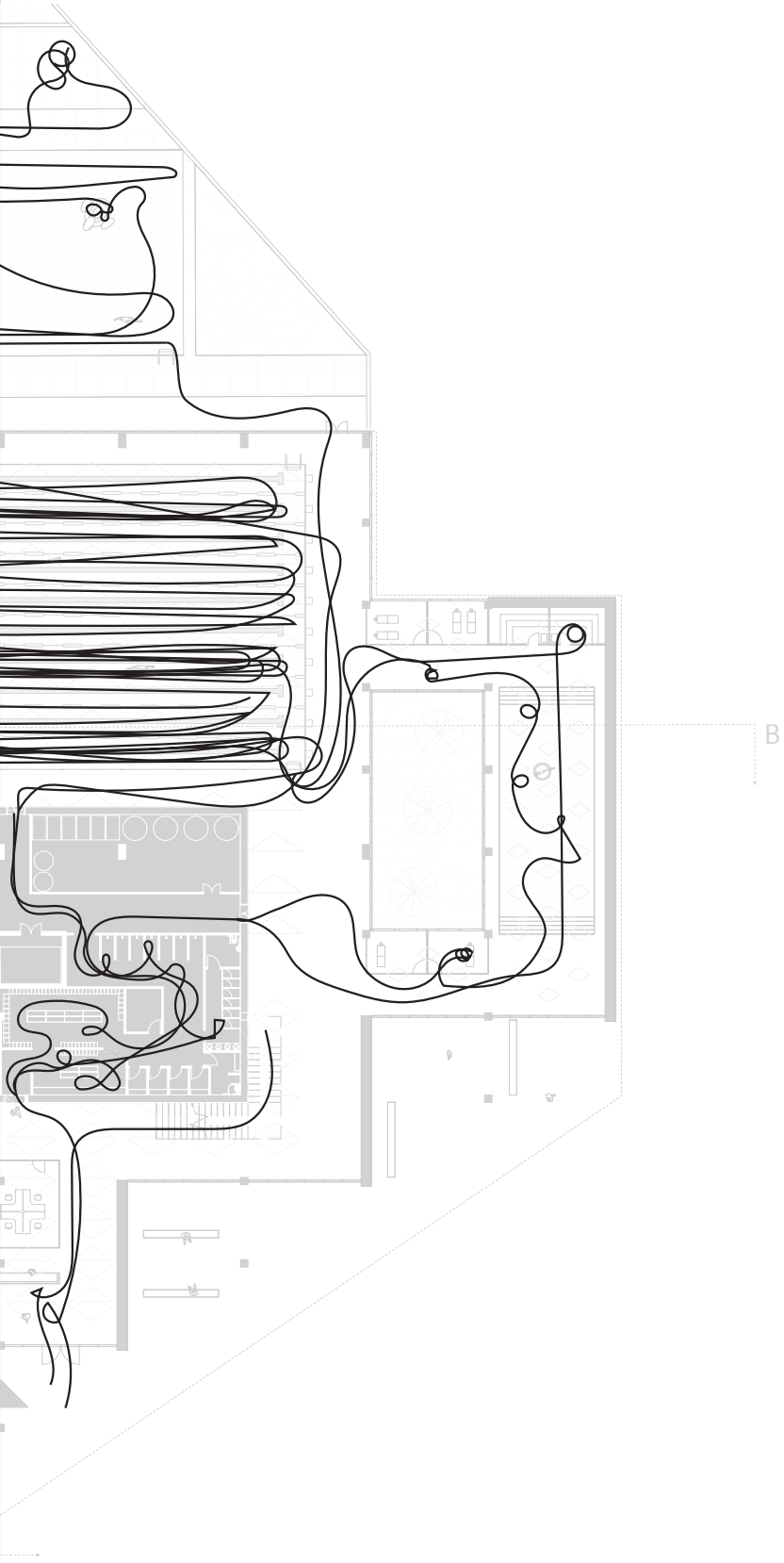












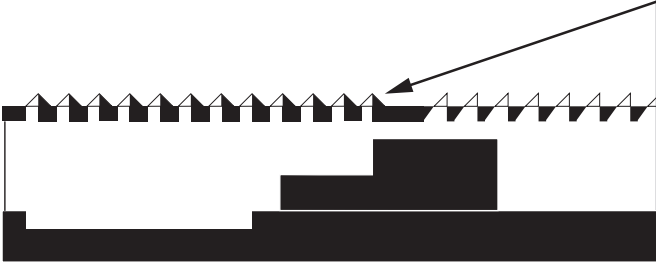
ENVIRONMENTAL AND TECHNICAL CHARACTERISTICS

The roof also performs an important technical function.

Swimming pools require large spans, adjustable daylight, humidity control, and acoustic characteristics. Instead of considering these requirements as separate engineering tasks, the project integrates them into an architectural concept.

The roof geometry ensures daylight penetration, minimizing glare on the water surface. Depending on the function below the roof, different lighting conditions are used. Above the main pool, skylights are designed only to allow indirect sunlight from the north. Above the entrance and non-water functions skylights block hot, high summer light but allow lower winter light to penetrate. Above the warm pool, skylights are larger to ensure a brighter atmosphere, whereas in the hot pool, they are small, allowing only a few rays of sun to enter, creating a more sensual atmosphere. In the roof itself, a large portion of space is reserved for the service plenum; this is where all services, including HVAC, fire safety, and electrical, are distributed across the entire roof. All these services connect to the core and are distributed within it.

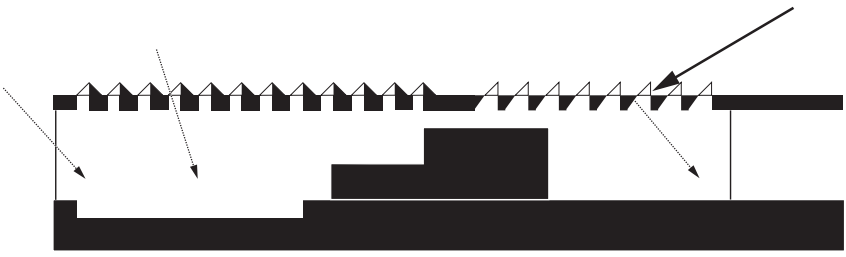
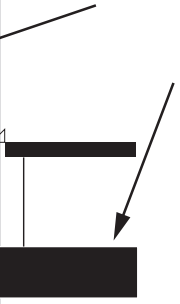
This combination of spatial and technical functions within a single architectural element demonstrates how architectural expressiveness can be enhanced rather than limited in the project.



