

Regeneration of Urban Vacant Space
— Taking Guangzhou Yitai Square as an Example

Politecnico di Torino



Master Degree

ARCHITECTURE CONSTRUCTION CITY

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February 2023

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Abstract

There is a lot of underused, vacant space in Chinese cities due to various factors, including the country's ongoing urbanization shift. These areas frequently waste social resources, damage the city's reputation, house possible security issues, and impede the advancement of urbanization. The rising vacant space and the declining demand for historic structures harm the city's economy. It is essential to investigate transformation techniques and the currently vacant space.

This article is based on the exploration and design strategy of the regeneration and transformation of the Guangzhou Yitai Square in the context of urbanization. The sustainability study of the vacant space in Yitai Square proposes design methods to activate vacant space in the city and explores ways and value of regeneration of vacant space.

The article examines the origins, traits, and effects of urban vacant space on Chinese cities and the lives of their inhabitants. It argues that concepts like continuity, utility, humaneness, sustainability, and context awareness should guide the transformation of urban vacant spaces. Case studies show how urban rehabilitation of vacant space contributes significantly to urban growth.

Finally, particular design approaches are suggested to change vacant spaces in light of prior research and theories of urban design. Four factors should be considered while changing urban vacant areas: social, cultural, economic, and space. This includes coordinating with the surrounding environment, ensuring functional utilization, preserving urban memories, enhancing public art spaces, improving

outdoor facilities, optimizing transportation systems, and elevating landscape quality.

Key Words

Vacant Space, Transformation, Sustainable Design, Urban Regeneration

Chapter 1 Introduction

1.1 Background

With China's rapid economic development and the continuous increase in urbanization, the current urban space is changing quickly. However, the accelerated pace of urban construction and extensive urban reconstruction has also left behind some issues. Excessive resource exploitation has led to the waste of spatial resources. A large number of vacant spaces have emerged. As financial backers, the government is more willing to develop high-value land for rapid economic growth, neglecting low-value land. There are also improper usage factors. Various reasons led to the emergence of urban vacant spaces. This kind of vacancy and abandon phenomenon is common in Chinese cities.

The government has been pushing for more attention to the problem of vacant spaces and encouraging their transformation and reuse, but the actual outcomes have yet to be good. Not all issues associated with wasted space can be adequately resolved by current approaches to managing vacant space. These vacant spaces are now tricky problems to solve in urban growth. They are dispersed throughout neighborhoods, secluded in the immediate area, or delineated by ambiguous borders. There still needs to be a consensus on whether to tear down and rebuild or renovate vacant spaces and use them again. The issue of vacant space has also attracted widespread social attention.

1.2 Significance of study

Many vacant spaces have appeared in different parts of Chinese cities these years. These areas waste available land resources in addition to harming the city's reputation and the standard of living. Nevertheless, tearing down and starting again is not a practical option because this kind of development would be costly to repair and would result in the loss of historic structures that may be transformed, wasting society's resources. These factors cause dilapidated buildings to stay neglected, weed-infested, and littered, turning them into a barren wasteland that obstructs efficient urban space management. In addition, changed industries, weakened economies, arcane financial systems, population migration, and aging resident populations have left many people living amid this vacancy, with clear implications for human health and safety (*Nassauer, 2014*). In order to alleviate these negative impacts, people should re-understand these disorganized urban vacant spaces.

First and foremost, investigating vacant spaces can produce tangible and helpful design ideas that direct workable solutions essential for resolving present-day and future urban problems. The pursuit of improved living conditions has always piqued interest. Cities are mostly made to be efficient and productive in modern urban development. Therefore, there needs to be more to sufficiently consider the conditions necessary for a higher standard of public life in finished urban areas. Vacant spaces provide a partial remedy for the problems associated with land usage.

We can explore how urban vacant spaces ought to be revived in today's cities by exploring the domain of urban vacant spaces. This entails classifying and combining

different kinds of vacant spaces, each with its own origins, to extract transformational principles that are generally applicable.

Second, it is clear from studying urban growth worldwide that new vacant spaces constantly appear as times change. As a result, the vacant space frequently involves urban issues, needs, and trends. In the long term, vacant spaces become dynamic in urban transformation because they are always connected to ongoing urban changes. They give research viewpoints on urban development and repair from an angle that views vacant spaces as opportunities rather than disadvantages.

1.3 Situation of study

Vacant space itself, or vacant space used, continues to be the primary research object in current vacant space studies, with the primary focus being on the spatial properties, potential value, utilization strategies, and transformation strategies of vacant space.

1.4 Research method

Literature review: A literature review makes it possible to understand the idea and substance of vacant spaces and the state of international research on the topic. It is possible to gather vacant space transformation cases from international contexts by reading pertinent literature supporting theoretical ideas. The literature evaluation also provides information on recent advancements in the relevant subject of study.

Case studies: Case studies are essential research methods in the study of vacant

space regeneration and have several uses. These case studies show the vacant spaces in pre-transformation and post-transformation states. Case studies are firstly to verify the correctness of theoretical research; secondly, the problem of urban vacant space is specific, special, and has certain types. Therefore, case studies need to be large and diverse to supplement theoretical research. As a result, doing case studies is essential. Similarities and differences between situations with different vacant spaces can be found by comparing them. This makes it possible to get design trends from the case and apply them to regenerating abandoned places.

Sociological research: Methods of sociological research are essential to the subject. Sociological research methods include site surveys, data collection regarding usage trends, and user feedback. This usually consists of the functional distribution, the user base's demographic makeup, usage patterns over time, and more. These study guides secondary changes.

Chapter 2 The Causes and Significance of Vacant Space

2.1 Definition and classification of vacant space

2.1.1 Definition of vacant space

Ordinarily, vacant urban spaces are defined as places that have lost their original purpose and function and whose current usage is uncertain but could be developed or used for more proactive purposes. There are many different sorts of vacant spaces and many causes that contribute to their emergence. Cities moved from traditional to modern environments in the second half of the 20th century as urban development advanced. In this process, a lot of vacant space was created. In contemporary cities, complex transportation systems and the development of tall skyscrapers are commonplace, contributing to the formation of what is known as the "urban forest." There are also unmanaged and disorderly areas surrounding these neighborhoods, some of which are made up of vacant urban spaces.

Drawing from prior studies, I provide the following summary of what I mean when I define vacant urban space: The term "urban vacant space" describes a variety of unused, abandoned areas created during the various stages of the urban environment's development. These areas are in flux, and their presence can negatively impact people's quality of life, the comfort of the surrounding area, and the city's reputation.

We can identify if a space is vacant based on the following three criteria outlined in the definition of vacant space above.

1. At a given time, urban vacant spaces lose their purpose and acquire functional characteristics or aesthetics that are out of keeping with the surrounding area or the age.

2. Urban areas that are occupied are solitary areas that need clear goals or functions.

3. The potential to reuse vacant places still exists.

2.1.2 Classification of vacant space

There are many different causes of vacant space in cities. Because vacant spaces have other characteristics, the ideas that drive their development also naturally diverge. As such, it is imperative to assemble broadly applicable strategies customized for various categories of vacant space. Researchers provided that “Different types of urban vacant lands can be categorized in terms of their potential uses. Derived from the field observations. Depending on its development history, urban vacant land can be divided into previously developed land or previously undeveloped land. Previously developed land often, but not invariably, has existing building structures, while previously undeveloped land represents sites that have never been built on and so contain no remnants of building structures. Previously undeveloped land is more straightforward: it is either suitable for development or not suitable for development, depending on whether its natural and physical characteristics render it physically unfit for development.” (Kim, 2016)

Some spaces eventually become unoccupied when cities build more buildings and

develop new areas on a massive scale. I divide vacant spaces into two primary categories: abandoned vacant spaces with existing structures and underdeveloped ones without facilities or defined roles. This classification is based on the many reasons for the formation of vacant spaces and their differing spatial characteristics. By examining these two categories of vacant spaces and comprehending their landscaping and traits, we can summarize their overall features.

1. The first group includes areas that were formerly home to buildings. Still, they must maintain their usefulness and regional vibrancy to suit the region's needs. Old factories, deserted structures, defunct docks, railroads, schools that have moved, and unfinished construction projects all fall under this category (*Jin Kim, 2009*). They're what we call "abandoned urban vacant spaces." These kinds of vacant spaces can be found throughout a metropolis. For instance, unfinished construction projects, such as abandoned buildings, can result from problems like poor pre-development planning, unfinished government development plans, or insufficient finance from real estate developers. These incomplete projects take up significant amounts of land and stay unresolved in an environment with limited land resources, not only the urban environment and image but also pose certain obstacles to economic development.

2. Undeveloped vacant spaces without structures or distinct uses fall into the second group. There are 4 types of vacant spaces defined in some research: physical vacant lands (*Jin Kim, 2009*), economic vacant lands, ecological vacant lands, and social vacant lands. Because these properties are frequently found in outlying regions of the city and might have less economic worth, developers are less interested in

purchasing them. Examples include recently released areas in the course of urban development and isolated suburban vacant spaces. Developers establish new projects, like retail stores and residential structures, depending on the intended use and location, such as the center of the city or its outskirts. They are classified as "undeveloped vacant spaces." The adverse effects of these isolated vacant spaces on the urban environment are usually minimal because they are rarely observed or given much attention.

Urban vacant spaces are not only a problem in one city; they are a widespread societal phenomenon on a global scale. It is impossible to prevent vacant spaces in light of societal growth completely. The public has long disregarded the issue of landscaping urban vacant spaces. Consequently, the study aims to investigate how urban vacant spaces might be activated by referencing pertinent urban spatial theories and providing an overview of critical key concepts and tactics. How to deal with the first group of abandoned vacant places is the main topic of this paper. Understanding these unoccupied, abandoned locations' characteristics is the first step toward transforming them. Many of these areas, like former factories, have lost their usefulness and functionality to urban regeneration. The upgrade is crucial to these existing structures while respecting their architectural heritage.

2.2 The causes of vacant space

Urban vacant spaces are a sign of today's urban spatial problems. The numerous elements that have contributed to creating these spaces—including historical,

architectural, natural, and other human-induced features—have all been thoroughly summarized by extensive research. The results of urban development and evolution, such as industrial decline, urban deterioration, and restrictions on preserving historical heritage, are historical elements that contribute to vacant urban spaces. Urban planning and architectural design decisions, particularly irrational urban planning, shape design-related factors that influence the generation of urban vacant spaces. Geographical and climatic conditions, such as restrictions imposed by geographic surroundings, are natural elements of urban vacant spaces. Furthermore, regulations, economics, and sociocultural variables—including the limitations imposed by policies and economic considerations—all impact other human-induced elements contributing to urban vacant spaces. Large swathes of built space have been abandoned. The abandonment is related to rapid programmatic changes due to deindustrialization, population aging, migration, political and economic shifts, cultural reframing, or ineffective planning (*Accordino & Johnson, 2020*).

When looking at the concept of vacant spaces, it is clear that the two most essential elements that lead to the creation of restricted spaces are those related to design and history. For design, excessive formalization is a tendency in design processes, frequently resulting in architectural design that ignores urban context and fails to address human-centric spatial design. For example, the designers need to understand that external spatial structure in the context of urban development is directly responsible for vacant spaces beneath urban elevated roadways. For history, conflicts within the urban landscape are inevitable due to the ongoing evolution and

change of the urban development process. The High Line Park in New York is one famous example. The demands of a modern urban environment clash with the long-standing legacy of elevated freight rail tracks, forming vacant space.

2.3 The significance of the existence of vacant space

1. Negative: Vacant spaces preserve a city's historical growth and living experiences by acting as archives of urban memory. The urban landscape has become fractured due to the long-standing disrespect for vacant urban spaces and the subsequent progressive obsolescence of their original purpose, which causes difficulties with transportation. Historic structures with a rich history of the city and distinctive features have come to represent a "burden" to the area, as they have fallen into disrepair and have not been able to protect the city's historical legacy. Rejuvenating urban vacant spaces requires more than just destruction and repair.

Given the current land-resource constraints, vacant spaces pose two problems: they impede economic development and damage the city's reputation while consuming critical social resources. These abandoned, forgotten areas have left the town "riddled with wounds," resulting in, among other adverse effects, underdeveloped local economies, disordered local surroundings, and security issues. In addition to degrading their quality of life and failing to meet their requirements, this causes adjacent citizens to feel insecure, dissatisfied with the city's state, and less well-off. Therefore, it is clear that urban vacant spaces have a detrimental effect on people's day-to-day lives.

