Echoes of Renewal

Transforming Centrale Termica into a Music Center through Adaptive Reuse

Supervisors:
Prof.Matteo Robiglio
Arch. PhD Elena Guidetti

Rojin Niyai Pour

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Master's Degree Thesis in
Architecture For Heritage

Author:
Rojin Niyai Pour

Supervisors:
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Arch.PhD Elena Guidetti

Politecnico
di Torino

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Abstract

Obsolete power plants are set to be defunct as the world shifts toward renewable energy. This thesis delves into an important question: what do we do with them? It investigates an integrated methodology through a "research-by-design" case study, focusing on the diachronic perspective and the building lifecycle. The project represents a dynamic use of Adaptive Reuse (AR) as a powerful tool for conversion, tracing the building over time.
This thesis explores the complex landscape of aging power plants, addressing the challenges of new energy production and impending decommissioning. It reveals a transformative project that employs an integrated methodology, shedding light on the adaptability possibilities of structures with similar characteristics.
Subsequently, it presents a compelling global comparison of AR cases, with a particular emphasis on energy-producing buildings. It extracts valuable insights by highlighting common features across various projects, which serve as the foundation for the proposed project.
The proposed project takes a form-form approach, creatively incorporating identified shared characteristics into a transformative design. It not only adds to the conversation about adaptive reuse, but it also provides a practical framework for long-term transformations. This study provides an appealing exploration of how Centrale Termica could be one of the examples of these aging structures, which can find renewed purpose, emphasizing the importance of a forward-thinking and adaptive approach to our architectural heritage.

Introduction

Older power plants face an issue in the constantly changing energy production landscape: they must adopt new energy paradigms or face the possibility of being phased out. To address the important question, "What should be done with these structures that have served as the backbone of our energy infrastructure?", this thesis sets out on an engrossing journey. This study, which adopts a "research-by-design" methodology, presents a ground-breaking project that uses an integrated approach and offers insights into the potential for the adaptation of buildings with comparable features.

The Centrale Termica, located in the heart of Ivrea, Italy, is a forgoten reminder of the city's otherwise celebrated industrial past. The large structure, once a thriving power plant before being shut down in 2003, now lies dormant, its machinery silenced by the relentless march of technological progress. Beyond its aged exterior, there is a compelling opportunity to revitalize this historical relic. This thesis sets out to propose a transformation, envisioning the Centrale Termica not as a relic but as the vibrant nucleus of a Music Center, effortlessly integrating its historical significance with a renewed purpose.

Before delving into the design details, a fundamental understanding of the concept of Adaptive Reuse is required. This investigation deepens the understanding the typology of the Centrale Termica—how it has been treated in the past and the numerous possibilities for its potential transformation. The thesis conducts a comparative study, analyzing other abandoned power plants worldwide that have a similar initial shell, enriching the project with insights from various adaptive reuse scenarios.

The selection of Ivrea as a starting point for this transformative project requires a thorough investigation of its historical, physical, and contextual dimensions. The elaborate patterns of the city, combined with the specifics of the Olivetti complex that once housed the Centrale Termica, provide an important context for understanding the particulars that will shape the proposed Music Center.

Moving on to the Design Proposal, the thesis examines the current state of the Centrale Termica, dissecting its urban integration and the layers that define its existence. Technical drawings reveal its structural intricacies.

Commencing with an analysis of the building's assessment, showcasing its potential and various new spatial uses. Highlighting the current condition using the yellowred method, with the existing situation of the building through demolition phase, and introduction of the new proposal. Selecting a music center as the primary function, acoustic considerations were taken into account along with relevant proposals to enhance the appropriate experience within the building. In the adaptive reuse journey, the design process emphasizes the incorporation of a cutting-edge acoustic system for the proposed music center. This strategic addition preserves Centrale Termica's historical essence while also aligning to the adaptive transformation with contemporary community requirements. It demonstrates how adaptive reuse can seamlessly combine historical significance with modern functionalities, ensuring coexistence with the changing urban environment. To conclude, an explanation of how the research stage informed the design process.

The closing of the thesis reviews the hypothetical next steps for intervention around the Centrale Termica, continuing the narrative proposed of the Music Center, and finally concluding by connecting everything discussed with the final design, highlighting the main subject matter of the project.

KeyWords: Adaptive Reuse, Industrial Heritage, Power Plant, Transformation.

01

Adaptive Reuse

"Adaptive reuse is based on the words 'adaptation' and 'reuse'. The term refers explicitly to changes that involve a functional and a physical component."
(Plevoets, B. and Cleempoel, K.V. 2019)

Background

Adaptive reuse is a recent term for something that has been in practice for centuries. Dating back to the Renaissance period, buildings were converted to new use, such as Santa Maria degli Angeli e dei Martiri in Rome, which had ancient remains of roman baths that were included in the design of the new basilica.[1]

From the beginning of the 18th century, the concept of "heritage" became more important and their focus was more on dealing with physical remains of the past. As Eugene Emmanuel Viollet-le-Duc (1814-1879) said:

The best of all ways of preserving a building is to find a use for it, and then to satisfy so well the needs dictated by that use that there will never be any further need to make any further changes in the building. In such circumstances, the best thing to do is to try to put oneself in the place of the original architect and try to imagine what he would do if he returned to earth and was handed the same kind of programs as have been given to us. Now, this sort of proceeding requires that the restorer be in possession of all the same resources as the original master - and that he proceeds as the original master did.[1]

Furthermore, John Ruskin claimed :
this kind of restoration as 'a destruction accompanied with false description of the thing destroyed' (Ruskin, 1849, p. 148)He also called it 'the most total destruction which a building can suffer' (Ruskin, 1849, p. 184)
It is impossible, as impossible as to raise the dead, to restore anything that has ever been great or beautiful in architecture, . . . Do not let us talk then of restoration. The thing is a lie from beginning to end. . . . Take proper care of your monuments, and you will not need to restore them.[1]

At the end of the 19th century, Camillo Boito (1836-1914) proposed practical guidelines for the restoration of historic buildings (1893). He criticized Viollet-le-Duc and Ruskin, proposing that the restoration method employed for any given project should depend on the individual circumstances of the building or monument in question. He never mentioned reuse in his ideology but the term Restauro in Italian refers to not only 'the action of returning something to a former owner, place, or condition' but also involves aspects of the reconstruction as well as adaptation to contemporary needs.[1]

In 1933, during the International Congresses of Modern Architecture (CIAM), it was proposed that historical monuments be preserved selectively under specific conditions, viewing them as 'isolated monuments' seamlessly integrated into modern urban settings.

With urban expansion came a significant rise in the number of buildings requiring conservation. The 1964 Venice Charter acknowledged this shift, endorsing 'adaptive reuse' as a form of conservation that advocates using monuments for socially valuable purposes.

In the second half of the 20th century, architects like Carlo Scarpa, Raphael Moneo, and Herzog & de Meuron embraced the challenge of working with historic buildings, and made it a crucial aspect of their work.[1]

"Existing buildings need to evolve and transform to fit with needs not only in terms of technical but also in terms of functional." (Petruzzi, V. ,2015)[2]

What is Adaptive Reuse?

Adaptive reuse is the act of renovating, restoring, or repurposing a structure rather than demolishing it. This approach enables the building to serve new functions while preserving its historical or architectural value.[3]

"*Adaptive reuse is the process of reusing an existing site, building, or infrastructure that has lost the function it was designed for, by adapting it to new requirements and uses with minimal yet transformative means*". [4](Robiglio, 2017)

In the past century, the main ideology in architecture thinking is by proposing a function and constructing the building according to it, as said in the term of "form follows function" by Louis Sullivan. In 1973, the Merriam-Webster dictionary officially defined adaptive reuse. This was a turning point, shifting the traditional formula. The new perspective, encapsulated in the concept of "function follows form," emphasizes studying abandoned buildings with obsolete functions based on what physically remains. This approach seeks to find a new purpose for these structures based on their potential as demonstrated by the architectural form. [4]

"*Adaptive reuse is a complex process which requires participants in the process that have a clear understanding of how to determine the most appropriate future for the building in a particular location and time*" (Kincaid, 2002).

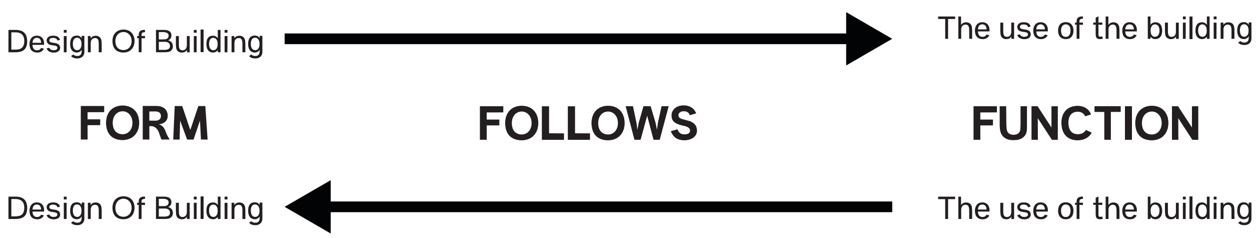

Figure 1. Form Follows Function Change To Function Follows Form (Elaborated By The Author)

Rationale

Adaptive reuse is a key strategy for heritage preservation in urban development, providing a sensitive approach to preserving cultural and historical assets. It maintains architectural heritage by repurposing existing structures and preventing the demolition of historically significant buildings. This approach revitalizes iconic structures, allowing them to contribute to the contemporary urban landscape while retaining their unique historical character, acting as a link between the past and the present, supporting a sense of continuity and historical significance in changing urban environments.[1]

For an economical approach in urban development, Adaptive reuse provides a cost-effective alternative to new construction. Repurposing existing structures not only reduces the high costs of demolition and rebuilding but also, increases economic growth, job creation, and community engagement. Adaptive reuse transforms historical or culturally significant structures into unique tourist attractions, attracting visitors who want to experience the blend of history and innovation within these repurposed spaces.[1]

Additionally, the sustainability approach to adaptive reuse emphasizes the importance of promoting environmental responsibility. Reusing existing structures significantly reduces the environmental footprint associated with new construction, minimizing waste and lowering carbon emissions. This strategy fulfills resource efficiency principles by conserving materials and optimizing available resources.[1]

Therefore, it is an effective urban development strategy that enables existing structures to quickly and efficiently adapt to changing needs. Rather than building from scratch, this approach ensures flexibility and responsiveness to the changing demands of society, optimizing resources and promoting sustainable growth. (figure 2)

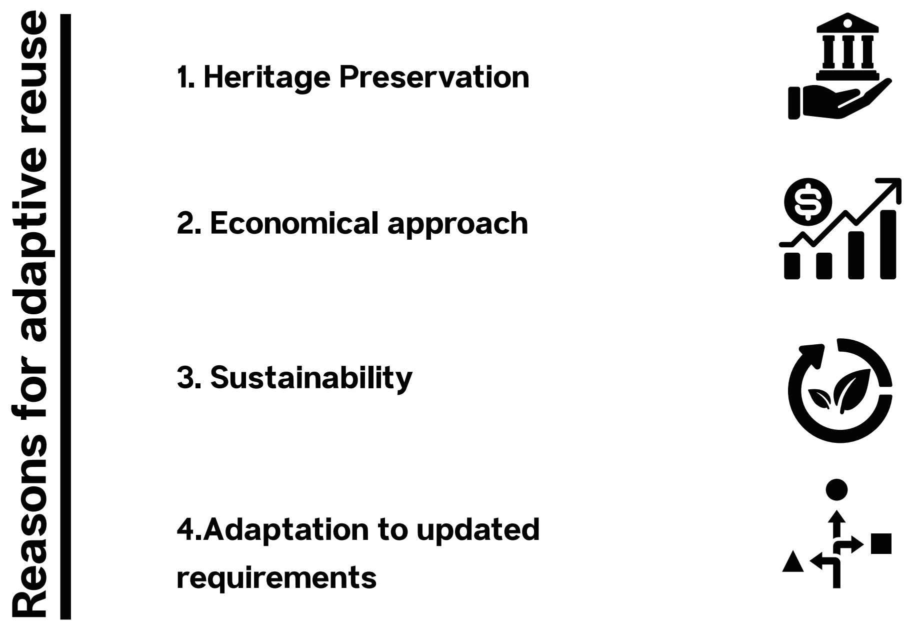

Figure 2. Some Important Reasons For Adaptive Reuse (Elaborated By The Author)

Form

Cantacuzino's pioneering work, "New Uses for Old Buildings," was published in 1975 and formed the basis for the concept of "adaptive reuse." This influential book delves into the historical evolution of adaptive reuse and its critical role in contemporary conservation practices. Following Cantacuzino's innovative approach, several other writers utilized a similar methodology. Scholars such as Cunnington (1988), Douglas (2006), and Latham (2000) implemented a similar approach to their research, focusing on the exploration of suitable functions for specific architectural typologies.[1]

This question aligns with Machado's concept of the form/function relationship.[1] Within this framework, considerable effort has been directed toward the examination of specific building typologies, such as: **industrial buildings** (Cantacuzino, 1975; Robert, 1989; Latham, 2000; Stratton, 2000; Henehan, Woodson, & Culbert, 2004; Douglas, 2006; Robiglio, 2017), **residential buildings** (Cantacuzino, 1975; Cunnington, 1988; Robert, 1989; Latham, 2000; Douglas, 2006; Nichols & Adams, 2013; van de Weijer & Van Cleempoel, 2015), **and churches** (Cantacuzino, 1975; Robert, 1989; Cunnington, 1988; Latham, 2000; English Heritage, 2003; Morisset, Noppen, & Coomans, 2005; Douglas, 2006; Alavedra, 2007). **Other building types such as military and commercial buildings received limited attention.**

Industrial Buildings	Factory, Warehouse, Barn, Granary, Mills, Brewery, Malting Mining Site, Railway Station
Religious Buildings	Church & Chapel, Convent, Beguinage, Presbytery
Residential Buildings	City Hall, Museum, School, Hospital, Observatory, Court House, Office, Library, Theatre , Hotel & Hostel, Post office.
(semi) Public Buildings	Castle, Country House, Farm, Town House
Commercial Buildings	Craft Shop, Department Store, Exchange, Bank, Market, Boutique, Passage
Military Buildings	Fortress, Barracks, Gate

Figure 9. Classification Of Building Typology (Elaborated By The Author)

Functions

In Figure 9. delves into the varied classifications of adaptive reuse across different building typologies, highlighting those that have been extensively researched. From this, Figure 10 illustrates how architectural programs are classified based on their current functions, in line with Fisher and Powell's insights [5], [6]. This shift emphasizes a dedication to exploring contemporary architecture and interventions, shifting away from a primary focus on historical aspects. (B. Plevoets & K. Van Cleempoel, 2011)[1]

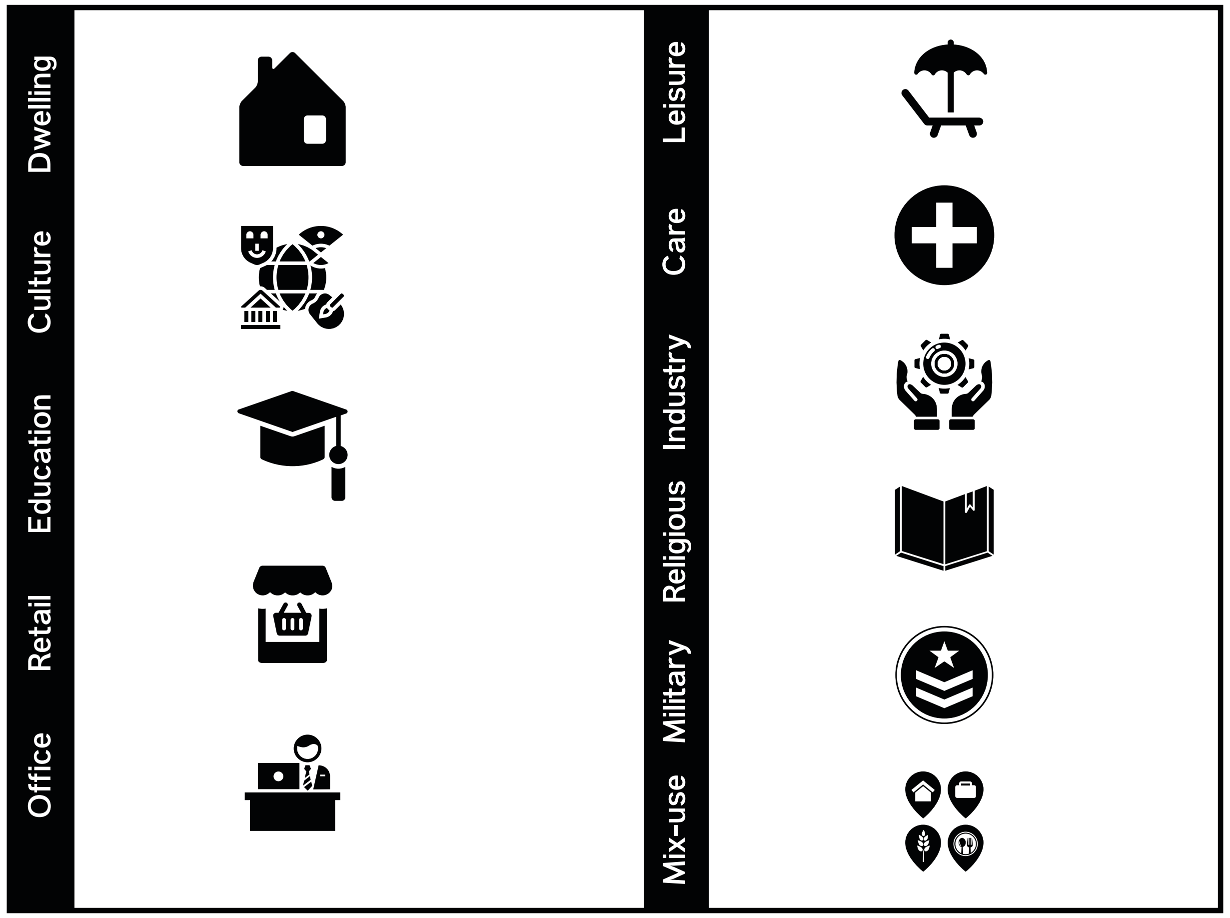

Figure 10. Classification of Functions (Architectural Programs) (Elaborated By The Author)

Industrial Buildings

The theory and practice of architecture have undergone significant change since the Industrial Revolution. When the industrial era began in the early nineteenth century, architecture began to shift away from designing structures that symbolized Western dominance, such military and ecclesiastical buildings, and toward designing spaces to accommodate the rapidly expanding production and transformation of goods. (Robiglio, 2017) [4]

In the adaptive reuse of industrial spaces, the buildings, stripped of their original functions, become replicas of a previous era, which plays an important role in the narrative. Many European factories closed due to changes in economic structures and technological advancements in the 1970s and 1980s, so the industrial buildings visible in cities are remembrances of the industrial era among urban landscapes. [7]

Therefore, the is a noticeable amount of abandoned industrial buildings and sites in cities is the result of deindustrialization. These industrial infrastructures were seen as obstacles that needed to be removed until the late 1990s. However, perceptions have changed recently, with industrial buildings being given more consideration for adaptive reuse as opposed to demolition, indicating a shift in how these buildings are being used and revitalized.[8]

"They are Iconic. They can accommodate any use and spatial configuration. It would be difficult to imagine a more ironic end to the corner stone of functionalism epitomized in the fortunate formula "Form follows function"" (Robiglio, 2017) [4]

"*building for industry was an industrial activity in itself, with standards forms defined by the available technologies-steel, iron, concrete, wood- offering maximum freedom from internal constraint (and possibly fire resistance).*" (Robiglio, 2017) [4]

This simplified and repetitive approach will lead to 2 main types of buildings in a city: [4]

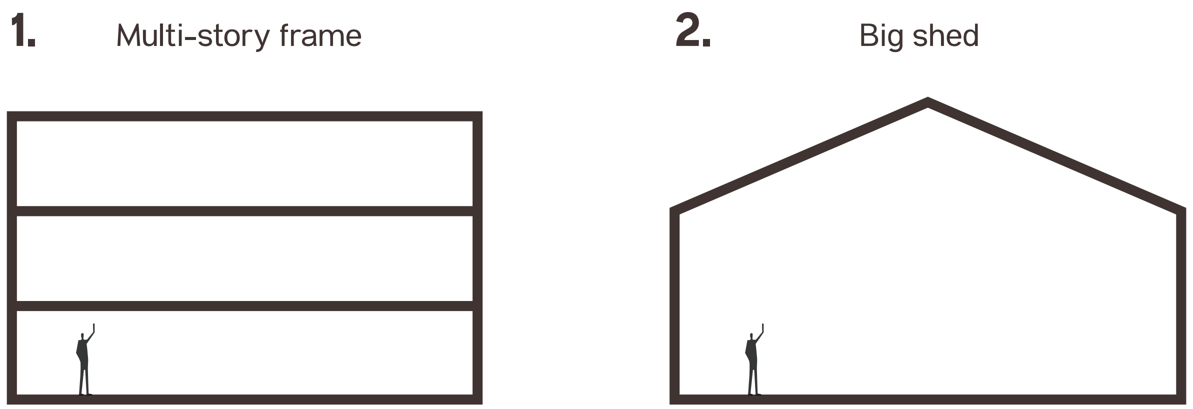

Figure 11. Two types of industrial spaces. (Elaborated By The Author) [4]

1. Multi-story frame: "'The frames were used as warehouses and for small manufacturing; the goal was to multiply space for light production by multiplying the natural ground in artificial vertical platforms."
2. Big Sheds: "The sheds were used for wrapping space around heavy production. Both were generic, potentially infinite spaces with no distribution. The internal layout was defined later by the variable disposition of machines, the chains transmitting power, the organization of the assembly line, and the given forms of bigger engines and machines." [4](p.194,195)

Since they were the forerunners of industrial production, both of these types of buildings have come to be considered the norm for other industrial buildings. The multi-story frame can be traced back to the earliest industrial mills (fig. 12), while the big sheds can be traced back to the building of railroads (fig. 13). These buildings reflected a society that frequently migrated from rural to urban areas near production sites in search of better living conditions. The big sheds and multi-story buildings became symbols of economic growth and stable living conditions for the communities surrounding them.

Figure 12. Built in Derbyshire in 1771, Cromford Mill was the first water-powered cotton spinning mill in history.[9]

Figure 13. Built in Liverpool in 1830, Crown Street Railway Station was the first metropolitan passenger station in history. [10]

Power Plants

During the industrialization period, factories required additional structures for energy production, Consequently, many factories complexes incorporating auxiliary buildings dedicated to energy production alongside the primary manufacturing facility. As technology advanced, the need for large machinery decreased, and many of these structures defunct over time. Despite some being transformed, the majority were abandoned and eventually demolished. However, power plants, due to their durability and central urban locations, offer a promising opportunity for adaptive reuse. Their durability, combined with expansive spatial potential, places them at the forefront of urban regeneration, providing opportunities to align with modern sustainability objectives. [11]

Function Follows Form

Adaptive reuse is a key method for preserving old buildings, and there are several approaches that can be taken to achieve this, with remodeling emerging as a particularly effective method in terms of sustainability. The design concept depends on preserving the existing building's form, with the critical task of determining which values are more or less important in the process.[12]

There are different Level of interventions

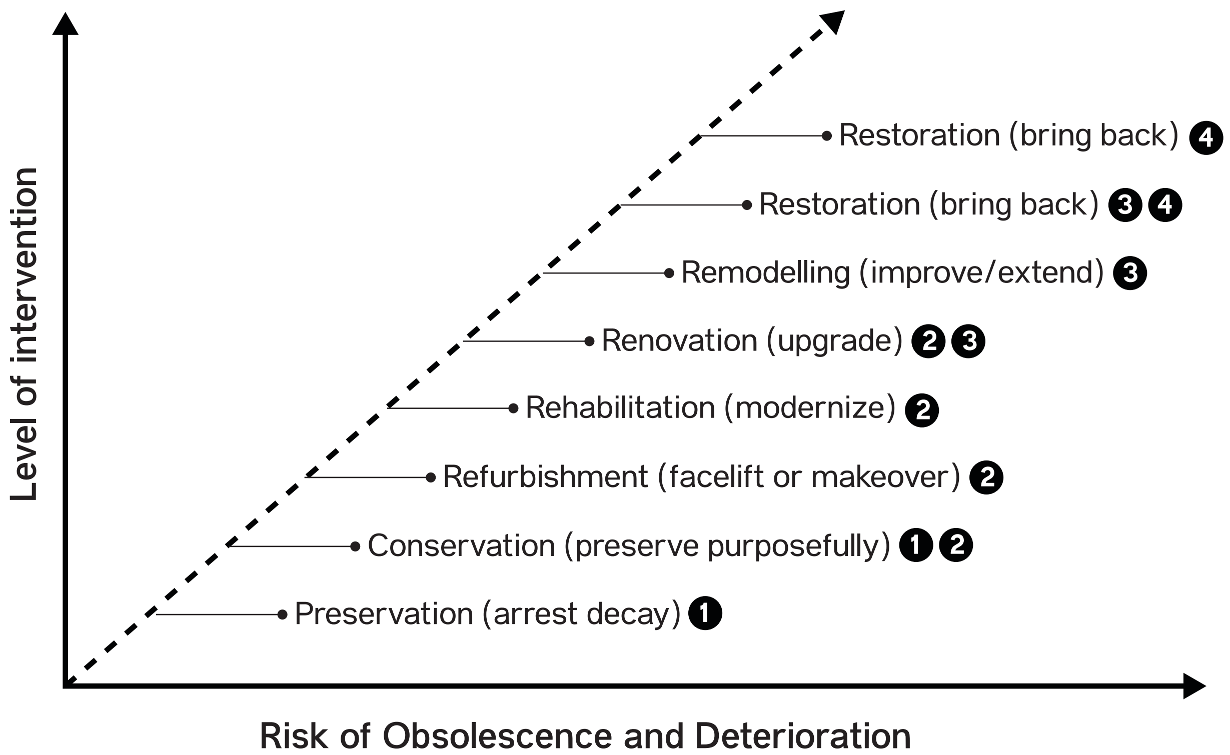

Figure 3. Level of intervention (Re-elaboration by the Author According To Brooker, G. & Stone,2004)[12]

1. Maintenance: Basic adaptation works including fabric repairs
2. Stabilization: Strengthening and major improvement works to the structure including inserting epoxy resin stitches in wall junctions
3. Consolidation: Medium adaptation and maintenance works including damp proofing measures and timber treatment.
4. Reconstruction: Substantial rebuilding of part or parts of the building.

Layers and Their Life-Cycle

In both architectural theory and practice, buildings are viewed as rigid bodies. Although a building's design may suggest areas, materials, and neighboring locations in response to a particular course of use, a building's life is unpredictable and shaped by its occupants long after construction is finished. There is now a division between the way architecture is usually portrayed and designed as though it were static, and how it is so frequently transformed and changed.In 1974, Duffy designed a framework for adaptability and building change [13], which Brand later developed his theory on, in 1994 [14]. The "levels" approach divides a building into parts based on their estimated technical, functional, and economic life-cycle, rather than measuring the whole structure in terms of material.[15]

Duffy correlates these sets of different components – levels- by simply looking at the initial costs of a building’s development and at the “reoccurring capital” on a time frame of 70 years (Schmidt III, 2014). Brand expanded Duffy's theory and named the "S's" as shown in figure (4). He divided the levels into six parts, each beginning with "S": stuff, space plan, services, skin, structure, and site. These levels have different predicted life spans and may be changed at all times. Of course, the more overlaid between levels, the more complicated and expensive the adaptation becomes. [16]

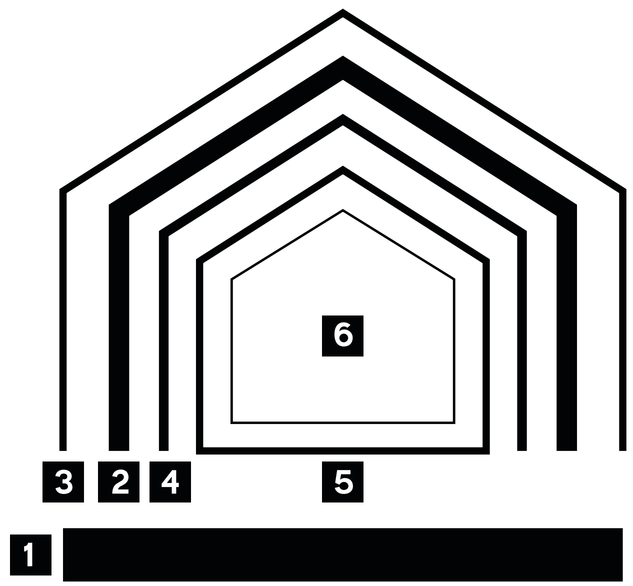

Figure 4. “The Shearing Diagram” From How Buildings Learn (The S’s, Brand, 1994). (Elaborated By The Author) [13]

1 SITE ⟶ **Permanent**
Location and Context

2 STRUCTURE ⟶ **30-300 years**
Bones

3 SKIN ⟶ **20+ years**
Envelope

4 SERVICES ⟶ **7-20 years**
Lifeblood

5 SPACE PLAN ⟶ **3 years**
Interior Layout

6 STUFF ⟶ **Daily**
People

Remodeling Classification

Our built environments consists of both buildings and the spaces that exist between them. During the remodeling of a building, there is an important relationship between the volumes of the existing structures and the nature of the intervention. As White defined,[17] it has become feasible to explain the changes in remodeling and exterior elevations with simple diagrams.(Fig.5)

Machado introduces pre-theoretical material suggesting remodeling concepts.[18] Robert classifies seven conversion concepts using the palimpsest metaphor, spanning historical periods [19]. Brooker and Stone categorize building reuse strategies as intervention, insertion, and installation, emphasizing emotional aspects and the importance of the original building [12]. Jager categorizes case studies into addition, transformation, and conversion, highlighting architectural uniqueness [20]. Cramer and Breitling distinguish between 'design strategies'—physical interventions—and 'architectonic expressions'—aesthetic qualities.

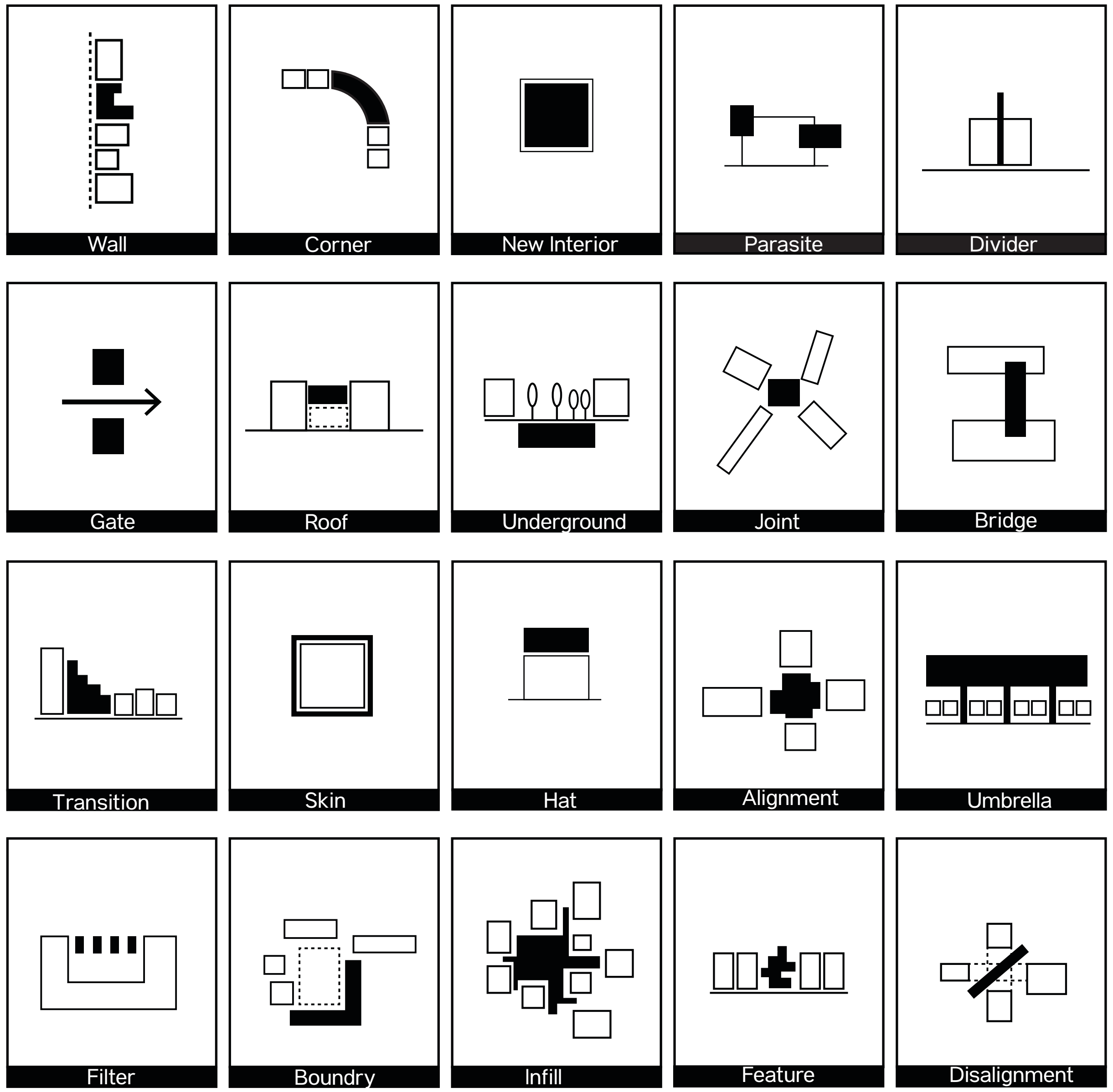

Figure 5. Selection Of Intervention Types (Re-elaboration by the Author According To White)[17]

Potential

The term "potential" comes from the ancient Greek word "dunamis," which means possibility or capability. Galileo Galilei updated and clarified the concept of "potential energy" in 1638 with his work on falling bodies. In adaptive reuse, this energy represents the greater potential inherent in all abandoned structures: the ability to be repurposed and given new life. George Simmel in his 1919 essay "On Ruins" described ruins as being "between the not-yet and no-longer," which presents possibilities for their continued existence.[21]

Adapting a new function to a building requires not only understanding its structural potential but also learning all aspects of the urban landscape, including its position and historical memory, to provide a sense of place.

"*In adaptive reuse, the potential of legacy has to be activated in order to produce a new form of locality*." (Robiglio,2017) [4]

To accomplish this, an in-depth understanding of the building is required, allowing us to determine its potential for future functions. Once the potential has been defined, the next steps are to choose a function for the space and begin the design process. [22] (fig.6)

"The task is to express the transformative potential as a relationship between computable elements, capable of giving weight to multiple use-options in existing buildings."(Elena Guidetti, 2022)[23]

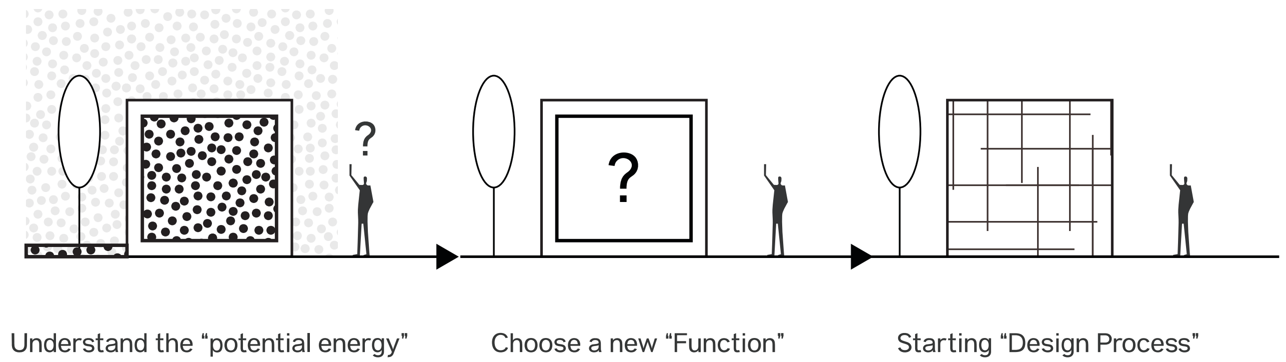

Figure 6. Design Process in Adaptive reuse. (Elaborated By The Author)

Flexibility

When you have a lot of space, both in terms of surface and volume, you can design more flexible and cost-effective forms. Sliding walls are one of the devices made possible by advances in technology. They are adaptable and allow you to house various functions in an old shed. Some adaptive reuse cases involved adding volumes to the space or next to it. Many architects added volume to buildings, known as parasite architecture, to meet particular localized comfort and performance requirements.

