



THESIS BOOKLET

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ADAPTIVE REUSE OF THE URBAN BUILT ENVIRONMENT AND DESIGN INTERVENTION STRATEGIES



Doctor of Liberal Arts in Architecture

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01 Research Background

It provides context for the study by discussing urbanization, sustainable urban renewal, and the difficulties of building-environment regeneration in Chinese cities.

Climate change has become the most pressing global issue of the 21st century. Due to increasing urbanization, Asia, the region with the fastest rate of urban population expansion in the previous 20 years, has tremendous economic, social, and environmental difficulties. Urban life has undergone radical changes since China's reform and opening up. Particularly since the 1990s, with the rapid development of Chinese cities and large-scale urban renewal, many historical buildings and traditional neighborhoods have been torn down, resulting in the serious "constructive" destruction of historical urban features. How could the sharp contradiction between conservation and development be reconciled in pursuing sustainable urban development? Adaptive reuse of the built environment has developed as a balancing mechanism in the face of this challenge. In recent years, China has begun to address this issue with legislation and regulations. There have also been theoretical studies and effective social impact cases from many viewpoints. Still, designers have fewer guiding principles and less developed research on design intervention strategies. Therefore, the author believes that it is necessary to study and explore the application of adaptive reuse strategies in the built environment. From a microscopic perspective, it's critical to offer relevant workers practical expertise to avoid unnecessary issues in practice and provide an experienced hand for those who work with existing environments. From a macro perspective, the conflict between conservation and development can be better balanced in the urban regeneration process.

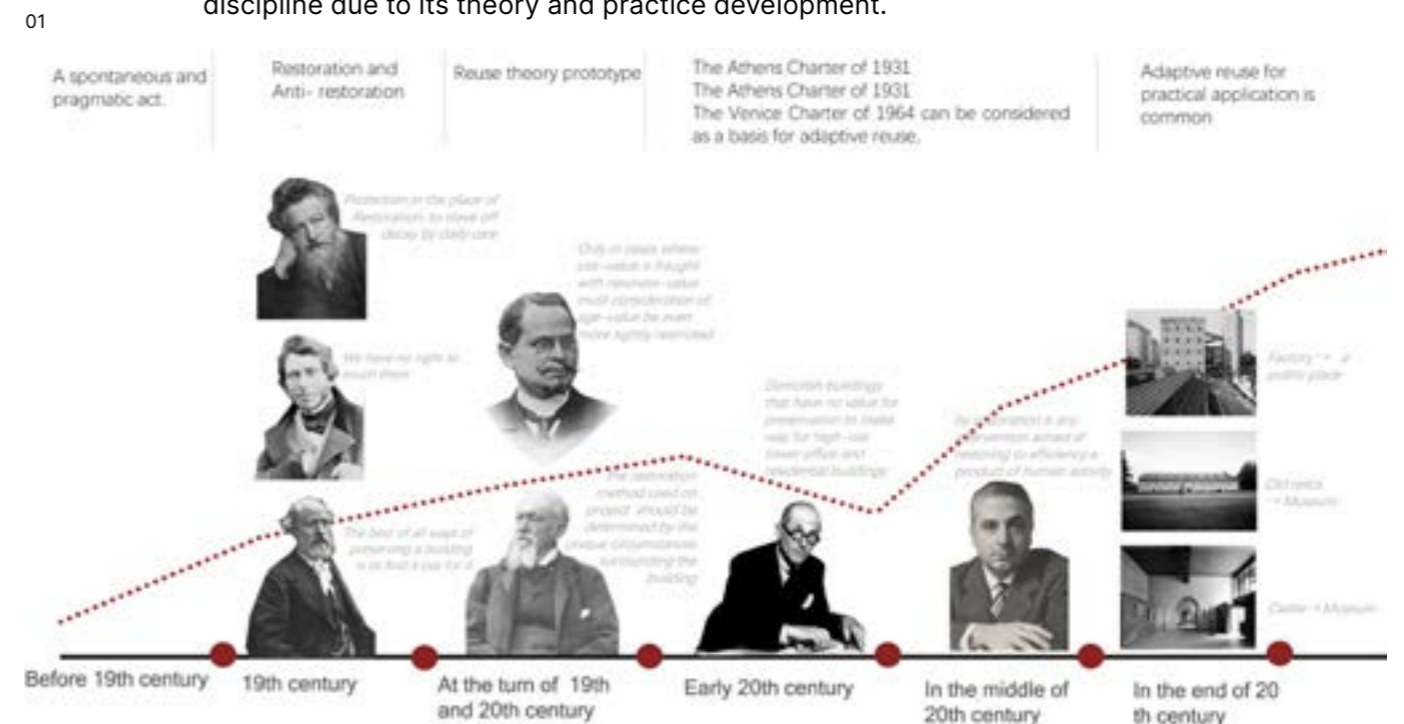
The urban built environment refers to the human-made environment that provides human activity settings, including homes, buildings, zoning, streets, sidewalks, open spaces, etc. Historic structures, stock buildings, and old city neighborhoods and blocks are essential components of the historic urban fabric. These three integrate multiple values of cultural and emotional, social and environmental, and economic dimensions and are material carriers of urban history and culture. Adaptive reuse is the reuse of existing materials to preserve and develop the built environment. First, it is necessary to understand the term's historical evolution and roots to comprehend this act.