2. Positive: Urban abandoned sites sometimes have a good effect. From an alternative angle, vacant spaces might highlight specific urban problems from particular eras. Cultures, as there are still vacant areas, indicate that the city is still developing and has great significance. Abandoned places are valuable because of their unrealized potential, and these are the exact kinds of spaces that may address and accommodate these urban problems. Thus, vacant spaces have a lot of potential and lots of opportunities. Vacant space presents an alternative to contemporary public spaces because even when vacant space is privately owned, local people have easy access and it can thus accommodate a variety of social groups, including marginalized types, creative industries and artists, or just young people hanging around in a place where they feel less under public scrutiny. Research suggests that external space is perceived as “public” when it is easy to access; its ownership or management is irrelevant. Public space does not require high costs or impressive design, but rather space for people’s activities (*Kim, 2016*).

Vacant space is an incredibly important albeit ephemeral resource. They are spaces that have an immense amount of flexibility in the way urban neighborhoods change. ‘Once you recognize that land in limbo is a resource, an asset rather than a liability, then actually it’s inexcusable to simply be in denial about it and do nothing about it,’ says Mr Baines. The truth is that most local authorities are in denial about what happens in this landscape (*Taylor, D., 2008*).

Chapter 3 Design Case

This chapter will investigate how to harness the potential of urban vacant spaces and achieve their transformation and city rehabilitation using the example of a reuse design project in Yitai Square, Guangzhou, where I participated.

3.1 Preliminary Analysis

3.1.1 Historical analysis

Originally intended to serve as an exhibition hall, the structure on Yitai Square was later transformed as a commercial retail space once its original use was no longer needed. Owing to a downturn in the economy, the first companies vacated the building, which became dilapidated and vacant for a while. It was later converted into a quarantine hospital during the COVID-19 pandemic, with the vast interior space partitioned into smaller areas to place hospital beds. Furthermore, a makeshift model room was built in the building's southeast corner as a washing room for medical staff. Following the end of the epidemic, the spaces remained empty again because of the tremendous cost of demolition indoors and outdoors. There could be a considerable decline in the value of vacant buildings as a result of reductions in commerce and de-investment, aesthetic appeal, and tourism.

3.1.2 Location Analysis

Situated in Guangzhou City's Yuexiu District, Guangdong Province, the project functions as a comprehensive functional area that links the residential areas of the

city's historic urban region with the commercial trade belt. The year-round weather in the area is warm and rainy, with lengthy summers and sporadic typhoons. In the city's heart, Yitai Square is encircled by several residential neighborhoods, educational institutions, retail centers, lodging facilities, parks, and other public areas, creating a busy and intricate atmosphere. Visitors may easily access the site because of its good geographical setting and well-developed transit network. There is an entrance heading into Yuexiu Park from the eastern side of the site. Jiefang North Road, which has one vehicle entry and two pedestrian entrances, borders it on the west side. On the southern side, there are stairs that lead to a bus waiting area. In conclusion, Yitai Square is located on a complicated and mixed-use site in Guangzhou's contemporary urban landscape because it is located in an area that blends commercial and residential land uses.

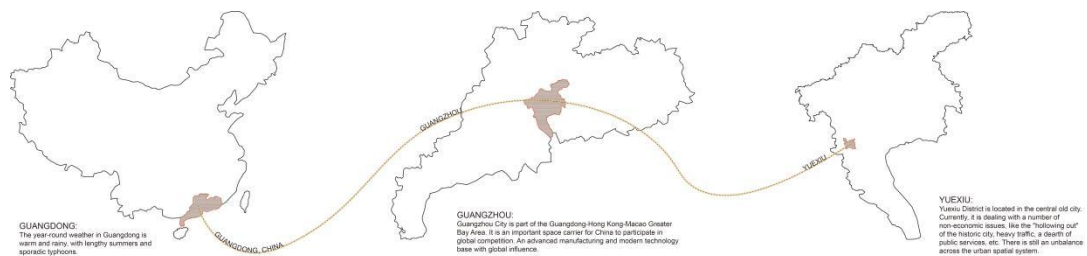


Figure 1 Location analysis (Drawn by the author)

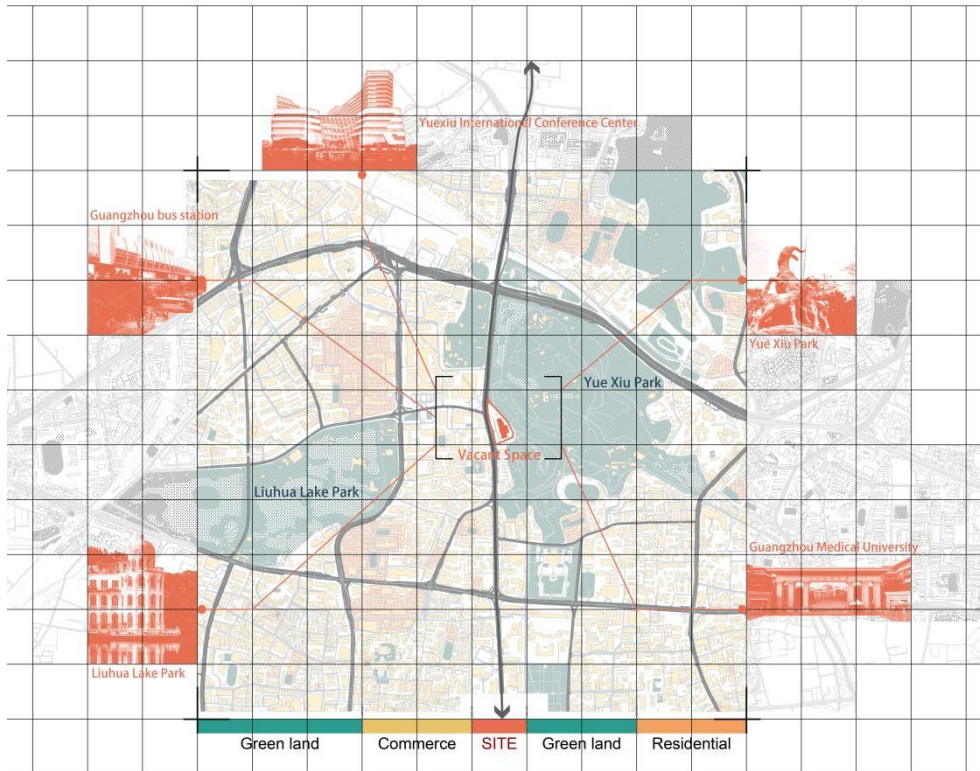


Figure 2 Site environment analysis (Drawn by the author)

Yitai Square, with its main building and surrounding vacant spaces, is roughly 14,500 square meters. The original building is a solitary concrete construction that dates back to the 1990s. It covers an area of about 4,800 square meters and is roughly 150 meters long by 50 meters wide. The original site is surrounded by a temporary fence that is two meters high, preventing unauthorized access, and the building's structural integrity is still intact. Additionally, 9,000 square meters of undeveloped vacant spaces surrounding the structure are presently utilized as a parking lot. The system's main body, from the first to the second floor, and the surrounding enclosed vacant spaces are included in the site selection for this project; there are no notable spatial constraints.

3.1.3 Site Survey

Considering the factual circumstances that were seen there, The four stories of the historic structure on the plaza are around sixteen meters high. The system is primarily concrete and has a straightforward architectural form with few external decorative details. It stands in stark contrast to the nearby contemporary structures. The location has eight lamp posts that can be taken down if needed.



Figure 3 Site environment (Drawn by the author)



Figure 4 Building environment (Drawn by the author)

The resident public facilities in the area are more than adequate. The park is excellent for kids and older people for walks and outdoor activities. Nonetheless, the urban adolescent population needs a venue that meets their social and recreational demands. In conclusion, there is a lot of crowd activity at the site right now, but visitors only stay for short periods. To address the requirements of the locals and

provide life to the site, it is imperative to provide a vacant space for activities.

3.2 Exhibition

This design was invited by Guangzhou Sun Yat-sen Memorial Hospital to update the vacant Yitai Square. The main purpose is to hold an art exhibition about female breast cancer with the title of "Embrace". The intervention of social activities gives Yitai Square the ability to regenerate. The exhibition period is from October 11, 2023, to November 11, 2023. In addition, the exhibition is a temporary transformation, mainly including photography, installation, painting, video, sculpture, and digital art. The square and building must be returned to its pre-exhibition condition, and the "boxes" used in the exhibition need to be retained and moved to Shenzhen, Hong Kong, and Turin for touring exhibitions in different cities.

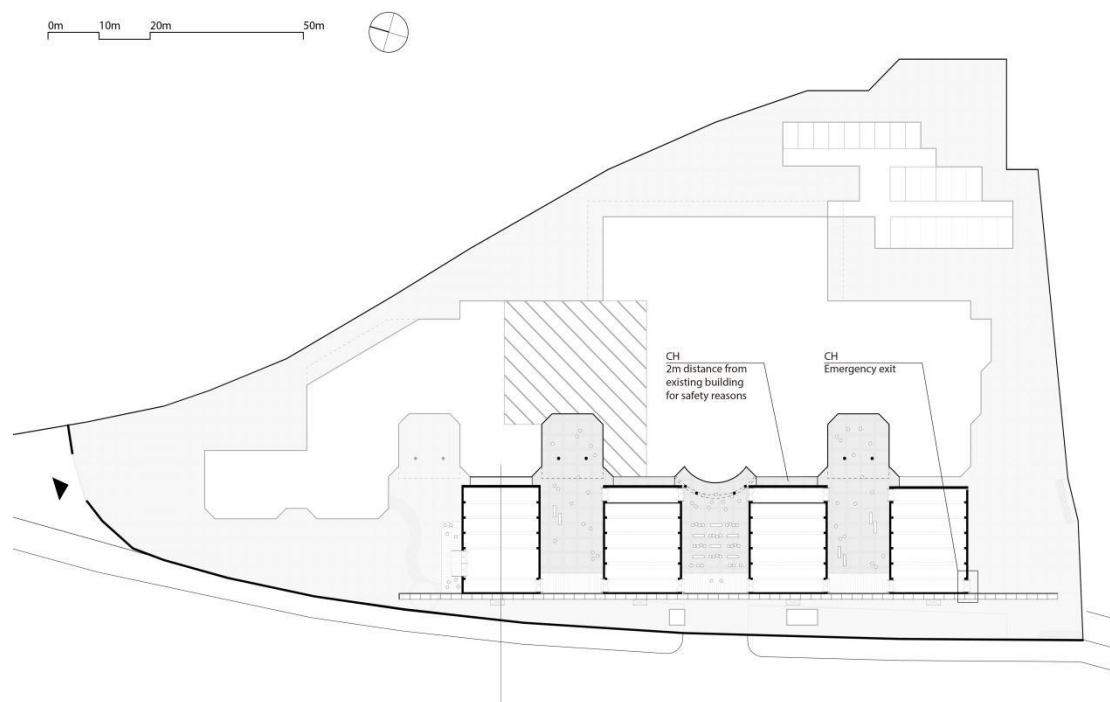


Figure 5 Exhibition plan (Drawn by Camilla Forina)

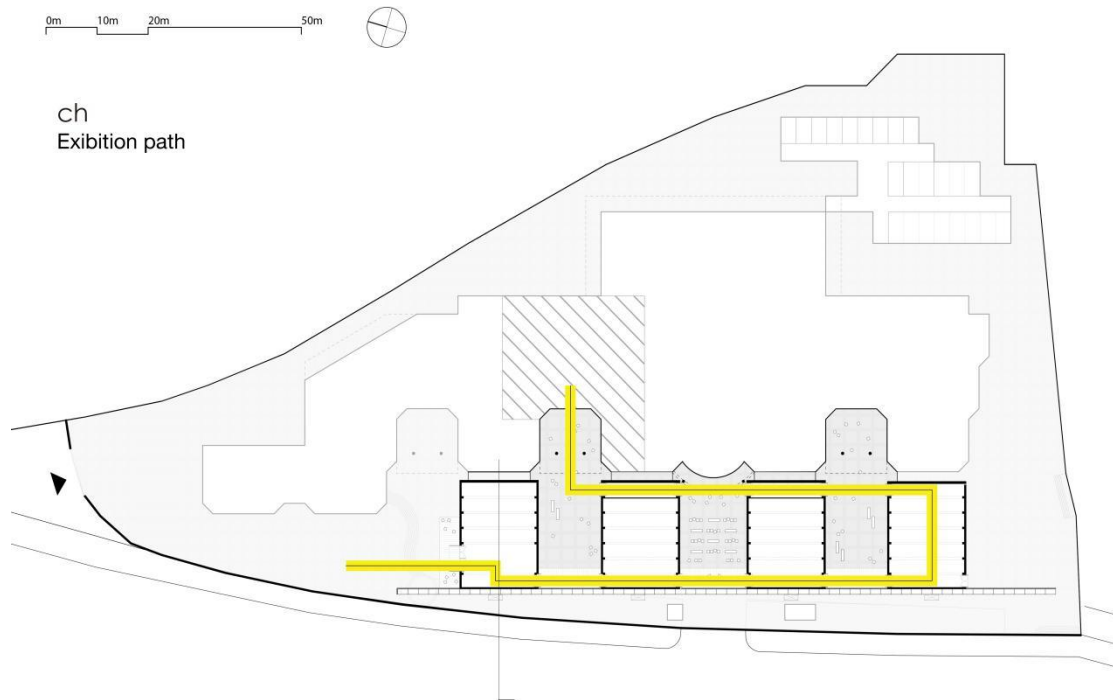


Figure 6 Exhibition path (Drawn by Camilla Forina)

In the actual project, Yitai Square's construction is primarily done on the exterior square, not inside the structure. The entire exhibition area is separated into national pavilions, and the CCCG's "PREMANU BUILDING" temporary construction method is utilized to make it easier for touring shows to relocate later. After that, the following two factors will be mostly used to reuse and change the vacant space in Yitai Square.