“Flexible adaptation to evolving need”. As Michel Foucault wrote in his writing about bodies in prisons, schools, hospitals, and factories. Therefore, in order to create new spatial distributive arrangements that maintain flexibility, provide accessibility, redistribute positions, reverse hierarchy, and blur distinctions, architects must create new societal forms.[4]

“To become an ingredient of change, the generic potential of the loft has to be structured in new spatial sequences and arrangements, enabling new lifestyle and new production modes.” (Robiglio, 2017) [4]

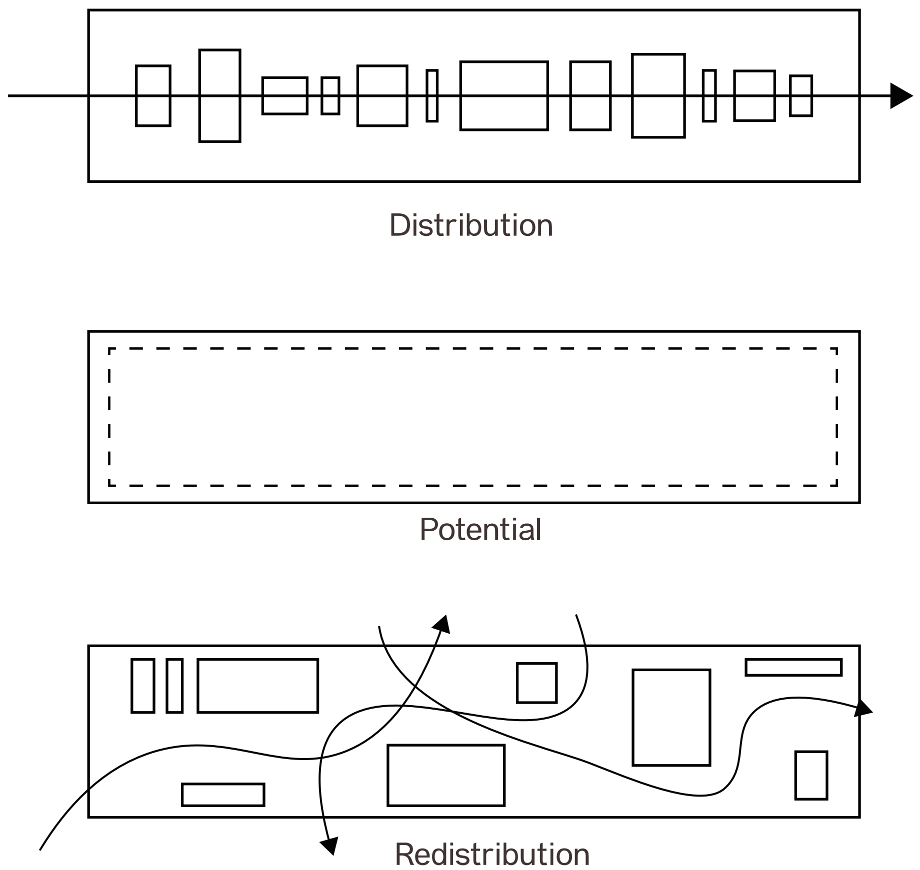

Figure 7. Distribution, potential, redistribution. (Re-elaboration by the Author According To Robiglio, 2017) [4]

Yellowred

Various demolition and addition processes take place during the adaptive reuse design phase when old buildings are reused. Drawings in adaptive reuse require a universal format, just as people need a common language to communicate effectively. Martin Boesch (MB) introduces the 'Black/Yellow/Red' concept, which uses a color code to represent Adaptive Reuse drawings. Existing parts are shown in black, demolition areas are in yellow, and new project elements are in red. This approach is useful not only as a design tool but also as an analytical research tool for adaptive reuse. [24]

“Its main goal is to illustrate how buildings, in their inevitable transformation process, can be re-used.“[24]

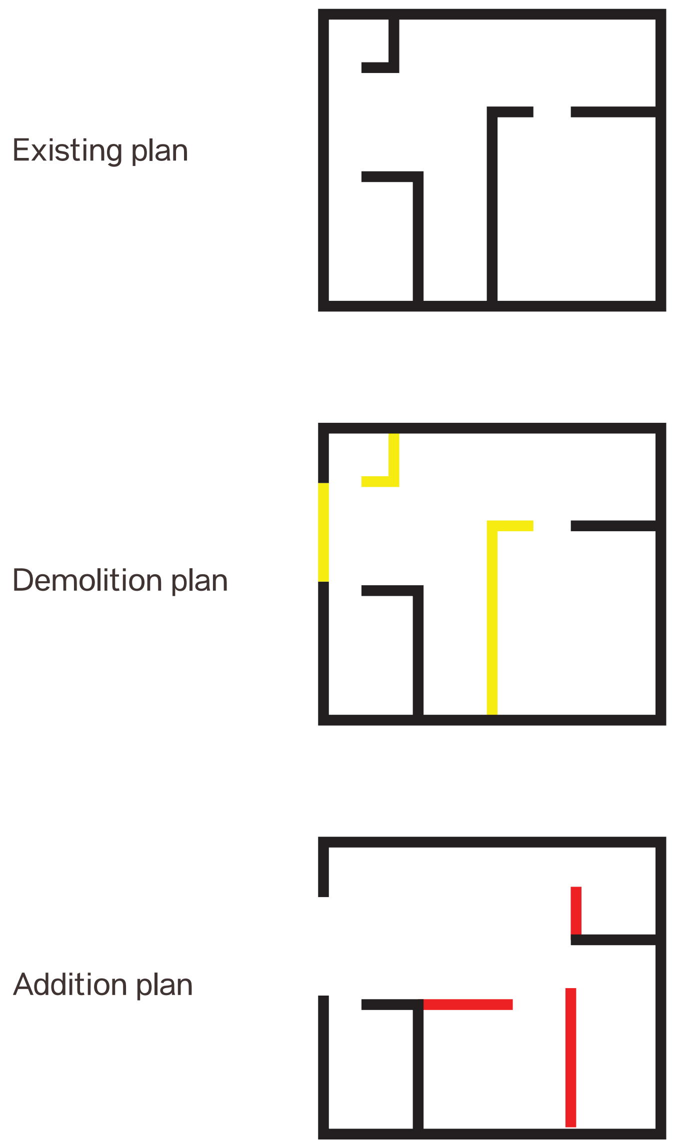

Figure 8. Different type of plans according to Black/yellow/red (Elaborated By The Author) [24]

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Comparative Analysis

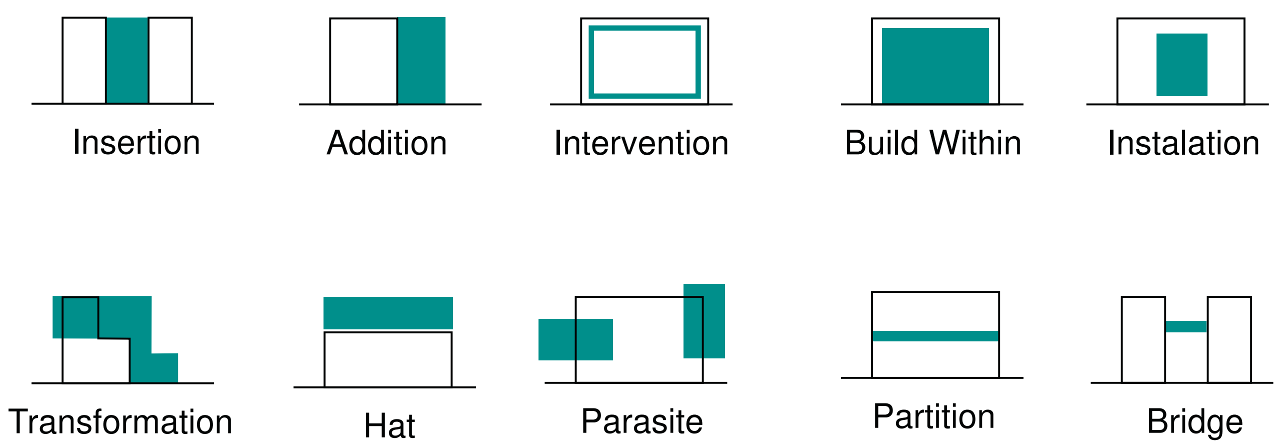
02

Case Studies of Adaptive Reuse Projects

This chapter delves into a diverse array of continental adaptive reuse projects; it includes 14 case studies from Europe, 12 from the United State of America, three from East Asia, and four from Australia. These case studies were selected for their innovative new uses and potential effects on their respective neighborhoods, with a primary focus on the adaptive reuse of former power plants.

The chapter includes a detailed table that lists all of the significant details for each case study, including the location, the dates of original construction and decommissioning, and the year of the adaptive reuse phase. The table also sheds light on each building's area and floor count, as well as its original and reuse function. moreover, a visualizations in accordance with the "White" adaptive reuse phase diagram, which illustrates how the adaptive reuse process projects. Below is the legend used in the following chapter, which is an interpretation of “White's” intervention types.

A volume is inserted between two buildings in an **Insertion**, a volume is added next to a building in an **Addition**, and intentional changes are made to interior finishes to improve functionality or beauty in an **Intervention**. **Build Within** is a construction that is permanent inside the structure. integrating a new spatial element or structure within the pre-existing architectural framework known as **Installation**. **Transformation** is the process of remodeling a building to transform its shape and form. **Hat** refers to the addition of a volume to the building's top, **Parasite** refers to the superimposition of volumes. **Partition** is the process of adding a floor to a building to create an additional story. **Bridge** is the process of creating a connecting structure to improve accessibility and connectivity between two buildings.



LEGEND

- Year of built
- Year of dicomissioned
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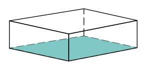
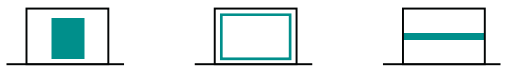
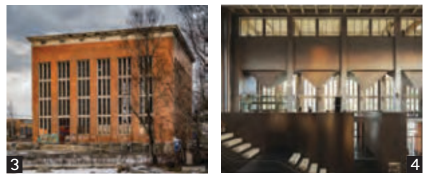
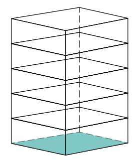
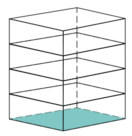
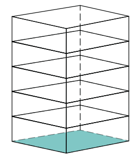
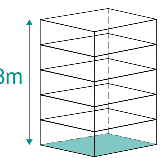
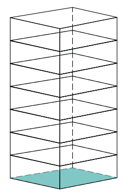
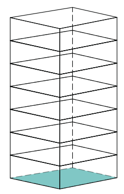
- Location

Location	Photos	Building	Original use	Built	Decommissioned	Adapted use	Adapted	Volume	Size		Interventions
1 Ljubljana, Slovenia		**Stara elektrarna**	Power Station	1898	1943	Performing arts theater	2004		2,000sqm 1 Floor		Instalation, Intervention, Partition
2 Munich, Germany		**Kunstkraftwerks Bergson**	Thermal power plant	1949	1988	Gallery space, an extensive cultural offering, modern event formats and high-quality gastronomy	2022		2,020sqm 5 Floors		Intervention, Addition, Instalation
3 Berlin, Germany		**Berghain**	Railway Heating plant	1953	1990's	Techno Club & art center	2004		3,400sqm 4 Floors		Partition, Instalation
4 Łodź, Poland		**EC1**	Heat and power plant	1907	2000	Centre for Science and Technology	2015		4,700sqm 5 Floors		Addition, Parasite, Bridge
5 Eindhoven, Netherlands		**Innovation Powerhouse**	Power Station	1913	2010	Innovation hub	2018	28m 	9,300sqm 5 Floors		Intervention, Build Within, Hat
6 London, U.K.		**Tate Modern**	Power Station	1947	1981	Gallery for international modern and contemporary art	2000		34,500sqm 7 Floors		Intervention, Addition, Build Within
7 London, U.K.		**Battersea Power Station**	Coal-fired power station	1933	1983	Retail Galleries, Events spaces, Shops,Restaurants and cafes, large open-plan office spaces and residential	2021		160,000sqm 7 Floors		Intervention, Build Within, Hat, Insertion

LEGEND

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- Location

Location	Photos	Building	Original use	Year of built	Year of dicomissioned	Year of Adaptation	New use	Size	Strategies		
8 Helsinki, Finland		Suvilahti	Electrical power plant	1909	1976	2008	Cultural and creative district	50,000sqm 3 Floor	Intervention	Instalation	Addition
9 Essen, Germany		Kokerei Zollverein Essen	The coking plant	1961	1993	2001	Cultural center (event space, exhibition space, cafe)	2,000sqm 3 Floors	Insertion	Instalation	Addition
10 Berlin, Germany		Kraftwerk-Mitte	Turbine hall	1964	1997	2006	Exhibition hall and music club	8,000sqm 5 Floors	Intervention	Instalation	Partition
11 Cottbus, Germany		The art museum Dieselkraftwerk Cottbus	Diesel power plant	1928	1977	2008	Brandenburg State Museum of Modern Art	4,400sqm 5 Floors	Intervention	Insertion	Partition
12 Duisburg, Germany		Kraftzentrale power plant	Meiderich Power Station	1902	1965	1997	Art and culture center, housing galleries, studios, and event spaces	20m 6,000sqm 5 Floors	Intervention	Instalation	Build Within
13 Luckenwalde, Germany		E-WERK Luck-enwalde	brown-coal power station	1913	1989	2017	Cultural and creative space, featuring artist studios, workshops, and exhibition areas	10,000sqm 4 Floors	Intervention	Instalation	Addition
14 Warszawa, Poland		Elektrownia Powiśle	Heat and power plant	1904	2001	2018	Mix-use: top-class office space, exclusive restaurants, elegant boutiques, and shopping galleries.	24,400sqm 7 Floors	Instalation	Parasite	Partition

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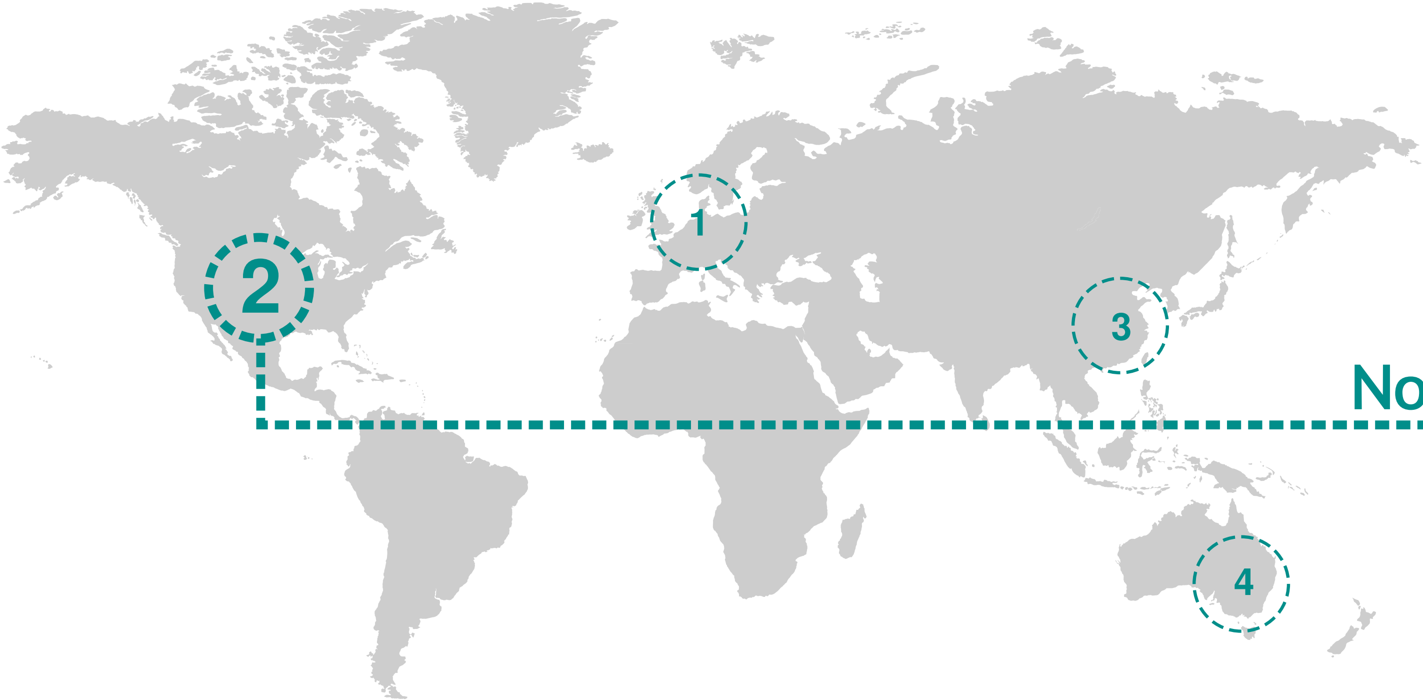
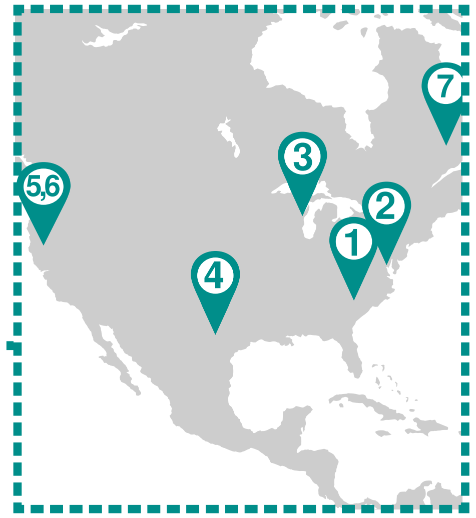
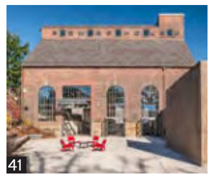
Location



North-America



Location	Images	Building	Original use	Year of built	Year of dicomissioned	Year of Adaptation	New use	Size	Interventions
1 North Carolina, USA.	 	The Bailey Power Plant	Coal-fired power station	1947	2000	2017	innovation, office, entertainment, retail, and congregation space	2,500sqm 4 Floor	Intervention, Instalation, Addition, Parasite
2 Baltimore, Maryland, USA	 	Pratt Street Power Plant	Boiler and Engine house	1909	1970's	2015	**Mixed-Used**: dance club, restaurants, cafe, bookshop, art gallery, gym	5,666sqm 8 Floors	Intervention, Instalation, Partition
3 Wisconsin, USA	 	Beloit College	Coal-fired power station	1949	1980's	2010	College student union	11,148sqm 4 Floors	Intervention, Addition, Partition
4 Austin, Texas, USA	 	Seaholm Power Plant	power plant	1955	1996	2004	Restaurant, Boiler Nine Bar + Grill, office space, retail, residential, a public plaza	7,600sqm 4 Floors	Intervention, Build Within, Partition
5 San francisco, California, USA	 	Station A	Power Station (Turbine Hall)	1920s	1980s	2021	offices and workspaces	4,300sqm (33 x 131) 8 Floors	Hat, Instalation, Transformation
6 San francisco, California, USA	 	Geneva Car Barn and Powerhouse	Electric rail system plant	1920s	1989	2020	offices and workspaces	10m; 3,100sqm 3 Floors	Intervention, Instalation, Partition
7 Amherst, MA, United States	 	Amherst College Powerhouse	coal-power plant	1925	1960	2014	student gathering and event space	2,000sqm 4 Floors	Build Within, Instalation

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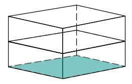
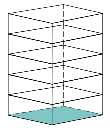
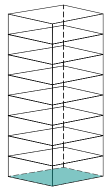
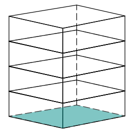
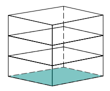
- Location

Location	Images	Project	Timeline	Area	Intervention type
8 Philadelphia, USA	 43  44	**The Power Plant**	Electric Company Power Plant: 1930 → 1984 → 2004 (hotel and events complex)	 420sqm, 2 Floor	Instalation, Intervention, Partition
9 Philadelphia, USA	 45  46	**Fishtown Power Plant**	Coal-fired power station: 1902 → 1984 → 2021 (**mixed-use** complex with office spaces, restaurants, and retail)	 21,000sqm, 5 Floors	Build Within, Intervention, Hat, Partition
10 Toronto, Canada	 47  48	**Partisans**	Hearn Generating Station: 1951 → 1983 → 2016 (Monumental performing arts venue)	 37,100sqm, 4 Floors	Instalation, Partition
11 Brooklyn, New York, USA	 49  50	**Powerhouse Arts**	Rapid Transit Power Station: 1904 → 1950 → 2022 (robust platform for art production and engagement in the arts)	 15,700sqm, 4 Floors	Instalation, Partition, Transformation
12 St. Louis, Missouri, USA	 51  52	**The Power House**	Coal-fired Power station: 1928 → 1980 → 2008 (Gallery and exhibit space)	 3,000sqm, 3 Floors	Build Within, Intervention, Partition

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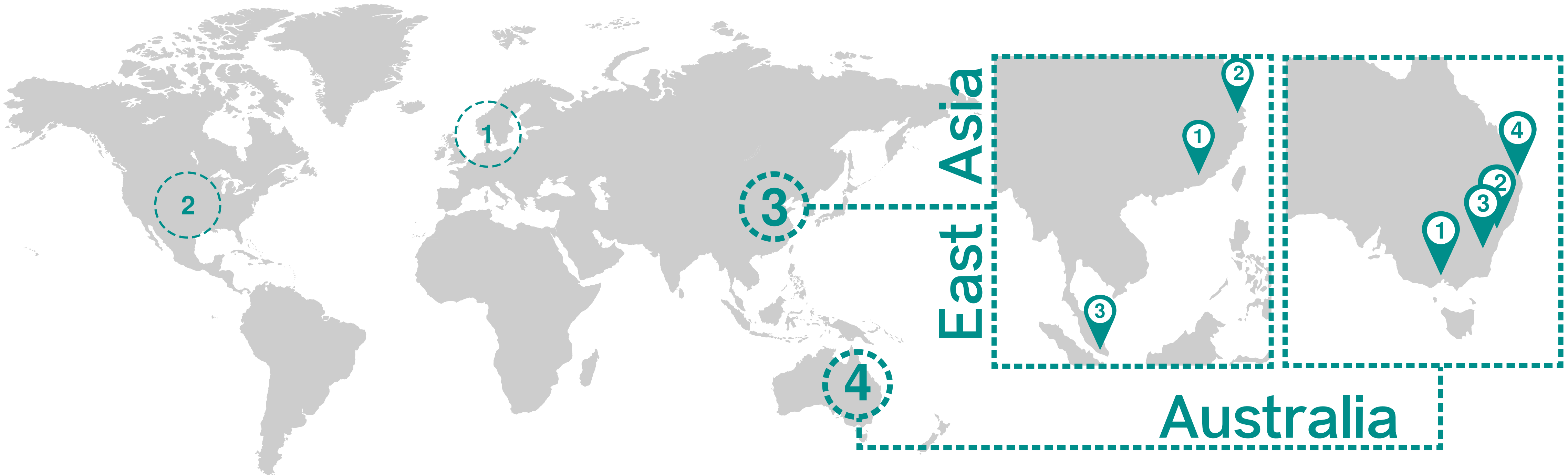
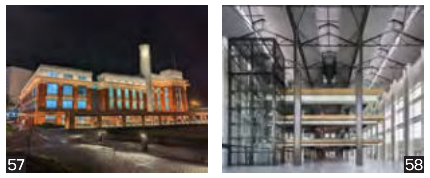
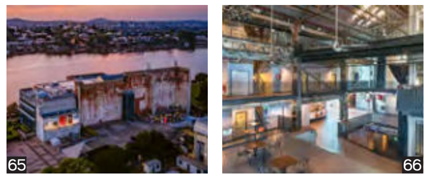


3 East Asia

Location	Images	Name	Original use	Year of built	Year of dicomissioned	Year of Adaptation	New use	Size	Interventions
1 Shenzhen, China		Shajing Village Hall	Gangtou Diesel Power Plant	1980s	2019	2020	Cultural Center (The lion dance, mantis boxing and Cantonese opera)	17m; 2,500sqm; 4 Floor	Instalation, Partition, Transformation, Parasite
2 Shanghai, China		Shanghai Power Station of Art	Power Station	1955	2007	2014	Museum of contemporary art	27m; 42,000sqm; 7 Floors	Intervention, Instalation, Partition
3 Singapore		St James Power Station	Electricity generating plant	1927	1976	2021	Technology centre	6,500sqm; 4 Floors	Intervention, Instalation, Partition

4 Australia

Location	Images	Name	Original use	Year of built	Year of dicomissioned	Year of Adaptation	New use	Size	Interventions
1 Spencer Street, Melbourne, Australia		Higher Ground	Coal-fired power station	1900	1982	2016	cafe and restaurant	1,500sqm; 1 Floors	Instalation, Build Within, Partition
2 White Bay,Sydney, Australia		White Bay Power Station	coal power plant	1958	1983	2018	cultural, goods,services and innovation form	38,000sqm; 7 Floors	Intervention, Build Within, Partition
3 Ultimo, Sydney, Australia		Powerhouse Museum	electricity generating plant	1899	1961	1986	Museum of Applied Arts & Sciences	18,000sqm; 4 Floors	Intervention, Instalation, Addition
4 Brisbane, Australia		Brisbane Powerhouse	Farm Powerhouse	1928	1971	2000	Modern entertainment hub	2,500sqm; 3 Floors	Intervention, Build Within, Partition, Parasite

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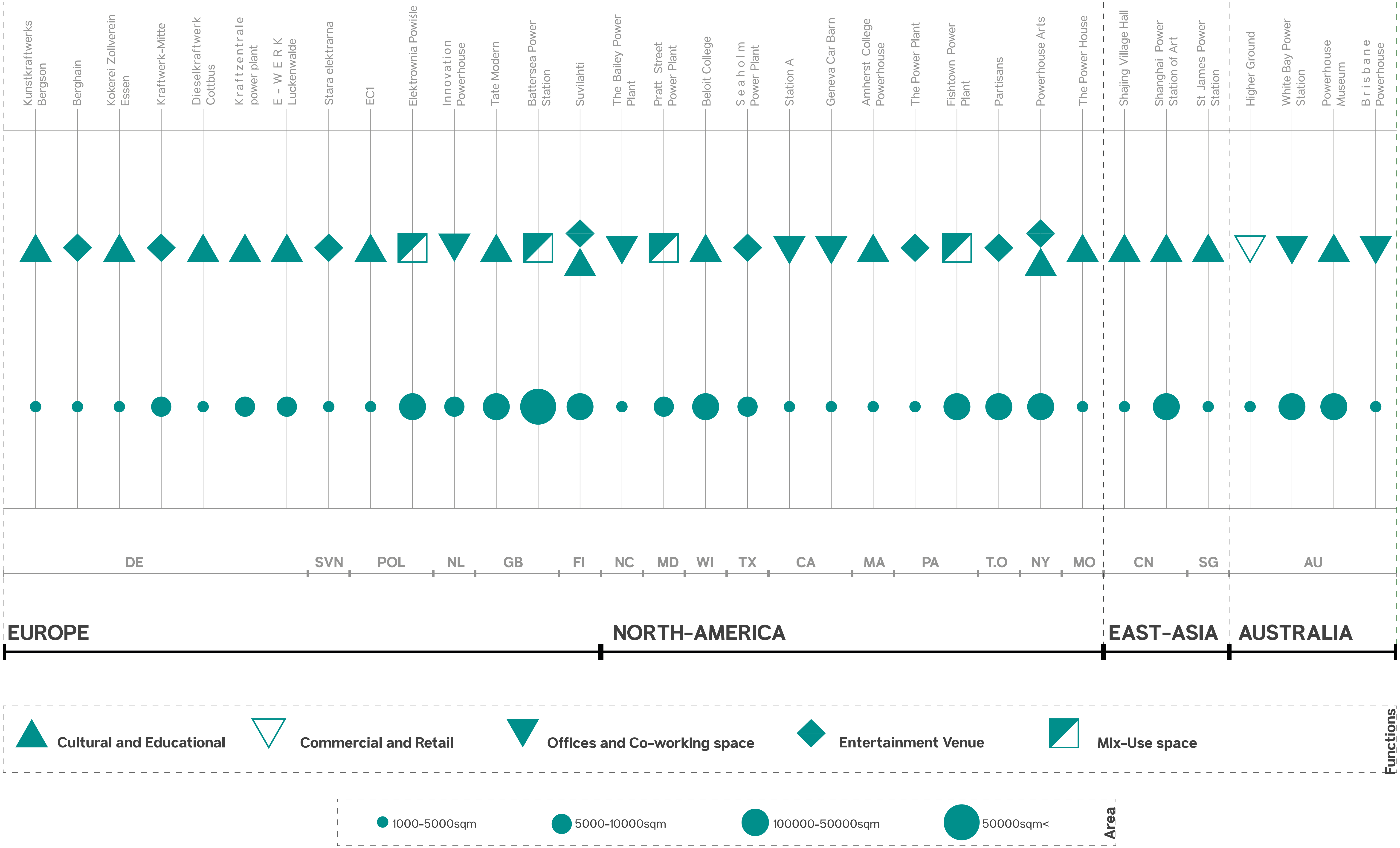
Cross Features In Adaptive Reuse Projects

Comparative case studies analysis outlines cross features, similarities, emphasizes a consistent theme across all previously mentioned building adaptations projects. The following presented table serves as a visual aid which employs outline continents, while for clarity, they are divided into categories ranging from 1000 square meters to more than 50000 square meters. Moreover, various geometrical shapes have been strategically employed to symbolize and categorize 4 functional clusters:

Cultural and educational: Museums, art galleries, educational centre that showcase the history and technology of power plants.
Commercial and retail: Repurposing the plant for retail spaces, restaurants, bars, cafes, capitalizing on its unique industrial aesthetic.
Offices and coworking spaces: Office spaces, coworking environments, or innovation hubs, fostering collaboration and creative work.
Entertainment venue: Unique entertainment venue, such as a concert hall, music clubs, theater, or immersive experience space.
Mix-use: Combining various functions, such as residential units, commercial spaces, entertainment venues, and public areas, to create a interconnected community hub.


Kunstkraftwerks Bergson
Berghain
Kokerei Zollverein Essen
Kraftwerk-Mitte
Dieselkraftwerk Cottbus
Kraftzentrale power plant
E-WERK Luckenwalde
Stara elektrarna
EC1
Elektrownia Powiśle
Innovation Powerhouse
Tate Modern
Battersea Power Station
Suvilahti
The Bailey Power Plant
Pratt Street Power Plant
Beloit College
Seaholm Power Plant
Station A
Geneva Car Barn
Amherst College Powerhouse
The Power Plant
Fishtown Power Plant
Partisans
Powerhouse Arts
The Power House
Shajing Village Hall
Shanghai Power Station of Art
St James Power Station
Higher Ground
White Bay Power Station
Powerhouse Museum
Brisbane Powerhouse
DE
SVN
POL
NL
GB
FI
NC
MD
WI
TX
CA
MA
PA
T.O
NY
MO
CN
SG
AU
EUROPE
NORTH-AMERICA
EAST-ASIA
AUSTRALIA
Cultural and Educational
Commercial and Retail
Offices and Co-working space
Entertainment Venue
Mix-Use space
Functions
1000-5000sqm
5000-10000sqm
100000-50000sqm
50000sqm<
Area

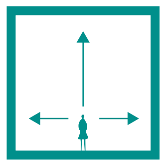
Rationale for Adaptive Reuse of power plants

At The end of this chapter, we begin a study focused on the strategic justification for the adaptive reuse of power plants according to their innate capabilities. When we examine this topic, we intend to clarify the strong arguments and positive outcomes linked to the reuse of these massive infrastructure pieces. The conversation includes a thorough analysis of the many benefits that these facilities have to offer when repurposed. Repurposing power plants holds transformative potential, as evidenced by their Urban Regeneration impact, Spatial Vastness, Structural adaptation, Historical narrative, Spatial Flexibility, Tourist Attraction, Light and Shadow Play, Material Innovation, and Acoustic Considerations.

The objective of this investigation is to expose the inherent worth and varied prospects offered by these constructions when utilized for adaptive reuse, emphasizing the crucial function they can fulfill in promoting sustainable growth, creativity, and involvement in the community.

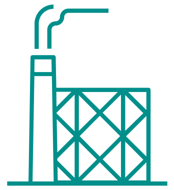
1. Urban Regeneration impact:
Power plants are sometimes located in or near urban areas for variety of reasons: 1. Urban areas typically have higher population densities and, therefore, higher electricity demand. 2. Power plants can more efficiently distribute electricity through the local power grid. 3. Integration with Existing Infrastructure such as gas pipelines, water sources, and electrical substations.

2. Spatial Vastness:
Typically offers expensive interior space with **high ceiling** and **open layout** which it will be better and easier for innovative designs. This adaptability accommodates the diverse requirements of galleries and cultural centers, enabling the display of various art forms, exhibitions, performances, and events.

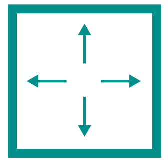


3. Structural adaptation:
Power plants may have **robust structural systems** designed to support **heavy machinery**. Architects can creatively adapt these structures to accommodate new uses, often resulting in adaptive spaces that retain their industrial character.

4. Historical narrative:
Retaining key **architectural elements** from the original power plant, such as exposed steel beams, brickwork, or turbine components, allows the architecture to narrate a story of **industrial heritage** within a **contemporary context**.

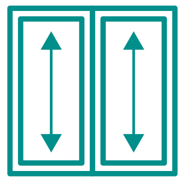


5. Spatial Flexibility:
The **open layout** of power plants provides architects with the **freedom to design spaces** that suit a **wide range of functions**. From galleries and museums to performance venues or cultural centers, the architectural adaptability is substantial.

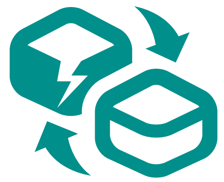


6. Tourist Attraction:
Power plant adaptive reuse projects often become **popular tourist destinations**. Their **fusion of heritage preservation**, **artistic expression**, and **architectural innovation** draws visitors from near and far, contributing to cultural tourism.

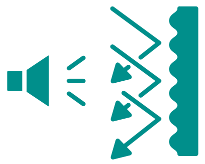
7. Light and Shadow Play:
The **large windows**, **skylights**, and **voluminous spaces** of power plants allow architects to manipulate **natural light** and **shadows** in captivating ways. This interplay adds depth, drama, and an ever-changing visual experience to the architectural design.



8. Material Innovation:
Architects can experiment with a **range of materials**, both **traditional and contemporary**, to enhance the aesthetic appeal of the repurposed power plant. The contrast between industrial materials and sleek modern finishes can create **a visually rich architectural language**.



9. Acoustic Considerations:
Power plants may have **unique acoustic properties** due to their **industrial history**. Architects can leverage these characteristics to design acoustically rich spaces suitable for performances, concerts, or immersive installations.