01. The timeline of adaptive reuse's historical background and theoretical foundations, Source by author

02 The Adaptive Reuse Theory's Historical Context

The article takes a methodical and chronological approach to develop the adaptive reuse historical theory. Based on its research, it is summarized as follows.

1. **Before the 19th century**, several political and religious structures were utilized to meet the ruling class's interests and economic considerations. The reuse of buildings during this period was spontaneous and unconscious and had nothing to do with architectural conservation.
2. By the **19th century**, there was a restoration debate between Le-Duc and Ruskin. The former claimed stylistic restoration, which restored the heritage and found a use for it; the latter claimed anti-restoration, which argued that people who should be present had no right to touch or preserve them in their current state. Even though the two views are very different, later academics say they both deal with the same essential question: how to define authenticity.
3. By **the turn of the 20th century**, the conservation of historic structures had garnered widespread discussion and attention as a result of the devastation caused by war. On the theoretical side, Alois Riegel, distinguished the various types of heritage values. On the practical side, Camillo Boito, distinguished three different approaches to restoration and eight guiding principles to help architects distinguish between original structures and subsequent modifications in their practical work.
4. The Athens Charter of **1931** and the Athens Charter of 1933 were adopted, which profoundly affected the conservation of the built heritage and its surroundings, despite their distinct objectives.
5. **1964**, the Venice Charter established the framework for adaptive reuse, resulting in the modern definition of this term.
6. By **the late 20th century**, adaptive reuse had become a field of study in the architectural discipline due to its theory and practice development.



03 The Approach Of Adaptive Reuse For Built Environments

Adaptive reuse is a term that can be used for historic structures, stock buildings, and urban regeneration, and they each have different cores.

Today, building vibrant, green, and resilient cities is possible by putting them on a sustainable development path. Adaptive reuse of the built environment is a critical strategy for achieving sustainable urban development because it contributes to cultural continuity, economic development, and the resolution of numerous social and environmental issues. It is also a strategy that maintains a balance between conservation and development. It applies to the conservation of historic buildings and the renovation of stock buildings and older urban areas. These three types of adaptive reuse for built environments address a different inner core, and defining them helps us focus on the things we can change when we work with different types of built environments.

Adaptive reuse for historic buildings, its theoretical foundation is first and foremost conservation, followed by the search for functions that are suited to the structure, transforming it into a usable space that serves the public interest. It is tasked with the responsibility of transferring urban heritage and architectural art to future generations.

Adaptive reuse for building stock is theoretically aimed at the goal of extending its useful life through new functions that address contemporary needs. It enables recycling to provide environmental, economic, social, and cultural benefits in accordance with the requirements of sustainable urban development.

Adaptive reuse for urban renewal, it is essentially an important tool for urban planning and requires the support of relevant government policies. It encompasses both of the above, with various approaches summarized here in three common threads. The first one is that adaptive reuse should preserve the integrity of existing structures and their surroundings when revitalizing a neighborhood while demanding as little intervention as possible when new uses are required. Second, adaptive reuse should protect the symbolic importance of historic structures and promote community participation. Finally, adaptable uses should be given more attention to help the local economy and make the area more livable.

“ Adaptive reuse frequently reduces the negative impact of construction on the environment and the depletion of non-renewable resources; in addition, it maintains the place memory and identity.”

