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ADAPTING AND TRANSFORMING ABANDONED INDUSTRIAL HERITAGE BUILDINGS INTO CONTEMPORARY OFFICE SPACES ON THE EXAMPLE OF PGNIG IN WARSAW, POLAND

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Abstract

Adapting and reusing industrial architectural heritage represents great potential for architects, conservators, and civil engineers. The subject of this research is to examine the possibilities of adapting abandoned industrial heritage, as well as to examine the conversion of former industrial structures into functions suitable to contemporary society. By interpreting theoretical foundations, this paper will talk about the importance of adaptive reuse of industrial heritage in the city of Warsaw, Poland. Analytical and descriptive methods will be used to process the chosen examples from Poland. This paper also analyses the principles of designing contemporary office spaces. As a synthesis of previous analyses, this article will elaborate on the author's conceptual design of converting a historic industrial building into a contemporary office space, as well as the visual and functional connection of the building with other structures that are a part of the industrial site PGNiG (Polskie Górnictwo Naftowe i Gazownictwo) in Warsaw. It is a historic site that produces natural gas and crude oil. The purpose of this research is to find ways to adapt industrial heritage that can meet the needs of contemporary society, but will not damage the integrity and visual identity of historic buildings, by evaluating of design proposal will on two aspects 1) the aspect od the industrial building's purpose and 2) the aspect of physical interventions. The basic results of this research suggest that it is possible to find favourable design solutions that are in line with the needs and habits of contemporary society and solutions that respect the visual integrity and architectural characteristics of industrial heritage buildings.

Key words: *industrial heritage, adaptive reuse, Warsaw, office buildings, contemporary office spaces, building transformation*

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1. INTRODUCTION

It is clear through various efforts that the recognition, valorization, and adaption of cultural heritage as one of the key supporting pillars for a sustainable, thriving European future [1]. Over the past few decades, the conversion of abandoned industrial heritage buildings into contemporary, functional spaces has gained significant attention worldwide. These buildings, remnants of the industrial era, hold immense historical and cultural value, often reflecting the identity and collective memory of a city or region. Their adaptive reuse presents a unique opportunity to preserve and celebrate architectural heritage while holding up to the evolving needs of contemporary society.

Certain qualities of industrial heritage are recognized as universal for many former industrial sights: favorable position by integrating into the central urban matrix, dimensional characteristics and constructive systems of industrial buildings enable flexibility in functional organization and provide the possibility of converting to diverse purposes, while their architecture and authentic facade elements, construction, materials and infrastructural elements bear witness to the industrial past [2]. This qualities make them suitable for adapting to different functions, and they are the reason why the conversion of such buildings is getting more popular in post-industrial countries.

Industrialization period in Poland is dated to the turn of the nineteenth and twentieth century when dynamic development of cities took place. Big scale production was developed throughout the period of partitions and continued during (till the end of) the Second World War [3]. The process of deindustrialization in Poland resulted in the abandonment of many industrial sites. Some of them are already adapted and reused, while the others are waiting for an intervention. Since its establishment in 1978, the Polish TICCIH Committee (PK TICCIH) has been supporting and initiating actions in the sphere of protection and interpretation of industrial heritage in Poland [4]. The company PGNIG (Polskie Górnictwo Naftowe i Gazownictwo) is showing interest in the preservation of architectural industrial heritage with already undertaken projects, as well as modernization of the site. This paper explores the posibilities of transforming abandoned industrial buildings into contemporary office space, using the case study of former power plant building, as well as the visual and functional connection of the building with other structures that are a part of the industrial site PGNIG. By evaluating the proposed conceptual design through various aspects, the purpose of this research is to determine wether these kind of interventions are suitable for historic industrial buildings.

2. METHODOLOGY

This research is divided into four main parts. The first part represents the theoretical background, in which the following aspects are defined:

- The definition of industrial heritage;
- Industrial development in Poland.

The purpose of dividing the theoretical background into two segments is to perceive the importance of industrial heritage as a category of built heritage, as

well as to systematize the complex topic of different types of industrial buildings that the industrial development has left behind. By defining the industrial heritage through globally recognized documents (such as the Dublin Principles) and theoretical adaptation principles, a list of evaluation criteria will be derived from those documents.

In the second part, an analysis of transformed and adapted industrial buildings in Poland will be conducted. The examples are analyzed based on the following parameters;

- The location of a building;
- The original use of a budiling;
- The adapted function of a building;
- The existence of a physical intervention;
- The visibility of a physical intervention.