Site Analysis

03

IVREA

The Salassi, a group of people who lived in the current Canavese and Valle d'Aosta, colonized what is now known as Ivrea. Their main activity was mining for iron, copper, gold, and silver, but the neighboring powers were at war, which put the area in the area. The Romans established Eporedia in the region in 100 BC, which later became a municipium. Because of the region's hilly terrain, Eporedia was built on an irregular pentagon, and its main street remains as such in today's Ivrea. Currently, Ivrea is a town and comune of the Metropolitan City of Turin in the Piedmont region in northwestern Italy. Situated on the road leading to the Valle d'Aosta, it straddles the Dora Baltea and is regarded as the centre of the Canavese area.[1]

The site 'Ivrea, industrial city of the 20th century' celebrates the urban landscape arising from the development of last century. The city has a specific interpretation of the relationship with society and industrial development, particularly after the Second World War, which results in a unique urban fabric, and several buildings of architectural value, functions ranging from manufacturing, service, and residential.[2]

Given its features, Ivrea has many examples of how to preserve industrial heritage, and beyond that, the maintenance of modern architecture. Centrale Termica encompasses the need for these interventions, not only for its style and function, but also to the relationship it has to the city itself and the morphological structure of the site in relation to its integrity and intangible values. [3]

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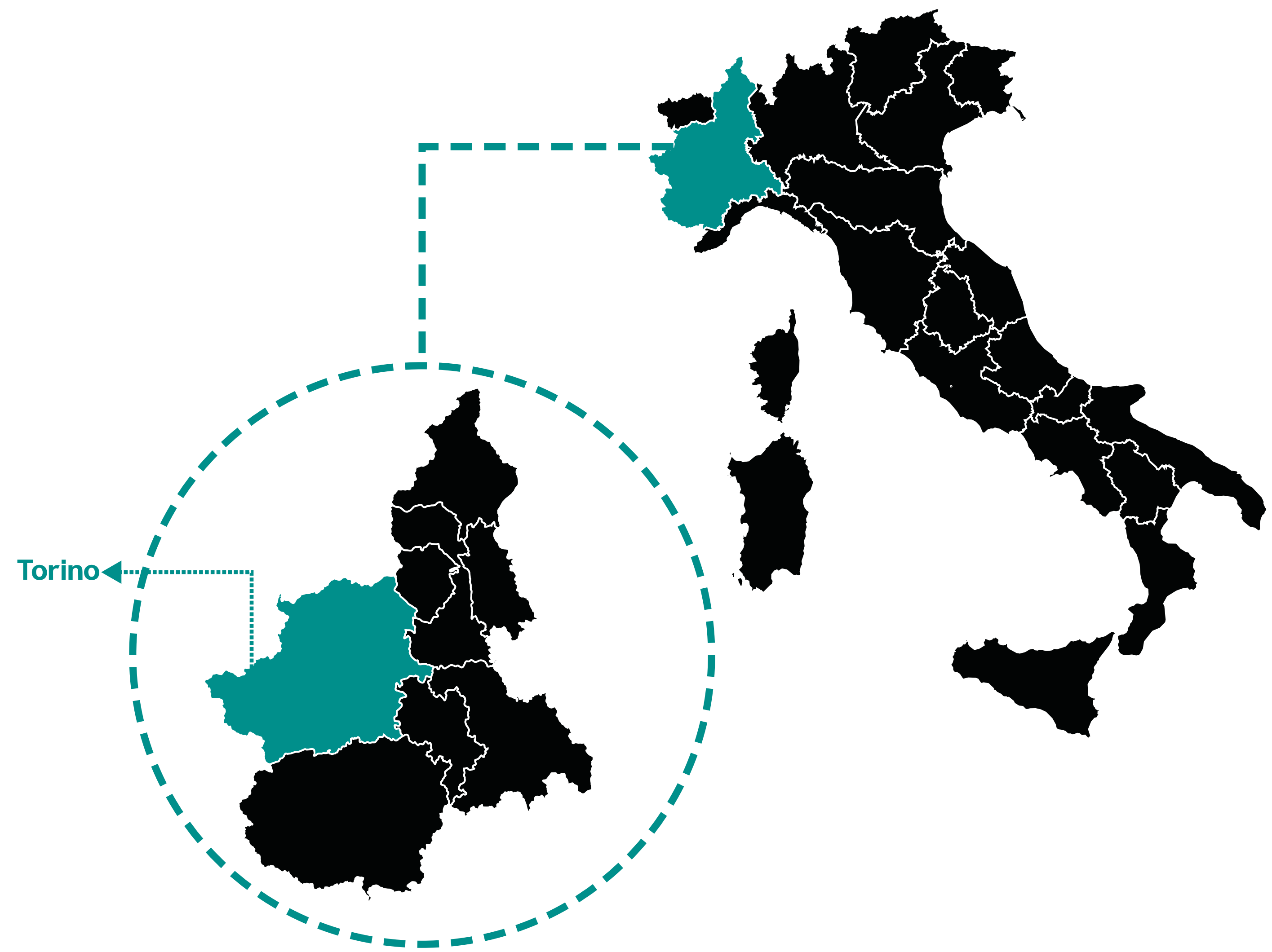
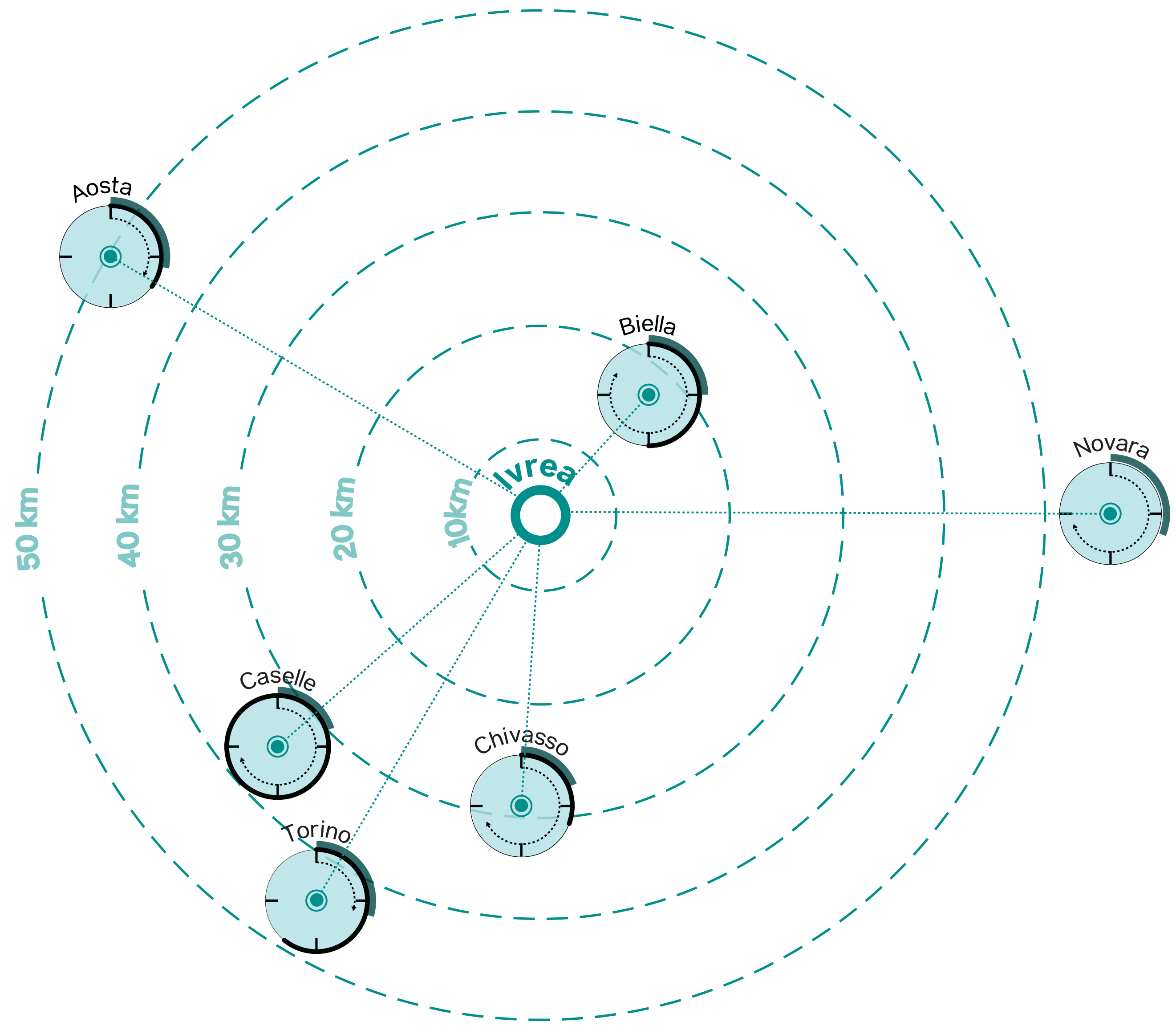
Italy and Piedmont Map



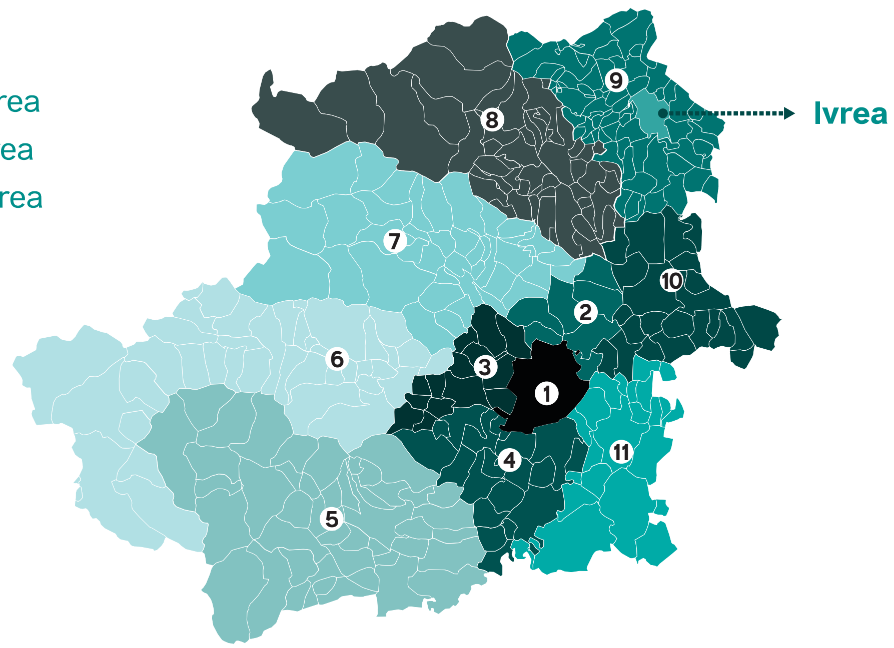
Piedmont

Journey Clock to Ivrea

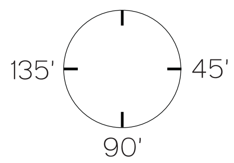


Torino Metropolitan Map

1. Torino
2. Torino North Metropolitan Area
3. Torino West Metropolitan Area
4. Torino South Metropolitan Area
5. pinerolese
6. Susa and Sangone Valleys
7. Canavese - Lanzo Valley
8. Canavese Occidentale
9. Eporediese
10. Chivassese
11. Chierese - Carmagnolese



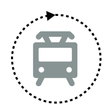
Legend



Travel Times from Ivrea to Various Cities per minutes

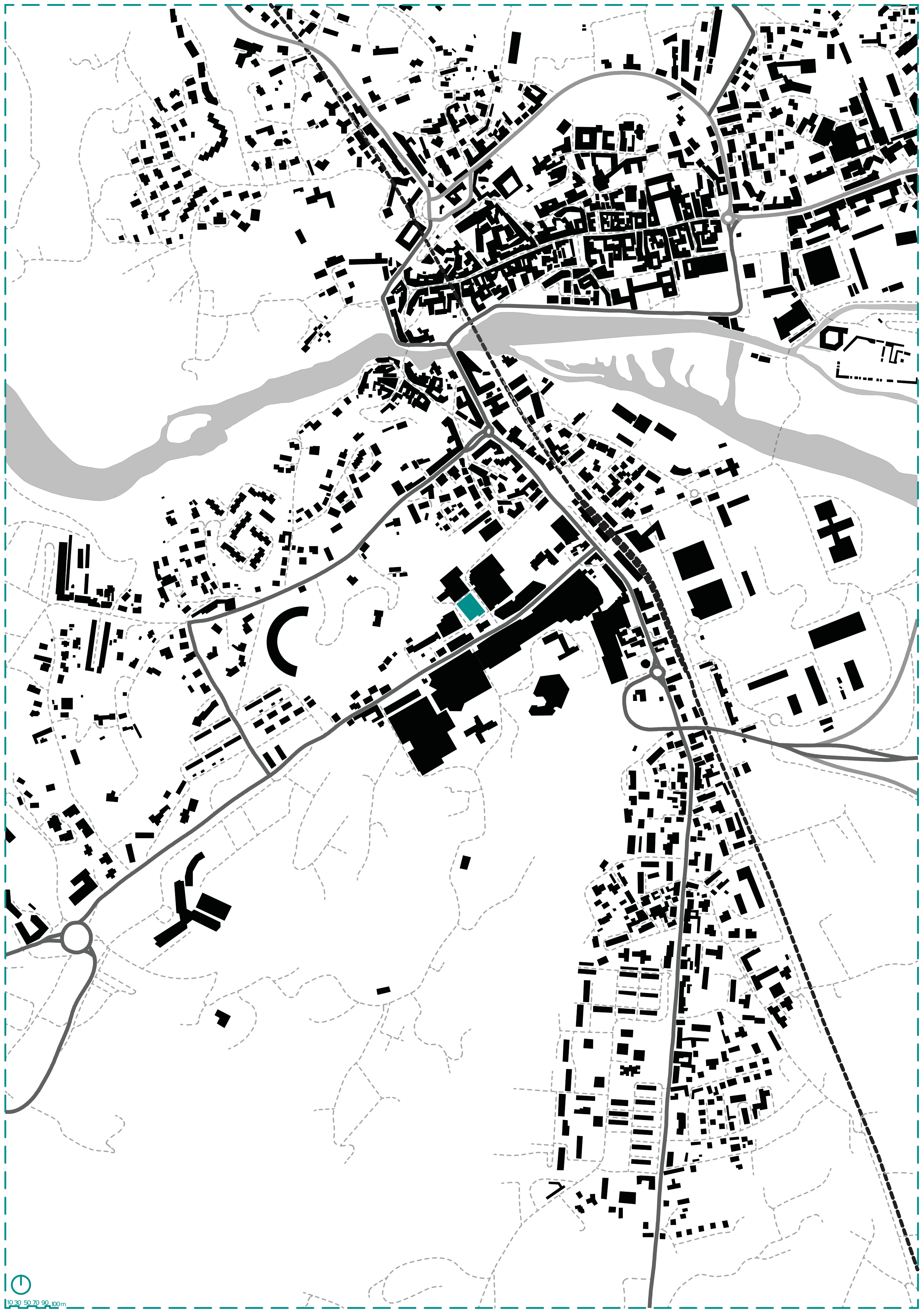
By Car

By Bus



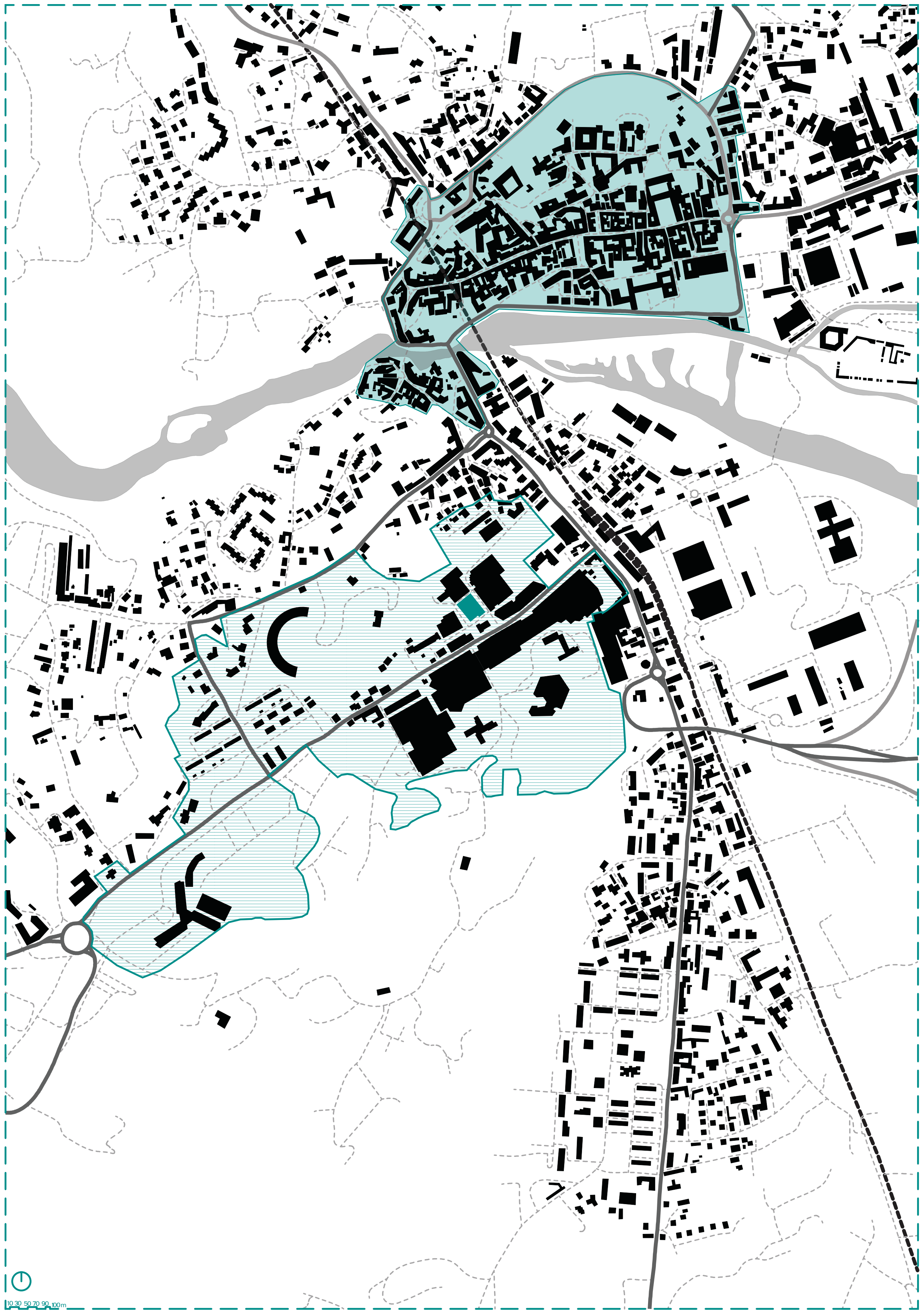
By Train

Ivrea Urban Fabric Map



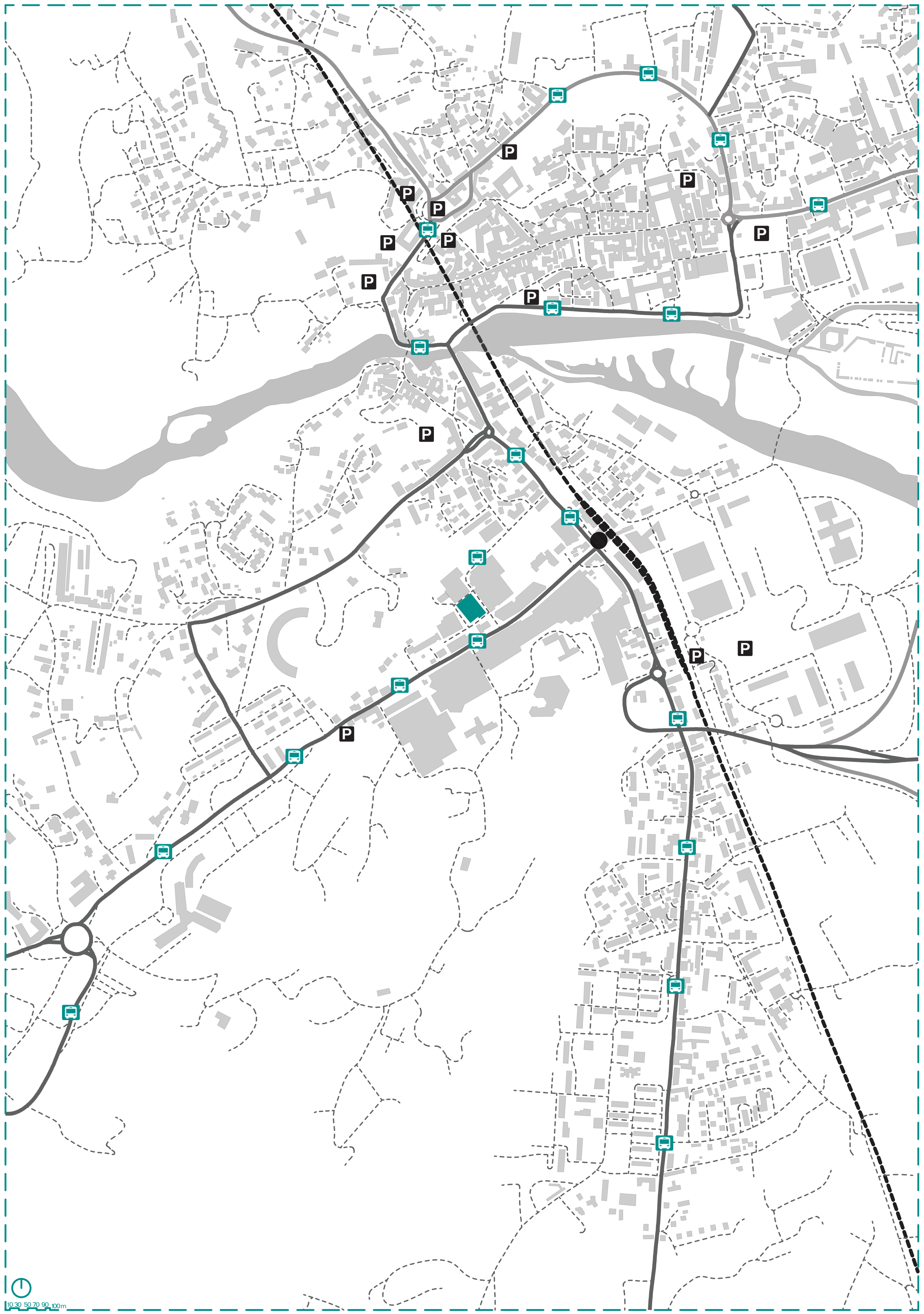
Buildings · Research Area · River · Main Streets · Streets · Railway

Ivrea Zonning Map

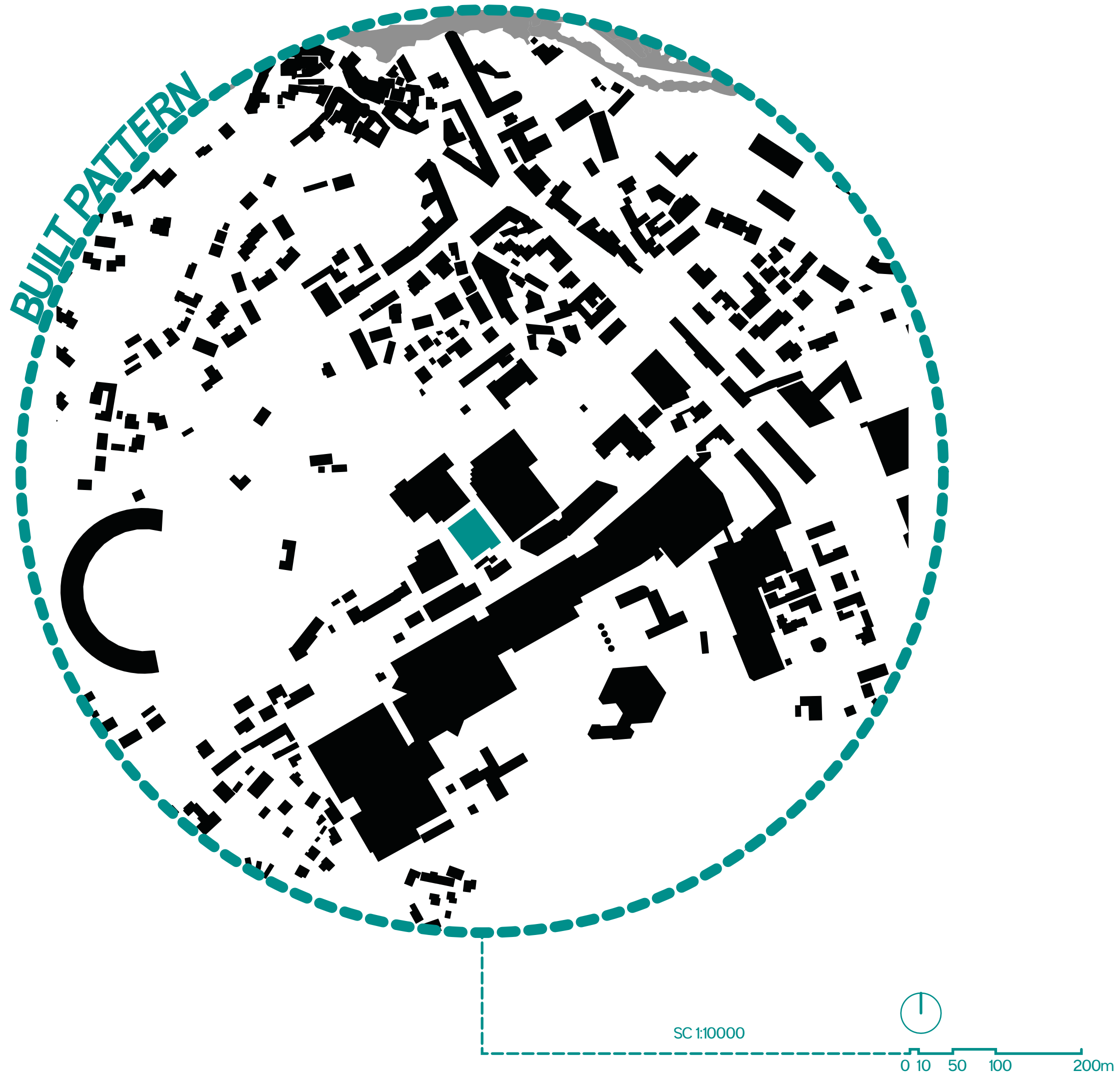


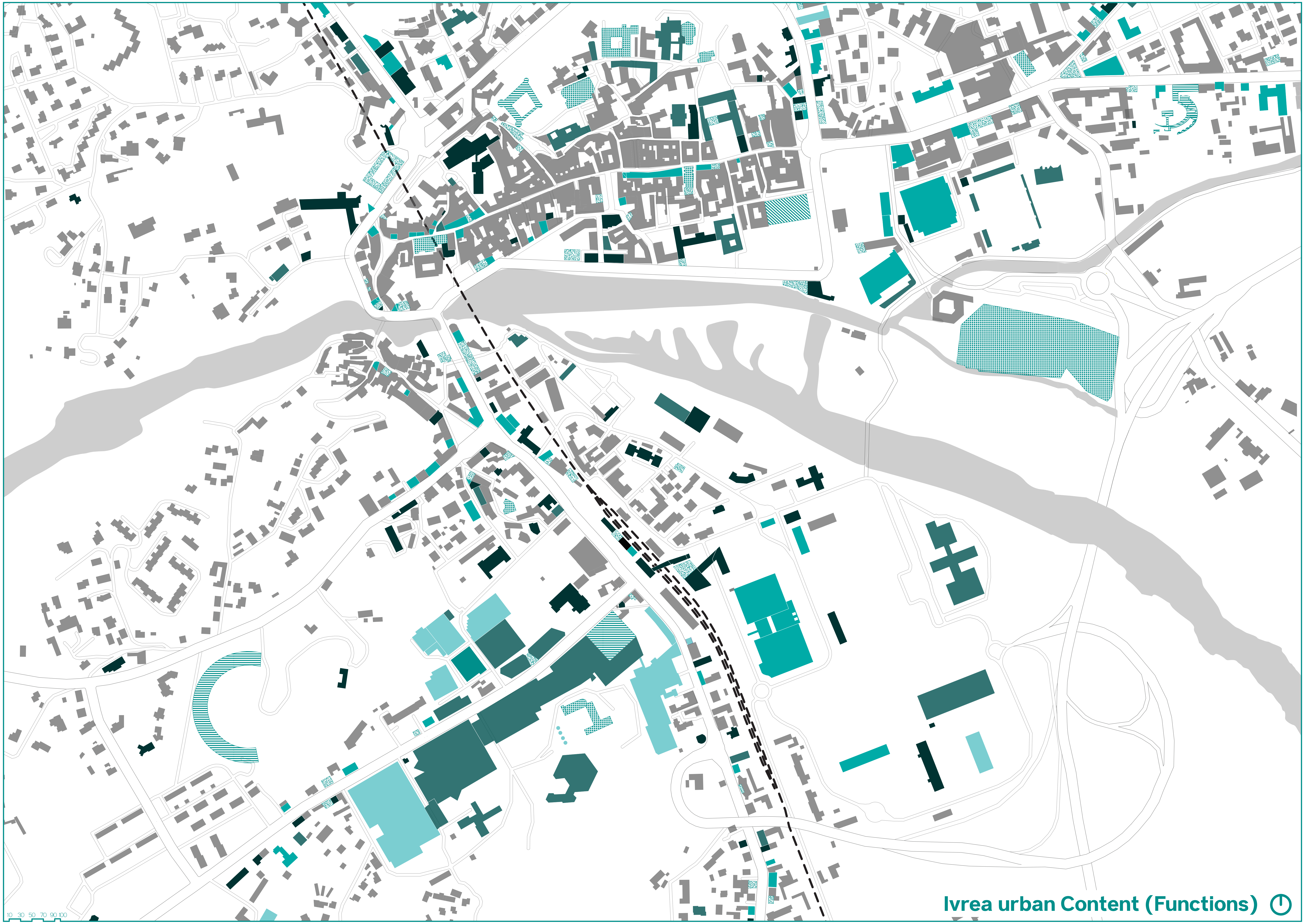
Industrial zone (Olivetti complex) · Historical Zone · Research Area

Ivrea Transit and Public Parking Map



Research Area | Bus Stops | Parking | Train station | Railway





Residence/accommodation | Commercial | Train Station | Railway | Services | Art, Entertainment, Recreation | Bar/Restaurants/cafe | Manufactoring/warehouses | Religious | Landmarks/heritage sites | Research area

Art, Entertainment, Recreation

Building functions

According to the map data, the area around our establishment is characterized by a variety of structures. Notable additions to the landscape include museums, institutional structures such as the ICO Academy, and recreational areas. Further exploration takes us to the historical zone, where architectural treasures create a compelling story into the fabric of our surroundings.

Commercial and general sales

Building functions

While the majority of commercial buildings are located in the historical district, a notable outlier is the expansive commercial complex located behind the train station, according to the map. pleasantly, this complex is only a seven-minute walk away from the Olivetti complex/Industrial area.

Services and offices

Building functions

In comparison to the industrial zone, the historical area, as expected, has a predominantly residential character. As a result, both zones provide a wide range of services to meet the diverse needs of the residents and businesses who coexist in these distinct areas.

Bar/Restaurants/cafe

Building functions

According to the maps, the majority of bars and restaurants align along the bustling main road, Corso Costantino Nigra, as well as in the historical area.
Near the centrale termica you can find several ding spaces such as: restaurant in ICO Academy and one small bar in ULTRASPAZIO and one small cafe in Via Giuseppe di Vittorio.

Religious

Building functions

According to the map data, religious buildings are mostly clustered within the historical district, which includes a cemetery. However, it is notable that a single church is located within the Olivetti Complex and was designed for factory workers.

Manufactoring/warehouses

Building functions

The industrial zone, without a doubt, is distinguished by a higher concentration of manufacturing and warehouse structures, emphasizing its role as a hub for industrial activities. In contrast, the historical zone, which is primarily residential, has almost no manufacturing and warehouse structures except one.

Landmarks/heritage sites

Building functions

Although Olivetti complex is one of the unesco heritages but here it's the buildings as a heritage which one 2 of the most important historical landmark of olivetti complex are Fabbrica Mattoni Rossi (red bricks factory), the first factory of olivetti, and Unita Residenziale Ovest - Talponia. in the historical area, Castello Sabaudo di Ivrea, The La Serra Complex, and Roman Amphitheatre.

HISTORICAL TIMELINE

Olivetti Complext

1896

1. The company 'C. Olivetti & C.' is founded in Ivrea for the production and trade of electrical measuring instruments by Camillo Olivetti.

1903

The production moves to Milan.

1908

Fabbrica Mattoni Rossi

2. Camillo Olivetti returns to Ivrea and founds the 'first national typewriter factory' in the 'Red Bricks Factory.

1911

3. The M1 model, the first prototype of a typewriter, is presented at the World Expo

1932

4. Adriano Olivetti becomes the general manager of the Olivetti company

1934-1942

ICO Expansion.

7.

1938

5. First proposals for **urban regeneration** of the Ivrea are put forward. The task is entrusted to Figini, who forms a design group consisting of Egisippo Devoti & Luigi Piccinatto.

6.

1938

8. First construction of Centrale termica by Eduardo Vittoria

1958

Expansion and Modernization of centrale termica:

9. To increase its capacity and efficiency in response to increased energy demands and technological advancements.

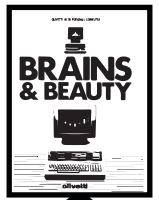
1960

4. Adriano Olivetti died

1962

10. Roberto Olivetti becomes the new CEO of the company

1978



11. The decline of typewriter production and changes in Olivetti's industrial focus might have resulted in alterations to the operations or usage of the power station. The company shifted its focus to newer technologies like computers and office equipment.

2003

Building Abanoned

As they adopted independent sources of electricity, the necessity for a centralized thermal power plant decreased. As a result, the thermal power plant was eventually shut down.

12.

2008

13. Olivetti celebrates its centenary since its foundation. The process of candidacy begins to include the city of Ivrea in the **UNESCO** World Heritage List.

2018

14. The city of Ivrea becomes a **UNESCO** heritage site under the name **'Ivrea, industrial city of the 20th century'**

Peroni, M. and Cecchetti, R. (2012) Adriano Olivetti: Un Secolo Troppo Presto. Padova: BeccoGiallo.

Table of Figures

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04

Design Proposal: Shifting Function, Enhancing Form

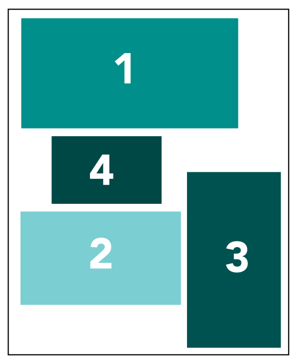
Centrale Termica

The Central Termica, a magnificent reminder of the city's industrial past, is located in the center of Ivrea, a city in Metropolitan of Torino, Italy. It was once a functioning power plant, but it is now silent and abandoned, with its machinery rendered defunct by more recent technological advances.

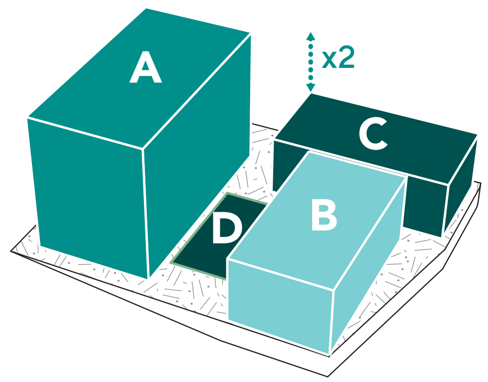
However, behind this silent safeguarding of the past lies a unique opportunity and potential for revitalizing its legacy. My proposal seeks to transform Central Termica into a vibrant Music Center by incorporating its physical shell and very core into the fabric of a revitalized environment.

Each location had a unique set of energy-producing machinery that was designed for internal plant movements and heat loss. The boilers were housed in the double-height block visible from the exterior, while the turbines and compressors were located in two blocks situated above the ground floor. From the outside, the Olivetti Technical Office has found that the other technical buildings for production design by Vittoria in Ivrea have served as valuable design models over time. There is an opal glazed wall on the upper and lower portions, and the base areas' three-part glazed facades let in an abundant amount of light.

The building's curtain walls were initially constructed from hand-painted enameled tiles, subsequently painted in terracotta, red clinker, and blue for the boiler room area and central block, respectively. Similar to the podium-level building's border cornice cement sections, a continuous flower box is covered in ceramic tiles. The elegant covering materials, bright colors, the arrangement of basic modular systems, and the flower box all contribute to an understanding of Vittoria's comprehensive examination of industrial architecture aspects, which in Ivrea produced designs very different from the practical architecture of the 1920s. From 1959 until 2003, the plant operated continuously until it was replaced by a new cogeneration facility. since 2003, the building has been abandoned.