- Lina Bo Bardi

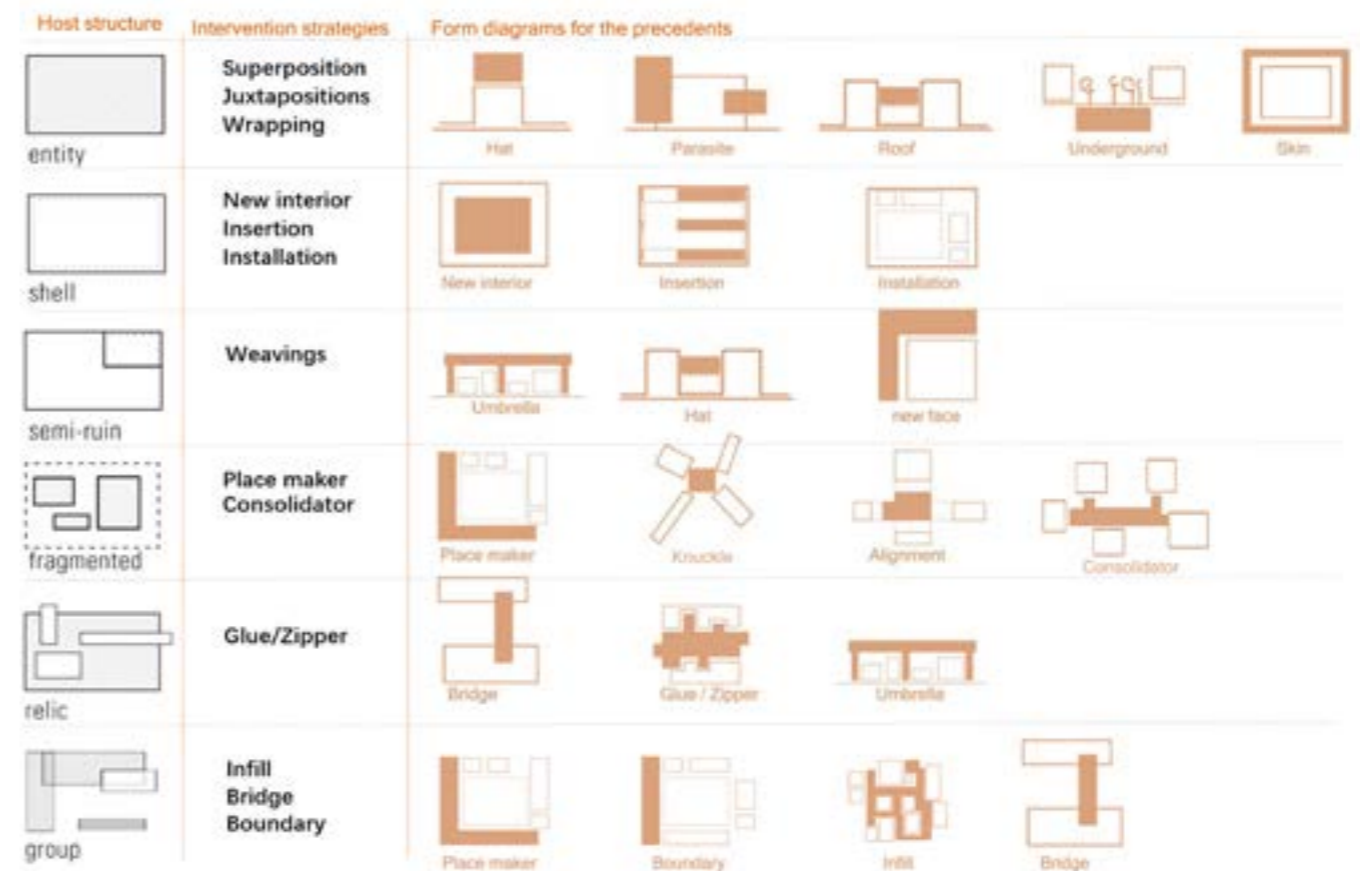
04 Intervention Strategies Of Adaptive Reuse

The author summarizes and concludes the adaptive reuse methods of the built environment on three levels: spatial form, architectural expression, and aesthetic fundamentals, which comprise the main body of this article’s design intervention strategy system.

According to their original structures, the architectural form is classified into six categories: “entity,” “shell,” “The Semi-Ruin,” “Fragmented,” “Relic,” and “Group”. They have different ways of intervening, and after thorough research, we have obtained the following strategies.

The authors assemble the relationship between the host structure and its intervention strategies and the prior researchers’ intervention approaches in the figure below. There is a substantial connection between the two methods, and the previous researcher’s study of building form supports this paper’s building form methods for adaptive reuse.