SHADING



MODULARITY

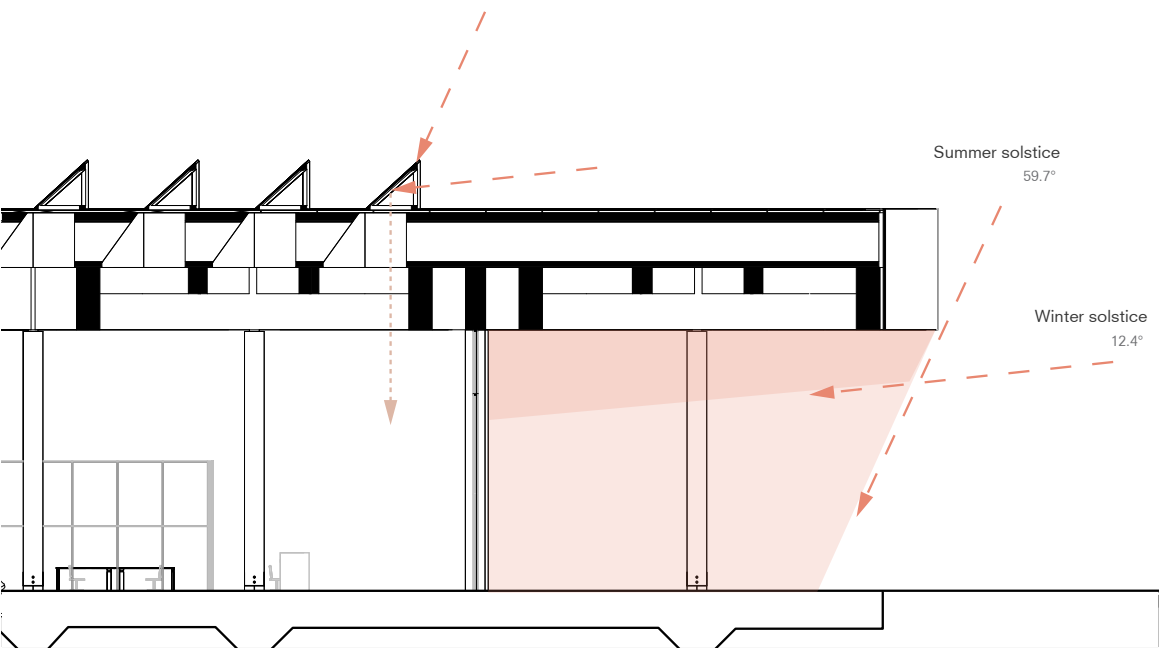


DAYLIGHT

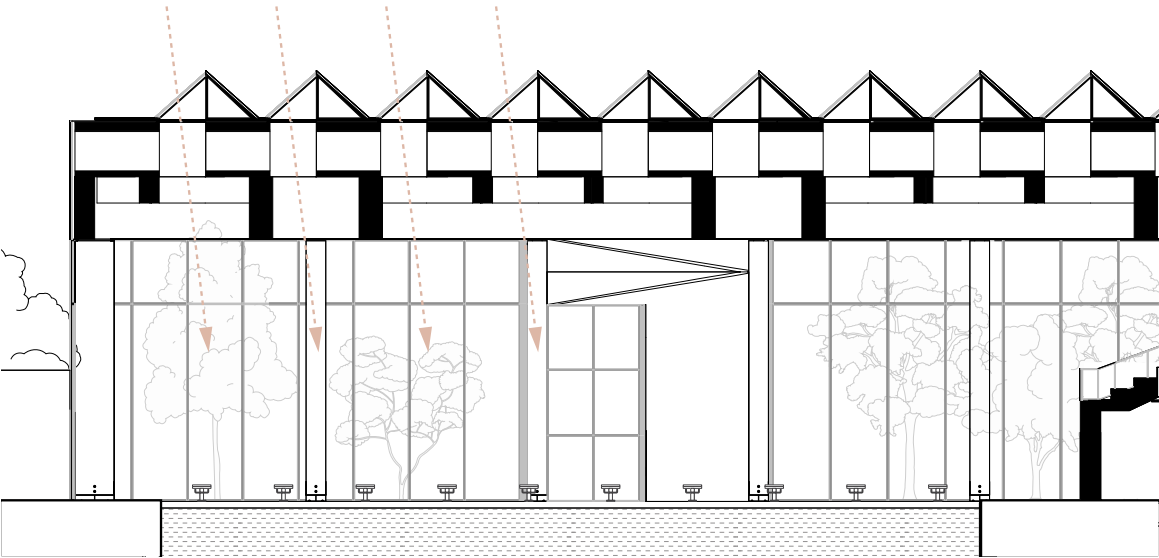


BUILDING SERVICES

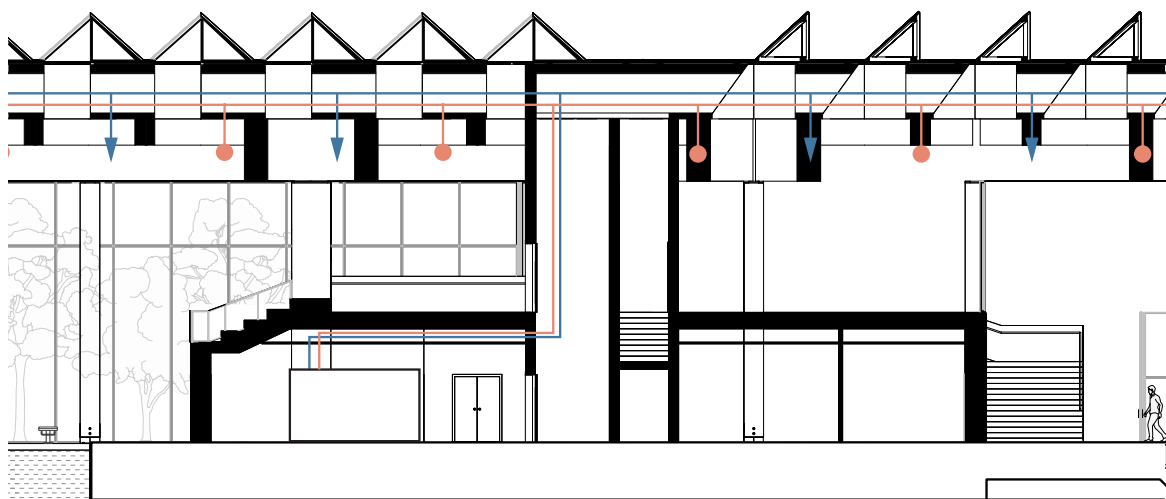
CLIMATE PRINCIPLES



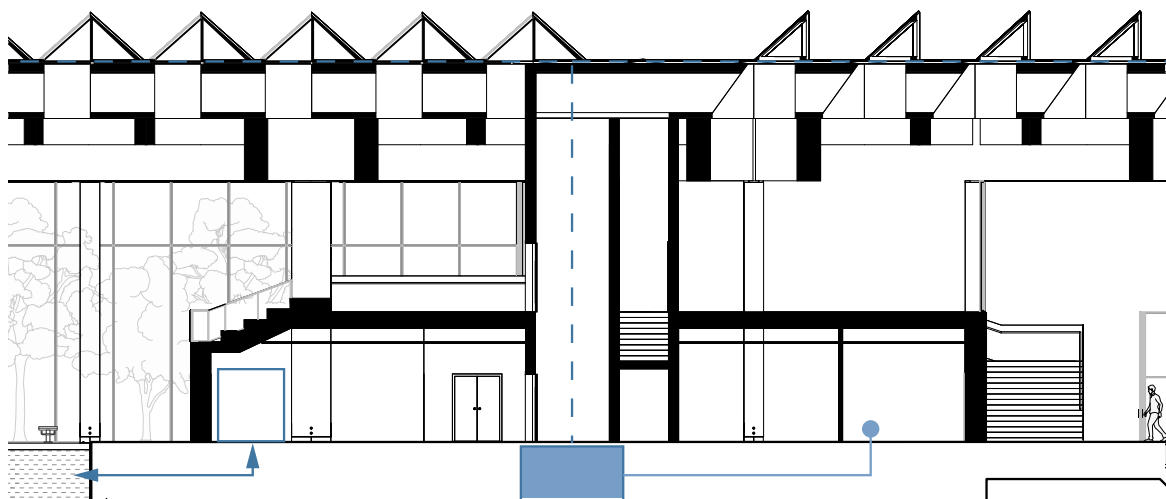
DIRECT SUNLIGHT



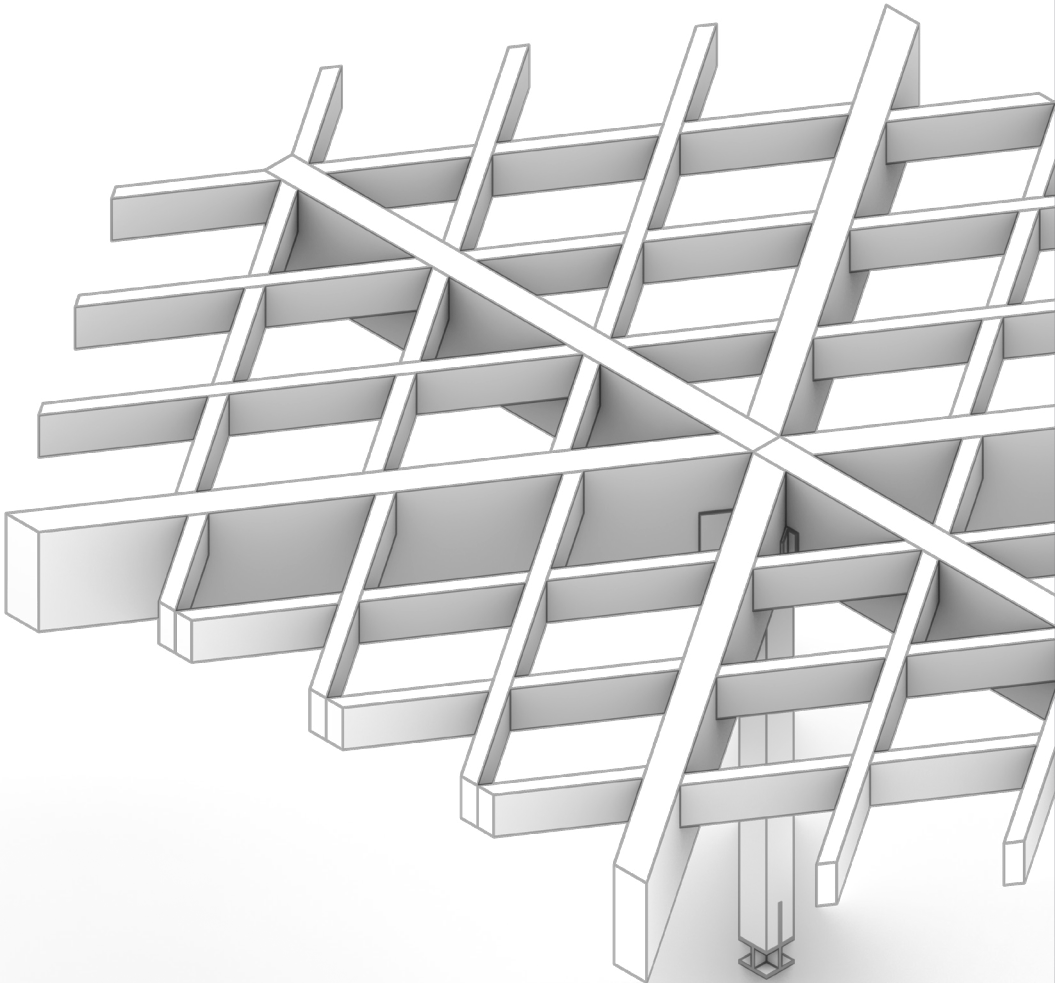
INDIRECT SUNLIGHT



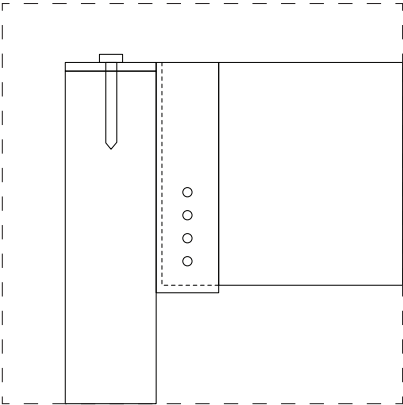
AIR SUPPLY



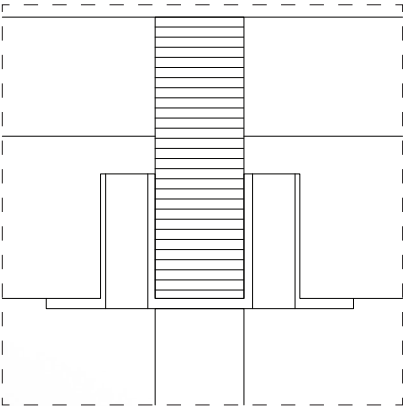
WATER FILTRATION & TREATMENT



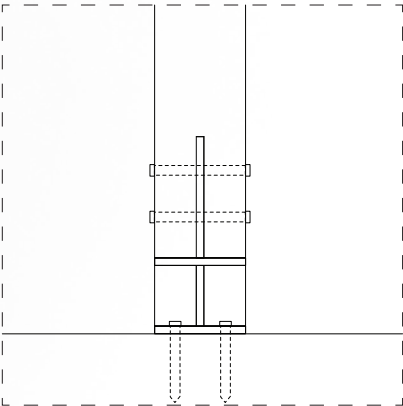
Beam - to - beam connection



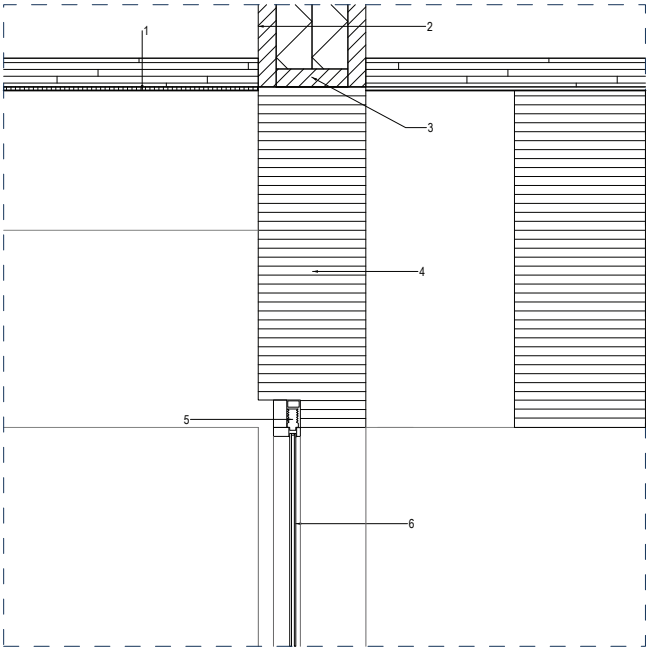
Column - to - beam connection



Column - to - base connection



FACADE CONNECTION DETAIL



1 Ceiling structure (From top to bottom):

- 1200 mm Service plenum
- 160 mm CLT slab
- 20 mm Perforated acoustic CLT panel

2 Multiplex

- Vapor retarder
- Insulation / wooden post
- Multiplex

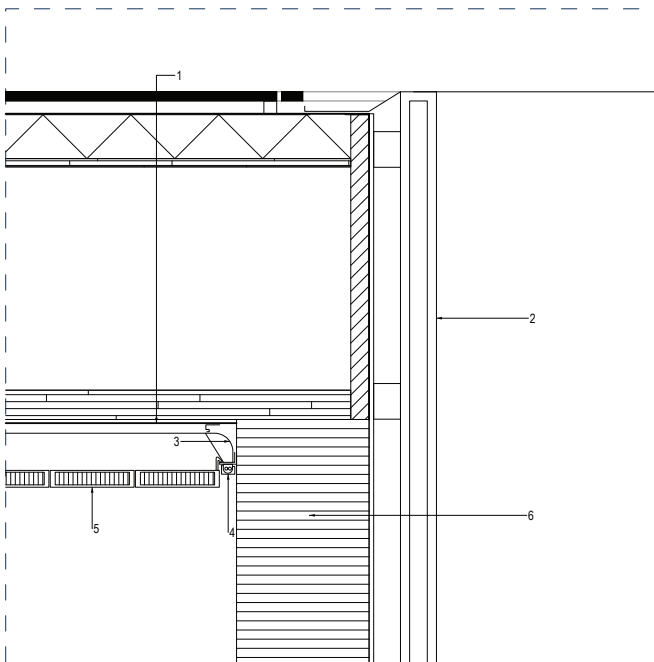
3 Wood rail

4 1900 x 600 mm Glulam beam, varnished

5 Bellows to accommodate roof deformations

6 Double glazing 10 mm toughened safety glass,
16 mm cavity, 8 mm toughened safety glass
aluminum frame

ROOF EDGE DETAIL



1 Roof structure (From top to bottom):

50 mm GFRC panel
 70 mm substructure metal tracs
 waterproofing membrane
 240 mm thermal insulation
 vapor retarder
 45 mm OSB panel
 1200 mm service plenum
 160 mm CLT slab
 20 mm three ply panel

2 2590 x 200 mm hollow GFRC side panel

3 High-gloss aluminum reflector

4 Removable housing for light fixture

5 50 mm aluminium sheet

6 800 x 600 mm Glulam beam, varnished

THE FINAL DESIGN RESULT

The final design is a public swimming pool, with the roof serving as the main organizing element. The roof structures the relationship between the city and the building, defines the hierarchy of spaces, directs movement, maintains technical characteristics, and shapes the user's perception.

The project demonstrates that one architectural element can work simultaneously at urban, architectural, practical, and technical scales. The roof becomes not just a protective covering, but the main source of architectural form in this project.





ILLUMINATION DURING THE NIGHT

The background of the page is an abstract, textured surface in shades of teal and blue. It has a painterly or marbled appearance with various brushstrokes and color variations, creating a sense of depth and movement. The colors range from light, airy blues at the top to darker, more saturated teals and blues towards the bottom.

MODEL MAKING