1. Continuation of existing fence

The site is currently surrounded by several metal walls used to demarcate the vacant site. The scaffolding wall serves as the temporary display building's front, effectively dividing the site into internal and outdoor sections. Technical equipment from outside can also be installed on the scaffolding wall. The translucent mesh material is draped around the exterior of the scaffolding. Through the scaffolding, a glimpse of the exhibition pavilions and the covering of artistic courtyards can be seen.

These mesh cloths also play a windproof role and can also be used as a carrier for art such as graffiti and wall painting. The walls and the blocks can also form some courtyards for socializing and outdoor exhibitions.

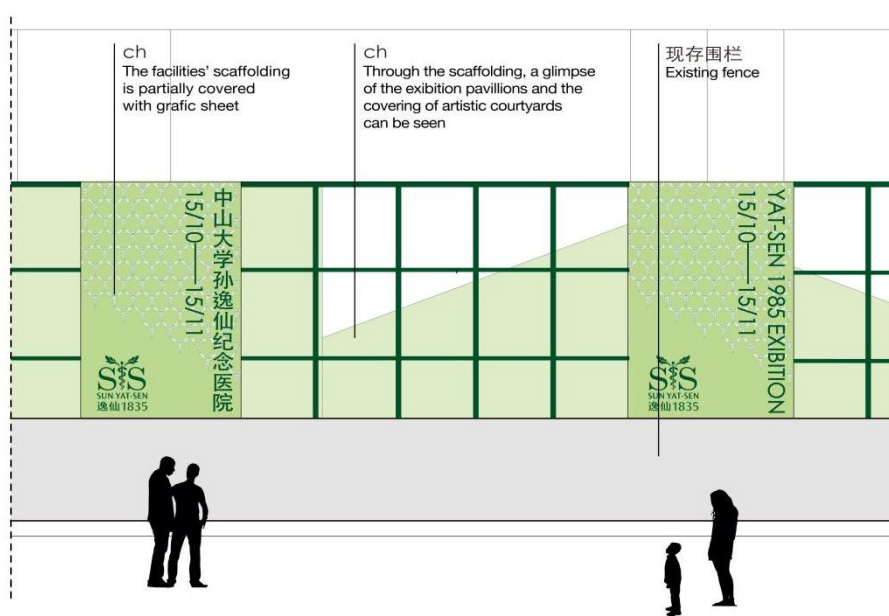


Figure 7 Scaffolding facade (Drawn by the author)

2. Reasonable module parameters

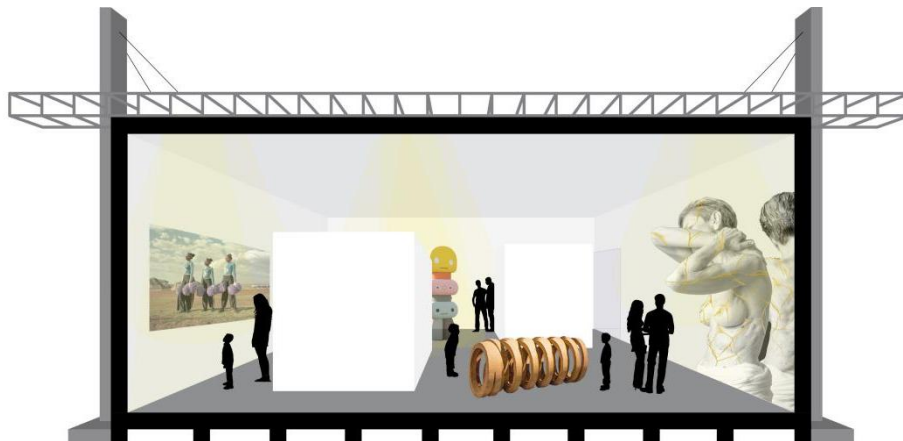


Figure 8 Pavilion interior (Drawn by Camilla Forina)

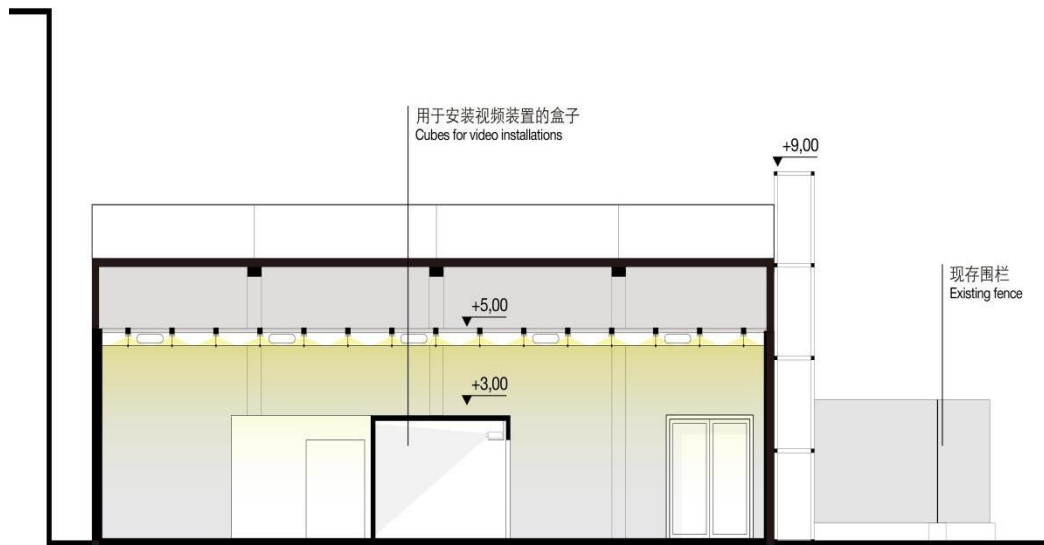


Figure 9 Pavilion section (Drawn by Camilla Forina)

Modular parameters that are appropriate can facilitate module assembly and combination, as well as improve the logic of module placement on the site. The ideal dimensions of the single module pavilion for display were found to be 20 meters by 16 meters by 6 meters, and the size of the single structure within the module is 5 meters by 4 meters, based on the existing state of the vacant space in the building and square. Taking into account the size of the site and the shape of the building, these modules are logically positioned in empty places. Walkway modules are used to connect each module to the others. A double-module pavilion is also utilized to accommodate the exhibition space's requirements.

Early on in the project's construction, the design was improved and optimized based on actual conditions. For instance, pitched roofs and counterweighted water tanks were added, to adapt to the weather conditions in Guangzhou City. light systems were redesigned, and some digital media technologies were applied.

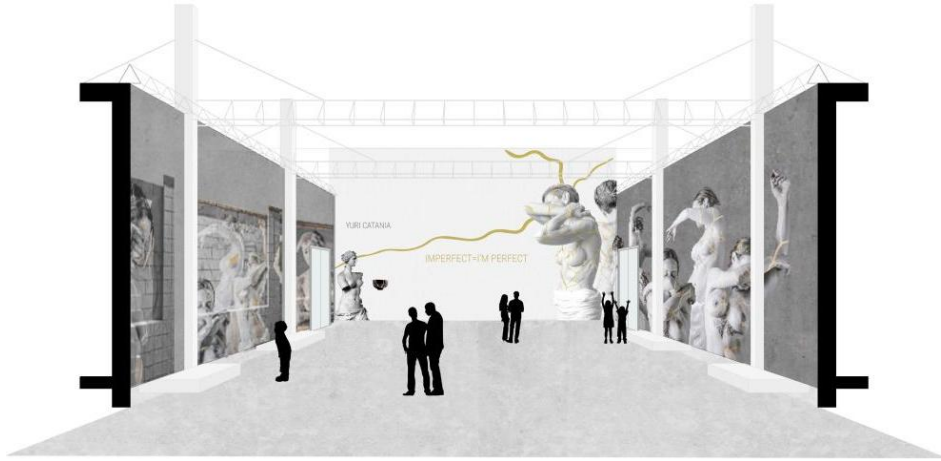


Figure 10 Art garden (Drawn by Camilla Forina)



Figure 11 Garden (Drawn by the author)

The revitalization and activation of vacant space serve as the foundation for the actual project design. The complete layout not only satisfies the owner's requirements but also gives the nearby residents a new area for recreation and activities. However, regardless of the commercial and economic aspects of design, the actual update of vacant space this time was monotonous. The architect neglected to take public engagement and vacant space's effects on the area's sustainable development into account when updating vacant space.

Another detailed plan explaining the complete process of vacant space renewal and how it should impact sustainability and regional growth is presented below, concerning the Yitai Square renewal design.

3.3 Project orientation and concept development

The design aims to revitalize the surrounding nature and bring life to this area by introducing new formats and restoring a new function. Bring vitality to this deserted region and refresh the vacant space. Three crucial components are going to help achieve this: "Renovation" is the process of using reuse strategies to stimulate new places through new functions; "Adaptation" is the identification of the existing space characteristics and the guidance of the introduction of new tasks that align with the space; and finally, "Integration" is the process of connecting the new place to the historical context and integrating the new functions into the urban space. Considering these three viewpoints, a comprehensive method will be employed to establish a cultural and recreational area for the city. In the future, attain sustainable regional growth, draw in more visitors, and host a range of forms and activities using architectural space transformation and industry improvements. The design aims to include people of all age groups and social strata, At the same time, the design draws on public consultation and involvement, local spaces that embrace local involvement in their design, purpose, and management. Quality public spaces could attract a wide cross-section of the public and the consequent mix of people contributes to the vibrancy of towns. *(Holland, Clark, Katz & Peace, 2007)*

According to earlier research and analysis, large vacant spaces, both indoors and outdoors, make up the majority of the site's vacant space. It can also be used as an exhibition space because of the linear arrangement of the surrounding empty spaces. In addition, the site's complex surroundings—including neighboring residential areas and parks—make landscape optimization necessary to serve the local community's needs effectively. In light of potential future growth, adding a public art space presents a chance for site revitalization. This location might evolve into a future center for the arts and culture, promoting long-term societal progress. To fully utilize this vacant space, the transformation project will primarily concentrate on public art spaces, with landscaping included in the overall design. This will serve as a recreational and activity center for the entire region.



Figure 12 Social problem analysis (Drawn by the author)

In this case, the renovated building's aim is to set up the essential operations and provide a comfortable, secure space. Exhibition becomes an essential activity with the creation of the public art space. New activities will be created as events happen at the venue.

Yitai Square's makeover is mainly about opening the enclosed spaces, converting "closed" into "public and open." The best way to accomplish this is to open up the enclosed area. We will dismantle the barriers of abandoned space by constructing

open staircases, linking passageways, and opening the railings on both the east and west sides. We will reconstruct the site's functions and provide linkage by using landscape function spaces to connect the functional areas in the surrounding regions.

The project's design concept is to establish two circular circulation patterns inside and outside the structure, considering the surrounding land's existing conditions. Two design ideas for tour routes can be created on the same site to fulfill the needs of exhibition and leisure spaces. The public's vacant spaces for recreation should be accessible and seamlessly incorporated into the surrounding environment, improving accessibility to the location and reducing traffic. The exhibition space's circulation pattern should be linear. Additionally, modular architecture is suggested as the primary architectural strategy for external exhibition pavilion construction to support transient exhibitions and the mobility of exhibits. In the future, modular design can be expanded or adapted for different purposes when needed, aligning with contemporary sustainable architectural practices.