The relationship between host structure, intervention in this paper, and the precedents form diagrams, Source by author



1. Existing buildings that are structurally intact and in the process of being adapted to new uses typically retain the completion of the structure because this type of building is predominantly a conservation type of building. It is mainly in the form of additions to the main structure, which serve to integrate old and new activities or to act as a carrier for new functions, that the intervention takes place. The paper provides three intervention strategies: superposition, juxtaposition, and wrapping.

2. Structures that are highly available on the outside but are obsolete or ruined on the inside are called "shell." This form of intervention is typically targeted at the interior spaces of a building's structure. The new functions introduced into the interior of the building must be compatible with the structural and cultural context of the existing structure to maximize the usage of the current structure. In the case of preserved buildings, they are designed to be as flexible as feasible in terms of composition, décor, and furniture. The following adaptive reuse strategies are mentioned in the text: new interior, insertion, and installation.

3. Buildings that have been partially damaged but are still structurally sound for the most part. Typically, interventions are aimed at repairing historically significant structures. The new features must complement the building's historical and cultural character, and balancing new technologies and materials with the existing structure is also critical. Due to the fact that this type of intervention approach must be tailored to the specific damaged structures, this study will focus on the most common top structure damage and the strategy employed to repair it: a weaving of the old and the new.

4. The structure of the building is largely damaged, and although it is in a state of disintegration, the general structure of the building can still be seen. In this case, adaptive reuse becomes an act of invention. This form of reuse is frequently justified by two factors: first, it is a historically significant conservation structure. Second, for economic reasons, abandoned, unfinished constructions are repurposed. At this point in the paper, we explain how to intervene with each of the two contributing elements. Placemaking is an effective method of preserving a site's historical and cultural significance, and economic reasons can affect consolidation decisions.

5. A relic of the past recalls the significance of an event, a history, a period of time through adaptive reuse. In the urban context, there are numerous ways of reuse for this category. We may broadly divide it

into two primary types, one as part of an urban park and the other as a building that can be renovated for public access. This research focuses on the second kind, Glue, and zipper, as creative and effective means of design intervention.

6. A group is a collection of structures, the most common of which is a city's industrial park. It is a resource that can be redeveloped in contemporary urban development. Due to the fact that they are a synthesis of numerous types of structures, their intervention methods frequently coexist in a variety of ways. Combining "infill" with "bridges" is a widespread intervention technique, which involves filling in gaps with new functional buildings, linking the various functional blocks via bridges, and eventually constructing new forms. Extending the space to alter the spatial pattern by parasitizing the main building is another appealing technique of adaptive reuse intervention.

The intervention strategies of host structures and the research cases in this paper-1
Source by author



Superposition



Casa Forum museum in Madrid was transformed from a former power plant.

Juxtapositions



A Grade I listed building in England sensitively converted into The Holburne Museum.

Wrapping



The warehouse converted into the most sought-after Copenhagen's Gemini Residence.



New interior



The Cinecittà Matadero was used as an auditor and livestock market. It is now renovated to cinema.

Insertion



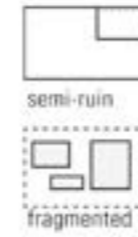
All Souls is an immense church, which has the largest single span nave in England. It converted into a community center.

Installation



A 13th-century church in Netherlands converted into an impressive contemporary bookstore.

The intervention strategies of host structures and the research cases in this paper-2
Source by author



Weavings



The Moritzburg Museum in Halle, Germany, is an example of a conversion from a semi-ruined roofless castle to a folding structural platform with the addition of a new roof and upper stories.

Place maker



The conversion of the earthquake-devastated 17th-century church (Chiesa Madre) in Salerno, Italy, into a new urban plaza, dictates the addition of a new floor, circulation, structural improvements, and new lighting.

Consolidator



The abandoned concrete skeletons in Carità de Villorba, Italy, to create a multifunctional structure that combined living spaces and common areas into a hotel, a cultural event auditorium and a residence.



Glue/Zipper



From the ruins of a late-Gothic church to the new Kolumba Museum in Cologne, Germany.

Glue/Zipper



Long Museum West Bund is a new museum of contemporary art, in Shanghai, China. This site of which was used as the wharf for coal transportation. Before the of the design, a two-story underground parking structure had been completed.

Infill Bridge



the preservation of the heritage of Zoidov family has resulted in the complex's conversion to a Cultural Quarter.

The approaches for adaptive reuse creation based on the existing environment are developed on three levels: spatial form, architectural expression, and aesthetic foundation. These three levels comprise the primary body of the design intervention strategy system discussed in this paper.