Physical model making formed an essential part of the design process and functioned as a research tool throughout the project. Rather than serving only as a means of presenting the final proposal, models were used to test spatial ideas, evaluate design alternatives, and translate conceptual thinking into architectural form.

The process began with the 3×3 assignment, in which three site models, three program models, and three concept models were developed independently. Each series investigated a specific aspect of the project, allowing different urban positions, programmatic organizations, and roof concepts to be explored without immediately combining them into a single proposal.

The next stage involved developing combination models that brought together selected ideas from the previous studies. These models represented the first attempts to establish a coherent relationship between the site, the program, and the roof. Through this iterative process, the project gradually moved from abstract conceptual investigations toward the first architectural proposals. Many ideas that appeared promising in the individual studies proved less successful when combined, while others unexpectedly reinforced one another. This process of testing and refining ultimately informed the development of the final design.

Model making continued throughout the project as the proposal became more detailed. The final presentation included two physical models at different scales and with different purposes.

A context model illustrated the relationship between the building and its urban surroundings, demonstrating how the proposal integrates with the existing block.

In addition, a large-scale fragment model focused on the project's architectural core. The model included the entire Olympic-sized swimming pool, part of the central core, and the roof structure above. By making this

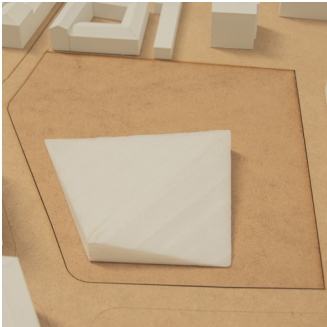
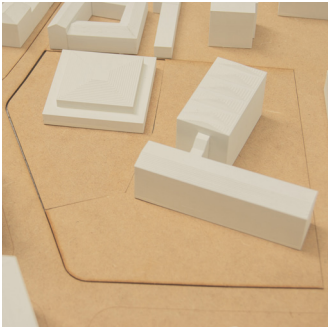
fragment, the model displays the principal ideas of the project: the relationship between the roof and the swimming hall, and the spatial atmosphere created through light and geometry.

Together, these models document not only the final architectural proposal but also the role of physical model making as an integral part of this project.

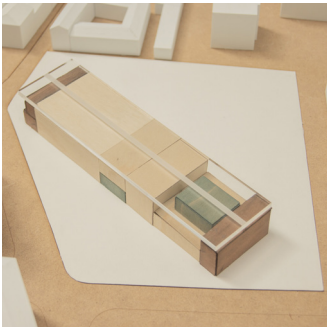
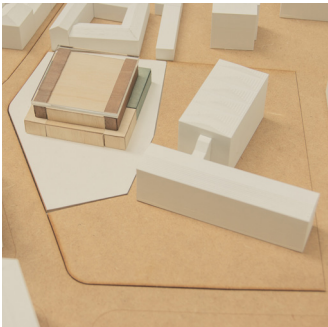
PISCINA MINCIO

3X

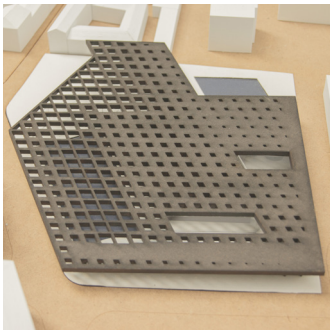
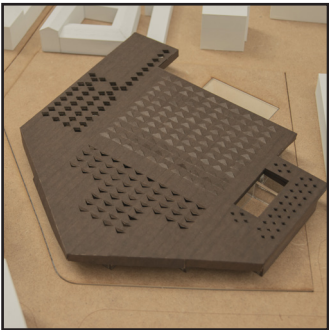
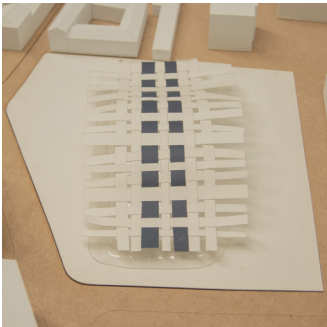
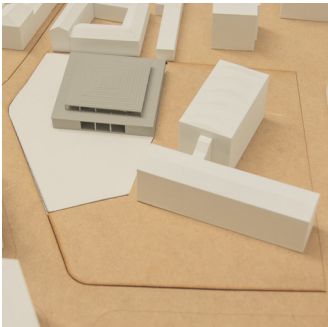
FORM/SITE