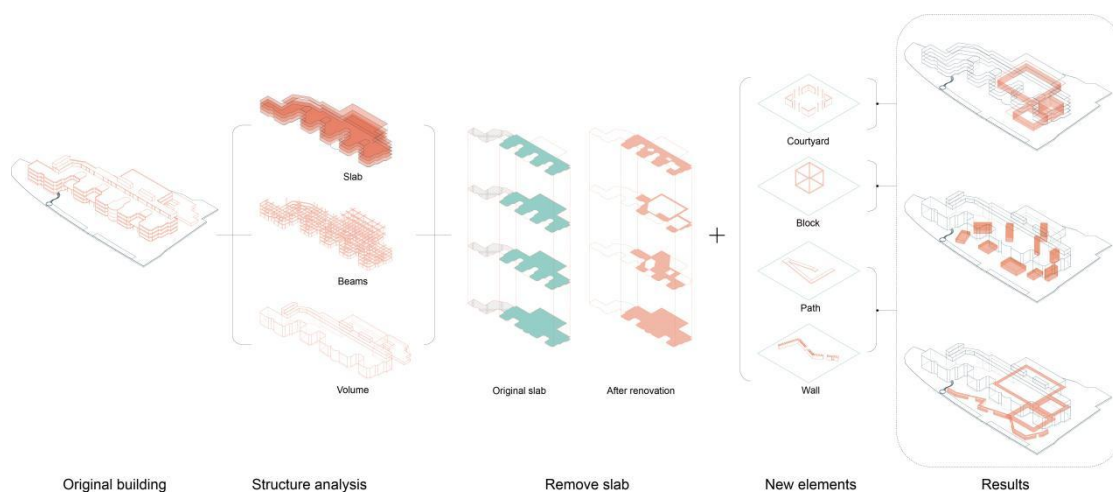


Figure 13 Structure analysis (Drawn by the author)

The main goals of architectural design philosophy are "green energy efficiency"

and "sustainable design," with privacy and immersive experiences being prioritized. The exhibition hall's interior area strongly emphasizes expanding the facade windows to optimize natural light and reduce the requirement for artificial lighting. The building's sides are filled with oversized floor-to-ceiling windows, which provide enough interior lighting. As partition barriers, scaffolding creates a semi-enclosed open space that improves visual transparency and lighting effects.

3.4 Deepening Design proposal

3.4.1 Overall planning

Walking paths are used to join the elevated module area that is first constructed at the base of the building outside the structure. In addition, several outdoor areas are enclosed by the building and connected walking paths. They are utilized as an entertainment area, an outdoor exhibition space, and an open theater. The same module is then put within the building, but different from the outside, it is used as a transportation space to connect various inside spaces without damaging the building structure. The modules are composed of solid metal and translucent PVC moldings, which provide the building with durability and an expansive view from both the inside and the outside. To create areas of varying heights for exhibition purposes, a portion of the interior floor slabs are removed. The entire landscape layout and public facility planning aim to create a space that is enjoyable for all the people, create marginal effects, and activate vacant spaces in a way that spreads to neighboring areas, all of which contribute to the urbanization process.

As depicted in the diagram, the updated Yitai Square has added additional buildings, turning the once-enclosed area into a cohesive urban public space with a plaza, activity platforms, and corridor staircases. Interactive regions have been introduced to the site to improve pedestrian functions and the traffic system to serve people's demands better.

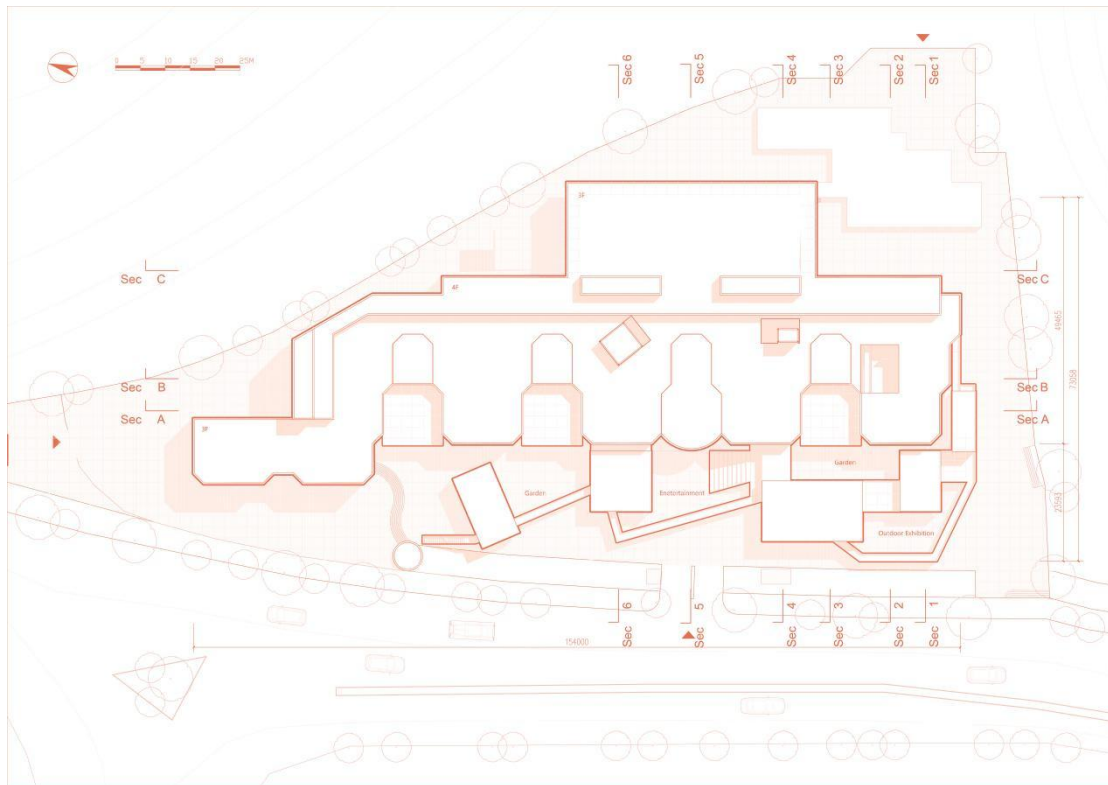


Figure 14 Master plan (Drawn by the author)

3.4.2 Section

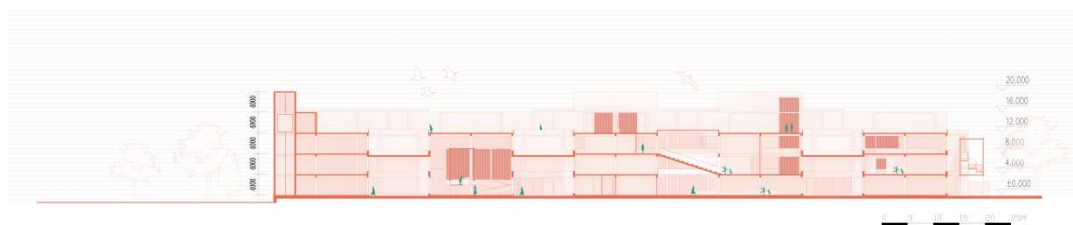


Figure 15 Section A-A (Drawn by the author)

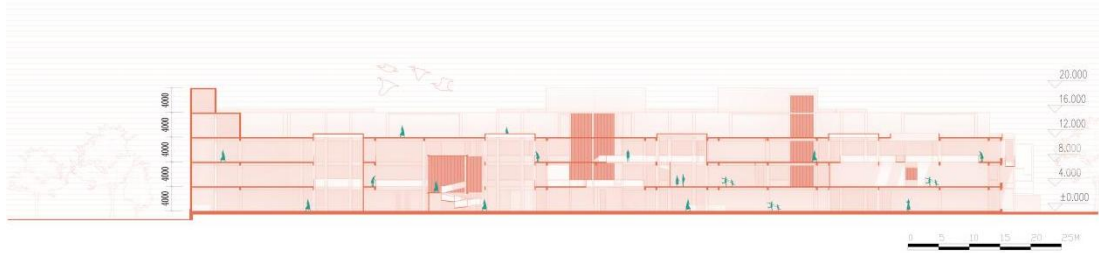


Figure 16 Section B-B (Drawn by the author)

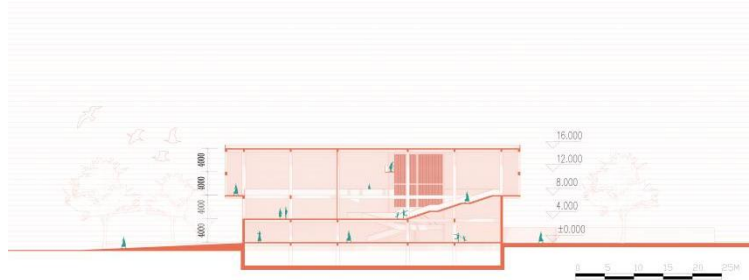


Figure 17 Section C-C (Drawn by the author)

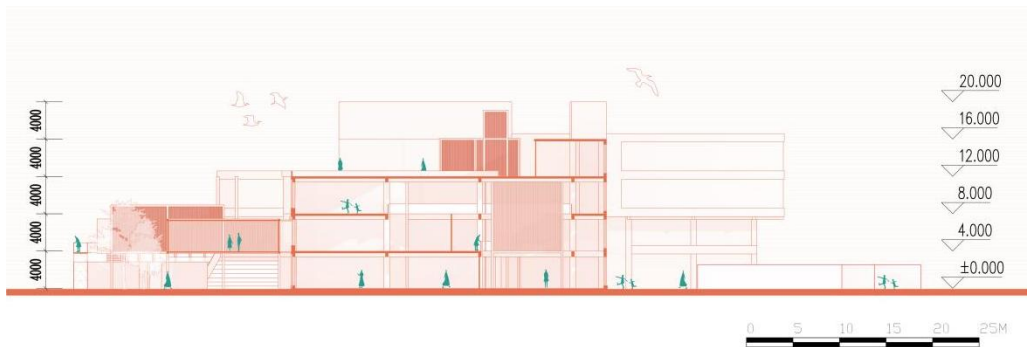


Figure 18 Section 1-1 (Drawn by the author)

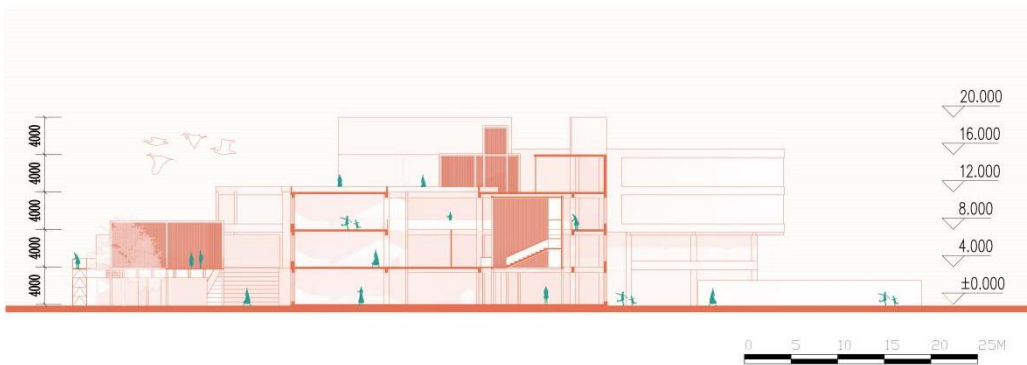


Figure 19 Section 2-2 (Drawn by the author)



Figure 20 Section 3-3 (Drawn by the author)

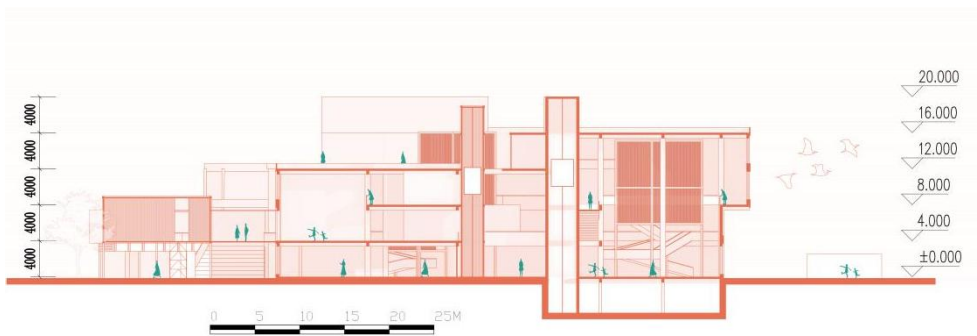


Figure 21 Section 4-4 (Drawn by the author)

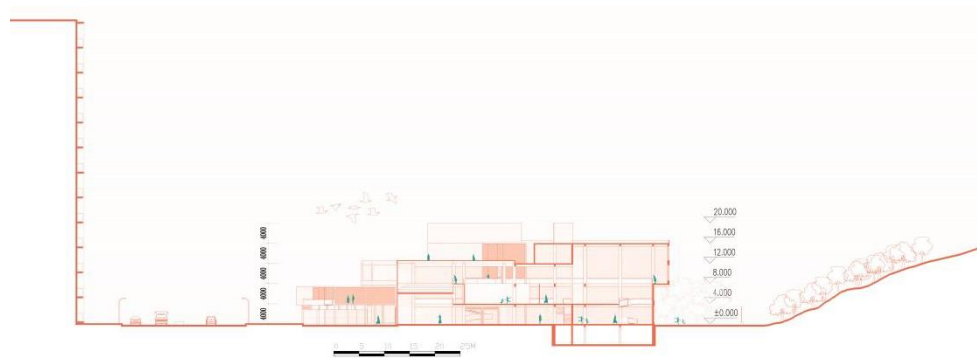


Figure 22 Section 5-5 (Drawn by the author)



Figure 23 Section 6-6 (Drawn by the author)

3.4.3 Plan and function

The construction area of this project is about 10,000 square meters. The first floor is an open public area. The main exhibition areas are located on the second and third floors. The overall functional division includes a reception area, exhibition area, and theater, outdoor platform activity area, restaurant, art production experience area, etc.