The purpose of this analysis is to recognize the existence of contemporary adaptive reuse practices that are widespread across the country.

The following part is the review of the conceptual design of adaptation and transformation of a building in the industrial complex PGNIG in Warsaw. It covers the following aspects:

- Historical analysis of the industrial site;
- Analysis of the existing condition of the site;
- Author's conceptual solution for the adaptation of an industrial building in terms of functional organization and design.

The division of the analysis into these three parts will help in the evaluation process, which is described in the last chapter.

The last part is the discussion chapter, where the evaluaton of the author's design proposal is conducted from two aspects:

- The aspect of the buidling's purpose (based on The Dublin Principles)
- The aspect of physical interventions (based on Danowski's industrial facilities restoration methodology)

3. THEORETICAL BACKGROUND

Industrial heritage, as an integral part of the built and cultural heritage inventory, is of great significance because it testifies about the cultural, historical, and technological development of a society, as well as the technical culture and literacy of a nation. Industrial heritage, in a form that is widely perceived today, can be traced back to the period that begins with the Industrial Revolution in the 18th century England, and relies on the phenomenon of human labor in the context of technological development [5]**.** Industrial heritage buildings can be recognized as objects of great cultural significance. However, in order to place the cathegory of industrial heritage in the globally recognized context of culture, it is important to acknowledge the institutional struggle to define the term cultural monument. ICOMOS (*International Council on Monuments and Sites*) institutionally recognizes the concept of the historic monument in 1964 [6], when adopting the famous Venice Charter that states the following ‘’ *The concept of an historic monument embraces not only the single architectural work but also the urban or rural setting in which is found the evidence of a particular civilization, a significant development or*

an historic event. This applies not only to great works of art but also to more modest works of the past which have acquired cultural significance with the passing of time.'' [7]**.** But how does the industrial heritage fit into all this? Industrial heritage has often been marginalized by the leading institutions in practice of cultural heritage protection, giving priorities to other types of built heritage [8]. However, there are attempts to systematize the built fund of industrial heritage. The Nizhny Tagil Charter was adopted in 2003 by TICCIH (*The International Committee for the Conservation of the Industrial Heritage*), and it was the first international guidance document for the protection of industrial heritage. Eight years later, the joint ICOMOS-TICCIH Principles for the Conservation of Industrial Heritage Sites, Structures, Areas, and Landscapes, known as the *Dublin Principles*, were adopted in Paris, France in 2011. This document represents the highest document on the protection and preservation of industrial heritage. Industrial heritage buildings can benefit from mindful adaptive reuse, as it is very unlikely that historic industrial buildings can meet contemporary technological needs of 21st century industries. Therefore, it is important to follow defined guidlines when adapting and transforming industrial heritage buildings. The Dublin Principles state the following when discussing adaptive reuse and transformation ''*Appropriate original or alternative and adaptive use is the most frequent way and often the most sustainable way of ensuring the conservation of industrial heritage sites or structures. New uses should respect significant material, components and patterns of circulation and activity*.'', as well as ''*physical interventions should be reversible, and respect the age value and significant traces or marks*'' [9]**.** As Danowski points out, there are two methods of restoring industrial facilities. The *puristic* method means that a building is cleaned in order to restore its original form, but with some acceptable changes that are result from a change in the function of the building. This method is applied to the most valuable buildings or to those should have a faithful reconstruction in order to highlight the prestigious or historical character of the building. The second method is the method of *active adaptation,* where the most valuable elements of the architecture are emhasized, but the dimensions of the building itself are enlarged by a construction that does not overwhelm the building [10]. This guidlines will be used as a criterion when evaluating the possibilities of adapting industrial heritage buildings .

