

Analysis of the Existence of Air Raid Shelters from the Perspective of Urban Renewal

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ABSTRACT

With the continuous development of society, as a wartime legacy space, air raid shelters have certain development significance in today's increasingly dense urban construction. However, there are currently many problems with air raid shelters, such as aging buildings, texture damage, hindering urban development, and underutilization. To address these issues. This article explores the optimization strategy of air raid shelters from the perspective of urban renewal, proposes solutions to organically integrate them with modern cities, and radiates new vitality and energy. At the same time, it also provides useful references for the analysis and practice of urban planning and historical and cultural protection.

KEYWORDS

Urban renewal; Air raid shelter; Problem; Strategy

1 Introduction

Urban renewal is an important link in the process of urban development, aimed at meeting people's growing living needs, enhancing the competitiveness and sustainable development capacity of cities. The 18th National Congress of the Communist Party of China gradually established the development strategy of new urbanization, and urban development entered the stage of stock renewal under the new development concept ^[1]. In recent years, China has attached increasing importance to urban renewal work ^[2]. Many policies have been introduced to jointly promote the development of urban renewal. Air raid shelters once played an important protective role during wartime, but with the changing times, they have gradually become passive spaces, and their functions and values urgently need to be reconsidered and repositioned. With the acceleration of urbanization in China, air raid shelters occupy a large amount of underground space and carry rich historical and cultural connotations, making them highly potential for development in the context of urban renewal.

2 Core analysis of Existing Problems in Air Raid Shelters

2.1 Building aging

2.1.1 Structural Safety Hazards

The construction of air raid shelters was an indispensable part of the national defense system during the Anti Japanese War, the Liberation War, and the early days of the founding of New China. Especially from the late 1960s to the early 1970s, due to the complexity of the international situation, there was a large-scale boom in the construction of air raid shelters in China. A large number of civil air defense projects (such as air raid shelters) were built, forming an "underground Great Wall" that spanned across the country. The Zhaoxindian air raid shelter in Fengtai, Beijing was built against this historical background, as it was necessary for national defense at that time.

Over time, these air raid shelters have been subjected to the dual effects of natural erosion and human activities, but have not been properly maintained and repaired for a long period of time, resulting in serious aging of the building's structure. Due to the relatively backward construction level at that time, many air raid shelters had problems with wall cracking, top collapse, and foundation subsidence. The Zhaoxindian air raid shelter is no exception. It has accumulated garbage inside, and because it has been in a humid underground environment for a long time, early building materials such as concrete and steel bars are prone to corrosion, resulting in reduced strength and cracking.

In addition, with the acceleration of urbanization in China, the development and utilization of underground space are becoming increasingly frequent, and the aging of building structures is also reflected in the weakening of the load-bearing system. Due to the lack of precise evaluation of the original structure's bearing capacity, some air raid shelters may face the risk of overload during the functional transformation process, causing deformation and displacement of their internal supporting structures. This not only affects the safety of the air raid shelter itself, but also endangers the safety of surrounding buildings.

2.1.2 Outdated and Dilapidated Facilities

The ventilation system is an important guarantee for ensuring the quality of the internal environment of the air raid shelter, but most of the existing ventilation equipment is outdated and cannot be used normally. The old ventilation ducts are corroded and blocked, and the ventilation equipment has insufficient power, which cannot meet the needs of modern use. This leads to poor ventilation, high humidity, and poor air quality inside the air raid shelter, which can easily breed harmful microorganisms such as bacteria and pose a threat to human health.

Lighting equipment also has similar issues. In the early days, the lighting of air raid shelters was mostly incandescent lamps or low-power fluorescent lamps, which had insufficient brightness and high energy consumption. With the increase of service life, problems such as aging and short circuits of lighting equipment and circuits have become increasingly prominent. This not only affects the normal use of the shelter, but also brings potential fire hazards to the shelter.