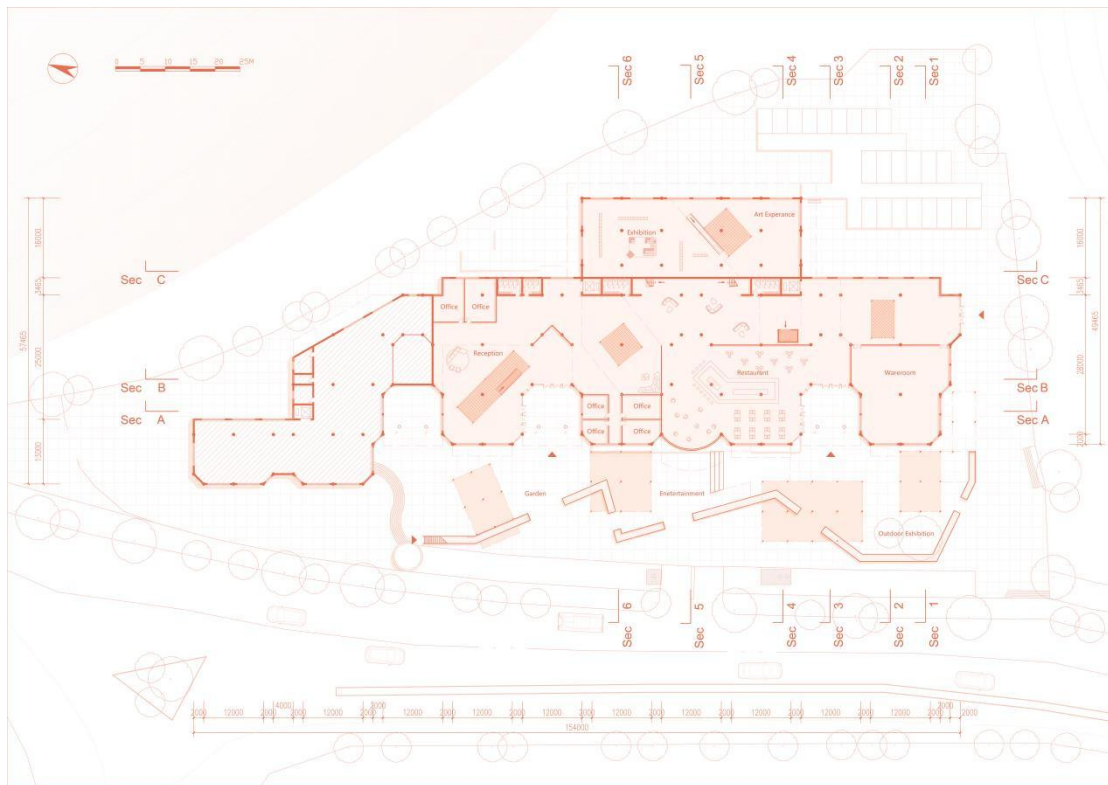


Figure 24 Ground floor (Drawn by the author)

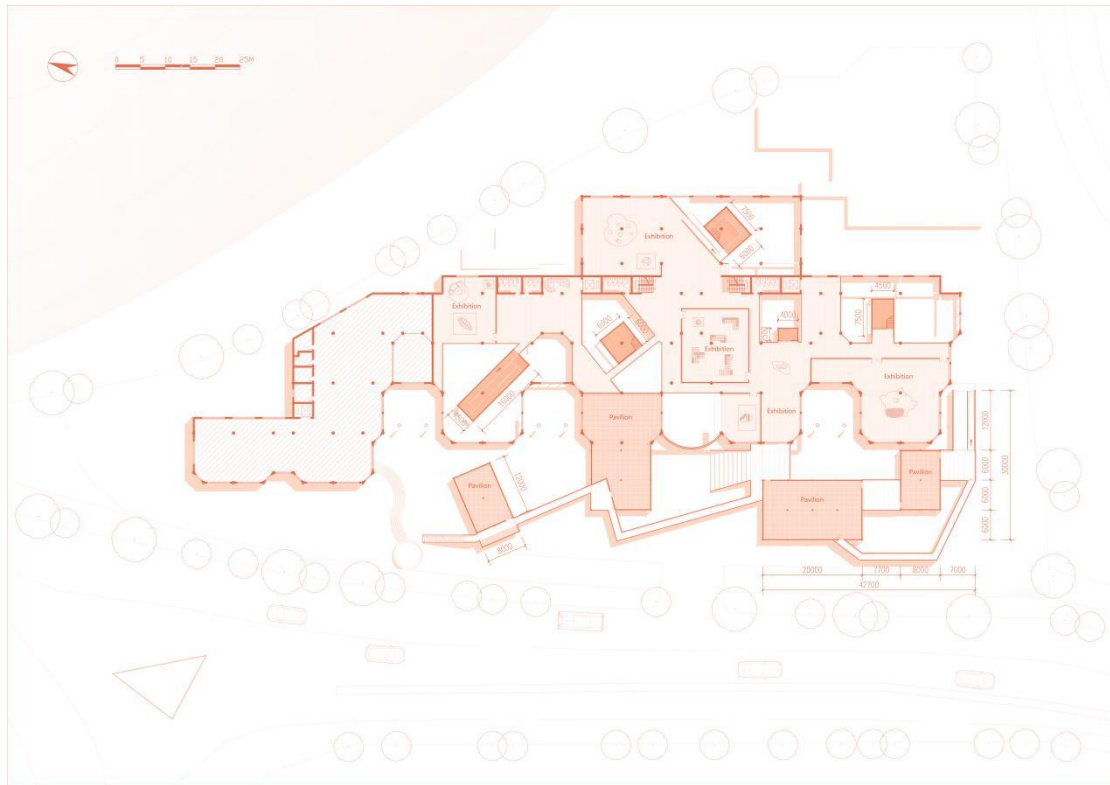


Figure 25 First floor (Drawn by the author)

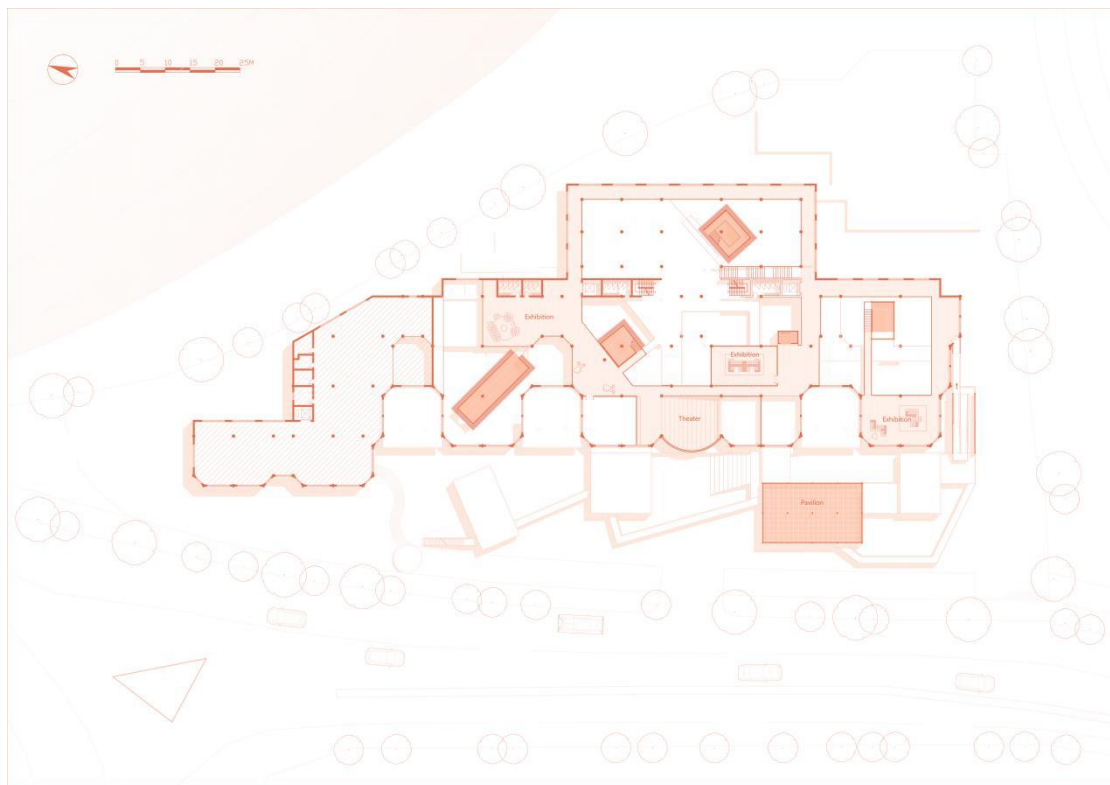


Figure 26 Second floor (Drawn by the author)

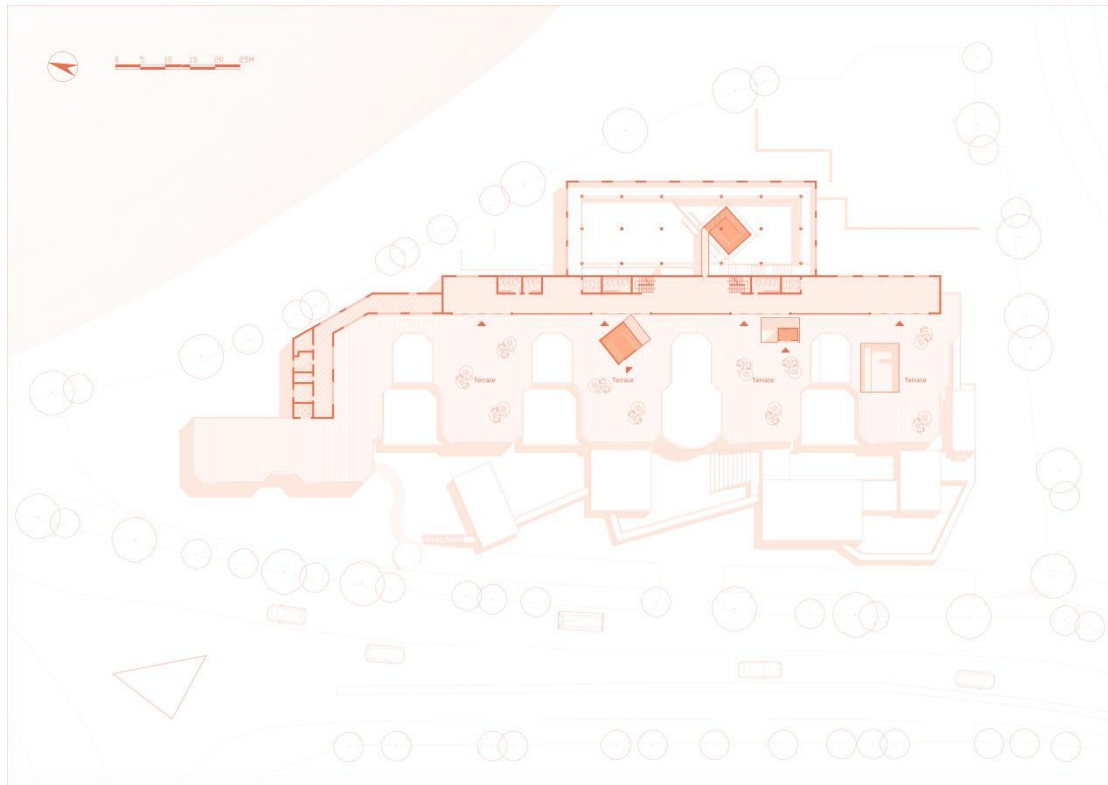


Figure 27 *Third floor (Drawn by the author)*

3.4.4 External appearance

This project proposal preserves the original physical attributes of the structure while considering creative creativity in the production of architectural form. Use geometric block splicing, insertion, and rearrangement on the exterior module shape. Additionally, the exhibition hall is raised above the public open area. The building is surrounded by a sizable empty space that eventually blends landscape activity areas and public art spaces to create a dynamic display area.