PROGRAM

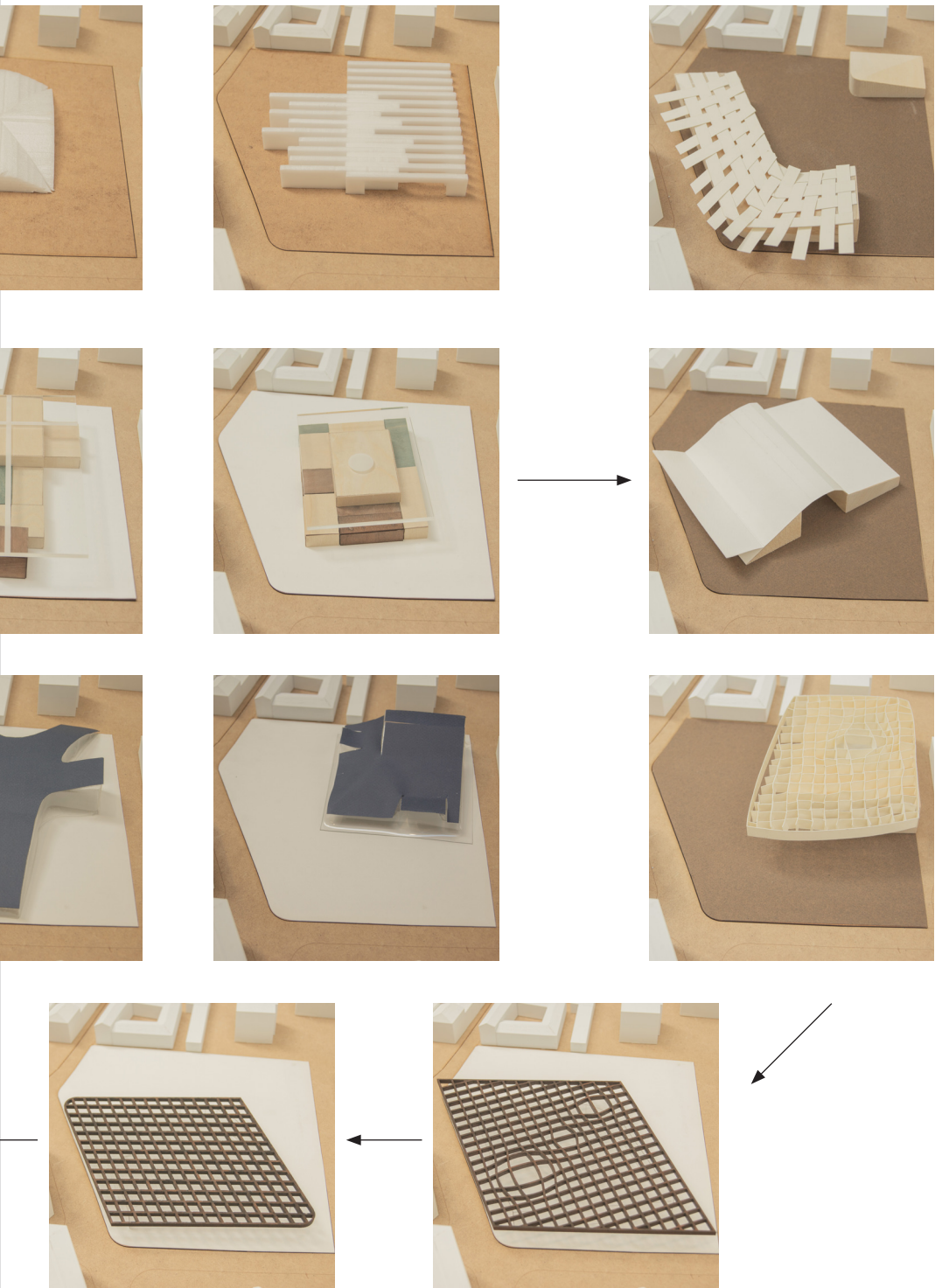


CONCEPT

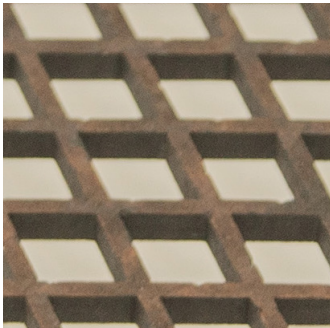
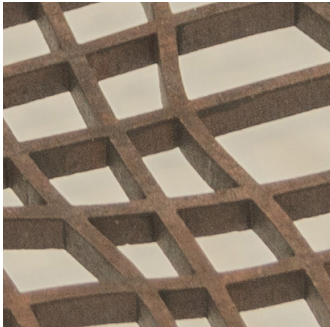