To understand the origin of industrial heritage, it is important to understand the evolution of industrial production, which significantly differs from one nation to another. This research is focused on the industrial heritage of a specific nation, Poland to be precise, thus it is essential to review the Polish industrial development. Rosa Luxemburg [11] in her doctoral thesis titled *The Industrial Development of Poland* states that industry became widespread in Poland at the beginning of the 19th century (1820) and classified the first period of production as The Manufacturing period (1820-1850). At the end of the 19th century, as present-day Poland was a part of the Russian Empire, Kingdom of Prussia, and Austro-Hungarian Empire, a large-scale industry period has arisen due to the influence of global powers, with the 20 year transition period (1850-1870)[3]. When regaining its statehood in 1918, until the beginning of World War II that begun with the Nazi occupation of Poland in 1939, however, the country has faced severe political

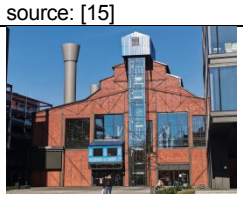
[3] This source is prone to criticism, having in mind the controversial political and ideological views of Rosa Luxemburg

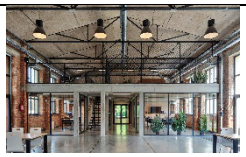
turmoil and warfare, which inevitably affected the industry. After World War II, with the shift to communist regime and socialist ideology brought the nationalization of industry, thus the revived production has actively functioned in the post-war years [12]**.** Socialism viewed industrial production and the industrial workers as a foundation of class struggle [13], thus the industry was thriving across Poland and the Eastern Block. The industrial prosperity in the post-war socialist years marks the third phase in Polish industrial development. However, the fall of communism in Europe took place in the late 20th century. An ideological shift, and a transition period from socialism to democracy, followed by economical unrest, marked the fourth phase in Polish industrial development – the deindustrialization process [14], which had significant proportions in Eastern Europe. Two centuries of intense industrial development have left a notable fund of industrial heritage, but due to the deindustrialization process many of those industries have been shut down, abandoned, and left to decay. The new era in Polish history, formally marked in 2004 with the accession of Poland into the European Union, has brought new views and ideas in treating historical industries, in the form of adaptive reuse and transformation. Centuries of industrial development in Poland have left a great amount of industrial buildings that can be considered a part of the industrial heritage. Various styles, forms, materials, and functions are recognized across the country. However, it is essential to systematically analyze the reused and transformed industrial buildings and have in mind the different levels of interventions on the industrial heritage in Poland.

4. ANALYSIS OF ADAPTED AND TRANSFORMED BUILDINGS IN POLAND

The analysis presented in Table 1 aims to examine the extent to which architectural practice in Poland is adapting and transforming former industrial buildings, the new functions of these buildings, and the presence of visible or invisible physical interventions on them.

Table 1. Analysis of adopted and transformed buildings in Poland

Name and architect	Photo	Original use	Adapted function	Existence of a physical intervention	Visibility of a physical intervention
Leszczynski Antoniny Manor Intervention / NA NO WO architekci.	 source: [15]	Agricu-ltural industry	Healthcare and residential complex for elderly people	Exists	Visible as an upgrade and in facade treatment
Elektrownia Powiśle / APA Wojciechowski Architekci	 source: author	Power plant	Commerci-al, office and residential complex	Exists	Visible as extensions and in facade treatment

NT Industry Polish Headquarter/ GIGAARCHIT EKCI Artur Garbula	 source: [16]	Heavy industry	Office building	Exists	Visible in the interior and facade treatment
EC1 Łódź - City of Culture / Rob Krier	 source: author	Power plant	Cultural center	Exists	Visible as upgrade and in facade treatment
Headquarters of WSEIZ/ studio Archimed	 source: [17]	Factory for iron construc-tions	University building	Exists	Visible as upgrade

The selection of adapted industrial buildings in Poland aims to demonstrate the diverse range of new, adapted functions that cater to the needs of contemporary society. In all of the chosen cases, there was a need to extend or upgrade the historical buildings to fulfill contemporary functions. The analysis of these buildings reveals that architects frequently use contemporary forms and materials to emphasize the historical and modern aspects of the construction, striving to find a balance where these two architectural approaches coexist harmoniously in a single location.

5. REVIEW OF CONCEPTUAL DESIGN OF ADAPTION AND TRANSFORMATION OF PGNIG IN WARSAW

A former gas production plant is situated at 25 Kasprzaka Street (historically Dworska Street) in the Wola district of Warsaw, Poland. It was constructed between 1886 and 1888, and in 1892, a tar distillery was opened there [18]. Initially, the gasworks included several buildings and facilities (Figure 1): a water tower, a laboratory building and experimental facility, an apparatus building, a central warehouse, an ammonia facility, a phenol plant building, system I and II desulphurization facilities, a vehicle station, a central boiler station with a chimney, and an office building [19].