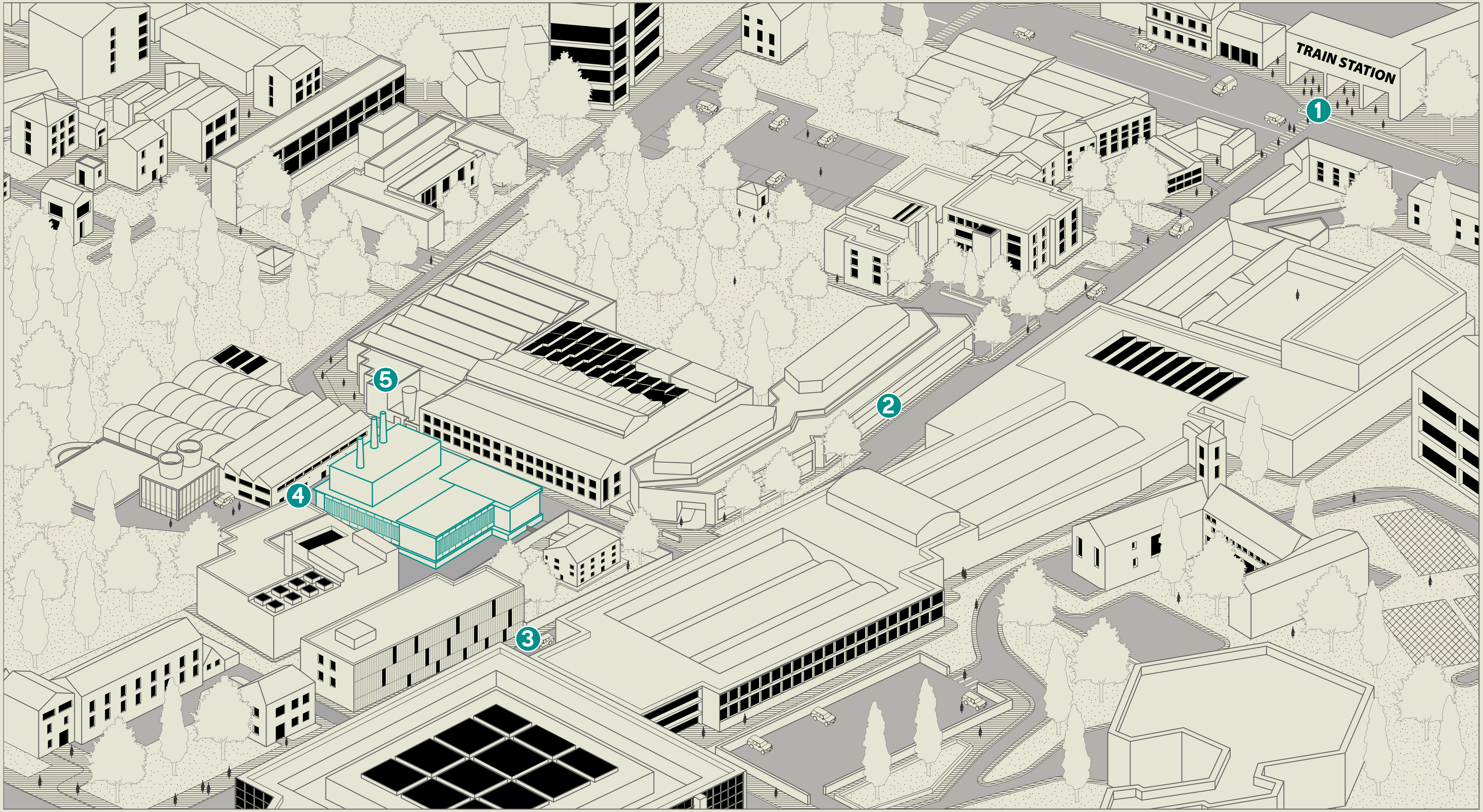


1: 452 m^2, 6780 m^3
2: 295 m^2, 2212.5 m^3
3: 290,6 m^2, 2179.5 m^3
4: 191 m^2
Total Area: 1860 m^2



Former Functions

A: three 30 MW Breda boilers
B: Brown Boveri turbines capable of producing around 6,000 kW/h.
C: The Pressers
D: Open patio



Neighborhood Axonometric

1. View Toward Via Jervis

Photo By: The Author

2. OLI - Adriano Olivetti Leadership Institute

3. ICO Academy

Photos By: The Author

4. View Toward Via Giuseppe di Vittorio

5. View Toward ICO Academy

Top View of Centrale Termica

Moore, T. (no date) Centrale Termoelettrica Olivetti a Ivrea - Eduardo Vittoria, MAMIvrea.it. Available at: https://www.mamivrea.it/collezione/edifici/centrale_termoelettrica.php (Accessed: 18 February 2024).

Photo By: Federico Covre

Photo By: The Author

Photo By: The Author

Photo By: The Author

Photo By: The Author

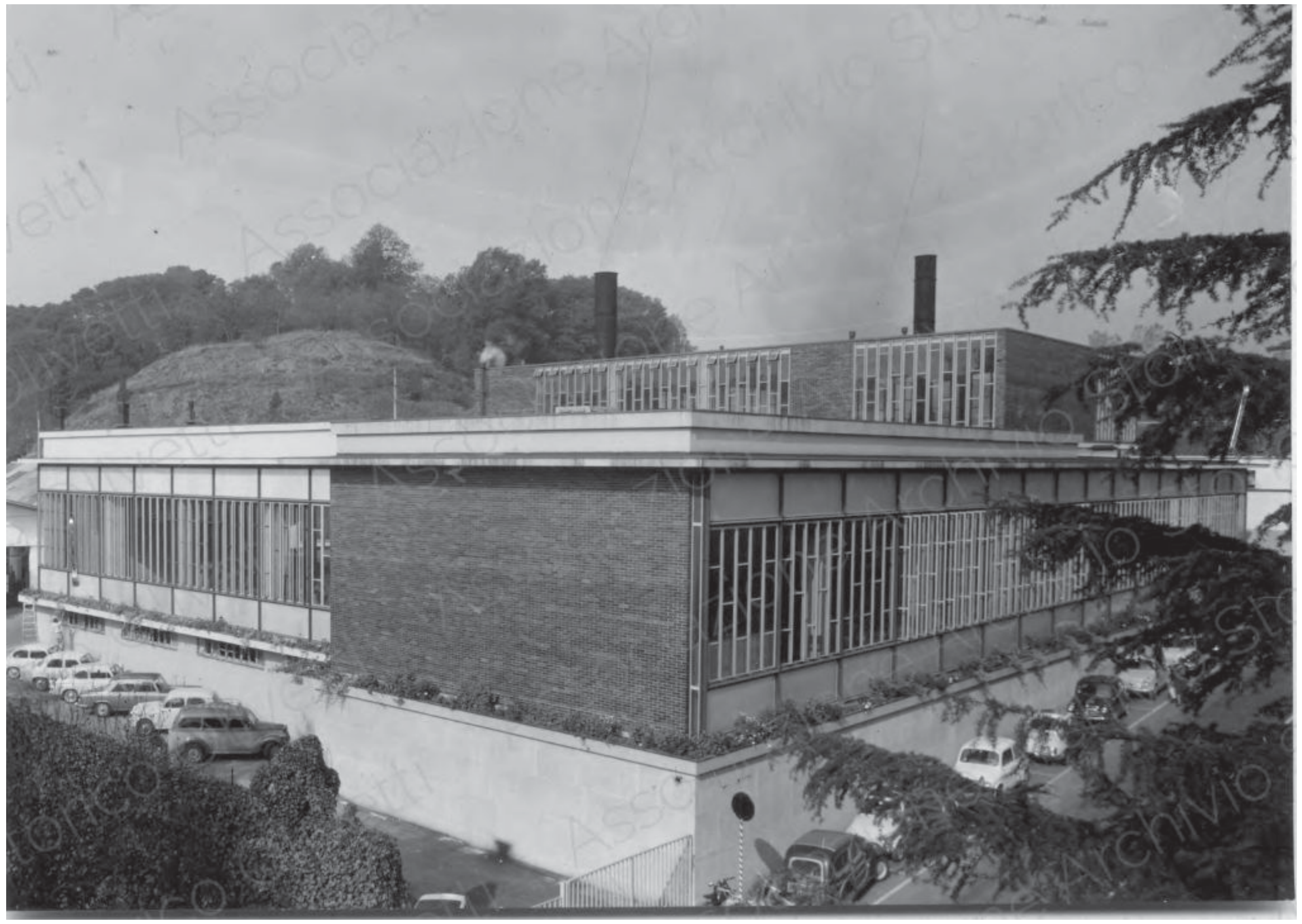
Photo By: The Author

Photo By: The Author

Photo By: The Author

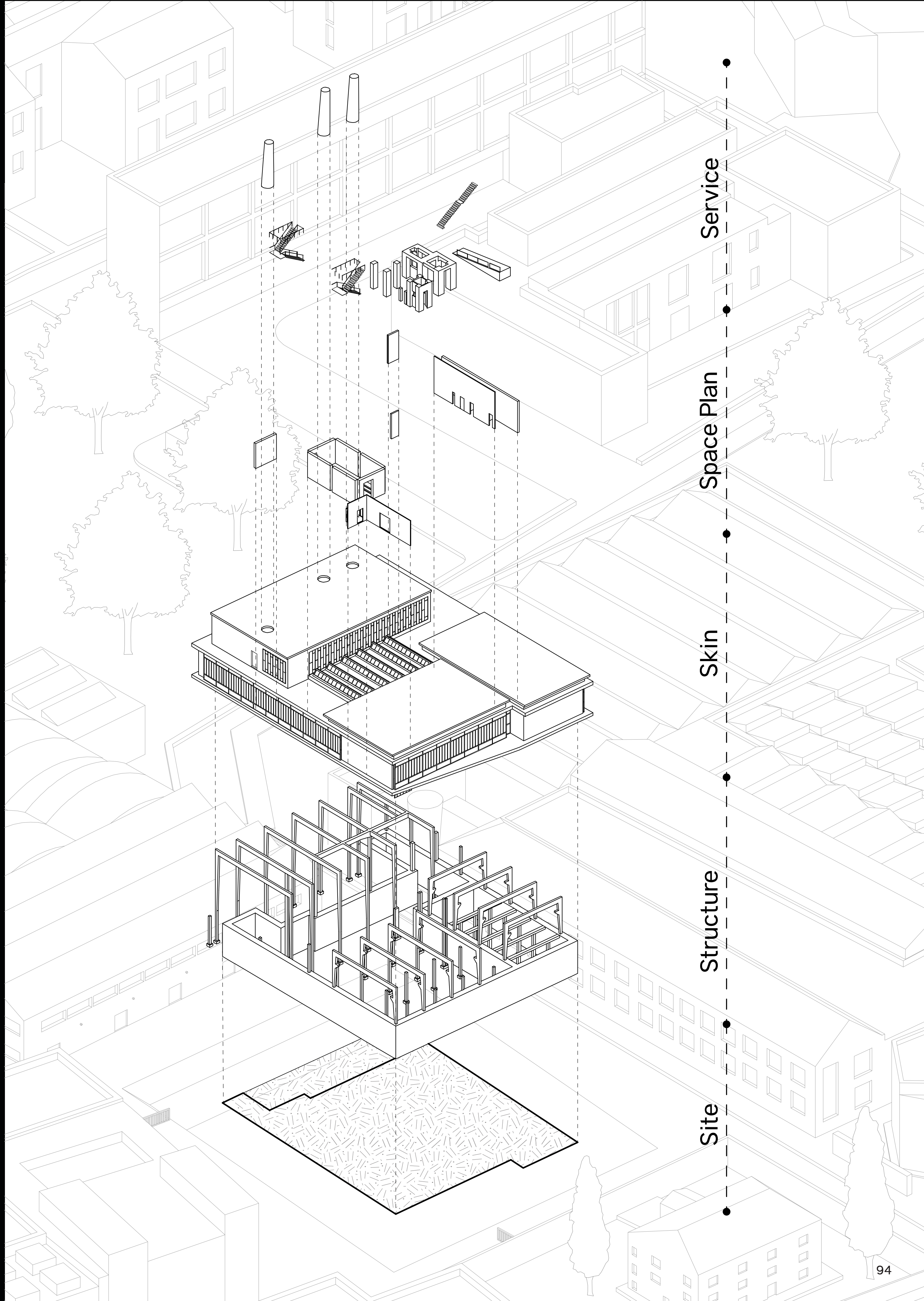
Existing

Archivio Storico Olivetti. Available at: https://archividigitaliolivetti.archiviostoricolivetti.it/ricerca/?keywords=centrale+termica+ivrea+ (Accessed: 25 July 2023).

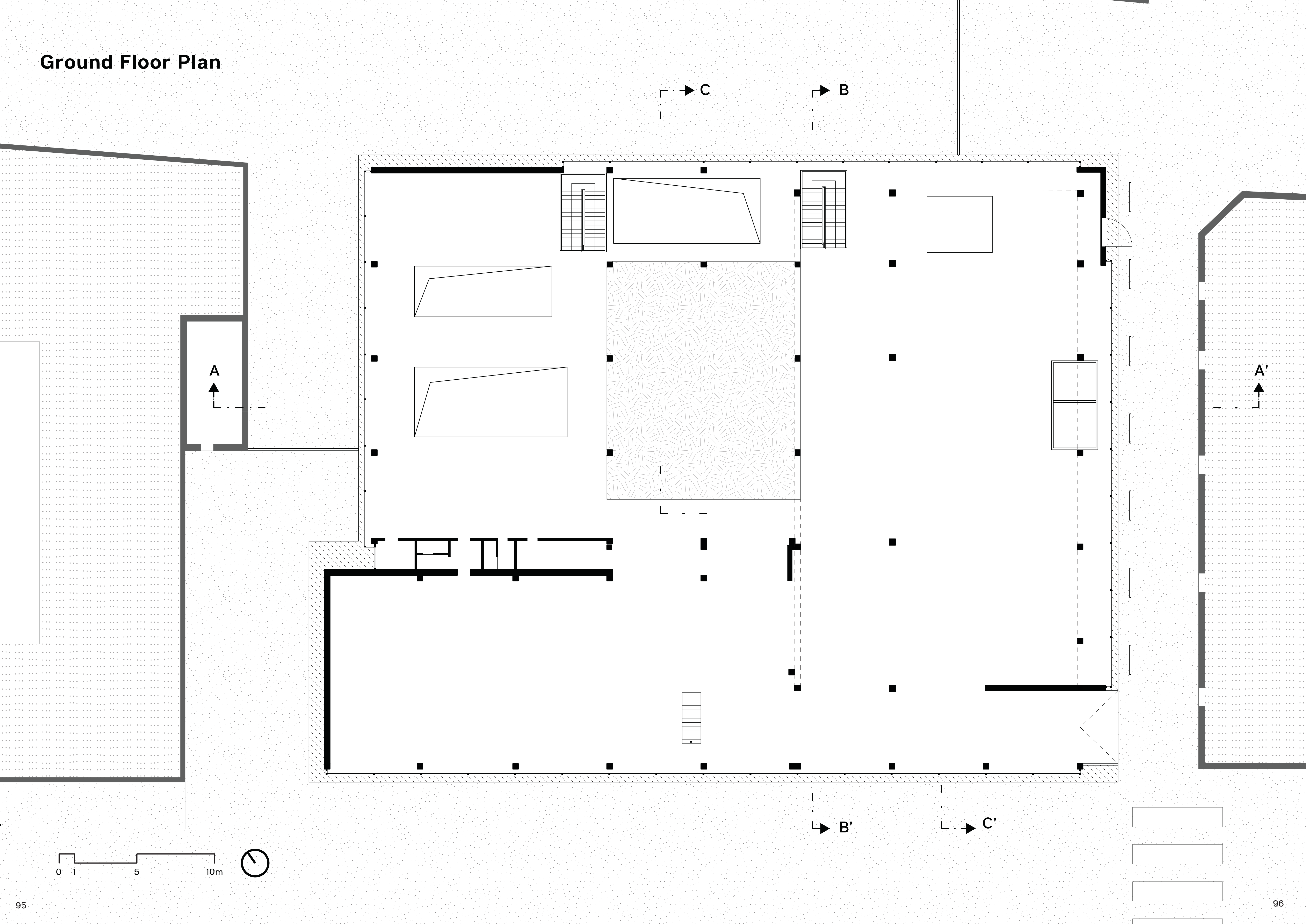


Archivio Storico Olivetti. Available at: https://archividigitaliolivetti.archiviostoricolivetti.it/ricerca/?keywords=centrale+termica+ivrea+ (Accessed: 25 July 2023).