Figure 28 Axonometric view (Drawn by the author)

To ensure the architectural design style's harmonic integration with the surrounding environment, we propose to use the following approaches, which were analyzed to vacant spaces a reference for the overall style and architectural aspects of the surrounding environment: First, creating a modern urban exhibition and recreation area with a strong sense of the times required extracting symbolic language from the architectural alteration of Ether Square and adding modern materials and processes and secondly, implementing a scattered layout strategy to incorporate leisure and exhibition activities into modern urban living effectively. Third, utilizing a prototype

measuring 6×4×4 meters and incorporating site-specific elements like cantilevers and reverse terraces, the design uses temporary architecture to provide a highly organized external architectural form and a wide range of internal and external space forms.

These strategies aim to ensure that the architectural design style complements and unifies with the overall style of the surrounding environment.

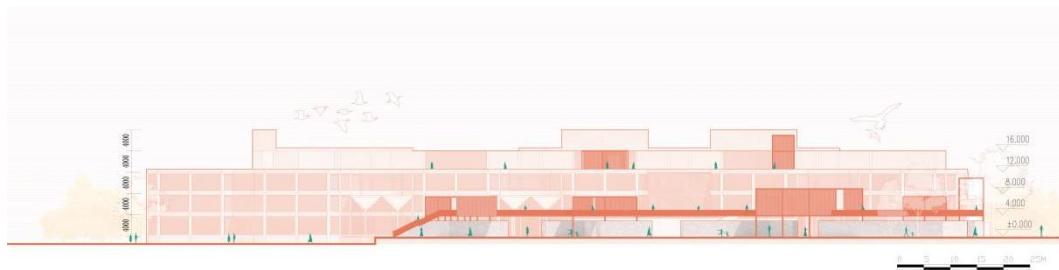


Figure 29 West Elevation (Drawn by the author)

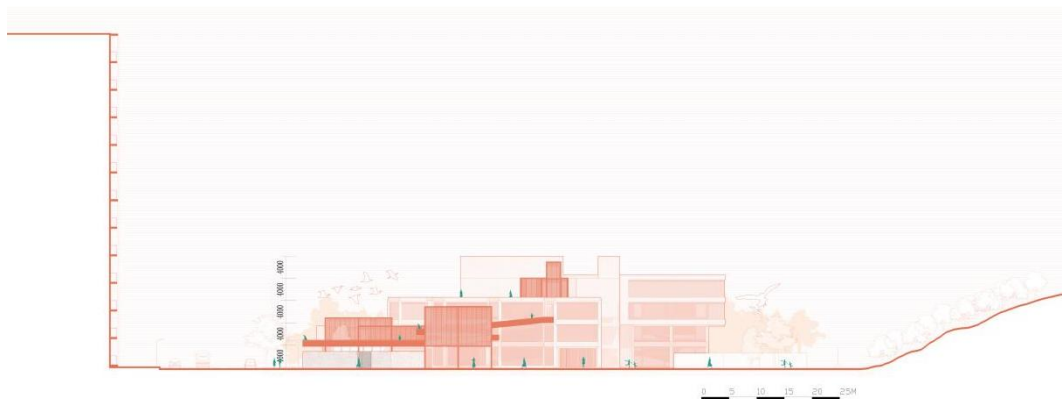


Figure 30 South Elevation (Drawn by the author)

3.4.5 Mobility analysis

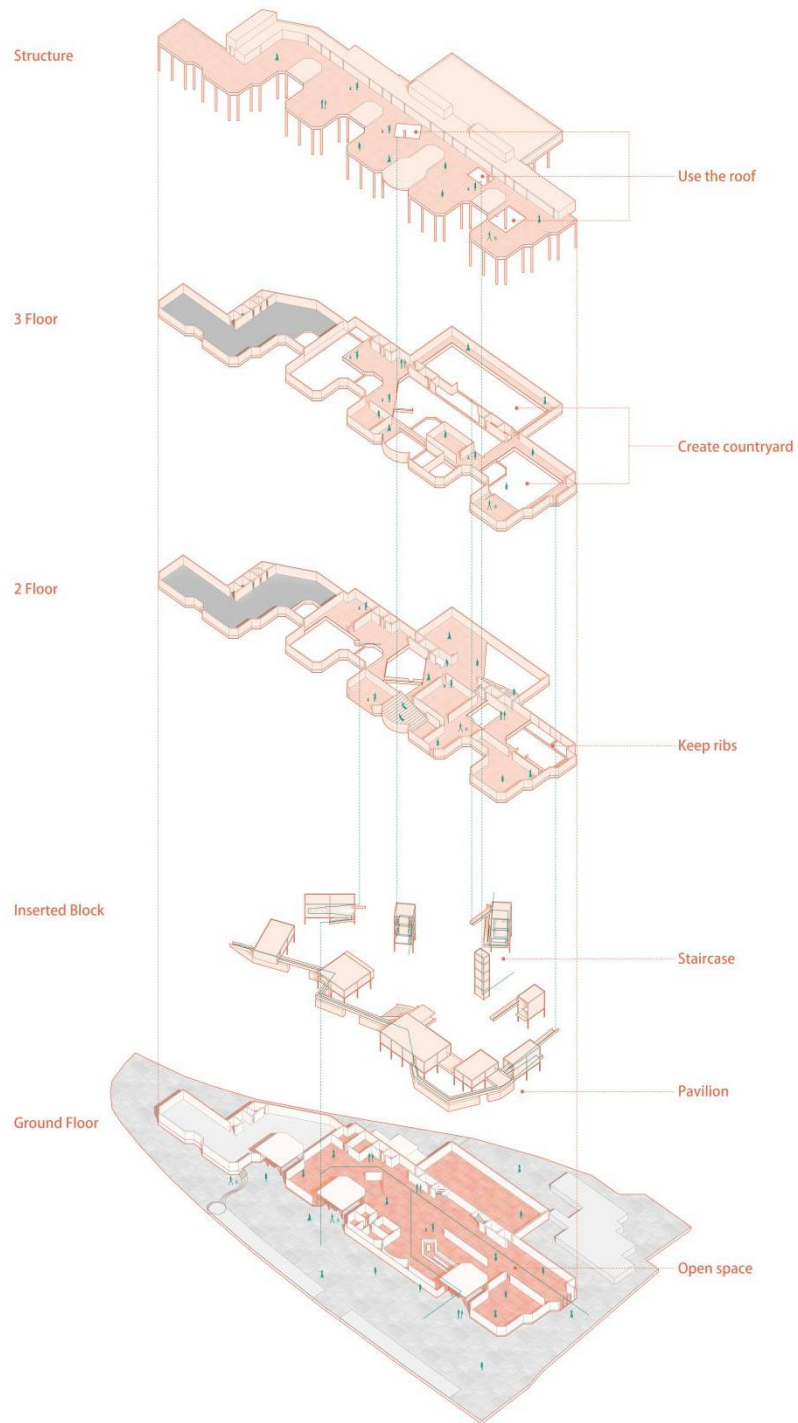


Figure 31 Exploded view (Drawn by the author)

The exhibition's circulation is intended to be a single, two-story walkway so guests can fully immerse themselves in the artwork without being distracted by outside elements. Through the interpenetration of indoor and outdoor platforms, a unique tour experience is formed. On the other hand, the pathways are comparatively broad and varied, and the public activities, coffee shops, and recreational areas are the main hubs for crowd gatherings. There are "active" and "quiet" zones inside the area. Dispersed throughout the site are semi-open leisure spaces and open activity platforms, departing from the conventional closed exhibition style. Integrating public rest places with architectural structures contributes to a more leisurely and pleasurable viewing experience.

3.4.6 Renderings



Figure 32 Exhibition hall (Drawn by the author)

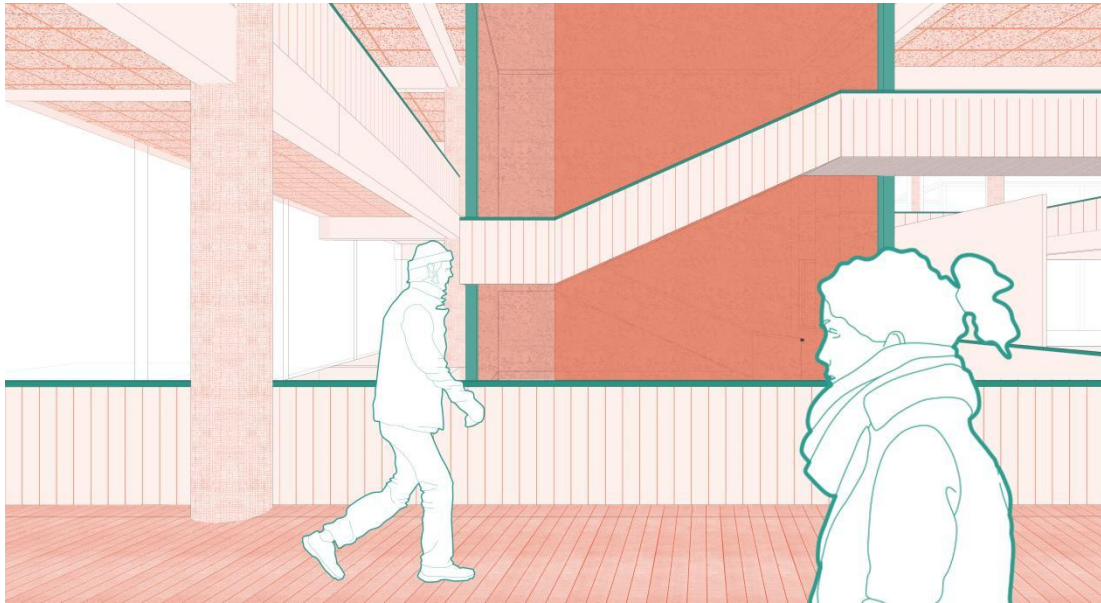


Figure 33 Corridor (Drawn by the author)



Figure 34 Entrance hall (Drawn by the author)

The area uses the aesthetic effect of "changing scenery with each step." Each diverse space has a sense of novelty due to the interconnectedness of its distinct interior shapes. The structure uses a lot of glass and semi-transparent fabric with grid printing as exterior embellishments, which allows light and shadows to cover different materials in different parts of the structure. This method guarantees adequate natural

light while enabling spectators to witness the shifting interplay of light and shadows throughout presentations.

3.5 Project Summary

The adaptation process implies selecting relevant novel design concepts that will support the older buildings to adjust successfully to contemporary requirements without destroying the existing urban form. transforming the buildings into useable units. The adaptive reuse would also enable the local authority and owners of older vacant buildings in suburb to minimise their economic, social and environmental costs.

Chapter 4 Regeneration Strategies for Vacant Space

4.1 The significance of regeneration of vacant space

Urban vacant space regeneration is a critical key strategy in modern urban development, acting as a catalyst for creative changes and the reinvention of urban spatial roles. It has a crucial function in addressing problems associated with urbanization, such as a lack of urban spirit and a gap between urban culture. Urban surroundings are destroyed by indiscriminate destruction, and vacant areas are historical remains of the city. Thus, revitalizing what would be deemed "waste" is a more important goal in altering urban form than just preserving and restoring abandoned areas with historical and cultural significance (*Bowman & Pagano, 2004*).

In the revitalization of urban voids, there are numerous varied experiences in transition throughout the world. Through historical contexts, aesthetic values, and the spirit of the times, these encounters shape urban cultural features, facilitating the changing of spatial functions. Through functional transformation, the regeneration of vacant space can be achieved, thereby enhancing the fiscal condition of the city, minimizing social disruption and protecting property values in the city, protecting the city's property value, and maintaining and improving the city's image.

