Politecnico di Torino

Master of Science in Architecture for Construction City

M.Sc. Thesis

Reconnecting the Urban Fabric: Adaptive Reuse of Industrial Sites through Strategic Bridge Integration

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Abstract

Reusing the OSI Ghia Factory:

A Proposal for Sustainable Redevelopment in Turin, Italy

The former OSI (Officine Stampaggi Industriali) was an important part of Turin's automotive industry, specializing in car body manufacturing. Today, the site stands abandoned a stark reminder of an industrial era that no longer fits within the city's evolving and compact urban fabric. The study deals with the possibilities for the redevelopment of this area into an energetic and sustainable urban habitat. Through investigating its historical function and architectural typology, analysing its current state, the paper seeks possibilities of being transformed and reconstructed within the scope of urban revival, environmental improvement, and reaction to the long-stagnant site. Based on historical, architectural, and similar studies, the project suggests a development that will respect the industrial heritage of the site. It presents urban solutions to satisfy contemporary demands without challenging the historical mission of the factory as a manufacturing space. The concept is to merge the sustainable approach with the protection of the site's heritage, at least as a guideline for the site's development, not just for its revival but for its restorability into the urban catalysts of the City of Turin.

Keywords:

Adaptive Reuse; Industrial Heritage; Brownfield Site; Heritage Conservation; Sustainable Urban Development

1.1

The document explores how to rewrite and reoccupy post-industrial space, using urban planning techniques and design practices to revive empty spaces within a city and, in doing so, reclaim its life within its urban context. In the last century, many big companies, especially in cities like Turin, moved their factories out because of economic hardship or changes in the job market. As these former industrial centers that were once vital hotbeds of commerce became derelict, they have left an indelible mark on the urban landscape: huge brownfield sites still visible today that symbolize lost cities. Yet it is in these traces of times gone by that a wealth of potential for rejuvenation can be found, breathing new life into the old and re-establishing connections with the city's social and cultural life. And Turin, known for its industrial past, started to transform in the mid-1990s. With pride, even older industrial facilities were refurbished and converted into livable, workable cultural spaces, literally bringing the city anew to life. However, some of the production areas, such as where the former OSI-Ghia factory is located, are still somewhat isolated from the local communities. This site bound by train tracks and difficult to reach is a rare driver for urban revival. It calls for imaginative proposals to heal and stitch it back into the material of the city of Turin, to return it to the community, to make it usable and accessible to everyone. In addition to this, the thesis considers the wider urban context and asserts that these marginal areas need to be planned with the aim of folding them into a compact city vision. It calls out for a turn in approach, for maintaining the outmoded, like the industrial heritage, and not for its dissolution. By reusing these buildings in a way that fits the current time, we can celebrate the historic structures while avoiding the fate of turning them into nostalgic memories. It’s an approach that has the practical benefits of preserving solid physical structures and avoiding throwing out the proverbial bathwater, with the career of Bath House still plugged in a hot towel rail on the market above you, but also hanging on to a connection with the industrial heritage of a city whose name will forever be associated with a shopping center. And the master plan for Turin provides an instructive example of how cities can transform industrial land to adapt to the changing needs of a community. The former OSI-Ghia factory is a key example, and its rebirth could be a template for similar efforts to bring life back to abandoned industrial sites and cities. By reflecting on city and neighborhood targeted strategies, this dissertation emphasizes former industrial arteries as useful to address local community needs. The design solutions not only conserve these historic spaces, but are designed to become modern, active, and energized features within the urban fabric, consistent with the regeneration objectives of Turin.

1.2

The purpose of my thesis is to establish opportunities for redeveloping the OSI Ghia factory and will emphasize a few main goals which represent the deep-seated past and future potential of the site. The first thing This thesis will do is provide an analysis of the historical and architectural importance of the factory, tracing how it has shaped the urban landscape of Turin over time. To comprehend that past is to help us not only to appreciate its value but also to imagine its future. Next, it evaluates the existing OSI Ghia site, specifically noting any environmental issues or conditions of the building that may impact reuse. This in-depth review of the site will help us approach the redevelopment of the site with a complete understanding of the challenges. The study will also consider several redevelopment options that focus on the reuse of existing buildings to complement the surrounding cityscape. I will be looking at sustainability as a crucial feature and all the practices will be based on repairing the site and the ecological equilibrium of the region.

Combining these results, I will elaborate a concrete proposal of reuse, aimed at the OSI Ghia factory, based on the requirements of the city of Torino and its population. Redeveloping brownfields such as the OSI Ghia which is good for urban areas by promoting compact land use, reducing development pressure on overburdened undeveloped land, and increasing jobs and economic opportunity.

This work, focused on a case study area that is of high historical value, is intended to supply to the discussion on reuse of brownfield sites by providing evidence from the past. In suggesting a use that is sustainable and community-responsive for the OSI Ghia factory, my ambition is that this initiative will be a catalyst for similar initiatives in the City of Turin and beyond, demonstrating that what have in the past been dismissed as industrial ruins are in fact sites that can vibrantly live again, answering the needs and demands of contemporary communities and their past.

1.3

The methodological framework of this thesis approaches the project as a complex system, highlighting the intricate connections between various design elements and their environmental, social, and economic impacts. As Ottino (2003) explains, a complex system consists of numerous interacting components that influence each other and their surroundings. There is a whole set of systems whose behaviours are characterized by non-linear dynamics, and they have features that have never been seen before, still more they are a sort of strength with weaknesses. To enhance resilience and mitigate vulnerability, it is essential to understand how these components relate to one another.

When we think about buildings, it’s important to consider Turin's perspective from 1981, which sets them apart from other market products. Buildings are seen as unique, complex, substantial, and enduring entities, deeply connected to their site characteristics, materials, human factors, and the availability of technical expertise. A building is more than just its physical presence; it represents a network of relationships both tangible and intangible that involve various stakeholders from the design phase through to construction. This complexity necessitates a comprehensive understanding of how different factors, including morphological variables, innovations, and the roles of various actors, interweave to create sustainable outcomes.

Several scholars (Groak 1990; Nightingale 2000; Allen 2008; Bachman 2008) describe architectural projects as open, adaptive systems. A building is assembled from many inter-dependent components produced in separate supply chains; taken together, these intertwined parts make both the artefact and its delivery process inherently systemic. The project is shaped by ongoing interactions both within its internal components and with the broader social, environmental, and economic context. These interactions create a continuous dependence on its environment and direction for those involved in decision-making but over time create its evolution. Seeing the project as part of a larger system emphasizes how decisions taken today impact outcomes years down the road. It also promotes more careful and responsible use of resources, requiring us to weigh not only present-day costs but what that usage will mean for future generations.

This systemic view resonates with the sustainability perspective set out by the Brundtland Commission. That report urges a critical re-examination of how we use resources and measure the consequences of our interventions in the built environment.

According to Nigra (2019), the field of architecture has responded to this challenge by seeking innovative design solutions, pushing technological boundaries, and exploring new delivery processes. To appreciate how far these efforts have reshaped practice and where further opportunities lie it is essential to understand the field's underlying dynamics. Within building projects and their delivery chains, sustainability can prompt shifts that both disrupt established routines and open fresh avenues for progress. Innovation born of these shifts can accelerate technological development, unlock new markets, improve social outcomes, and yield higher-quality design solutions. Yet complex systems present a paradox: adaptability can make them robust, while growing complexity renders them vulnerable to external shocks. In this context, sustainability acts simultaneously as a disruptive force and a vital catalyst for renewal, challenging entrenched practices while offering substantial prospects for advancement across the built environment.

This exploration emphasizes the need to clarify the complexity of sustainable building projects and their delivery processes, aiming to identify their characteristics, recognize risks of disruption, and highlight emerging opportunities. Such insights are invaluable for policymakers to understand value and make informed decisions, for designers to explore their creative possibilities, and for the industry to minimize risks associated with innovative projects that are often perceived as high-risk (Slaughter 1993). However, if innovation is poorly managed, it can lead to difficulties in adapting to changes, unexpected environmental and social consequences, and potential economic mismanagement. Given the unique nature of each innovative sustainable building project and its delivery processes, minimizing disruption risks is critical. Therefore, mapping and observing the system's characteristics and dynamics becomes foundational. By conceptualizing buildings as complex systems, it is vital to trace innovation patterns, responsibilities, outcomes, and impacts on delivery processes, clarifying the cause-effect relationships between innovative sustainable design solutions and their resulting environmental, social, and economic impacts. Identifying these interrelations provides valuable feedback to designers, policymakers, and industry participants. The more we understand these systems, the easier it is to see how introducing sustainable solutions can create specific changes and effects.

This understanding is essential for developing improved strategic sustainable development strategies, envisioning superior design solutions, and reducing industrial risks linked to innovative endeavours. Ultimately, grasping the complexity and dynamics of sustainable building projects is significant for advancing our built environment and addressing emerging social, economic, and environmental challenges.

In addition to sustainability, the concept of innovation is equally critical. Here, innovation is understood as the application of a transformation or enhancement in a process, product, or system that is new to the organization initiating the change (Freeman, 1989).

1.4

The thesis investigates the industrial history of Turin, where the decline of the production system, especially since the '70s, has caused the abandonment of important factory settlements. That exodus of production companies left not only empty buildings, but also a legacy of social and economic dislocations. The former OSI-Ghia factory provides a good example of this, a considerable now disused and abandoned presence quite separate and hostile to the urban network and tissues of the city. Similarly, in this context, the study highlights the importance of acknowledging the possibility of reconnection with the urban landscape of such derelict areas. It suggests that their historical role may provide guidance for development policies. Promoting the idea of adaptive reuse, the thesis also argues for industrial heritage preservation. These buildings carry cultural and historical significance that should not be wiped out. Rather than just tear the buildings down, we should be focused on how we are going to recreate these buildings for the needs of the 21st century but still remembering their history. This offers a style that does not simply maintain the building and reflects a unique character of identity in the neighborhood. Additionally, the public preservation approach limits land and resource usage, now designing the acceptance that the past could still exist in accordance with modern urban needs. The case of Turin represents a useful model of how cities can turn industrial heritage areas into an opportunity to be managed. The thesis studies positive models of these types of transformation in the city, showing ways that former factories contribute to active urban environments. It is also a new instrument used for reading some selected case studies, as they are presented among which the ex-OSI-Ghia factory, an illustrative example of reuse that looks in ways to the reconnection of the abandoned industrial heritages to the urban living. This revitalization should result in these locations taking on a utilitarian function in the life of a community and contribute to the cultural and social in this roof of a small town.

Looking at the project as a complex system, the thesis makes a case for how different parts of a project interact with each other and with the broader social, environmental, and economic environment in which they are embedded. This viewpoint illustrates the relationships between various intermediaries and the materials they control and processes they are involved in and brings out the importance of early cooperation and mutual planning. These relationships are important to underpin development of resilient cities. Sustainability is positioned as a problem and a possibility for innovation in architecture and urbanism. The results suggest that sustainable action can not only lead to technological developments, but also facilitate such developments, open new markets and improve social conditions. It warns however that

innovation must be controlled to prevent disorder. The ‘messy systems’ view implied that sustaining this change would work in reverse: sustainable innovations may well have the potential to catalyze change, but they will also introduce new components that might threaten existing practices and interrelations. The findings are summarized in a set of recommendations for future abandoned industrial area redevelopment efforts. The thesis emphasizes the need for a more thorough comprehension of the intricacy associated with these types of projects, including both risks and gains of innovative design and sustainable approaches. The findings in this manuscript can be used by policymakers, designers, and industry players in various sectors to support decision-making processes, and to also reduce uncertainty in adopting new technologies. Finally, the objective of these suggestions is to better guide the process of industrial land consumption so that this process becomes a positive contributor in the field of urban development and also reacts to the changes in the sphere of social, economic, and ecological threats.

2.Introduction

This thesis has employed AI-based tools, such as ChatGPT and Grammarly, solely for grammar checking, language refinement, and improving textual clarity in the whole text of the report. All content, analyses, and referenced materials have been independently researched and produced by the author.

2.1

Post-industrial cities are increasingly faced with the challenge of transforming disused industrial spaces into dynamic urban environments. Brownfield sites typically marked by contamination, physical degradation, and spatial fragmentation pose both challenges and opportunities for sustainable redevelopment. Rather than viewing these areas as obsolete, they can be understood as layered urban fabrics: remnants of former industrial economies, and yet also vessels for future possibilities. Redeveloping brownfields is widely seen as worth doing because it contains urban sprawl, gives cities more compact size and allows their residents to stay put--something which links brownfield policy directly with wider sustainability goals.

The famous OSI-Ghia car plant in Turin is a case in point. Situated in the northeastern part of the city, the site once formed part of a thriving automobile manufacturing district. Today, it stands as a giant, rusting symbol of the end of an era yet also as a space with significant potential for revival. Redeveloping this area offers a unique opportunity to address urban sprawl, environmental degradation, and historical neglect. Adaptive reuse enables spaces like this to be reborn, meeting the evolving needs of modern cities while honouring the richness of their past. Successful brownfield regeneration, however, depends on careful governance. Gute (2011) emphasizes that effective initiatives must balance the level of certainty required by developers and investors with a decision-making process that allows local communities to shape risk-aware reuse strategies an approach that ultimately secures backing from both neighboring residents and financial markets (p. 474).

Douet (2015) emphasizes that the conversion of industrial heritage not only preserves architectural integrity but also reduces the need for demolition. More importantly, it injects new life into communities by enabling functions that reflect contemporary social and cultural demands. Across Europe, former factories have successfully been transformed into housing, cultural venues, and hybrid public spaces. These interventions show that post-industrial infrastructure can evolve into inclusive urban settings that foster community identity and connectivity (Dixon & Lerner, 2007; Douet, 2015). Recognizing this potential allows us to design urban environments that not only reflect our historical memory but also contribute to building sustainable and vibrant cities of the future.

2.2

This thesis is about reusing the OSI Ghia factory through a planned conversion in response to the threats and opportunities of brownfield reuse in post-industrial Turin. It looks at how a balanced solution could protect the valuable industrial history of the site, whilst responding to pressing environmental, social, and economic needs.

At the core of this work is a fundamental question:

How to develop the adaptive reuse of the OSI Ghia factory preserving its industrial heritage and responding to today's environmental, social, and economic requirements of the city of Turin. To address this question, the article has four main aims, each focused on a fundamental dimension of regenerating brownfields as seen through the OSI Ghia brownfield.1st aim focuses on the environmental hazard of brownfield sites. Pollutants such as heavy metals and industrial solvents are hazardous to the public and regional environment. Effective remediation is necessary to combat these hazards and prevent any further unchecked urbanization (De Sousa, 2009). Advanced environmental testing and sustainable remediation practices should be a primary component of any responsible future of the OSI Ghia factory. A second and separate goal is to examine cultural and historical meaning within the industrial landscape of the site. It's not just abandoned remains of a factory - it reflects the turbulent life of the car-making industry in Turin. By maintaining and wisely combining these historical ideas into an innovative architectural and urban paradigm, we can build a useful link between the past and the future. The third has to do with improving urban integration. As with many brownfield sites, OSI Ghia is disintegrated spatially and functionally from the context in which it is inserted. The site, by means of enhancing mobility, access, connections, etc., achieves a local project and benefits neighboring areas to promote cohesion. This integration, as noted by Dixon and Lerner (2007), is necessary to move urbanism towards equity and inclusiveness.

Last, the fourth goal looks after the socio-economic revitalization of the territory. Reusing the OSI Ghia factory could be a magnet for new investment, new jobs, and higher property values. Just as significant, however, is the direct participation of local communities in the planning and design of projects. Guaranteeing that the transition is responsive to the needs and aspirations of residents creates ownership, a sense of belonging, and ultimately resilience. This thesis, funded by the City of Turin, is intended to reveal the potential of the OSI Ghia factory as a model for regenerating sustainably and inclusively. It is one in which past lives of the present city of Turin may influenced.

Based on the objectives outlined above, this research is guided by the following hypotheses:

- Adaptive Reuse of Industrial Heritage: Industrial heritage sites like the OSI Ghia factory can be transformed to meet contemporary urban needs while still preserving their historical and architectural significance. This means that we can breathe new life into these spaces without losing the essence of what makes them valuable.
- Sustainable Redevelopment Strategies: Effective redevelopment strategies can tell us environmental risks associated with brownfield sites while also improving socio-economic growth. This suggests that we can create cleaner, healthier environments that not only protect public health but also stimulate local economies.
- Community Involvement: Actively involving local communities in the planning and design processes significantly enhances the success, inclusiveness, and long-term sustainability of brownfield regeneration projects. This highlights the importance of listening to and incorporating the voices of those who live and work in the area, ensuring that the redevelopment truly reflects their needs and aspirations.

By exploring these hypotheses, the research aims to demonstrate how a thoughtful and inclusive approach to the adaptive reuse of the OSI Ghia factory can lead to a revitalized urban landscape that honors its past while embracing the future.

2.3

This dissertation is interdisciplinary in its blend of historical research, building analysis, environmental testing, and urban study. The research starts by exploring the archives to formulate an understanding of the historical development and importance of the OSI Ghia factory, to follow the story from its foundation in 1908 to its closure in 2001. This deep-rooted history enables us to develop an approach that reflects the conditions of the site and to devise strategies that are informed about the historical significance of the changing place as we imagine the adaptive reuse. From the environmental component, the literature review looks at the common contaminants in brownfield sites, including heavy metals and industrial solvent. This is important in developing environmentally safe and healthy remediation strategies. We want to make sure it's not only environmentally responsible but also respectful of the community's health. At the same time, an architectural survey is carried out to examine the current conditions of the structures on-site and determine what can be reused. This study contributes to the understanding through which components of the factory can be kept, adapted, or rearranged to suit new functions while maintaining their historical value. Furthermore, to evaluate the level of connection, to detect traveller gaps and understand spatial relationships, a site and its surrounding urban context are also analysed on space. These findings will inform developments that can better the site's urban integration and connection, so the redeveloped site interfaces well with the surrounding context. Finally, the study compares successful brownfield redevelopment examples across the European continent. While they are available, it lends feasible material for developing a mixed-use community regeneration proposal for the OSI Ghia site. Drawing on these different levels of examination, the methodology develops an overarching approach which looks at the environmental, historical, social, and spatial dimensions of redevelopment processes. This holistic vision is designed to deliver not just the successful but the truly transformative and purposeful revitalization of the OSI Ghia factory that serves the community and city of Turin.

2.4

1. Abstract

Provides a summary of the research topic, objectives, methodology, and key findings.

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2. Introduction

It introduces the goals for conducting this research, outlines its overall approach and also introduces structure of the entire thesis.

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3. Background and Context

There are main preliminary historical backgrounds, and this is not a deep historical chapter but a preliminary primary reference, and there are in depth historical studies both concerning the Osi Ghia area and the urban industrial history of Turin.

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4. Literature Review

Reviews theoretical frameworks, prior studies, and key concepts related to brownfield regeneration, adaptive reuse, and sustainable urban development.

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5. Case Studies

Analyzes examples of successful brownfield redevelopment projects, highlighting strategies and lessons relevant to the OSI Ghia site.

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6. Methodology

Explains the research design and approach, focusing on the methods used to collect and analyze data for this study.

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7. Site Analysis

Examine the current condition of the OSI Ghia factory, including its environmental, architectural, and urban characteristics.

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8. Proposed Redevelopment Plan

Presents a vision for the redevelopment of the site, with an emphasis on sustainability, adaptive reuse, and urban integration.

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9. Conclusion

Summarizes the research findings and their implications, offering recommendations for future research and practical applications.

10. References

Lists all academic sources, case studies, and supporting materials used in the research.

2.5

Sites like the OSI Ghia factory represent potential NOT spots within the urban fabric of many cities worldwide, often left behind due to two main reasons: environmental contamination from former industrial activity and the presence of underutilized, deteriorated land. These locations typically stand as blank urban voids, disconnected from their surroundings and posing significant redevelopment challenges. However, this research suggests that with the adoption of well-structured and environmentally responsible redevelopment strategies, such sites can be transformed to mitigate ecological degradation and promote more efficient and integrated land use within the city.The intention is a plan closely aligned with the global sustainability agenda and one also paying tribute to Turin's abundance of industrial history, the most noteworthy of which stems from the automotive sector. Converting the OSI Ghia property into mixed uses demonstrates a proven method of economic revitalization and increased social enrichment for the neighbourhood. Good ones make these public spaces inclusive, to promote interaction, encourage investment, and include residents in guiding and controlling the dynamics of redevelopment. "Adaptive reuse can transform heritage buildings into accessible and useable places as well as provide the added benefit of regenerating an area in a sustainable manner." (Bullen & Love, 2011, p. 412). As Slaughter (1993) points out, "This is important because policymakers can better understand value and make informed choices, designers can understand the range of their design opportunities, and the industry reduce the risk of embarking into innovative projects that are often portrayed as high risk" (p. 533). Although the work concentrates on the city of Turin, the methodology sets out a portable toolkit of mitigation measures for other post-industrial areas coping with comparable issues. Finally, this thesis argues that redundant industrial sites can be reconceived as stimuli for sustainable urban regeneration that is culturally rich. If we embrace the potential of these spaces, we can have a lively, exciting place that meets the needs of today, while also recognizing and valuing the history that created them.

3.Background and context

3.1

There are main preliminary historical backgrounds, and this is not a deep historical chapter but a preliminary primary reference, and there are in depth historical studies both concerning the Osi Ghia area and the urban industrial history of Turin.

The OSI Ghia factory, established as the Carlo Garrone foundry in 1908, has been a cornerstone of Turin's industrial history. Nestled at the intersection of the Crocetta and San Salvario neighborhoods, the factory played a crucial role in the city's rise as a hub for automotive production. Designed by Engineer Della Beffa, the factory featured two main structures, one for administrative functions and another for storage reflecting the early 20th-century industrial aesthetic that emphasized both functionality and design. Throughout the 1910s and 1920s, the factory underwent significant expansion to meet the growing demands of the automotive industry. The Garrone foundry shifted its focus to producing steel components for automobiles, embracing modern construction techniques like reinforced concrete. This innovation allowed for the creation of larger manufacturing spaces, with Engineer Porcheddu being a key figure in these developments, as he was among the first in Italy to implement the Hennebique system, which revolutionized building design and manufacturing processes. During World War II, the factory adapted once more, pivoting to military production and manufacturing arms and ammunition under the name "Società Anonima Trafilati." After the war, it returned to its automotive roots, collaborating with renowned designers such as Giorgetto Giugiaro. This partnership solidified its reputation in the luxury car market and significantly contributed to the production of iconic models for Fiat and Alfa Romeo. However, despite its successes, the factory faced a downturn in the late 20th century, leading to its closure in 2001. This closure marked a pivotal transition for the site, transforming it into a brown field area. In the years that followed, various redevelopment efforts have aimed to revitalize the location, integrating modern urban planning concepts while respecting its historical significance. Today, the OSI Ghia factory stands as a testament to Turin's industrial heritage, embodying both the challenges and opportunities that come with repurposing historical sites for contemporary urban needs. The ongoing discussions surrounding its redevelopment highlight the importance of balancing preservation with innovation, ensuring that its rich history continues to inform and enrich future urban developments.

3.2

Turin's identity has been shaped by its early role in Italy's automotive sector. The city's factories among them the former OSI Ghia plant capture the moment when early-1900s workshop craft gave way to full-scale, assembly-line production. Companies such as Fiat and Lancia, together with a growing cluster of metal-working and coach-building firms, pushed this shift forward. Their buildings balanced practical efficiency with striking design, turning production halls into architectural statements of modern industry. These structures still shape the character of Turin, underscoring its reputation for technical know-how and design innovation.

Keeping sites like OSI Ghia intact goes beyond safeguarding bricks and steel: it protects the stories of the people and ideas that built the city. Sensitive reuse folds those stories into today's urban life converting dormant factory floors into workplaces, cultural venues, or neighbourhood landmarks that speak to both long-time residents and newcomers. In doing so, the city strengthens local pride and ensures that its industrial past continues to inspire the way Turin grows and evolves.

Fig.1 This is an image of part of the production line inside the Officine Stampaggi Industriali (OSI) factory. You can see the partially constructed Innocenti 950 Spyder on the left and the Fiat 2300 Coupes on the right.

3.3

As industrial buildings adapted and as several large-scale industrial sites like Ghia OSI closed, the notion of brownfields appeared sites, often abandoned or underused, with a real or perceived threat to the environment and society. Former ‘blight warrens’ which, in the past, formed the epicentres of urban industrial progress, have now started to be associated with urban decline, as a complex spatial void that necessitates careful and sustainable regeneration strategies (De Sousa, 2009). A comparative study of European metropolitan areas confirms that successful brownfield regeneration depends strongly on the project’s capacity to integrate environmental goals with social inclusion objectives (Rey et al., 2022, p. 13). In recent years, transforming neglected urban land has become a key focus in city planning and development strategies. These efforts not only help reshape the physical landscape of urban areas, but also support economic revitalization, strengthen social bonds, and help limit unchecked urban expansion. Brownfield areas often present a strong potential to attract private investment by increasing the appeal and functional value of previously underused land. Through thoughtful redevelopment, these neglected sites can be turned into dynamic spaces tailored to accommodate diverse, mixed-use functions that respond to specific local needs. The transformation of brownfields is not just a question of turning an old area into a new one; it's about tackling complex challenges, including soil pollution, social dislocation, and the introduction of green infrastructure. Revitalising disused industrial land begins with a transitional phase that keeps the site active through interim programmes, invites residents into the decision-making process, and relies on design solutions flexible enough to evolve over time. Turin offers an ideal proving ground: the former OSI Ghia plant, an industrial landmark with distinctive architecture and clear redevelopment potential. A sensitive strategy can safeguard its historic character while introducing new functions, contemporary aesthetics, and genuine social relevance. When heritage preservation merges with forward-looking urban planning, a city both reaffirms its collective identity and guides growth in harmony with its cultural roots. Applied consistently, this approach allows Turin to turn neglected brownfields into vibrant urban spaces that honour the past while shaping future aspirations.

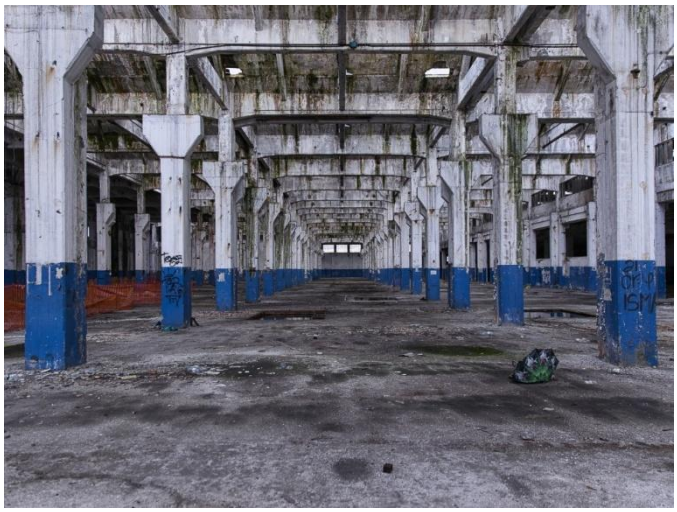


Fig.2 Interior part of factory

4. Literature Review

The adaptive reuse of industrial sites has become an essential strategy in urban regeneration, particularly in European cities where former manufacturing hubs now face decline. The conversion of brownfields abandoned or underused industrial lands into sustainable, multi-functional urban areas is a key theme in modern urban planning. Brownfields present both challenges and opportunities, particularly concerning environmental cleanup, cultural heritage preservation, and sustainable urban development. In the context of Turin, Italy, the OSI Ghia factory stands as a prominent case for exploring these dynamics. Several scholars have explored adaptive reuse within the urban regeneration framework, emphasizing the importance of integrating historical preservation with new development. Bullen and Love (2011) emphasizes the environmental and social benefits of adaptive reuse, asserting that it is a crucial strategy for promoting sustainability in urban environments. They point out that this approach not only reduces construction waste but also preserves cultural heritage, providing economic advantages by revitalizing previously underutilized sites. While brownfield sites present various environmental challenges, they also hold significant potential for innovative and sustainable urban redevelopment. By transforming these neglected areas, cities can breathe new life into their landscapes, creating vibrant spaces that honor their history while meeting contemporary needs. The adaptive reuse of brownfields can foster community engagement, enhance local economies, and contribute to a more sustainable urban future, showcasing how thoughtful redevelopment can turn challenges into opportunities. Their transformation can lead to the creation of innovative, green public spaces that contribute to environmental restoration and urban vitality. The city of Turin serves as a compelling example, where industrial heritage has been extensively examined in urban planning discourse. In such contexts, adaptive reuse plays a crucial role in revitalizing former industrial areas, particularly in cities with a strong manufacturing legacy. Turin's transition from a production-cantered economy to one rooted in innovation and cultural development is evident through the repurposing of major industrial landmarks, including the former FIAT facilities and the OSI Ghia complex. The economic benefits of brownfield redevelopment have also been well-documented. According to De Sousa (2009), brownfield redevelopment projects are often catalyzed by public-private partnerships that aim to balance economic revitalization with environmental remediation. Successful redevelopments of brownfield sites do more than just address environmental hazards; they create valuable opportunities for new business investments, housing developments, and green spaces. By transforming former industrial zones, cities can foster the emergence of cultural and recreational areas that enhance the quality of life for surrounding communities. Equally important are the social aspects of redevelopment, which cannot be overlooked. Active community engagement is crucial in the successful transformation of brownfield sites. When residents are involved in the planning and decision-making processes, their needs and aspirations can be better understood and addressed. This collaboration not only helps ensure that redevelopment reflects the community's identity and values but also fosters a sense of ownership and pride among residents. In this way, the project can not only act as a springboard to income generating opportunities for local people but also begin attracting investment from outside investors who want their money back.

Engaging local communities from the early stages of planning through to project implementation ensures that redevelopment efforts reflect the area's unique social, historical, and economic fabric. In cases such as the OSI Ghia factory, where industrial heritage intersects with contemporary urban needs, open dialogue and collaborative decision-making play a crucial role in achieving balanced and meaningful transformation.

4.1

The redevelopment of brownfields defined as former industrial or commercial sites that have been abandoned or underutilized due to contamination has become a central theme in urban regeneration. As Allen (2008) emphasizes, the complexity inherent in the built environment requires interdisciplinary frameworks to fully understand the dynamic challenges and uncertainties of brownfield redevelopment. His insights support the idea that planning and redevelopment should be adaptive, non-linear, and grounded in systems thinking. “A complex system is defined by a large number of elements, in fact, that are able to exchange impulses among them and with the environment that surrounds them.” (Ottino, 2003, p. 292). As Allen (2008) stresses, “some method is required for estimating the strategic impacts on the growth patterns of the city, effects on house prices, on residential and commercial development and, in turn, on future traffic patterns, energy consumption, pollution, etc.” (p. 13). This highlights the importance of systemic thinking in brownfield redevelopment, ensuring that urban planning decisions are not left solely to intuition or political pressure but guided by informed, adaptive frameworks. Theoretical approaches to brownfield redevelopment often emphasize sustainable development, environmental remediation, and economic revitalization. These strategies aim to reduce urban sprawl, conserve natural and built resources, and address lingering environmental hazards. They also promote principles of sustainable urbanism, such as minimizing land consumption, encouraging mixed-use developments, and enhancing urban resilience. Smart growth, another related concept, advocates for urban renewal within existing city boundaries to avoid unnecessary outward expansion. These principles also align with environmental goals that aim to mitigate pollution, improve public health, and integrate green space into cities. From a socio-economic perspective, brownfield projects often focus on balancing environmental cleanup with job creation, investment attraction, and the enhancement of public services. Engaging local communities in the process is key to ensuring that redevelopment efforts respond to real needs and create lasting social value.

4.2

Industrial heritage conservation has emerged as a vital component of urban regeneration strategies in Turin, a city rich in manufacturing history that is currently navigating its transition to a knowledge-based, cultural economy. Rather than perceiving old industrial structures as relics of the past, contemporary approaches focus on their potential for reuse and reinterpretation within the urban landscape. These efforts underscore the architectural, historical, and symbolic significance of these sites, recognizing that they can serve as anchors for community identity and cultural continuity. As Turin strives to redefine its identity in the post-industrial era, the adaptive reuse of industrial heritage not only preserves the city's unique character but also integrates these structures into a vibrant urban narrative that reflects both history and innovation. By embracing this perspective, Turin can foster a sense of place that honors its past while paving the way for a dynamic future. Industrial buildings do more than simply occupy space—they hold the memory of a city’s evolution. These structures embody the stories, labour, and identity of generations, becoming powerful markers of collective urban experience that shape how communities connect with their past. In this light, adaptive reuse emerges as a key strategy for revitalizing these structures, repurposing them to meet contemporary needs while preserving their historical character. This approach not only minimizes material waste and resource consumption but also helps maintain the architectural language of cities undergoing transformation. The case of OSI-Ghia, a former automotive

design and assembly plant in the southern area of Turin, exemplifies the untapped potential of small- to medium-scale industrial heritage sites. Although not yet fully redeveloped, OSI-Ghia represents an opportunity to create multifunctional urban spaces aligned with innovation, education, and community use. Its characteristic industrial features such as sawtooth roofs and large open spans make it highly adaptable to new functions, while preserving its identity. Other examples across Turin, such as Lingotto, Spina 3, and portions of the Mirafiori complex, demonstrate how different industrial buildings can be transformed according to site-specific needs. While Lingotto was converted into a commercial and cultural complex through high-profile investment, OSI-Ghia could instead foster a more community-oriented model emphasizing inclusivity, creative industries, and local empowerment. This layered approach to industrial reuse in Turin highlights the importance of site diversity, architectural flexibility, and socio-economic adaptability in shaping a sustainable and heritage-conscious urban future.

Fig 3. The Parco Dora residential area in the Spina 3 complex.

Fig 4. Dora Park.

Fig 5. The Mirafiori complex in Turin

4.3

Adaptive reuse has become a cornerstone of modern sustainable-city thinking, especially when dealing with disused factories and other industrial brownfields. By giving obsolete buildings new purposes while honouring their historic form, this strategy cuts demand for virgin construction materials, lowers energy use, and safeguards cultural memory. Industrial structures, with their robust frames and generous spans, lend themselves naturally to this kind of transformation; once-vacant halls can reopen as housing, studios, or civic venues instead of ending up in landfills. From Nigra (2019): "...The field of architecture and building have tried to respond to this call by envisioning design solutions, pushing boundaries of technologies, and searching for new delivery processes. In order to understand the degree of these changes and their development opportunities, it is significant to fully gauge the nature and the dynamics that characterise the field. From a systems perspective, successful reuse is never strictly linear. It must evolve with the surrounding neighbourhood, absorbing feedback from social, economic, and ecological forces. This idea resonates with Groak's conception of buildings as living systems, where architecture is not seen as fixed but as continuously shaped by organizational flows and contextual interaction (Groak, 1990). As Allen reminds us, "the built environment should be an emergent artefact that responds to people's needs in a changing world" (Allen, 2008, p. 13). His insight underlines the need for redevelopment models that adapt gradually, identifying new 'attractors' of growth and stitching former industrial voids back into the urban fabric. Real-world projects such as the ongoing revitalisation of the OSI-Ghia complex in Turin demonstrate how thoughtful reuse can spark local jobs, diversify land use, and knit stronger community ties. When planned this way, brownfield regeneration not only recycles space but also supports the broader shift toward compact, resource-efficient and socially inclusive cities. The message is clear: creative re-imagination of what already exists often delivers greater sustainability dividends than building from scratch.

Example of case studies

- London, UK
- Essen, Germany
- Amsterdam, Netherlands
- Milano, Italy
- Vienna, Austria
- Duisburg, Germany
- Tilburg, Netherlands
- Paris, France
- Madrid, Spain
- Turin, Italy

5.Case studies

5.1

Tate Modern

Location: London, UK

Design Team: Herzog & de Meuron

Former Industrial Site: Bankside Power Station

Project Type: Adaptive Reuse and Cultural Redevelopment

Date of Project: Original Conversion Completed in

-Tate Modern Extension Completed in 2016

Original Area: Approximately 35,000 square meters

Post-extension surface area: Total size now exceeds 99,000 square meters, making Tate Modern one of the largest modern art galleries in the world.

The building that now houses the Tate Modern was originally the Bankside Power Station, an iconic structure designed by Sir Giles Gilbert Scott. Constructed in two phases, the western half of the power station was built between 1947 and 1952, while the eastern half was completed in 1963. For many years, it operated as an oil-fired power station until it was decommissioned in 1981, largely due to its inefficiency and mounting environmental concerns.

Bankside Power Station, known for its towering central chimney and robust steel structure, became an iconic part of London's industrial landscape. Situated on the south bank of the Thames, directly across from St. Paul's Cathedral, it was a prominent feature of the post-war era, even though some viewed it as an eyesore. After its closure, the building stood empty for nearly twenty years, sparking ongoing discussions about its potential for reuse.

Fig 6.Tate modern exterior view

Fig 7.Site -2

Figure 8.Site-1

In 1994 Herzog & de Meuron were commissioned to convert the old Bankside Power Statio into Tate Modern.

The new museum initiated breakneck development in the once neglected district of Southwark and is now to be extended.

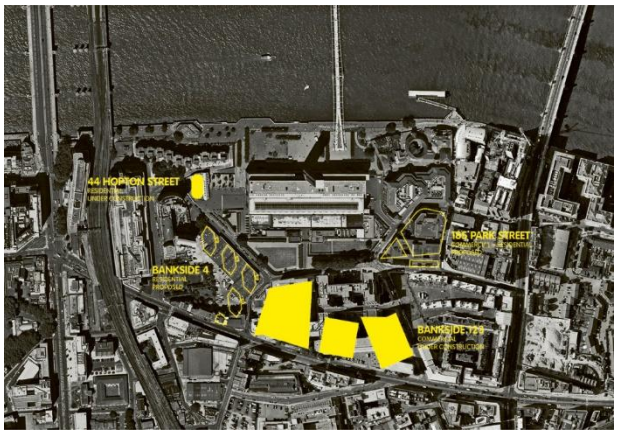


Fig.9 surroundings

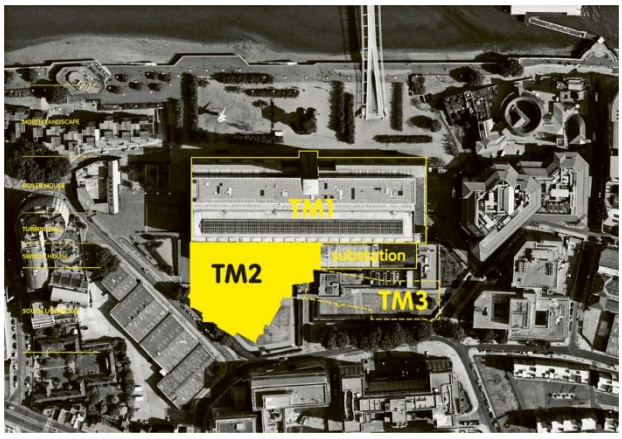


Fig.10 Masterplan

The reconstruction, between 1996 and 2000, was based on several principles:

• One of the big challenges was saving the colossal turbine hall the most distinctive part of the power station. Today, the 152-metre-long, 35-metre-high space is an immense gallery for large-scale installations and sculptures.