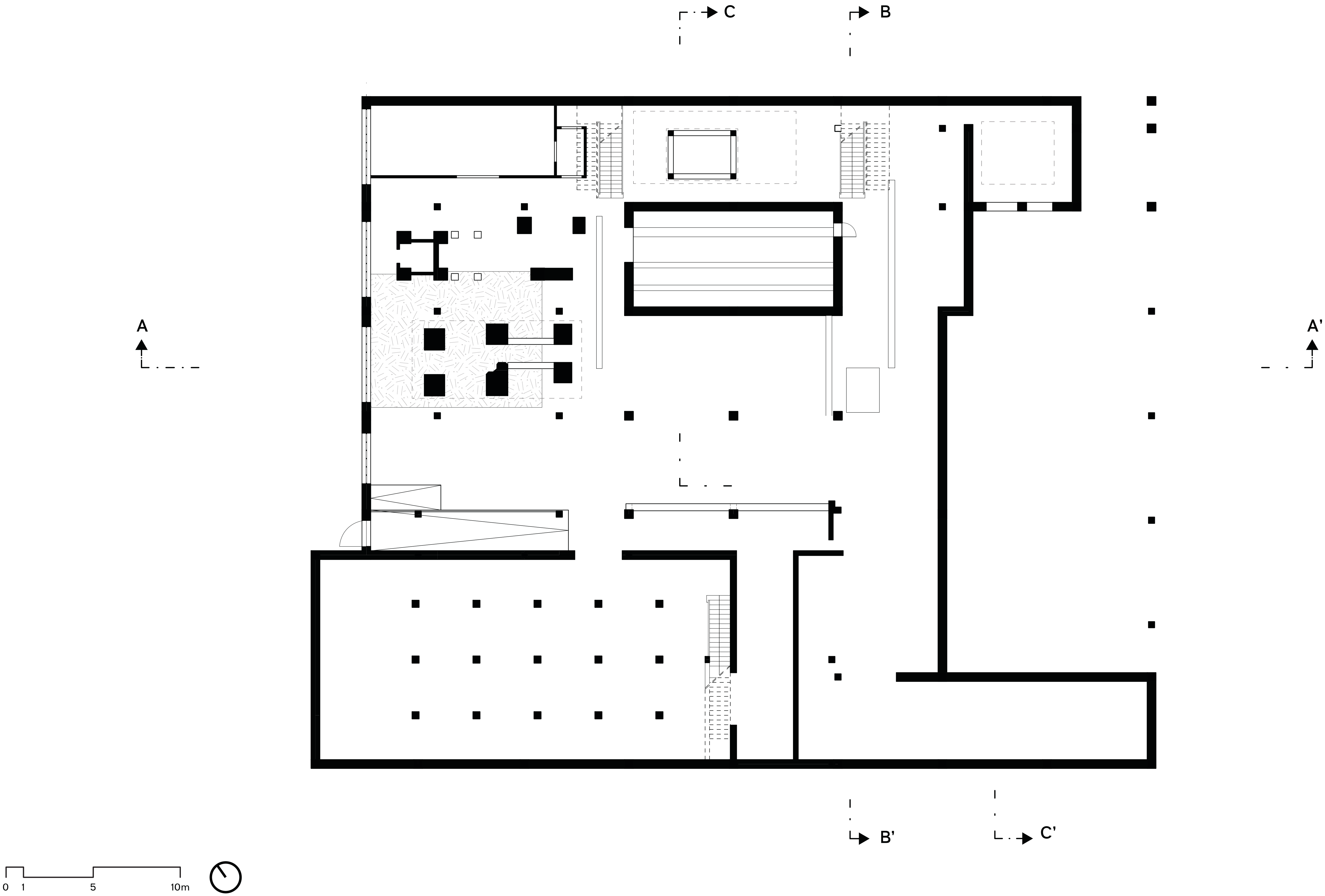
Shear Layers



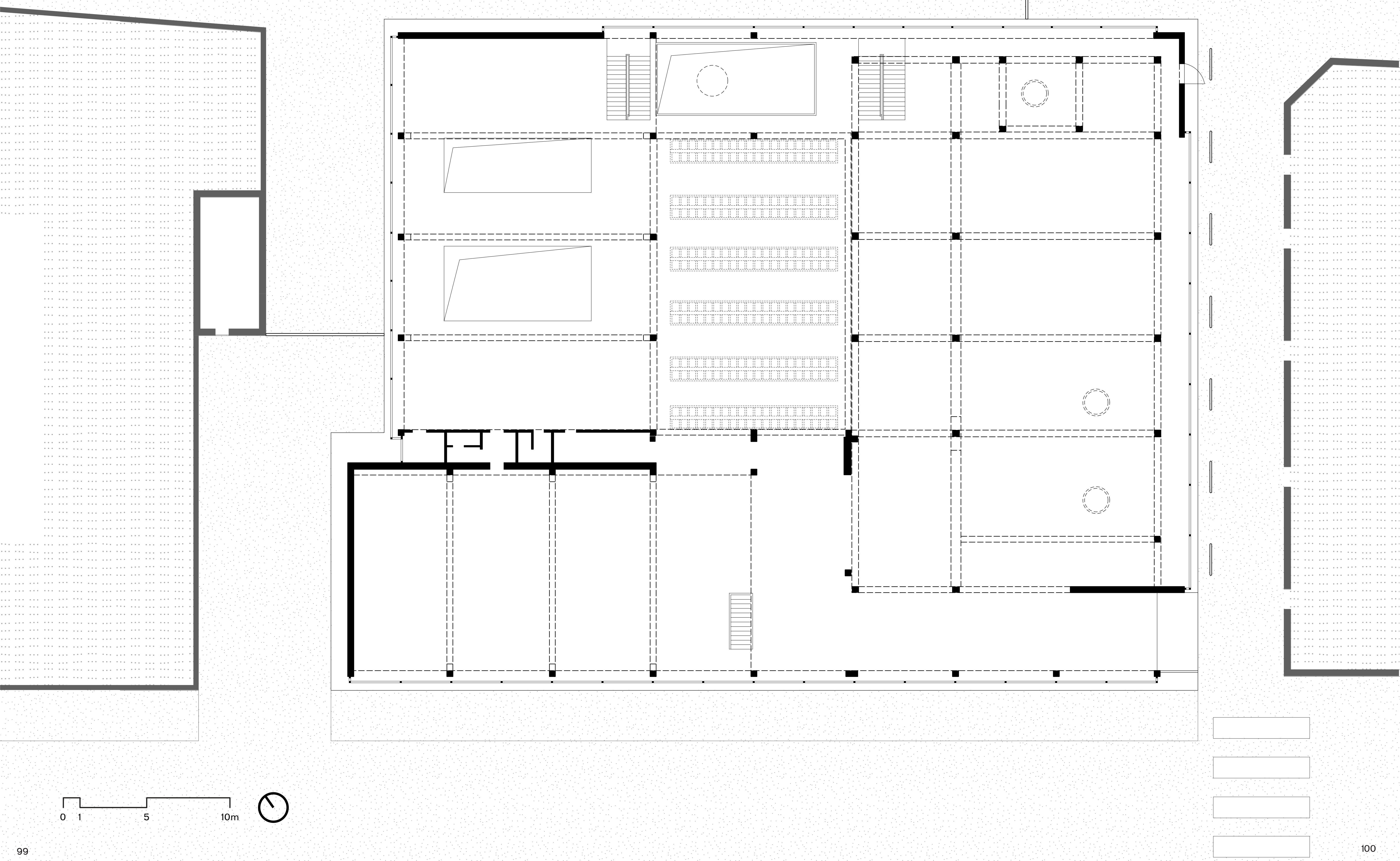
Ground Floor Plan



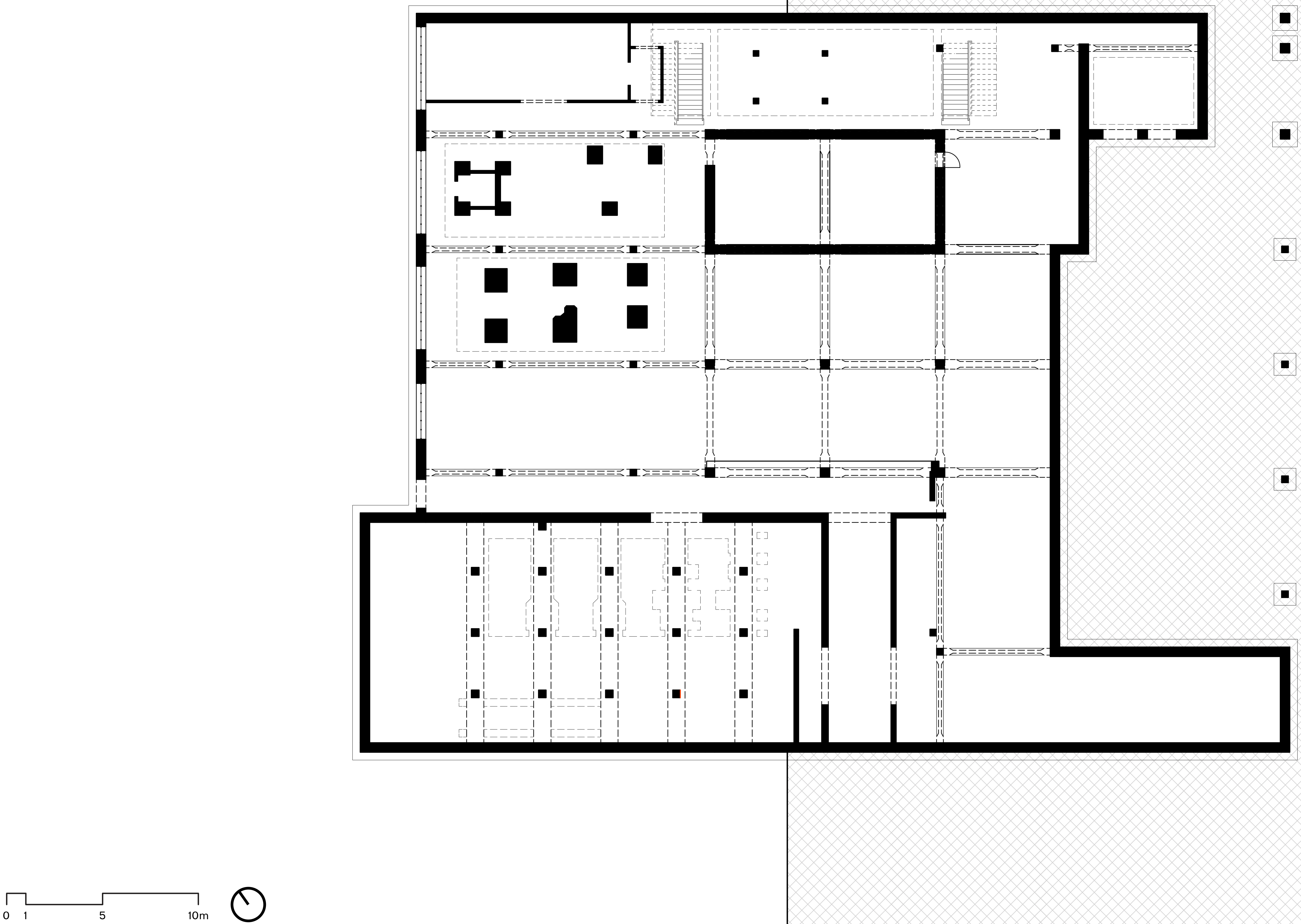
Basement Floor Plan

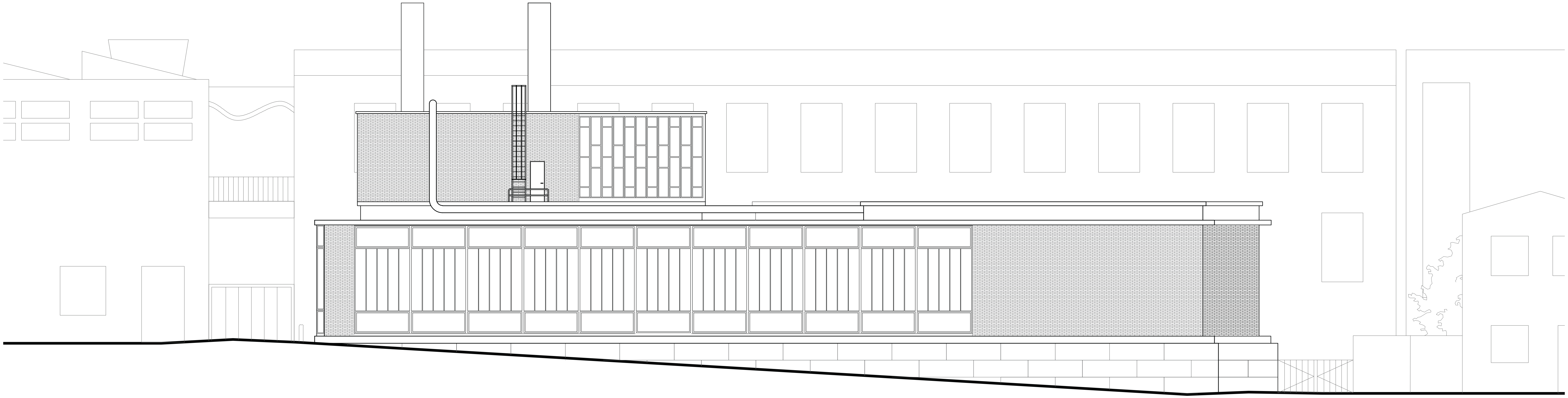


Ceiling Plan
Ground Floor

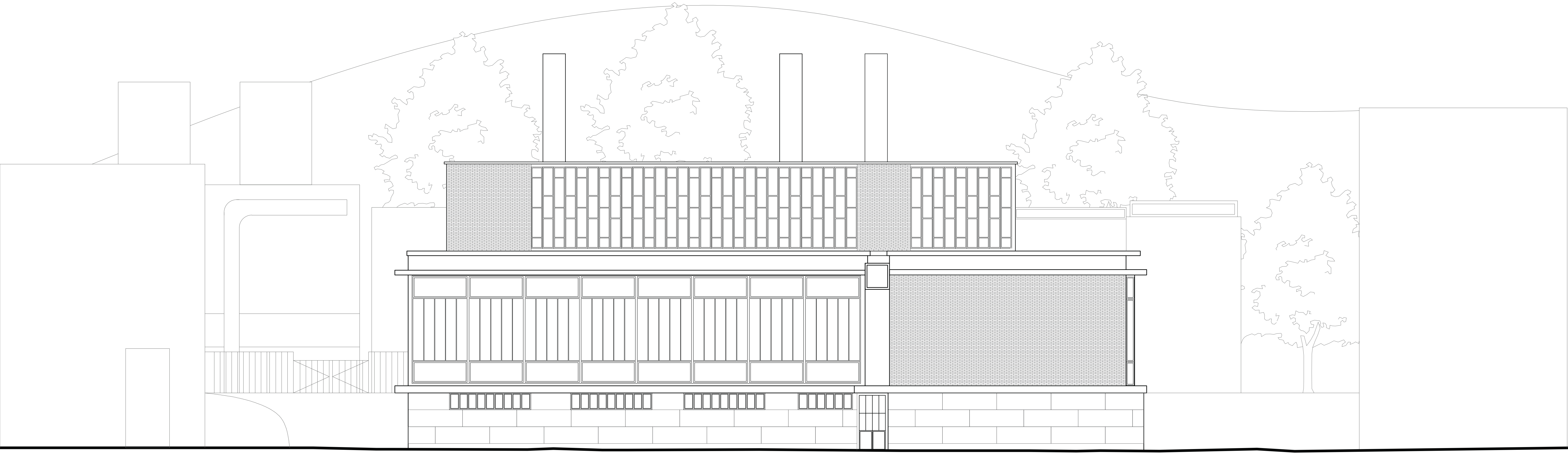


Ceiling Plan
Basement

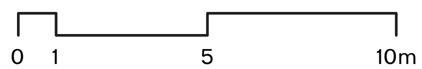


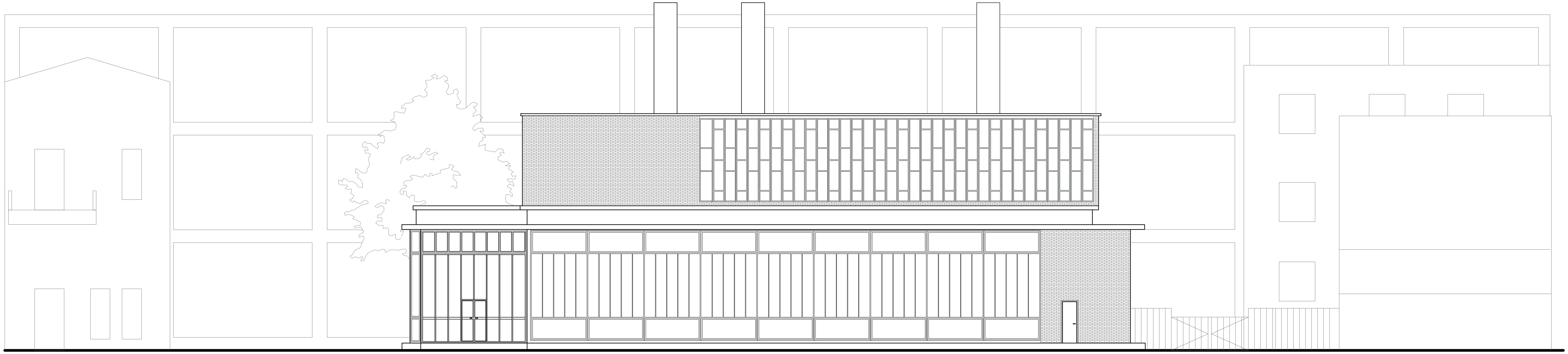


South west facade

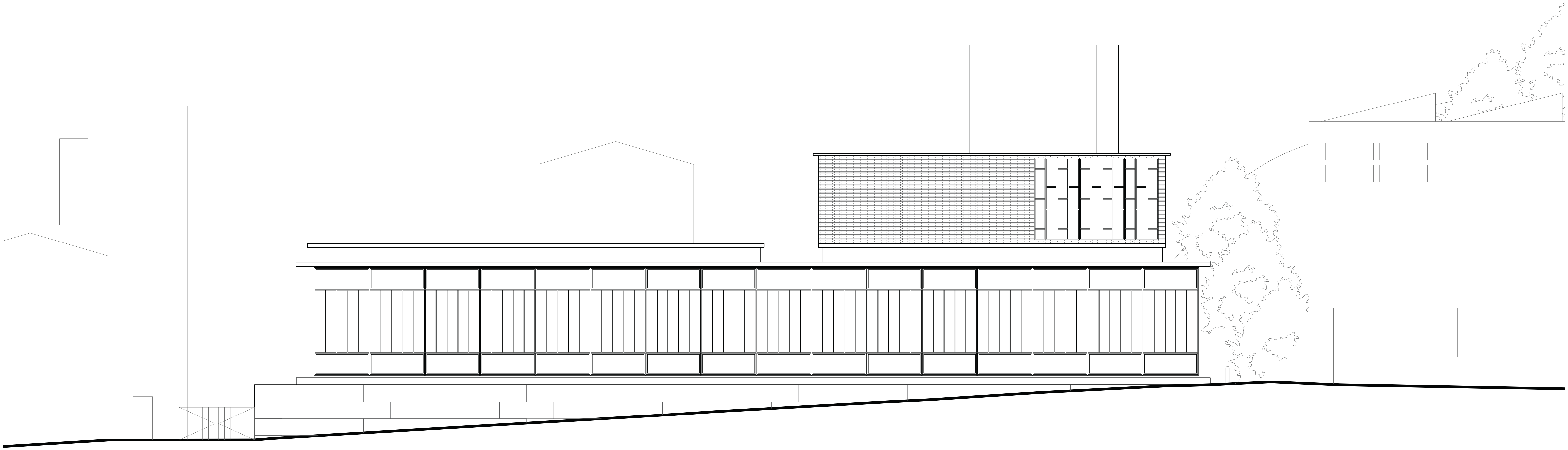


South east facade

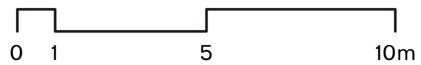




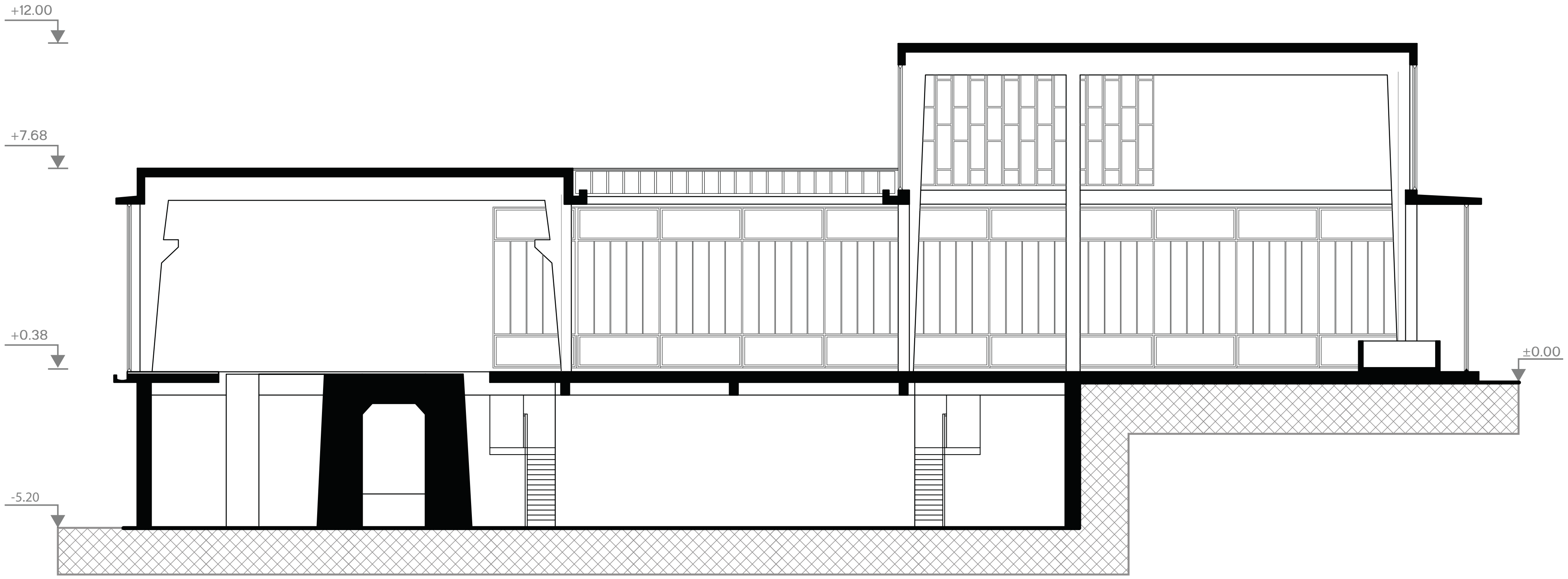
North west facade



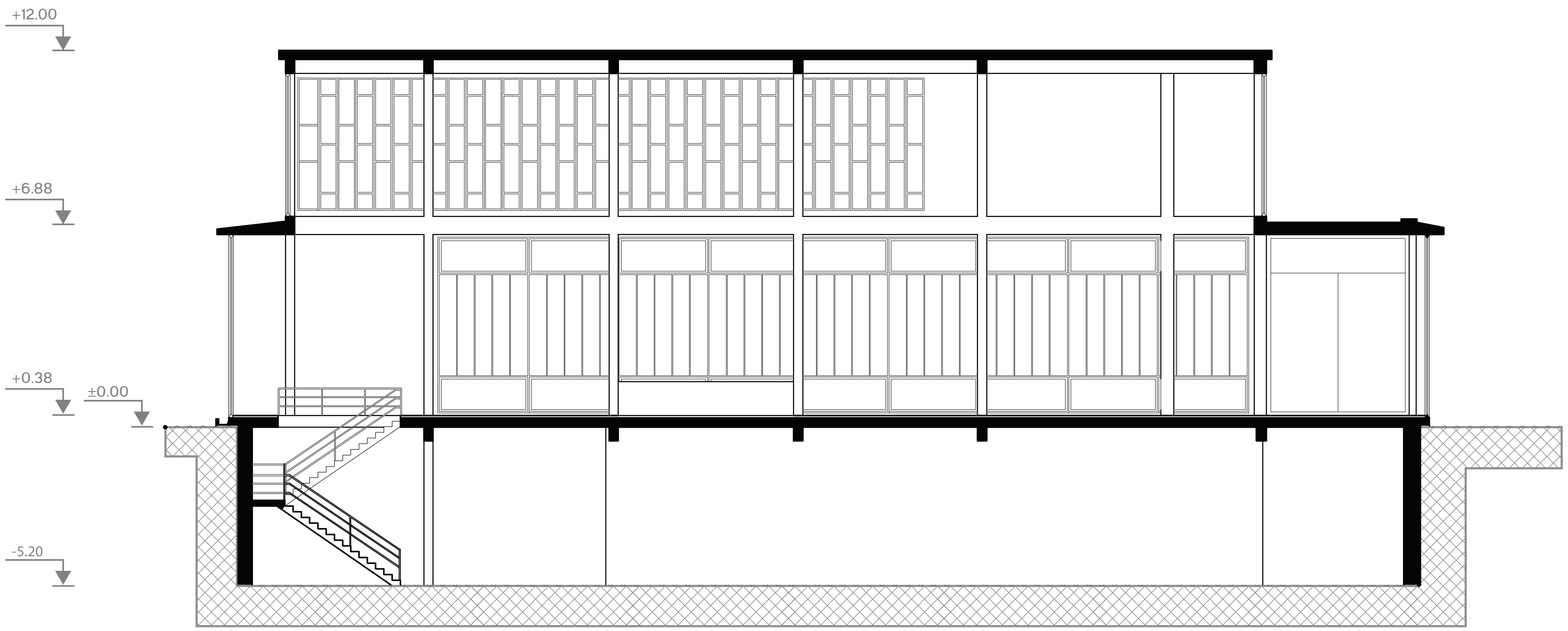
North east facade

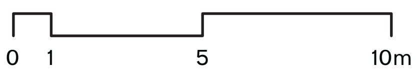


Section A_A'

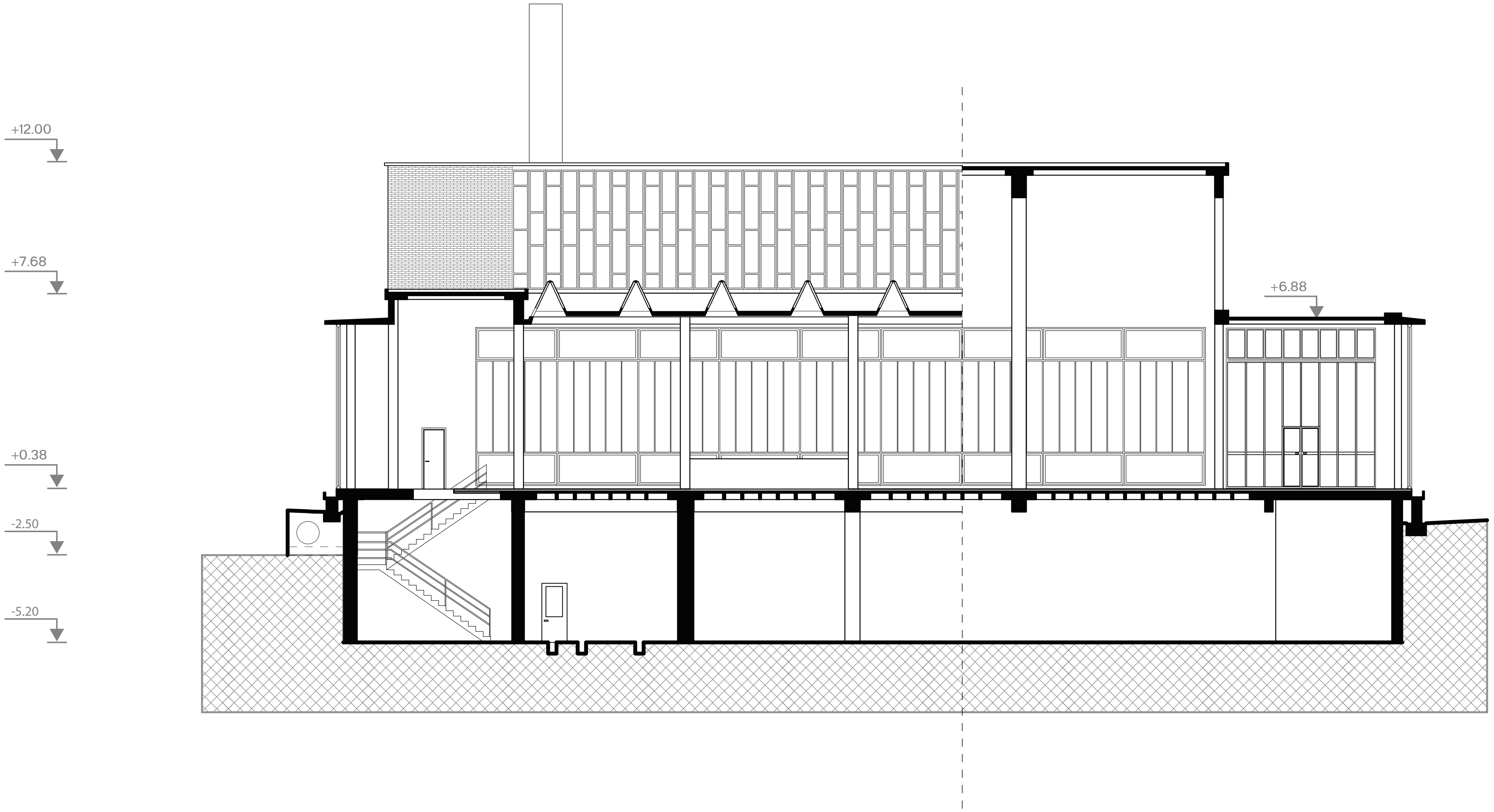


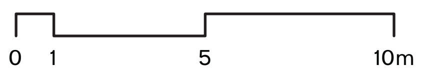
Section B_B'

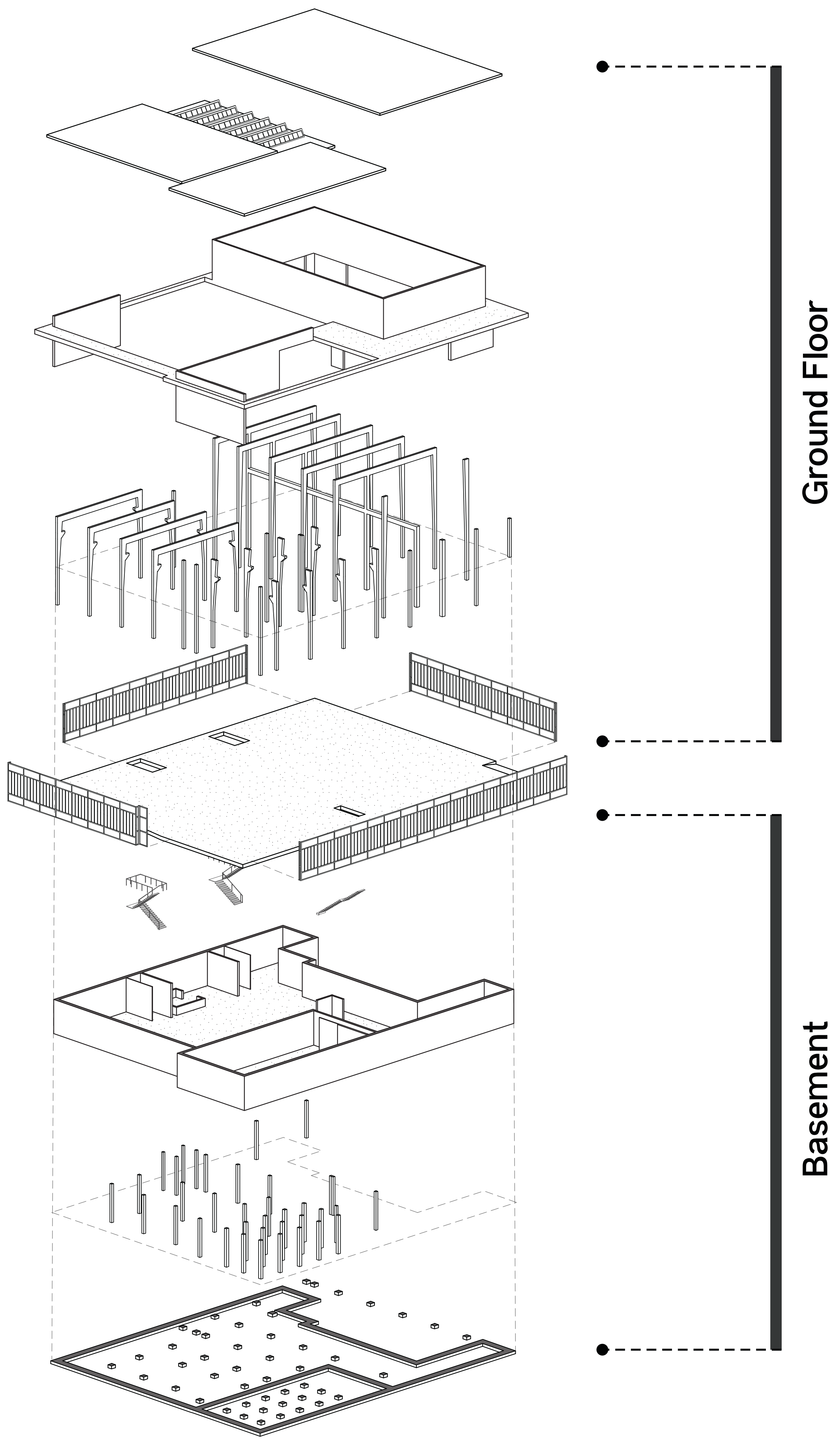




Section C_C'



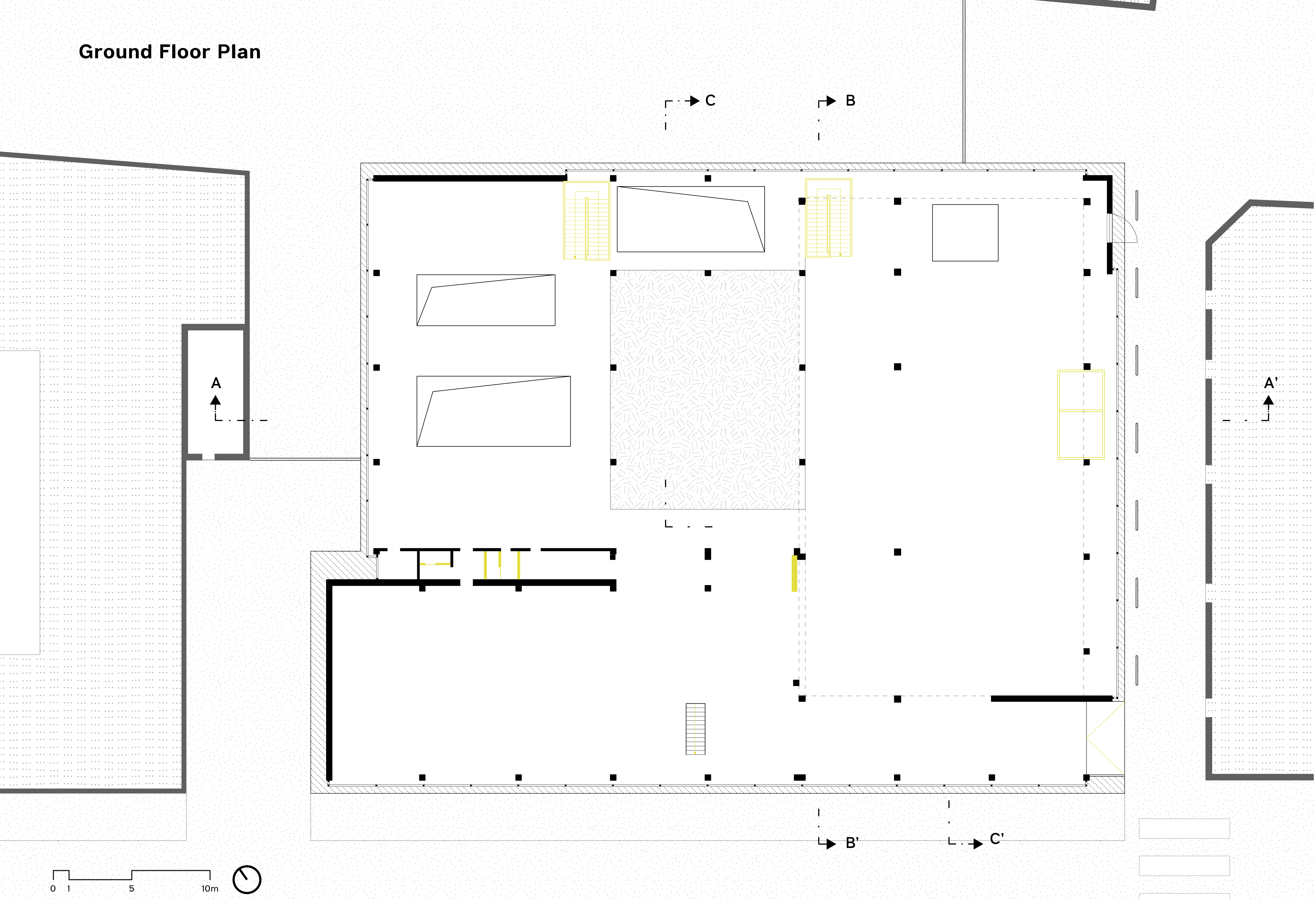




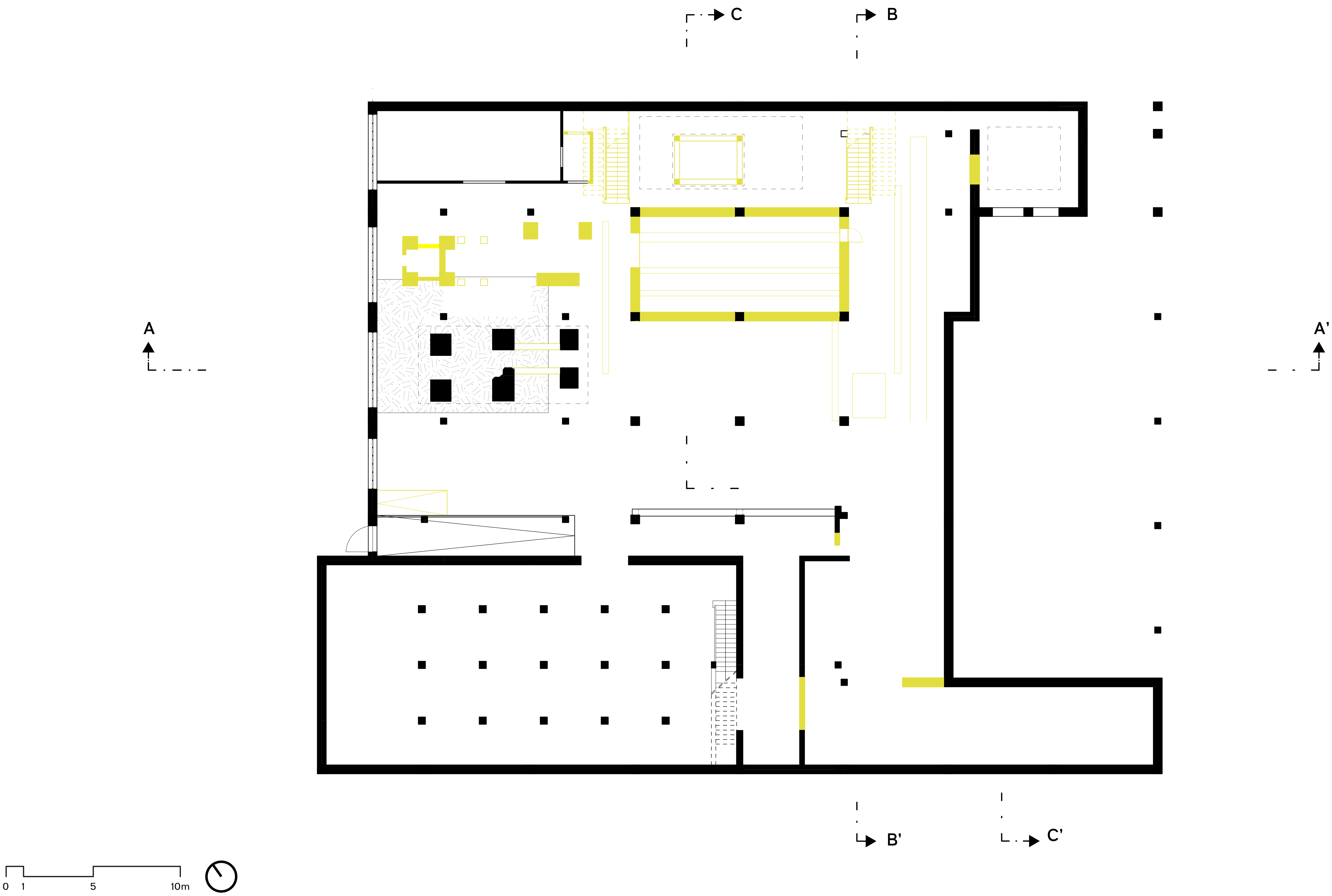
Exploded Axonometry

Demolition

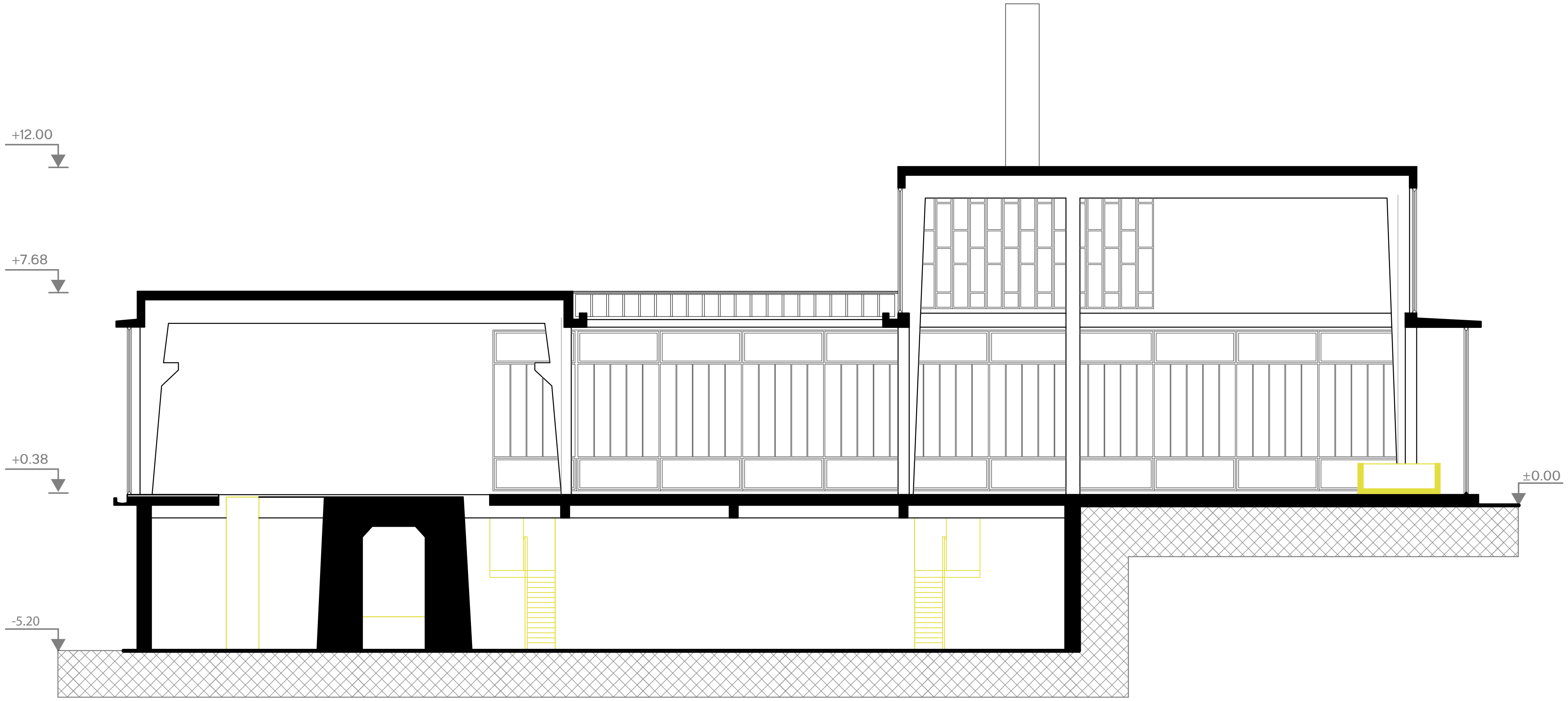
Ground Floor Plan



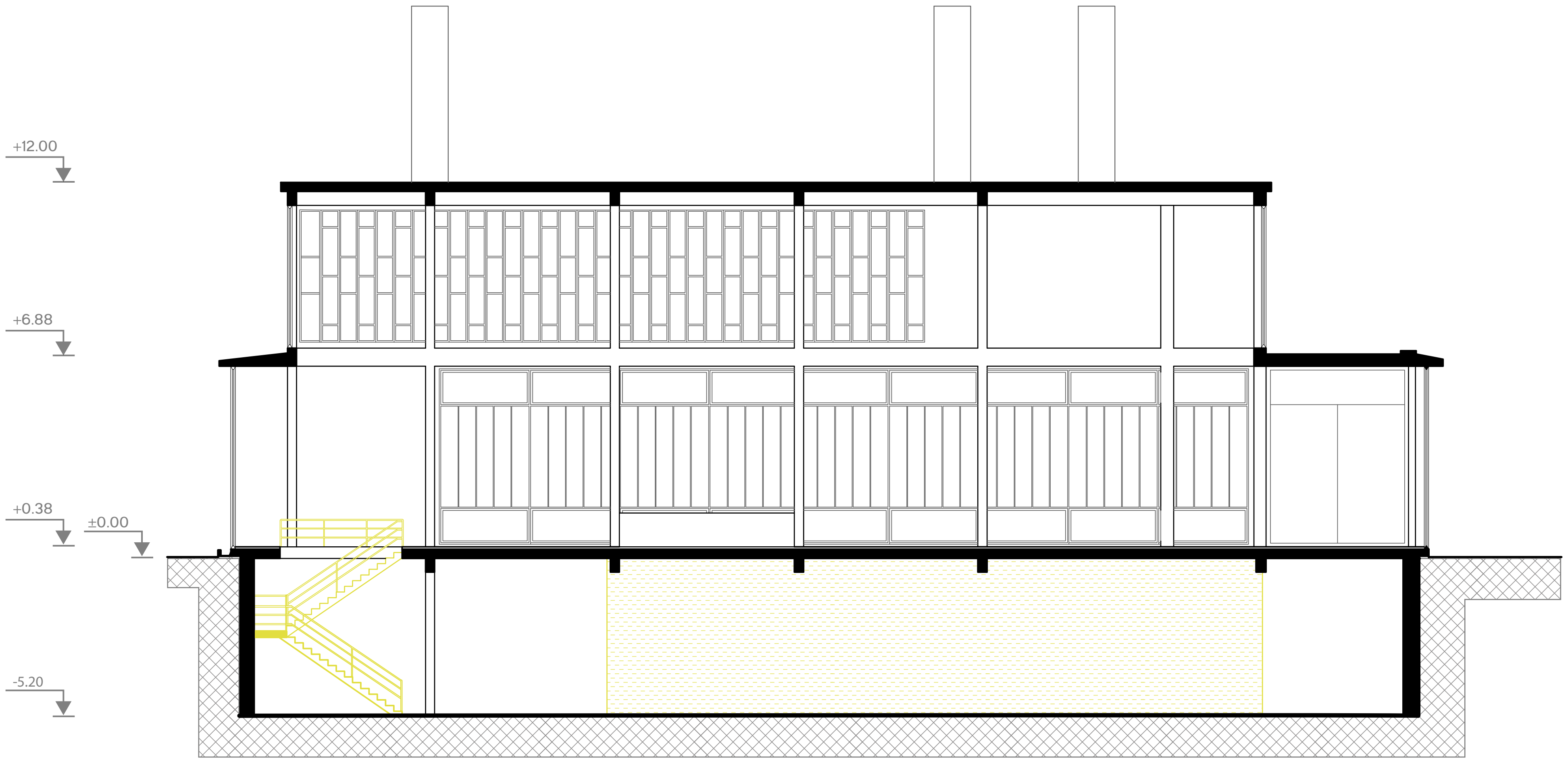
Basement Floor Plan

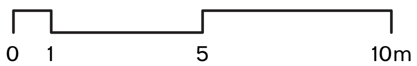


Section A_A'

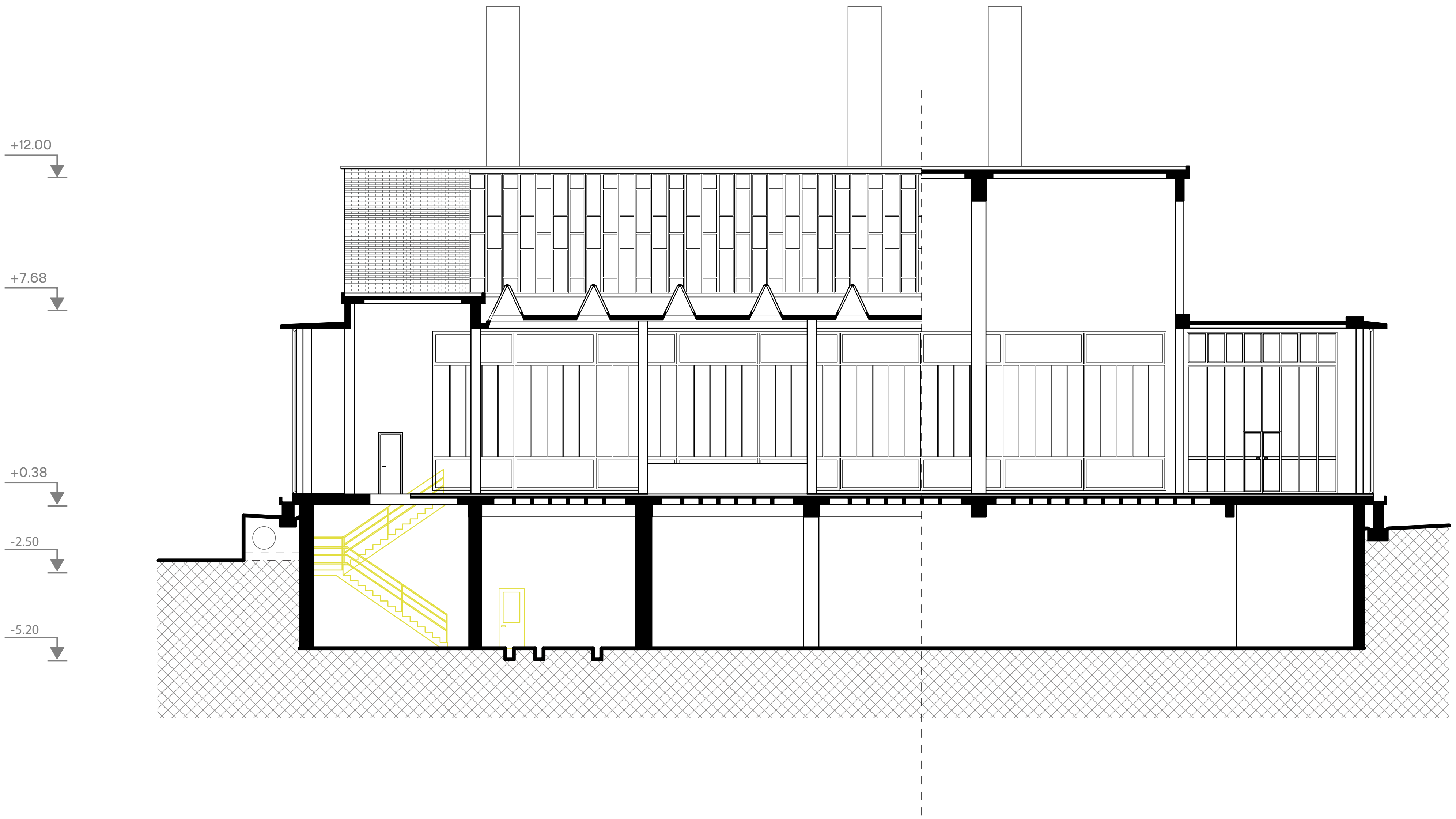


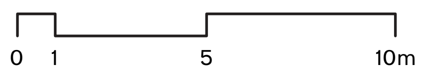
Section B_B'





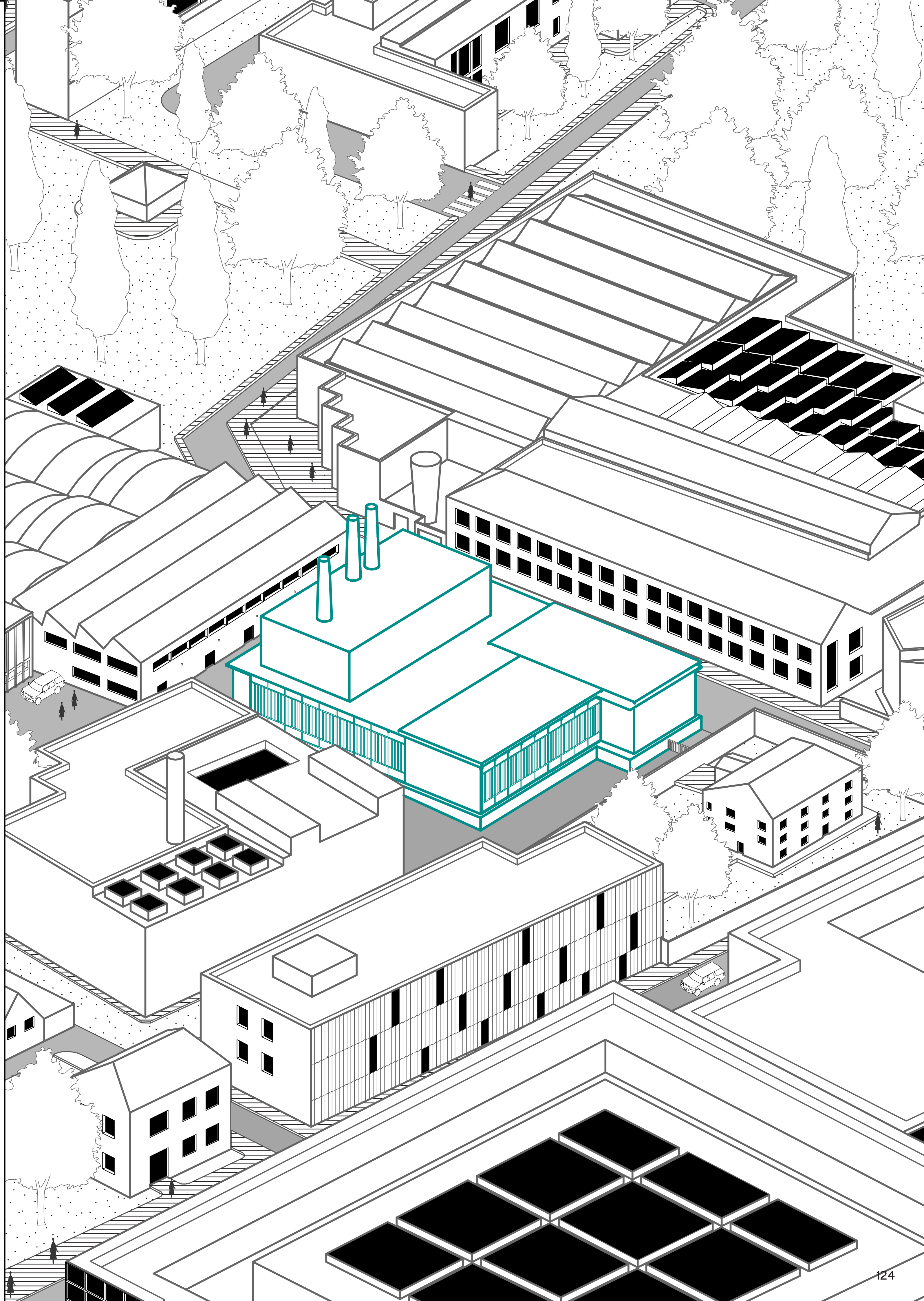
Section C_C'