4.2 Principles of regeneration of vacant space

Since there is no one right way to alter abandoned urban spaces, there is freedom in how those spaces can be transformed. We may condense the following five design

concepts for the transformation of vacant urban areas based on particular instances of urban vacant space transformation projects:

1. Continuity Principle: This holds for both temporal and spatial dimensions. From a spatial perspective, vacant spaces become obvious over extended periods. This suggests that to modify these places. We must create new linkages, consider how well the overall spatial form blends in with the surrounding urban areas and landscapes, and include them in the general functional structure of the city. The continuity concept simultaneously entails blending the old and the new in terms of temporal dimensions. Old buildings showcase the creative expression and technological advancements of their time. Thus, it's crucial to think about how to live in harmony with older structures when remodeling buildings and the areas around them. By merging modern cultural symbols with historical legacies and assimilating them into the preexisting foundation, urban memory is carried forward. (*Ozcohan & Can, 2021*)

2. Principle of Function: Regenerating vacant spaces as a unique resource requires alignment with modern lifestyles. The goal is to increase a place's beauty by making it more functional. The architecture's spatial organization should be modified for a particular purpose to restore the space's original cultural character. This approach is necessary to create a venue atmosphere that encourages more activities. It can be challenging to spark spontaneous activities in vacant spaces. Thus, it's essential to add activities to make them more appealing to people, especially in less-frequented vacant spaces. However, this strategy might be optional in crowded areas.

3. The Human-Centric Principle states that while transforming vacant spaces, creative and aesthetic forms should be considered as they enhance people's enjoyment. Clarifying the new uses for the vacant space can be facilitated by better understanding the neighborhood's needs. Additionally, meeting people's needs for self-fulfillment requires designing open, participatory places. Creating a pleasing sense of enclosure and scale is also essential.

4. Principle of Sustainable Development: It is essential to reduce social resource waste, minimize environmental harm, and promote sustainable design in a world where energy and resources are becoming more scarce. Reusing vacant space can contribute to a decrease in the use of resources. In specific scenarios, concepts such as modular design, recyclable design, green design, and other transformative techniques might be considered. These techniques help to create safe, green spaces. (*Mısırlısoy & Günçe*)

5. Principle of Contextual Adaptation: It is critical to comprehend the site's primary conditions, historical legacy, and cultural context, in addition to considering the site's natural features and regional characteristics. Based on the site's design requirements, existing vacant spaces can be transformed into particular work, living, and service areas by utilizing their cultural characteristics. This idea includes combining site characteristics, choosing primary functions based on local conditions, and enhancing the neighborhood's development and the surrounding area.

It is clear from the examination of the previously listed design concepts that there are certain commonalities in the methods used to change urban vacant spaces. Every

transformation example does, however, also demonstrate its individuality, especially in terms of contextual adaption. In conclusion, each vacant space has a different starting point and design approach, yet they all have an organized relationship.

4.3 Regeneration strategies for vacant space in urban centers

The urban vacant space regeneration approach will be examined from four perspectives, drawing on the theoretical foundation mentioned above:

1. Social Aspects:

Urban vacant spaces are typically associated with a shortage of public services that need to be improved to suit the varied demands of the community. The living conditions of those nearby are not better due to improper administration and unfounded security. Transforming vacant space into better infrastructure can protect the environment and enrich people's lives. To advance social development, maximize urban industrial structures, preserve culture, and establish the new city's identity, managing the rehabilitation of vacant space is beneficial.

Before redeveloping vacant spaces, market research is crucial to comprehending opportunities and demands in the market. This can help identify the kinds of building regeneration projects with the most significant potential and provide insight into community needs, ensuring that the redevelopment of vacant spaces responds to market demands. Together, the government and local communities can play a crucial role in redefining the function of buildings and creating redevelopment plans during the change process.

For instance, like many isolated rural communities, Maogong Town in China was formerly underdeveloped and underprivileged. But in 2016, the town's museum and the government worked together to develop a new plan for the city. After surveying the community, they began the makeover of old vacant spaces that had fallen behind the times. One noteworthy conversion was turning an abandoned grain terminal into an arts center for the village's residents. As a result of this program, Maogong Town attracted tourists and increased economic consumption, establishing itself as a new cultural hub for the surrounding communities.



Figure 35 Maogong Town Before Reconstruction (<https://www.archdaily.cn/cn/921278>)

The purpose of vacant spaces shifts during this process. For example, abandoned warehouses were converted into cultural centers, commercial buildings into residential units, and derelict farm buildings into office spaces. This instance demonstrates how community research-informed cooperation between local organizations and the government can result in the regeneration of vacant spaces, ultimately changing a town's identity and drawing in more business.



Figure 36 Maogong Town before renovation (<https://www.archdaily.cn/cn/921278>)

2. Cultural Aspects:

Urban vacant spaces are typically correlated with a weak cultural atmosphere, a lack of liveliness in the surrounding neighborhoods, and a lack of cultural amenities that cannot meet the local populace's needs. From a humanistic standpoint, people engaged in architectural places can be inspired by them because of their connection to the location and past occurrences. They prove how society has evolved throughout time in various historical eras. Architecture can convey the historical context, political climate, cultural norms, and economics of a bygone age through its material form.

If the current space has historical or cultural significance, historical preservation and restoration efforts should be conducted during the early stages of vacant space transformation to maintain the original architectural traits while transforming it for new purposes. These vacant spaces were frequently used for creative and cultural endeavors throughout this period. This vacant space might be turned into artist studios, theaters, music halls, or galleries, showcasing a range of art shows and allowing locals

to engage in the arts and culture. This strategy maintains the city's cultural legacy, fosters the growth of other cultures, and strengthens people's emotional ties to the local identity. It also helps to preserve historical urban memories.

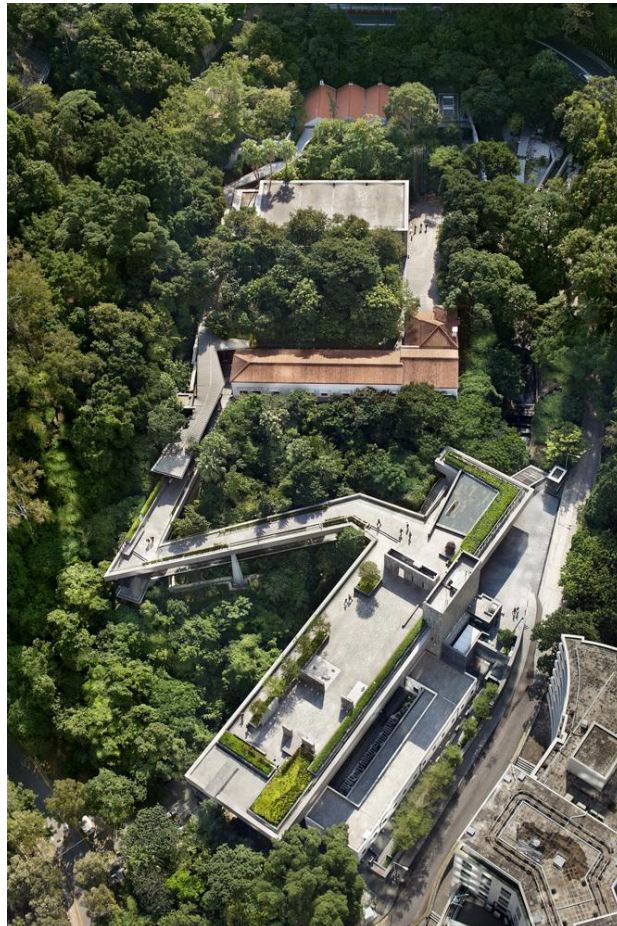


Figure 37 Asia Society Hong Kong Center Aerial view (<https://www.archdaily.cn/cn/784145>)

One such example is the Asia Society Hong Kong Center, a once-derelict property in Hong Kong that is now a bustling complex for talks, seminars, conferences, cultural events, art exhibitions, plays, and movies. Four buildings from the mid-19th and early 20th centuries—some of the earliest military buildings from Hong Kong's colonial era—will be transformed in addition to new construction as part of this project. The architecture has retained the original space's historical and cultural significance, and attempts were made to preserve and restore the structure

while maintaining its original architectural elements during the renovation process. Adding additional features has ensured that it satisfies contemporary architectural standards.

3. Economic Aspects:

Converting vacant spaces is a more effective and economical strategy that preserves social and land resources since it eliminates the need for demolition and reconstruction. In addition to improving living conditions and residential regions, vacant space transformation encourages different industry growth and draws in new company prospects. One way to influence economic development in the surrounding areas is to rehabilitate vacant places and combine them with rising sectors, such as the creative and cultural industries. Converting vacant spaces into functional areas facilitates municipal renovation and adds economic benefit.

From an economic standpoint, it makes sense to consider building vacant spaces as multipurpose, mixed-use areas to make the most of their use while promoting architectural diversity and sustainability. For instance, an empty warehouse can be converted into a variety of services, including social meeting spots, small retail stores, creative studios, and offices. Additionally, empty rooms can be transformed into shared office spaces or innovation centers, which offer business owners a comfortable place to work. Additionally, moving vacant spaces into training and education facilities is an additional choice that provides a range of instructional and training possibilities to support professional growth and skill development.

Take Berlin's Tempelhofer Feld, which was formerly a German airport. On the

other hand, the adjacent vacant site was developed into a residential community, and the terminal building was converted into an entrepreneurship and innovation center after the airport closed. In addition to working here, residents can engage in recreational pursuits, including cycling, walking, and attending festivals and other outdoor events. Because of the multipurpose mixed-use alteration that has added additional economic value to the neighborhood and allowed the original structure to remain standing, this makes the building viable.

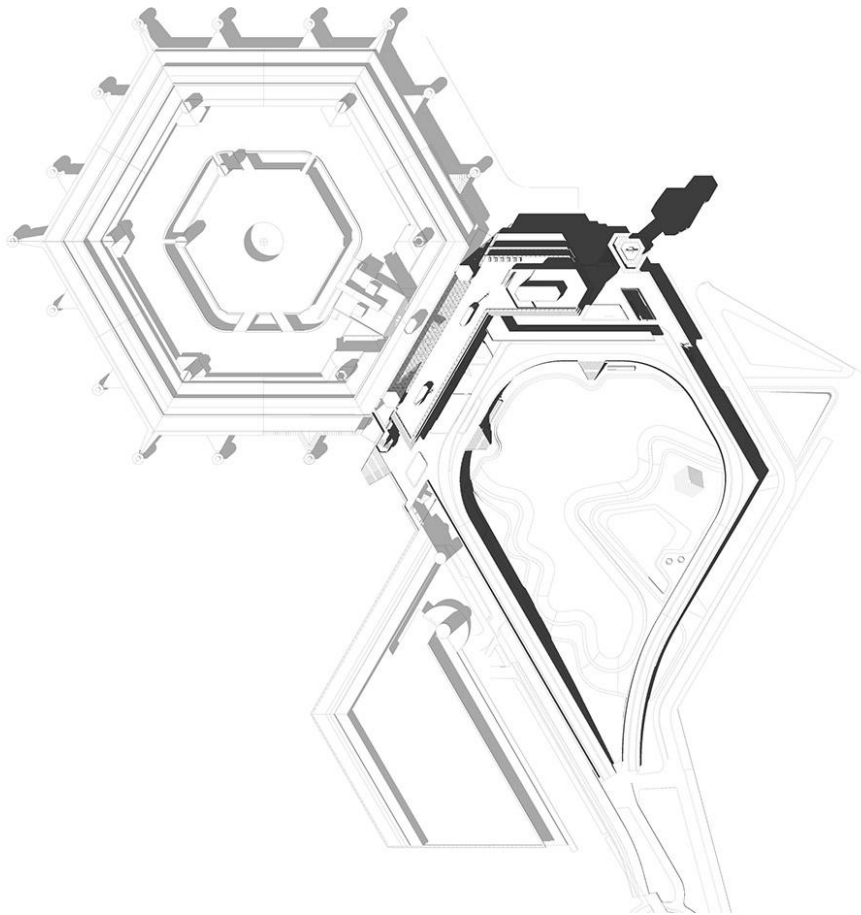


Figure 38 Berlin's Tempelhofer Feld Site plan

(<https://www.gooood.cn/the-future-of-berlin-txl-by-gmp-agn-niederberghaus-partner.htm>)

Monitoring and assessing vacant spaces following renovations is also crucial. Project sustainability and preventing the building from being abandoned again can be

ensured by routinely assessing and evaluating the project's operation and making necessary upgrades and adjustments in response to input.

4. Spatial Aspects:

Urban areas no longer in use generally need more utility and are challenging to blend in with their surroundings. This may disrupt transportation and the urban fabric. The city's general spatial organization is disjointed. Transforming vacant spaces improves their usefulness and contributes to the health of the urban spatial system. It reestablishes loose spatial patterns into ordered alignment by optimizing transportation systems and integrating urban fabric.

Regarding physical places, how vacant spaces are transformed should have some visual appeal. Using innovative architectural and spatial regeneration methods helps improve the city's reputation. A well-designed public area should encourage exploration and human interaction with the surrounding area.