• Herzog & de Meuron took a minimalist approach to the architecture, spotlighting the original industrial materials, including brick and steel. To it they added modern elements a glass-columned roof extension, a new entrance that ran against the heavy, industrial nature of the building.

• The architects also paid attention to making the building accessible and welcoming to the public. The vast turbine hall of the former power station was repurposed into a meeting place, which offered free exhibitions and events, rendering art more accessible to all.

A major extension, the Blavatnik Building (formerly Switch House), opened in 2016, adding 60 percent more gallery space. The new building, also designed by Herzog & de Meuron, made the museum an even better host for contemporary works.

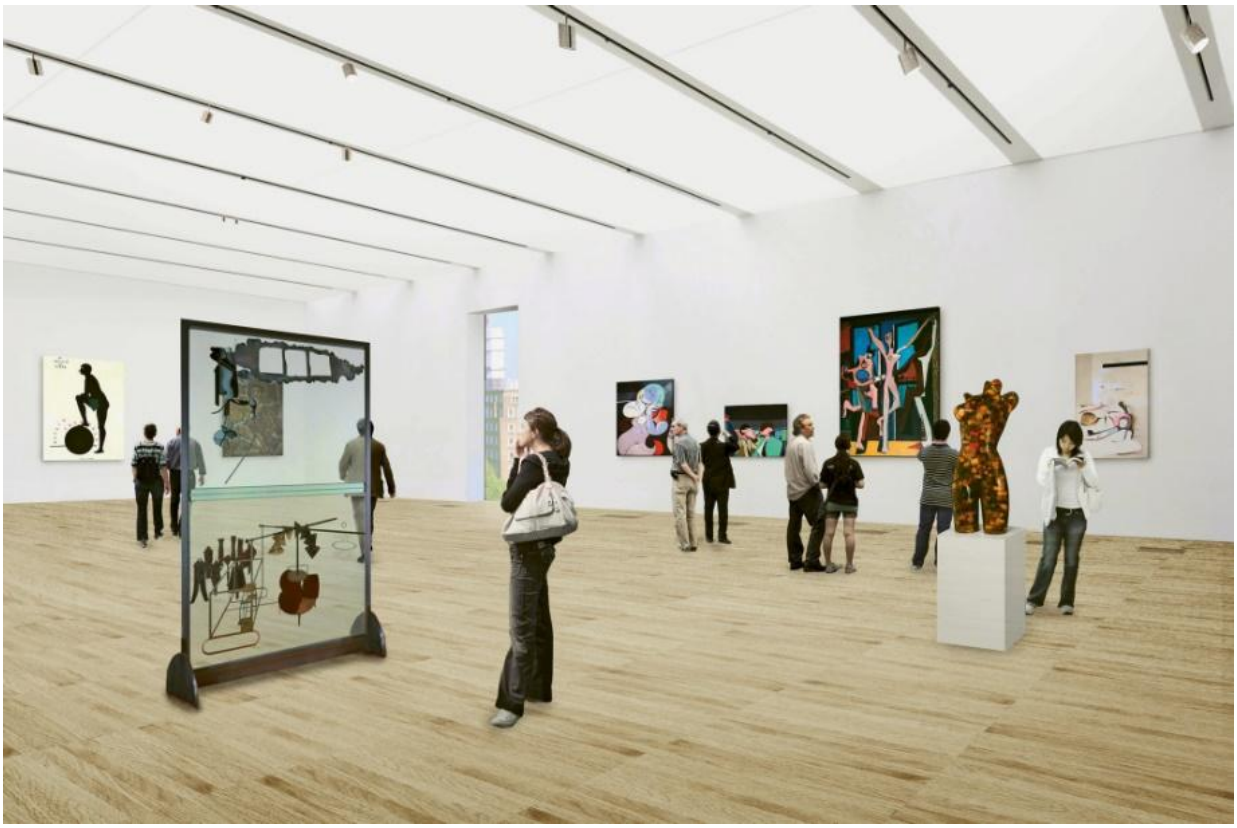


Fig.11 Interior view of Tate Modern gallery

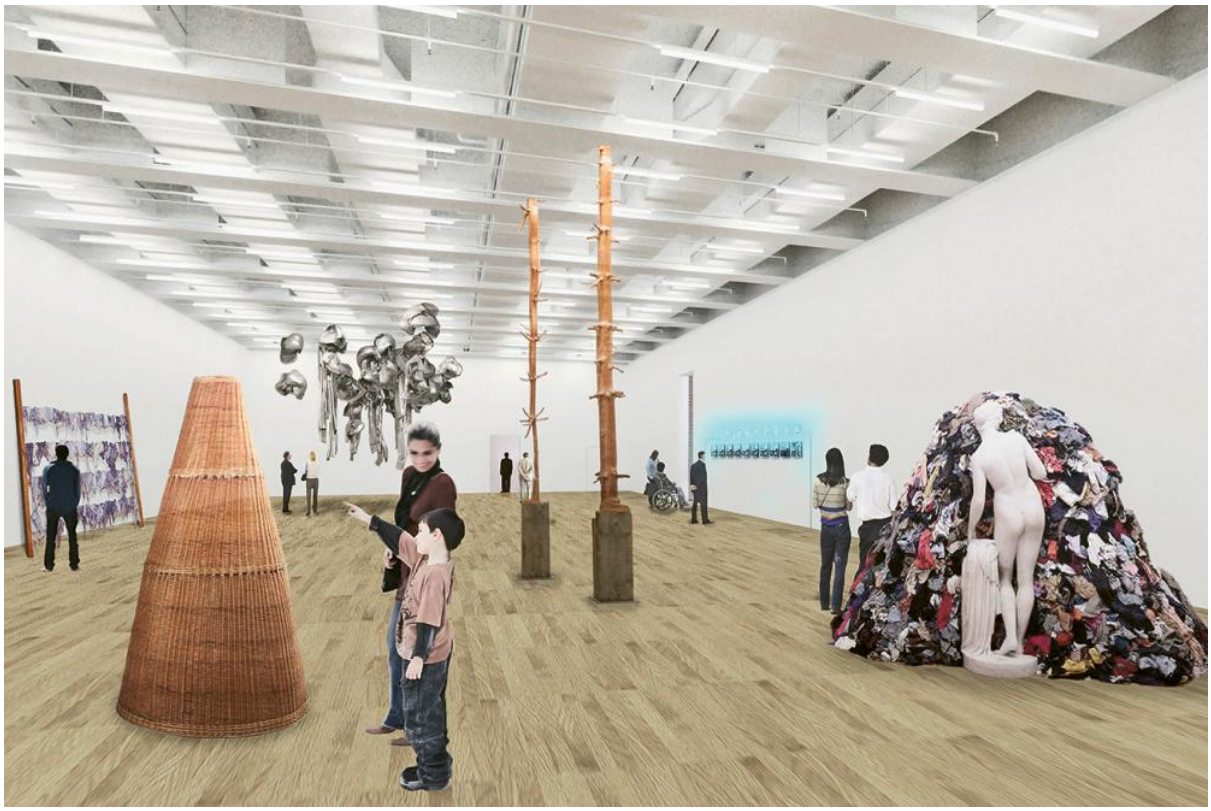


Fig 12.Interior v of Tate Modern gallery

Fig13. Baan, I. (2016). Exterior view of Tate Modern Switch House (Blavatnik Building) by Herzog & de Meuron

Architecture plays a strategic role in constructing national identity, often through the transformation of industrial structures into iconic landmarks that reflect political and cultural aspirations. A prime example is the adaptive reuse of the Bankside Power Station into Tate Modern—an intentional act to shape London's global image—highlighting how such projects become tools for national storytelling (Sudjic, 2005, as cited in *Urban Studies*, 2006)

5.2

Zeche Zollverein

Location: Essen, Germany

Design team: Herzog & de Meuron-Fritz Schupp & Martin Kremmer

Original function: (Former Coal Mine and Coking Plant)

Project Type: Adaptive Reuse and Cultural Redevelopment

Date of Project: Closed in 1986, redevelopment began in the 1990s, and it became a UNESCO World Heritage Site in 2001.

Surface: 100 hectares

Zeche Zollverein, located in Essen, Germany, was one of the largest and most famous coal mines in the world. Established in 1847, it played a crucial role in Germany's industrial revolution by efficiently extracting coal from the rich seams of the Ruhr area, which fueled the country's rapid industrial growth in the 19th and 20th centuries. At its peak, Zollverein employed thousands of workers and was often dubbed the most beautiful coal mine in the world for its striking modernist architecture. Together with its coking plant, it produced substantial amounts of coal and coke, making it a vital part of the Ruhr Valley's economic strength.

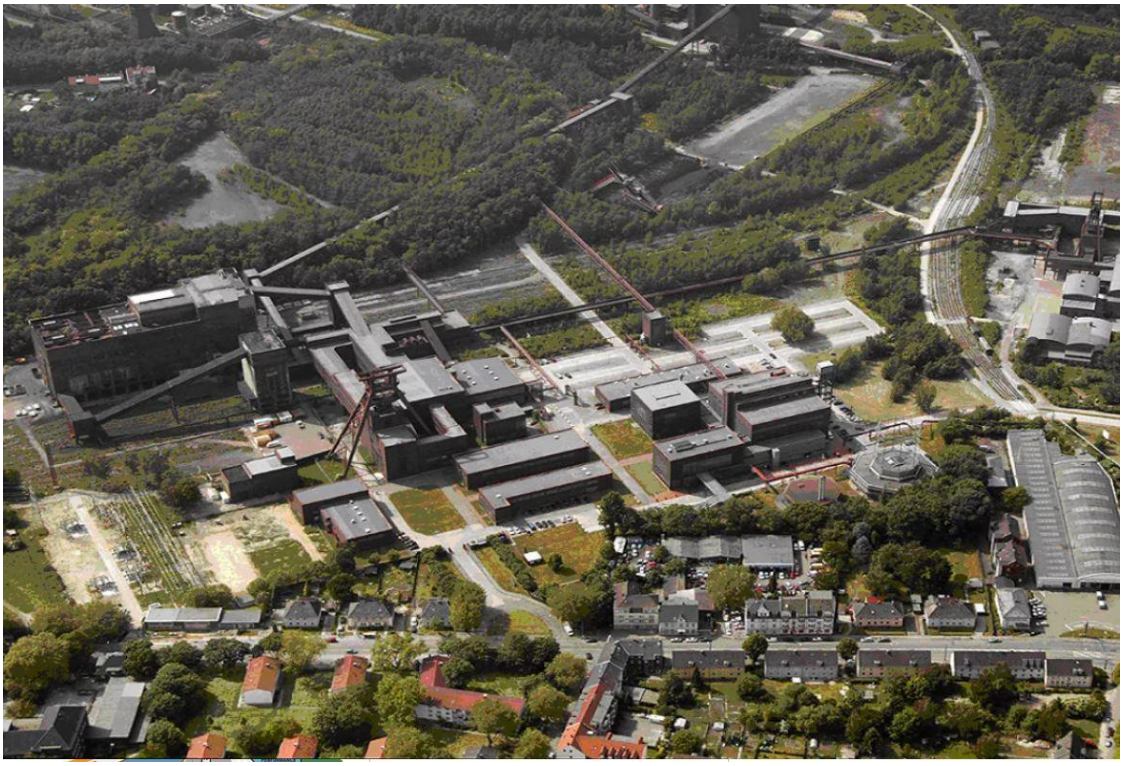


Fig.14 Steger, C. (n.d.). Aerial image of the Zollverein Coal Mine Industrial Complex in Essen (view from the southeast)

Fig15. Zeche Zollverein Foundation. (n.d.). Photograph of outdoor festival tents and lighting at Zeche Zollverein

Zeche Zollverein ended coal production in 1986 after almost 150 years in response to a wider process of de-industrialization in the area. The closings were the end of an era as heavy industry was replaced by economies more oriented around service and technology.It was left empty, closed up, and the site was left for regeneration instead of destruction. Appreciating the historical and architectural value of Zeche Zollverein, local leaders and architects launched the ambitious adaptive reuse project that transformed the former industrial site into a Völklingen-esque preservation of industrial culture. The redevelopment was the result of a wider regional project aimed at redeveloping the post-industrial Ruhr region and reinventing it as a center for culture, art, and education.The master plan for the site was designed by Swiss architects Herzog & de Meuron, and aimed to maintain the site's industrial legacy yet relocate its buildings for new applications. Herzog & de Meuron, also involved in the design of the Tate Modern in London, were tapping into the powerful industrial vibe of the complex. Their architectural approach was to leave much of the old structures in place, even incorporating the iconic Bauhaus-style Shaft 12, which has emerged as a symbol of the complex's history. Oh, and the plan kept (and converted) the industrial buildings rather than knocking them down.The emblematic, Bauhaus-inspired Shaft 12 has been kept as a monument to industrial architecture. A primary priority was renovating buildings to create sites for cultural institutions like the Ruhr Museum (and history museum), the Red Dot Design Museum, and the Zollverein School of Management and Design.The master plan included large areas of green space to make the site accessible to the public. They also served to link these industrial buildings and were used for exhibitions, public meetings, and leisure activities. The site was redeveloped with new transport and infrastructure links allowing visitors easy access. Public transport links, footpaths, and cycle paths were developed to foster sustainable access across the site.

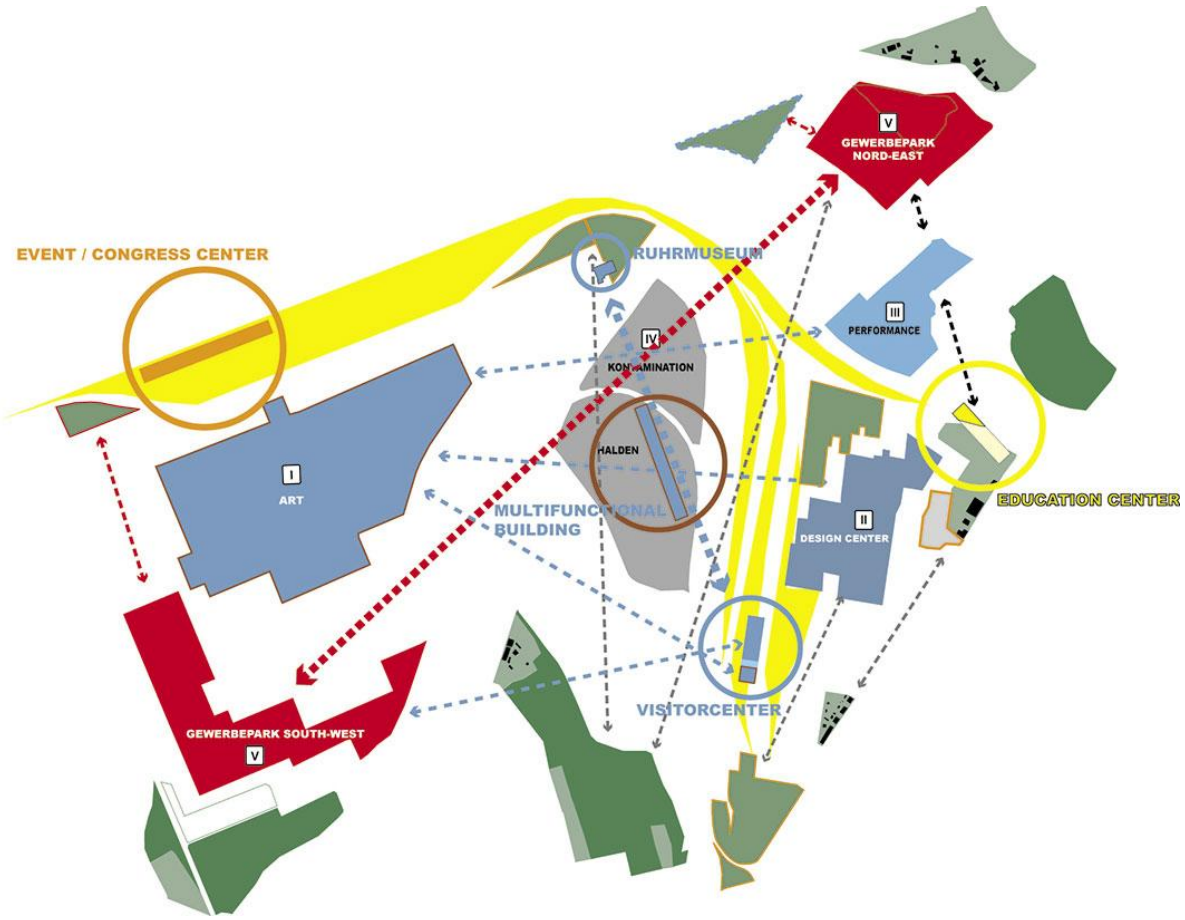


Fig 16.Diagram of the programatic connection of the Zeche Zollverein Masterplan by OMA

Fig 17-Zeche Zollverein Masterplan by OMA

"We must recognize that the industry, with its massive structures, is no longer a disruptive force in our cityscapes and landscapes. Instead, it stands as a symbol of labor and a monument to the city one that every citizen should proudly showcase to visitors, just as they would with public buildings." Fritz Schupp and Martin Kremmer, architects of Zollverein.

Fig 18-Zeche Zollverein Foundation. (n.d.). Images of recreational reuse at the Zollverein Industrial Complex

5.3

Westergasfabriek

Location:Amsterdam, Netherlands

Design Team: Originally designed by Isaac Gosschalk (1885),

redevelopment led by Gustafson Porter + Bowman in the 1990s.

Former Industrial Site: A gasworks facility supplying coal gas for Amsterdam's energy needs in the late 19th and early 20th centuries.

Project Type: Brownfield redevelopment aimed at adaptive reuse for cultural, recreational, and mixed-use purposes.

Date of Project: Redevelopment started in the 1990s and officially reopened in 2003.

Surface: The entire complex, including Westerpark, spans 14 hectares

Fig 19-.Schlijper, T. (n.d.). Aerial view of Cultuurpark Westergasfabriek and Westerpark..

The Westergasfabriek in Amsterdam is a shining example of how industrial heritage can be transformed into a vibrant cultural and recreational space. Originally built in 1885 as a gas factory to meet the city's growing energy needs, it was designed by Isaac Gosschalk and became an important part of Amsterdam's industrial history. The factory featured neo-Renaissance architecture, characterized by its brick buildings and iron frameworks, which added aesthetic appeal to its practical function. However, as more efficient energy sources emerged, the gas factory became obsolete, closing by the mid-20th century. It remained abandoned for several decades, facing significant challenges due to environmental contamination, particularly from coal tar. In the 1990s, Amsterdam launched an ambitious redevelopment plan to transform the derelict Westergasfabriek into a cultural and recreational hub. This initiative combined environmental remediation with cultural development, ensuring the site could be safely repurposed while preserving its historical significance. Extensive soil cleanup addressed the contamination, allowing for the adaptive reuse of the historical buildings. Today, the

redeveloped Westergasfabriek serves as a creative hub, hosting a variety of cultural events such as film screenings, art exhibitions, and music festivals. It has become home to creative industries, featuring offices and studios for artists and designers. The redevelopment also created a mixed-use space that includes cultural venues, restaurants, and recreational areas, while the adjacent Westerpark was expanded to provide green space for residents and visitors. The Westergasfabriek's redevelopment is recognized as a sustainable project, showcasing effective environmental remediation, the adaptive reuse of historical structures, and the integration of green spaces. It exemplifies how industrial brownfields can be transformed into valuable assets for urban communities. "Westergasfabriek is one of our defining projects. It forms a seamless whole with the buildings it surrounds and is a meeting place for everyone." Neil Porter, Founding Partner. Challenges for redevelopment. In the 1990s, the city of Amsterdam initiated an ambitious redevelopment plan to transform the derelict Westergasfabriek into a cultural and recreational hub. The city's strategy combined environmental remediation with cultural development, ensuring that the site could be safely repurposed while preserving its historical significance.

Fig 20.Schlijper, T. (n.d.). Water play and recreational space at Westerpark.

The city's strategy combined environmental remediation with cultural development, ensuring that the site could be safely repurposed while preserving its historical significance. The cleanup involved extensive soil decontamination, particularly of the coal tar that had leaked into the ground over the years. Once the environmental concerns were addressed, attention shifted to the adaptive reuse of the historical buildings. The redeveloped Westergasfabriek was envisioned as a creative hub for cultural activities. It now hosts a variety of cultural events, including film screenings, art exhibitions, music festivals, and other public events. The site has become a home to creative industries, with offices and studios for artists and designers.

The redevelopment also focused on making the site a mixed-use space that would include cultural venues, offices, restaurants, and recreational areas. The Westerpark, adjacent to the site, was expanded and integrated into the complex, offering a green space for residents and visitors. The Westergasfabriek's redevelopment is considered a sustainable project due to its environmental remediation, adaptive reuse of historical structures, and integration of green spaces. It serves as an example of how industrial brownfields can be transformed into valuable assets for urban communities. "Westergasfabriek is one of our defining projects. It forms a seamless whole with the buildings it surrounds and is a meeting place for everyone." — Neil Porter, Founding Partner

> "Projects may restrict themselves to stand-alone buildings or larger building complexes, or they may include entire quarters or networks of locations. Mostly, the projects are housed in former industrial complexes, but quite often they also imply the building of new sites." (Mommaas, 2004, p. 508)

According to the master plan, grounds were to have a green, recreational park function, residents would be the main users, natural environmental qualities had to be strengthened, and a one-hectare open-air events area must be included. Gustafson Porter + Bowman developed a refined plan that is faithful to the original proposal in its creation of park zones that relate specifically to existing site elements and contexts. At the renovated Stadsdeelraad (town hall), the plaza's layout is a cultivated expression of order. Along the Haarlemmervaart canal, a popular access point for neighborhood residents, a wide, linear plaza provides public recreation space and connection to the adjacent Market Square. To the southwest, two historic gas holding structures adjacent to the Cité des Artistes complex, frame displays of aquatic plants, fish and reflective water. At the park's northwest corner, proximity to an active agricultural polder generates an explicitly ecologically oriented circulation scheme and water feature. In its attentiveness to external circumstances, the design is a conglomeration of uses – civic, social, commercial, cultural, recreational, ecological -- that operates as a synecdoche for the city rather than the sequential circuit or continuous fabric of a conventional park.

Fig22-Conceptual landscape master plan for adaptive reuse site

Fig23- schlijper, T. (n.d.). recreational space at Westerpark.

Fig24- schlijper, T. (n.d.). recreational space at Westerpark.

5.4

Fondazione Prada

Location:Milan, Italy

Design team: OMA (Office for Metropolitan Architecture), led by Rem Koolhaas.

Former function: Originally, it was a distillery (Società Italiana Spiriti) from the early 20th century.

Project Type: Adaptive reuse of an industrial site into a contemporary cultural center.

Includes art exhibition spaces, a cinema, a library, and public areas.

Date of Project: Opened in May 2015. The project began in 2008.

Surface: Total area of approximately 19,000 square meters

Fig25-Princen, B. (n.d.). Exterior view of Fondazione Prada (restored and new OMA structures)

The Fondazione Prada is also housed in a refurbished former industrial compound, where an abandoned gin distillery was turned into an institution pioneering new realms of culture based on contemporary art and architecture. The area is a preserved district, which makes it different from other adaptive reuse projects in the fact that it allows the coexistence of respecting the preservation of the past and creating new interventions. Conceived by OMA and led by Rem Koolhaas, the Fondazione seamlessly enlivens three new buildings (a cavernous exhibition pavilion, a 20-meter-tall vertical gallery, and an indigo-colored cinema) with the old industrial

architecture. This well-considered combination of old and new not only respects the history of the site but will provide a vibrant space for expression and culture.

Fig26-Princen, B. (2015). Exterior view of Fondazione Prada (restored industrial buildings and new structures by OMA)

The design of the Fondazione Prada goes beyond conventional adaptive reuse practices. Instead of focusing solely on preservation or creating a completely new structure, Koolhaas sought to merge the past and present in a way that invites ongoing dialogue between art and architecture. This is achieved through a carefully curated mix of restored historical buildings and newly constructed spaces.

The project is not attempting to come together to form an image or a hierarchy. Instead, it forms a series of broken yet linked-up spaces with no single room that dominates. This leeway provides for an "unstable, open programming" which promotes a productive dialogue between art and architecture and stretches their limits on both sides.

The Torre, or Tower one of the big new elements is a 60-meter-tall tower with nine floors, featuring differing spatial configurations for exhibitions and sprawling if vertigo-inducing panoramic views of Milan. On the outside, the stark white concrete contrasts sharply with the grizzled industrial throws of the old buildings. The Torre has become a symbol of the Fondazione and of the dialogue between history and modernity that informs the entire project.

Fig27-Princen, B. (2015). Interior view toward the Haunted House core at Fondazione Prada

In re-using an industrial space without scrubbing away its past, the Fondazione Prada also demonstrates the power of adaptive reuse as a tool of urban renewal. It keeps the tradition of the industrial history of Milan alive, at the same time providing a dynamic volume for the culture of today, innovation, and public participation.

Among the other new structures are a cinema building that serves as a theater for cultural programming, and an exhibition pavilion whose expansive, flexible spaces can accommodate contemporary art installations. One of the original buildings, the golden facade of the “Haunted House” serves as a visual counterpoint to the industrial/contemporary aesthetic throughout the complex. Unlike the common flat museum, the Fondazione Prada consists of multiple typologies of spaces. A Holly Hobbit-like experience consisting of floor space as large as Saskatchewan and as small as PEI, visitors meander there through small, crowded rooms, intimate viewing platforms, and sprawling halls of exhibits. These two contrasting spaces enable artists and curators to play with the display and experience of their work.

The movie theater inside the complex is more than a cinema and becomes a space for retrospectives, avant-garde screenings, and interdisciplinary projects that link the cinema to plastic and architectural arts. And then there's Bar Luce, created by the film director Wes Anderson, which is a playful, retro-inspired spot to take a break and chat.

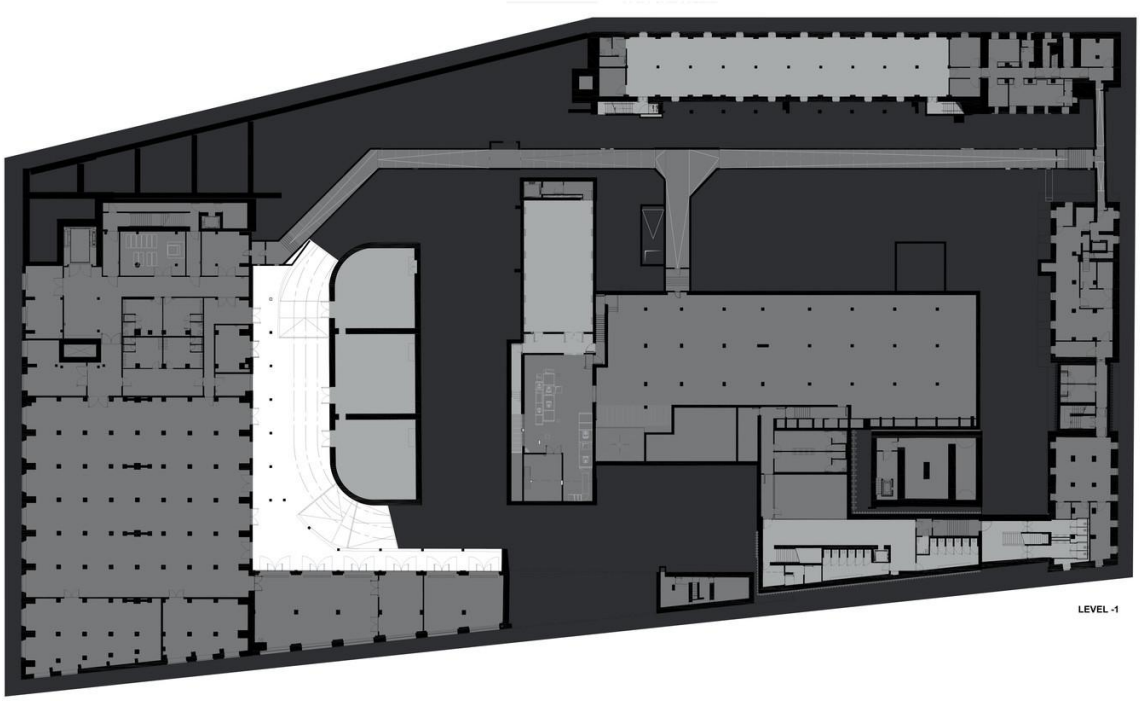


Fig29-Underground level

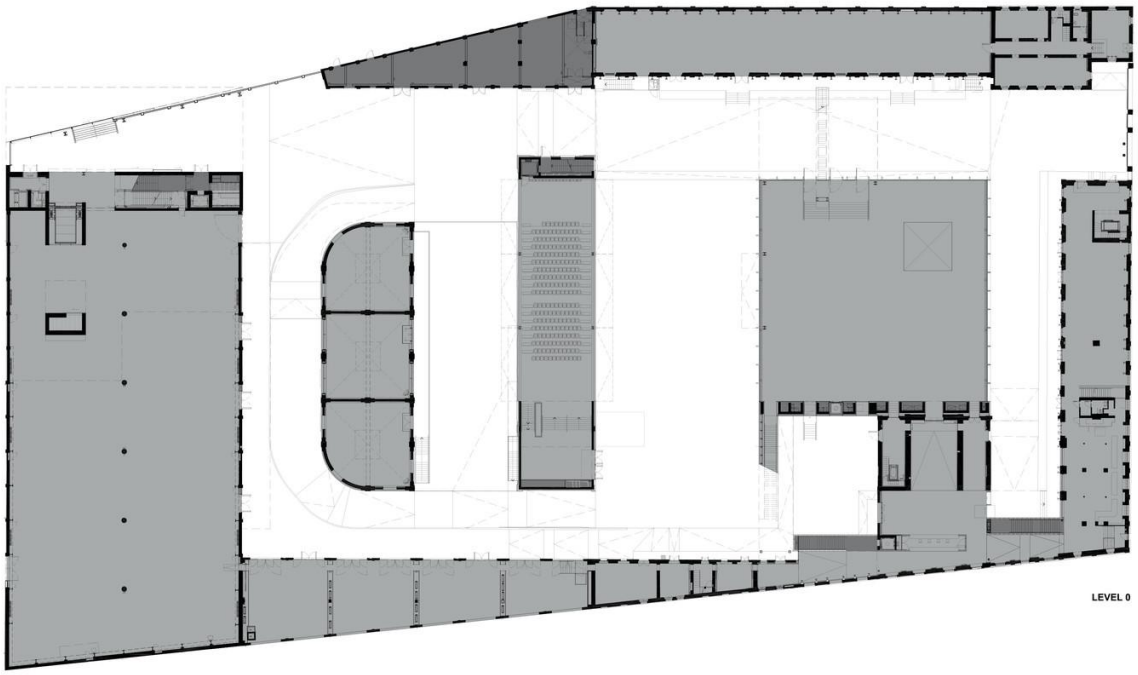


Fig30-Ground floor

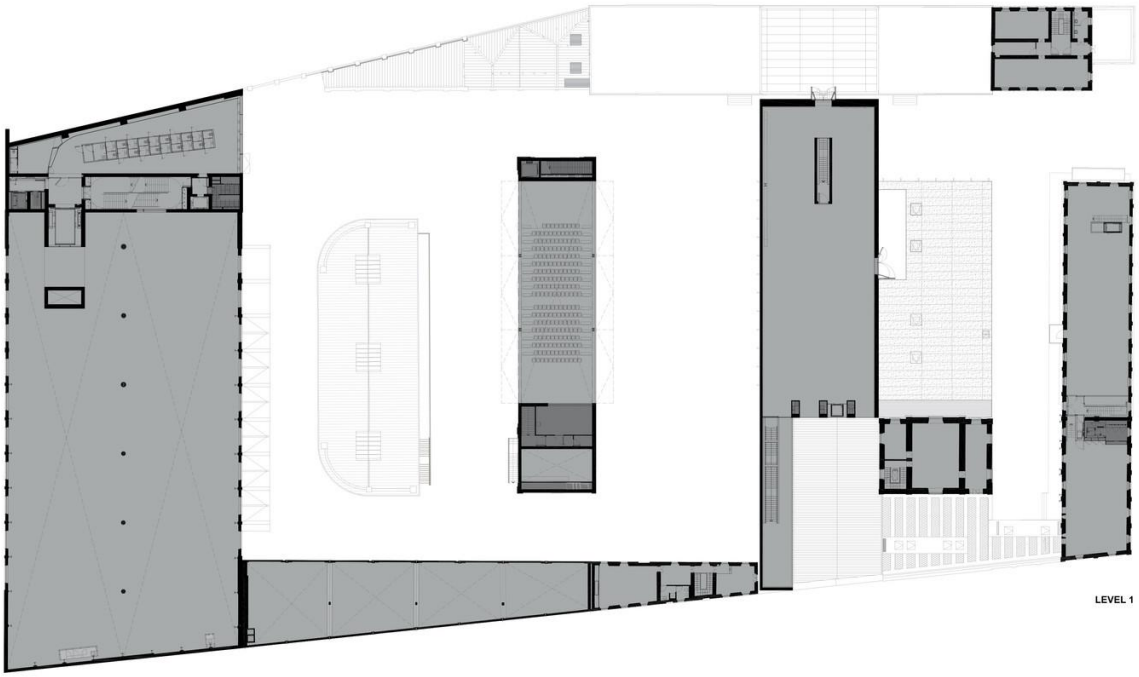


Fig31-First floor

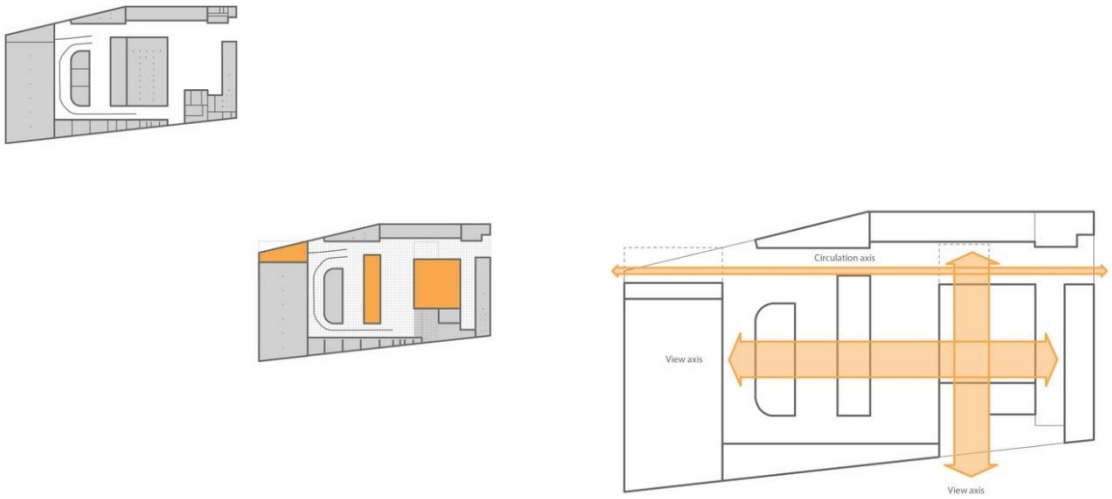


Fig32-Conceptual circulation and view axis diagram

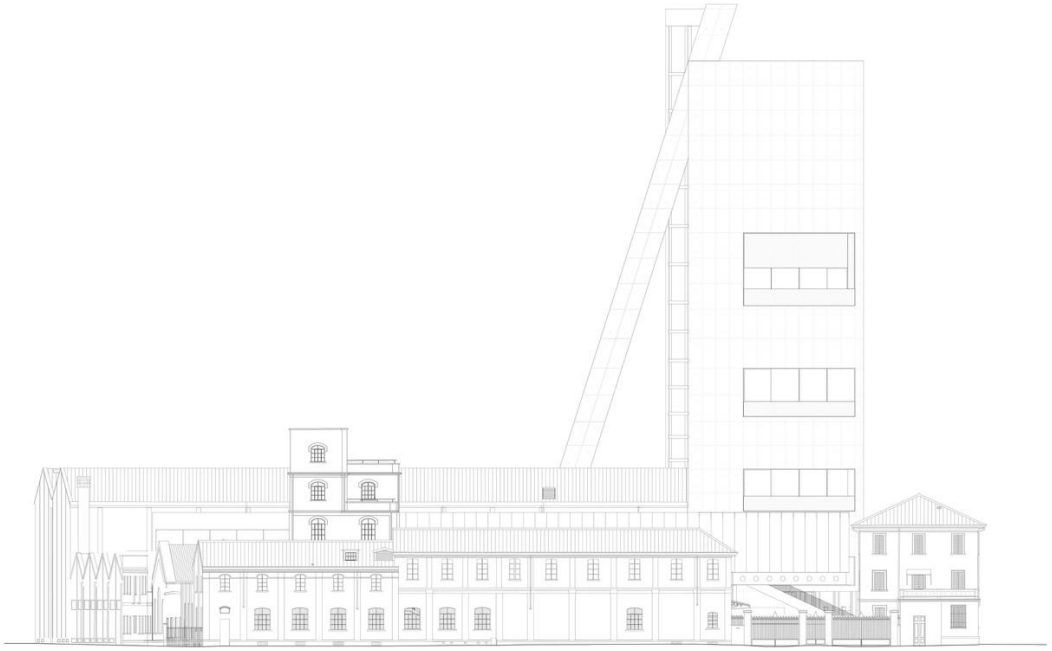
The new Fondazione Prada, in a former Milanese industrial estate in the city's southern suburbs, has done a great deal toward that resurrection. With the former industrial decay of the area long gone today is a lively cultural hot spot for local and international visitors. In preserving the industrial heritage of the site, the project adds cultural value to exhibitions, workshops, and events of world-class status. The program of the Fondazione Prada is designed to create a dialogue with different artistic disciplines. Its showcases include contemporary art, architecture, and cinema as it provides opportunities for established and up-and-coming artists. The addition of themed exhibitions like those that look at philosophy, science, and cultural history also broadens the base.

Fig33-Sisto Legnani, D., & Cappelletti, M. (2015).