The drainage issue in the structure of the air raid shelter is also a key focus. Due to the low construction standards at that time, the basement has completely lost its wartime protection function, and there are many safety hazards due to water seepage in multiple places^[3]. During the rainy season, there will be significant water accumulation. Accumulated water not only accelerates the damage to the building structure, but also increases indoor humidity, deteriorating the internal environment.

2.2 Texture Destruction

2.2.1 Space Fragmentation

The distribution of air raid shelters in cities often lacks systematic planning, with scattered layouts based on emergency shelter needs during wartime, without considering the organic integration with other functional spaces in the city during peacetime. From a spatial distribution perspective, these buildings are like isolated nodes scattered in the urban fabric, lacking effective connectivity and a unified spatial sequence. Separated from surrounding commercial, residential, and public service facilities, it forms a fragmented underground space model. This disorderly layout not only makes it difficult for air raid shelters to form large-scale functional zones, but also seriously affects the overall utilization efficiency of urban underground space, becoming a bottleneck restricting the construction of urban underground space networks.

In terms of the spatial structure inside the air raid shelter, early construction and later use often led to unreasonable zoning. For example, the design team attempted to transform the Qixinggang air raid shelter under the Tongyuanmen City Wall in Yuzhong District into a commercial space that combines with the surrounding urban space, revitalizing the old city. However, during the renovation, it was found that it was randomly divided into narrow and cramped spaces. Due to its irregular wall segmentation, narrow corridors, and other factors, it affected the layout of shops and the shopping experience of consumers, making it impossible to create an open, comfortable, and attractive commercial atmosphere. This disorderly zoning destroyed the overall integrity of the space, causing the underground space, which originally had a certain scale and plasticity, to become fragmented. It restricts its commercial value and development potential, and it is also difficult to form a good correspondence and complementarity with the surrounding ground commercial blocks.

2.2.2 Disconnected from the Urban Context

With the continuous development of urban renewal in our country, many historical buildings and traditional neighborhoods around air raid shelters have been gradually demolished or rebuilt, causing serious damage to their original historical features and cultural context. As a product of historical periods, air raid shelters were originally embedded in specific historical and cultural scenes, and together with surrounding buildings, streets, and people's activities, formed a special urban memory. However, with changes in the surrounding environment, air raid shelters gradually lose their historical and cultural soil on which they rely for survival, becoming a "cultural island" isolated by modern urban scenery.

The renovation of Wushan air raid shelter in Fuzhou is a typical example, which reveals how air raid shelters have lost their historical and cultural significance in the wave of modernization. This air raid shelter is also a convenient passage connecting Wushan Park and Liming Lake Park, and with its Fuzhou oil paper umbrella design, it has attracted many tourists to come and check in^[4]. However, after transforming into a commercial theater, tickets must be purchased to enter. This renovation method did not fully consider the cultural value of the air raid shelter as a historical relic, but instead placed too much emphasis on its commercial value. This transformation cannot fully reflect local culture, nor can it fully leverage its inheritance and innovation of local culture.

In addition, during the renovation of air raid shelters, many cultural relics were lost or overlooked due to a lack of deep understanding and awareness of historical and cultural protection. From the perspective of spatial design, many unique entrance forms, internal arch structures, historical slogans or graffiti on the walls, and other original architectural features of air raid shelters are arbitrarily demolished, covered, or damaged without consideration. Therefore, when the air raid shelter is reintegrated into urban life, it only becomes an ordinary functional space and loses its unique charm as a carrier

of urban culture, leading to further disconnection from the urban context.