Renovation and reconstruction for the majority of older spaces. To satisfy different uses and contemporary expectations, this involves structural repairs, external improvements, increased energy efficiency, and interior plan modifications. In this procedure, the building's original beauty is restored while simultaneously being updated to meet modern requirements.

One example of a project that employs this technique to revitalize and enhance space quality is "The Unusual Football Field" in Bangkok, Thailand. The five asymmetrical football fields that are sprinkled among the congested and chaotic slums of Bangkok were imaginatively created by the designers using vacant space. These

unconventional fields offer impoverished kids in the slums a place to play. The red-painted, uneven football grounds have drawn the neighborhood's attention, enhancing communal life and fostering a pleasant recreational space. This enhancement in the area encourages natural flow and lessens issues with traffic congestion.

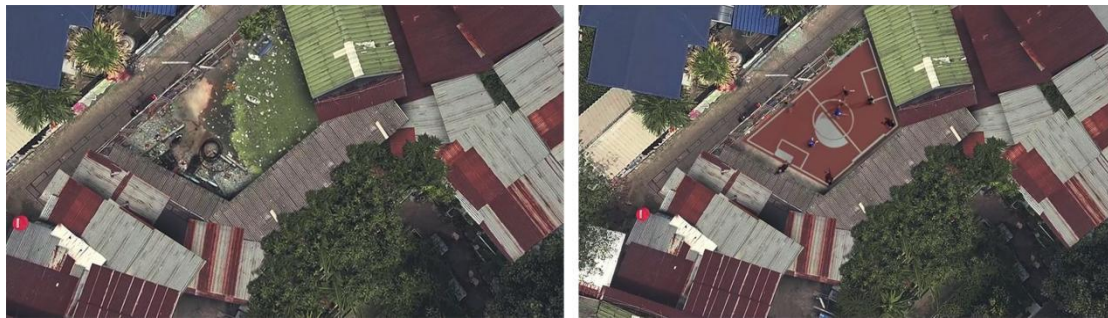


Figure 39 Comparison before and after site renovation

(<https://www.digitaling.com/projects/22101.html>)

Furthermore, it is possible to expand to existing structures by utilizing creative architectural features. Moreover, sustainability must be taken into account at every stage of reconstruction. In addition to lowering running expenses, using eco-friendly building materials and following green design guidelines can help safeguard the environment.

4.4 Period of vacant space utilization

During the process of redeveloping vacant spaces, the period of utilization is an important consideration. Some considerations need to be taken into account when deciding how long to rehabilitate vacant spaces, including the building's nature, sustainability, economic viability, and social feasibility.

Long-term use

Long-term usage refers to integrating the redevelopment of vacant spaces into city planning and community development over a longer period, to achieve long-term sustainability and social advantages. Long-term vacant space redevelopment initiatives yield more sustainability and social benefits, they satisfy present requirements as well as those of the future. But they usually come with higher initial and ongoing expenses. Long-term usage makes sure that abandoned spaces can be used for the benefit of the city and community for a considerable amount of time, enhancing the quality of life for locals and promoting community stability. To lessen their influence on the environment, long-term use projects are frequently better suited to include sustainability concepts like waste management, water resource management, and energy efficiency. Most existing vacant spaces are renovated for long-term use.

Temporary use

Instead of including vacant space rehabilitation projects in long-term city planning, temporary usage refers to their use for shorter periods, usually for particular activities, cultural events, or seasonal needs. Usually, temporary use takes place in underutilized areas that nevertheless have some purpose. Temporary-use projects typically require less upkeep and investment than long-term usage projects. With this way, there is greater flexibility in fulfilling specific needs and making adjustments based on varying requirements and timing, meeting the demands of certain activities or events. Because they are typically more collaborative and participative,

temporary-use initiatives are frequently more accessible for the community to get involved in. As a result, they are more likely to support inventive, creative, and cultural activities, reviving the city's life.

For instance, the DeKalb Market in New York, USA, is a 4,000 square meter construction site situated in Brooklyn, New York's downtown region. The construction site wall eliminates the pedestrian area along the street and divides the construction site from the urban area. It makes sense to explain the temporary building's architectural concepts because the contractor anticipates finishing the project in two years. The creative market's venue objective was ascertained by considering the leisure demands and social practice goals of the youth in the nearby schools. To provide youth with a place to hang out, container modules were constructed. In order to accommodate the needs of the construction party to continue work, the market only utilizes the trapezoidal plot on the north side of the construction site.

4.5 Case study on renovation of vacant space

Case 1: Gasholders Apartment, London, UK, 2018

King's Cross is the most significant urban reconstruction project in Europe, and the area's rich industrial history is essential to the growth of the site. A conjoined triplet of gasholder guide frames, built in 1867, is one of the most notable and exquisite elements still intact. Owing to shifting requirements for local development, the gas storage area becomes empty. Large-scale industrial buildings create adverse psychological effects and negative associations with noise, spectacle, and pollution.

Factory spaces consistently provide this feeling as well. The architect decided to save the industrial elements of the abandoned industrial buildings while adding new uses because they may have commercial value and historical relevance.



Figure 40 Gasholders Apartment, London (<https://wilkinsonseyre.com/projects/gasholders-london>)

This gasholder was later converted into gasholder apartments by the renowned British architectural company Wilkinson Eyre. The project was recognized as a Grade II protected building in the UK. A domestic adaption helped to maintain the historic buildings. Much of the architectural character of the gas storage station was preserved in the Gasholders Apartments by keeping the elliptical cast-iron frames of the gas storage holders. However, the original construction was altered to meet the needs of the residents. Following converting the gas storage tanks, the interior space design maintained the general architectural character. Industrial structures are interconnected with people's lives. The entire property has a post-industrial spatial feel created by transforming industrial remnants. This method presented a new industrial feature

while simultaneously maintaining the legacy and culture by integrating fresh thinking into the already-existing historic structure. This makeover gave the old industrial structure new life and revitalization for modern usage.

Case 2: Gas Station Cinema, London, UK, 2010

Gas stations, gas filling stations, and charging stations have multiplied in urban areas due to shifting transportation energy demands, resulting in the regular existence of such abandoned infrastructure in urban locations. There were reportedly about 4,000 abandoned gas stations in the United Kingdom in 2010.

This project aims to investigate the use of common vacant spaces by converting a petrol station into a movie theater. The location is on Clerkenwell Street, where a long-abandoned gas station had lost its use and degenerated into a lonely, vacant space. Without fresh investments and suitable planning measures, it would stay in this inactive state. It was challenging to convert it from its prior form into a visually appealing public area.

Assemble Studio seeks to design a room that is both inventive and in contrast to the busy street scene. The design team took note of Clerkenwell Street's distinct ambiance, resulting from the street's short main thoroughfare and cumbersome pedestrian activity. As a result, they decided on the film screening activity, which calls for a dimly lit area. People leave the world of the movie theater and return to the busy city streets when the curtain rises, marking the beginning of the new cinema space's separation from the surrounding urban area.

The design team decided to use a temporary architecture method by organizing

volunteers to build the cinema from transformed materials despite the restricted construction budget and the objective reality of quick space utilization. With the large interior provided by the gas station's existing structure, the temporary architecture design technique was only needed to build the theater's outside, sitting area, and screen.

To create a border and divide the space into inside and external regions, a circle of curtains was first hung up along the edge of the gas station canopy and retracted by two meters. After that, a scaffold was built to progressively construct the audience sitting area's framework as it rose in height. The floor was finished by laying wooden planks on top, and then seats made of the same wood were installed. Ultimately, a 118-seat screening room was finished.

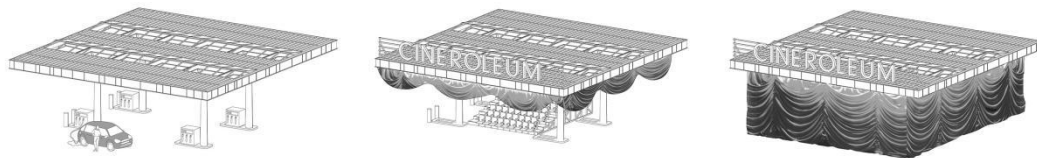


Figure 41 Transformation process of Gas Station Cinema, London

(<https://www.gooood.cn/the-cineroleum-by-assemble.htm>)

In addition, the theater operator launched business ventures and oversaw the space. The gas station's service area on the north side of the property was converted into a restaurant-style retail room. Due to commercial operations, this location is now well-known.

Case inspiration:

Through these case studies, we now understand the importance and worth of

urban vacant spaces for the city. These vacant spaces have unique qualities; intricate surroundings frequently surround them, and the development site may present more significant difficulties. Research and site study are essential. Analyzing the benefits and drawbacks of a site's development is crucial because it forms the foundation for further design. To decide what can be done and what is viable during project orientation, it is necessary to examine the surrounding environment's features and evaluate the site's suitability. This entails investigating the site's viability.

Chapter 5 Difficulties in Regenerating Vacant Space

1. Legal and Regulatory Concerns: Strict legal and regulatory requirements frequently apply to urban planning and development, which may restrict the amount of vacant space developed or used again. For example, planning permissions could be challenging, land use planning might not match new uses, and building codes must be significantly changed to make room for new designs and services. Revitalizing vacant spaces may become costly and complex due to these legal and regulatory constraints. A lead agency, such as a city planning agency, city community development agency, economic development corporation (CDC), or special purpose or special district public entity, should be specifically designated to play a key role in advancing redevelopment plans for different types of vacant spaces (*Kim, 2016*).

2. Ownership Issues: Since many vacant places and buildings are privately held, transforming them frequently raises questions about property rights, land leasing, and changes in land use. Negotiation issues may arise if the expectations of the owner do not match the demands of the government or the community, along there is more difficulty with acquiring grants, getting insurance coverage, and responsible risk management. For private development of vacant land and abandoned buildings, it may be helpful if municipalities provide some incentives, such as tax abatement for infill project areas with vacant land (*Kim, 2016*).

3. The financing and investment challenges of transforming vacant spaces usually involve large sums of money for costly repairs, renovations, refurbishments, and facility upgrades. It might be challenging to find trustworthy sources of funds and

investments and determine whether the project is economically feasible, particularly for non-profit organizations. Although few are familiar with the reuse of vacant space in terms of its ecological and social value, financial issues are major obstacles for redevelopers of vacant space. Most cities lack adequate economic incentives designed to support vacant land and abandoned buildings that could be maintained and improved. Tax foreclosures and enforcement codes increase the already large amounts of vacant land that are not maintained for lengthy periods. Unmaintained vacant land and abandoned buildings negatively impact both local property values and the quality of life in surrounding neighborhoods (*Kim, 2016*).

4. Historic Preservation and Cultural Heritage: While specific vacant spaces are valuable historically or culturally, there may be a contradiction between preservation and change. To achieve a seamless fusion of heritage protection and sustainable development, striking a balance between historic preservation and redevelopment may necessitate careful planning and cooperation.

5. Opposition from the Community: When changes are made to vacant spaces, it might lead to disagreements from the surrounding residents. To guarantee project acceptability and support, effective community engagement and communication are essential. (*Prete, 2020*)

6. Technological and Sustainability Challenges: Innovative technologies and sustainable building techniques may be necessary to convert vacant spaces into contemporary, sustainable structures. More technological know-how and resource

allocation could be needed to guarantee the project's sustainability. *(Tam & Hao,2018)*

7. Maintenance and Management: Vacant space management and upkeep become very important after construction. To prevent new vacancy issues from occurring, ensuring the long-term maintainability of buildings and facilities may need careful planning and financial investments. City governments should also support the public maintenance of different types of vacant land by multiple city and county agencies through funding supplied from ratepayer fees for post-industrial sites, building maintenance codes from local ordinances to maintain minimum safety standards, and enforcing abandoned property maintenance requirements *(Kim, 2016)*.

Chapter 6 Conclusions and Recommendations

Urban vacant space regeneration is implemented according to different functional forms and spatial needs. Throughout the redesign and utilization of vacant space worldwide, one can see how well various elements—including space, usefulness, form, culture, and economy—have been balanced. As a result, the use of vacant space has become a trend and is one of the best ways of urban renewal.

Regeneration of vacant spaces is only a small part of managing and redistributing urban areas, as seen from an integrated approach to urban development. Owing to vacant spaces' distinct characteristics, urban space transition is especially noticeable in vacant spaces. Research is primarily focused on activating and renovating these places, as they represent a challenge that needs to be repositioned within the framework of urban evolution. From this angle, observing vacant spaces is an unavoidable contemporary trend. Around the world, much progress has been made in improving urban environments. The study of vacant spaces is essential and has the potential to lead to urban rejuvenation in the context of fast urbanization. Future urban vacant space design still has much creative freedom, there is yet to be a set formula for the urban regeneration of vacant spaces.

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