The three do not exist in isolation but are inextricably linked. According to the table, adaptive reuse occurs in monolithic buildings with a complete structure whose architectural expression on the exterior tends to be “the contrast of the host structure and the new addition.” Fragmentation or clusters of buildings tend to have an architectural expression of “the correspondence of host structure and new addition.” Due to the internal environment’s stability and controllability, this type is more likely to exhibit a “multi-level preservation” expression. Furthermore, in the process of adaptive reuse of the built environment, “holistic expression and seeking inspiration in the original” and “host structure as material for the new building” as the aesthetic foundation are more accessible to apply in practice than “preservation of the scene and spirit of the place.”

Intervention strategies
Source by author

Selected cases by Architectural Form						Architectural expression			Aesthetic fundamentals of adaptive reuse		
Host structure	Now	Former	Intervention	Diagram (orange is new, grey is old)	Photo	The correspondence of host structure and new addition	Multi-level preservation	The contrast of host structure and new addition	Holistic expression and Seeking inspiration in the original	Preservation of the scene and spirit of the place	Host structure as material for the “new building”
entity	Caixa Forum museum in Madrid	A former power plant	Superposition					✓	✓		
entity	The Elbphilharmonie	A storehouse	Superposition					✓			✓
entity	The Holburne Museum in England	A Grade I listed building	Juxtapositions					✓		✓	
entity	Copenhagen's Gemini Residence	The warehouses	Wrapping			✓			✓		✓
shell	The Cineteca Matadero cinema	An abattoir and livestock market	New interior				✓				✓
shell	An immense church, which has the largest single span nave in England	A community center	Insertion				✓		✓		
shell	A 13th Dominican church in Netherlands	Contemporary bookstore	Installation				✓		✓		✓
semi-ruin	The Moritzburg Museum in Halle, Germany	A semi-ruined roofless castle	Weavings					✓	✓		
fragmented	A new urban plaza in Salemi, Italy	The conversion of the earthquake-devastated 17th-century church (Chiesa Madre)	Place maker			✓				✓	
fragmented2	Combined living spaces and a hotel, a cultural event auditorium and a residence in Carità de Villorba, Italy	The abandoned concrete skeletons	Consolidator			✓					✓
relic	Kolumba Museum in Cologne, Germany	The ruins of a late-Gothic church	Glue/Zipper			✓	✓			✓	
relic	Long contemporary art Museum, in Shanghai, China	The wharf for coal transportation	Glue/Zipper			✓	✓		✓		
group	Zsolnay Cultural Quarter in Hungary	The preservation of the heritage of Zsolnay family	Infill Bridge			✓		✓	✓		

05 Renewal Of Sifang Road Historical & Cultural District

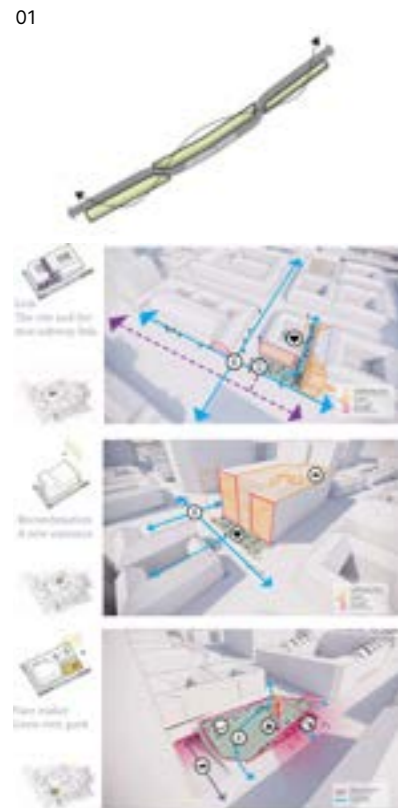
A series of intervention strategies allow the old buildings to take on a new life to upgrade the district sustainably.

The "Liyuan" buildings are an essential part of the urban fabric of Qingdao's old city, and they can best reflect the city's commonplace life. They carry not only the historical and cultural information of the city's past, but more importantly, they serve as the memory of the city and give the locals a sense of identity and belonging to the city. The Four Square Street Historic Preservation Area preserves the integrity of the "Liyuan," a unique residential building in Qingdao. After evaluating the buildings, the designers have adopted an adaptive reuse approach to renew the area. The premise is to maximize the preservation of the district's historical and cultural facilities by finding new adaptive functions. A series of intervention strategies allow the old buildings to take on a new life, thus upgrading the district sustainably.