Between 1886 and 1900, large casings for gas tanks were added on the side of Prądzyńskiego Street, and at the beginning of the 20th century, residential houses were constructed at the entrance to the plant from Dworska Street. In September 1939, the plant suffered significant damage, but production resumed in October 1939, though the reconstruction of the plant continued until 1944. Originally, the gasworks were owned by the Dessau Gas Society, but in 1925, they became the property of the city. Gas production at the Kasprzak plant was eventually ceased in 1978, and presently, the historical buildings at Kasprzaka Street house the

headquarters of PGNiG (Polskie Górnictwo Naftowe i Gazownictwo). Furthermore, a new office building was erected at the gas plant site - the PGNiG Head Office [20].

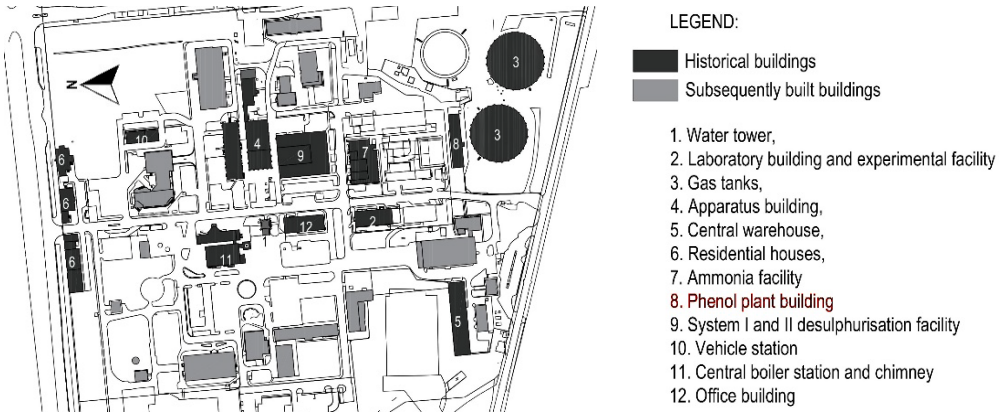
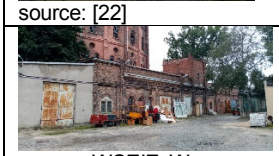


Figure 1. Current site plan, source: archive of the subject „Architectural design (II)", University of Ecology and Management, Warsaw, 2022, edited version

Table 2. Analysis of the current condition of the buildings within the site

Photo	Former use (for historical buildings)	Transformation/adaptation	Current function of the building	Existence of a physical intervention	Visibility of a physical intervention
 source: author	Gas building	No	Not in use	/	/
 source: [21]	Apparatus building	Yes	Gasworks museum	Exists	Facade refurbishment
 source: [22]	/	No	Administrative building	/	/
 source: WSEIZ, Warsaw	Phenol plant building	No	Warehouse	/	/

In Table 2 a few examples of current buildings in the complex are presented. In situ research suggests that some of the historical buildings are revived and adapted to different functions. Despite the transformation of many buildings into

different functions, some examples still remain in poor physical condition, while others have been subsequently built (see Figure 1). In the case of historical buildings undergoing revitalization, the focus is mainly on transforming them for a specific function, with only facade-level refurbishments. Subsequently built buildings are designed in contemporary styles, while still incorporating brick motifs reminiscent of the former industrial complex.

The conceptual design for the adaptation and transformation of a building within the PGNIG industrial site in Warsaw pertains to the former phenol plant building, which currently serves as a warehouse. The current condition of the building (Figure 2) reveals that it has non-historical, subsequently built extensions. The facade's brickwork is old and damaged (Figure 3), and some doors and windows have been altered. Nevertheless, the building's overall structure is well-preserved. It also retains characteristic details associated with architectural influences from classic English industries [23], such as a fully brick facade, decorative brickwork elements, distinctive arched windows and chimneys.

Figure 2, Figure 3. Current condition of the building, source: archive of the subject „Architectural design (II)“, University of Ecology and Management, Warsaw, 2022.

The task[4] of the conceptual design is to adapt and transform the building to suit contemporary administration and office space requirements. After analyzing examples of adapted and transformed buildings in Poland, as well as buildings in the industrial complex itself, the design concept foresees a visible upgrade and extension to the building to expand its capacities and improve the working conditions within the inherited structure. The concept also aims to showcase the layering of architectural practice in different time periods and is guided by the current tendency of the PGNIG complex, which aims to modernize the area while preserving and respecting the architectural heritage.