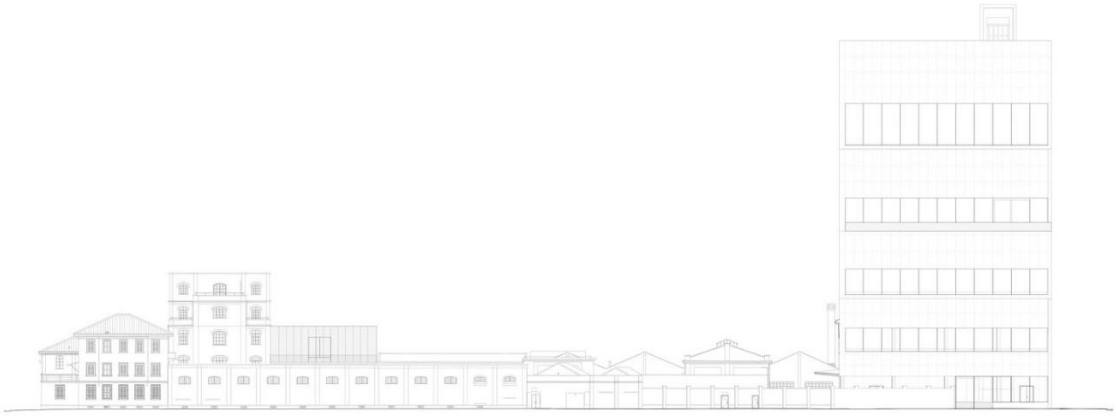
Exterior view of restored industrial and new volumes at Prada

Fig34-Princen, B., Sisto Legnani, D., & Cappelletti, M. (2018). Rooftop and new volumes at Fondazione Prada's Torre, Milan

The interplay of the old and the new in the architecture of Fondazione Prada is one of permanent interaction. Instead of writing over the industrial history or forcing one modern language, the new building acknowledges paradox and conflict. This "incomplete" condition makes the house appear open to the point of "becoming" with the inhabitants and the art that is kept inside. The preservation of the existing factory, the implementation of new architecture and reading of the site, has brought the Fondazione Prada wide acclaim for the imaginative reuse of a factory and integration of new structures. It has organized numerous key exhibitions including cooperation with international curators and institutions. Fondazione Prada testifies to the potential of adaptive reuse beyond its mere function, making it an experimental site in which architecture converses with art. Not only does it feed Milan's cultural scene, but it is also a lesson in bringing industrial heritage in line with contemporary urban life.



- Fig35-East Elevation



- Fig36-North Elevation

5.5

Gasometer City

Location: Vienna, Austria

Design Team: Jean Nouvel, Coop Himmelb(l)au, Manfred Wehdorn, and Wilhelm Holzbauer.

Former Function: Originally built as large storage tanks for coal gas in Vienna’s 19th-century gasworks.

Date of Project: Redevelopment began in 1999 and was completed in 2001.

Surface Area: The project covers approximately 22,000 square meters, with each gasometer structure reaching 70 meters in height.

Fig37-Toni Rappersberger. (2001). Exterior view of four Vienna Gasometers with tennis court

Originally erected from 1896 to 1999 the Gasometers in Vienna were four huge gas reservoirs without which the city’s gas distribution system could not have operated. These 70-meter-high cylindrical brick structures were the nearly a hundred-year storage sites for coal gas. Each of the four tanks held up to 90,000 cubic meters gas. They ceased operation by 1984. The Vienna authorities wanted to preserve these buildings which had both architectural significance and historical value, thus they have been repurposed and expanded as Vienna's new urban living districts. Beginning in the late 1990s, a comprehensive redevelopment project transformed the Gasometers into a multifunctional urban complex. Completed in 2001, the project had four award-winning architects at the helm: Jean Nouvel, Coop Himmelb(l)au, Manfred Wehdorn, and Wilhelm Holzbauer. Each architect was responsible for redesigning one gasometer, thereby making a unified yet distinct whole structure. The new complex blends historical architecture which has been witness to so many important events and delights people from all over the world today with modern design which makes everyone feel at home.

Gasometer A

Architect: Jean Nouvel

In 1866 the great Gasometer A in Vienna, now redeveloped by famous French architect Jean Nouvel himself, is one of four old gas storage tanks at Gasometer City that have been converted into a modern urban complex. Nouvel's design features the preservation of the Gasometer's historic brick exterior, and its interior is completely modern, characterized by clear glass and steel elements which result in open spaces filled with natural light. Inside, the living apartments of Gasometer A and retail and office areas offer a mix of urban lifestyles. This is a new version for city living and working, where both lifestyles complement each other. Initial conclusion: Although Jean Nouvel's approach is thoroughly modern, he preserves the historical substance of the buildings by adding innovative materials which simply were not around in earlier times.

Compared to the newly fitted interior, the 19th-century original red brick facade has a distinctive contrast. Glass is utilized in the building so it can also be seen through from outside, a symbol of transparency and modernity. Through such modern interventions, Gasometer A is converted to an integral part of Vienna's social and cultural life. This blend of community-focused residential areas and contemporary urban lifestyle facilities serves to fill that role.

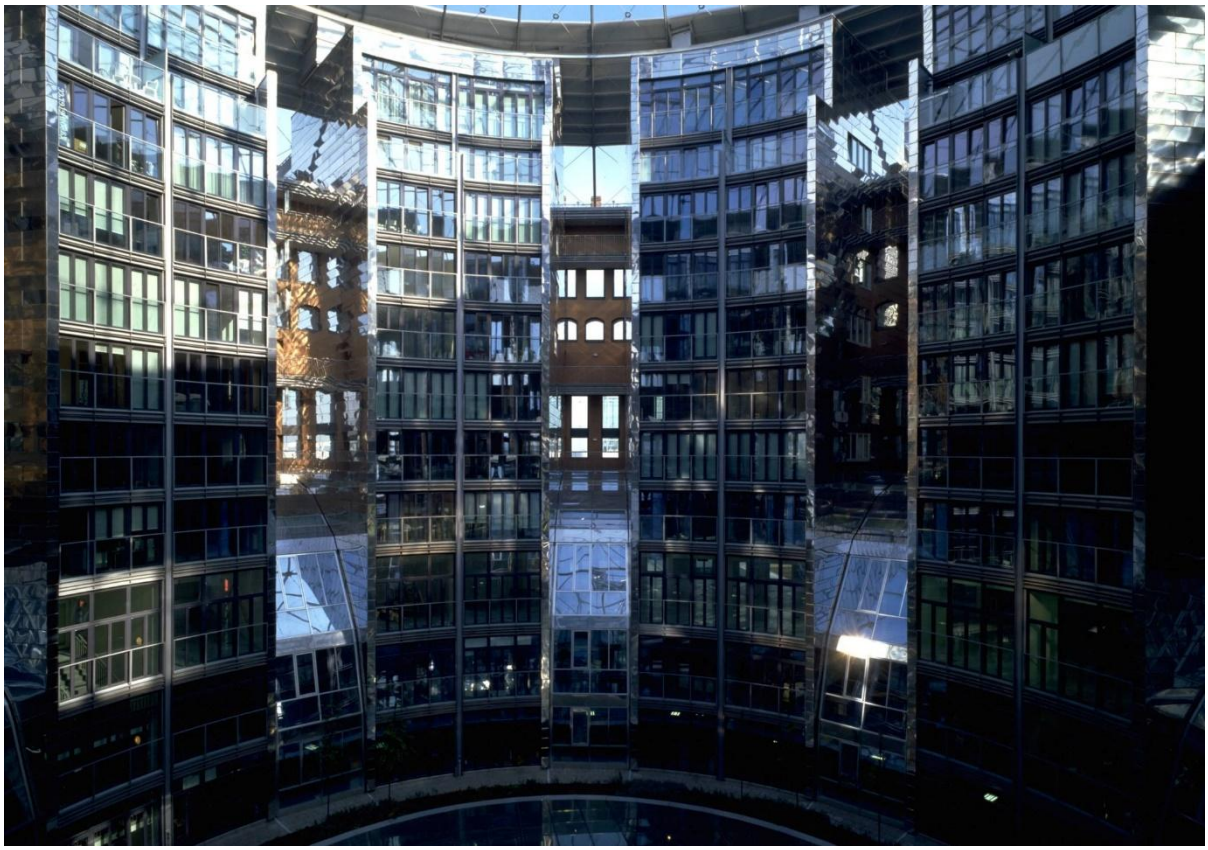


Fig38-Esther Seijmonsbergen. (2013). Interior dome and reflective glazing in Vienna Gasometer

Fig39-Andreas Pöschek/Viennaphoto.at. (2006). Gasometer C facade close-up, Vienna

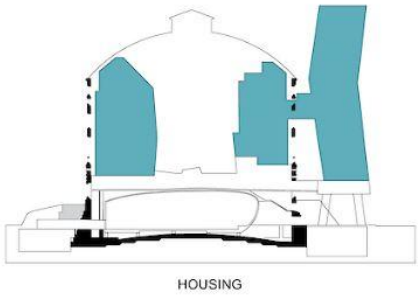
Gasometer B

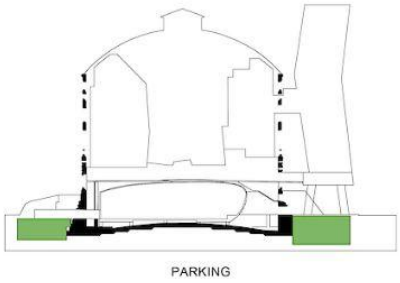
Architect: Coop Himmelb(l)au

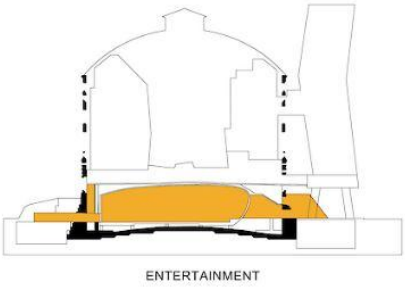
There are three additions to the original structure in Gasometer B, designed by Coop Himmelb(l)au: a new volume has been added at the interior portion of the Gasometer itself, shield added protectively on the outside, and a multifunctional event hall placed at base level. The tower of Gasometer B contains both apartments and offices. Those within the cylinder are bathed in natural light from the conical inner court and windows set in the historical facade. The shield receives natural light from a large glass front facing north and that has loggias. Among the 330 apartments there are different types of living, ranging from three-room maisonettes and lofts to small units suitable for students. This combination of office and living space was something new in architecture at the time of construction. For outside access, the development is entered from either Guglgasse or through an adjoining shopping mall off each of its four sides. The latter provides connections at ground level among all gasometers. Inside Gasometer B, a generously dimensioned, purpose-arranged event hall is built between apartments and offices on ground level. Internal communication thus gains in importance. A social space for the residents of Gasometer B is on the seventh floor. Other areas that need some putting in common, can be put in common.

The event hall is a column-free, self-supporting shell construction in the Gasometer, that is freestanding and not structurally connected to the residential building above it. Functionally, structurally and acoustically, the operation of the event hall is thus uncoupled from the apartment building.

- Fig 40-Austria. Cesar Serrano. (n.d.). General interior circulation space in a Vienna Gasometer
- *Austria. Roman Plesky. (2019) (n.d.).* Dome and courtyard interior of a Vienna Gasometer







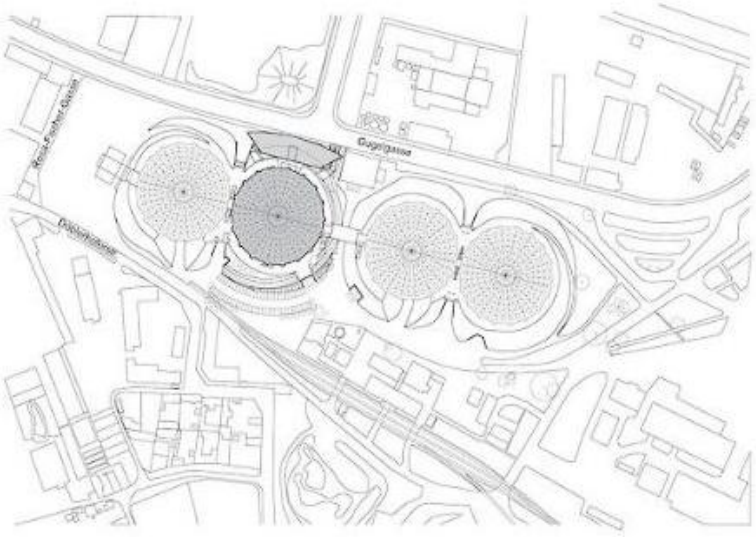


fig41-Site Plan

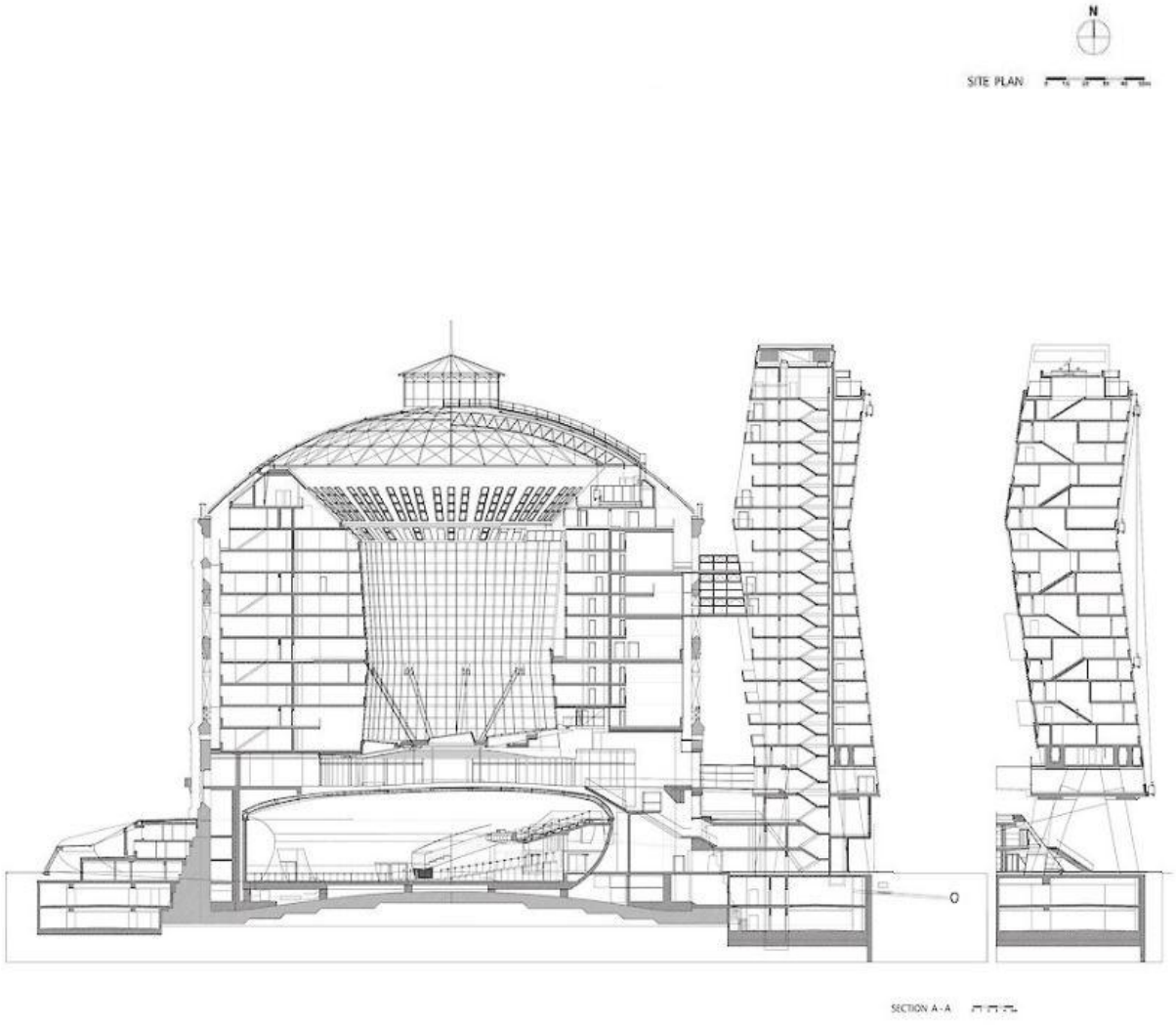


fig42-Apartment building gasometer B drawings

The event hall is a free-standing structure that is roofed by Gasometer C and is not fitted with a wall separating it from the residential building overhead. In terms of function, structure and acoustics, operation of the event hall is therefore independent of the apartment blocks. Nouvel did reconstruct the fourth of Vienna's Gasometer City complex gas storage tanks as Gasometer C. His plan was a rebirth, and fabrication out of what it once was. His imaginative response to an existing industrial structure was to extend the circular internal core and add a sequence of storeys. To top it off, the architect capped the building with an impressive glass dome that allows natural light to pour inwards. This innovative feature, along with the veined glass sections, creates a novel play of disclosure and concealment that enriches apartment and business functions within Gasometer C**.** For the interior, Nouvel has arranged it as a multifunctional complex in which student flats and offices, as well as leisure outlets are combined. By superimposing modern elements onto the historical face of the gasometer he has reflected part of the building's industrial ancestry while giving it a contemporary twist. And that combination of old and new is what has made Gasometer C in Vienna a memorable emblem for comparatively reinventing itself: transforming former sites of industry into lively urban shires serving a variety of collective needs.

Fig43-Austria. (n.d.). Residential courtyard under dome in Vienna Gasometer City

Fig44-Inside part

Gasometer D has an area of around 15,500 square meters light streams down internal courtyards provide a spacious and lively atmosphere. Virtually all of these apartments are built round it; using lifts in a through tunnel, Holzbauer could include internal courtyards and thereby fit three self-contained units into just two blocks layout. This arrangement gave the building breathing space and made it possible to have functional as well as original housing. Gasometer D combines modern materials, such as concrete, glass, and aluminium with the original brickwork to preserve the old structure's character. In this way, Gasometer D is now a lively city hub of some 1,500 residents. Retail shops, offices, and cultural facilities are all under one roof with the urban production system reinventing itself to fit modern requirements.

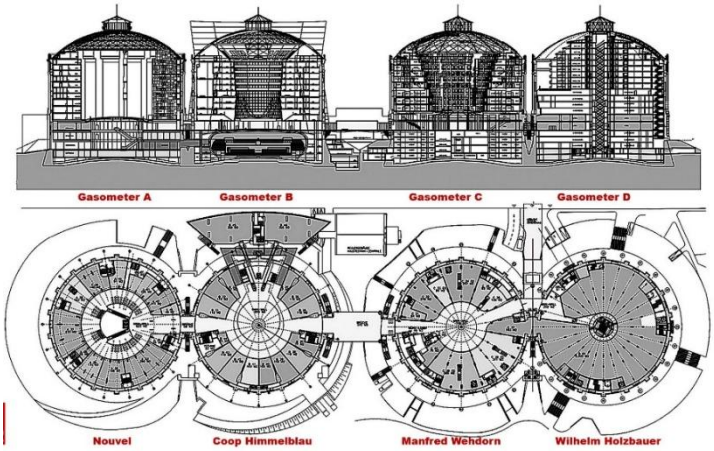


Fig45-Austria. (n.d.). Section and plan diagram of Vienna Gasometers A–D

5.6

Landschaftspark Duisburg-Nord

Location:Duisburg, Germany

Architect: Peter Latz and Partner.

Former Industrial Project Type: Former iron and steelworks plant repurposed as a public park.

Date of Project: Initiated in the early 1990s and officially opened in 1994.

Surface Area: Approximately 180 hectares.

Fig 46-Launer, G. (2014, October 3). Aerial view of Landschaftspark Duisburg-Nord

The site was originally steelworks complex built in the early 20th century and remained in use until 1985. It was part of the Ruhr region's industrial core, contributing to Germany's economy by producing steel for various industries, including wartime production during both World Wars. One of the major reasons for closing down the plant in 1985 was industrial decline. This left a site now known as Duisburg-Nord Park with contaminated soil, abandoned buildings and polluted waterways. It would be a challenging brownfield site. In the early 1990s, city planners in Duisburg and the International Building Exhibition (IBA) Emscher Park began to transform this waste land into a

park. Basic ideas for ecological redevelopment, sustainable construction methods and the preservation of industrial heritage were combined into one view.

Design vision: with his design Latz sought to merge nature and the residues of its previous industrial era historically important identity site remain intact, creating green space and natural views. The blast furnaces, ore bunkers and bunkers have all been retained as icons of the park, interactively transformed into sightseeing platforms. Polluted places were cleaned using innovative phytoremediation techniques, where plants absorb and neutralize pollutants from soil or water.

Fig 47-Latz, M. (n.d.). Industrial structures at Landschaftspark Duisburg-Nord

The unique recreational and cultural spaces of Landschaftspark Duisburg-Nord blend industrial history with urban park design.Climbing walls have been created by converting ore storage bunkers; scuba diving is now possible in the gasometer tanks with filtered water providing a unique diving experience.At the same time blast furnaces, tanks and other facilities not originally designed for it, have been used creatively to fulfill these needsThey are also an important part of the cultural vitality now found within the park.Steel catwalks and staircases provide walkways round and over the former factory structures, allowing you to view Duisburg and the Ruhr region from high vantages.British artist Jonathan Park designed a nightly illumination of the site, using colored lights to pick out various buildings and pathways. In this way, visitors could enjoy new and unusual grandeur.As it keeps the original structures and derives recreational value from them, the memorial is a worthy tribute to this industrial legacy.It has a rich assortment of amenities that are not very expensive, from areas to campfire. Even climbing walls can be found here. All age groups, all different kinds of people now have access to the countryside.

Fig48- Latz, M. (n.d.). Reused pipeline and wind turbine in Landschaftspark Duisburg-Nord

Some bunkers and silos now house gardens and installations. For example raised beds in set-plays off plants make the effect of foliage against concrete, reflecting both the park's efforts to restore ecologically and that industry can regenerate a countryside wild from. This is where a large network of conveyor belts and tunnels used to convey materials throughout the plant. Today the many of them have been transformed into sidewalks for people cycling in the Park. Some of these walkways and elevated tunnels serve as viewing platforms -- and connections enable visitors to explore Andrei Sakharov’s industrial city from all levels and viewpoints.

Fig49-Latz, M. (n.d.). Fireworks and night event at Landschaftspark Duisburg-Nord

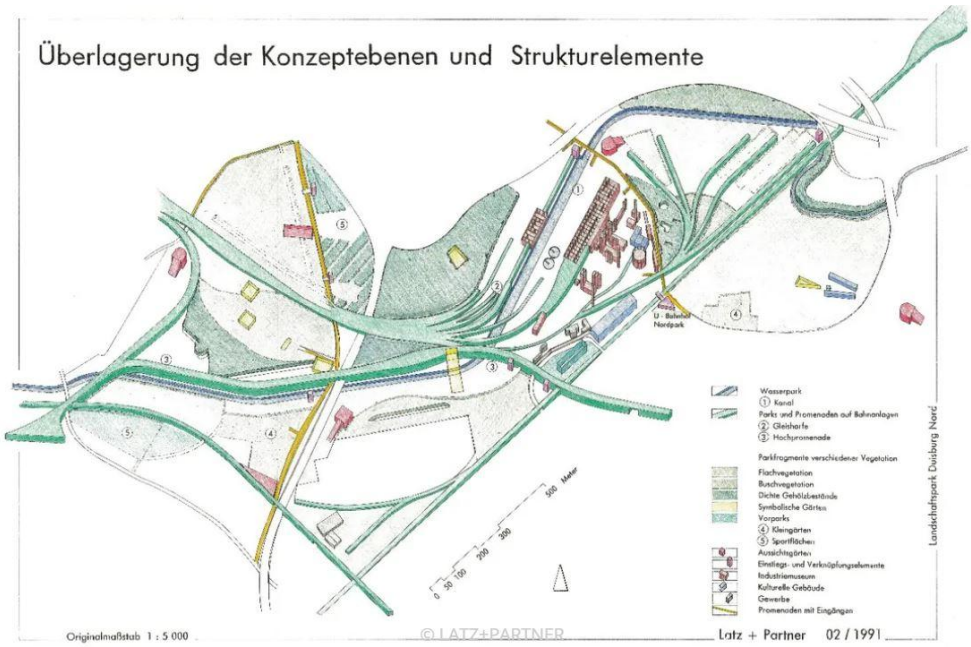


Fig50-Latz + Partner. (1991, February). *Überlagerung der Konzeptebenen und Strukturelemente* [Design drawing]

In this map, areas of different species and thus different natural systems can be seen. They represent a process in which nature retreated before man but now asserts itself once again on industrial sites like these.Rather more fabric-than-factory, these green areas include local plants symbolic gardens and densely rich vegetation to form areas of outstanding natural beauty. The Landschaftspark Duisburg-Nord is a turning point in the history of industrial wasteland renovation. The scheme showed how an old steelworks can be revitalized with innovative design and ecologically sensitive planning.It also saw a former steelworks in Germany's Ruhr region converted into a multi-purpose public park. This was carried out by Latz + Partner and shows historical preservation balanced with ecological regeneration. There are no "translation effects" in language. Just as water-treatment channels have replaced the old cooling channels were concrete fences built to block flies off the furnace area which had apparently been in existence since before World War I. Native vegetation healed our wounds. Unlike the previous approach, ground that had once been industrial land was now covered with grassy plateaus. This not only makes the environmental problems of the past responsible once again, but also contain sustainability assets for future generations When seen as a model,Duisburg-Nord Landscape Park is unique in encouraging adaptability approaches in urban planning. It suggests that post-industrial sites around the world will be available as 'places' of public life, enriching their local environment, and providing them with points for community involvement. “By transforming them in subtle and sensitive ways into parts of a new design, and by re-programming their functions, they have successfully converted this former industrial site into a revolutionary new landscape type, one that is attracting more than 500,000 visitors per year.” (Stilgenbauer, 2005, p. 7)

5.7

LocHal

Location:Tilburg, Netherlands

Architect:Mecanoo, in collaboration with Civic Architects

Former Industrial Project Type: Originally a locomotive maintenance and repair hall for the Dutch National Railways.

Date of Project: The redevelopment was completed in 2019

Surface Area: Approximately 7,000 square meters

Fig51- Bollaert, S. (2019). Exterior view of LocHal public library in Tilburg

The Dutch National Railways had to set up this grand semi-circular locomotive hall to meet its unique requirements for repair and maintenance in the 1930s. It would not have been possible to include such a facility anywhere else on the company premises - there simply was not enough room. Tilburg, a city with a dockyard and railway heritage, saw the huge structure as an important part of its own livelihood. However, as the need for repair of locomotives died down, the LocHal building went unused and for years lay dormant until ideas surfaced to turn it into a community-oriented HUB. LocHal buildings began to be transformed once more In 2011 local stakeholders and city planners began to see ways of re-using the space. The goal was to respect the historical significance of the building and, at the same time, adapt it for contemporary urban needs. To accomplish their familiar goal, three architectural firms among them Mecanoo and Civic Architects formed a team; they were joined would also play an

important role in providing the necessary technology Arup and interior design firm Inside Outside.The architects aimed to preserve the industrial character of the building but at the same time create spaces that were flexible enough to serve a variety of purposes. Now the redeveloped LocHal houses the public library for Tilburg city,there are co-working spaces, areas in which to hold conferences, other events and meetings,a cafe as well- it has become a cultural and social center for everyone who comes there.

Its flexible layout allows for diverse uses, ranging from large public events to small group meetings and quiet individual workspaces.

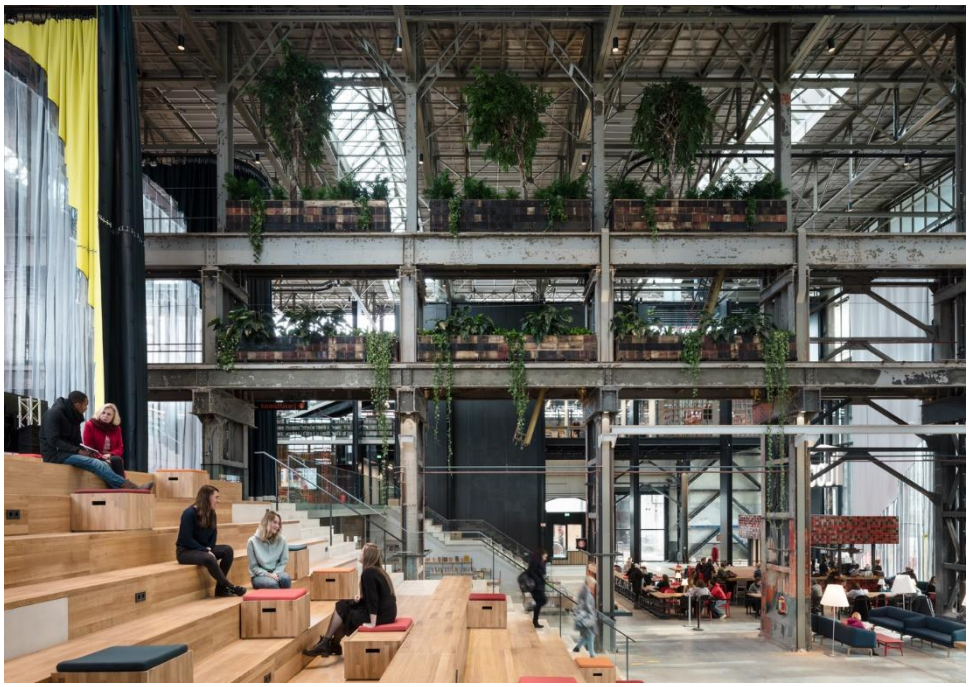


Fig52-Bollaert, S. (2019). Interior view of LocHal Library, Tilburg

Its flexible layout makes it handy for a wide range of activities, from big public events to small group discussions and even those secluded individual workrooms.The design kept much of the original look of an industrial building, with exposed steel beams, concrete floors and big, high windows. This approach keept he historical setting for modern adaptation.One of its most impressive features is the use of huge textile curtains—designed by Inside Outside. These curtains are not only decorative but also functional; they can be moved to create separate rooms within the larger area, so offering some freedom in acoustics and privacy. They are also a reference to Tilburg's textile industry. The monumental steps which form the main entrance also serve as seats, making this a raised outdoor platform for events, lectures, and public gatherings.The architects went to great lengths to create a flexible interior space. This made it possible for future managers of LocHal to adjust their offices and exhibition space rather than be impeded by built-in features. LocHal's open floor plan encourages interaction, making it a real social center.LocHal has been designed with sustainability in mind. By preserving and reusing original structures, we have managed to cut as much as possible the carbon footprint of its construction. Energy-saving lamps insulation that works with the natural coolness of this northern climate make sure these savings will continue well into winter.

Fig53-Bollaert, S. (2019). Interior view of LocHal Library, Tilburg—public living room with seating steps, industrial structure and greenery

public library, community center, and working area all rolled into one As a public area on the ground floor of such a building, people come together in workshops and exhibitions. The upper levels provide more private workplaces or board rooms for organizations to hold their meetings here. Today, the building has been transformed into Tilburg's new landmark. It attracts both the city's residents and visitors from elsewhere--and Tilburg residents are curious about this new icon of their town! More than merely a fair-weather attraction, it has revitalized the Spoorzone area. Tilburg' s riverside district is following suit with these developments .

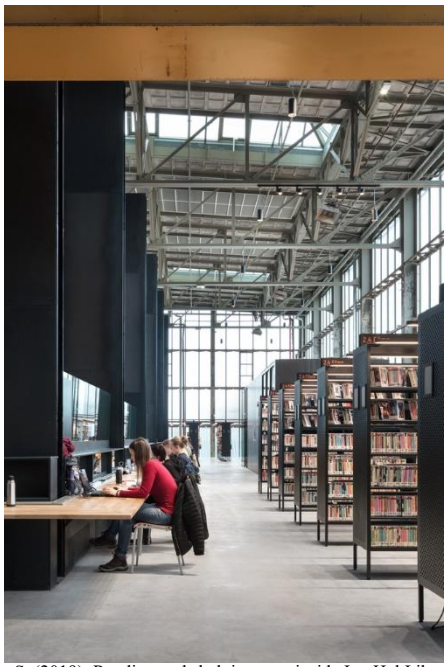


Fig54-Bollaert, S. (2019). Reading and shelving area inside LocHal Library,Tilburg

LocHal is a successful example of adaptive reuse that respects historical architecture while embracing modern design.It preserves its past industrial character, doing justice to Tilburg's history while also providing a current community space for all to use in an innovative way.These are brilliant curtains, combined with a completely free-form layout and open structure that gives it the ability to shift into the new environment at practical levels, so that the building's future value is actually guaranteed.LocHal is a model case of sustainable urban regeneration: former industrial machine rooms can transformed into centers for contemporary cultural and artistic activity.

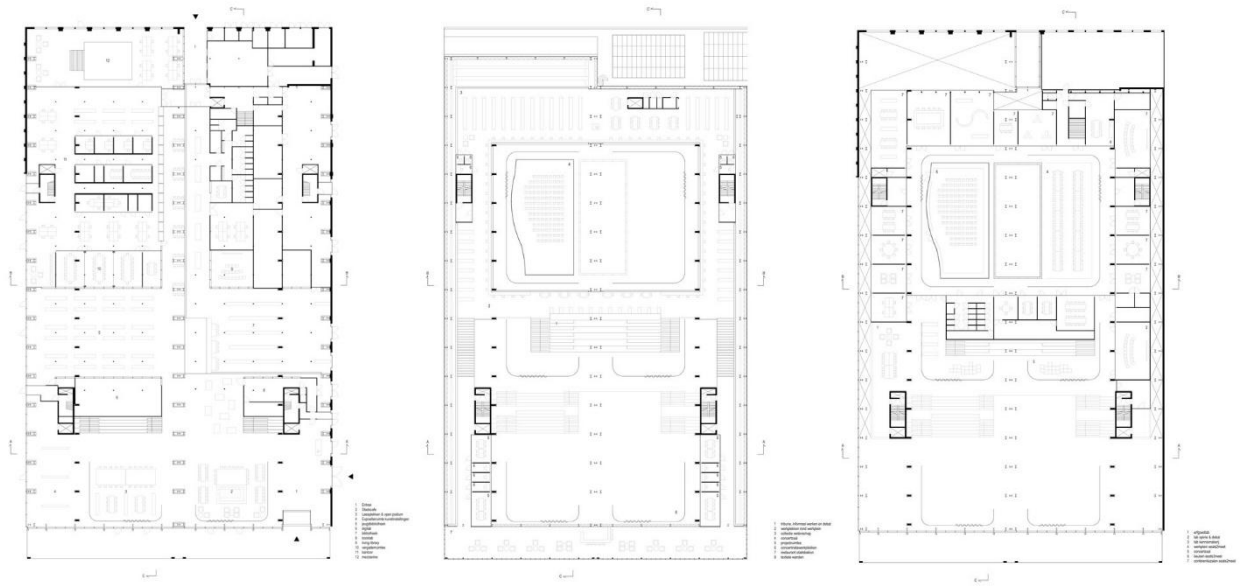


Fig55-CIVIC architects, Braaksma & Roos architectenbureau, Inside Outside, & Mecanoo. (2019). Floor plans of LocHal Library, Tilburg [Architectural drawings].

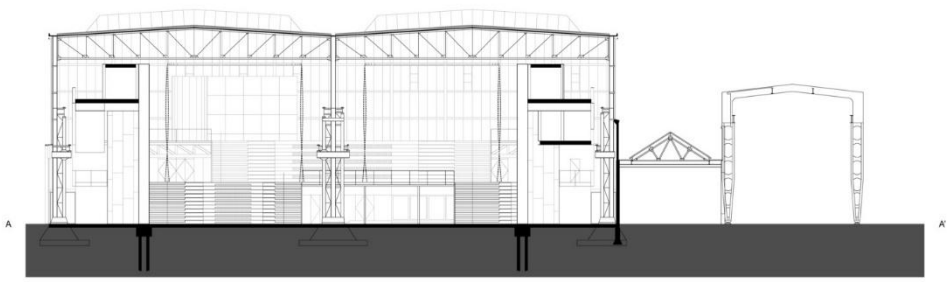


Fig56-Longitudinal section AA of LocHal Library, Tilburg, showing structural adaptation and spatial layering within the repurposed locomotive hall.

Awards and Recognition:

LocHal is an innovative model for the use of adaptable old buildings urban design, won several awards including:

- Best Building Worldwide 2019 by the World Architecture Awards.
- Best Interior Design in the Netherlands by the Dutch Design Award, which recognizes that this is a wholly new way to integrate textiles and flexible spaces.
- Dutch National Reuse of the Year Award for re-vamping an industrial zone into a thriving residential and cultural area.

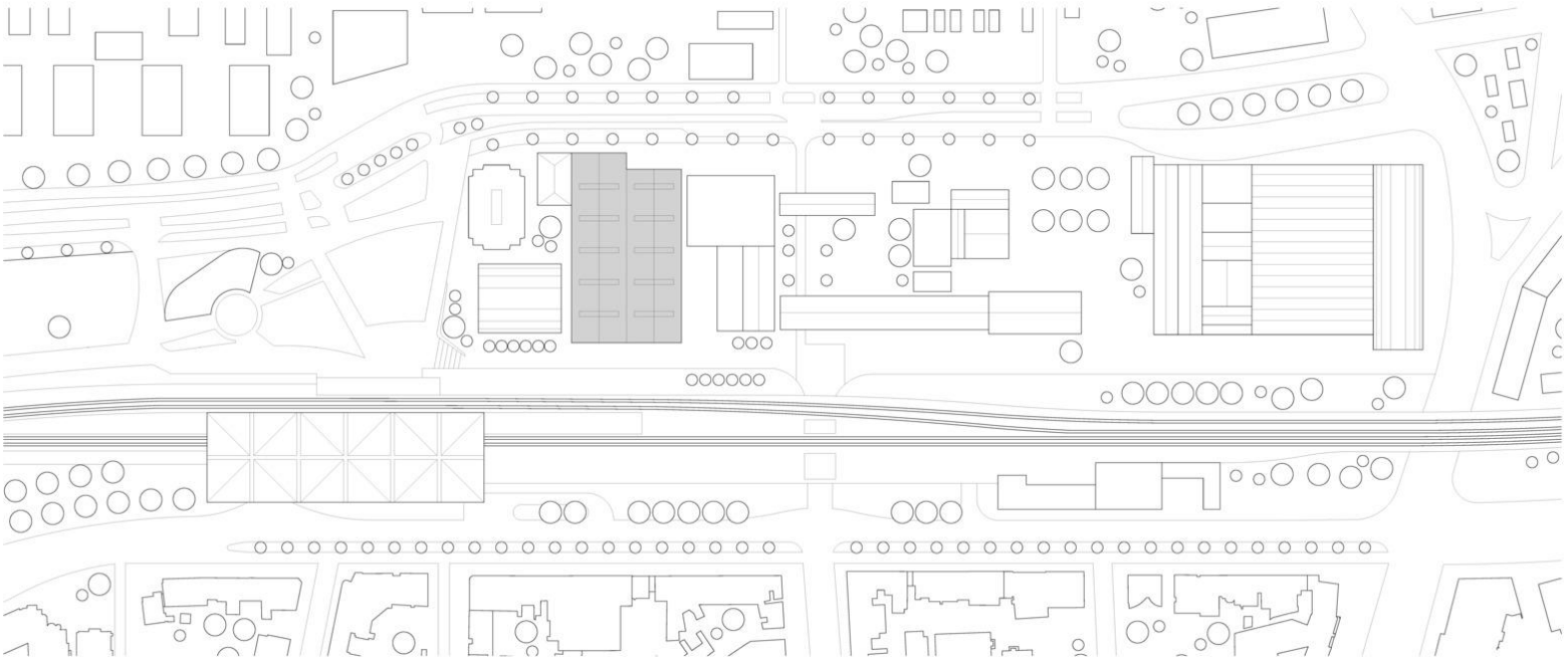


Fig57-CIVIC architects, Braaksma & Roos architectenbureau, Inside Outside, & Mecanoo. (2019). Site plan of LocHal Library, Tilburg [Architectural drawing].