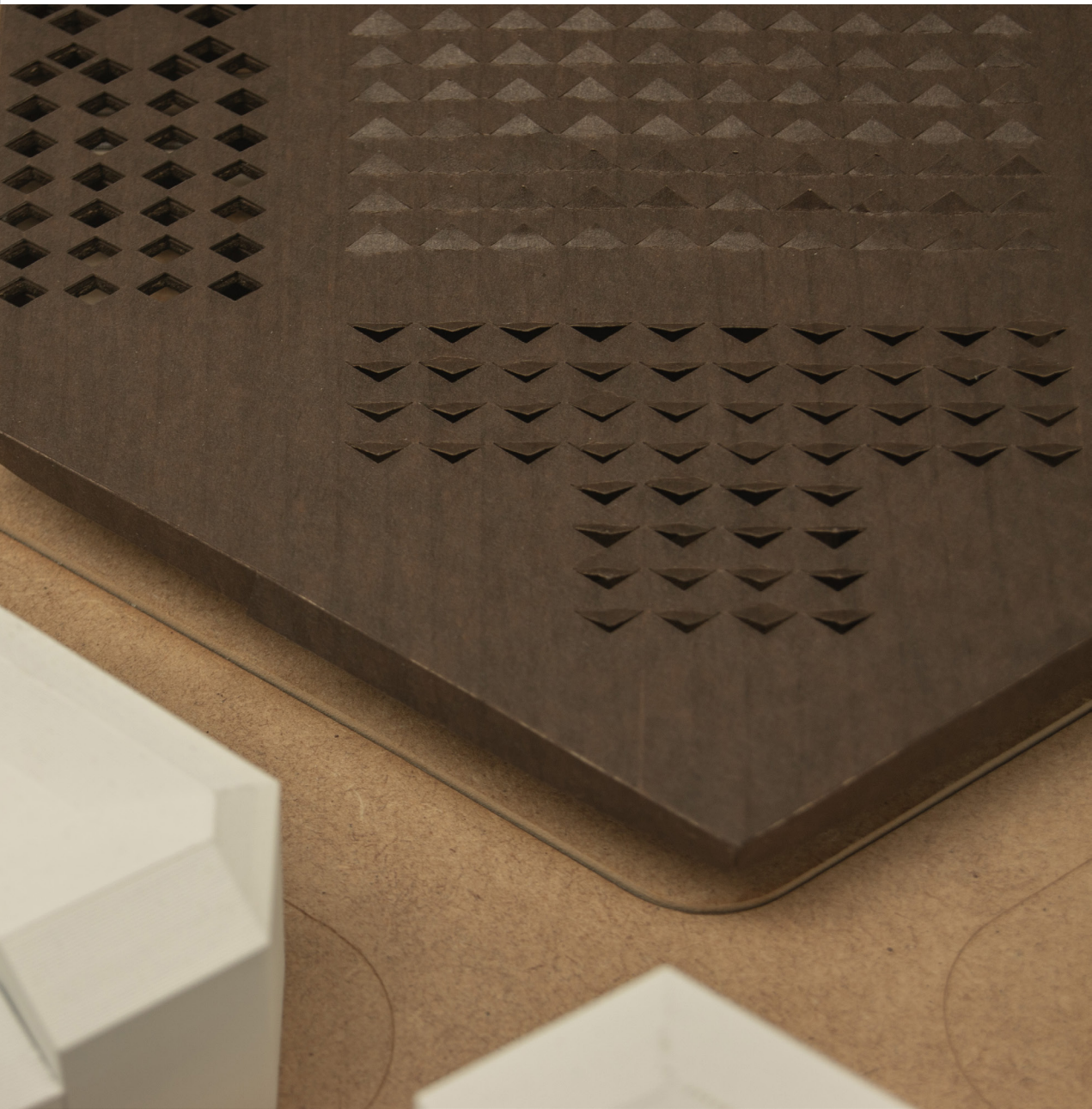
K3

COMBINATION



GRID EVOLUTION







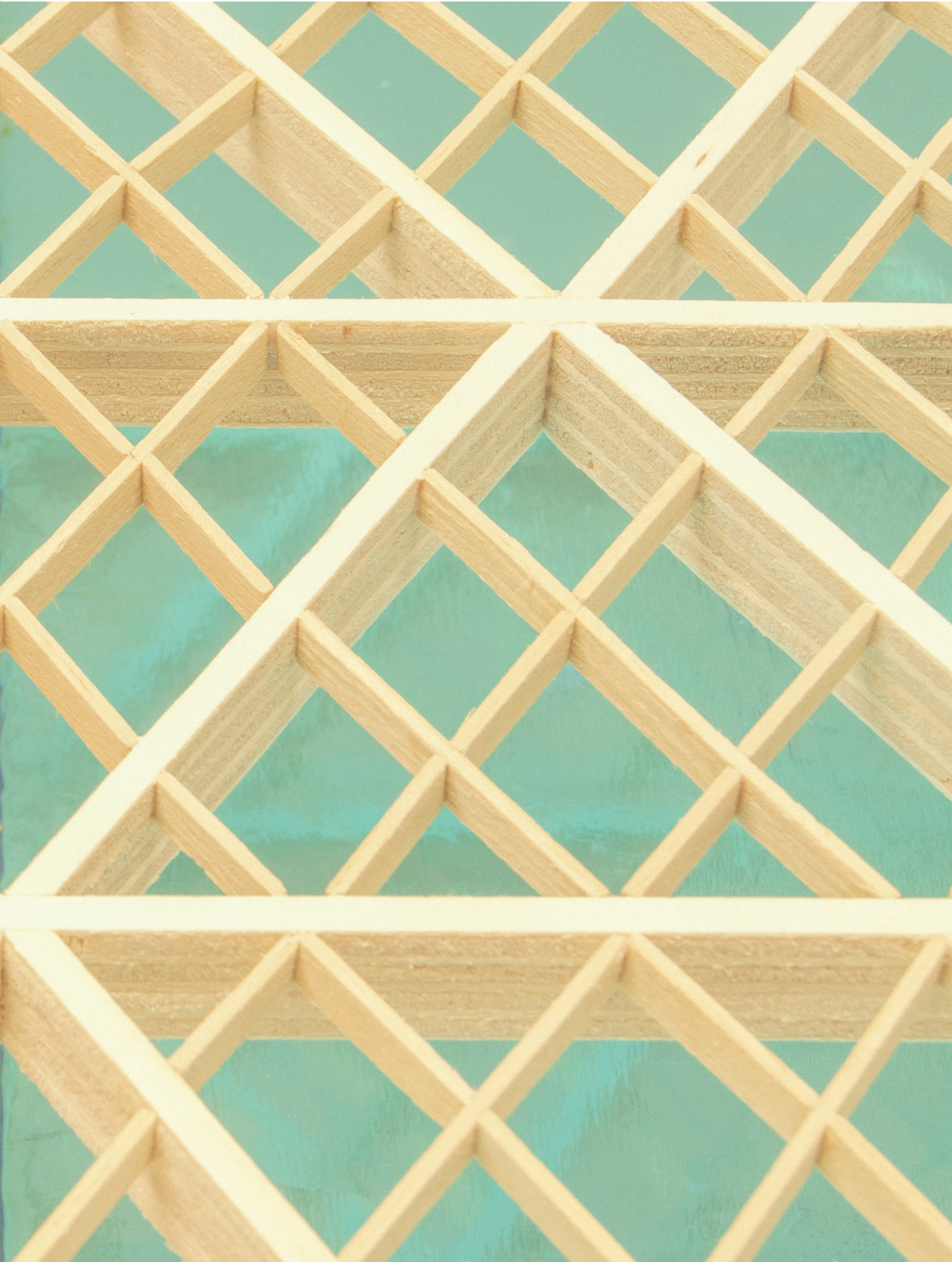






FRAGMENT MODEL



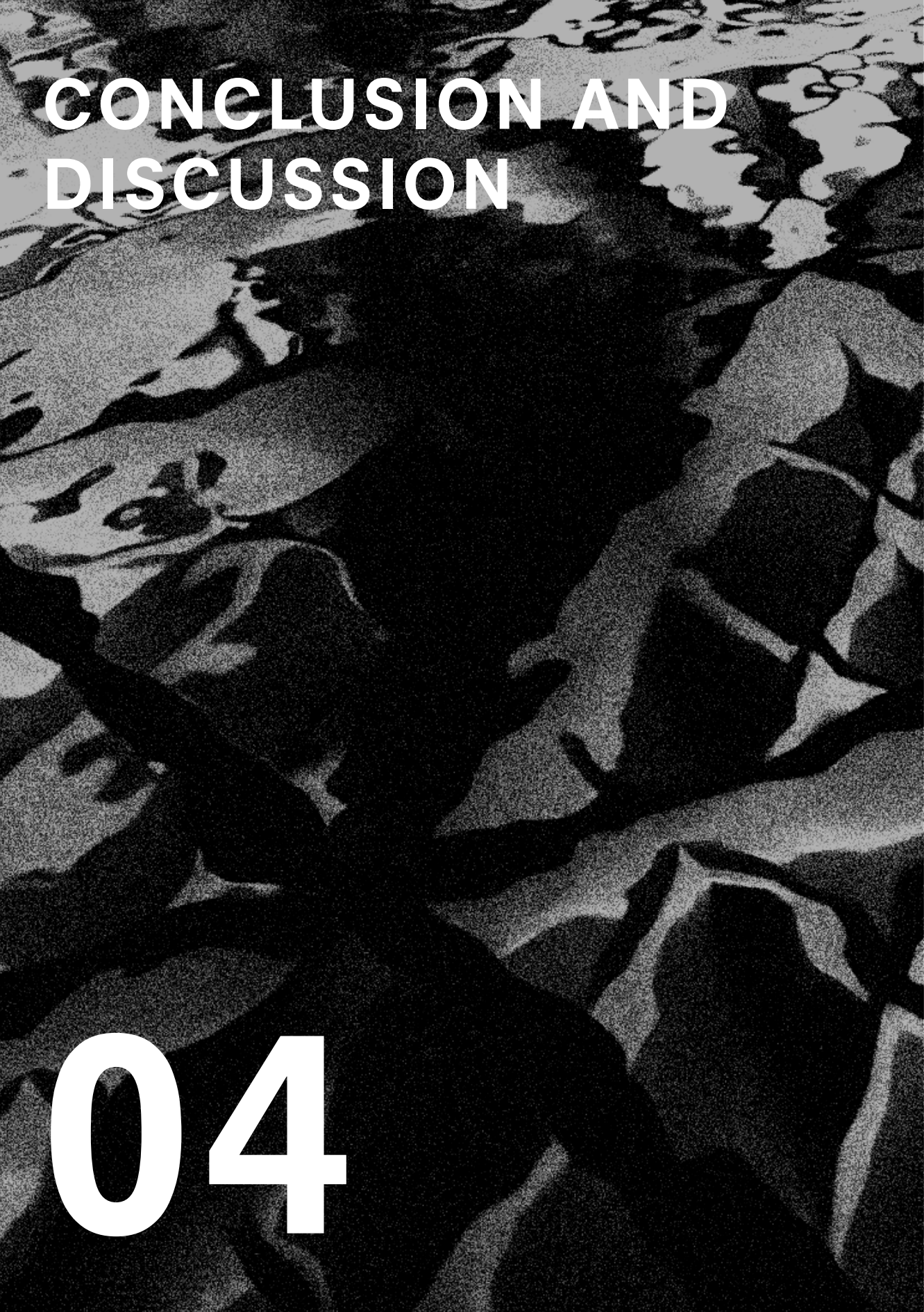












CONCLUSION AND DISCUSSION

04



CONCLUSION

This graduation project investigated the potential of the roof to function as the main organizing element in swimming pool architecture. The research was guided by the question of whether a roof could influence not only the enclosure of a building but also its spatial organization, programmatic structure, user experience, and technical performance.

The final design demonstrates that the roof can successfully operate as the main operator of architectural form. Rather than emerging as a consequence of the program, the roof became the starting point of the design process. Its geometry established the project's spatial hierarchy, organized circulation, became a base for the structural grid, and influenced the arrangement of functions throughout the building. Considering the ambitions set for the project at the beginning, the majority were achieved in one way or another. From the site and client perspectives, an expanded site enabled the creation of a larger-scale pool that still interacted with the surrounding environment. The program expansion enabled increased and diversified visitor intake, as well as the return of a social aspect to pool culture in Italy.

The project, therefore, shows one way to test a hypothesis. In this project, the roof achieved simultaneous operation at urban, architectural, experiential, and technical levels, becoming the primary element of the swimming pool rather than merely its protective covering.