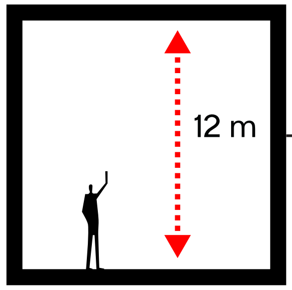
Potential + New Use

The concept of *potential* emerges as a commonly used term in this literature, and yet its univocal meaning is questionable. Evidence suggests that the amount of *potential* is among the most important factors for design within the existing buildings. Although the term potential varies in the literature, there appears to be some agreement among the adaptive reuse field that *potential* refers to the 'unexpressed transformability'. (Elena, Guidetti,2022)

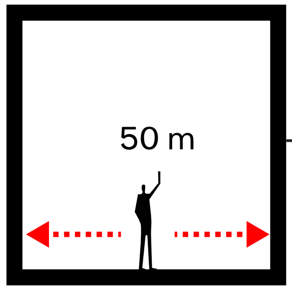


Potentials

Structural Adaptation



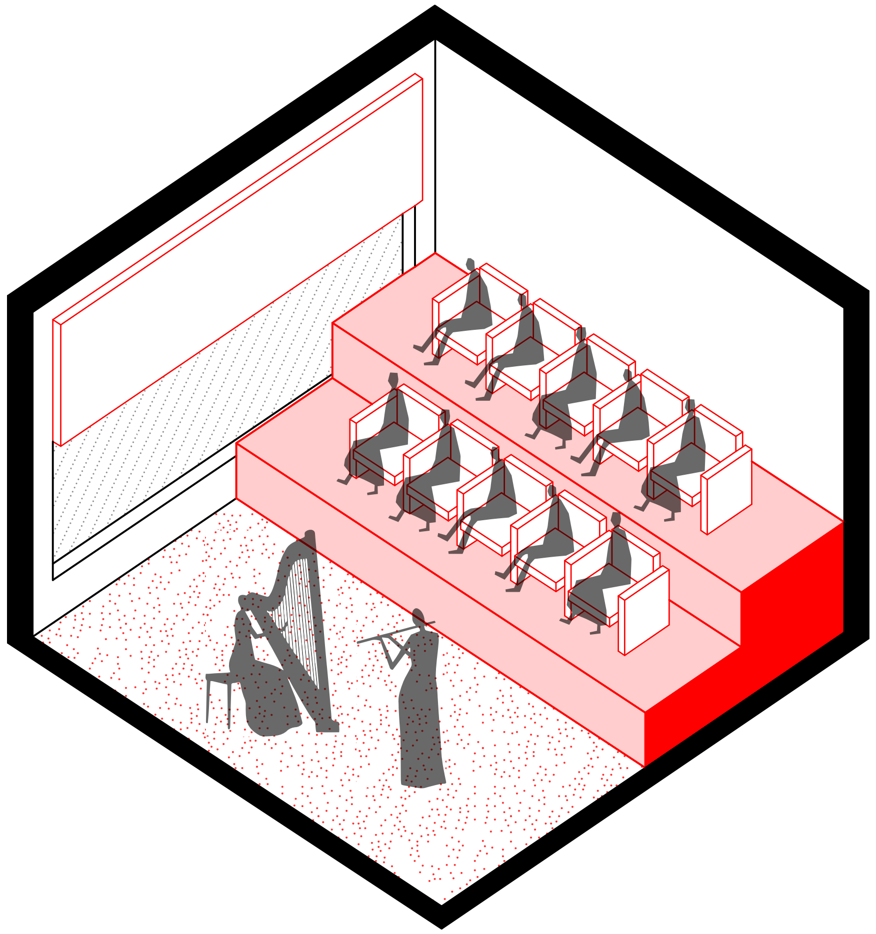
High Ceiling



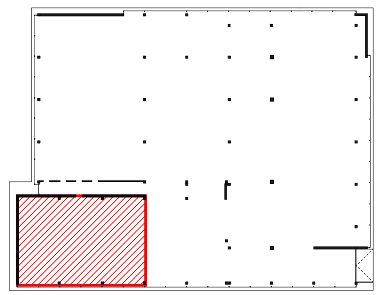
Spatial Vastness

Acoustic Considerations

Design Strategies



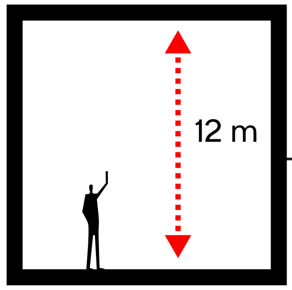
Amphitheatre



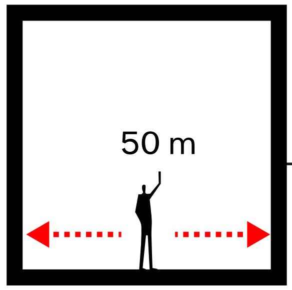
Key plan
Ground Floor

Potentials

Structural Adaptation

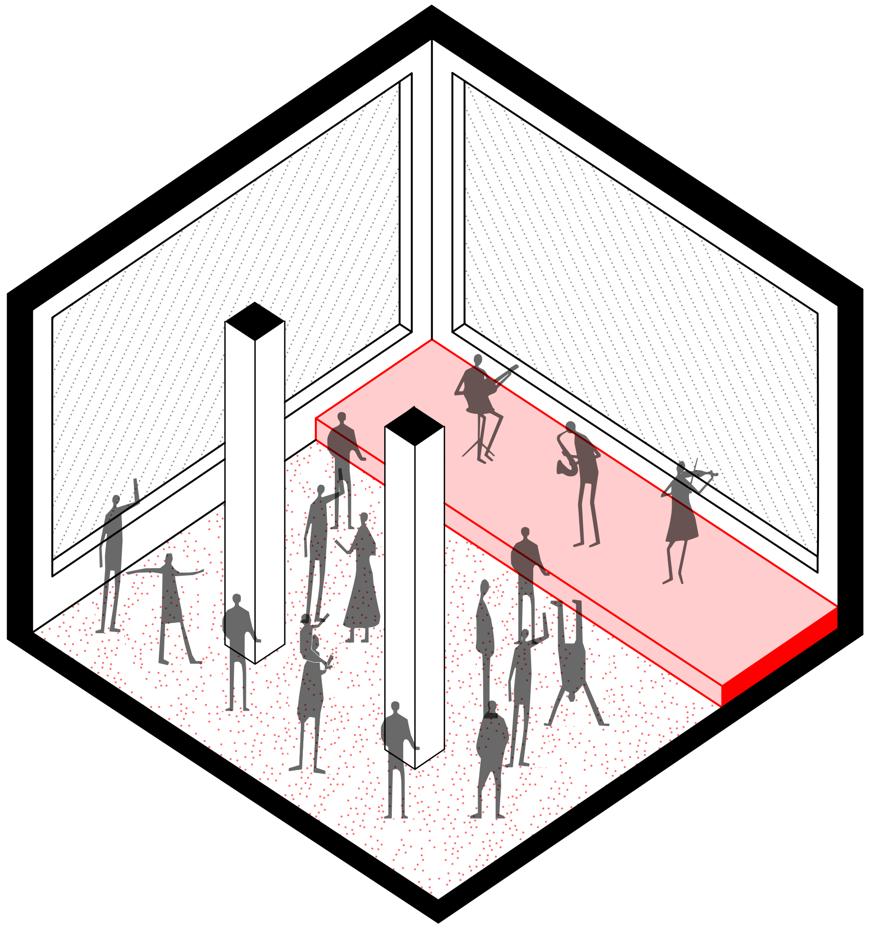


High Ceiling

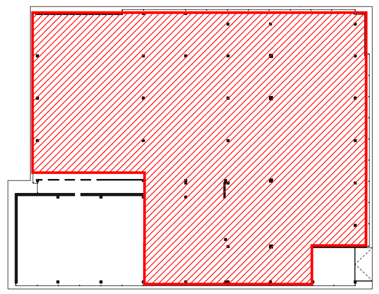


Spatial Vastness

Design Strategies

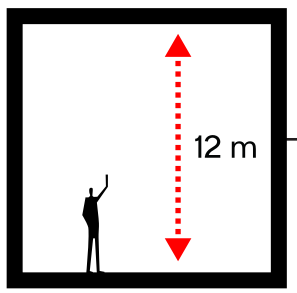


Night Club/Concert Hall



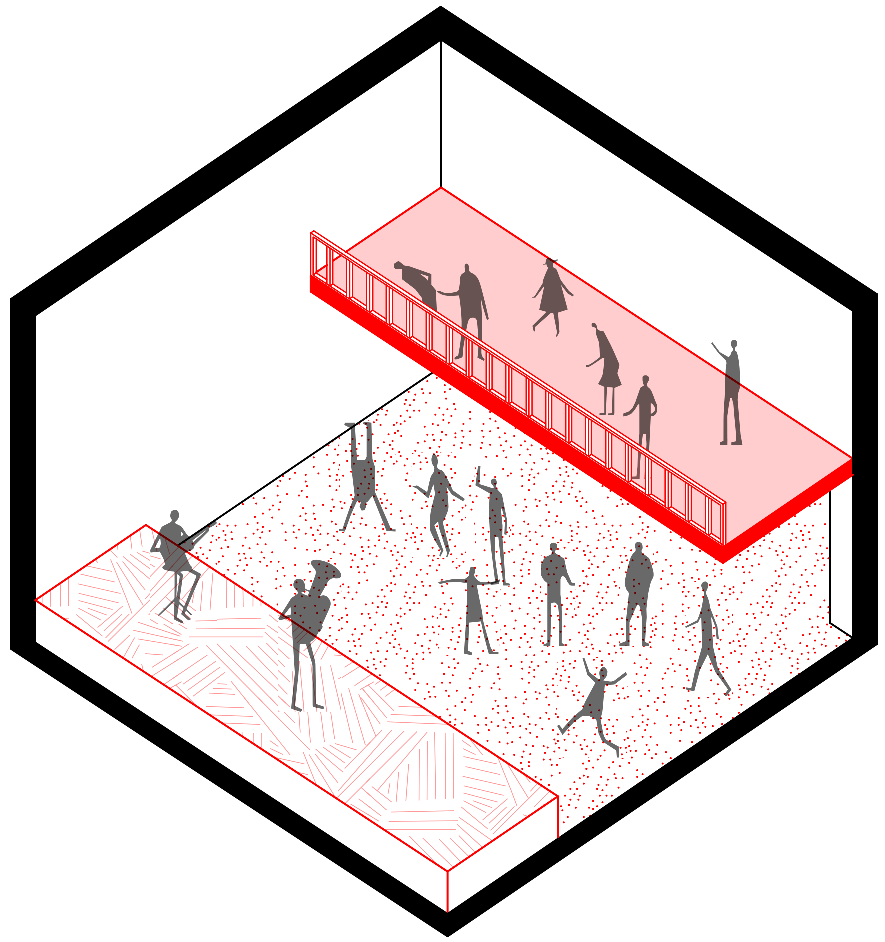
Key plan
Ground Floor

Potentials

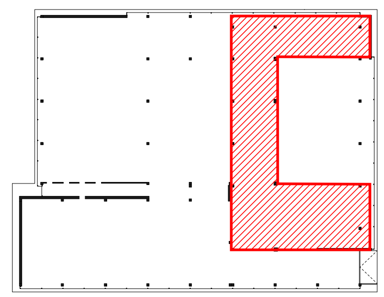


High Ceiling

Design Strategies

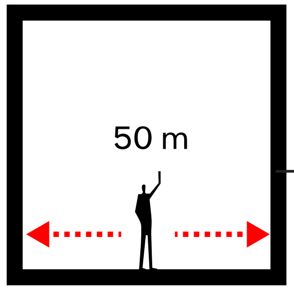


Mezzanine/connection to the roof



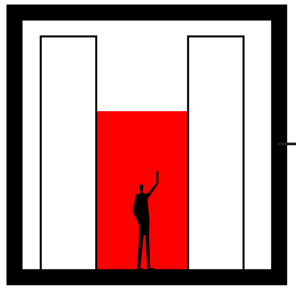
Key plan
Ground Floor

Potentials



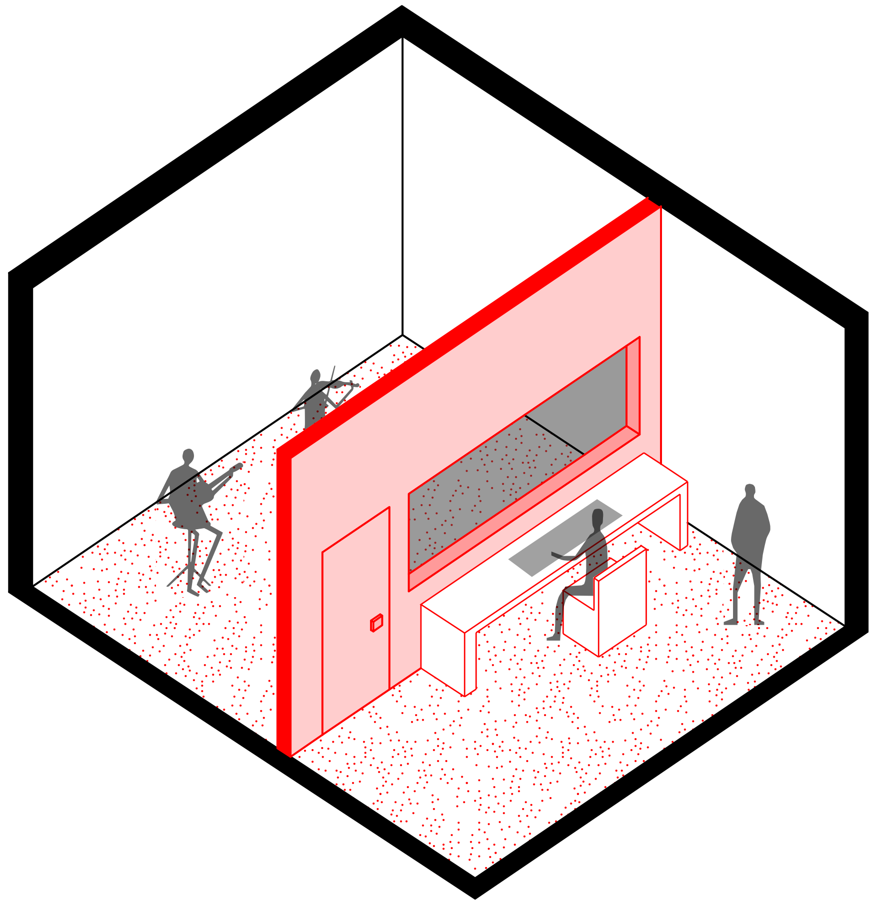
Spatial Vastness

Acoustic Considerations

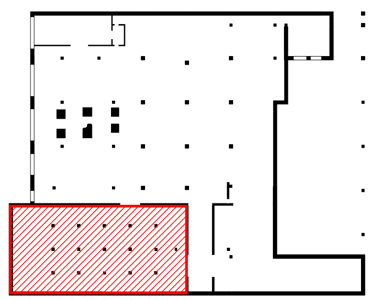


Columned Room for Better Contribution

Design Strategies

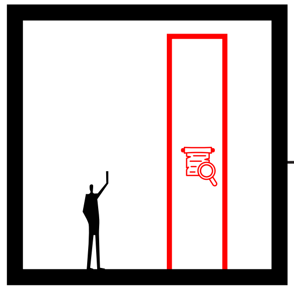


Recording Room

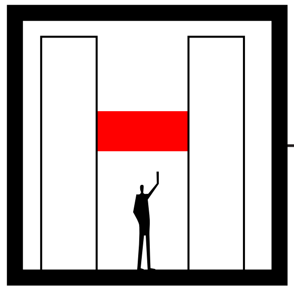


Key plan
Basement

Potentials

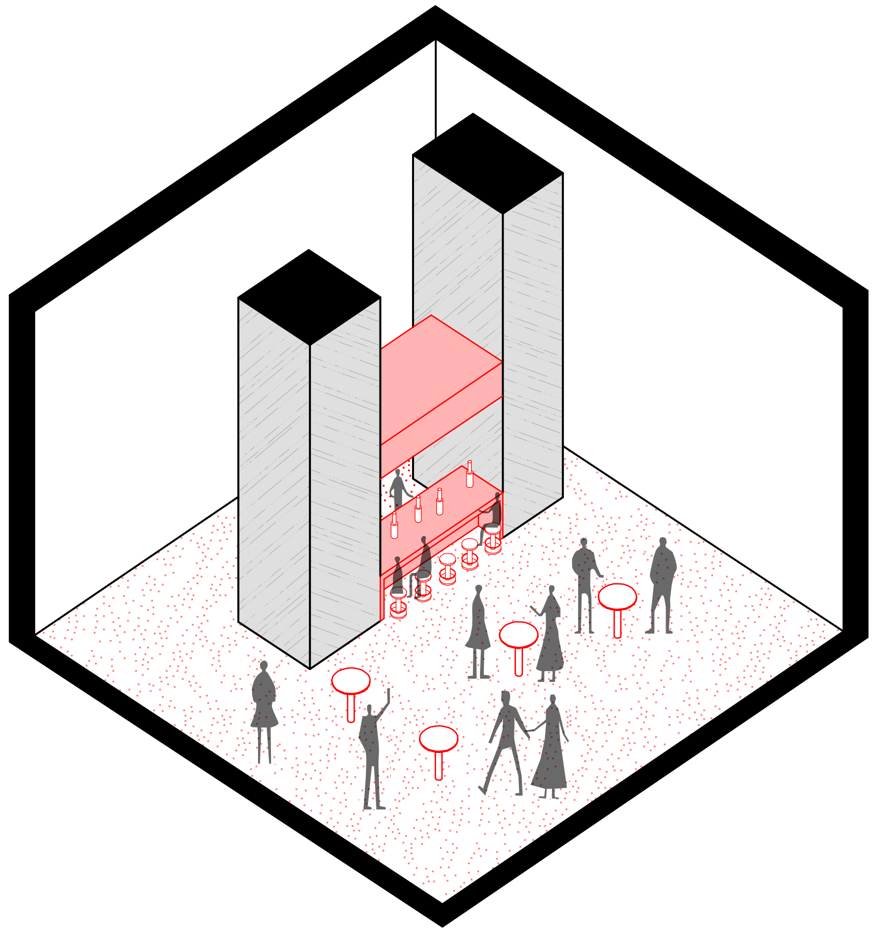


Historical narrative

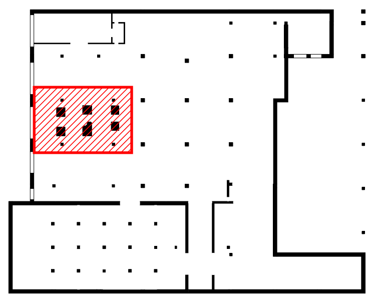


Columned Area for Better Contribution

Design Strategies

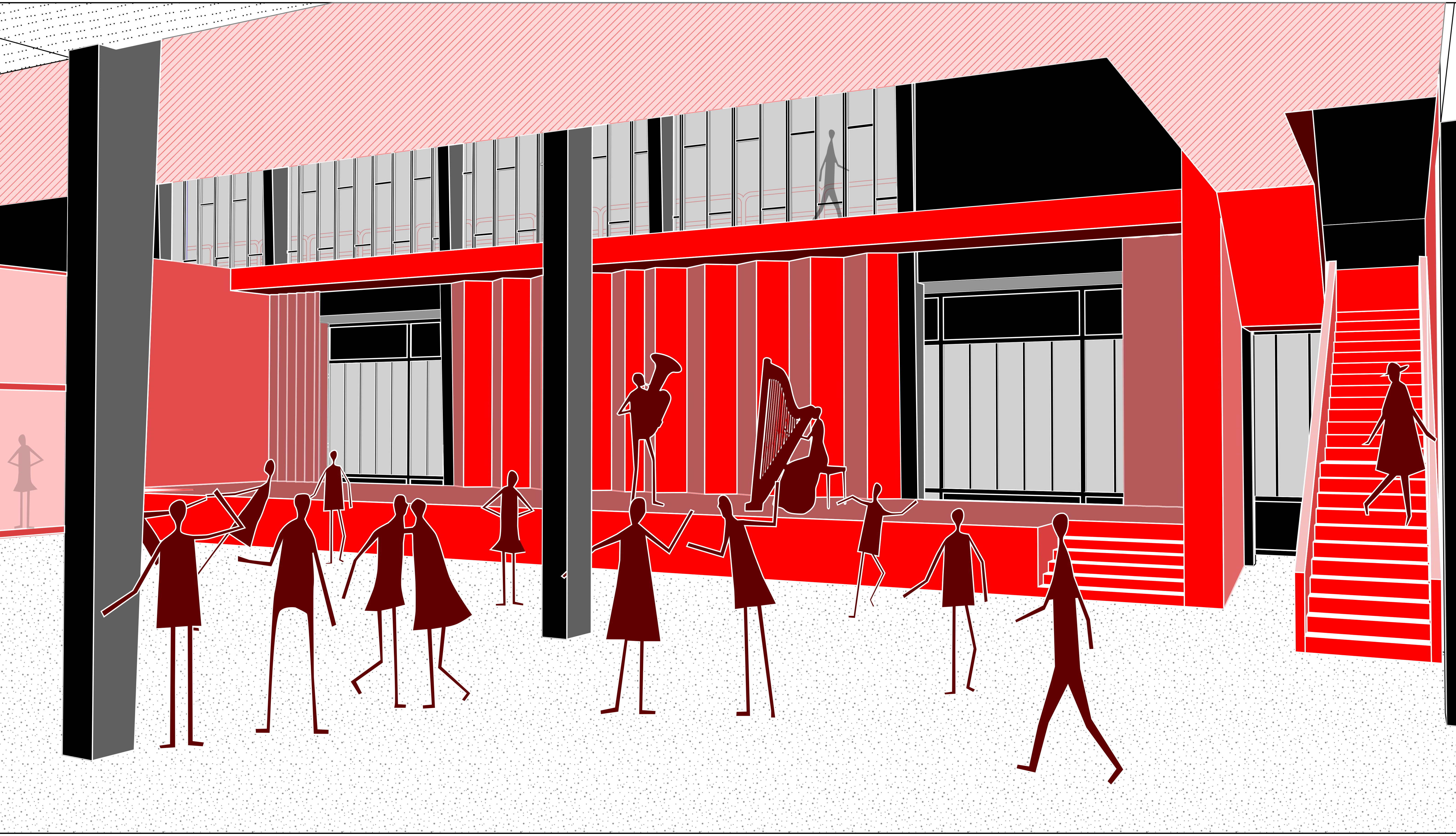


Bar



Key plan
Basement

Addition



Legend

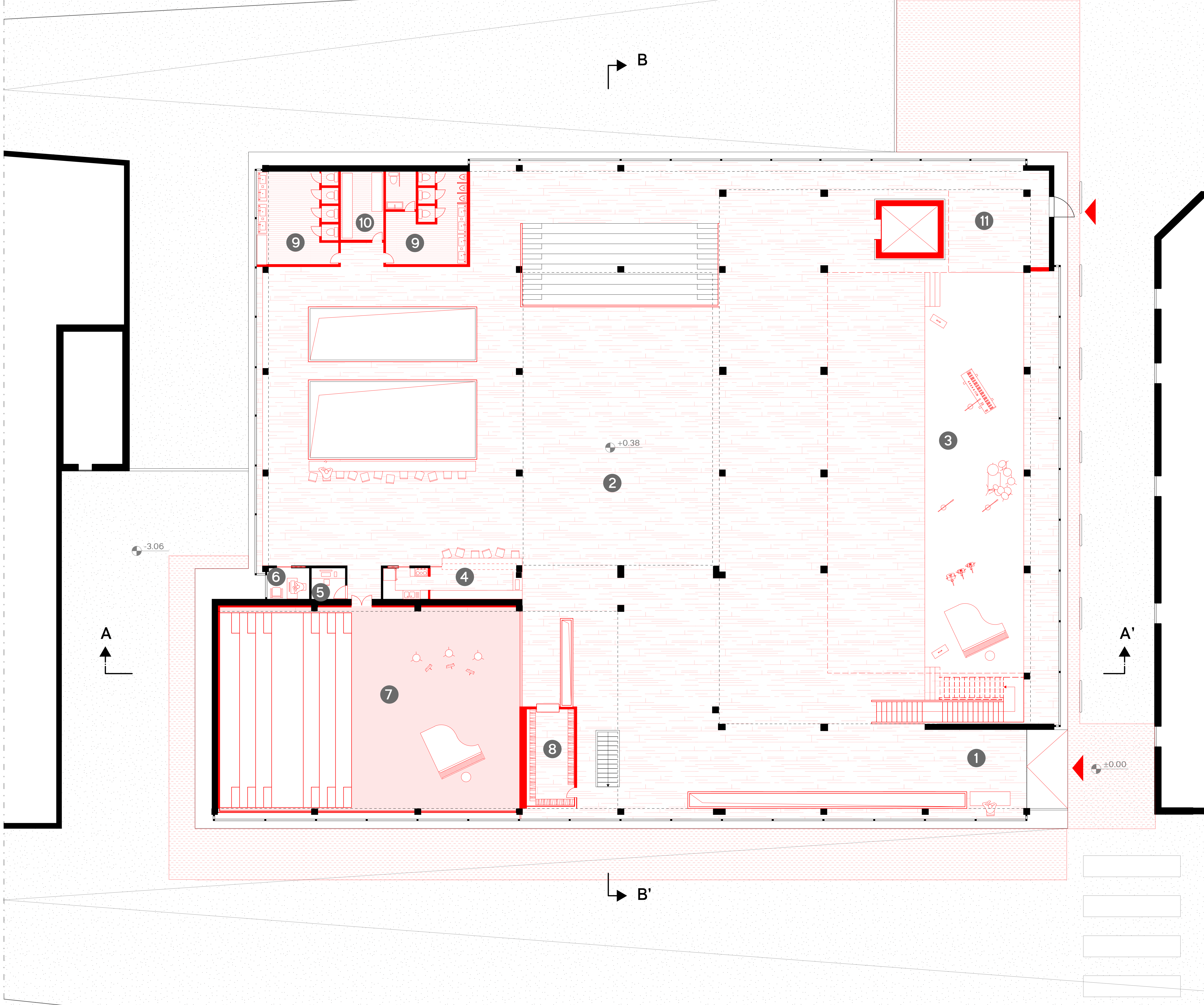
- Existing Walls
- Addition/Constructed Walls

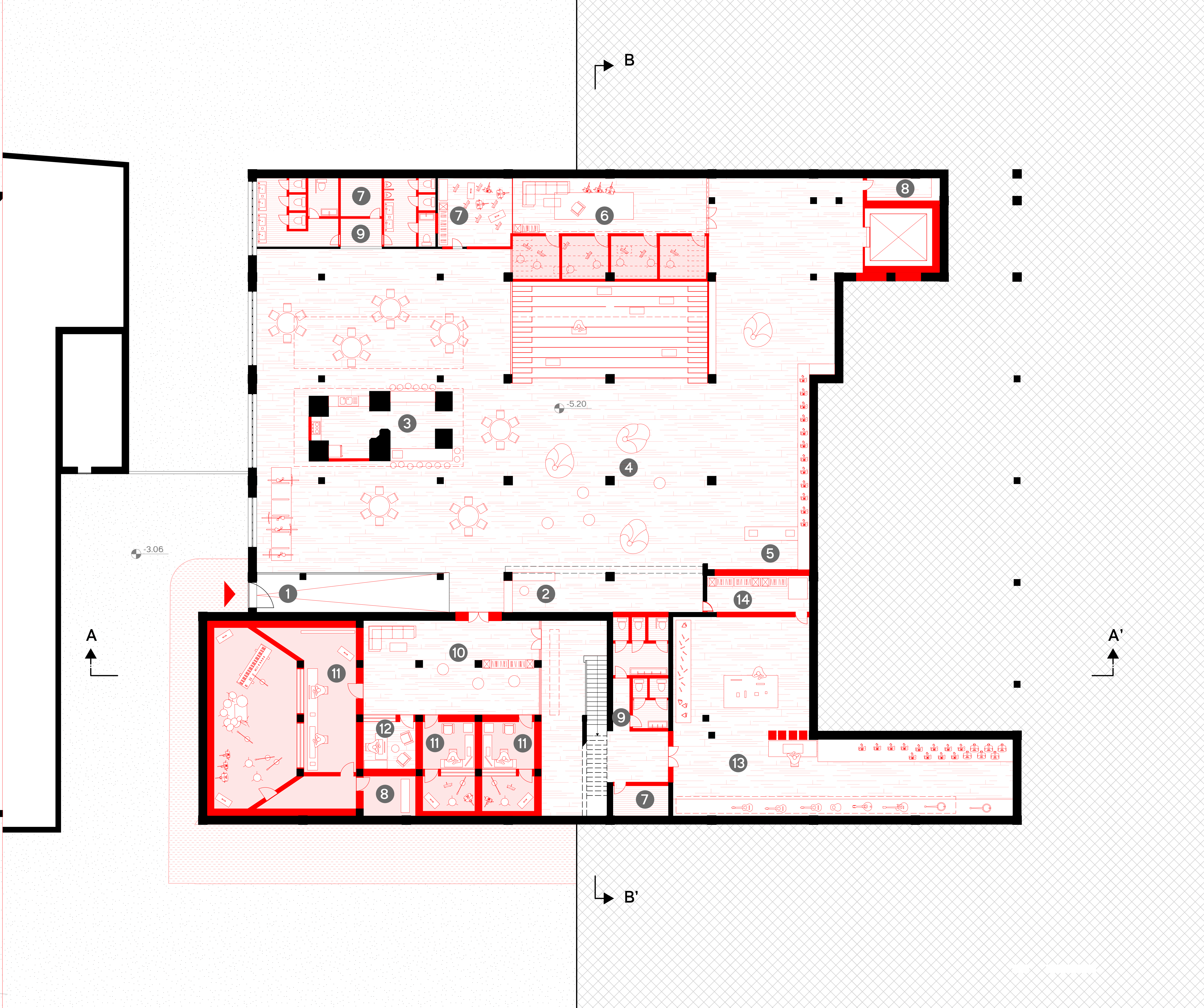
1	Entrance	27.00 sqm
2	Concert/Event Hall	1,200.00 sqm
3	Concert stage	138.00 sqm
4	Bar & Kitchen	20.00 sqm
5	Control Room	3.60 sqm
6	Manager Room	5.00 sqm
7	Amphitheatre	222.00 sqm
8	Cloak Room	16.30 sqm
9	Bathrooms	61.00 sqm
10	Storage	10.00 sqm
11	Back Door Entrance	4.00 sqm

- Dry area
- Wet area
- Insulated/Isolated area
- Outdoor Pavement

Ground Floor Plan

0 1 2 5 10m





Legend

- Existing Walls
- Addition/Constructed Walls

1	Entrance	2.60 sqm
2	Reception	1.40 sqm
3	Bar & Kitchen	41.00 sqm
4	Multifunctional space	375.00 sqm
5	Bookshop	114.00 sqm
6	Rehearsal Rooms & Waiting area	67.00 sqm
7	Deposit Area	30.00 sqm
8	Electrical room	13.20 sqm
9	Bathrooms	59.00 sqm
10	Rc.R Waiting area	57.00 sqm
11	Recording studios	150.00 sqm
12	Manager room	11.00 sqm
13	Manufacturing Space	148.00 sqm
14	Lucker Room	13.00 sqm

- Dry area
- Wet area
- Insulated/Isolated area
- Outdoor Pavement

Basement Floor

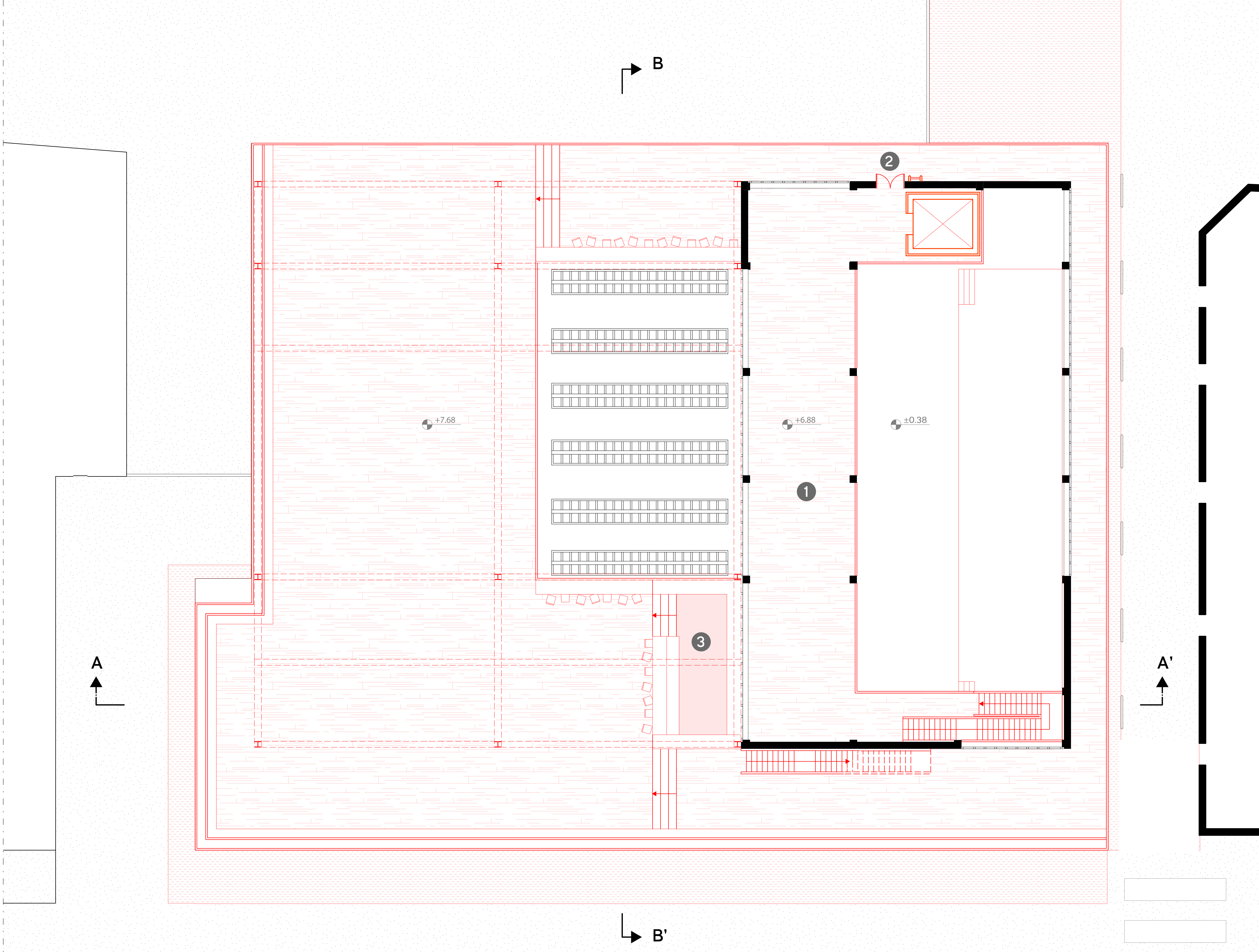
0 1 2 5 10m

Legend

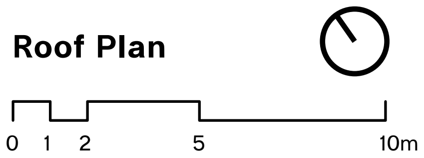
- Existing Walls
- Addition/Constructed Walls