5.8

Les Halles

Location:Paris, France

Desigm team: The renovation project was led by architect Patrick Berger and Jacques Anziutti, focusing on the redevelopment of the area and the creation of "La Canopée," a large canopy structure over the public space.

Former function: Originally a major central market for fresh produce, Les Halles was the primary food distribution hub in Paris from the 12th century until it was closed in 1971.

Date of Project: Renovation began in 2010 and was completed in 2016.

Surface Area: Approximately 60,000 square meters.

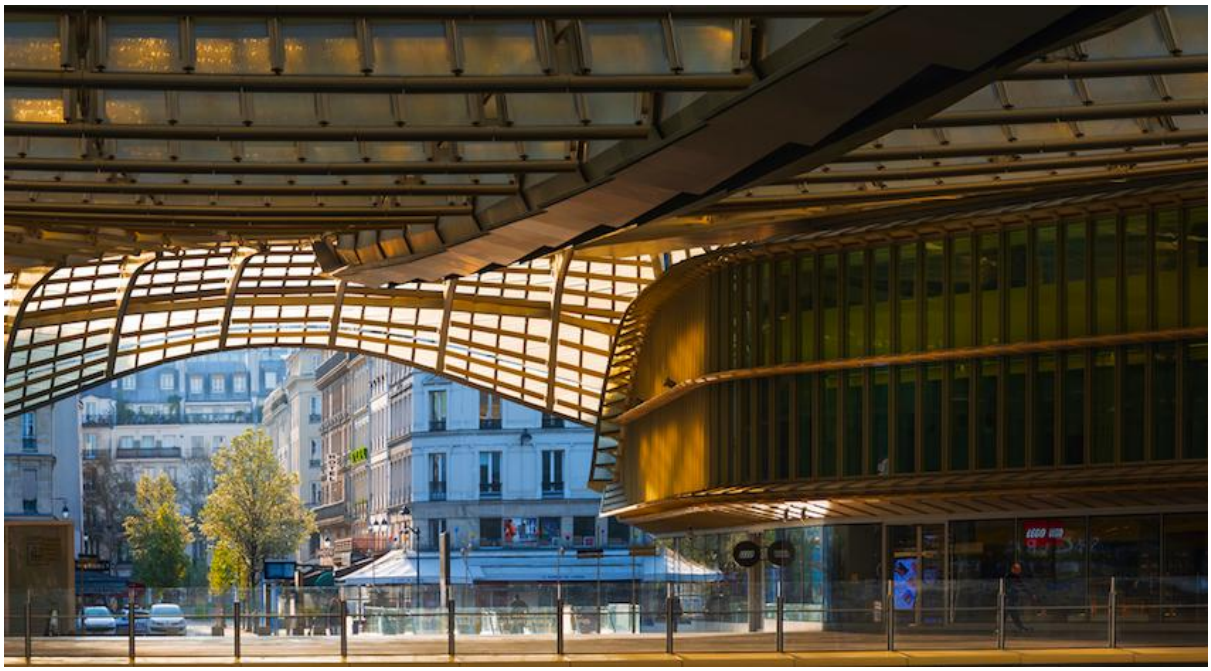


Fig58-French Moments. (2016). *La Canopée over Les Halles, Paris*. from French Moments blog post “The Canopy of Les Halles: A Gigantic Structure in Central Paris”

Les Halles has been a major center of commerce and trade since the 12th century when it was established as the city's central market. It was known as the "Belly of Paris," an animated outdoor marketplace. Merchants gathered there to trade fresh produce; meats- The market spanned some twelve centuries, from a tiny souk in the 12th century to what was in fact Europe’s largest market which symbolized Paris’ commercial heart. However, in the 1960s the market was shut down because of overcrowding and sanitation problems-scripts from those days are legendarily bad. The French government closed it off in 1971, seeking to solve however all three issues above together.

The market was moved to Rungis and its original pavilions destroyed.Soon after, the place became disused. In the '70s it was once again revived when part of Les Halles was turned into an underground shopping mall and train station (the Châtelet-Les Halles RER). Today, this is one of Paris's most heavily trafficked transportation hubs.Still, this initial redevelopment of the site got plenty of flak due to its dark "labyrinths," which were perceived as dangerous and hard to navigate.

Fig 59-French Moments. (2016). Forum des Halles under La Canopée, Paris [Photograph]

In response to public dissatisfaction, the City of Paris launched an international design competition in 2004 to reimagine Les Halles. Architect Patrick Berger and his partner Jacques Anziutti were selected to lead the new redevelopment, creating a modern, community-focused design that would be completed in 2016.

Modern Structure La Canopée

In the latest redevelopment projects, a huge undulating glass and steel canopy, "La Canopée" is the focal point. Covering 6,000 square meters, La Canopée is an open design that takes in natural lighting from above ground to go downwards into underground areas. La concept of open-space and visibility underground, the building design is characterized by organic, free-flowing lines that resemble the leaves of a tree. This signifies nature through earnest work urbanizationAs of today, Les Halles is a combination of cultural, public and commercial spaces. Under the Canopy, you'll find a variety of other features including Shopping Mall, Cdn Jean Vilar, Public Library and Garden.The redevelopment of Les Halles can be seen as a microcosm to explore the possible challenges and opportunities inherent in reusing historical commercial complexes for contemporary urban centers. It is also an occasion for those who carry out the actual physical work, leaving building site or other similar activities strengthened not only anew.Les Halles now bristles with new vigor, transformed into a dynamic and multivalent

space that embodies its past while providing the facilities that the modern world demands. The design of La Canopée, in particular, has enabled this transformation from a derelict area of town into something really happening now; an architectural creation both remarkable for its own sake and also a perennial attraction beyond all seasonal change.La Canopée has played a key part in shaping the new look of Les Halles as it has revolutionized this once neglected urban zone into a celebrated structure that is thriving today amidst Parisian neighborhood and capital life.

Fig60-Main entrance area under La Canopée at Forum des Halles, Paris, showing the fluid glass-and-steel canopy above a major urban circulation point. Architects: Patrick Berger & Jacques Anziutti.

Les Halles is a good example of how a historic commercial area can be turned into a lively urban center. Its renewal brought the district new energy by combining its historical roots with present-day uses. The addition of La Canopée played a key role in this transformation, turning the once-overlooked space into a well-known landmark and an active part of daily life in Paris.

Fig61-Tak, P. (2016, August 7). Market under La Canopée, Forum des Halles, Paris- Flickr. from Flickr photo titled “La Canopée – Paris (France) |

Fig63.UlyssePixel. (2020, August 9). Interior view of La Canopée, Forum des Halles, Paris

Fig62- [Creator Unknown]. (n.d.). Conceptual aerial plan for Forum des Halles redevelopment, Paris [Rendering].

Changes to the main garden entrance have provided a different view on its surroundings. Now the Pompidou Center is in one continual line with the exchange, which has made carving up space for pedestrians even more difficult. Bordered by trees and filled with flowers, the garden is a vast open space where children can play while grown ups relax. In this place they also have petanque courts, chess tables and other facilities. Greater and more varied planted areas should give more people more sense of what it is like to be in a public park. At the same time, entrance into this free garden guides foot traffic in such a way as to reflect its constantly evolving identity.

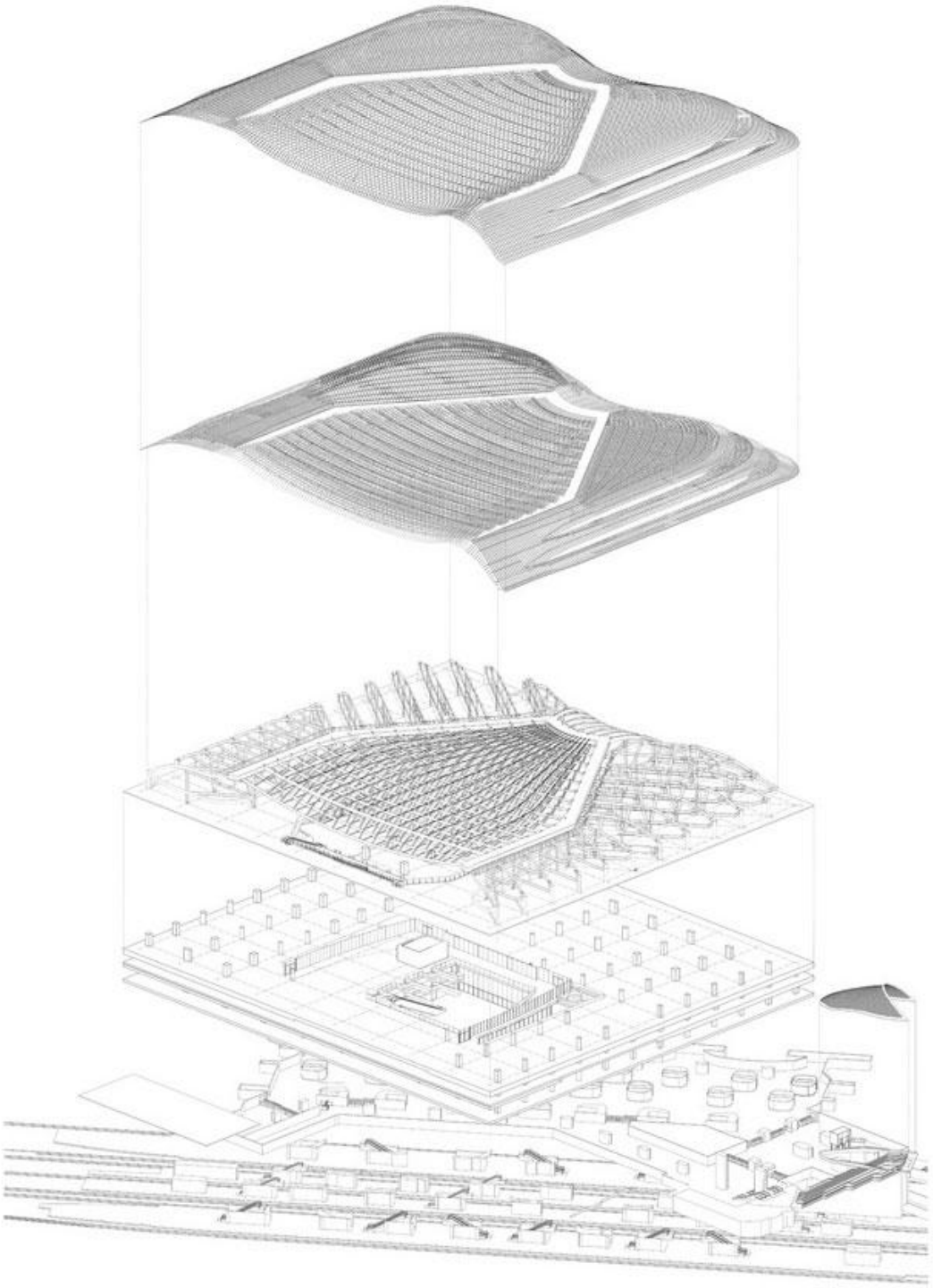


Fig64-Exploded axonometric diagram of La Canopée canopy at Forum des Halles, illustrating structural layers and assembly logic.

5.9

CaixaForum Madrid

Location:Madrid, Spain

Design team:Herzog & de Meuron, Swiss architectural firm.

Former function: Adaptive reuse of a former industrial building (a power station).

Date of Project: Completed in 2008.

Surface Area: Approximately 10,000 square meters

Fig 65-Lauwers, K. (2017, November 13). Vertical garden at CaixaForum Madrid

The "Central Electrica del Medioda," Fuente Elctrica del Agua, was originally an electrical power station in the early 1900s. La Caixa Forum in Madrid, which began as an engine for civilizing and cultural progress entersieve Madrid s municipal politics was a coal-fired power station that provided light and electricity to the rapidly growing urban nucleus of Madrid. The La Caixa Foundation, with its solid cultural and social reputation, acquired the building in order to establish a cultural center that would be open to everyone in Madrid, yet is undoubtedly an amplification of the city s arts and culture scene. This was the vision for CaixaForum: a public facility where art exhibits, cultural events and educational programs could be undertaken. The architects of the project tried very hard to retain fundamental characteristics of the power plant's original brick structure while introducing new designs into the building to create a productive and accessible local institution. The result is that the industrial character of the building was retained in their design, simultaneously making it modern and contemporary.One of the most

special things is the building's "floating" appearance. Herzog & de Meuron could achieve this by deleting the original brick base of the power station and supporting the building on concealed steel columns. This creates a shaded public plaza beneath the building, which is a symbol of accessibility, where visitors can gather together and enter the museum.

Fig66-Lauwers, K. (2016, August 19). Vertical garden wall at CaixaForum Madrid [Photograph].

The original exterior of red brick was left by the architects of the new structure, so it has a rustic-industrial look--but they added oxidized steel cladding above. This rust-coloured steel provides a stark contrast to the historic brick below, indicating the change from past to present times. The patina on the surface changes color with weather and time, giving the structure a dynamic feel that alters over time. Right next to the building stands a green wall created by botanist Patrick Blanc, which covers a space of about 460 square meters and contains roughly 15,000 plants from 250 different species. This living wall is a natural complement to the industrial aesthetic; it brings added greenery into the city without needing any land at ground level, purifies air, and lowers the urban heat island effect.CaixaForum's interior includes several open-plan galleries that rotate for art exhibits. These spaces are both delicate and freecurrent design by the architects; the tall ceiling allows for various types of exhibits to be installed in both classical and contemporary styles.

Fig67-Gallery spaces interior

Daylight comes through skylights and strategically-placed windows into the gallery spaces: not only does it reduce the need for artificial lighting, but also it improves viewing here as well The architects' aim was to harmonize this light with a shading system to which paintings and sculptures would be largely impervious. The main staircase is a white curvilinear outcropping that spirals up: allowing seamless flow from ground-floor galleries to those higher up. In contrast to the building's heavy industrial appearance, this minimalist modern staircase has a better presence than all other elements of the entire hall combined! It is an emblem of continuity between different levels and an expression that runs throughout the space.

Fig68-Interior marble stairwell

It is located on Paseo del Prado, the CaixaForum Madrid lies right smack in heart of Madrid's "Art Walk," a historic area known for its many institutions of culture, including Pradium and Reina Sofia museums. This presence not only matches but also combines with said institutions to pull even more visitors to the area. The lower level holds an auditorium which is capable of being used for conferences, performances and film screenings. These rooms and multipurpose ones, along with the auditorium, can offer a wide range of different amenities that attract diverse cultural and educational events. CaixaForum Madrid offers a generous array of exhibits on art themes, history inquiries into science and current social issues. The shows are often lively and interactive for a broad audience, making artistic works accessible to everyone in such a state of mind (engaging). CaixaForum Madrid collaborates with museums and galleries worldwide in the presentation of first-class exhibitions. The center is heavily involved in education, offering workshops for young people, families and adults. These activities focus on creativity, critical thinking and experimentation; often tied to the present exhibits. Subjects range from study of artistic methods to work in scientific laboratories, attracting broad community involvement in the learning process. In the center there is an auditorium capable of taking on anything from music concerts and theatres all the way to cinema presentations and lectures. These events may involve local international artists, adding diversity to Madrid's cultural fare.

Fig69-Interior view of a contemporary gallery space in Spain -Madrid

Fig70-Herzog & de Meuron. (n.d.). CaixaForum Madrid – Level -2 Floor Plan [Architectural drawing].

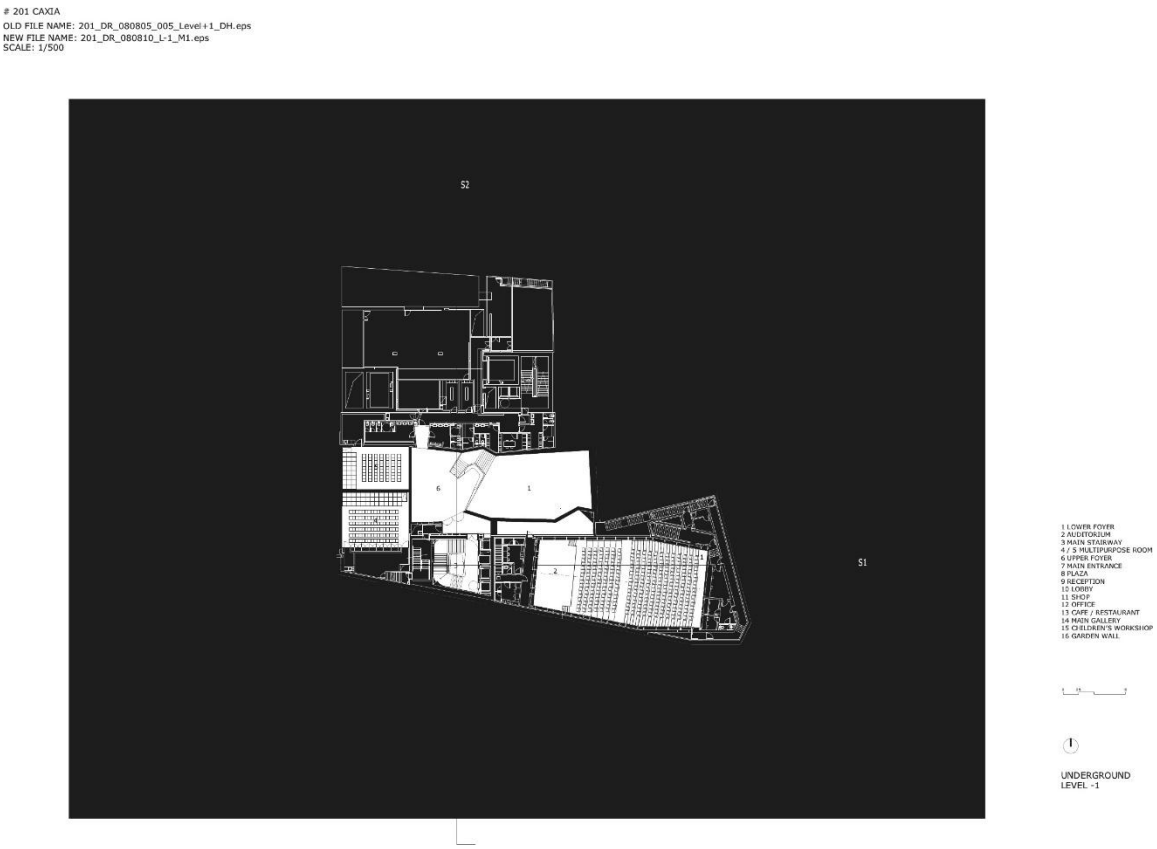


Fig 71-Herzog & de Meuron. (n.d.). CaixaForum Madrid – Underground Level -1 Floor Plan [Architectural drawing].

201 CAIXA FORUM

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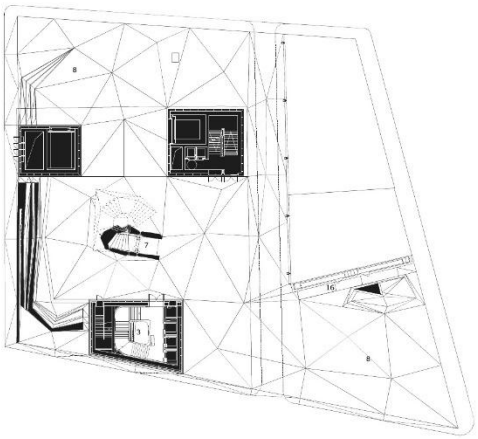

1 LOWER FOYER
2 AUDITORIUM
3 MAIN STAIRWAY
4 / 5 MULTIPURPOSE ROOM
6 UPPER FOYER
7 MAIN ENTRANCE
8 PLAZA
9 RECEPTION
10 LOBBY
11 SHOP
12 OFFICE
13 CAFE / RESTAURANT
14 MAIN GALLERY
15 CHILDREN'S WORKSHOP
16 GARDEN WALL

GROUND LEVEL

Fig72-Herzog & de Meuron. (n.d.). CaixaForum Madrid – Ground Level Plan [Architectural drawing].

201 CAIXA FORUM

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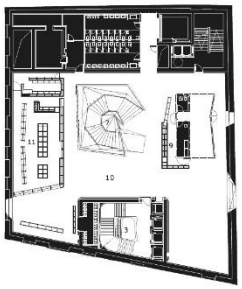

1 LOWER FOYER
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16 GARDEN WALL

FIRST LEVEL

Fig73-Herzog & de Meuron. (n.d.). CaixaForum Madrid – First Level Plan [Architectural drawing].

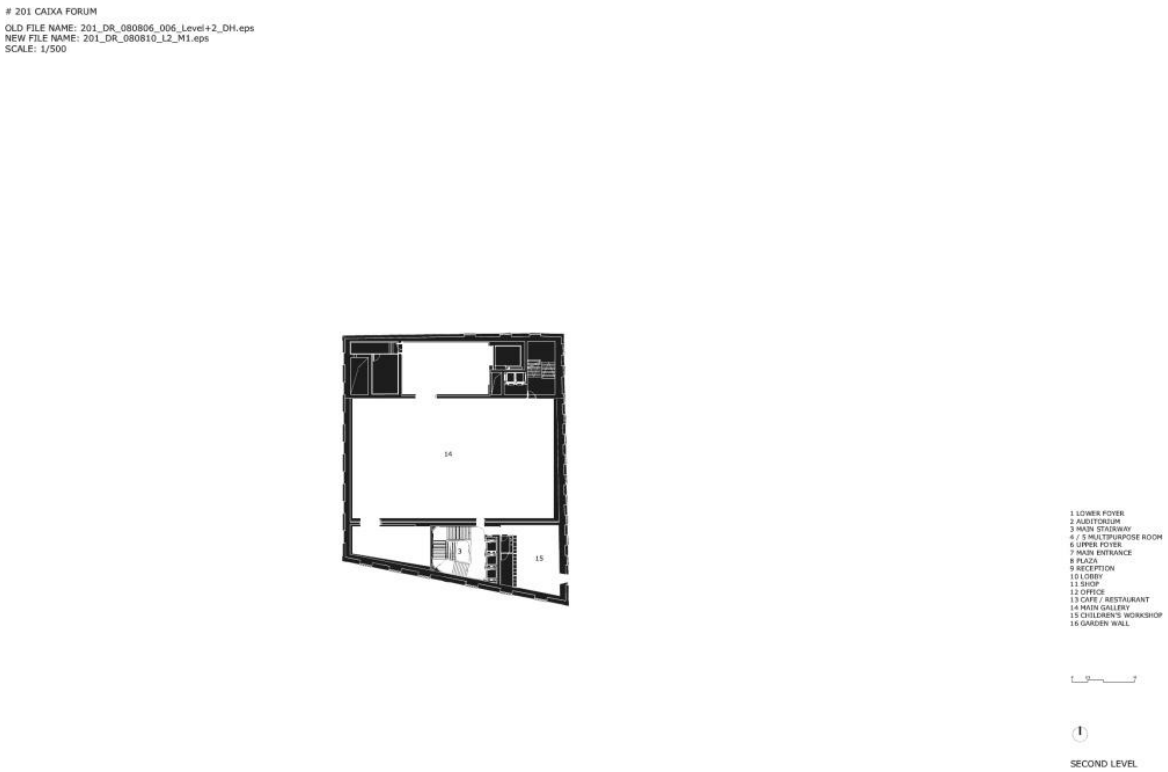


Fig74-Herzog & de Meuron. (n.d.). CaixaForum Madrid – Second Level Plan [Architectural drawing].

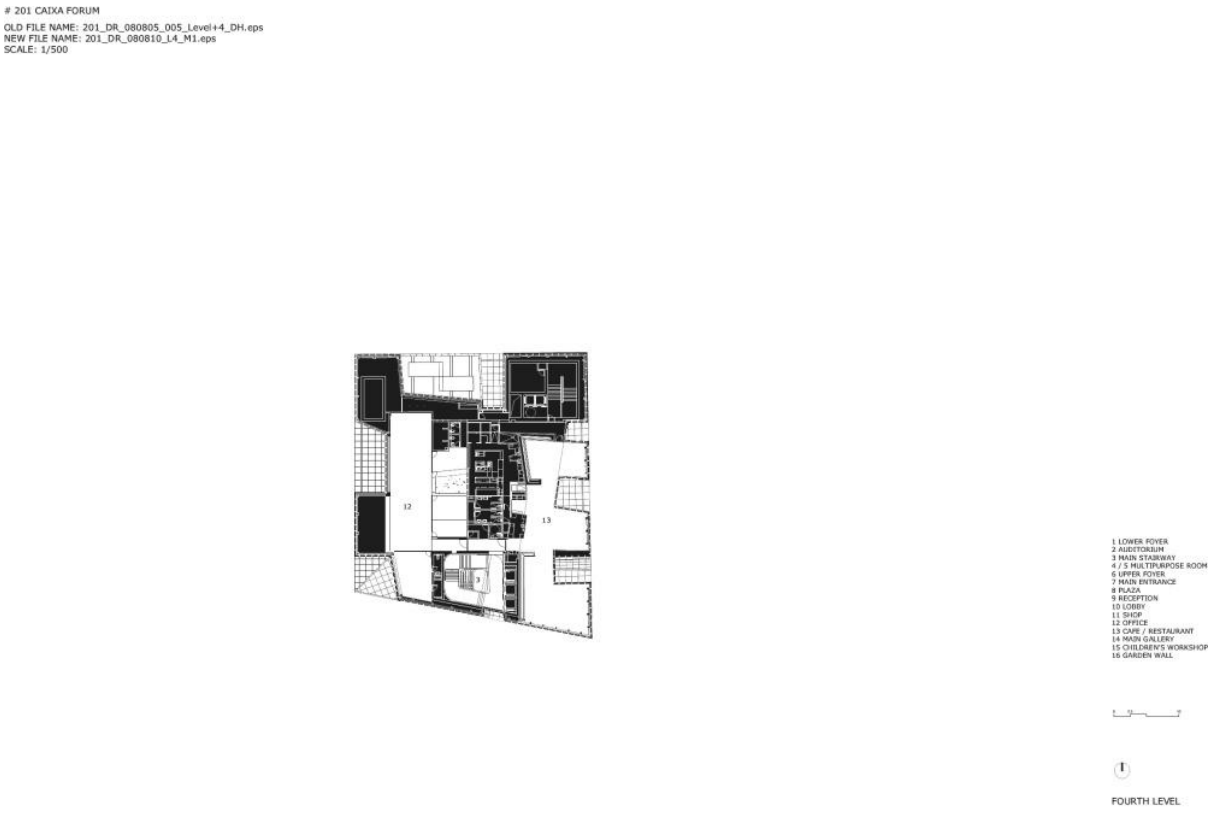


Fig75-Herzog & de Meuron. (n.d.). CaixaForum Madrid – Fourth Floor Plan [Architectural drawing].

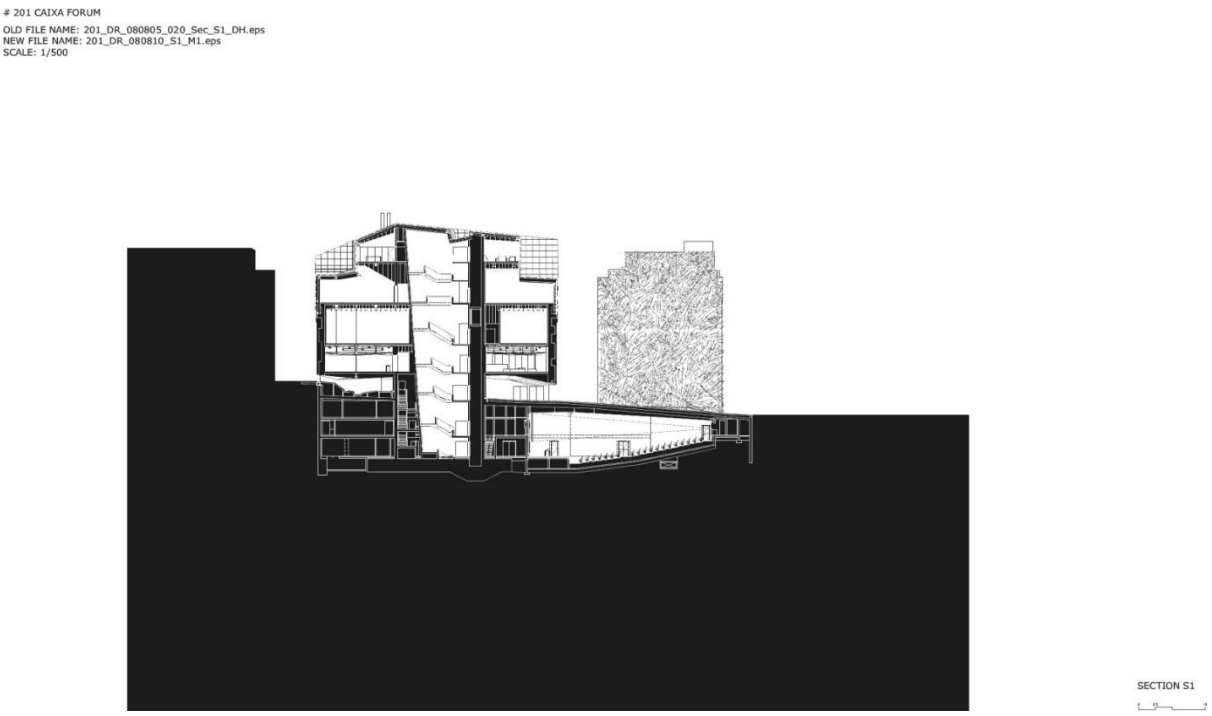


Fig76-Herzog & de Meuron. (n.d.). CaixaForum Madrid – Section S1 [Architectural section].

Reusing an existing building eliminates the environmental cost of new construction. As a result, this is truly sustainable architecture. Herzog & de Meuron retained as much of the original structure as possible, thus preserving resources and lowering construction site waste. Integrating natural light reduces the need for artificial lighting. The design includes natural ventilation strategies, reducing energy needs, and the vertical garden is insulation--thereby regulating temperature inside The CaixaForum Madrid is an innovative architectural project of adaptation, demonstrating how old buildings can be transformed so that they serve public modern demand but still retain their historical character. Herzog & de Meuron's design integrates industrial heritage with contemporary architecture, actively promoting energy-saving strategies and green space within today's cities Through its exhibitions, workshops and other activities, CaixaForum Madrid contributes to the diversity of Madrid's cultural life. Art and education are for everyone. As a result, it has now become a symbol of the novel architecture, civic participation and artistic vigour that mark Madrid today alone in the world.

5.9.1- Lingotto

Location: Turin, Italy

Design team: Initially designed by the emgineer Giacomo Matte Trucco, the Lingotto factory was transformed into a mixed-use complex by several architects, notably Renzo Piano, who oversaw its conversion in the 1980s.

Former function: The building was originally a Fiat car factory, with a distinctive test track on the roof.

Date of Project: The factory was built between 1916 and 1923, while its transformation into a multi-purpose complex began in the 1980s, with significant completion by 1990.

Surface Area: The complex covers approximately 80,000 square meters.

Fig77-Piano, R. (n.d.). Aerial view of Lingotto redevelopment, Turin, Italy.

Lingotto stands as one of Turin's most remarkable and crucial buildings: a wonderful example of industrial architecture from the early 20th century that has become a multifunctional grouping.It is both historically important-how Italy's industrial miracle began-and architecturally important in reusing idle factories along with other types of architecture.This modernist building was constructed during the early 20th century to serve as a car manufacturing plant for the Fiat Corporation.It was the brainchild of Giovanni Agnelli, the founder of Fiat, and it was designed and built by the Matteo Fiore Engineering Company.Begun in 1916, the building was finished in 1923.At the time of its construction, Lingotto was both the largest and most modern industrial complex in Europe, a facility designed to keep up with the burgeoning demand for cars in Italy as well as other parts of Europe.At its time of building, this new-fangled facility was unique for three reasons: it showed an inventive use of space and

functioned efficiently; it also worked into the very design features that would be needed later as technology changed further around us.

Lingotto's design was a real innovation, fusing industrial function with cutting edge engineering. The plant stretches 5 floors down and a circle line running in the opposite direction for accumulating the car And the most momentous feature of the original design of the factory comes into play here - the test track.This unique feature allowed cars to be tested at high speed in a controlled environment that has no resemblance to reality, and was also free from any distractions whatsoever.

Fig78-Aerial view. Courtesy RPBW,, Renzo Piano Building Workshop. (Ph. © Studio Merlo)

The production style of the factory was characterized by brick walls, large windows for natural lighting and a stark, functional form typical of industrial buildings at that time. The interior was designed to be efficient. Large floors needed space, and high ceilings were necessary for heavy machinery--needed as cars were produced en masse into an affordable luxury so everyone could own their own automobile at Pearl Harbor instead of waiting months for factory delivery in Detroit. The most unique attribute of the Lingotto factory was its famous test track on the roof, which was then used to check Fiat cars after they were assembled. This resulted in one of engineering great symbolism–the track enabled vehicles to be put through their paces and for any last minute adjustments or corrections, before being delivered elsewhere. It became none other than an integral part of factory identity too. By the 1970s Fiat's manufacturing requirements had moved on from Lingotto, which was unable to accommodate the processes of modern industrial production any longer. Fiat shifted its operations elsewhere; the factory stopped automobile production in 1982. The building remained empty for some time. It was not until plans for its rehabilitation appeared in the beginning of 1980 that prospects became

brighter at last. The 1980s saw the transformation of the Lingotto complex, led by architect Renzo Piano. The change aimed at keeping historical authenticity while enabling it to become a new,more diversified use. The project was completed in the 1990s, and Lingotto is a multi-use complex that includes offices,shopping stores,cultural spaces, and even a hotel.Renzo Piano's renovation preserved the iconic test track on the roof but added modern elements, to create a balance between historic preservation and contemporary function. The building was reimagined as a symbol of Turin's industrial past and in the future.

Fig79-HDR (n.d.). Interior redevelopment of Lingotto shopping gallery, Turin, Italy [Render]

A high-end hotel has been installed which is furnished with modern facilities, serving as both destination for tourists and business travelers. Thanks to its large and versatile spaces, it is also a major location for conferences and conventions. The famous test track has been preserved, but slightly altered, and still was a major feature of the complex. It was also converted into events, exhibitions and even occasionally for leisure activities with attractive urban views. The transformation has included the establishment of an auditorium in the building serving as a venue for various forms of cultural performances, concerts and events. The Scuola di Belle Artihas art galleries, exhibition halls, cultural institutions Pinacoteca Giovanni e Marella Agnelli (a museum of fine arts). It has the Centro Congressi (Conference Center) also located here as well, providing a venue for business and cultural events.

Fig80-Exterior image-Luca Onnibon

Fig81- concrete access ramps

Fig82-DAP Studio. (2021). New Interior Vision for Lingotto Shopping Area, Turin, Italy [Render].

Fig83-Politecnico di Torino. (n.d.). Interior view of Lingotto campus, Turin, Italy

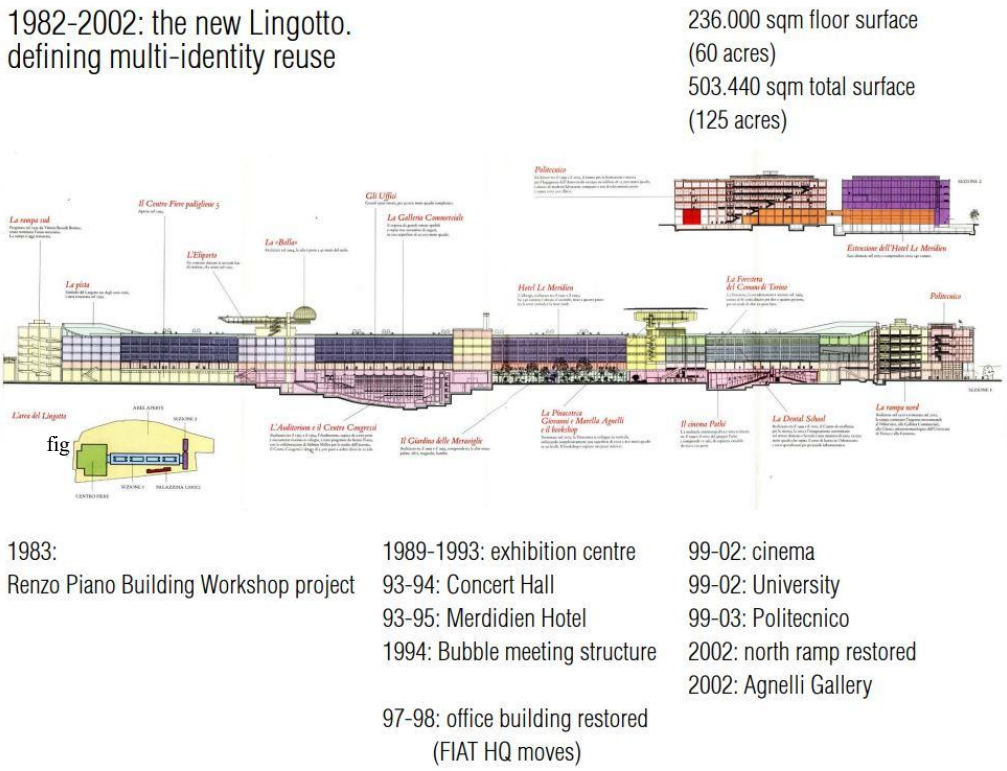


Fig84-Renzo Piano Building Workshop. (2002). Lingotto redevelopment phases: 1982–2002.

Le Corbusier described the Fiat Lingotto factory as “an advance for town planning in the new mechanised age,” highlighting the rooftop track as a symbol of technical progress and urban vision (as cited in Cook, n.d., p. 7).

The Lingotto is a good example of urban regeneration. It mixes modern needs with an old style of industry, puts preservation and modern functions together.Saving the track on top, adding art galleries, including Politecnico di Torino’s campus -- these all play their part in ensuring that Lingotto plays an active role as a downtown campus and hub for interaction between business, academia, and the local community.Lingotto’s successful transformation is a textbook example of how industrial typologies can be re-fashioned to meet modern needs. It reconciles the preservation of existing historical traces with urban renewal and makes a lasting contribution to Turin's social and architectural fabric. In so doing, this approach provides not only an innovative experimental model for a city’s future but also sets international benchmarks in the operation of industrial heritage.