2.3 Hindering Urban Development

2.3.1 Idle and Wasteful Land Resources

Air raid shelters occupy urban central areas or other land resources with high development value, but due to the lack of reasonable and effective development plans, they have been idle or underutilized for many years. This has caused difficulties for urban renewal. For example, the air raid shelters in Shanghai are mainly distributed in urban areas such as Huangpu, Jing'an, and Xuhui. According to incomplete statistics, there are over 40 air raid shelters along more than two kilometers of Nanjing East Road^[5]. In today's increasingly tense urban land situation, the land occupied by air raid shelters has not been fully developed and utilized, resulting in resource waste. In some core areas, due to the existence of air raid shelters, the surrounding land cannot be used for large-scale commercial development and high-quality residential construction, resulting in the economic value and social benefits of urban land not being fully realized. Due to its irregular distribution and complex underground spatial structure, urban renewal projects require more time and cost.

2.3.2 Difficulties in Planning and Coordination

Due to time constraints, there are often missing, inaccurate, or incomplete planning data and drawings. This has caused great difficulties for current urban planning and construction. Chongqing is a good example. By 1942, Chongqing had 1603 air raid shelters, equivalent to 178 shelters per square kilometer, which could accommodate almost all citizens^[6]. These air raid shelters are not only numerous, but due to the unique terrain and long history, many detailed drawings of the shelters have been lost. These factors combined make them face the problem of planning difficulties. For engineers, it is difficult to accurately grasp the location, depth, structural form, and layout of internal equipment of air raid shelters. For example, in the foundation construction of a new building, if the specific condition of the air raid shelter is not well understood, accidents may occur during construction, and even safety incidents may occur. In order to detect and deal with unknown air raid shelters, it requires increased investment in technology and personnel for physical exploration. Add some unnecessary extra costs. Inaccurate information can also affect the scientificity of urban planning. If the location of the air raid shelter is not fully understood, building bridges above it will not only put a lot of pressure on the shelter, but also pose risks to the service life and driving safety of the highway.

At the same time, due to the complex ownership issues of air raid shelters involving multiple departments and units, there is a lack of effective communication and collaboration among various departments in urban construction, making it difficult to establish a unified planning and management mechanism. This leads to a lack of systematic and complete planning guidance for the protection and utilization of air raid shelters, which can easily result in fragmented and redundant construction, seriously affecting the coordination and orderliness of construction and restricting the smooth progress of urban renewal.

2.4 Insufficient Utilization

2.4.1 Single Function

Currently, the usage of most air raid shelters in China is relatively simple, limited to basic functions such as storage and parking. This single functional model has not fully tapped into the potential value and diverse spatial possibilities of air raid shelters. In the commercial center area, air raid shelters are only used as low value-added commodity storage, and some of their advantages can be developed into underground spaces with special functions.

The air raid shelters around residential areas are often only used as temporary parking spaces, neglecting that they are a place for people to engage in public activities. Air raid shelters can be converted into community libraries, sports halls, and children's entertainment venues to meet the diverse living needs of residents and improve the quality and cohesion of community living. The "Military Brother Bookstore" in Huangjueping Street, Jiulongpo District, Chongqing is a case of air raid shelter renovation that meets the above requirements. This building was originally prepared for war and later converted into a community library. Using the space inside the air raid shelter, a bookshelf measuring 45 meters long and 4.5 meters wide was set up along the wall, with a collection of over 5000 books. This renovation not only provides a place for citizens to read and relax, but also preserves the historical style of the air raid shelter, increasing the humanistic atmosphere and cohesion of the community.

2.4.2 Lack of Innovative Development Models

There is a common problem of insufficient innovative ideas in the development and utilization of air raid shelters. Many development projects simply imitate the traditional underground space development model. Not fully tailored to the characteristics of the air raid shelter itself. The project of converting some air raid shelters into commercial spaces simply replicates the construction method of ground commercial blocks, without considering the unique spatial atmosphere and historical and cultural heritage of air raid shelters, resulting in a lack of attractiveness and

competitiveness in the developed commercial space, making it difficult to establish a foothold in the market. There are also shortcomings in the application of new technologies, materials, and concepts. At present, the application of green building technology and intelligent technology systems in the renovation of air raid shelters is relatively rare. Due to the lack of deep integration with cultural and creative industries, emerging technology industries, etc., innovative and leading development projects for air raid shelters have not been created, which limits the value enhancement of air raid shelters in urban renewal.