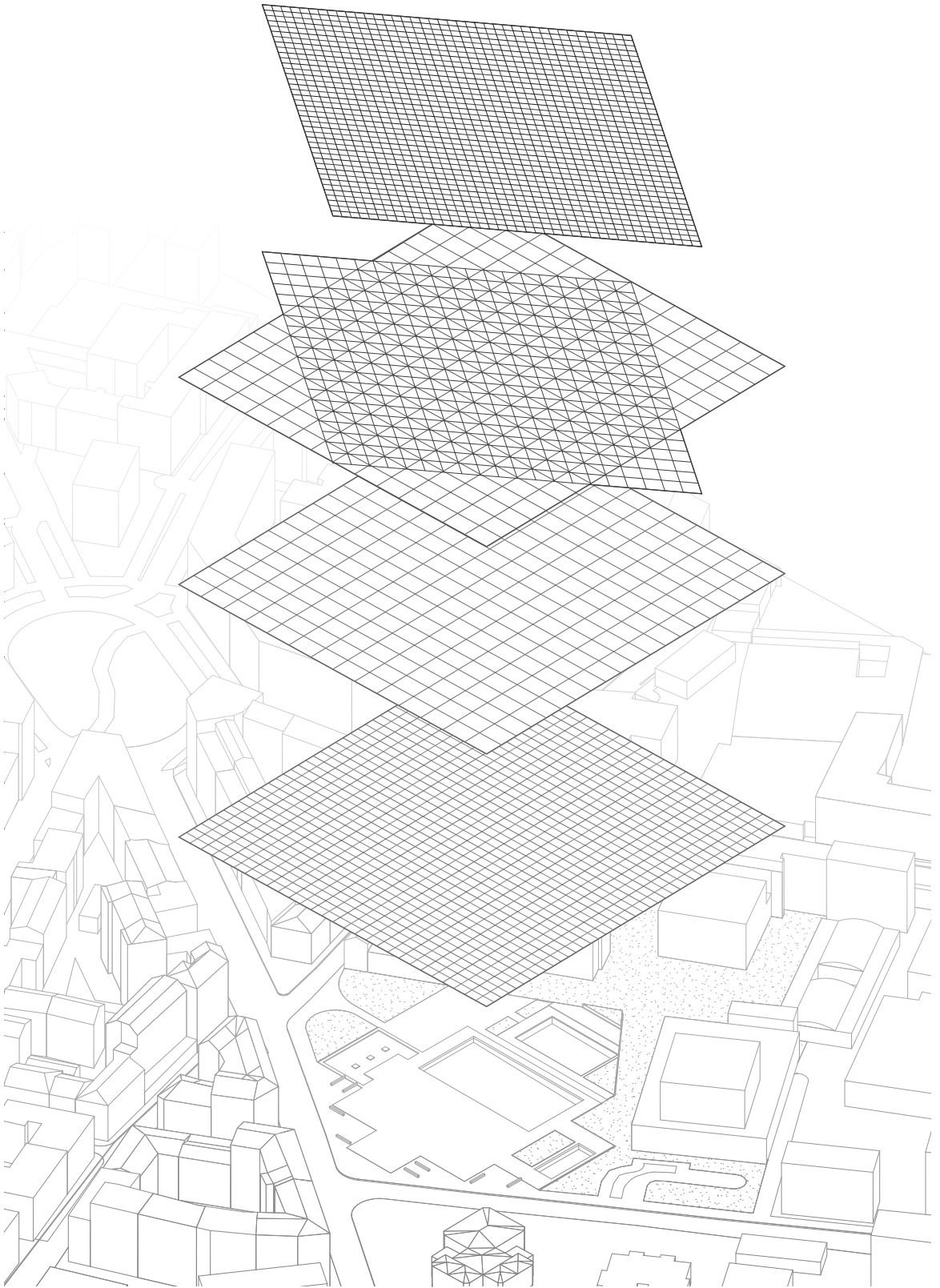
IMPLICATIONS AND RECOMMENDATIONS

The project suggests a broader architectural approach in which individual building elements can become generators of the entire design process. Contemporary buildings are often developed by separating programmatic, structural, and technical requirements. This project explored an alternative strategy in which a single architectural element coordinates these different aspects into a single spatial system.

The project may also contribute to discussions concerning contemporary sports architecture. Swimming pools are often designed as highly technical buildings, with spatial qualities secondary to performance requirements. This proposal argues that the specific relationship between the swimmer and the roof creates a unique and pleasant experience for the user in the first place.

In the context of Milan, the proposal demonstrates how the already long history of pool culture can continue in the contemporary world and bring back the notion of treating water facilities not only as a sporting component but also as a social one.

Future research could investigate how similar roof-driven design strategies perform in other large-span, sport-connected public buildings and whether they would have as big an influence on users as they did in the swimming pool.



REFLECTION

This project and the process of developing it have been a broad learning experience, offering many growth opportunities. Looking back, the most valuable lesson I take away from this graduation project is the importance and power of a strong architectural concept.

Even though concept has always been an important part in any architectural project, only during this project did I start to feel the actual power it has over the design and decision-making throughout the whole process, compared to my previous experience, where the concept was mainly the beginning and later more of an afterthought. During this project, however, the concept remained the main reference point for decision-making at every stage.

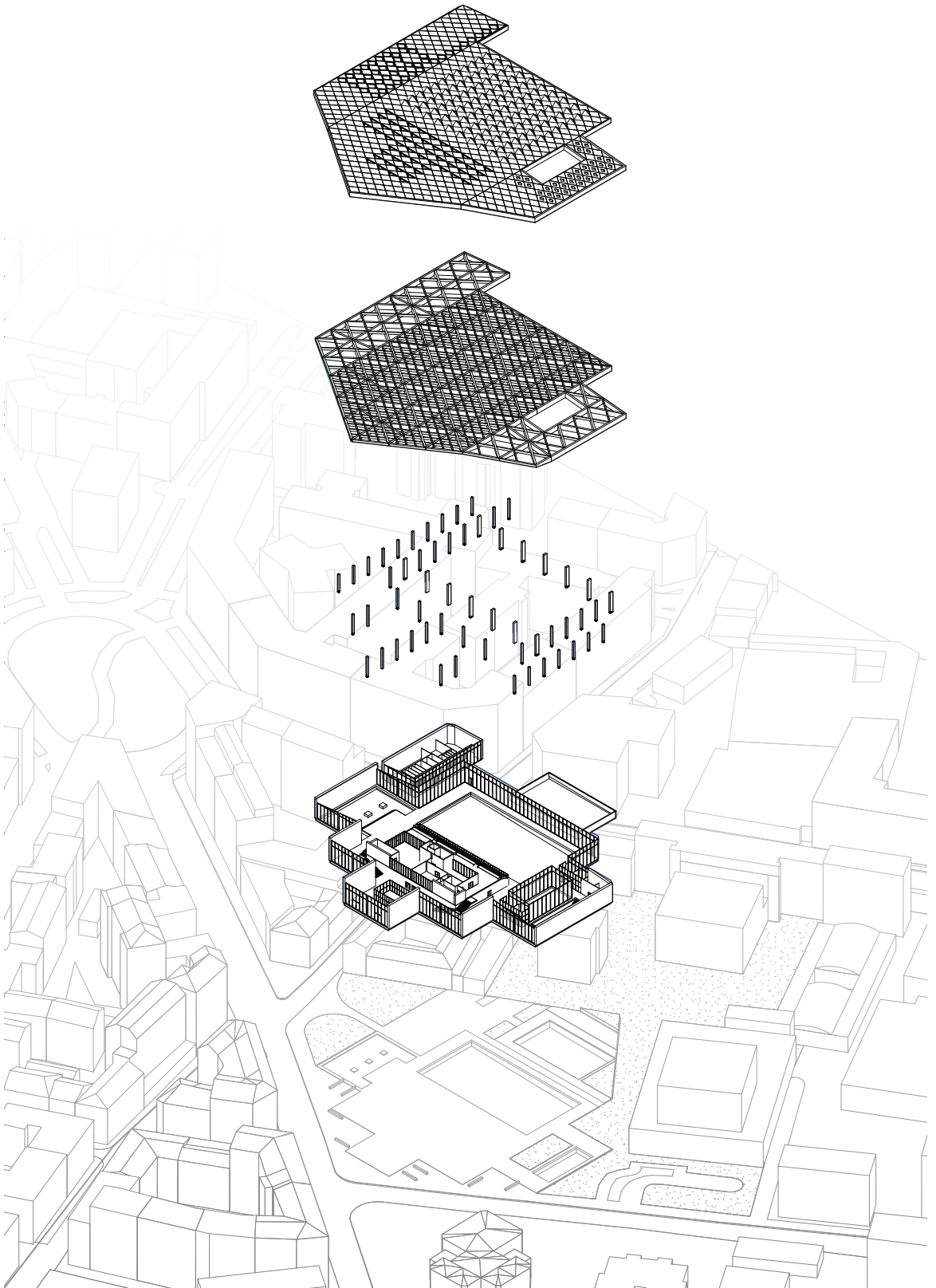
Adopting this way of working was not always clear. It required overcoming habits developed in earlier projects, in which design decisions were often made more intuitively and only later connected to a conceptual narrative. Throughout the graduation process, there were many unsuccessful attempts, dead ends, and moments when proposed design directions had to be abandoned. However, these failures became an essential part of the project rather than a setback.

A recurring realization during the design process was that the value of an idea can only be tested by developing it. A common way for me in this project was to think that, until I tried, I would not know for sure whether it would work or not. Some ideas that seemed great at first didn't work out, while others revealed unexpected potential only after further investigation. At first, it was hard not to see the ideas that didn't work out as wasted effort. But as I kept going, I started to understand that they were actually an important part of getting to a better solution in the end. Even the ideas that didn't make the cut still helped shape the final design, so every failure and rejected idea still played a role.

Many rejected ideas earlier actually made it into the project, but in a different form. This

time, the difference was that they now had a clearer purpose and stronger reasoning behind them.

What really stood out to me was how this project completely changed my view of the design process. I used to think of a concept as just a way to explain a finished design, but now I see it as something that actually helps shape the design as it's being developed. This shift in perspective is perhaps the biggest thing I took away from this project.