6.1 Research Design and Approach

This research adopts a qualitative and interdisciplinary methodology to explore the adaptive reuse of the OSI Ghia factory as a catalyst for sustainable urban regeneration in Turin. It employs a case study strategy, which Yin (2014, pp. 16–17) defines as:

"An empirical inquiry that investigates a contemporary phenomenon … in depth and within its real-world context."

This method enables detailed examination of the site's architectural, historical, environmental, and socio-spatial dimensions providing insights applicable to wider brownfield redevelopment.

Rather than testing a fixed hypothesis, the study follows an exploratory stance, viewing the OSI Ghia site as a complex adaptive system. As Ottino (2003, pp. 292–293) notes:

"The system must be analysed as a whole"

highlighting that components interact non-linearly in environments with emergent properties. Infrastructure for the city is a web of tightly interlocking materials and social institutions, as well as complex self-organising systems that evolve through decentralised interactions. Instead of running top-down, these systems are the outcome of collective behaviour by each part (individual components), following nonlinear and potbelly unpredictable patterns. Thus, their development can be modified through methods which reproduce each local action and the feedback from this, such models capturing the dynamic development and easy-to-learn nature of city growth.This methodological perspective also aligns with Allen's (2008) view that urban environments should be approached as evolving systems, shaped through complex interdependencies and continuous feedback loops, rather than simplified cause-and-effect models.

The study is anchored in a multi-scalar analysis:

- **Micro-scale:** examining the building's physical adaptability.
- **Macro-scale:** assessing its integration into Turin's urban fabric.

As highlighted in the study by Loures and Panagopoulos (2007), the regeneration of derelict industrial sites requires a planning approach grounded in knowledge, advanced technologies, and collaborative design, emphasizing architectural innovation alongside land-use and accessibility strategies.

The methodology combines:

1. Historical analysis to trace the factory's evolution.
2. Architectural and spatial analysis for functional and structural adaptability.
3. Comparative case studies to derive transferable lessons.
4. Environmental review for contamination risks and remediation solutions.
5. Visual mapping to display integration strategies clearly.

The result complies with a vision of sustainability where current needs must be met at the same time as the interests of future generations are both guaranteed balance between respect for heritage, perpetuation urban connection, concern with the environment, and social significance.

6.2 Data Collection and Analysis Methods

- To track down the use of OSI Ghia involves the use of comprehensive qualitative based techniques. In keeping with the case study approach of Yin (2014, pp. 16-17), data is collected from multiple sources in order to ensure triangulation and depth of understanding:

- **Using historical documents to study the archives**

  By inspecting historical maps, factory plans, and photographs from the archives, the factory's changes are shown live as well as additional evidence that will support these findings.

- **Semi-Structured Interviews**
  Interviews with key stakeholders, local planners, municipal representatives—provide insight into functional shifts and socio-political dynamics. As Yin (2014) advises, interviews offer a flexible framework to explore emergent themes (p. 19)
- **Visual Site Analysis and Field Notes**
  On-site observations are recorded in field notes, focused on material conditions, building envelope, adaptive potential, and urban context. This aligns with Ottino's (2003, pp. 292–293) perspective that system-level understanding requires direct engagement.
- **Spatial and Functional Mapping**
  Diagrams and maps are developed to show distribution of activities, material reuse zones, and circulation routes. These visual tools support both **micro-level** (building) and **macro-level** (urban context) analysis.
- **Comparative Case Analysis**
  Two similar brownfield projects in Turin and nearby cities are analysed to extract transferable design and policy lessons.

Data triangulation is used throughout: archival, interview, observation, and mapping data are cross-referenced, enhancing reliability (Yin, 2014, pp. 17–18). Attention is paid to ethical considerations—informed consent, confidentiality, and reflexivity (Yin, 2014, p. 90)

This multi-method design allows for a rich and credible understanding of the site's transformation potential, balancing interpretive depth with methodological rigor.

6.3 Limitations and Ethical Considerations

Limitations

- **DataGaps**
  Some historical and technical archives concerning the OSI Ghia factory were incomplete or inaccessible due to long-term abandonment, which limited the depth of historical reconstruction.

- **Restricted Site Access**
  Due to safety and structural hazards, portions of certain interior areas have not been fully recorded, thus limiting knowledge that might be gained from observation.

- **Context-Specific Findings**

  As this research is based on a single case study, the findings provide in-depth insights into the OSI Ghia context; however, their applicability to different cultural or regulatory settings may be limited.Moreover, it reflects on a broader challenge in architectural research, where “architectural design has generally treated the deeply interrelated and dynamic characteristics of buildings as if they could be reduced to mechanistic problems” (Bachman, 2008, p. 16), highlighting the need for more nuanced, systems-based evaluations in site-specific studies.

Ethical Considerations

- **Cultural Sensitivity:** One of the major contributions of participatory planning lies in its capacity to integrate local knowledge into redevelopment strategies. Communities often hold a deep understanding of their social and environmental context, which can enhance sustainability by ensuring development aligns with cultural meanings and place-based values. This integration makes redevelopment projects more locally grounded and responsive to regional identities (Sebunya & Gichuki, 2024, p. 4).
- **Stakeholder Inclusivity**: Participatory planning enhances community engagement—especially for historically marginalized groups by ensuring their voices are incorporated into decision-making, which in turn promotes fairer and more socially equitable redevelopment outcomes (Sebunya & Gichuki, 2024, p. 8).
- **Environmental Stewardship**: Participatory planning enables local people co designing sustainable housing and urban infrastructure which not only minimizes resource consumption but improves the environmental resilience of towns.

Turin and the OSI-Ghia Site — Historical Legacy and Urban Regeneration

Preface to the Chapter

Note: This chapter offers a preliminary contextual overview of the OSI-Ghia site and the city of Turin. It is not intended as an in-depth historical study, but rather as a foundational framework to support later architectural and urban analyses. Detailed historical research concerning both the OSI-Ghia site and the broader industrial development of Turin is cited where applicable and may be consulted in specialized literature.

7.1

The city of Turin is the capital of Piedmont, situated in the northwest of Italy. It has long been at a strategic point at the foot of the Alps and on the banks of the Po. Italy's fourth largest city, with about 870,000 inhabitants (ISTAT, 2019), Turin has played an important part in both politics and industry throughout this country's history. It has humid subtropical climate (Köppen classification Cfa*),with warm summers and rainfall evenly distributed throughout the year (Dell'Anna et al., 2019).

*Cfa: C = warm temperature, f = fully humid, a = hot summer

Rooted in the city's Roman foundation, Turin retains a live urban layout. In the orthogonal grid of the historic center, one can see outlines of this origin. During the Baroque period (16th–18th century), the city experienced extensive transformation. Aesthetic elegance and functional infrastructure were blended so closely that they were inconceivable as separate concepts anymore. In the industrial revolution, Turin's urban landscape was altered again. The 19th and 20th centuries marks the rapid development of this Northern city into an industrial hub. The establishment of FIAT in 1899 represents a new age in a major city's history. Large-scale production requires substantial working class enclaves and communication links can be drawn according to the needs of industry's bottom line.

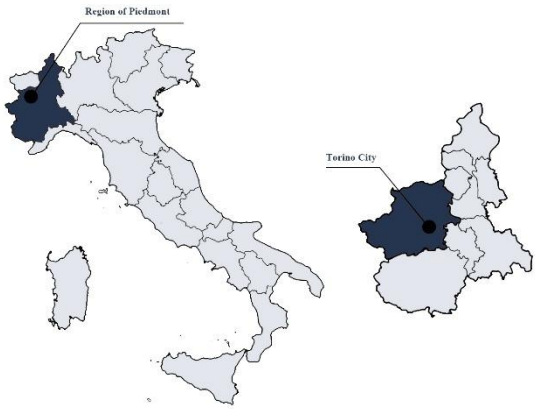


Fig 85 -Map of Italy

Left photo: This shows the map of Italy and Piedmont.

Right photo: This Map of Piedmont is showing City of Turin and the metropolitan.

7.1.1

In the 20th century, Torino's industrial expansion deeply influenced peripheral areas such as the Lingotto and Mirafiori zones, where various manufacturing centres including the OSI Ghia facility were set up or reconverted.The OSI Ghia complex, sited near Corso Dante, is an example of Turin's crowded industrial development.Now on this site, built up from the Garrone foundry in 1915, reconstituted later, at the end of the war destroyed and rebuilt, taken over again by Ghia and in 1958; the example confirmed with partial demolition in 2009.

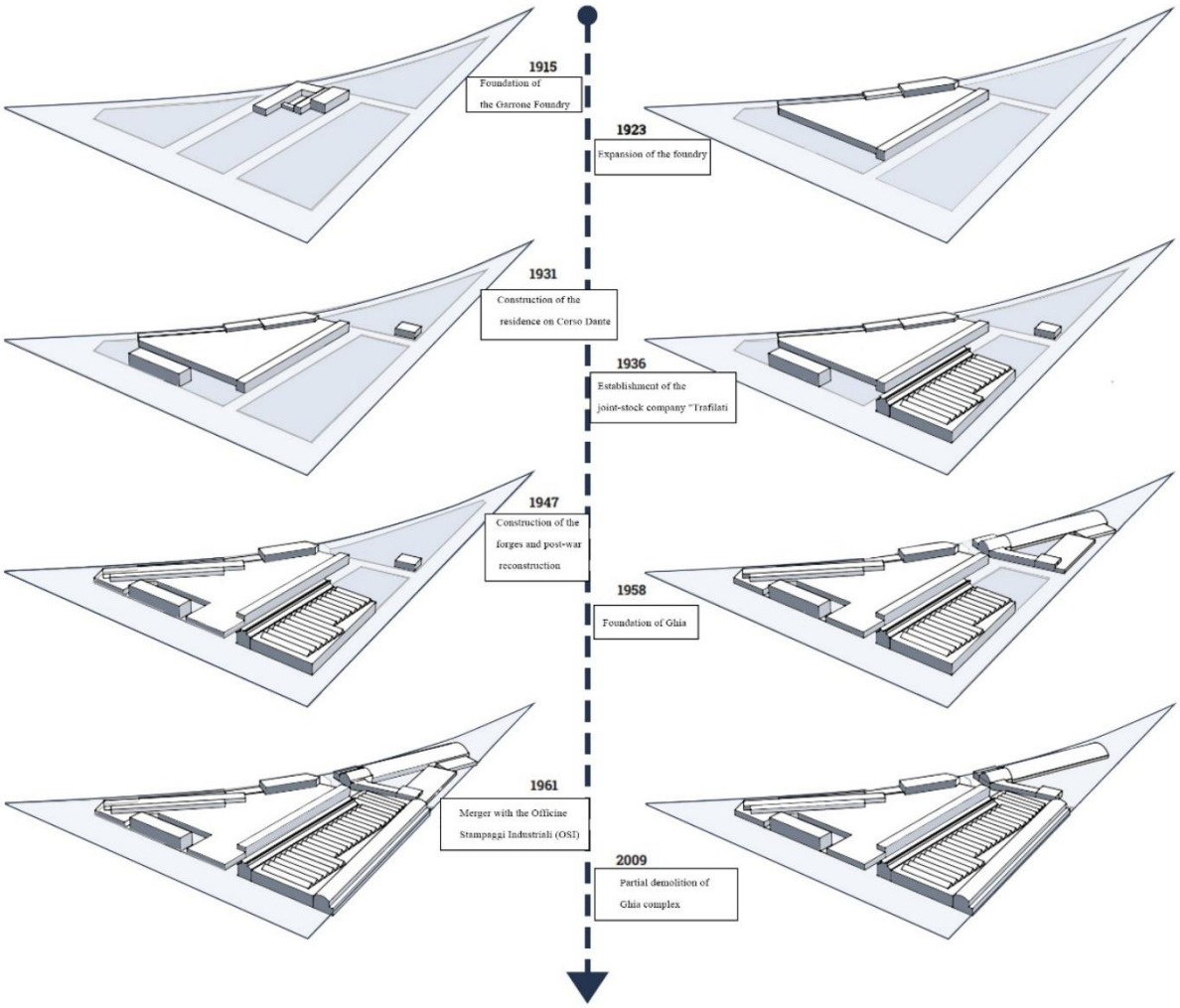


Fig86-Historical Evolution of the OSI Ghia Factory: 1915–2009

7.2

By the early 20th century, Turin had become a symbol of Italian industrialism. FIAT and related sectors employed thousands, attracting internal migration and shaping the city's socio-economic dynamics. However, the oil crisis of the 1970s and the collapse of the Fordist economic model led to mass deindustrialization. By 1990, FIAT had laid off over 50,000 workers, causing widespread unemployment and urban decay.

To counteract this decline, the municipality initiated several strategic planning measures. The Piano Regolatore Generale (PRG) facilitated the rezoning of disused industrial sites for mixed-use redevelopment. The Spina Centrale project, introduced in the 1990s, buried the railway tracks bisecting the city and replaced them with a new urban spine—an axis of infrastructural and urban renewal. While these efforts culminated in the successful hosting of the 2006 Winter Olympic Games, the subsequent 2008 global financial crisis revealed the vulnerabilities of Turin's redevelopment strategy, particularly its heavy reliance on large-scale investments and public debt. (LSE Cities, 2024)

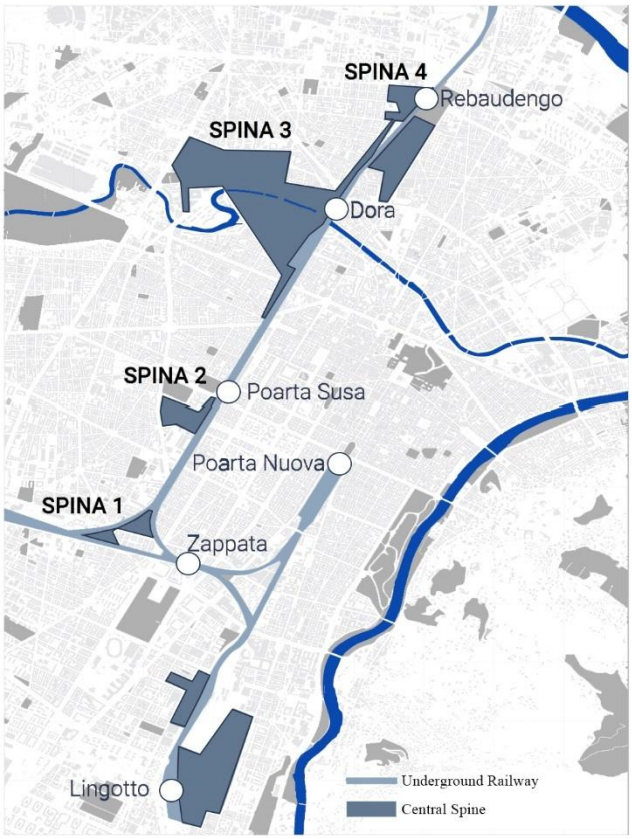


Fig87-Central Spine of Torino (Spina Centrale) and Underground Railway (Passante Ferroviraio)

Source: Redrawn from Winkler, 2007

7.3

The OSI-Ghia site is situated within a triangular plot bordered by the neighborhoods of Crocetta and San Salvario. It was initially founded in 1908 as the Garrone foundry and gradually developed into an important industrial center. One of the early advancements implemented on the site was the use of reinforced concrete construction, which allowed for the creation of large-span industrial spaces. This construction method later influenced similar developments in other parts of the city, such as the Lingotto complex.In the 1950s, architect Nicola Diulgheroff designed new modernist production buildings. Over time, the site became a center for automotive design and prototyping, housing firms like Ghia, OSI, Ford, and Alfa Romeo. Production ceased entirely in 2001, leaving the area with severe structural decay, environmental contamination, and fragmented ownership.

7.4

By dividing into three zones of function:

- **Ghia Area**: In addition to being architecturally significant, it also has a central hall with barrel-vaulted high ceilings and historic administrative offices.
- **OSI West**: The Toolbox Coworking, which has provided a successful example of adaptive reuse, is now using this site to demonstrate the opportunities for creative redevelopment as well as other real-world applications..
- **OSI East**: The biggest portion of its floor space consists in concrete production halls and warehouses, all of which are at an advanced state of disrepair.

Challenges include poor accessibility, decoupling between infrastructure and the city, inconsistent zoning laws, and numerous levels of ownership. Emerging creative hubs and concepts such as the IED Campus by Mario Cucinella Architects, however, represent hidden reserves waiting to be realized in urban regeneration passively downstream.

7.5

Any future regeneration of the OSI-Ghia site needs to be consistent with the broader aims of Turin's urban redevelopment work:

Environmental remediation: Soil and building material are contaminated and must be cleaned in order to make the area safe again.

Heritage conservation: Preservation and re-interpretation of historically significant industrial types.

Mixed-use development: Educational, cultural, residential and commercial was all integrated into the same unit.

Improved connection: Bike paths and foot highways, car pool sites and pedestrian networks.

Achieving long-term integration of the OSI-Ghia site into Turin's urban framework demands more than technical remediation; it calls for an architecture that evolves with users, supports diverse needs, and adapts over time. As Bachman (2008) notes, successful architectural design must "accommodate different sets of stakeholders and facilitate collaboration as well as be robust in the face of inevitable changes in its use" (p. 16). This systems-based perspective aligns with the project's ambition to create a multifunctional and resilient urban hub. According to Freeman (1989), innovation refers to the implementation of improvements or changes in processes or systems that are not commonly practiced by the originating organization.

8

This chapter shows the redevelopment strategy for the OSI-Ghia site, combining urban design, architectural proposals, environmental resilience, and participatory planning. Building on the previous analysis, the aim is to propose a regeneration framework that responds to the site's spatial challenges and unlocks its strategic potential within Turin's post-industrial landscape.

8.1

The OSI-Ghia site is strategically located within the urban fabric of Turin, bordering the neighborhoods of San Salvario and Crocetta. It lies in proximity to major urban nodes, including the new Biotechnology campus, the future IED Campus, the revitalized Via Nizza, and the cultural complex of Torino Esposizioni. Despite this privileged position, the site’s potential remains largely underutilized and calls for a spatial rethinking.At a macroscale level, The area is well served by Turin's main public transport systems-including both the metro and bus networks. However, pedestrian pathways and soft mobility infrastructure-particularly around key nodes like Corso Dante-are fragmented and difficult of access.The existing bridge over Corso Dante serves as a vital vehicular artery and is regularly congested at peak hours.Over-reliance on car-based infrastructure has significantly inhibited flexible, human-centred urban movement in the area.In addition, a severe shortage of student housing presents a major challenge in surrounding neighborhoods. According to Urban Center (2017), over 29,000 non-resident students attend universities in Turin, yet fewer than 3,000 dormitory beds are available. This imbalance increases daily commuting pressure and places additional strain on the public transport network and nearby residential zones. The core of this project is a proposal to construct and install two new connections between pedestrians and vehicles in the vicinity of Corso Dante. These bridges will therefore form a complement to what is already there, making traffic flow smoother and safer. In addition, they offer direct linkage between this area and sunrise or sunset urban districts: with such facilities in place there is no need for detouring around impassable main streets anymore. Also, this type of urban architecture will dramatically diminish the severe congestion issue. From a systemic perspective, urban regeneration is not a linear task but a complex process that responds to diverse and shifting needs. Nightingale (2000) highlights that sustainable innovation in the building sector should be viewed as a complex system, where technologies, organizational structures, and knowledge are interlinked. This viewpoint supports a development model that evolves over time and promotes resilience through adaptive design strategies.Essentially, the regeneration of the OSI-Ghia site is not only social change but also a process in which living space and work establishments are interwoven. It connects Turin’s industrial past with a more sustainable, integrated future for all.

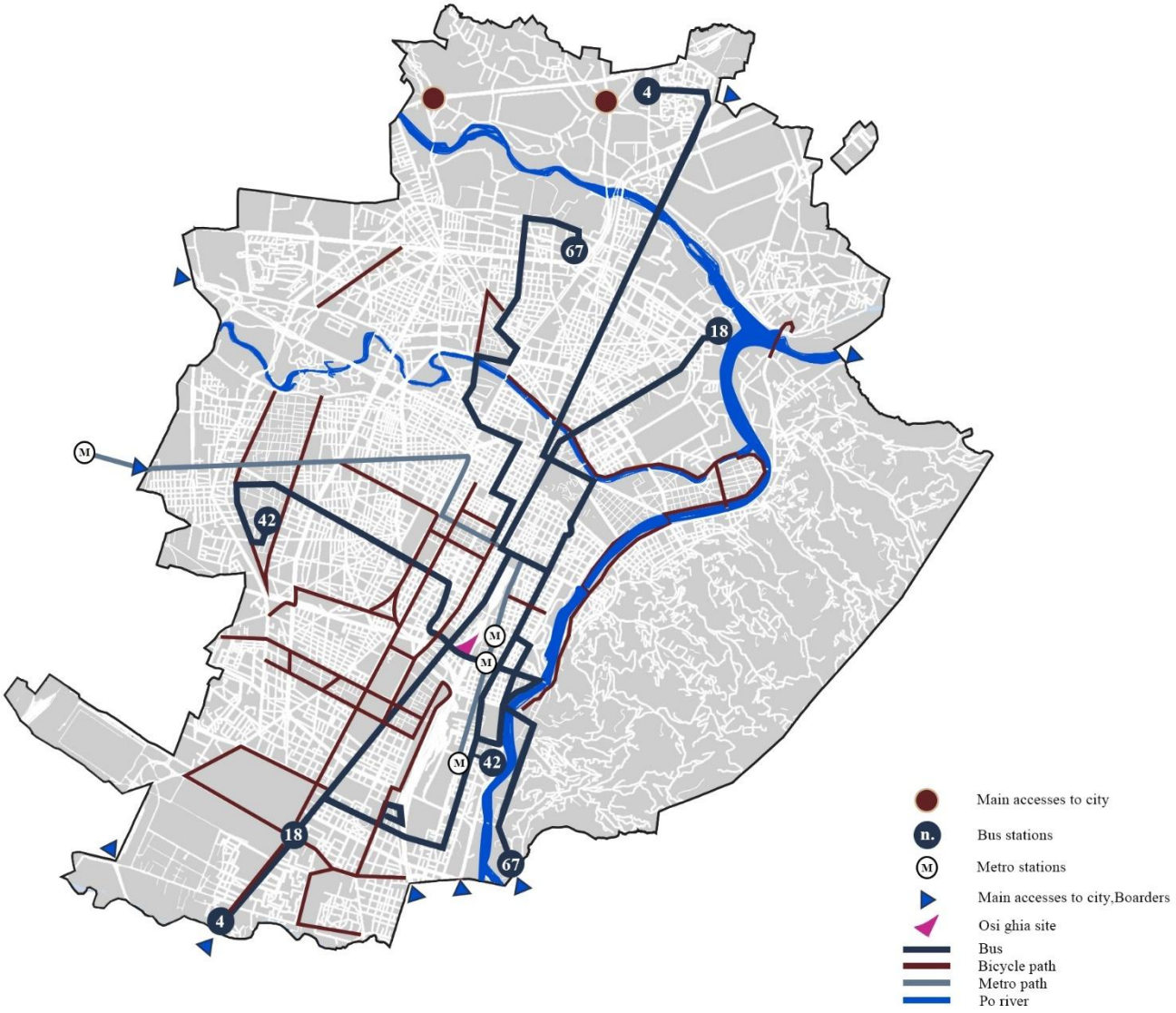
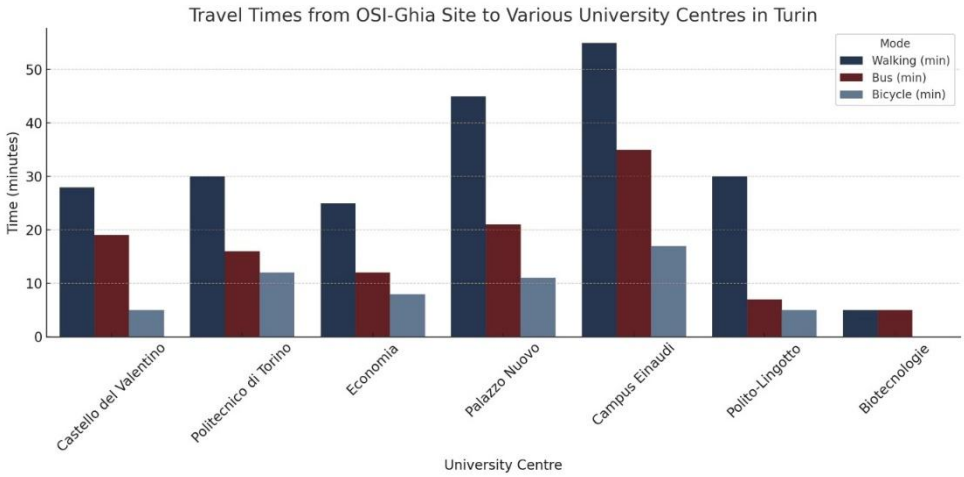


Fig88-Macroscale Urban Mobility and Public Transport Network of Turin, Including the OSI-Ghia Site

This bar chart shows the average travel time from the OSI-Ghia site to university campuses in Turin using different modes of transport. The data highlights that the site is within a 5–12-minute cycling radius from most academic hubs such as Politecnico di Torino, Castello del Valentino, and Economia, while walking times exceed 25–55 minutes for most of the

destinations. The Biotechnology campus is the nearest (5 minutes by foot or bus), while Campus Einaudi is the most distant. These figures explain the site's strong potential for academic integration, especially with improved pedestrian and bicycle infrastructure, and point to a compelling argument for student-oriented redevelopment strategies.

Fig89- Distances from University Centers



9.

The transformation of post-industrial urban areas presents both a challenge and an opportunity for contemporary cities. For Turin, a city historically shaped by manufacturing and mobility industries, the OSI-Ghia site epitomizes the spatial, social and infrastructural entanglements of such legacy. Now, this former industrial enclave that sits at the conjunction of important urban districts and transport systems is merely an empty gap inside a crowded metropolis. This section aims to look critically at the urban and architectural attributes of the site and its immediate environment. By tracing site conditions ranging from the level of morphology to that of the social functions which shape space, the analysis sketches both how things are at OSI-Ghia and what could potentially happen. By examining the built environment and its immediate context, this chapter sets up a baseline theory on which later urban design proposals will be developed. Ultimately, we aim to devise ways to re-story the OSI-Ghia area to rejoin it in the flow of a new, more sustainable, participatory and educated Turin.

Fig90-Osi Ghia Factory-Corso Dante Torino

9.1

The OSI-Ghia site is located between the Crocetta and San Salvario districts on a triangular plot that has long been isolated by surrounding railway infrastructure. Its location within the city is strategic, offering a rare opportunity to reconnect two historically important neighborhoods.By looking at the site's potential, it can be seen that not only the site itself but the entire urban context need examining. Historically, this area played a significant role in Turin's industrial development, hosting manufacturing facilities which supported not only the local economy but also its residential .These industrial blocks turned into communities where workers had jobs, houses and services.Over time, however, the OSI-Ghia plant has been abandoned and the once vibrant site decayed. Large sections of the area remain derelict to this day, some spaces being rarely visited mere blank urban waste associated with social vulnerability. Despite its central location and proximity to such adjacent facilities as the Toolbox coworking space, most of the site languishes empty, waiting to be skillfully reintegrated into city life.The major obstacle of the area's railway station and its limited connections with other forms of movement is a major barrier to rehabilitation. This has greatly reduced access for both pedestrians and vehicles, giving the impression that it is nestled away from society Insights into its spatial, social and infrastructural character are detailed in the following analysis, thus laying solid foundations for devising an integral regeneration strategy.

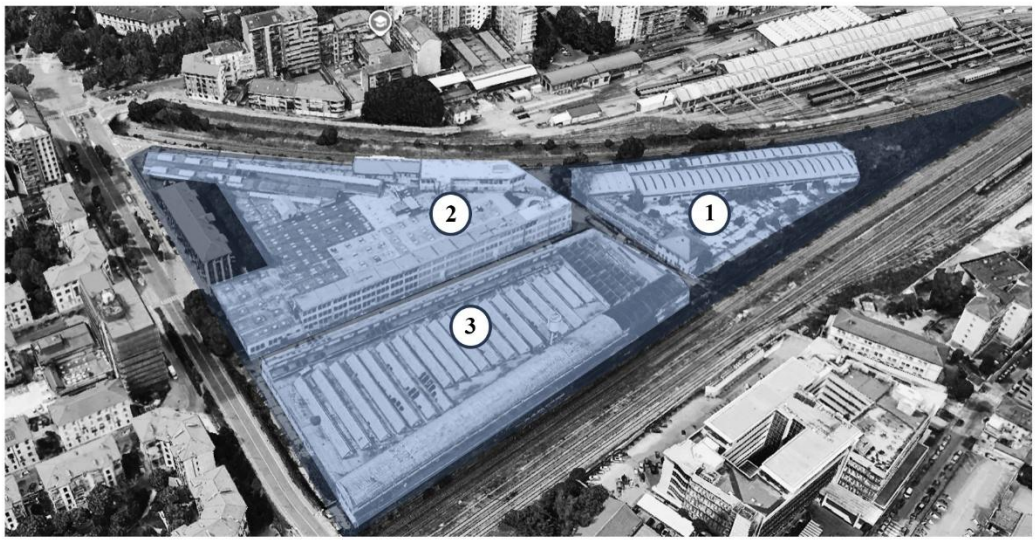


Fig91-Ex Osi-Ghia Factory

1.Ghia

2.Osi-West

3.Osi East

Source: Google Earth

- **Fill-Void**

Fig92-Fill and Void Structure of the OSI-Ghia Site and Surroundings

The fill/void analysis helps us better understand the spatial structure of the study area. In the neighborhoods surrounding the OSI-Ghia site, such as Crocetta and San Salvario, the urban fabric is dense and continuous, with very little empty space between buildings. However, the condition inside the OSI-Ghia site is quite different.This area, once home to a large industrial factory, now contains only a few large buildings, surrounded by vast unused open space. These voids have weakened the spatial connection between the site and the surrounding neighborhoods, creating a sense of isolation.Nevertheless, these empty spaces present a valuable opportunity for urban regeneration. They could be transformed into public areas, pedestrian corridors, or green spaces elements that would help reconnect the site with its

context. Therefore, the fill/void analysis highlights how proper design can turn an abandoned site into a vibrant and active part of the city once again.

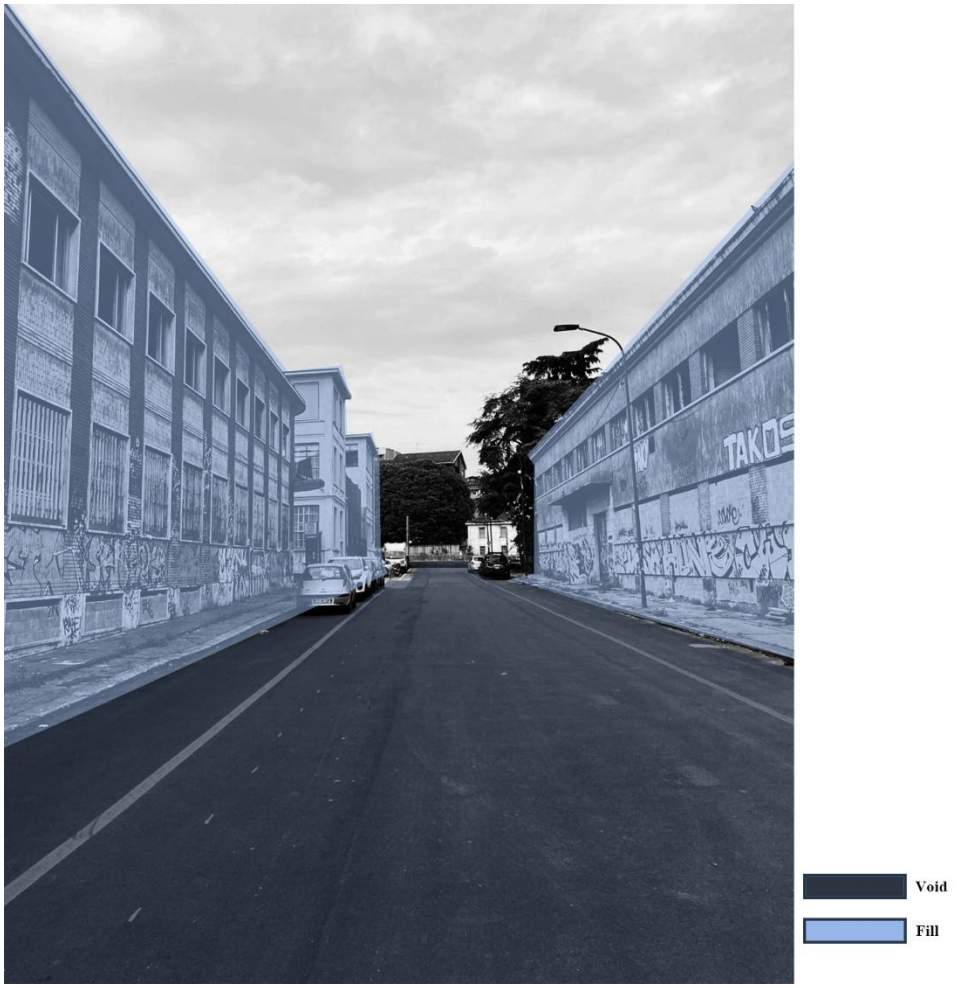


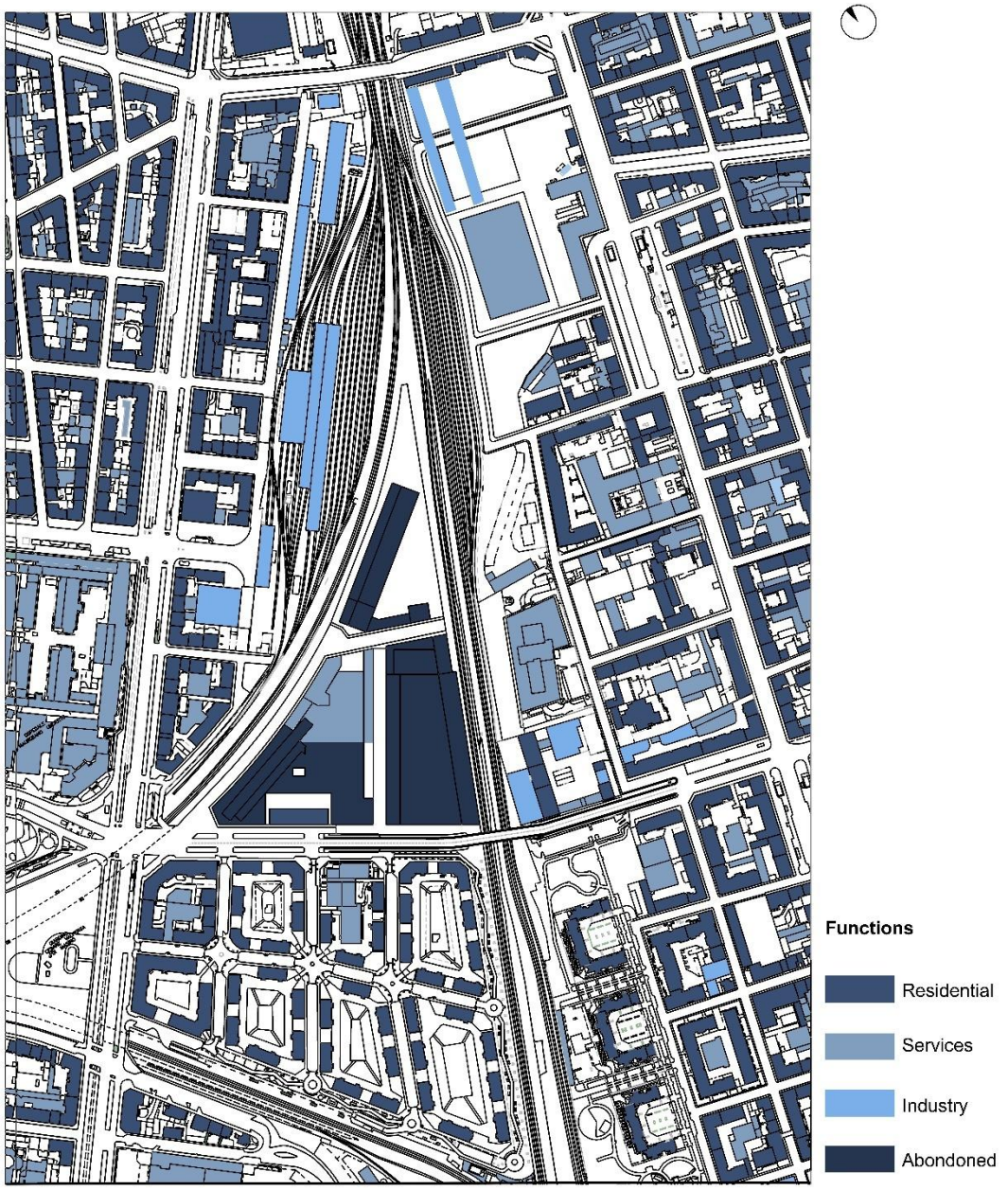
Fig93-View of Via Agostino da Montefeltro — Adjacent to the OSI-Ghia Site

- **Density**

Fig94-Density of buildings

The included site analysis map focuses on understanding the densification of the built environment. This knowledge is important in making planning decisions, as population truly does affect such things as resource consumption, pedestrian foot flows and light shed. By understanding current densification densities, future schemes have a chance to flow smoothly in harmony with both past development and the city surrounding them.

- **Functions**



- **Fig95-**Functions

The area surrounding the OSI-Ghia site is primarily made up of residential neighborhoods. Most buildings are apartment blocks, many of which feature ground-floor commercial units—such as small shops, cafes, or local services. These commercial activities are generally low in density and serve the immediate community.Key service and institutional buildings enrich the urban context. Mauriziano Hospital, located nearby, plays a central role in public healthcare and contributes to the institutional character of the zone. Along Dante Boulevard, the ATC office tower stands as a vertical landmark and supports the administrative presence in the district. The headquarters of La Stampa on the Turin-Genoa railway's eastern edge brings to the area a media and cultural dimension.The Biotechnology Department also on Nizza Street is planned to expand, and will become a growingly important educational and research centre.

Its influence on local development will continue to increase, in large measure through the arrival of students researchers and academic staff.The area's Industrial Past which still lingers on is most obviously evidenced to the north of the site where railway storage buildings stand along Chisone Street. These serve as a faded, very significant reminder of the site’s old industrial role.

- **Green areas**

Fig96-Green Areas

In the green space analysis, the vegetable fractionates yet important situated of OSI-Ghia. There are few parks inside the park (of which there is none) and several public or half-public facilities are close at hand. In the southwest and southeast parts of this area are Clessidra Park and Muratori Park respectively, which provide a good open area for residents close by. Further green spaces can be seen across railway tracks. Surrounded by similarly semi-detached places at present, these districts nevertheless all have ecological future.