1	Mezzanine	30.00 sqm
2	Roof Entrance	1.40 sqm
3	Bar/Kitchen	47.00 sqm

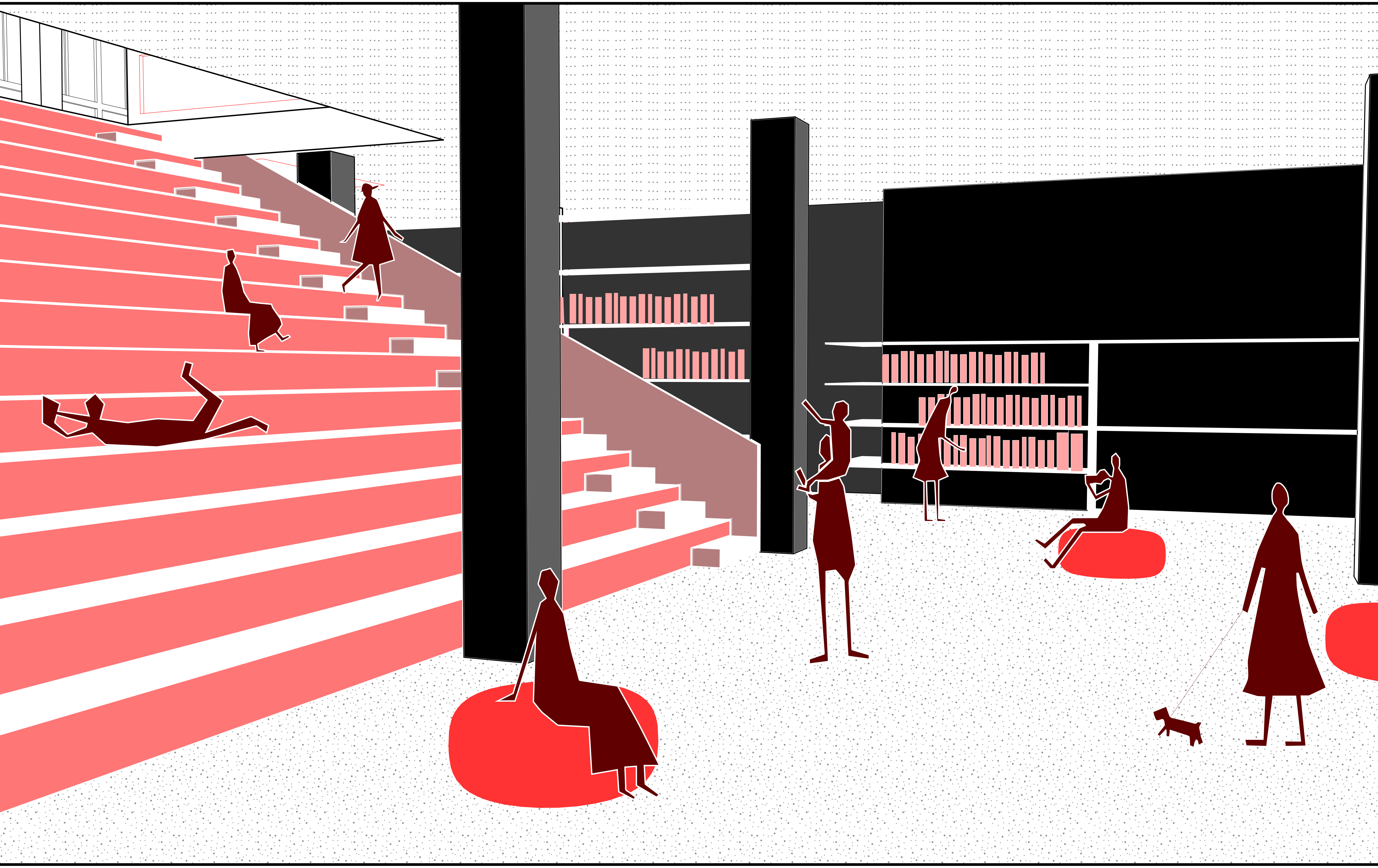
- Dry area
- Wet area
- Insulated/Isolated area

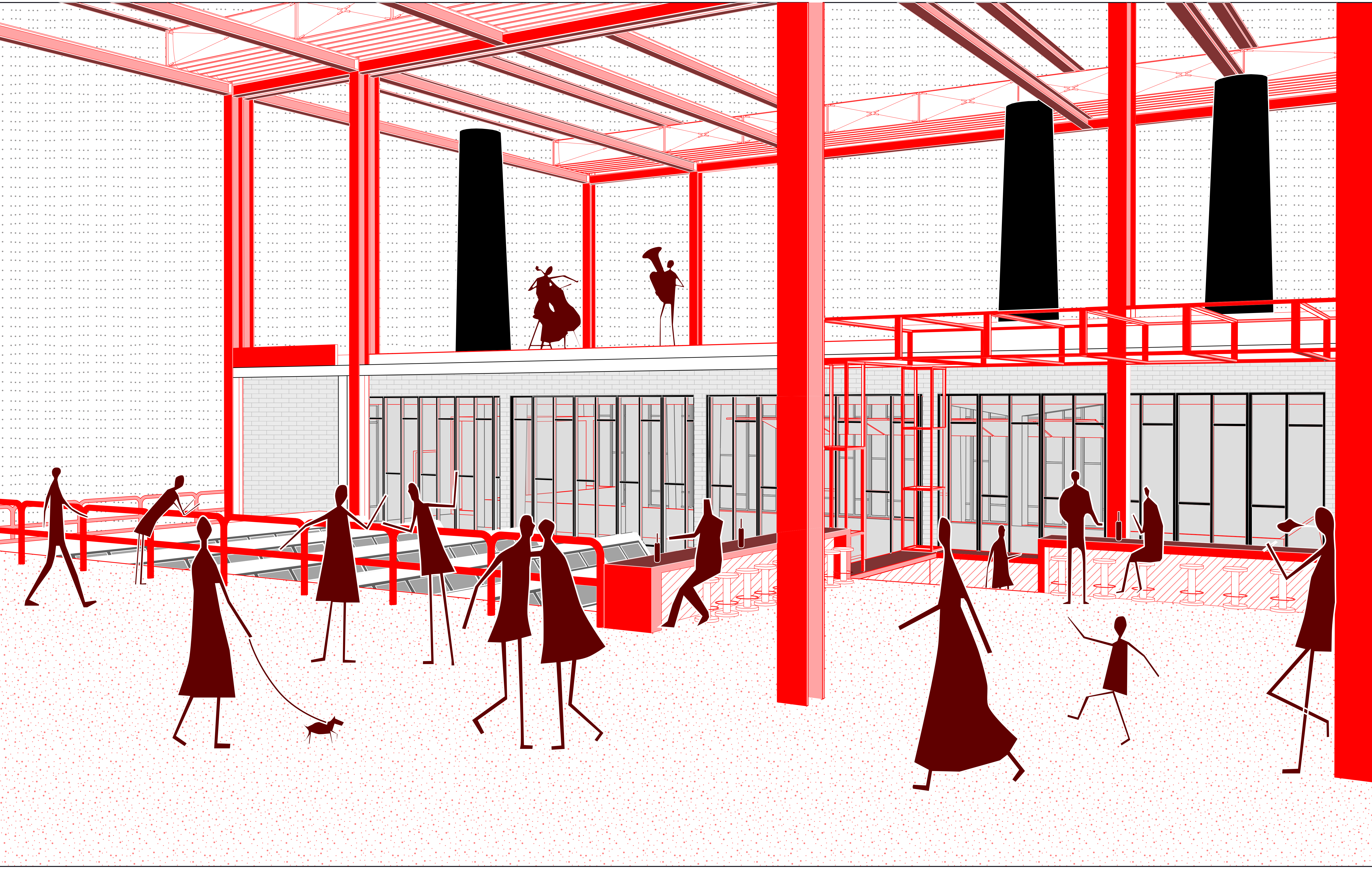


Roof Plan

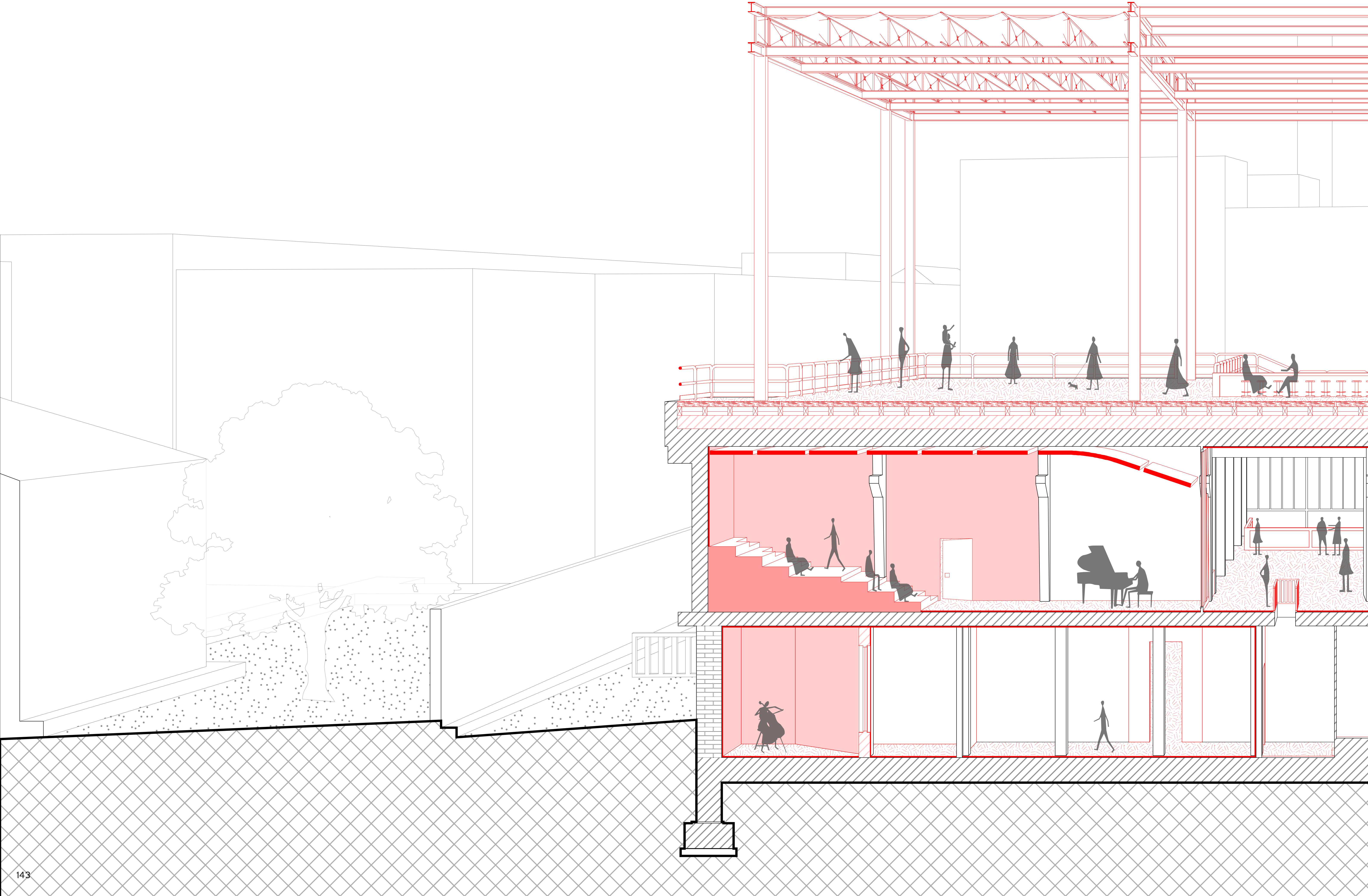


Basement View

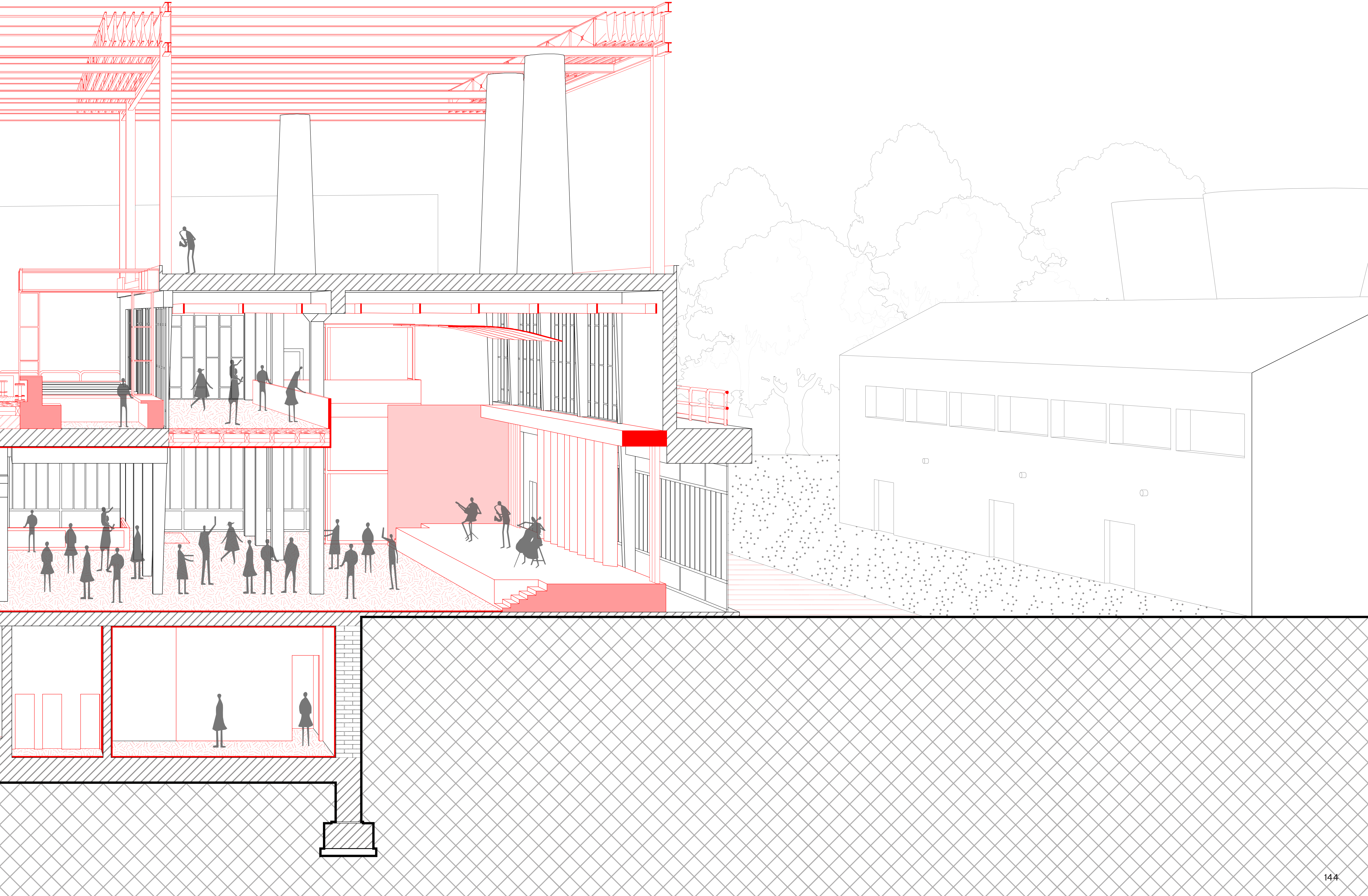




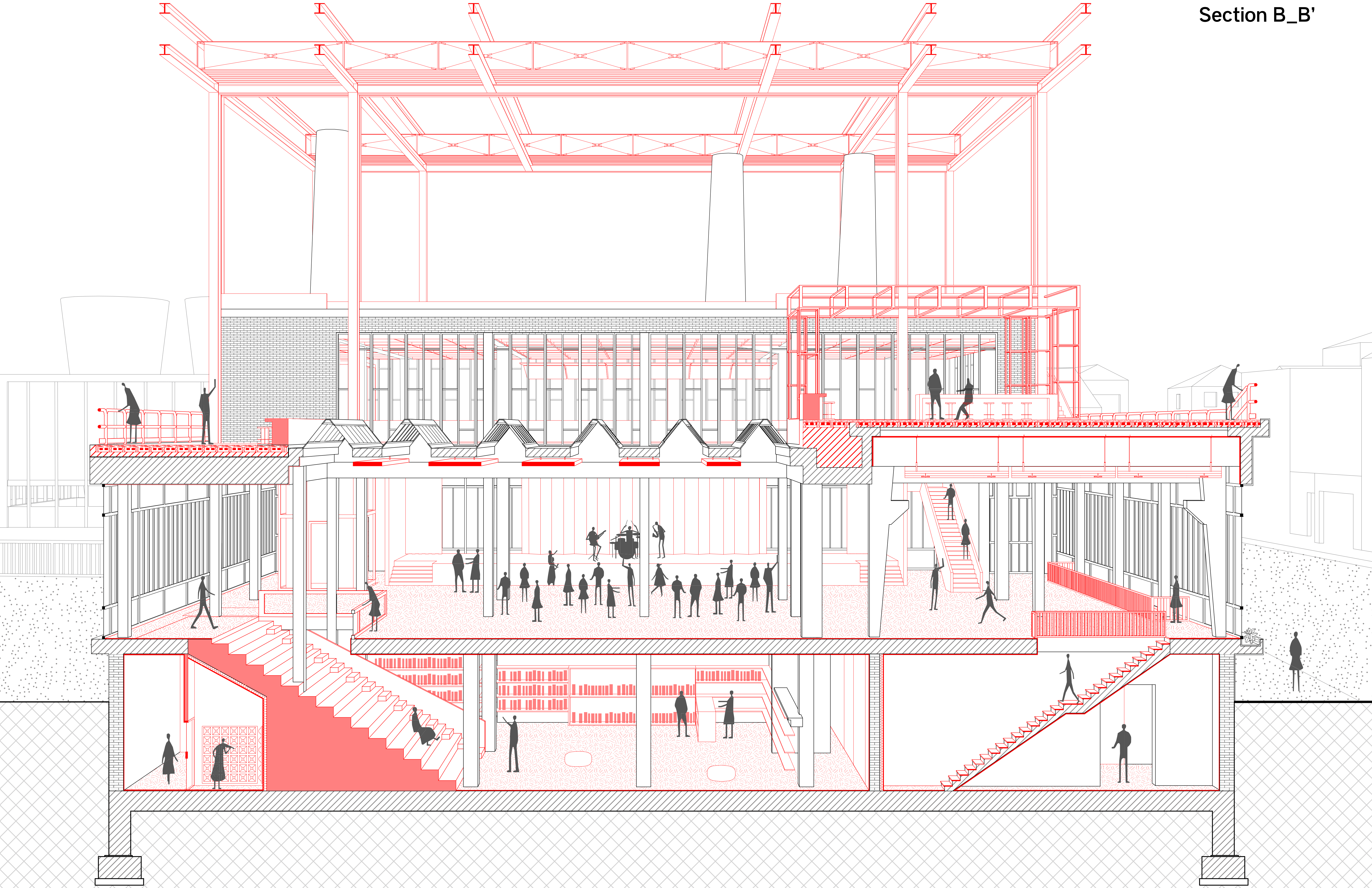
Roof Top View



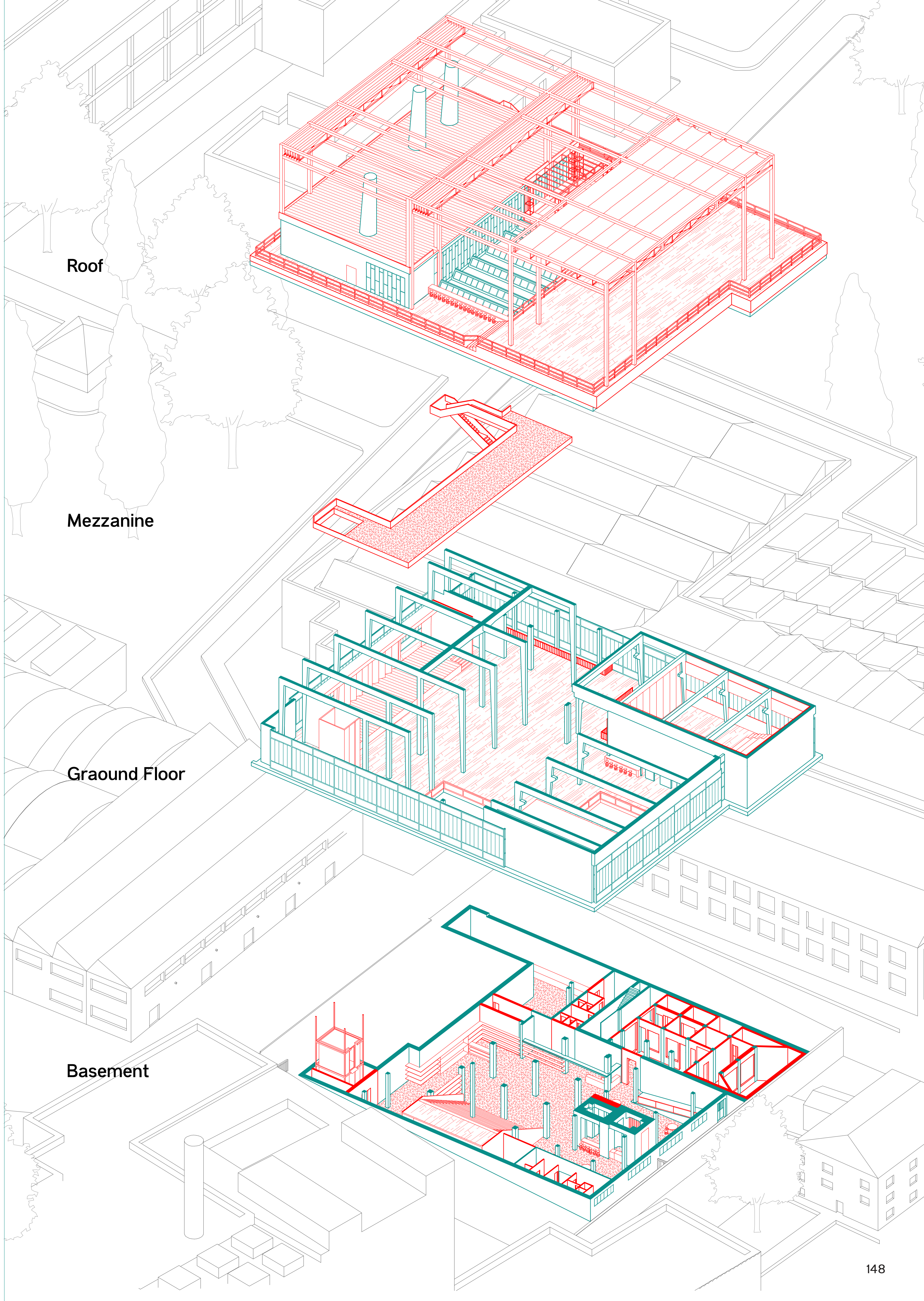
Section A_A'

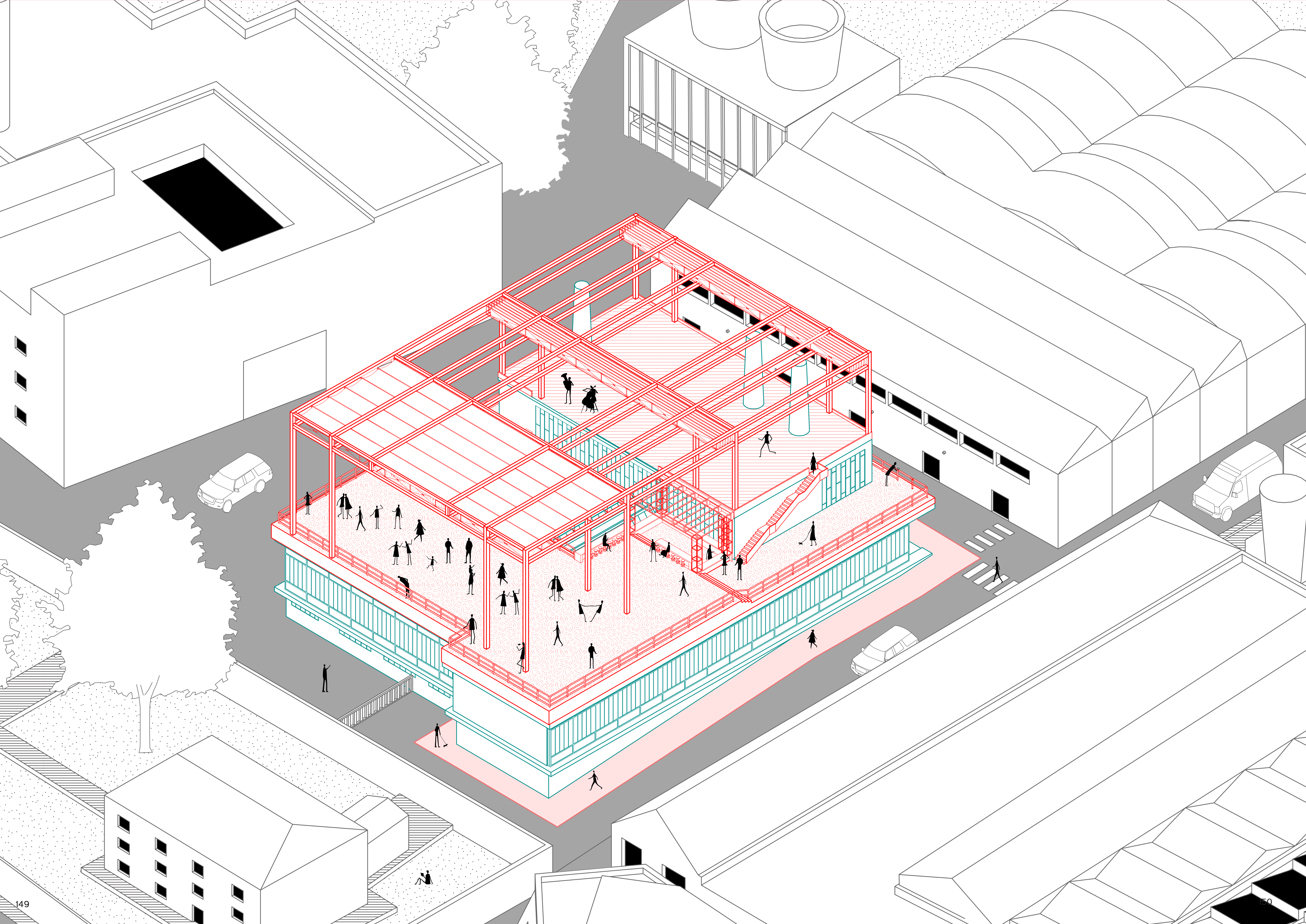


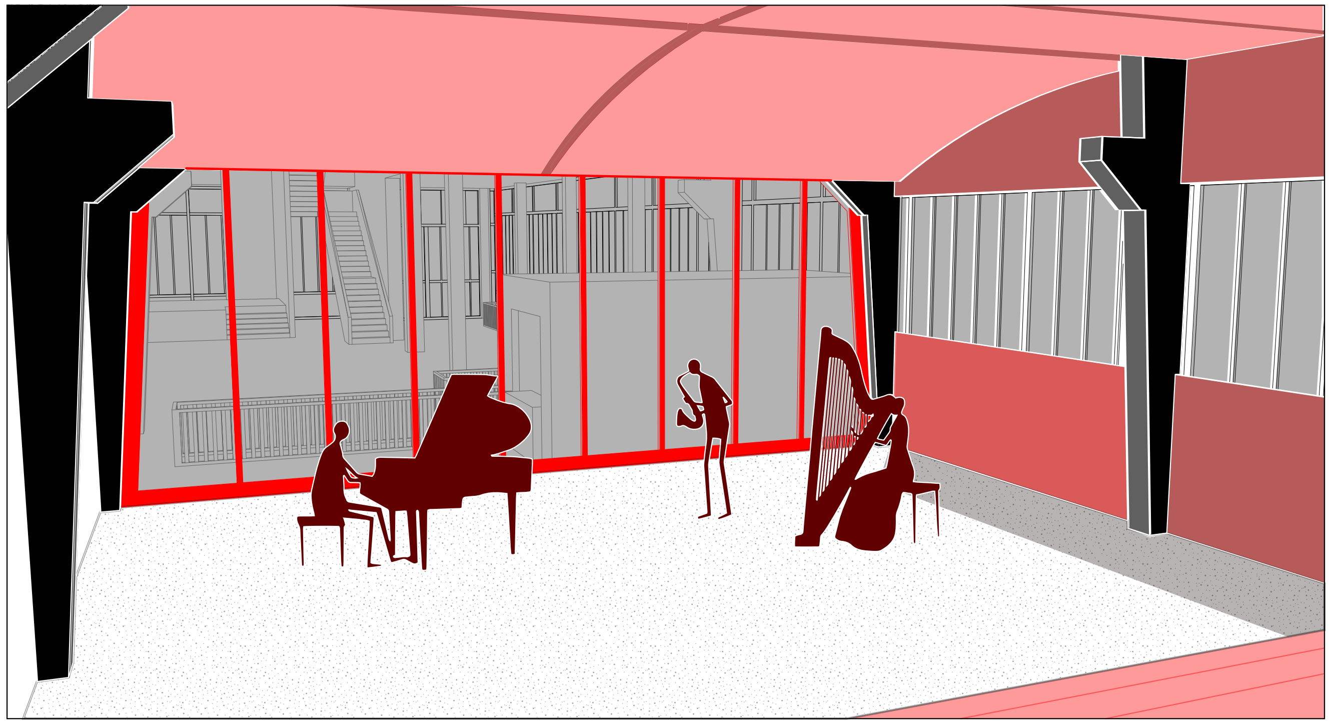
Section B_B'



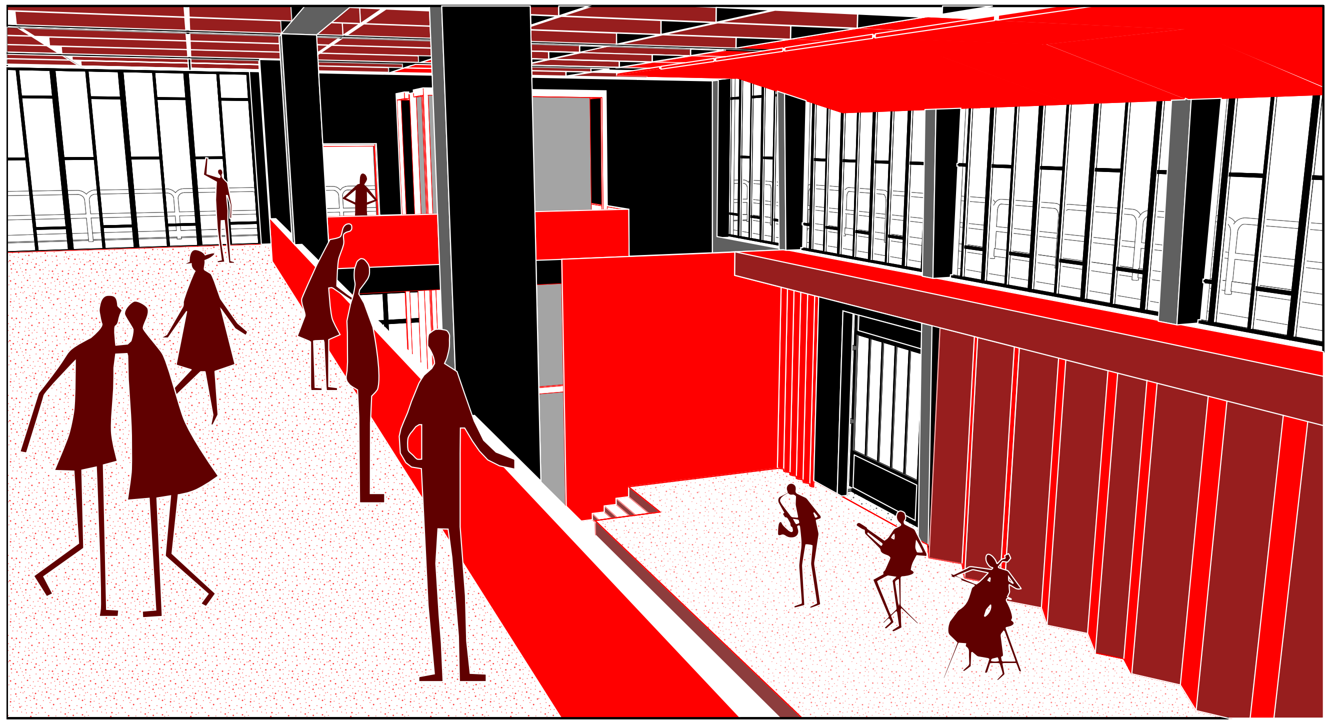
Exploded Axonometry





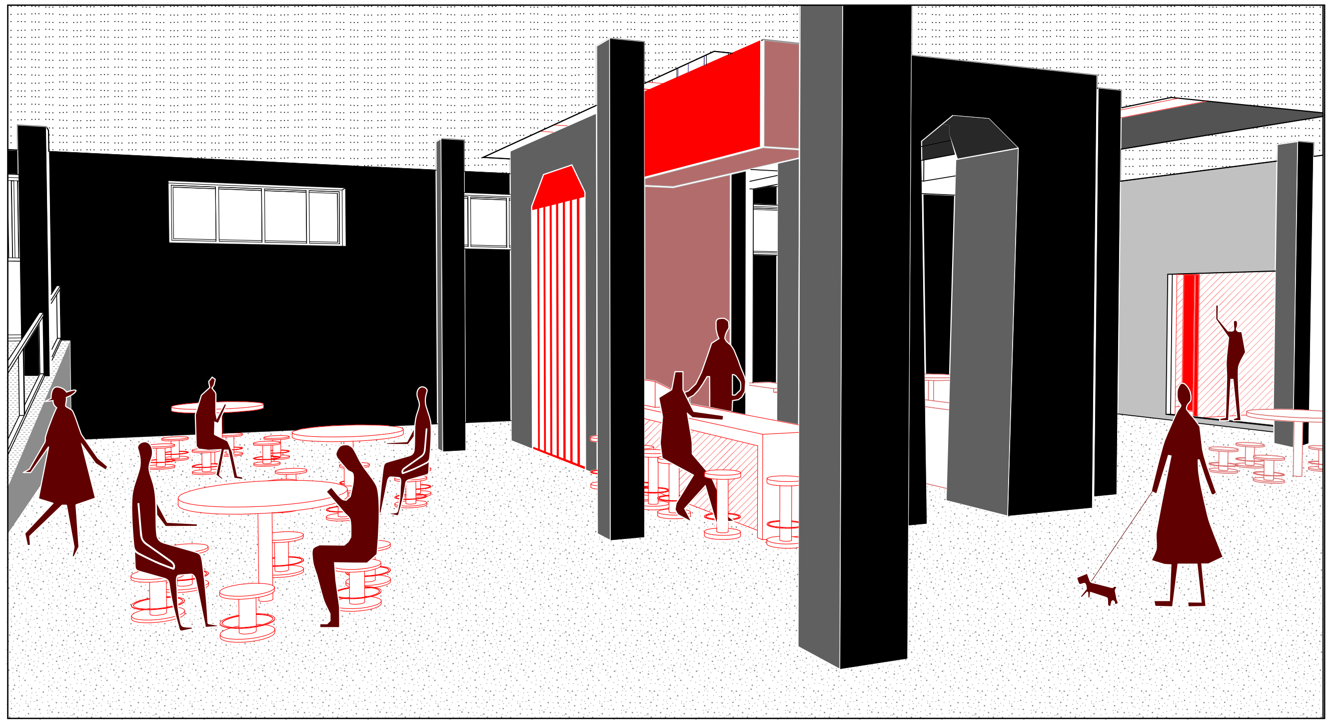


Amphitheatre



Mezzanine

Bar (Ground Floor)



Bar (Basement)

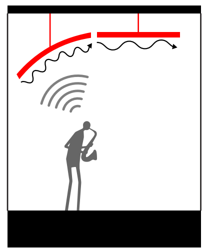
Acoustic Consideration

This section focuses on improving the sound quality within the Centrale Termica, an essential to the new function of musical center, elaborating on acoustic considerations for places such as the main music hall, amphitheater, recording rooms, and rehearsal spaces.

One proposed strategy is the strategic use of reflectors, which are meant to guide and control the direction of sound generated by sources within these spaces. Reflectors play an important role in transferring sound waves, optimizing their path, and contributing to a better auditory experience.