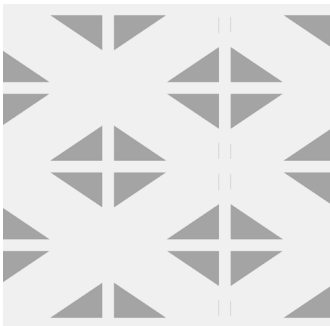
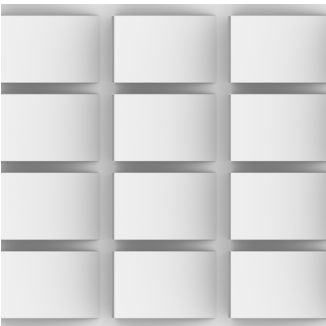
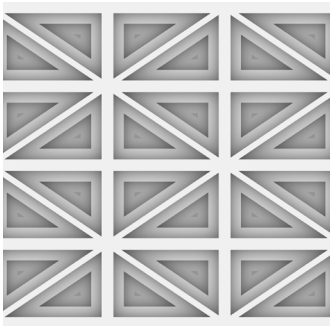
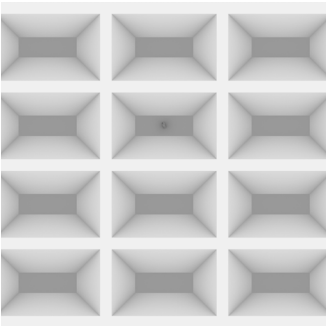
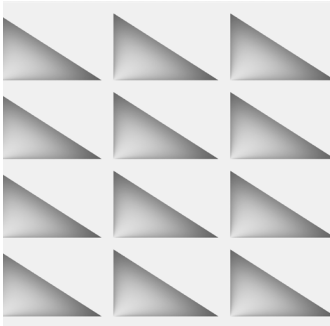
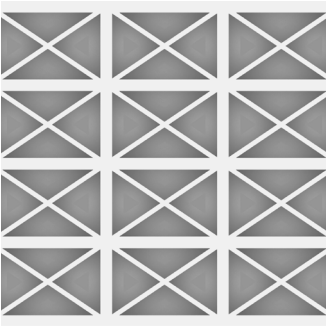


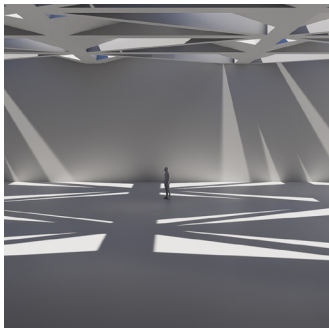
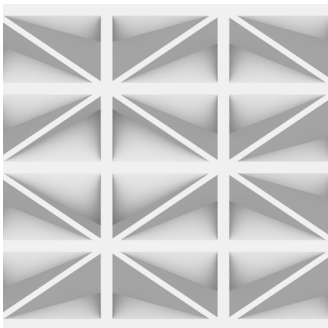
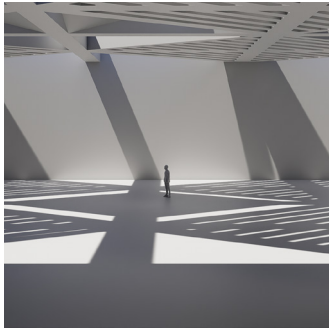
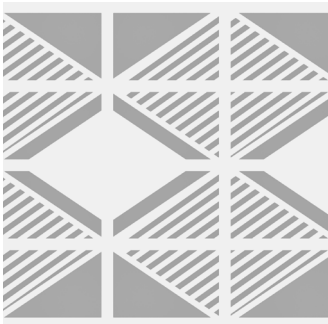
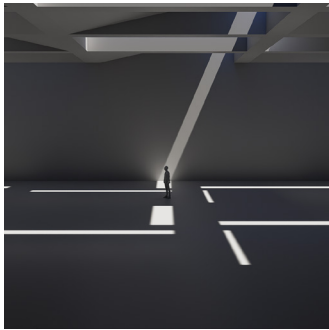
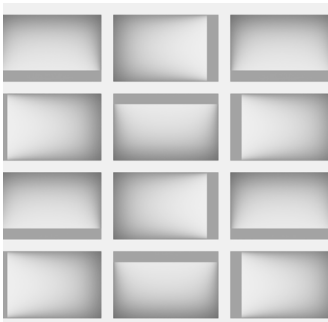
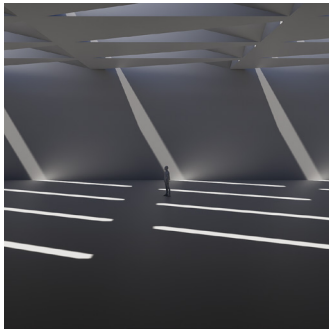
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PRECEDENT RESEARCH

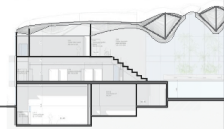
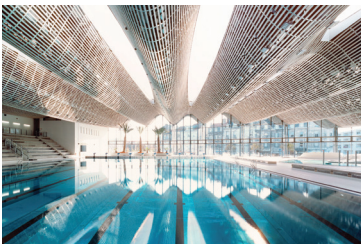
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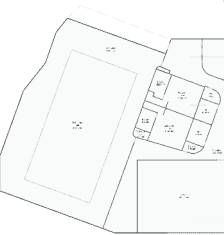
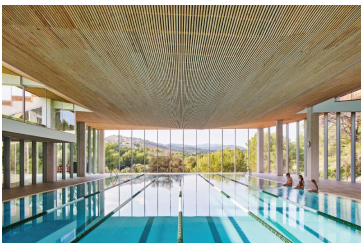
**SWIMMING
POOL COMPLEX**



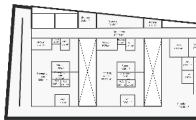
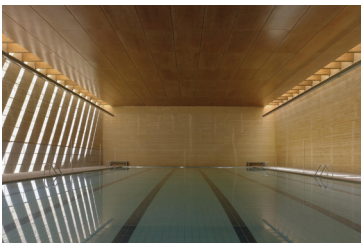
**UCPA SPORT
STATION GRAND
REIMS**



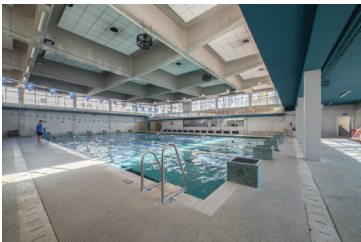
**QUEENS CENTRE
SPORTS**



**INDOOR
SWIMMING
POOL IN TORO**

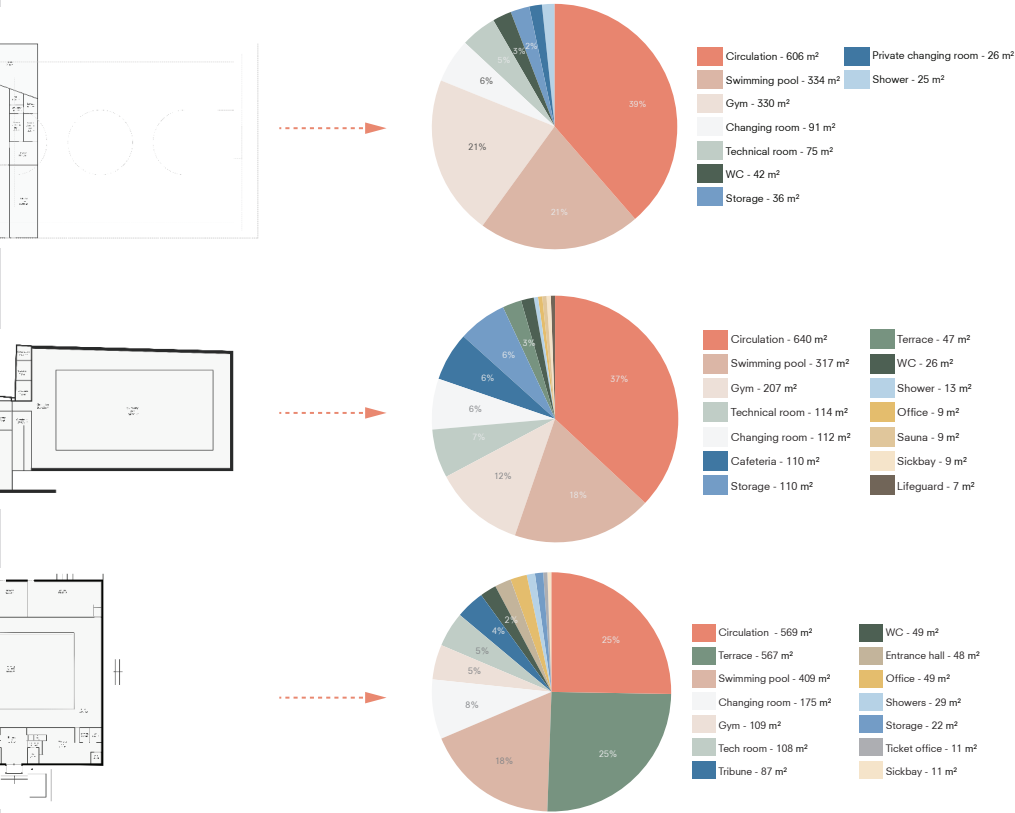
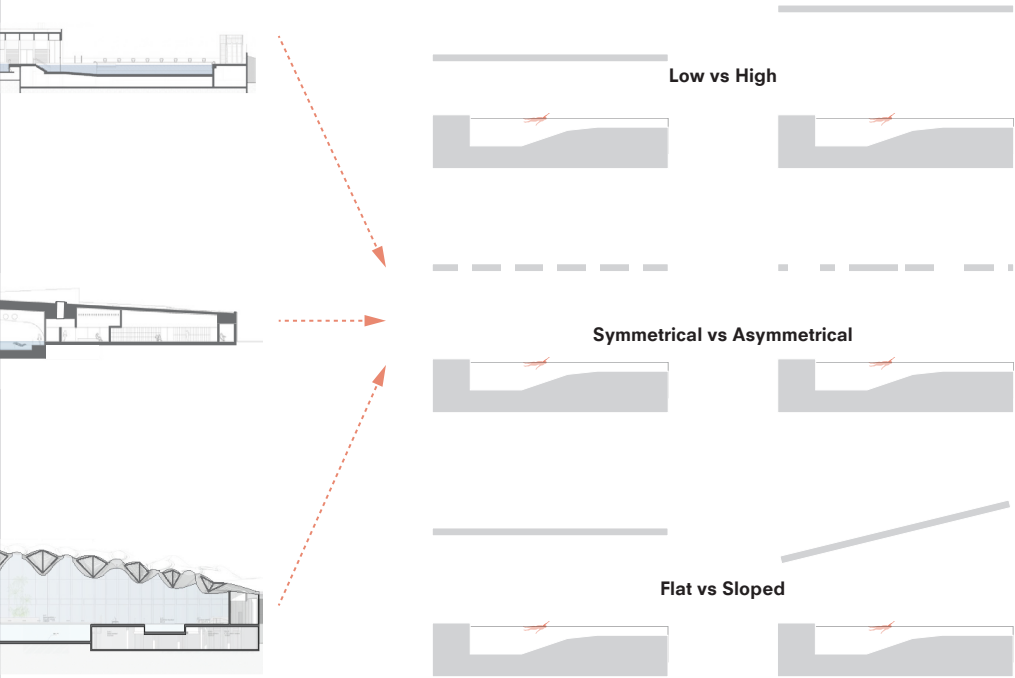