The Arquata residential block, located on the other side of the Dante Boulevard, combines internal private greenery with public tree-lined sidewalks next to the railway tracks. The main roads like Turati and Dante Boulevards are lined with trees, which shapes the visual and environmental experience for pedestrians. These linear green features influence not only urban aesthetics but also microclimate regulation and air quality along busy transit corridors. This analysis emphasizes the possibility to reconnect scattered green areas through strategic planning. By identifying and linking these existing vegetated zones, the future redevelopment of the site can contribute to an ecological network that enhances both urban resilience and public well-being.

- **Transport**

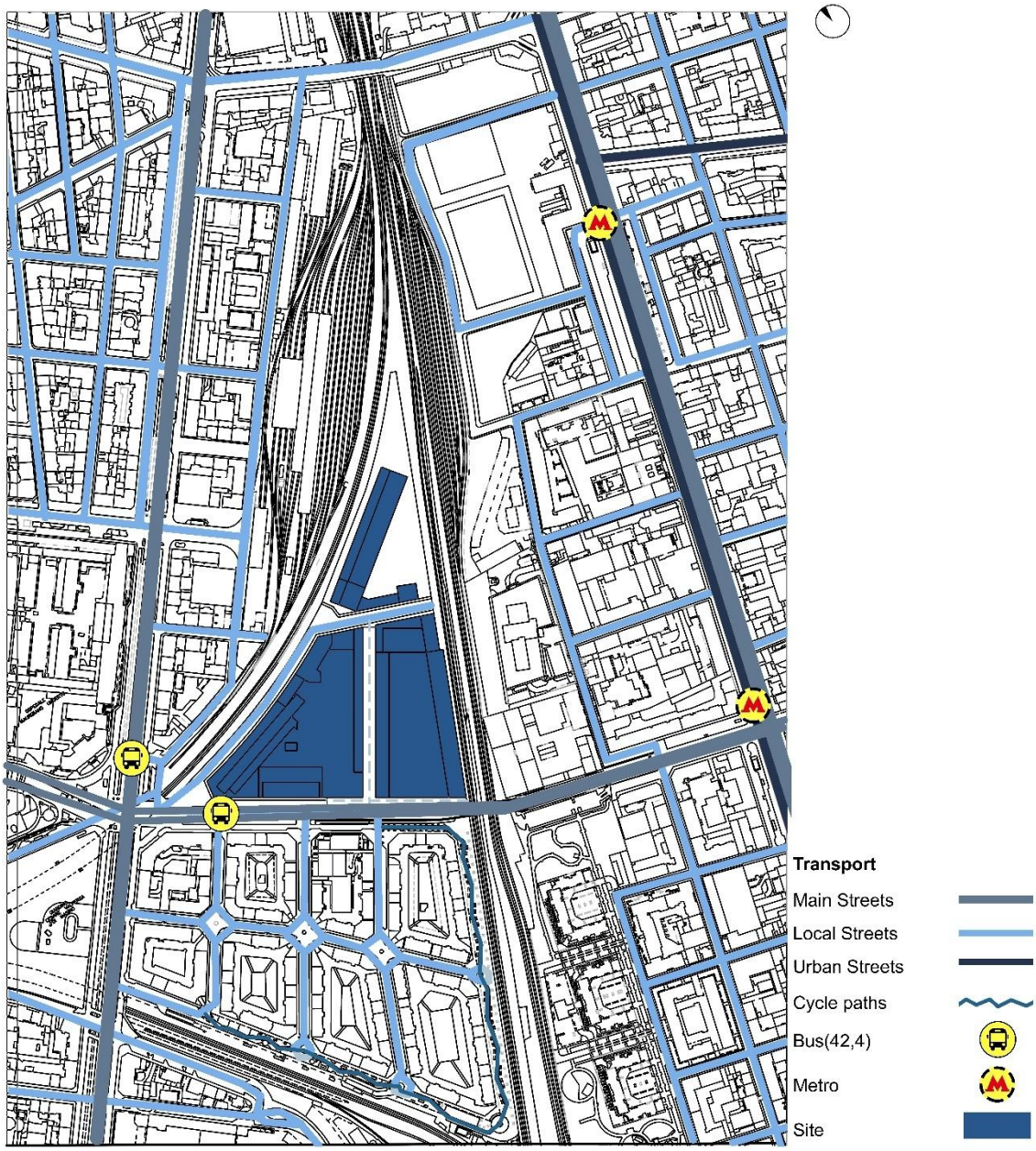


Fig97-Transport

The OSI-Ghia area is located where two railway lines cross, which breaks the usual grid pattern of Turin's streets. This makes it harder for people to move easily between neighbourhoods and creates a feeling of separation. Two main roads pass near the site: Corso Turati and Corso Dante. Corso Dante goes over the railway on a bridge, which creates a physical barrier. Because of this, the area near the Arquata housing block is not easily connected to the project site. Still, the area is well-served by public transport. Two metro stations and bus lines 4 and 42 are very close, which helps people reach the area easily. But there are not enough bike lanes, and the ones that do exist are not well connected, so biking is not very convenient.

There is also a new project happening on Via Nizza, where a bike and pedestrian path will be built to connect this part of the city to the center. This is a good step toward making movement easier and more sustainable.

- **Traffic Flows**

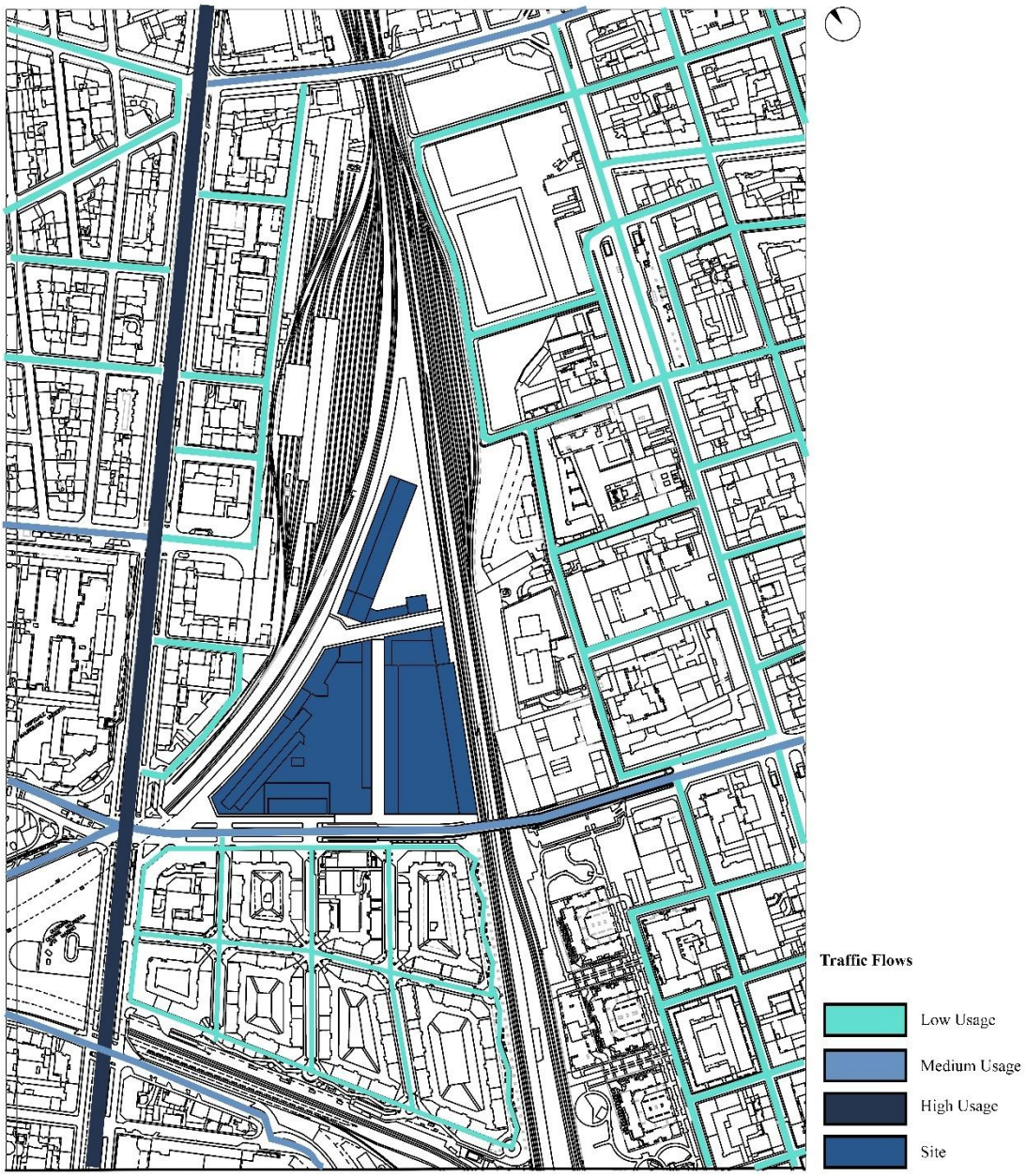


Fig98-Map of the Study area dividing the roads by usage

The streets in the area around OSI-Ghia are of medium to high traffic occupancy, with particularly busy main roads like Corso Turati and Corso Dante. The west-east main traffic corridor over the railway points is a subject of widespread congestion in these areas, particularly during the evening hours. No auto circulation is planned within the OSI-Ghia zone at present, but there is heavy road activity all around it. This lack of direct access from within further limits OSI-Ghia's connectivity and contributes to its position as an isolated "island" in an otherwise dense urban matrix. In the design stage, the issue will be settled: the indoor circulation system opened can avoid nuisance to everyone else. Such a strategy affords connectivity through, rather than inundating the site with traffic and its surrounding streets.

The task is to secure an easy but at the same time safe access, and in doing so to form an urban space conducive integratedness and sustainable development.

- **Horizontal walkability Permeability**

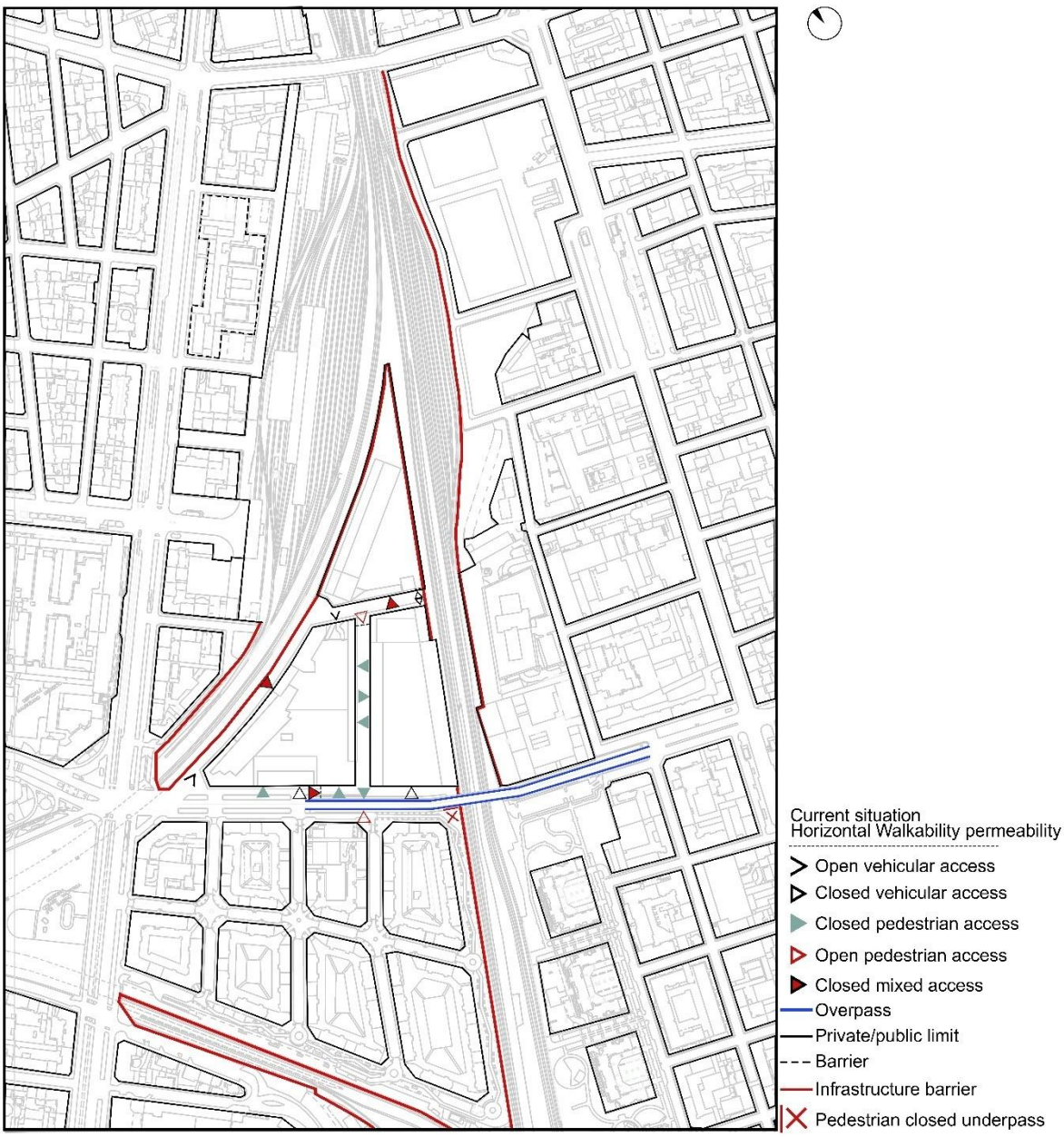


Fig.99-Current situation of walkability

Because of the presence of two active rail lines and an elevated bypass called the Corso Dante that spans across it, poor penetration is common here. These things all greatly restrict not just for cars but people too there is only one access point available. Many neighbouring streets are either blocked or disconnected; the underpass below Corso Dante suffocates circulation! All this infrastructure hampers circulation on an urban scale and causes this space to be simply that. However, due to the intricate layouts and dense concentration of the surrounding buildings, a sense of enclosure is created. Everyone just can't operate from within it. Making it an autonomous recluse instead of a Completed outpost in city to complicate matters further, physical obstacles such as fences and deserted structures make free movement impossible throughout the site; rather than unifying features this makes the landscape fragmented and quite static.

10

Fig.100-Urban layout of the Site

10.1

The city planning provides a high-quality road network, street system and walkway. The current urban grid around the OSI Ghia location is compact and well-structured. However, the location itself has always been relatively isolated because of physical barriers and poor access. To solve these problems, the project introduces new links by car, on foot that can merge into the surrounding Urban texture site. The ring link proposed in this plan mitigates traffic burden and consequently raises mobility levels on its perimeter, while planned pedestrian walkways will make it easier to get around within and provide simpler Yet more direct connections for adjacent communities.

These interventions are designed not only to reduce isolation but also to support future development in this area, by improving the mobility, and ensuring the site's role as a vibrant urban node in Turin’s regeneration strategy.

Fig.101-Conceptual Sketch of connectivity strategy

10.2

The new vision for the OSI-Ghia site focuses more on enhancing its integration with the surroundings of urban fabric through a series of new vehicular and pedestrian connections like the bridges that in my thesis will be discuss. As illustrated in the drawing, these proposed pathways on the north and west edges aim to break the site's previous isolation caused by railway lines and infrastructural voids. The updated connections improve the walkability, ease traffic pressure especially along Corso Dante during rush hours and support the site's reintegration into the city grid.

At the architectural scale, the design process is clearly visualized through a 3D development diagram showing how the site's-built form evolves. The design strategy identifies:

- Volumes to be demolished (highlighted in yellow), due to spatial limitations
- And new additions (in red) that support new function needs and improve connectivity.

To bring the site into line with present contemporary uses like public spaces, innovation centers and cultural programs, a selection approach was taken for this transformation. The additional parts are arranged such that the space flows more easily; live edges are created and views improved, while demolition released precious land for green belts and functional use rearrangement.

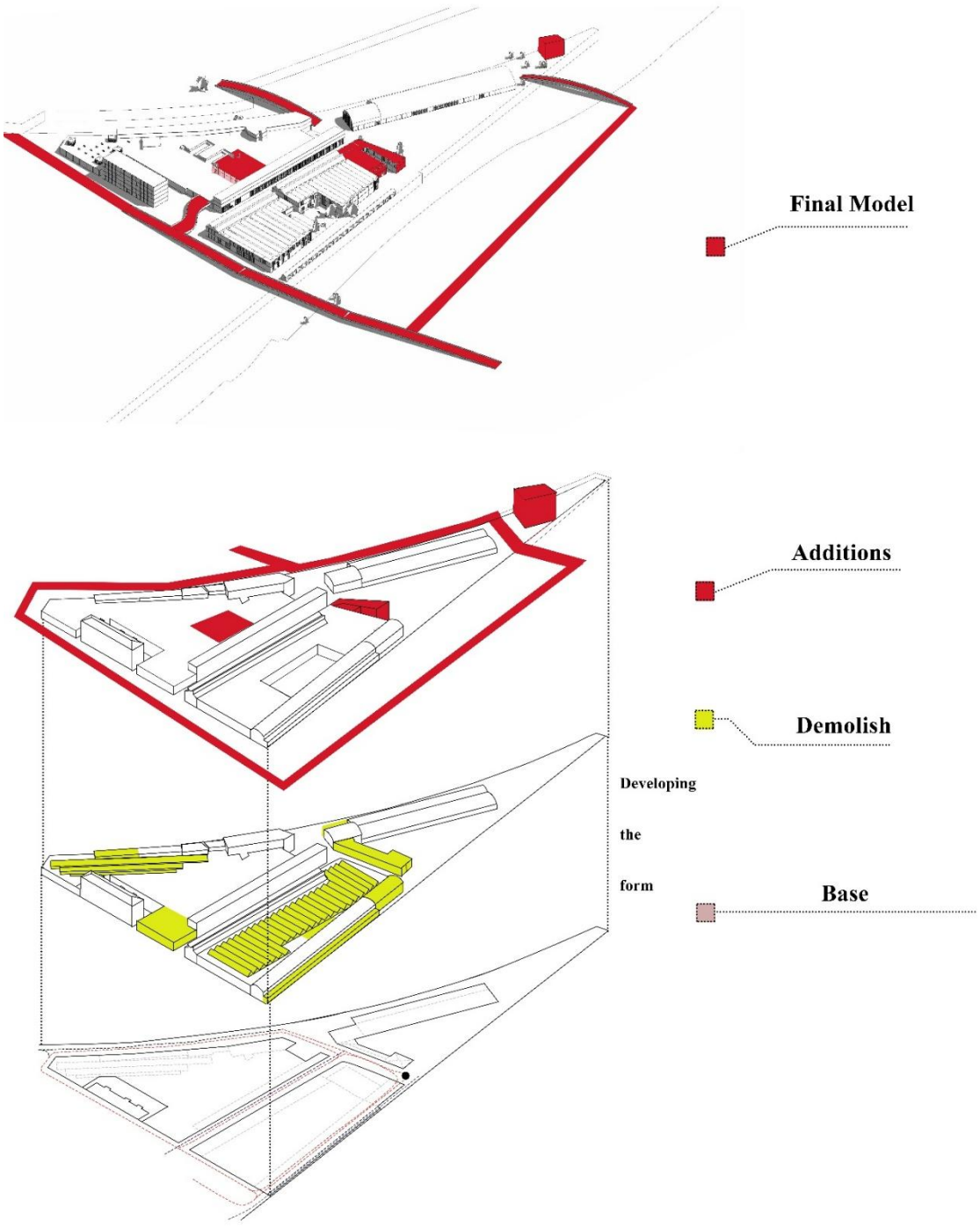


Fig102- 3D Diagram of Morphological Transformation

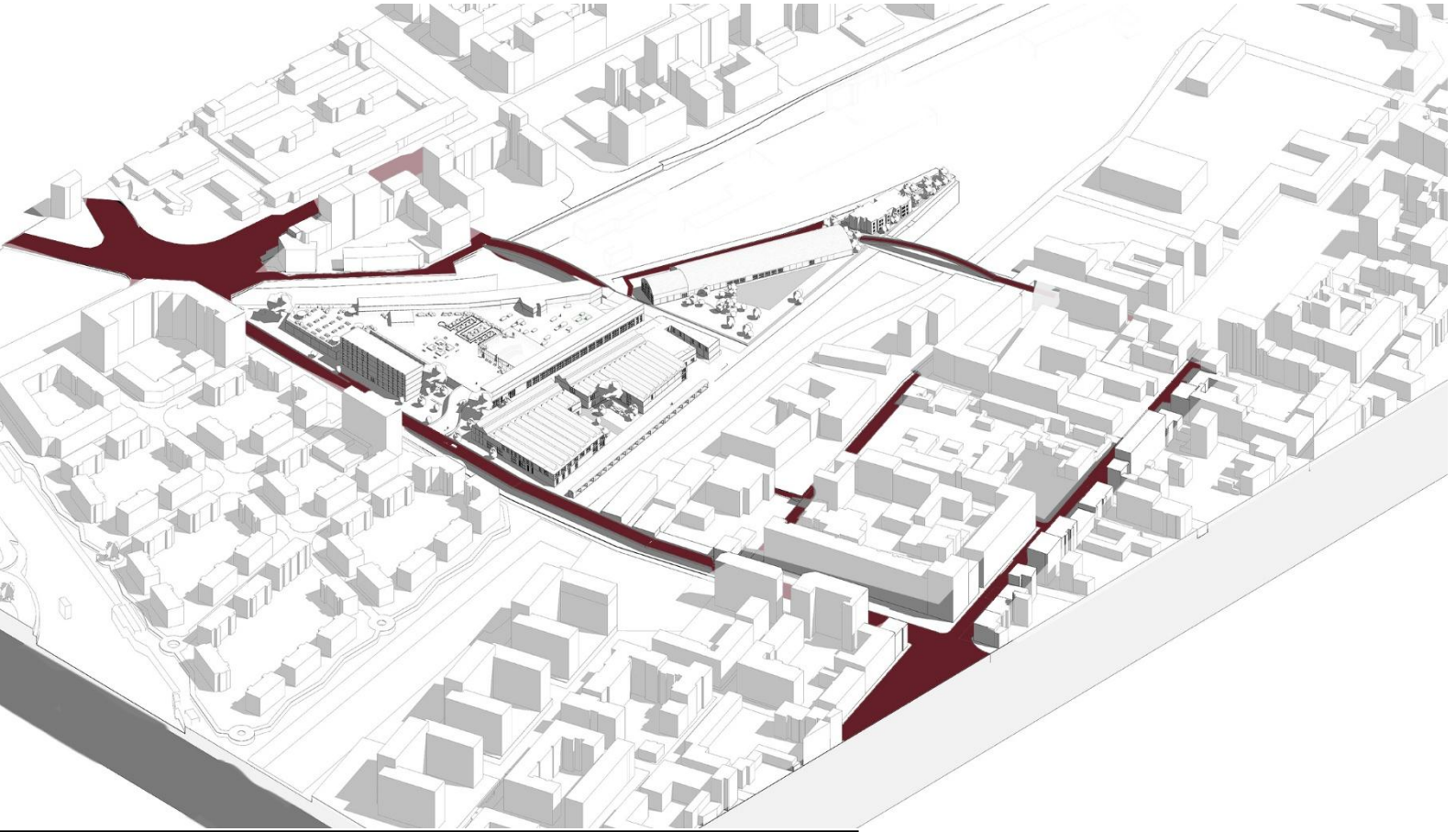


Fig103-Axonometric View of Final Integration with Urban Context and New Connections

10.3

This report provides a complete schematic for transforming the former OSI-Ghia site from unproductive space to one with real urban vitality. This diagram distributes many functions over the site, creating a varied and lively urban environment. The major individual composition elements are:

- **Student Residences:** Several blocks are dedicated to affordable student housing, addressing a core need in this area of Turin, which is close to university campuses. Student Residences: Several blocks are given over to affordable student housing, something which is very necessary in this area of Turin that closely adjoins university campuses.
- **Cultural and Educational Facilities:** A museum dedicated to the site's industrial heritage, a public library and printing center, and an open-air cinema enrich the site's cultural identity.
- **Leisure and Sports Infrastructure:** With a sports shop, basketball court, and large sports complex, and other facilities, life can be closer to nature and the community can embrace a healthier lifestyle.
- **Green and Social Spaces:** A green pathway runs through the site, rooftop gardens complement shady seating for sustainable development and to enhance liveability in the city.
- **Retail and Dining:** The Supermarket, restaurants, food trucks and terraced café bring life to the public realm Promote economic vitality.
- **Mobility Support:** Parking zones and new vehicular connections ensure integration. with the surrounding context. Additional elements include chess & games area, shopping mall, rooftop plaza, and green rooftop.

Fig104-Functional Program Distribution

10.4

Moreover, on this view which illustrates the integrated mobility strategy for the redevelopment of the OSI-Ghia site we can see a circulation system designed to accommodate pedestrians, cyclists, vehicles, and emergency services, ensuring full functional integration with the urban context.

It shows:

- **Pedestrian pathways**, which are more continuous and walkable within and around the site, improving accessibility and encouraging active transportation.
- **Bicycle Paths** strategically design to connect main areas and support sustainable mobility alternatives.
- **Vehicular Roads**, ensuring efficient access to various programmatic zones and linking the site to surrounding neighbourhoods.
- A **Service Road**, To the supermarket and restaurants allocated its own road strictly for receiving shipments supports daily operations While not intruding on public life.
- Defined **Safety Zones**, Defined safety zones with direct access lanes for ambulance services and fire departments to keep safety Both day to day security as well Cannot pass through development.
- The mobility framework can support this structure adjustment so everything in the area adapts to all daily use and is ready for emergencies.

Fig105-Integrated Circulation and Mobility Strategy for the OSI-Ghia Site

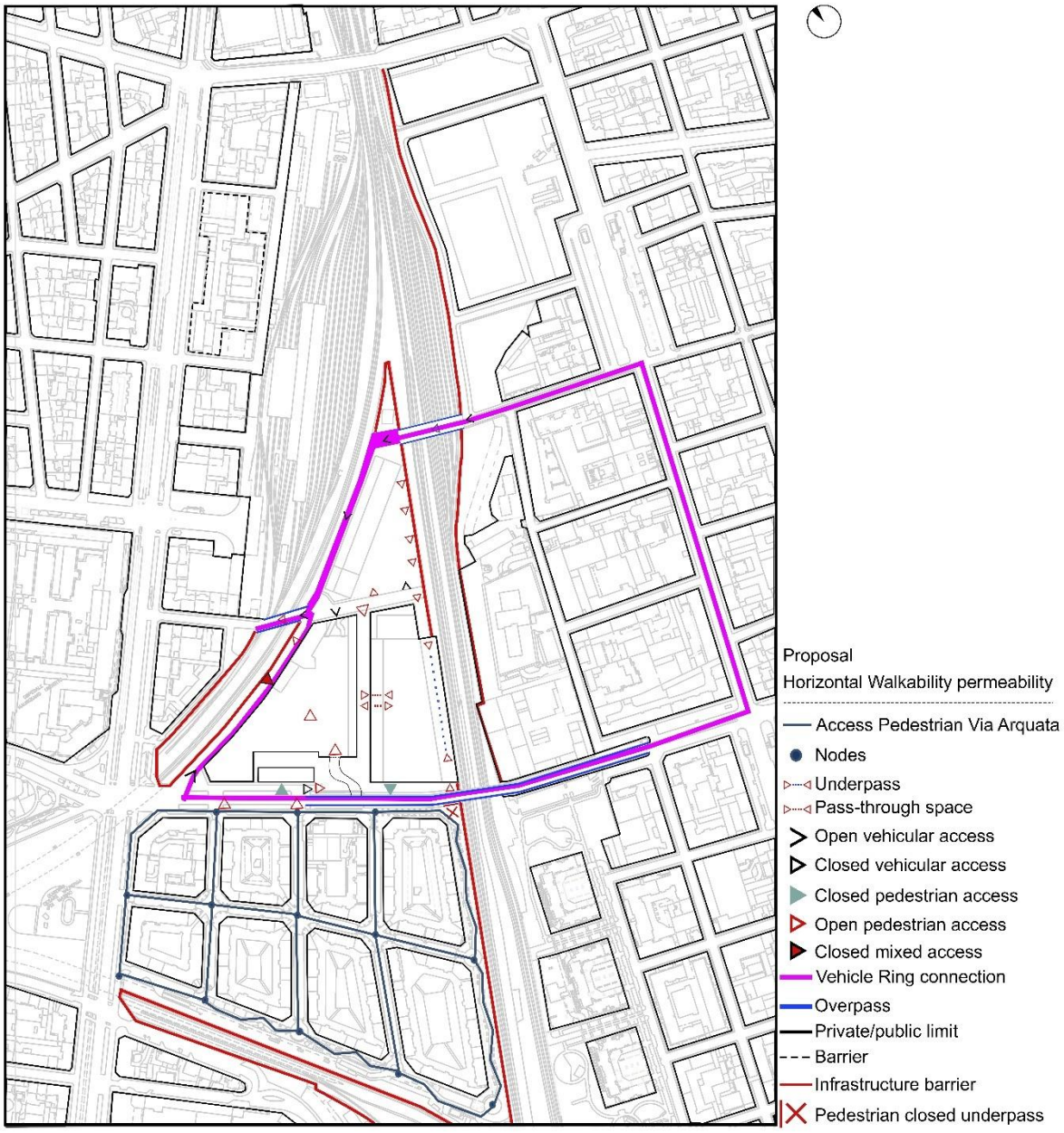


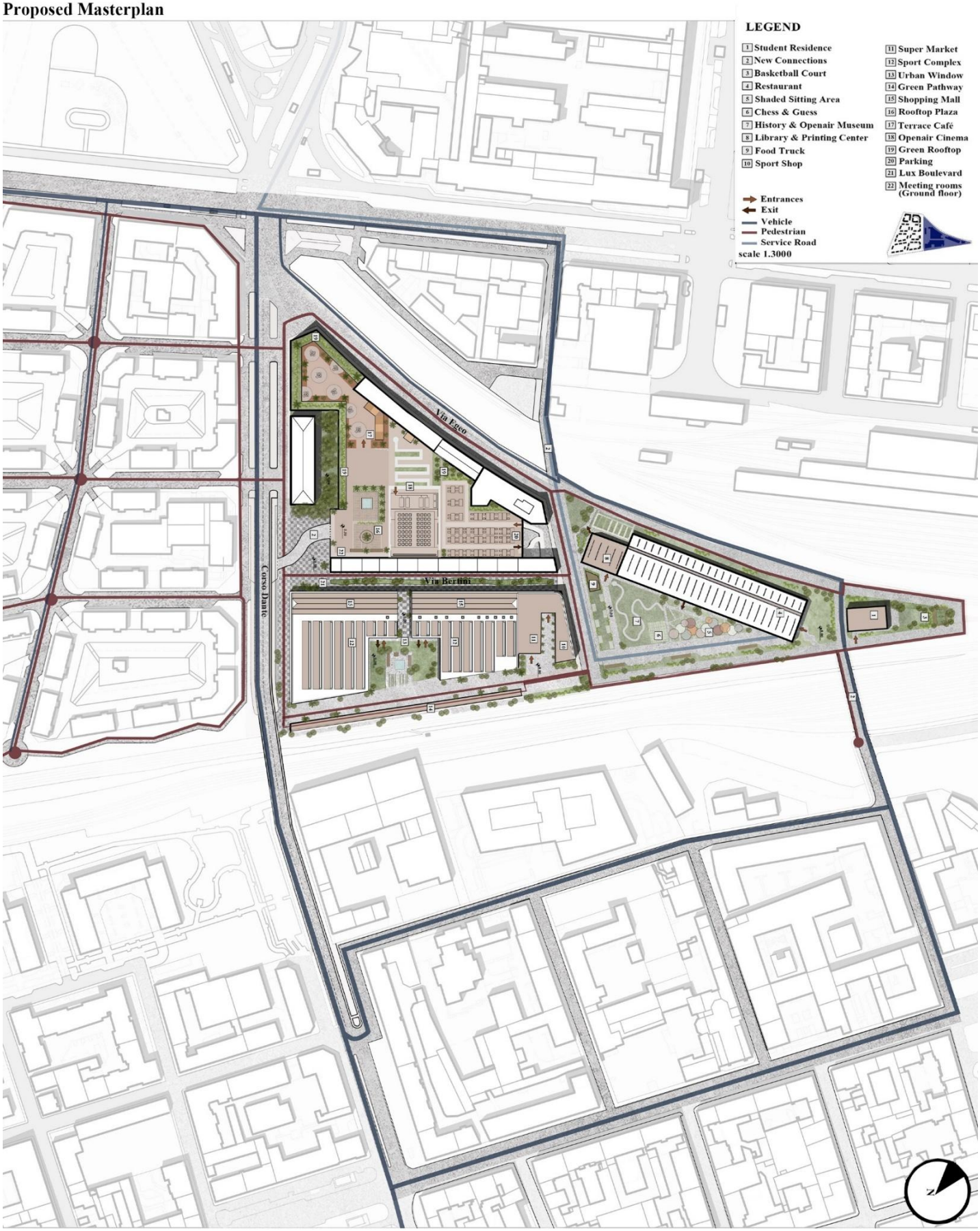
Fig106-Proposal of walkability design

10.5

Previously the OSI-Ghia site felt very cut off from the rest of the city, Railways and blockages around it made it hard for people or cars to move through the area. All the underpasses were closed or unsafe, and there were no clear walking paths for pedestrians. This made the site feel completely isolated, with little connection to nearby homes, parks, and public spaces. To solve this problem, the new design adds clear and safe ways for people and vehicles to move across the site. One of the key ideas is a ring connection which is a circular path that wraps around the site and links important places like student housing, green spaces, and cultural areas. Inside the site, we've added new paths that make walking easier and safer. By adding these connections, we've turned a closed-off space into an open, welcoming, and connected part of the city where people can move freely and interact.