3 Strategies for Addressing Existing Issues in Air Raid Shelters

3.1 Revitalization and Architectural Regeneration Design

The perspective on the aging problem of air raid shelters should be on how to revitalize and regenerate these historical spaces through "activation" and "regeneration". A complete architectural assessment must be conducted on the air raid shelter to understand its structural safety, spatial layout, and potential usage requirements. Based on the above research results, modern design methods such as spatial reconstruction, material updates, and lighting and ventilation are adopted to transform the air raid shelter into a space that meets modern usage requirements. For example, air raid shelters are products preserved during wartime, reflecting the severe social background and conditions of the time, and can therefore be said to be excellent national defense education bases^[7]. While preserving its historical memory, it can also become a diverse and modern architectural space.

On the other hand, in architectural design, emphasis should be placed on ecological and sustainable development, utilizing green building materials and energy-saving technologies to reduce the impact on the surrounding environment and improve the energy efficiency and comfort of air raid shelters. In addition, the application of artistic techniques such as art installations and murals can serve as a way to "activate" and "reuse" architectural renewal design. This can not only beautify the space, but also encourage people to pay more attention to and participate in the renovation work of the air raid shelter.

3.2 Spatial Integration and Urban Texture Restoration

The core of spatial integration is to organically combine the unique underground space of air raid shelters with other spatial elements of the city, forming a continuous, coordinated, and dynamic urban spatial system. This requires a comprehensive consideration of the geographical location and spatial form of the air raid shelter at the beginning of design. By utilizing landscape design, green layout, and other methods, the entrance of the air raid shelter is seamlessly connected to the urban public space, forming a transitional landscape node. This not only beautifies the urban environment but also enhances the recognition of the air raid shelter.

Urban texture is an important reflection of urban history and culture. As a part of urban texture, the restoration of air raid shelters involves both the reconstruction of physical space and the preservation and reshaping of urban memory. When renovating air raid shelters, full consideration should be given to their historical context and regional characteristics. Using modern design methods, reshape the spatial form of air raid shelters to meet contemporary aesthetic requirements and coordinate with the surrounding urban space.

3.3 Policy Guidance

The problem of air raid shelters hindering urban construction and underutilization requires joint efforts from the government and various sectors of society to solve. It should be advocated to promote the renovation and use of air raid shelters in a policy oriented manner. The state should formulate corresponding policies to define the development direction and usage standards of air raid shelters, and encourage private funds to invest in the construction of air raid shelters. At the same time, establish an approval, supervision, and evaluation mechanism for civil air defense projects to ensure that their implementation meets the requirements of urban planning, environmental protection, and historical and cultural preservation. In addition, various activities such as design competitions and creative markets can be held to stimulate public attention and participation in the renovation of air raid shelters, creating a good atmosphere of government guidance and participation from the whole society.

4 Conclusion

In today's densely populated cities, air raid shelters are an important spatial resource, and their development potential and value cannot be ignored. However, there are still many problems with the existence and development of air raid shelters, which not only limit their value but also affect the sustainable development of cities. Therefore, from the perspective of urban renewal, this article optimizes the design of air raid shelters to promote their modernization and sustainable development. Of course, this article also has some shortcomings. Firstly, the analysis of the problems existing in the air raid shelter is not comprehensive enough and does not cover all the factors that may affect the survival of the air raid shelter. Secondly, regarding the discussion of coping strategies, although directional suggestions have been put

forward, more research and improvement are needed in the specific operational process. In the future development, it is hoped that more scholars will turn their attention to the special space resource of air raid shelters and explore its existing problems on this basis. To provide valuable experience and reference for the renovation and transformation of similar historical legacy spaces in other cities, and to promote the prosperity of urban renewal in the interweaving of history and modernity.

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