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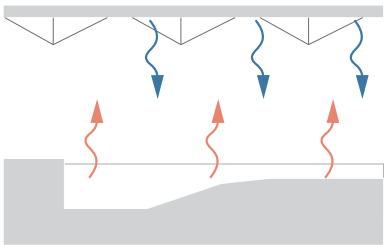


ROOF STUDY

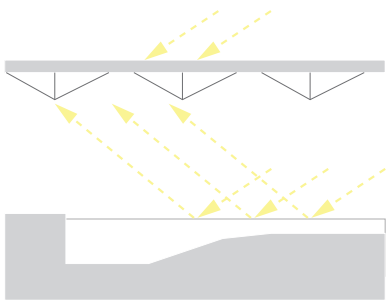
PROGRAM STUDY



CONDENSATION
& HUMIDITY



GLARE & LIGHT REFLECTION



PROBLEMS

- Warm water + cool surfaces
- Dripping
- Fogging
- Material decay

- Direct sunlight reflected by water
- Visual discomfort for swimmers
- Disorientation

RELATION TO THE
ROOF

Roof is coldest and highest surface

Light primarily enters from above, making the roof a key light moderator

INFLUENTIAL
FACTORS

- Roof layering
- Ventilation strategy
- Surface temperature
- Slope

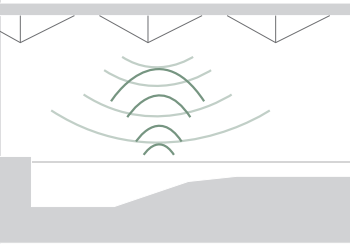
- Roof geometry
- Translucency
- Orientation
- Light diffusion

ATMOSPHERIC
EFFECT

Can create either a misty, heavy atmosphere or a **clear, breathable space**

Determines whether the space feels aggressive and blinding or **calm and soft**

ACOUSTICS & ECHO



- Hard reflective surfaces
- Splashing noise amplification



The roof is the largest continuous acoustic surface in the pool hall

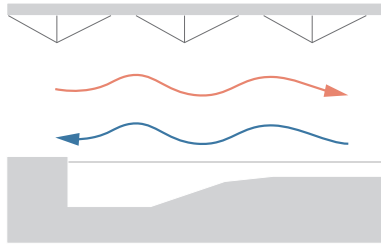


- Material absorption
- Ceiling articulation
- Structural rhythm
- Height



Shapes the soundscape between overwhelming or **serenity noise**

THERMAL COMFORT



- Heat stratification
- Hot humid air above
- Cold drafts below



The roof regulates heat accumulation and air movement

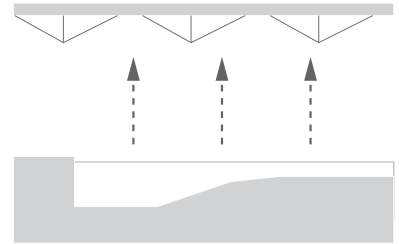


- Insulation thickness
- Vent openings
- Roof height
- Air circulation paths



Affects **bodily comfort and endurance** during swimming

VISUAL MONOTONY



- Flat neutral ceilings
- Long repetitive sessions
- Mental disengagement



The roof becomes the dominant visual field for swimmers

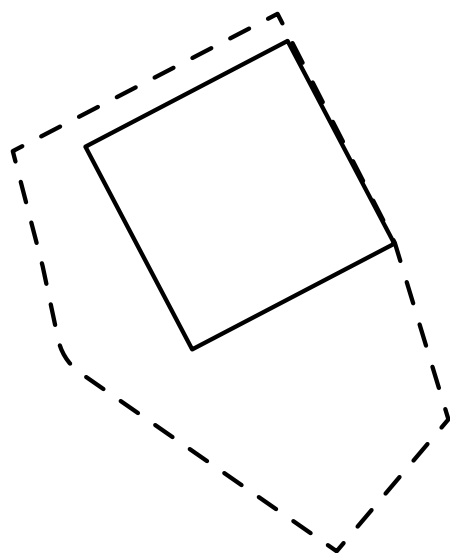


- Structural rhythm
- Pattern
- Light variation
- Modulation

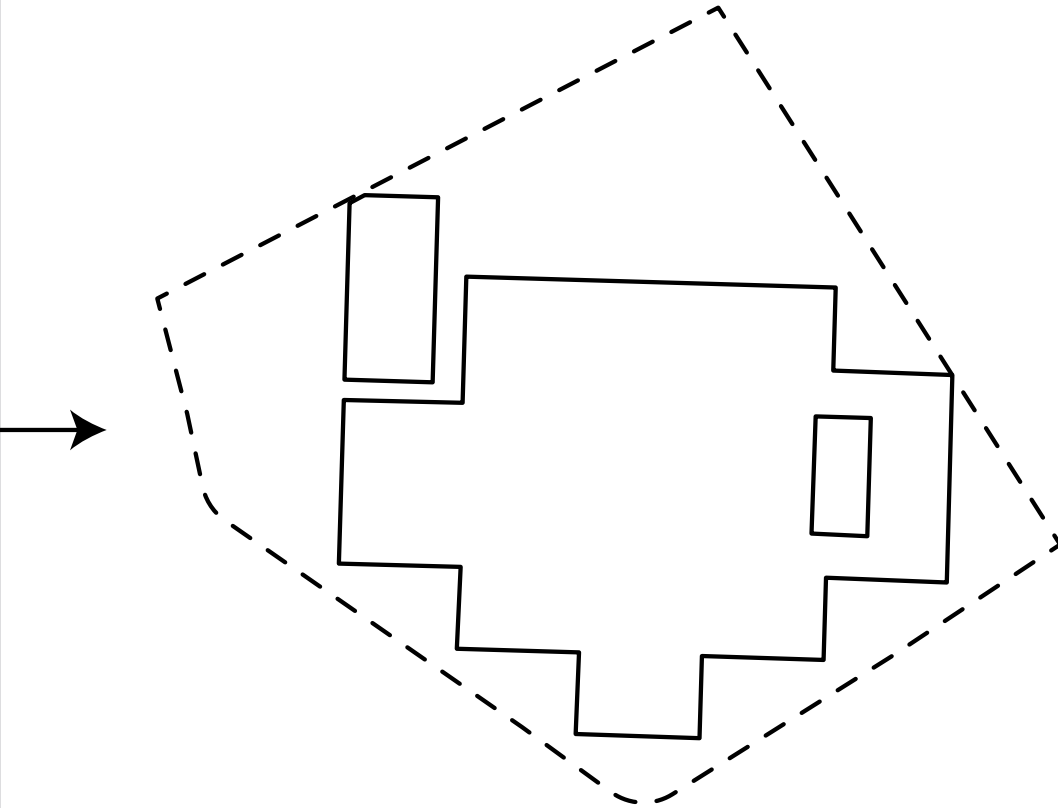


Can turn boredom into immersion, rhythm, or contemplation

PLOT EXPANSION



Plot area: 3,700 m²
Building area (GFA): 2,400 m²
Volume (GBA): 11,000 m²
FAR: 0.65



Plot area: 10,800 m²

Building area (GFA): 6,700 m²

Volume (GBA): 55,000 m²

FAR: 0.62

025 dalle ore 12:15

HI CAMPIGNIO
INGRESSO VILLA E GIARDINO
19-25 ANNI - VILLA E GIARDINO - (9.000)

MECCHI, 04
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PASS

Book
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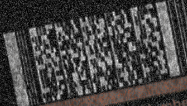
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Departure time
06:55

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1



Boarding Group
3

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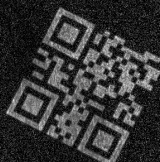


1387
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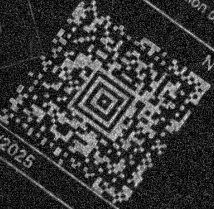
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27/11/2025		27/11/2025		27/11/2025		27/11/2025	
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