10.6 **Fig107-**Proposed Masterplan

Proposed Masterplan

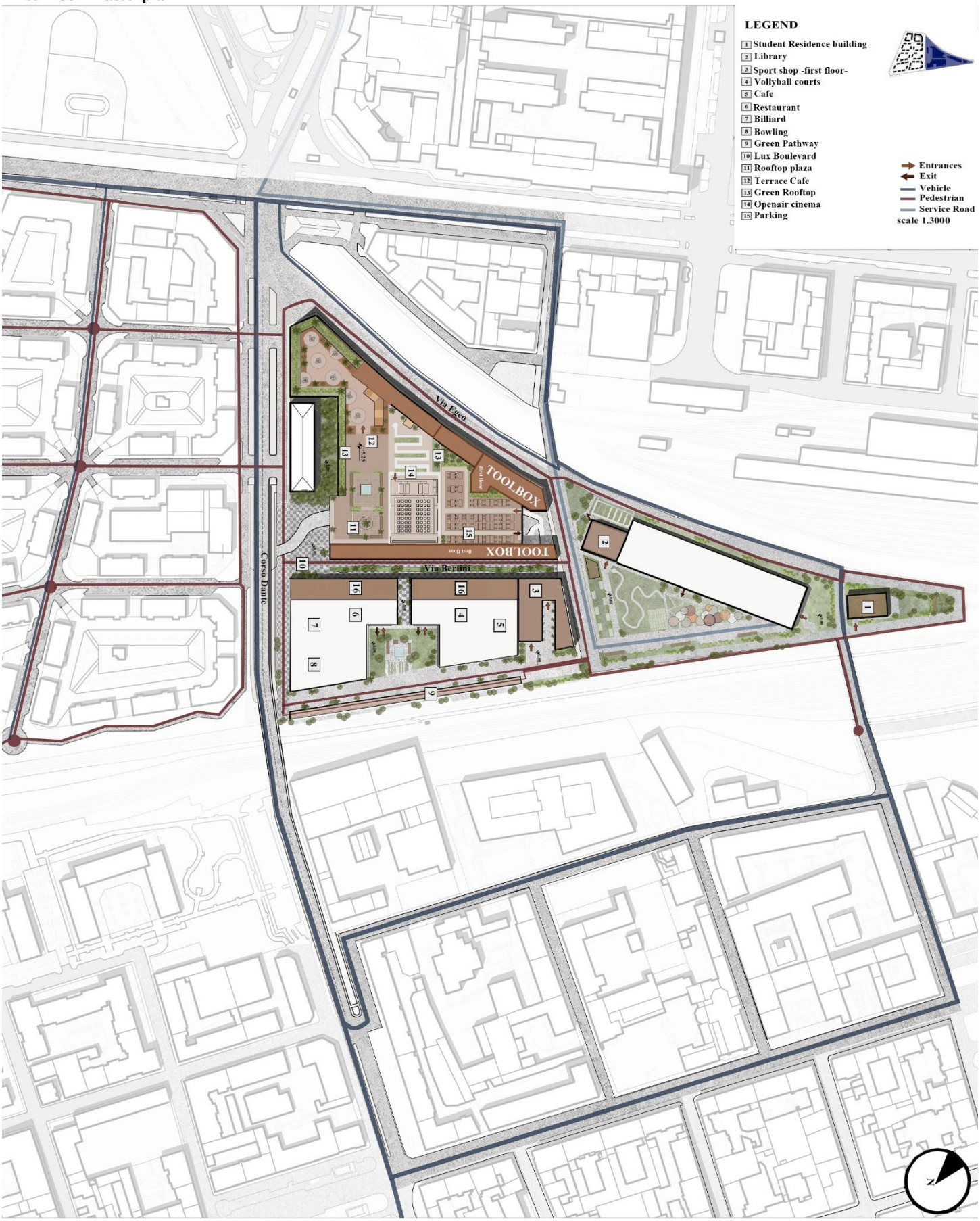


10.7 **Fig108**-GroundFloor Masterplan

Ground Floor Masterplan

10.8 **Fig109**-First Floor Masterplan

First Floor Masterplan



10.9

Fig110-Section Lines

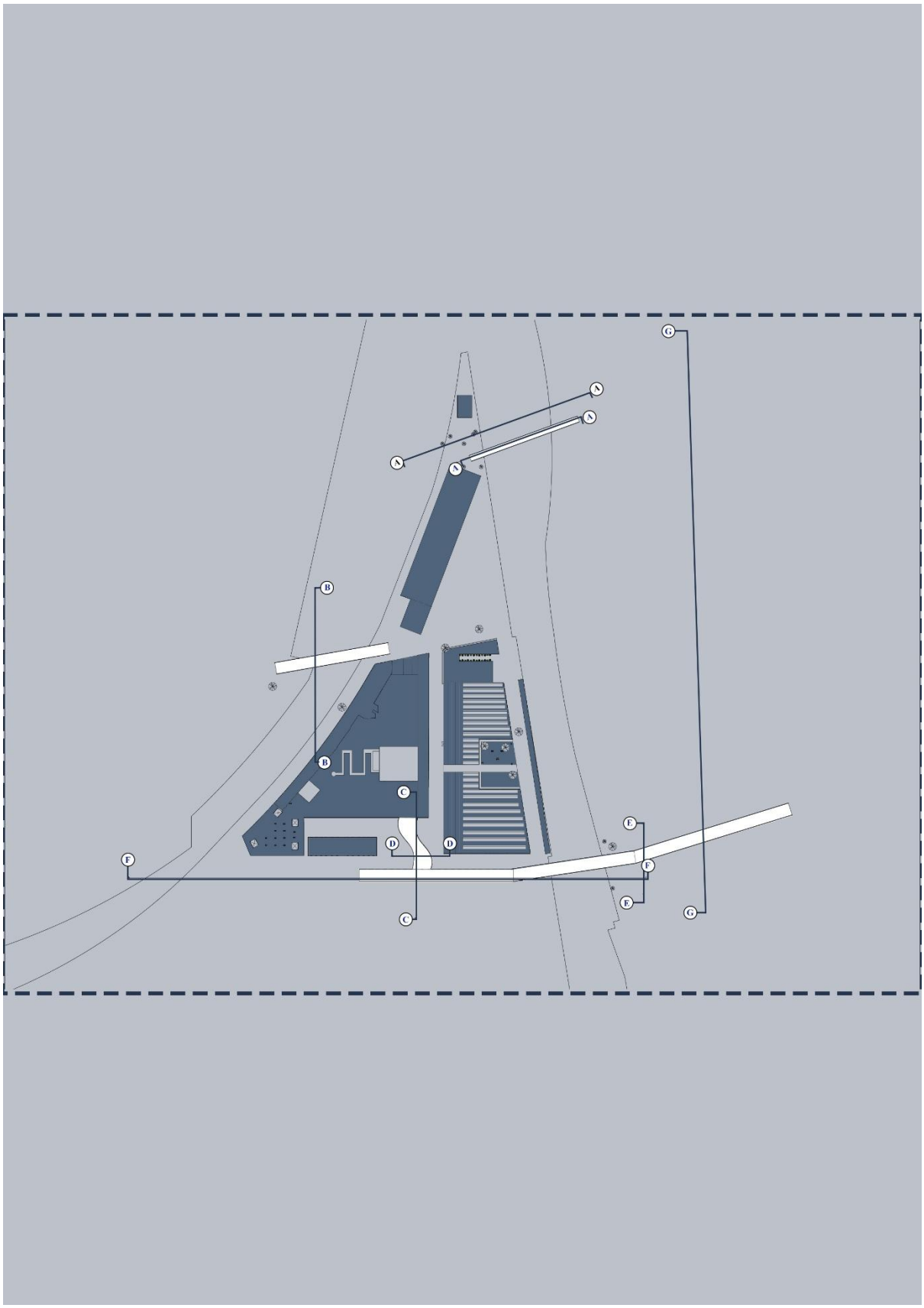
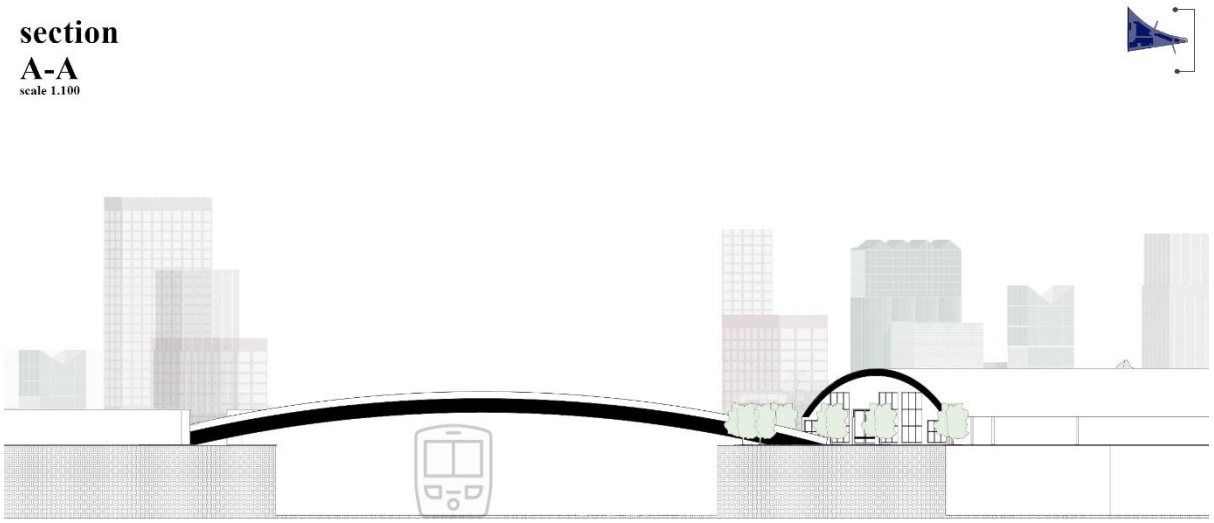


Fig111-Sections



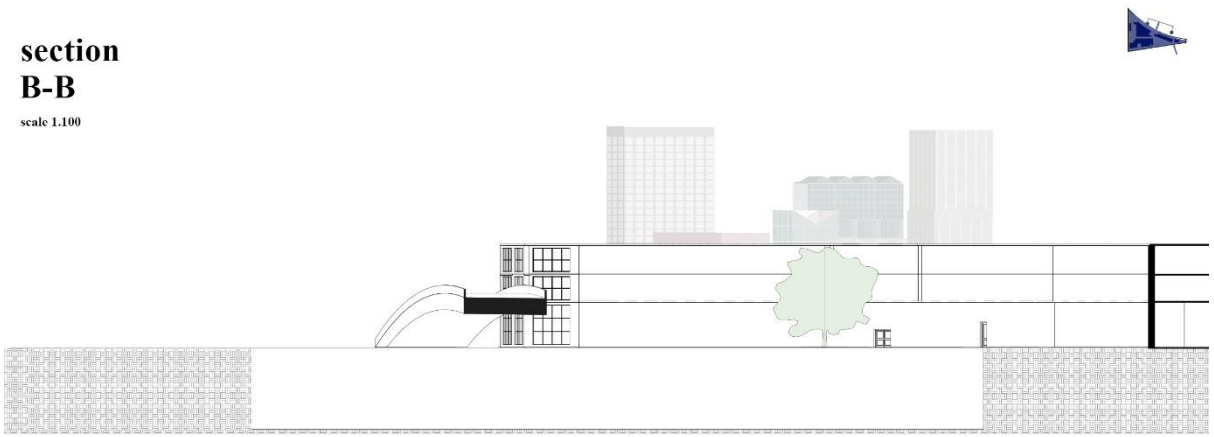
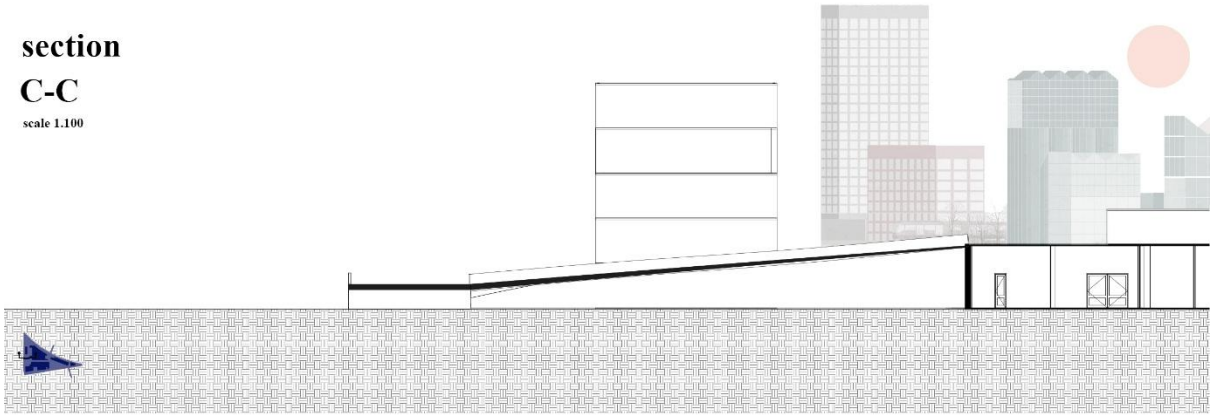
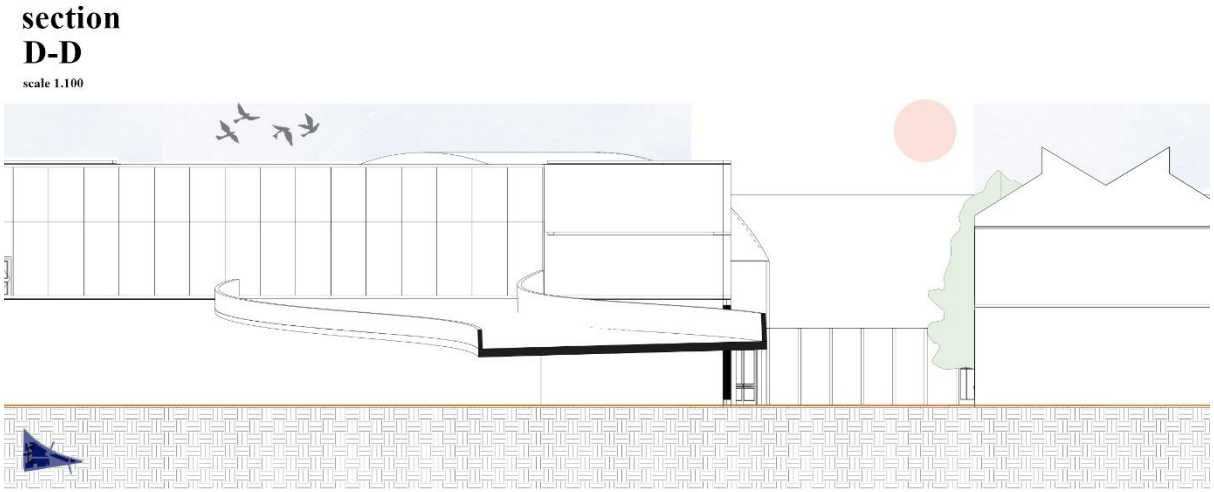


Fig112-Sections





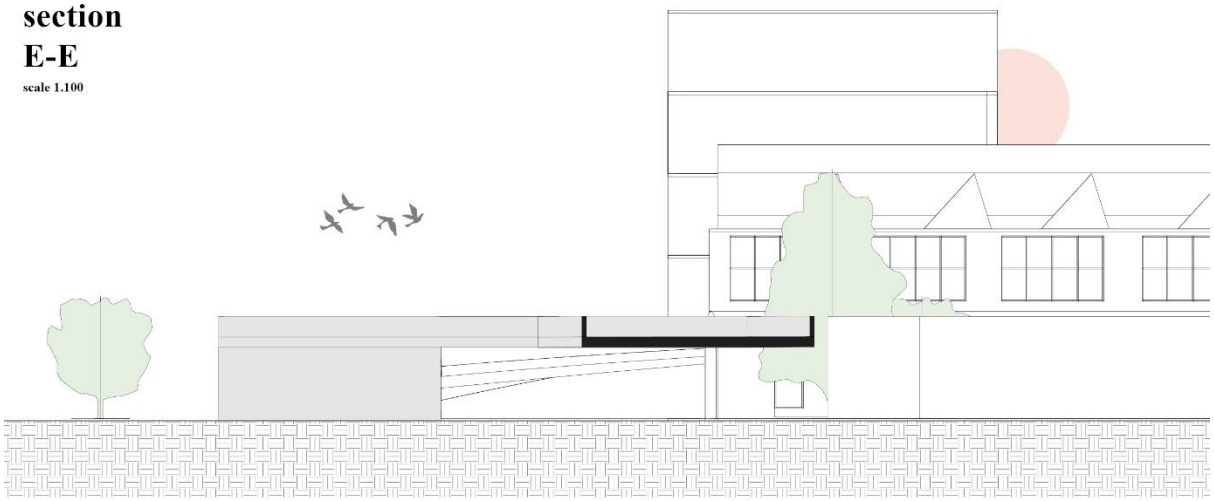
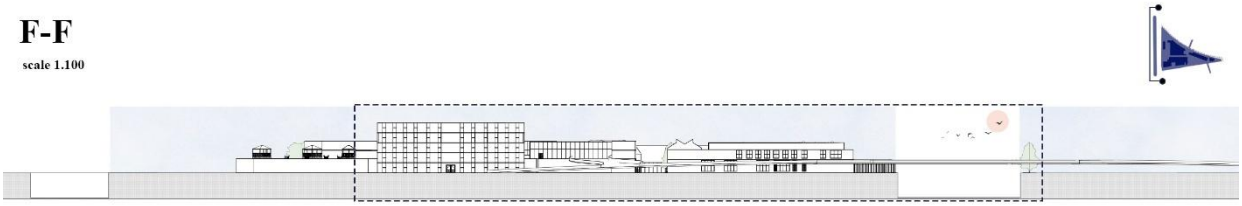


Fig113-Sections

sections

F-F

scale 1.100



F-F zoom

scale 1.50

G-G

scale 1.100

G-G zoom

scale 1.50

10.10 Fig114-Views

views

North

scale 1.100

North Zoom

scale 1.50

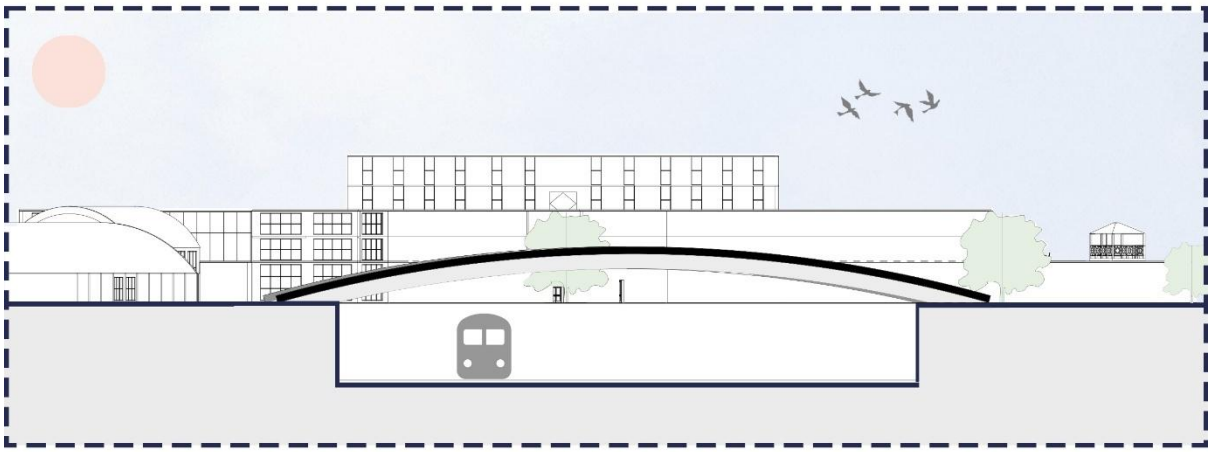


Fig115-Views

views

East

scale 1.100

East Zoom

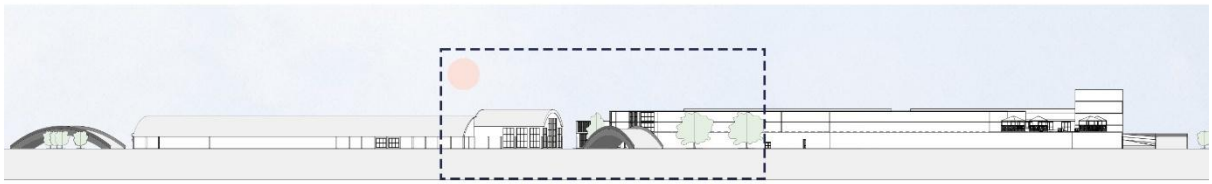
scale 1.50

Fig116-Views

views

West

scale 1.100



West Zoom

scale 1.50

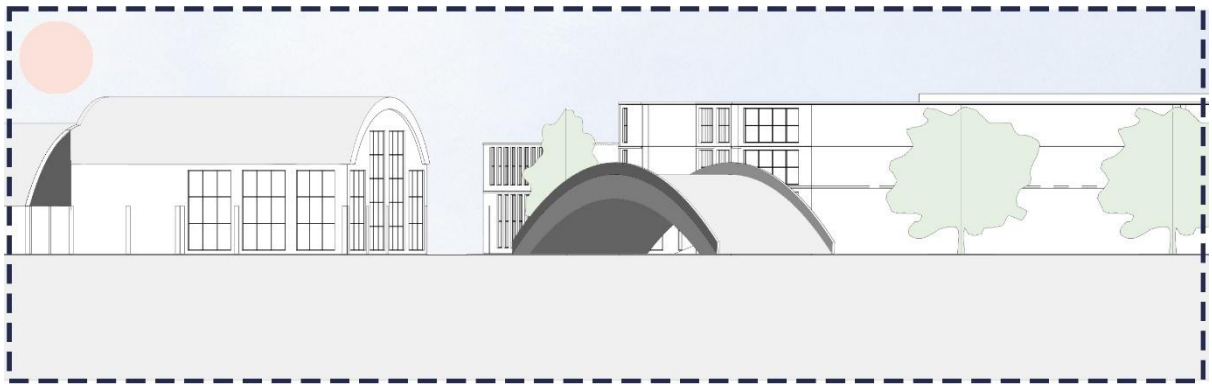
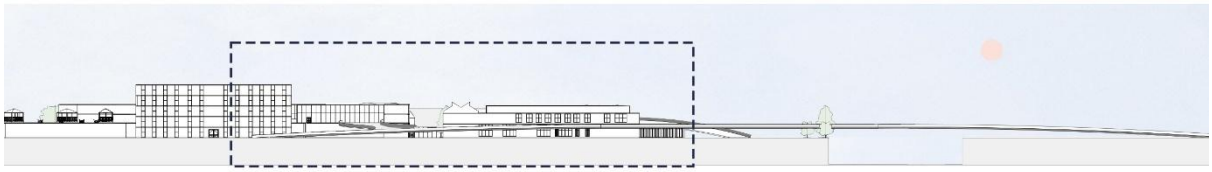


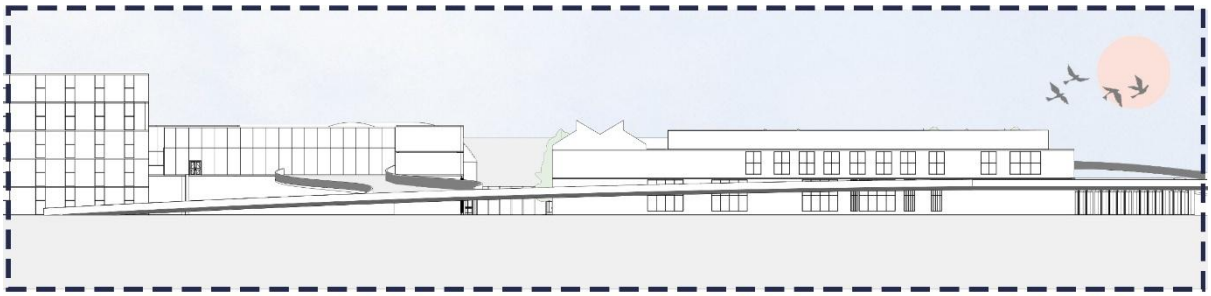
Fig117-Views

views

South
scale 1.100



South Zoom
scale 1.50



11.

Exploded Diagram

Osi West

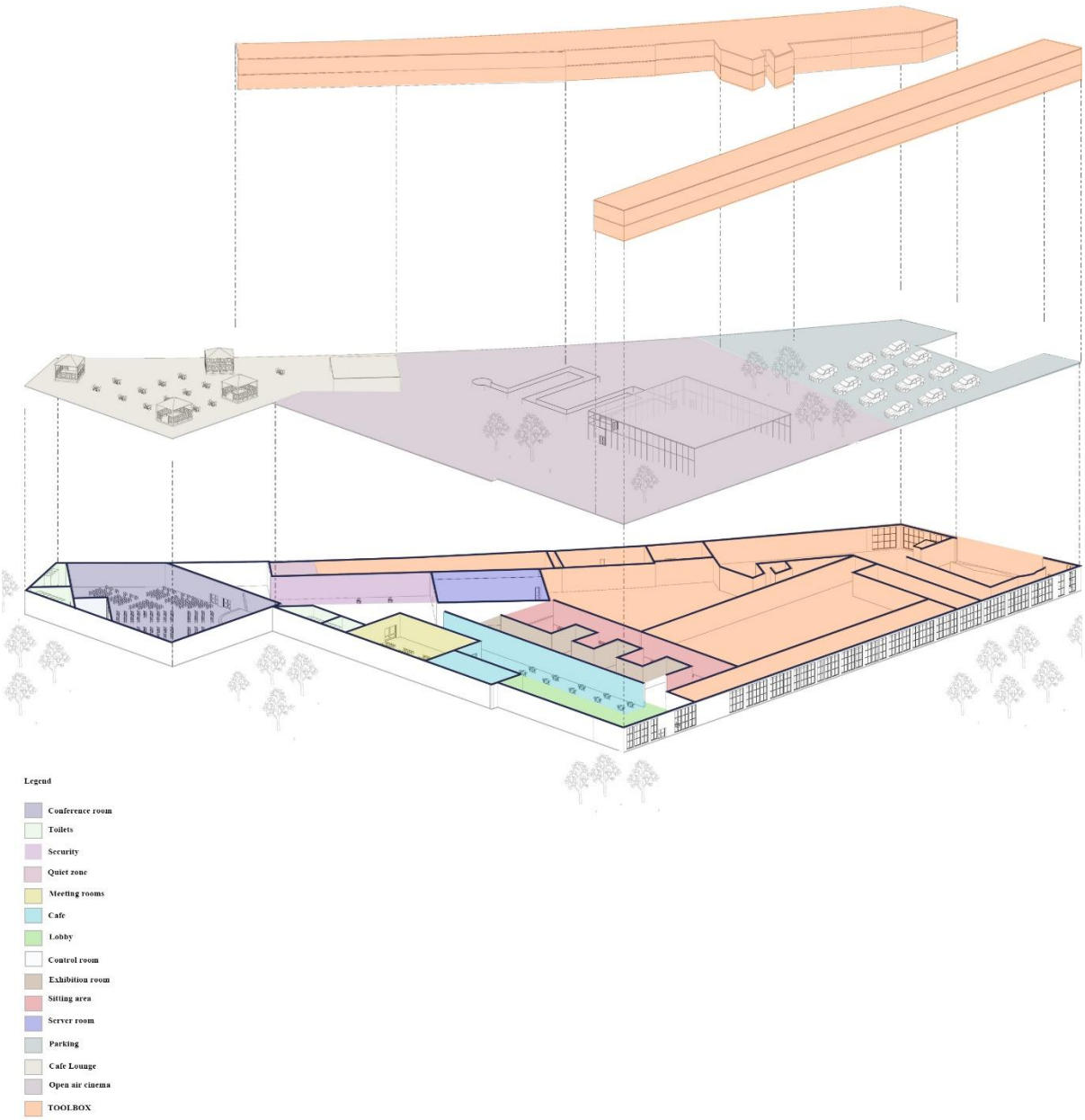


Fig118-Color scheme diagram of osi west

11.1 - **Fig119-**Ground floor -Osi west

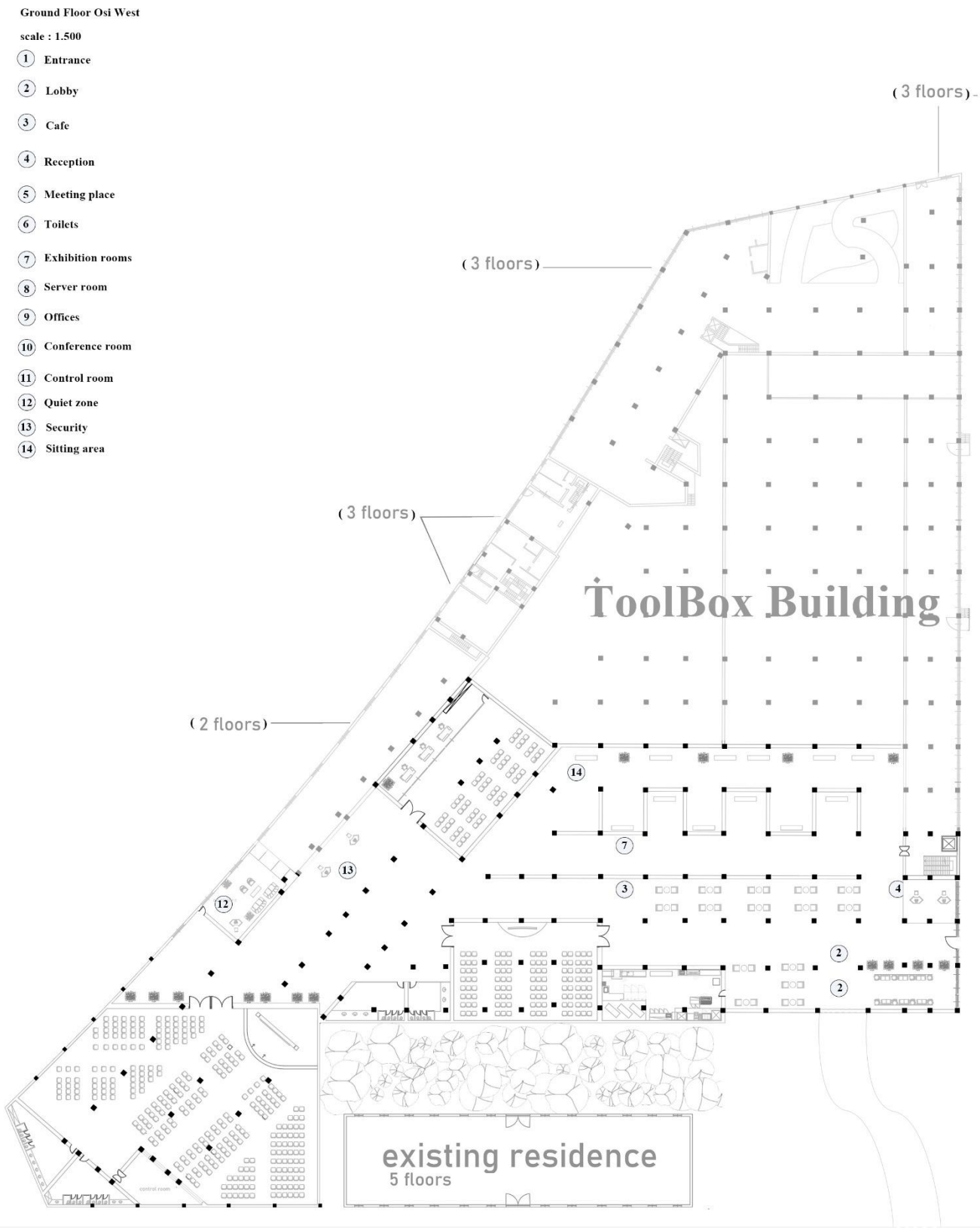
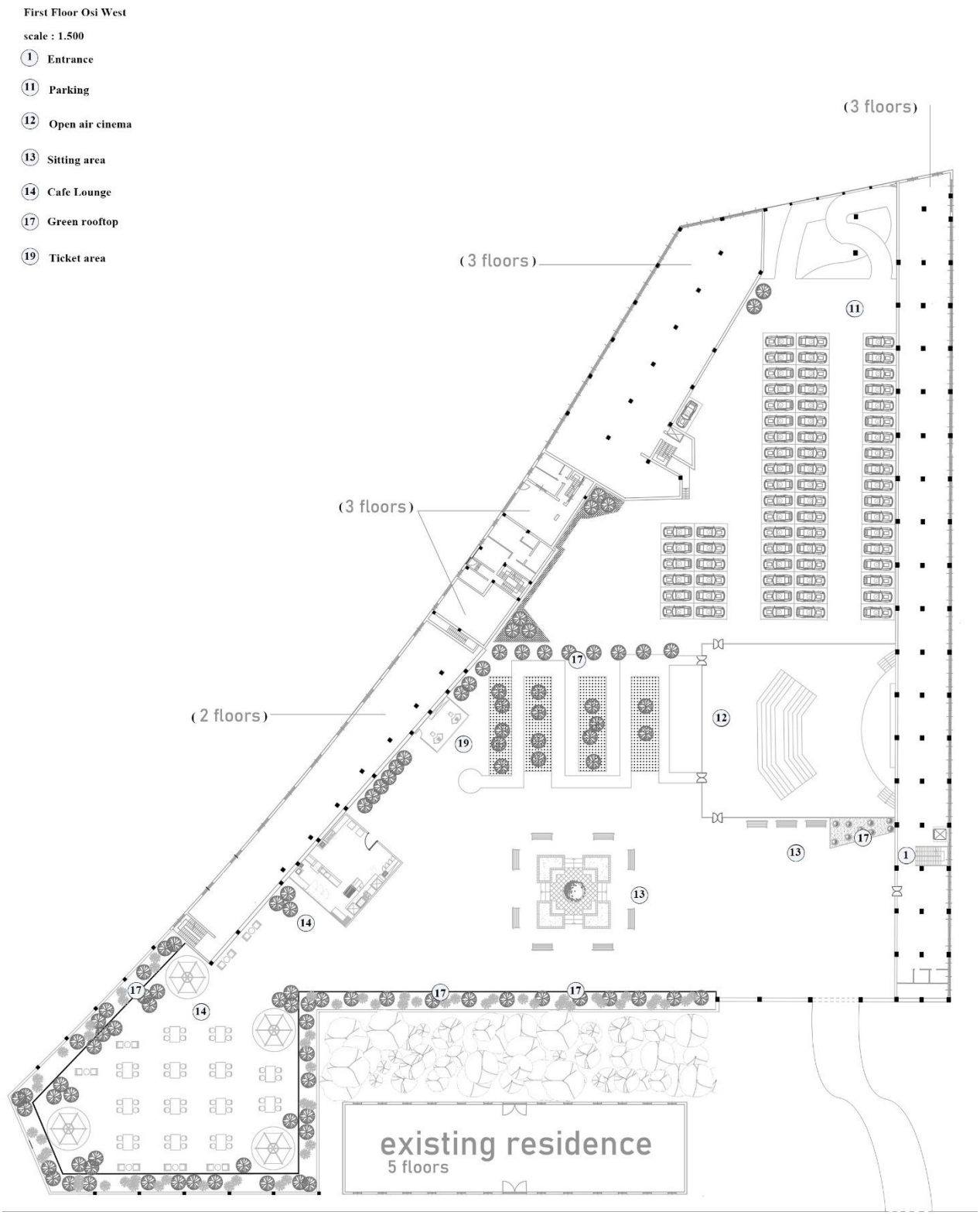


Fig120-First floor -Osi west



11.2

Fig121-Exterior render

Fig122-Exterior render

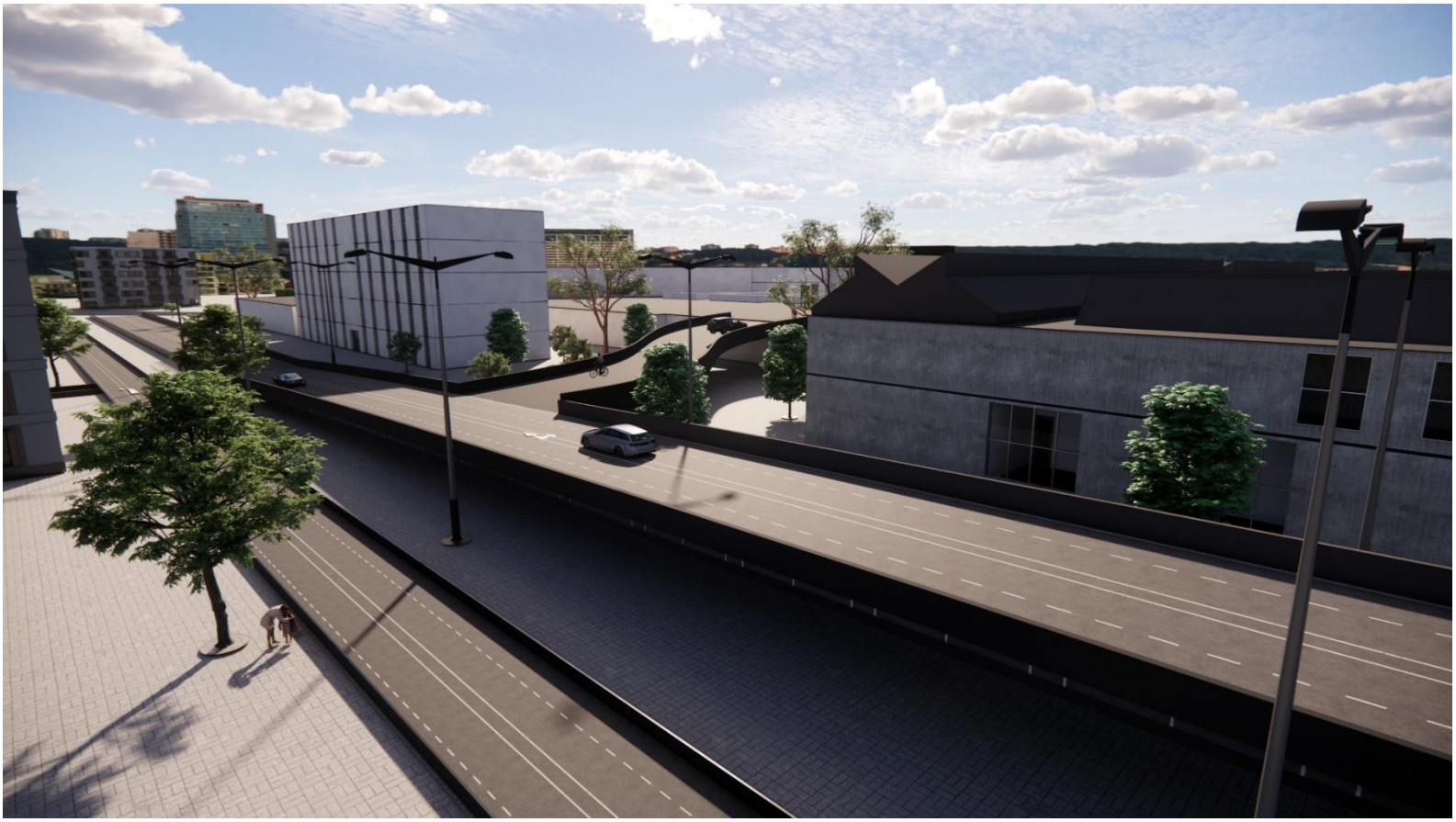


Fig123-Exterior render

Fig124-Exterior render

Fig125-Exterior view

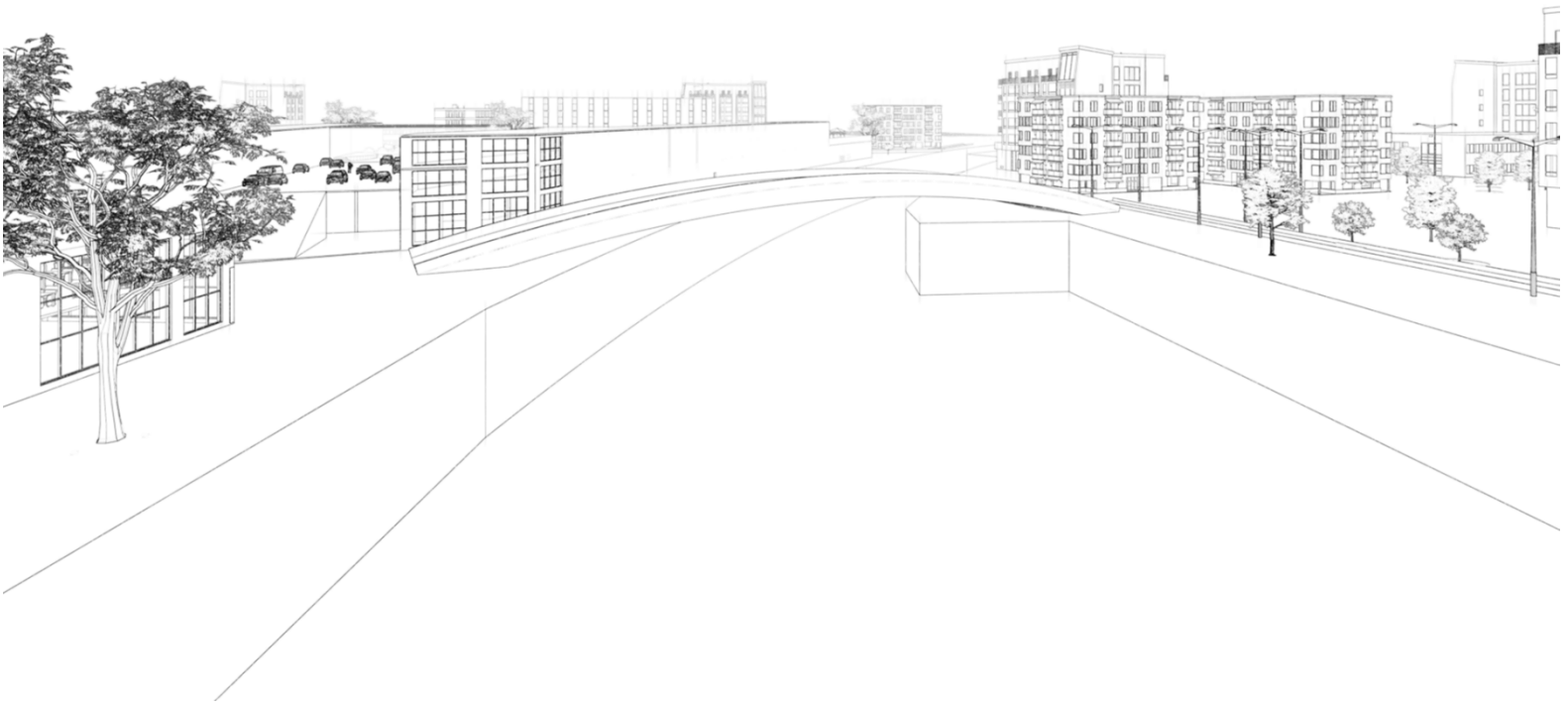
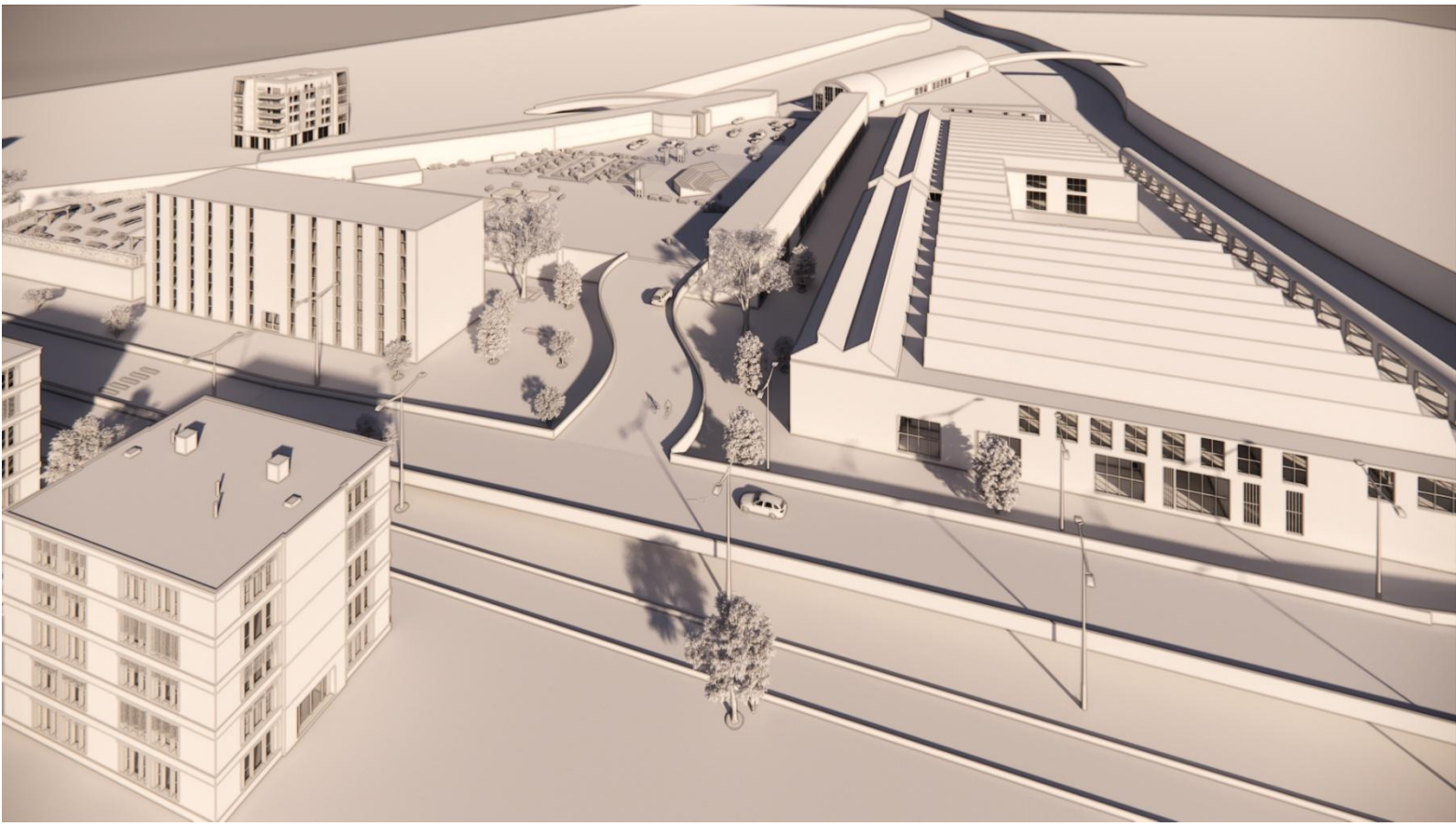


Fig126-Exterior view



11.3

Fig127-Interior view Osi West

Café and Conference room

12.Conclusion

The thesis started with a basic question: How can the regeneration of an old industrial brownfield like the OSI festival factory bring about greater social returning? Through urban analysis, design experiments and complex environment integration, it has been shown that by strategically redeveloping the site especially in terms of traffic, access to services and mixed uses--isolated fragments of the city can be effectively brought back together or even united in such a way that maintains reasonable conditions for public welfare.