In this conceptual design, the current horizontal extension that doesn't correspond with the historical building is removed. The brick facade is refurbished, and all characteristic elements of industrial architecture are preserved and highlighted by incorporating traditional windows in damaged areas of the facade. A new horizontal extension and vertical upgrade are designed to achieve balance and rhythm in the composition while avoiding symmetry (see Figure 4). The space between the new volumes forms a terrace for formal and informal gatherings. The main materials used for the new structure are concrete and glass.

[4] This conceptual design was the subject of research for the exam „Architectural design (II) – Modernisation of Architectural Facilities“ on University of Ecology and Management in Warsaw, 2022

The building's upgrade includes large glass portals, forming double-height winter gardens within the historical buildings, introducing biophilic design into the industrial building, and providing an opportunity for abundant greenery. Green buildings not only ensure a high-quality indoor climate, including elements such as acoustic and thermal comfort, access to daylight, excellent ventilation, and access to fresh, pollution-free air, but they also have a strong influence on people's health and well-being, addressing their needs, health, and mood. Loss of direct contact with nature takes a toll on our health and well-being, leading to civilization diseases, including depression, as well as decreased productivity [24].

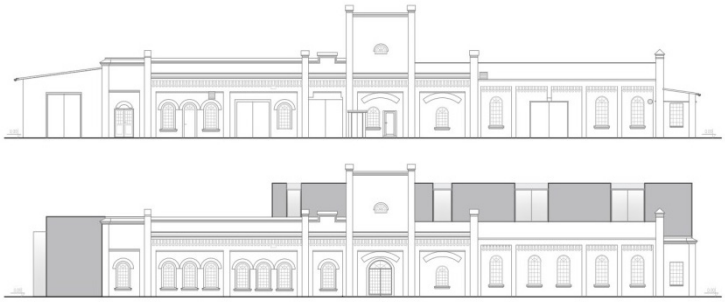


Figure 4. Current facade condition (above) and the proposed design (below), source: archive of the subject „Architectural design (II)“, University of Ecology and Management, Warsaw, 2022, edited version.

The functional plan (Figure 5) provides environments that encourage informal conversations and workspace designs that provoke chance encounters. Chance encounters and spontaneous conversations among coworkers can spark collaboration, improving creativity, innovation, and performance [25]. Therefore, the authors have included spaces for informal gatherings along the corridors and a separate social room that connects to the terrace for team-building gatherings and can also be used for more formal occasions. These spaces are designed to create a more inviting atmosphere in the building. House-like offices are introduced to the design with appropriate decor, interior climate, and accessories (e.g., hair dryers and cabinets for personal cosmetics). The inclusion of shared kitchens encourages employees to cook together, and gathering rooms with comfortable armchairs and couches promote a sense of domesticity. Domestication contributes to a sense of security, reduces distance among individuals, and facilitates relationship-building, which in turn alleviates stress and positively impacts successful careers, as well as employee engagement [26]. The building is located within a large industrial site with several buildings in need of contemporary facilities. This circumstance presents an opportunity to expand the usage of the building to serve the entire PGNiG complex. The horizontal extension is utilized as an entrance and connection to the major conference room, providing toilets and multifunctional space. This space can function as a single entity, adapting to different functions depending on user needs. Additionally, it can serve as storage for chairs from the conference room, allowing the room to be transformed for various purposes. According to the research "Future of Office Space" [26], a survey of Polish citizens about their needs and wishes for contemporary offices revealed the most popular

facilities desired were: inspiration classes and creative activities, spaces for yoga/fitness, and playrooms for children. The horizontal extension, either as a connection to the conference room or as a separate entity, provides the flexibility to accommodate these facilities based on the temporary needs of the staff.

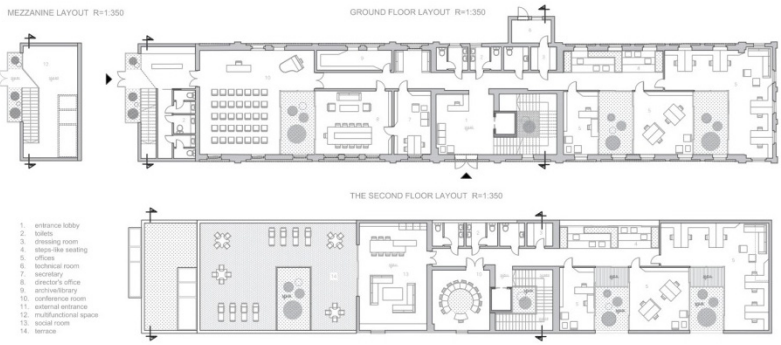


Figure 5. Proposed functional plan of the building, source: archive of the subject „Architectural design (II)“, University of Ecology and Management, Warsaw, 2022.