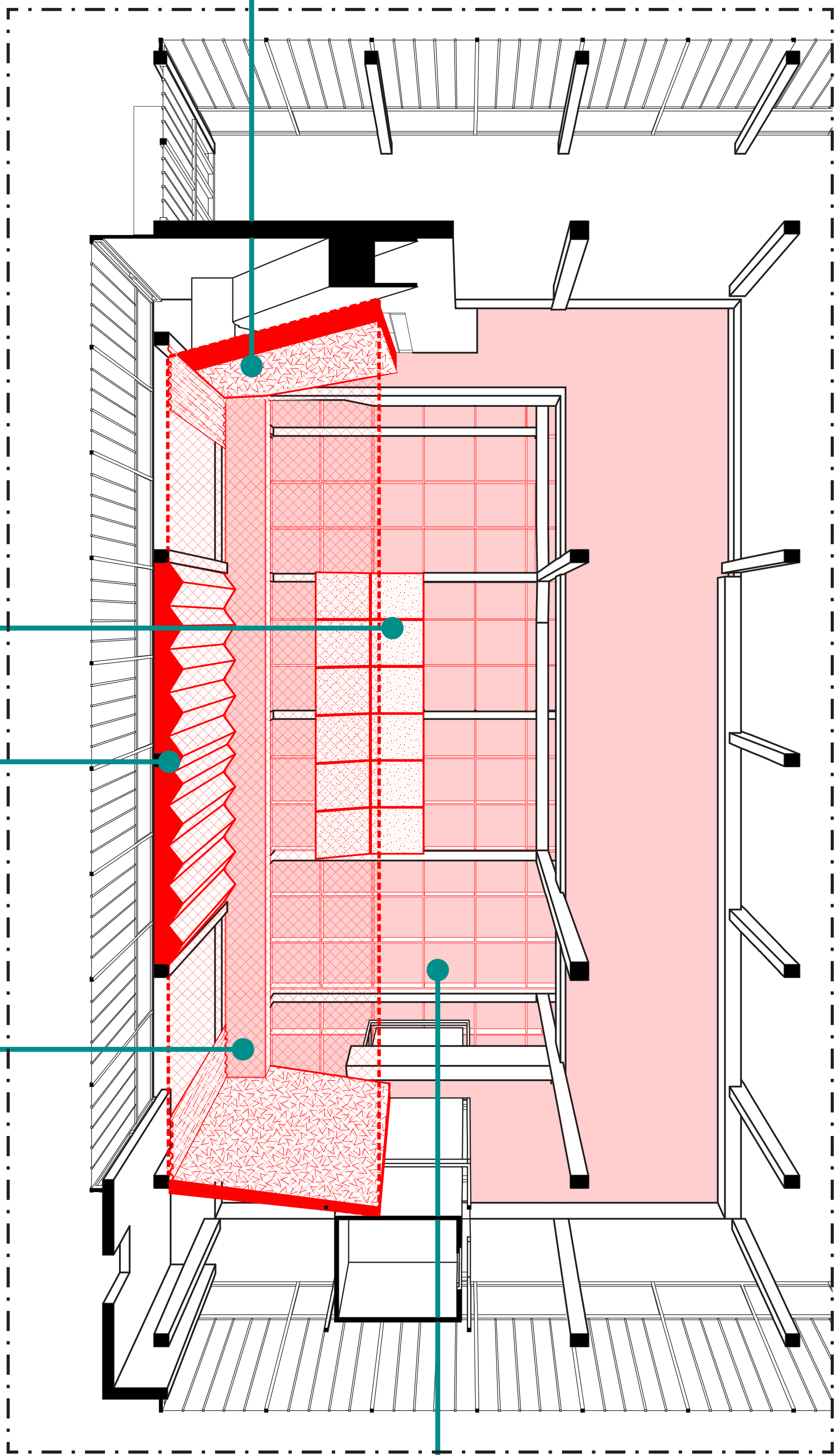
Additionally, the importance of using sound-absorbing materials for effective soundproofing is pointed out. Acoustic absorption, designed for specific frequency ranges, is essential for transforming and minimizing sound waves. This strategic use of absorbent materials is intended to reduce reverberation, control unwanted sound reflections, and create an acoustically optimized environment.

Thanks to Arianna Astolfi for her invaluable assistance and guidance on these considerations.



Sound reflectors will be suspended from the ceiling along the stage to effectively guide and control the direction of noise.

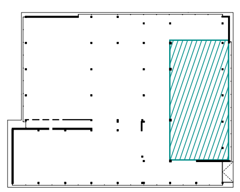
The angled panels on each side of the stage serve as reflectors, directing sound from the source towards the dancing hall in front, enhancing the overall acoustic experience.



The acoustic configuration of the stage consists of a panel made of pale oak wood in the center that reflects sound, and sound-absorbing dampening curtains on the sides.

On top of the stage we will put a wooden beam to control the noise by partialy absorb the sound from the stage.

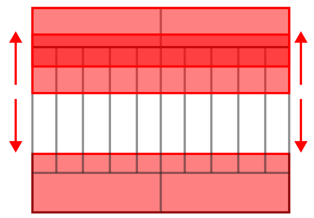
Acoustical ceiling baffles will be installed to effectively manage and control noise in the large, high-ceilinged space.



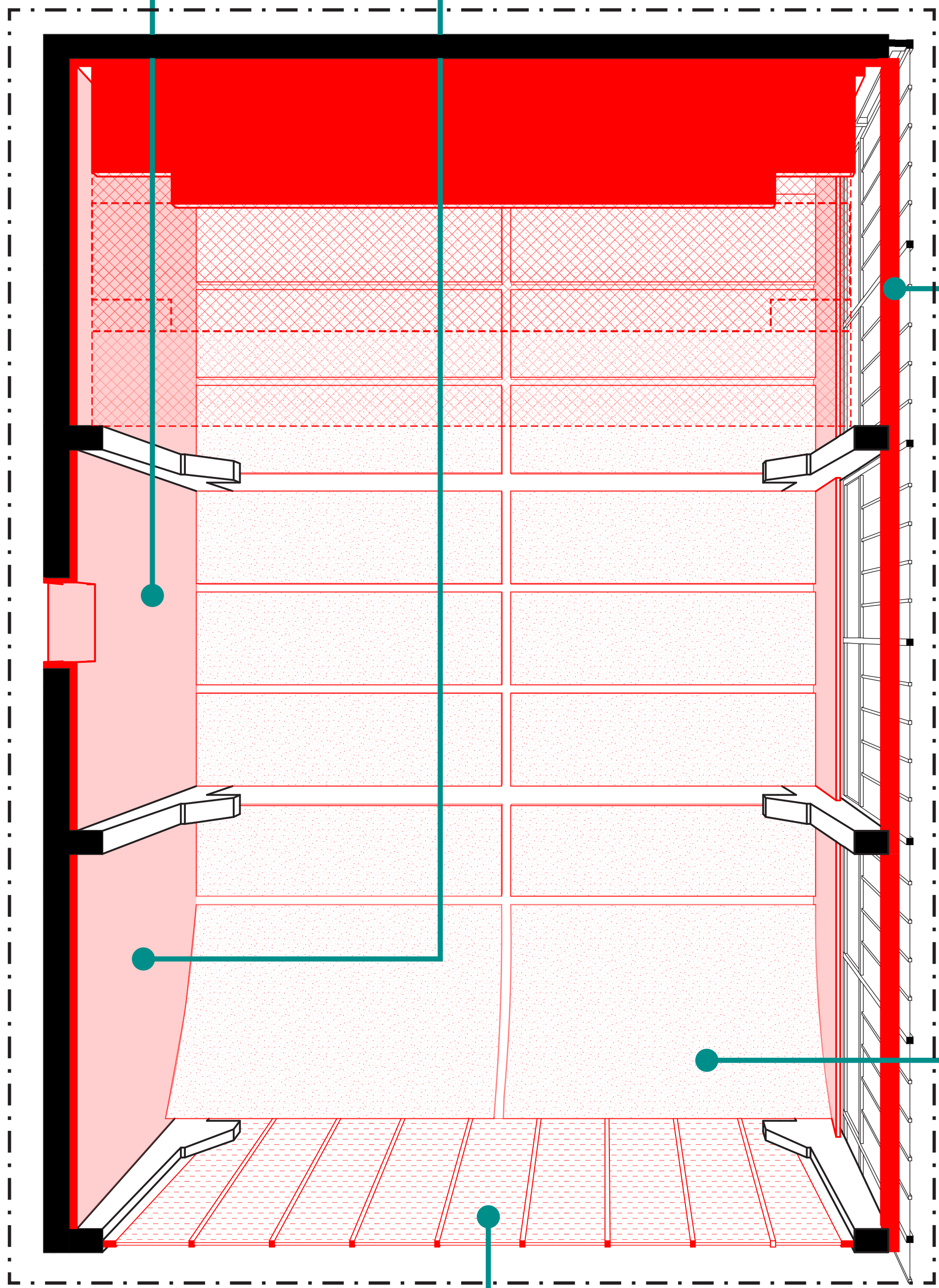
Ground floor

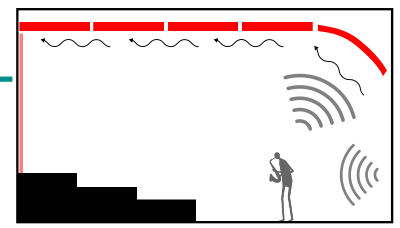
Adding sound-absorbing materials for improved acoustic comfort.

Side-mounted sound reflectors improve sound control in the performance space.



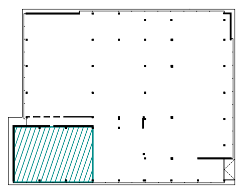
Flexible absorbtance panel for the better lighting when is needed and isolation



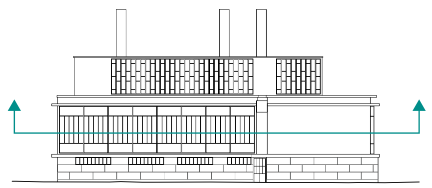


Suspended sound reflector to lead the noise to the back of the room.

Absorbtance glass material for better acoustic and sound proofing system inside the amphitheatre

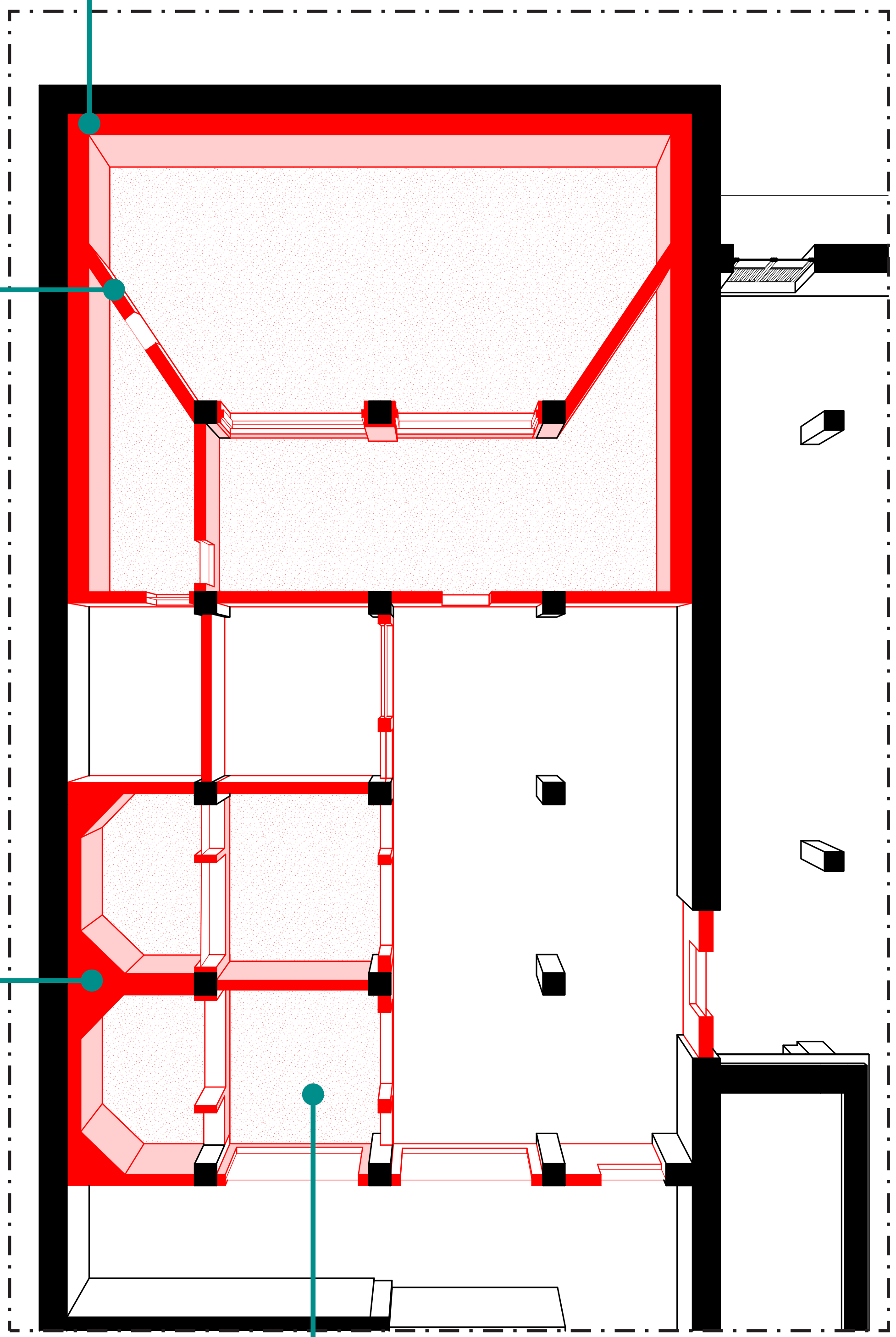


Ground floor

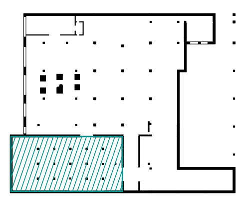


Acoustic materials such as foam panels, and bass traps, are used in recording rooms to control sound reflections, reduce reverberation, and create an acoustically ideal environment for high-quality audio recordings.

Angled walls in recording rooms are designed to reduce sound reflections by avoiding parallel surfaces, minimizing wave propagation, and improving the acoustic environment for precise and clear audio recordings.

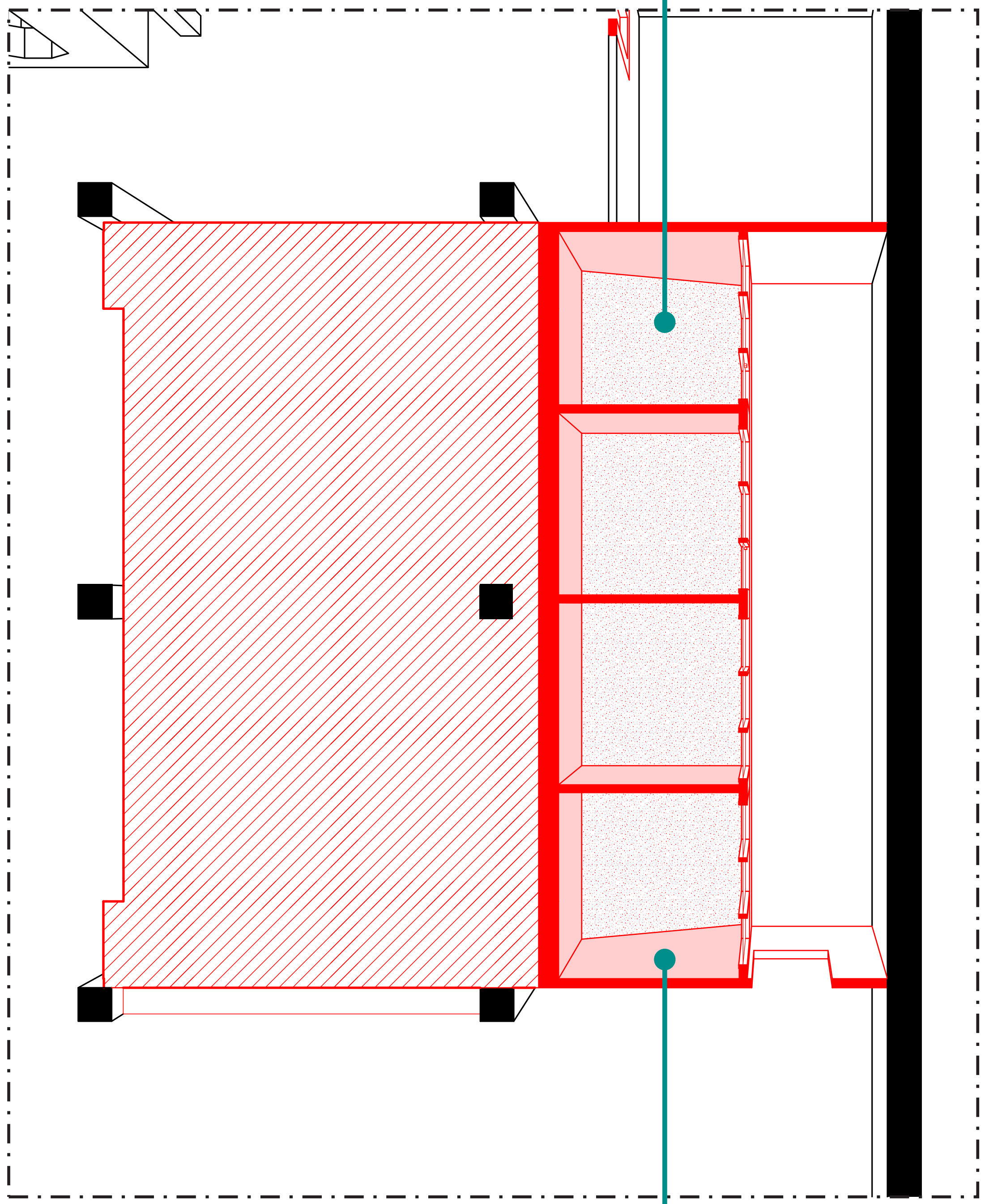


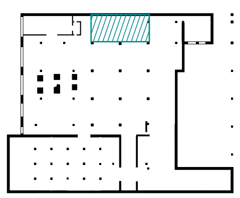
In order to control sound reflections and provide the best possible environment for audio recording, recording rooms frequently use ceiling baffles, acoustic clouds, and diffusive ceiling tiles as acoustic materials on their roofs.



Basement

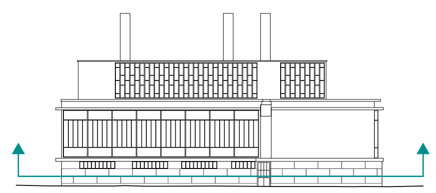
In Rehearsal Rooms Ceiling same and recording rooms, Cloud panels were used to control sound reflections minimizing reverbration, and enhance the acoustic quality to promote productive rehersal





Basement

Acoustic materials such as fabric-wrapped panels are used on rehearsal room walls. These materials are chosen to absorb sound, reduce reflections, and provide a controlled acoustic environment for effective rehearsals.



Conclusion & Future Intervention

05

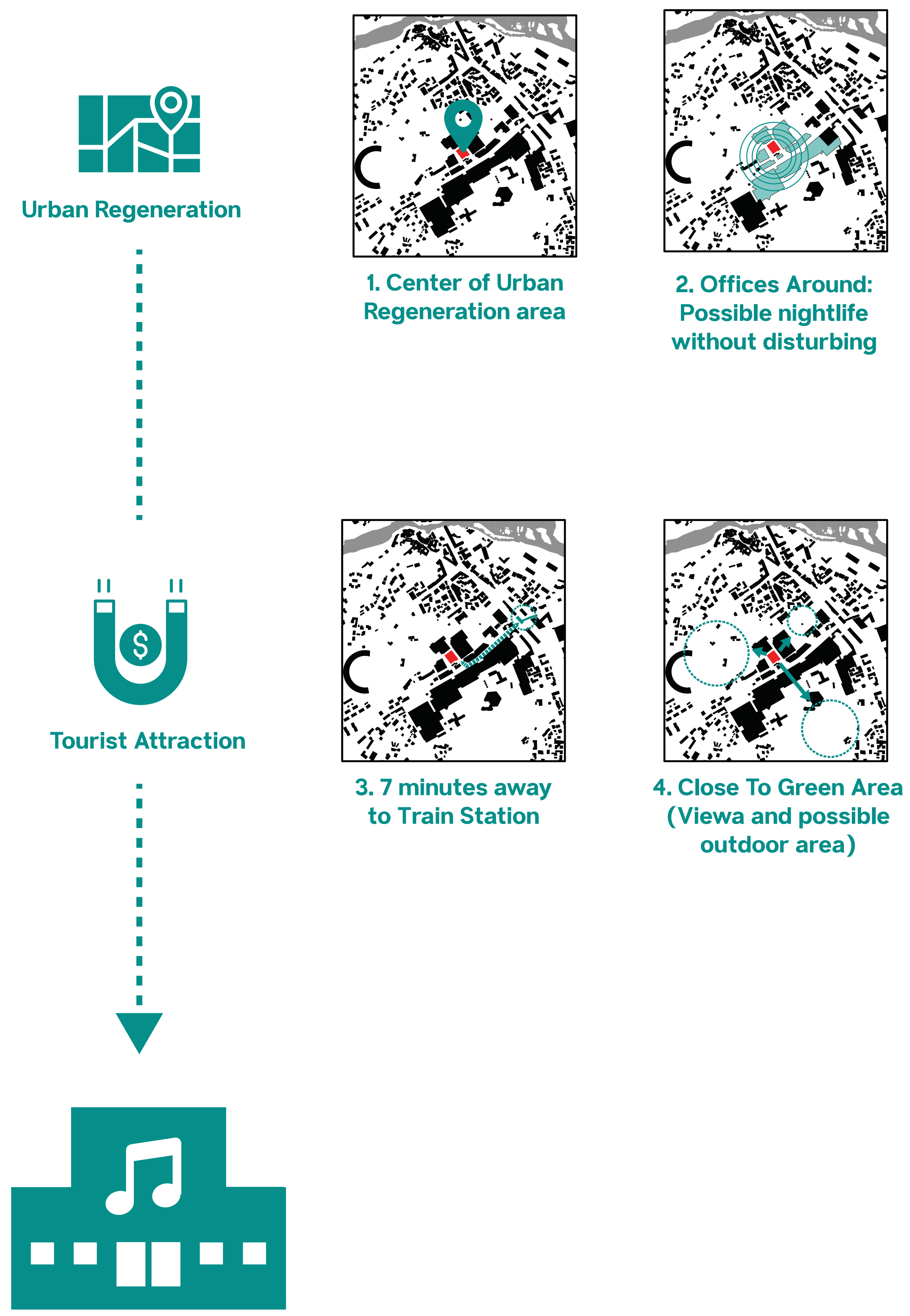
In conclusion, implementing an adaptive reuse strategy for an abandoned space requires a close understanding of the structure and its surroundings. The first phase entails a thorough examination of the structure's inherent potential, which serves as the foundation for determining the most appropriate new function. This analysis, in turn, informs the design phase. This chapter delves into the potential of Centrale Termica, categorizing it in three ways: urban potential, building potential, and technical potential.

Urban Potential:
Due to increased demand for more effectively distributed electricity before it was abandoned, Centrale Termica is situated in the center of the Olivetti complex. Since the majority of the buildings in the area are currently offices, they are only open during the day and closed at night. The music center is the ideal feature in this situation to avoid disturbing the neighbors. Tourists visiting the town will find it easy to get to and from train station, which is only a 7-minute walk away. There are three green spaces surrounding the building, which is why the roof can serve as a place for people to gather and take in the view day or night.

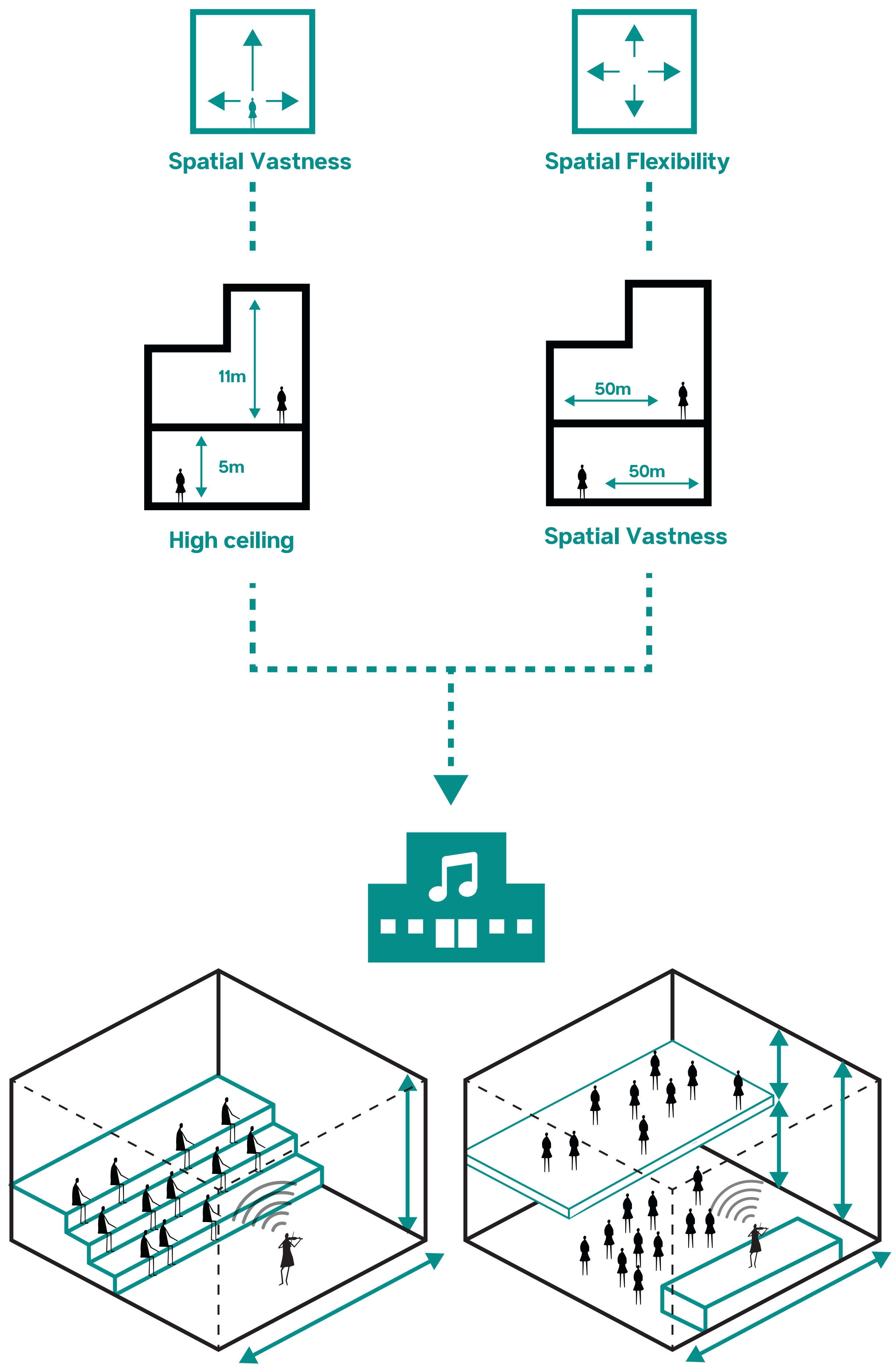
Building Potential:
Centrale Termica's defining feature is its vast spatial quality and high ceilings, evidence of its industrial past that houses substantial machinery. This characteristic is a valuable asset when designing a function that thrives on open space and adaptability. Such expansive layouts are especially beneficial to music centers and concert halls, which can easily accommodate a large audience. The high ceiling not only lends itself to a well-organized stage but also allows for the addition of another floor, increasing accessibility and convenience to the large space and roof top.

Technical Potential:
The building's former use as a power plant provides significant technical advantages as a music center. Its robust construction, intended to support machinery, guarantees stability. Tall windows provide sufficient light and safety, and effective ventilation systems are in place. The thick basement walls support the building's weight, and the ability to add an envelope allows for an entirely integrated acoustic system. These features collaborate to create an ideal space for a music center.

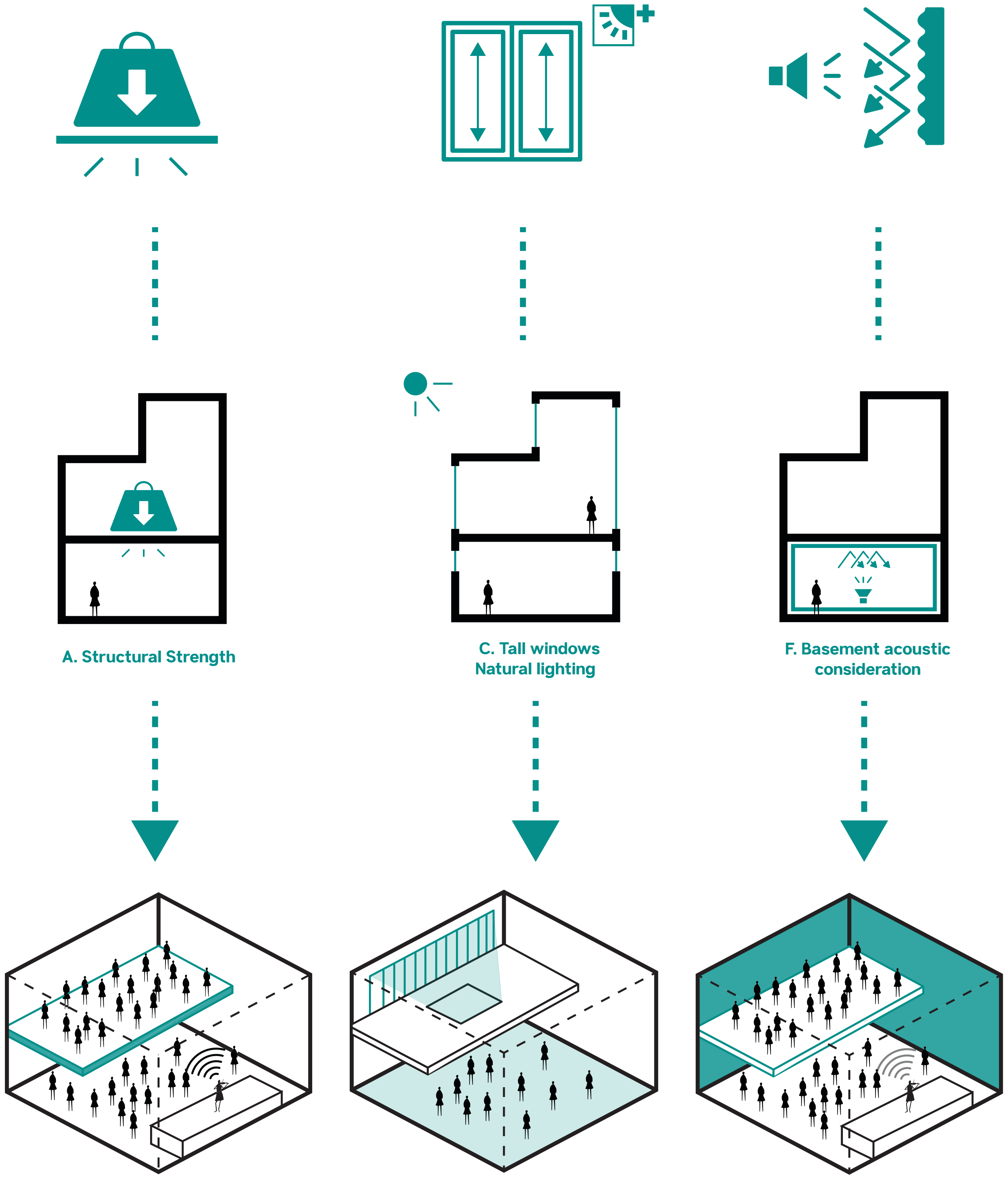
Urban potentials

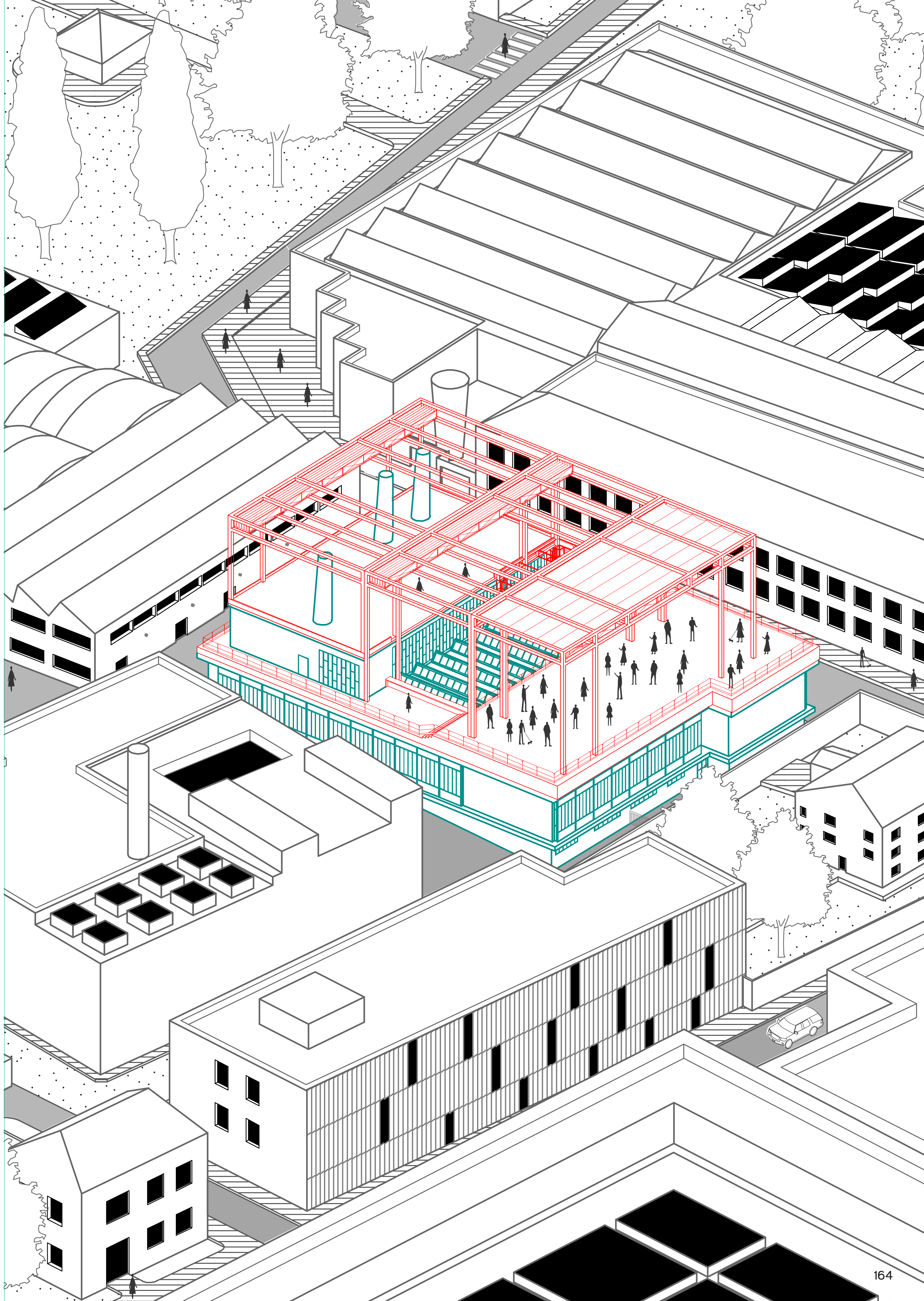


Building potentials



Technical potentials





Future Intervention

The primary goal of this thesis is to increase the appeal of Ivrea by investigating various avenues to boost the town's income. Beyond hosting concert events at Centrale Termica to attract tourists, there is a need for accommodations to cater to those who want to stay longer and enjoy the town's attractions. Adjacent to Centrale Termica, an underutilized building with an open space in front that is currently used as a parking lot has significant potential as a lodging facility for both tourists and musicians attending Centrale Termica events. This strategic conversion has the potential to not only meet the demand for overnight stays but also contribute to Ivrea's overall economic vibrancy.