OSI-Ghia, from industrial era land use and space tear, suffers under the influence of railway facilities, its closed underpasses curtail any public foot traffic and there is no thru access around it at all. An urban study found a disconnection between the surrounding residential areas such as Via Bertini and Via Arquata with site. At the same time, this gap revitalizes site by highlighting closeness to Mauriziano Hospital and institutions of higher learning. It breaks the mold not as simple architectural elimination but urban repair on a larger scale.

Building on Renzo Piano's concept of urban mending which he defines as "sewing back the city's fragmented tissues not with grand gestures but with threads of continuity and meaning" (Piano, 2004) the project proposes two new bridges: one toward the Mauriziano Hospital and another shaping part of a mobility ring connecting south-western residential blocks through the pedestrian axis of Arquata. The removal of the abandoned Sport City gym unlocked a double-threshold space between Via Bertini and Via Arquata, transforming a void into a symbolic gateway between old and new.

The masterplan introduces a mix of functions including student housing, co-working spaces, cinema, supermarket, and green public zones prioritizing youth engagement and everyday urban life. A continuous network of pedestrian and vehicular paths enhances site permeability. The central "urban window" offers social relief and ecological value, while the circulation system ensures seamless access across public, private, and service domains.

This intervention transforms the ex-OSI Ghia site from an isolated part into an open, inclusive, and connective node within the city. It responds to infrastructural gaps, rebalances mobility pressure (especially around peak hours near the existing bridge), and reweaves urban continuity. Also, it creates a multifunctional landscape that improve interaction across medical, academic, and residential realms reviving the site's relevance for the contemporary urban fabric of Turin.

In addition to the direct project objectives which are focused on creating a more sustainable brownfield, among other things: -What's transpired now is a set of criteria that challenge traditional perceptions of mobility reliance and design in the service urban resilience. The same problem presents itself Future studies can investigate different aspects of technological integration such as smart mobility and modular infrastructure or take a long-term perspective regarding social consequences which might be expected to bear most heavily on youth presence, affordable housing options, and ecological performance.

12.1 Bibliography

- Allen, P. M. (2008). *The importance of complexity for the research agenda in the built environment*. Architectural Engineering and Design Management, 4(1), 5–14. https://doi.org/10.3763/aedm.2008.S907
- Bachman, L. R. (2008). *Architecture and the four encounters with complexity*. *Architectural Engineering and Design Management, 4(1), 15–30. https://doi.org/10.3763/aedm.2008.S407*
- Freeman, C. (1989). The Economics of Industrial Innovation, MIT Press: Cambridge
- Groak, S**.** (1990). *The idea of building: Thought and action in the design and production of buildings*. Taylor & Francis Group. Retrieved from https://ebookcentral.proquest.com/lib/polito-ebooks/reader.action?c=UERG&docID=169734&ppg=5&pq-origsite=primo
- Nightingale, P. (2000). The product–process–organisation relationship in complex development projects. *Research Policy*, 29(7–8), 913–930. https://doi.org/10.1016/S0048-7333(00)00112-8
- Rey, E., Laprise, M., & Lufkin, S. (2021). *Neighbourhoods in transition: Brownfield regeneration in European metropolitan areas. Springer. https://doi.org/10.1007/978-3-030-82208-8*

- Nigra, M. (2019). *Patterns of sustainable innovation in the building industry: Towards a strategic management perspective on environmental, social, and economic values* (Doctoral dissertation). Politecnico di Torino. http://hdl.handle.net/11583/2729358

- Ottino, J. M. (2003). Complex systems. *AIChE Journal*, 49(2), 292–299. https://doi.org/10.1002/aic.690490202
- Slaughter, E. S. (1993). Builders as sources of construction innovation. *Journal of Construction Engineering and Management*, *119*(3), 532–549. https://doi.org/10.1061/(ASCE)0733-9364(1993)119:3(532)

- Bullen, P. A., & Love, P. E. D. (2011). Adaptive reuse of heritage buildings. *Structural Survey*, 29(5), 411–421.https://doi.org/10.1108/02630801111182439

- ARE – Federal Office for Spatial Development.*Brundtland Report – "Our Common Future"*. Swiss Confederation. Retrieved June 29, 2025, from https://www.are.admin.ch/are/en/home/media/publications/sustainable-development/brundtland-report.html
- Douet, J. (Ed.). (2015). *Industrial heritage re-tooled: The TICCIH guide to industrial heritage conservation*. Routledge. https://www.taylorfrancis.com/books/edit/10.4324/9781315426532/industrial-heritage-re-tooled-james-douet
- Dixon, T., Raco, M., Catney, P., & Lerner, D. N. (Eds.). (2007). *Sustainable brownfield regeneration: Liveable places from problem spaces***.** Wiley-Blackwell. Retrieved from https://ebookcentral.proquest.com/lib/polito-ebooks/detail.action?docID=351478&pq-origsite=primo
- Gute, D. M. (2011). *Sustainable brownfields redevelopment and empowering communities to participate more effectively in environmental decision-making*. *Local Environment*, 11(5), 473–478. https://doi-org.ezproxy.biblio.polito.it/10.1080/13549830600853015
- de Sousa, C. A. (2009). *Brownfields redevelopment and the quest for sustainability*. *International Journal of Climate Change Strategies and Management*, 1(2), 242–256. https://doi-org.ezproxy.biblio.polito.it/10.1108/ijccsm.2009.41401bae.002
- Rey, E., Laprise, M., & Lufkin, S. (Eds.). (2022). *Neighbourhoods in transition: Brownfield regeneration in European metropolitan areas*. Springer. https://doi.org/10.1007/978-3-030-82208-8
- Comune di Torino. *Comitato Parco Dora*. http://www.comune.torino.it/comitatoparcodora/
- Comitato Dora Spina 3. *Home page*. http://www.comitatodoraspina3.it/
- Italia150. *Parco Dora – Torino e Piemonte*. http://www.italia150.it/Torino-e-Piemonte/Torino/Parco-Dora
- MuseoTorino. *Homepage*. https://www.museotorino.it

- Sudjic, D. (2006). *The edifice complex: How the rich and powerful shape the world* [Book review]. *Urban Studies, 43*(10), 1899–1918.
https://doi.org/10.1080/00420980600888627

  Retrieved from https://research-ebsco-com.ezproxy.biblio.polito.it/c/leaf3r/viewer/pdf/jmhm3hfmin?route=details

-
- Tate Modern. *Tate Modern official website*. https://www.tate.org.uk/visit/tate-modern
- Herzog & de Meuron. *The Tate Modern Project*. Herzog & de Meuron. https://www.herzogdemeuron.com/projects/263-the-tate-modern-project
- Arquitectura Viva. *Ampliación Tate Modern, Londres*. Arquitectura Viva. https://arquitecturaviva.com/works/ampliacion-tate-modern-londres-8
- ArchDaily. *Tate Modern – project collection*. ArchDaily. https://www.archdaily.com
- UNESCO World Heritage Centre. *Zollverein Coal Mine Industrial Complex in Essen*. https://whc.unesco.org/en/list/975
- Office for Metropolitan Architecture (OMA). *Zollverein masterplan*. OMA. https://www.oma.com/projects/zollverein-masterplan
- https://www.domusweb.it/en/news/
- ArchDaily. *Zeche Zollverein redevelopment: Preserving the industrial past with modern functionality*. https://www.archdaily.com
- Zollverein Foundation.*Zollverein: From coal mine to cultural landscape*. https://www.zollverein.de

- *The Zollverein Coal Mine Industrial Complex: From Coal to Culture*. Google Arts & Culture. https://artsandculture.google.com/story/gQXxjFEHi0QZ9Q
- Westergasfabriek. (n.d.). *Official website*. https://www.westergas.nl
- *Gemeente Amsterdam.The transformation of the Westergasfabriek: Creating cultural and social value [Report]. https://www.amsterdam.nl*
- *ArchDaily. Official website. https://www.archdaily.com*
- *Gustafson Porter + Bowman. Cultuurpark Westergasfabriek. Retrieved from https://www.gp-b.com/cultuurpark-westergasfabriek*
- *Mommaas, H. (2004). Cultural clusters and the post-industrial city: Towards the remapping of urban cultural policy. Urban Studies, 41(3), 507–532. https://doi.org/10.1080/0042098042000178663*
  Retrieved from https://research-ebsco-com.ezproxy.biblio.polito.it/c/leaf3r/viewer/pdf/u74papbuhr?route=details
- ArchDaily. (2015). OMA's Fondazione Prada is “study in contrasts". *ArchDaily*. https://www.archdaily.com/634015/oma-s-fondazione-prada-is-a-study-in-contrasts
- https://dezeen.com/2015/05/03/oma-fondazione-prada-art-centre-gold-leaf-cladding-wes-anderson-cafe-milan/https://www.domusweb.it/en/architecture/2015/05/11/fondazione_prada_milano.html
- *https://recyclenation.com/2010/06/viennas-repurposed-gas-tank-city/*
- *https://architectuul.com/architecture/gasometer-b*

- https://research-ebsco-com.ezproxy.biblio.polito.it/c/leaf3r/viewer/pdf/li4h4cmrhf?route=details
- https://landezine.com/post-industrial-landscape-architecture/

- World Architecture Festival. (n.d.). *LocHal Library, Tilburg*.
- Mecanoo Architects. (n.d.). *LocHal: Redefining public library spaces*.
- https://architizer.com/projects/lochal-library-architecture-by-civic/
- https://www.archdaily.com/929810/lochal-public-library-named-2019-building-of-the-year-at-world-architecture-festival

- https://arquitecturaviva.com/works/la-canopee-de-les-halles-1#
- https://www.travelfranceonline.com/les-halles-historic-district-paris/
- https://www.domusweb.it/en/architecture/2016/04/06/berger_anziutti_architects_la_canopee.html
- https://www.herzogdemeuron.com/projects/201-caixaforum-madrid/
- https://www.verticalgardenpatrickblanc.com/realisations/madrid/caixa-forum-madrid
- https://arquitecturaviva.com/works/edificio-caixaforum-madrid-2

- https://www.camerana.com/en/portfolio-items/la-pista-500/
- https://www.archiobjects.org/lingotto-building-in-turin-giacomo-matte-trucco/
- https://www.domusweb.it/en/from-the-archive/2023/05/23/renzo-pianos-lingotto-project-turin---from-the-domus-archive.html
- https://architectuul.com/architecture/fiat-lingotto-factory
- Comoglio, G. (n.d.). *Lingotto*. [Photographic or design portfolio]. https://r.search.yahoo.com/_ylt=AwrkgSu0XWJoDwIAr7cM34lQ;_ylu=Y29sbwNpcjIEcG9zAzEEdnRpZAMEc2VjA3Ny/RV=2/RE=1752486580/RO=10/RU=https%3a%2f%2fwww.gmfus.org%2fsites%2fdefault%2ffiles%2fLingotto_Giovanni_Comoglio.pdf/RK=2/RS=NFrOEXYritZMv_c2j45QMLgLH9I-
- Cook, J. (n.d.). *Lingotto: Myths, mechanisation and automobiles* [Unpublished manuscript].

- Loures, L., & Panagopoulos, T. (2007**).** Sustainable reclamation of industrial areas in urban landscapes. *WIT Transactions on Ecology and the Environment*, 102**,** 791–800. https://doi.org/10.2495/SDP070752
- Yin, R. K. (2014). *Case study research and applications: Design and methods* (5th ed.). Sage Publications.

  pp. 16–17: Definition of case study

  p. 19: Benefits of semi-structured interviews

  pp. 17–18: Use of multiple sources of evidence (triangulation)

  p. 90: Ethical issues including confidentiality and reflexivity

- Sebunya, J., & Gichuki, A. (2024). *The impact of participatory planning on sustainable development: A literature review*. *Journal of Strategic Management, 4*(4), 1–9. Retrieved from https://edinburgjournals.org/journals/index.php/journal-of-strategic-management/article/view/404/436
- ISTAT. (2019). *Resident population on January 1, 2019: Turin Municipality*. Istituto Nazionale di Statistica. https://demo.istat.it/app/
- Dell’Anna, F., Bravi, M., & Marmolejo-Duarte, C. (2019). EPC green premium in two different European climate zones: A comparative study between Barcelona and Turin. *Sustainability, 11*(20), 5605. https://doi.org/10.3390/su11205605
- LSE Cities. (2024). *European Cities Programme – Spina Centrale: Torino’s infrastructure and regeneration corridor* [PDF]. London School of Economics and Political Science. https://eprints.lse.ac.uk/67844/1/casereport106.pdf

- Mario Cucinella Architects. (n.d.). *IED – Campus of the European Institute of Design (Turin, Italy)*. Retrieved May 2025, from https://www.mcarchitects.it/en/projects/ied-campus-of-the-european-institute-of-design
- Piano, R. (2004). *Renzo Piano Building Workshop: Urban projects*. Phaidon Press.

.

12.2 Image references

- Fig.1 This is an image of part of the production line inside the Officine Stampaggi Industriali (OSI) factory. You can see the partially constructed Innocenti 950 Spyder on the left and the Fiat 2300 Coupes on the right. OSI20mts Archive-https://silodrome.com/osi-20m-ts/
- Fig.2 Photo:samuelesilva- OSI20mts-https://cafebabel.com/it/article/torino-post-industriale-il-caso-osi-ghia-5ae00b38f723b35a145e743f/

- Fig 3. The Parco Dora residential area in the Spina 3 complex. Photograph by Michele D'Ottavio, 2010.Museo Torino-https://www.museotorino.it/view/s/c18a2ace6cc144e892b09c5c29cf8770?utm
- Fig 4. Dora Park. 2011.Turin City Archive-https://www.museotorino.it/view/s/d6211fd19d5d4c65bee9061bf405d494?utm
- Fig 5. The Mirafiori complex in Turin - https://uk.images.search.yahoo.com/search/images;_ylt=AwrLNFqUiFho8gEA1TIM34lQ;_ylu=Y29sbwNpcjIEcG9zAzEEdnRpZAMEc2VjA3BpdnM-?p=Mirafiori+complex+in+Turin&fr2=piv-web&type=E210GB885G0&fr=mcafee#id=1&iurl=https%3A%2F%2Fi0.wp.com%2Fmoparinsiders.com%2Fwp-content%2Fuploads%2F2022%2F09%2FStellantis-Mirafiori-Assembly-Complex-in-Turin-Italy.-Stellantis-1-scaled.jpeg%3Fresize%3D2048%252C1154%26ssl%3D1&action=click

- Fig 6.Tate modern/photos are taken from the tate modern website. 263_CP_160614_003_PRI-https://banksidelondon.co.uk/theatres-and-galleries/tate-modern/
- Fig 7.Site -2 - https://www.herzogdemeuron.com/projects/263-the-tate-modern-project/lightbox/35345/
- Figure 8.Site-1 - https://www.herzogdemeuron.com/projects/263-the-tate-modern-project/lightbox/35344/
- Fig.9 surroundings https://www.herzogdemeuron.com/projects/263-the-tate-modern-project/
- Fig.10 Masterplan https://www.herzogdemeuron.com/projects/263-the-tate-modern-project/

- Fig.11 Interior view of Tate Modern gallery- https://www.herzogdemeuron.com/projects/263-the-tate-modern-project/lightbox/71899/

- Fig 12.Interior view of Tate Modern gallery - https://www.herzogdemeuron.com/projects/263-the-tate-modern-project/lightbox/71899/
- **Fig13.** Baan, I. (2016). Exterior view of Tate Modern Switch House (Blavatnik Building) by Herzog & de Meuron ArchDaily-https://www.herzogdemeuron.com/projects/263-the-tate-modern-project/lightbox/71933/

- Fig.14 Steger, C. (n.d.). Aerial image of the Zollverein Coal Mine Industrial Complex in Essen (view from the southeast) [Photograph]. Licensed under CC BY-SA 4.0- http://www.luftbild-archiv.de/page-g54.htm-https://www.oma.com/projects/zollverein-masterplan
- Fig15. Zeche Zollverein Foundation. (n.d.). Photograph of outdoor festival tents and lighting at Zeche Zollverein-https://whc.unesco.org/en/list/975/gallery/
- https://commons.wikimedia.org/wiki/File:Aerial_image_of_the_Zollverein_Coal_Mine_Industrial_Complex_in_Essen_(view_from_the_southeast).jpg

- Fig 16.Diagram of the programatic connection of the Zeche Zollverein Masterplan by OMA-https://www.oma.com/projects/zollverein-masterplan

- Fig 17-Zeche Zollverein Masterplan by OMA-https://www.metalocus.es/en/news/walled-city-zollverein-oma

- Fig 18-Zeche Zollverein Foundation. (n.d.). Images of recreational reuse at the Zollverein Industrial Complex-https://www.internationale-bauausstellungen.de/en/history/1989-1999-iba-emscher-park-a-future-for-an-industrial-region/zollverein-coal-mine-complex-essen-from-coal-and-steel-to-art-and-culture/

- Fig 19.Schlijper, T. (n.d.). Aerial view of Cultuurpark Westergasfabriek and Westerpark ArchDaily. –https://www.mecanoo.nl/Projects/project/91/Westergasfabriek-Terrain?t=0

- Fig 20.Schlijper, T. (n.d.). Water play and recreational space at Westerpark. ArchDaily-https://www.archdaily.com/803228/cultuurpark-westergasfabriek-gustafson-porter-plus-bowman/58755648e58ece262e00012f-cultuurpark-westergasfabriek-gustafson-porter-plus-bowman-photo

- Fig 21Schlijper, T. (n.d.). recreational space at Westerpark. ArchDaily - https://www.archdaily.com/803228/cultuurpark-westergasfabriek-gustafson-porter-plus-bowman/58755683e58ecea37600020e-cultuurpark-westergasfabriek-gustafson-porter-plus-bowman-photo?next_project=no

- Fig22-Conceptual landscape master plan for adaptive reuse site -Archdaily- https://www.archdaily.com/803228/cultuurpark-westergasfabriek-gustafson-porter-plus-bowman/5875565ee58ece262e000130-cultuurpark-westergasfabriek-gustafson-porter-plus-bowman-site-plan?next_project=no

- Fig23- schlijper, T. (n.d.). recreational space at Westerpark. ArchDaily - https://www.archdaily.com/803228/cultuurpark-westergasfabriek-gustafson-porter-plus-bowman/587556a9e58ecea37600020f-cultuurpark-westergasfabriek-gustafson-porter-plus-bowman-photo?next_project=no

  https://divisare.com/projects/339776-mary-bowman-mecanoo-helene-binet-cultuurpark-westergasfabriek

- Fig24-https://www.archdaily.com/803228/cultuurpark-westergasfabriek-gustafson-porter-plus-bowman/587555f5e58ece262e00012b-cultuurpark-westergasfabriek-gustafson-porter-plus-bowman-photo?next_project=no https://divisare.com/projects/339776-mary-bowman-mecanoo-helene-binet-cultuurpark-westergasfabriek

- Fig25-Princen, B. (n.d.). Exterior view of Fondazione Prada (restored and new OMA structures) ArchDaily.-https://www.archdaily.com/628472/fondazione-prada-oma/554af34ee58ece423b000126-fondazione-prada-oma-photo?next_project=no

- Fig26-Princen, B. (2015). Exterior view of Fondazione Prada (restored industrial buildings and new structures by OMA) ArchDaily https://www.archdaily.com/628472/fondazione-prada-oma/554af384e58ece423b00012a-fondazione-prada-oma-photo?next_project=no

- Fig27-Princen, B. (2015). Interior view toward the Haunted House core at Fondazione Prada-Archdaily https://www.archdaily.com/628472/fondazione-prada-oma/554af317e58ece61f2000145-fondazione-prada-oma-photo?next_project=no

- Fig28-Axonometric-https://www.archdaily.com/628472/fondazione-prada-oma/554af3f0e58ece423b00012f-fondazione-prada-oma-axonometric-c-oma?next_project=no

- Fig29-Underground level - https://www.archdaily.com/628472/fondazione-prada-oma/554af450e58ece423b000134-fondazione-prada-oma-underground-floor-plan-c-oma?next_project=no

- Fig30-Ground floor https://www.archdaily.com/628472/fondazione-prada-oma/554af42be58ece423b000132-fondazione-prada-oma-ground-floor-plan-c-oma?next_project=no

- Fig31-First floor-https://www.archdaily.com/628472/fondazione-prada-oma/554af418e58ece423b000131-fondazione-prada-oma-first-floor-plan-c-oma?next_project=no

- Fig32-Conceptual circulation and view axis diagram -https://www.archdaily.com/628472/fondazione-prada-oma/554af3dbe58ece423b00012e-fondazione-prada-oma-diagram-c-oma?next_project=no

- Fig33-Sisto Legnani, D., & Cappelletti, M. (2015). Exterior view of restored industrial and new volumes at Prada -https://www.archdaily.com/628472/fondazione-prada-oma/554af3afe58ece423b00012d-fondazione-prada-oma-photo?next_project=no

- Fig34-Princen, B., Sisto Legnani, D., & Cappelletti, M. (2018). Rooftop and new volumes at Fondazione Prada's Torre, Milan-ArchDaily-https://sibylle.life/2016/07//fondazione-prada-bar-luce/

- Fig35-East Elevation -https://www.archdaily.com/892898/fondazione-prada-torre-oma/5ad89dc9f197ccdb4900012b-fondazione-prada-torre-oma-east-facade-c-oma?next_project=no

- Fig36-North Elevation -https://www.archdaily.com/892898/fondazione-prada-torre-oma/5ad89e78f197ccdb4900012c-fondazione-prada-torre-oma-north-facade-c-oma?next_project=no

.

- Fig37-Toni Rappersberger. (2001). Exterior view of four Vienna Gasometers with tennis court - PORR Media Library. https://www.facebook.com/photo/?fbid=952475916674329&set=pcb.952477226674198

- Fig38-Esther Seijmonsbergen. (2013). Interior dome and reflective glazing in Vienna Gasometer- https://www.jeannouvel.com/en/projects/gazometre/

- 39-Andreas Pöschek/Viennaphoto.at. (2006). Gasometer C facade close-up, Vienna- https://www.jeannouvel.com/en/projects/gazometre

  https://coop-himmelblau.at/projects/apartment-building-gasometer-b/

- Fig 40-Austria. Cesar Serrano. (n.d.). General interior circulation space in a Vienna Gasometer Austria. Roman Plesky. (2019) (n.d.). Dome and courtyard interior of a Vienna Gasometer- https://coop-himmelblau.at/projects/apartment-building-gasometer-b/

- Fig41-Site Plan- https://coop-himmelblau.at/projects/apartment-building-gasometer-b/

- Fig42-apartment building gasometer B drawings- https://coop-himmelblau.at/projects/apartment-building-gasometer-b/

- Fig43-44-Austria. (n.d.). Residential courtyard under dome in Vienna Gasometer City- https://en.wikipedia.org/wiki/File:Gasometer_c-inside-by_viennaphoto_at.jpg

- Fig45-Austria. (n.d.). Section and plan diagram of Vienna Gasometers A–D- http://www.polyucee.hk/cecspoon/lwbt/Case_Studies/Gasometer_City/pic01_plan.jpg

- Fig 46-Launer, G. (2014, October 3). Aerial view of Landschaftspark Duisburg-Nord, Germany euroluftbild.de / AerialPhotoSearch- https://www.latzundpartner.de/de/projekte/postindustrielle-landschaften/landschaftspark-duisburg-nord-de/

- Fig 47-Latz, M. (n.d.). Industrial structures at Landschaftspark Duisburg-Nord . Latz + Partner https://www.latzundpartner.de/de/projekte/postindustrielle-landschaften/landschaftspark-duisburg-nord-de/

- Fig48- Latz, M. (n.d.). Reused pipeline and wind turbine in Landschaftspark Duisburg-Nord - Latz + Partner.https://www.latzundpartner.de/de/projekte/postindustrielle-landschaften/landschaftspark-duisburg-nord-de/

- Fig49-Latz, M. (n.d.). Fireworks and night event at Landschaftspark Duisburg-Nord -Latz + Partner. https://www.latzundpartner.de/de/projekte/postindustrielle-landschaften/landschaftspark-duisburg-nord-de/

- Fig50-Latz + Partner. (1991, February). Überlagerung der Konzeptebenen und Strukturelemente – Landschaftspark Duisburg-Nord [Design drawing] https://www.latzundpartner.de/de/projekte/postindustrielle-landschaften/landschaftspark-duisburg-nord-de/

- Fig51- Bollaert, S. (2019). Exterior view of LocHal public library in Tilburg -ArchDaily - https://www.archdaily.com/909540/lochal-library-mecanoo-plus-civic-architects-plus-braaksma-and-roos-architectenbureau/5c86b8ce284dd1d62c0004ea-lochal-library-mecanoo-plus-civic-architects-plus-braaksma-and-roos-architectenbureau-photo

- Fig52-Bollaert, S. (2019). Interior view of LocHal Library, Tilburg -ArchDaily- https://www.archdaily.com/909540/lochal-library-mecanoo-plus-civic-architects-plus-braaksma-and-roos-architectenbureau/5c86b3f9284dd1362c000197-lochal-library-mecanoo-plus-civic-architects-plus-braaksma-and-roos-architectenbureau-photo?next_project=no

- Fig53-Bollaert, S. (2019). Interior view of LocHal Library, Tilburg—public living room with seating steps, industrial structure and greenery -ArchDaily-https://www.archdaily.com/909540/lochal-library-mecanoo-plus-civic-architects-plus-braaksma-and-roos-architectenbureau/5c3f3251284dd15bc600001c-lochal-library-mecanoo-plus-civic-architects-plus-braaksma-and-roos-architectenbureau-photo?next_project=no

- Fig54-Bollaert, S. (2019). Reading and shelving area inside LocHal Library,Tilburg Archdaily- https://www.archdaily.com/909540/lochal-library-mecanoo-plus-civic-architects-plus-braaksma-and-roos-architectenbureau/5c86b680284dd1362c00019f-lochal-library-mecanoo-plus-civic-architects-plus-braaksma-and-roos-architectenbureau-photo?next_project=no

- Fig55-CIVIC architects, Braaksma & Roos architectenbureau, Inside Outside, & Mecanoo. (2019). Floor plans of LocHal Library, Tilburg [Architectural drawings]. ArchDaily- https://www.archdaily.com/909540/lochal-library-mecanoo-plus-civic-architects-plus-braaksma-and-roos-architectenbureau/5c86ba8b284dd1362c0001a7-lochal-library-mecanoo-plus-civic-architects-plus-braaksma-and-roos-architectenbureau-?next_project=no-

- https://www.archdaily.com/909540/lochal-library-mecanoo-plus-civic-architects-plus-braaksma-and-roos-architectenbureau/5c86bb39284dd1d62c0004f2-lochal-library-mecanoo-plus-civic-architects-plus-braaksma-and-roos-architectenbureau-?next_project=no
- https://www.archdaily.com/909540/lochal-library-mecanoo-plus-civic-architects-plus-braaksma-and-roos-architectenbureau/5c86b9d5284dd1d62c0004eb-lochal-library-mecanoo-plus-civic-architects-plus-braaksma-and-roos-architectenbureau-?next_project=no

- Fig56-Longitudinal section AA of LocHal Library, Tilburg, showing structural adaptation and spatial layering within the repurposed locomotive hall. Source: CIVIC architects et al. (2019). https://www.archdaily.com/909540/lochal-library-mecanoo-plus-civic-architects-plus-braaksma-and-roos-architectenbureau/5c86bc44284dd1362c0001ab-lochal-library-mecanoo-plus-civic-architects-plus-braaksma-and-roos-architectenbureau-?next_project=no

- Fig57-CIVIC architects, Braaksma & Roos architectenbureau, Inside Outside, & Mecanoo. (2019). Site plan of LocHal Library, Tilburg [Architectural drawing]. ArchDaily. https://www.archdaily.com/909540/lochal-library-mecanoo-plus-civic-architects plus-braaksma-and-roos-architectenbureau/5c86b937284dd1362c0001a6-lochal-library-mecanoo-plus-civic-architects-plus-braaksma-and-roos-architectenbureau-?next_project=no

- Fig58-French Moments. (2016). La Canopée over Les Halles, Paris. from French Moments blog post “The Canopy of Les Halles: A Gigantic Structure in Central Paris” https://www.aparisguide.com/leshalles/

- Fig 59-French Moments. (2016). Forum des Halles under La Canopée, Paris [Photograph] https://www.aparisguide.com/leshalles/

- Fig60-Main entrance area under La Canopée at Forum des Halles, Paris, showing the fluid glass-and-steel canopy above a major urban circulation point. Architects: Patrick Berger & Jacques Anziutti. Photo: © travelphotosonline.com.

- Fig61-Tak, P. (2016, August 7). Market under La Canopée, Forum des Halles, Paris- Flickr. from Flickr photo titled “La Canopée – Paris (France) | Les Halles 07/08/2016 18h09”

- Fig62- [Creator Unknown]. (n.d.). Conceptual aerial plan for Forum des Halles redevelopment, Paris [Rendering]. https://www.archdaily.pe/pe/770175/las-5-iniciativas-para-remodelar-les-halles-y-darle-a-paris-un-nuevo-sector-metropolitano

- Fig63.UlyssePixel. (2020, August 9). Interior view of La Canopée, from des Halles, Paris- Dreamstime.from Dreamstime-https://www.theguardian.com/artanddesign/2016/apr/06/les-halles-paris-architecture-custard-coloured-flop

- Fig64-Exploded axonometric diagram of La Canopée canopy at Forum des Halles, illustrating structural layers and assembly logic. Archdaily.-https://architectuul.com/architecture/the-canopy/media/59c3db47-d3d4-4d34-8076-61b46d7b5e1b

- Fig 65-Lauwers, K. (2017, November 13). Vertical garden at CaixaForum Madrid - Dreamstime, from Dreamstime editorial image ID 77681727-https://www.herzogdemeuron.com/projects/201-caixaforum-madrid/lightbox/34366/

- Fig66-Lauwers, K. (2016, August 19). Vertical garden wall at CaixaForum Madrid [Photograph]. Dreamstime. from Dreamstime, editorial image ID 77681727-https://www.herzogdemeuron.com/projects/201-caixaforum-madrid/lightbox/34367/

- Fig67-Gallery spaces interior- https://www.herzogdemeuron.com/projects/201-caixaforum-madrid/lightbox/19445/

- Fig68-Interior marble stairwell- https://www.herzogdemeuron.com/projects/201-caixaforum-madrid/lightbox/19444/
- Fig69-Interior view of a contemporary gallery space in Spain -Madrid- https://www.herzogdemeuron.com/projects/201-caixaforum-madrid/lightbox/19430/

- Fig70-Herzog & de Meuron. (n.d.). CaixaForum Madrid – Level -2 Floor Plan [Architectural drawing]. from project technical documentation-https://www.herzogdemeuron.com/projects/201-caixaforum-madrid/lightbox/19478/

- Fig 71-Herzog & de Meuron. (n.d.). CaixaForum Madrid – Underground Level -1 Floor Plan [Architectural drawing]. from project technical documentation
- https://www.herzogdemeuron.com/projects/201-caixaforum-madrid/lightbox/19477/

- Fig72-Herzog & de Meuron. (n.d.). CaixaForum Madrid – Ground Level Plan [Architectural drawing]. from project technical documentation- https://www.herzogdemeuron.com/projects/201-caixaforum-madrid/lightbox/19484/
- Fig73-Herzog & de Meuron. (n.d.). CaixaForum Madrid – First Level Plan [Architectural drawing]. from project technical documentation- https://www.herzogdemeuron.com/projects/201-caixaforum-madrid/lightbox/19479/

- Fig74-Herzog & de Meuron. (n.d.). CaixaForum Madrid – Second Level Plan [Architectural drawing]. from project technical documentation- https://www.herzogdemeuron.com/projects/201-caixaforum-madrid/lightbox/19480/

- Fig75-Herzog & de Meuron. (n.d.). CaixaForum Madrid – Fourth Floor Plan [Architectural drawing]. from project technical documentation- https://www.herzogdemeuron.com/projects/201-caixaforum-madrid/lightbox/19481/

- Fig76-Herzog & de Meuron. (n.d.). CaixaForum Madrid – Section S1 [Architectural section]. from project documentation archive https://www.herzogdemeuron.com/projects/201-caixaforum-madrid/lightbox/19482/

- Fig77-Piano, R. (n.d.). Aerial view of Lingotto redevelopment, Turin, Italy. from [FIAT Archive] https://uk.images.search.yahoo.com/search/images;_ylt=AwrLAAxmLlloDAIArQ8M34lQ;_ylu=Y29sbwNpcjIEcG9zAzEEdnRpZAMEc2VjA3BpdnM-?p=Fig77-Piano%2C+R.+%28n.d.%29.+Aerial+view+of+Lingotto+redevelopment%2C+Turin%2C+Italy.+from+%5BFIAT+Archive%5D&fr2=piv-web&type=E210GB885G0&fr=mcafee#id=4&iurl=https%3A%2F%2Fwww.anfrix.com%2Fwp-content%2Fuploads%2F2020%2F05%2FLingotto-15.jpg&action=click

- Fig78-Aerial view. Courtesy RPBW,, Renzo Piano Building Workshop. (Ph. © Studio Merlo)- https://www.fourexcellences.com/viaggi-cultura/ospitalita/lingotto-e-doubletree-by-hilton-turin-2018

- Fig79-HDR (n.d.). Interior redevelopment of Lingotto shopping gallery, Turin, Italy [Render] https://mole24.it/2021/08/28/il-centro-commerciale-lingotto-ex-8gallery/

- Fig80-Exterior image-Luca Onniboni

- Fig81- concrete access ramps- https://www.greyscape.com/architects/lingotto-factory-turin/

- Fig82-DAP Studio. (2021). New Interior Vision for Lingotto Shopping Area, Turin, Italy [Render]. https://mole24.it/2021/08/28/il-centro-commerciale-lingotto-ex-8gallery/

- Fig83-Politecnico di Torino. (n.d.). Interior view of Lingotto campus, Turin, Italy https://uk.images.search.yahoo.com/search/images;_ylt=Awr.QLaUL1loEQIAau4M34lQ;_ylu=Y29sbwNpcjIEcG9zAzEEdnRpZAMEc2VjA3Nj?p=Fig79-HDR+%28n.d.%29.+Interior+redevelopment+of+Lingotto+shopping+gallery%2C+Turin%2C+Italy+%5BRender%5D&fr=mcafee#id=59&iurl=https%3A%2F%2Fwww.nextto-lingotto.com%2Fwp-content%2Fuploads%2F2019%2F04%2FART_lingottointerno-700x466.jpg&action=click

- Fig84-Renzo Piano Building Workshop. (2002). Lingotto redevelopment phases: 1982–2002. Retrieved from https://www.rpbw.com
- https://pure.tue.nl/ws/portalfiles/portal/46933829/845393-1.pdf

- Dell'Anna, F., Bravi, M., Marmolejo-Duarte, C., Bottero, M. C., & Chen, A. (2019). *EPC green premium in two different European climate zones: A comparative study between Barcelona and Turin*. *Sustainability, 11*(20), 5605. https://doi.org/10.3390/su11205605

- https://silodrome.com/osi-20m-ts/

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