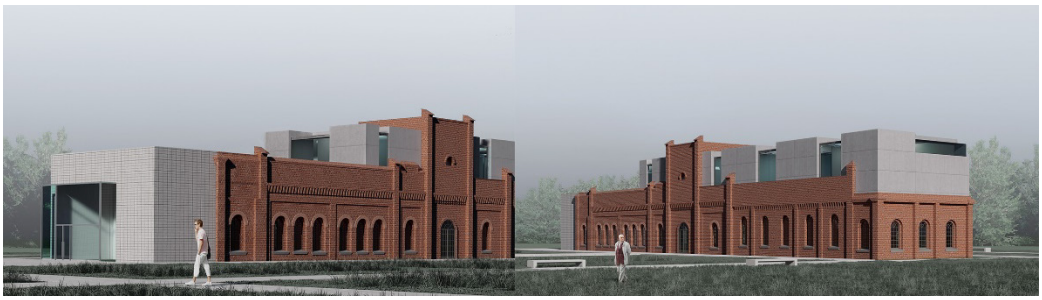


Figure 6, Figure 7. Visualization of the conceptual design, source: author

6. DISCUSSION

The discussion will be conducted from the aspect of the building's new purpose, defined by the Dublin Principles [9] and from the aspect of physical interventions, defined by Andrzej Danowski [10], both dicussed in chapters 2 and 3.

From the aspect refered to The Dublin Principles document, it has been concluded that converting a former industrial building into an office space benefits the sustainability and usability of the structure, especially considering the wider function of the PGNIG complex. The space is optimized for all types of collaboration, from chance interactions to large formal meetings. Conference room has the individual entrance, so it can be used not only by the workers of the budiling, but also to support the whole PGNIG complex. Neutral palette and the color of glass which is complementary to the brick color are emphasizing the historical facade. The grid pattern of the extension correlates to the original brickwork. Furthermore, the interior of contemporary office spaces is designed with light surfaces and furniture, ensuring the massivness of the brick walls to stand out as the leitmotiv. In line with The Dublin Principles state that ''*physical interventions should be reversible, and respect the age value and significant traces or marks*'' the light structures can easily be assembled and dismantled without endangering the historic structure. Minimalistic design is neutral compared to the inheritaged

buidling, highlighting the details and the brickwork of historical facade These structures also stand in contrast to the inherited spaces in terms of form, scale, and materialization, thus the differentiation between old and new is easily recognized. Such approach is chosen to emphasize the original form and proportions of the building.

From the aspect of physical interventions on the building, the authors have relied on theoretical classifications by Danowski. The authors have concluded that, in the case of this buidling, it is more favorable to use the active adaptation method, as the building is surrounded by larger and more monumental industrial buildings. Also, it is up for debate wether the buildings is of great historical importance, or does it represent revolutionary achievements of Polish industrial development. Therefore, by adding contemporary extension and upgrade to the historic building, there are more opportunities for designing favorable contemporary functional organization, while the exterior is impersonating layers of arhchitectural practice over time. Contemporary extension and upgrade reffers to the intention for modernization of the PGNiG complex, which suits up with their previous interventions.

7. CONCLUSION

The discussion chapter suggests that any architectural interventions in historic structures must represent a well-balanced communication between the needs of contemporary society and the universal postulates on heritage preservation and adaptation. It proposes that it is possible to find contemporary solutions that, although built in a different style, correlate with the historical buildings, making them more suitable for contemporary urban functions. Individual proposals for the transformation and adaptation of inherited buildings should consider the historical importance of the buildings, the broader context and function of the site, as well as the needs of the users, while respecting the heritage protection framework and theoretical principles in the field of heritage management. Adopting a systematic and holistic approach in this process can greatly benefit the local community and provide sustainable spaces for contemporary cities, so it can serve as a guide on the possibilities of preserving, transforming, and reusing our collective history.

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