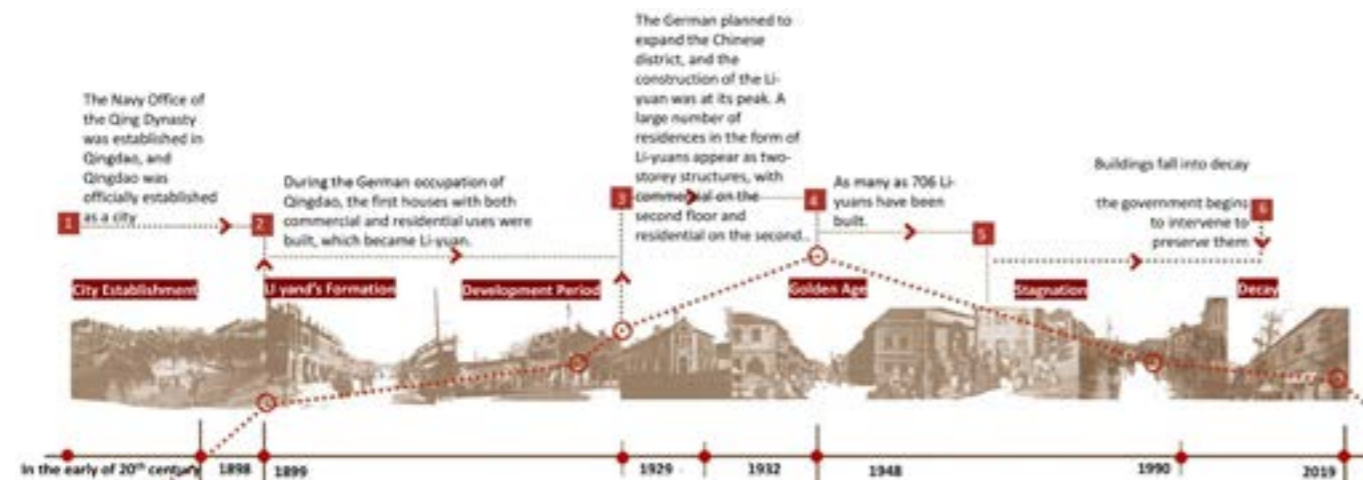
Through an in-depth survey and study of the protected area, the project proposes a design strategy from two perspectives: the urban renewal perspective and the other being the specific interventions for the existing environment.

From the perspective of urban renewal, four points are proposed:

1. Create multiple types of public dynamic nodal places.
2. Develop creative industries to promote the neighborhood as a sustainable mixed neighborhood.
3. Improve the comfort and experience of the streets to create pedestrian-friendly pedestrian neighborhoods.
4. Maximize the district's value through a combination of above- and underground development.



02



Graphic	Design elements	Areas	Adaptive reuse's intervention
	A linear park	Jiaozhou road	Link Bridge
	Four theme streets	Boshan Road Haipo Road Zhifu Road Yizhou Road	Space maker Weaving
	Multiple cultural landmarks	Jiaozhou Road - Boshan Road Node Jiaozhou Road - Zhifu Road Node Sifang Road - Yizhou Road Node	Insertion Parasite Weaving
	An area of industrial clusters	Civic Park(car parking) Living & Recreation Centre Urban Vitality Corridor Industrial Creative Centre	Zipper/Glue

03



04

The specific interventions for this existing environment begin with creating a linear park to connect the north and south. Secondly, the planning of four main streets to stimulate street commerce and drive connectivity throughout the area. And then, the renovation of nodal buildings at road crossings makes them public service buildings that identify the site. Finally, industrial clustering will drive the vitality of the area.

The renewal project of the Sifang Historic District has already been implemented in Qingdao, and each building or area will have a different design company to provide specific solutions according to this plan. Due to the large number of stakeholders involved, the complexity of the transformation of the buildings, and the coordination of various units during the implementation process, the final presentation of the area is unknown and still faces many risks. As the author mentioned above, "adaptive use is used for urban renewal. The core is a way of city planning that needs a wider range of policy tools to make it happen.

01. Specific Intervention strategies-1, Source by BDP
02. The evolution of Sifang Street is depicted in this timeline. Source by author
03. Intervention strategies of the project design elements, Source by BDP and author
04. Specific Intervention strategies-2, Source by BDP

06 The Interior Design Of A Private Middle School

The original construction structure of the school indoors is used as the interior material to minimize the use of new materials, and most decorating materials are made locally.

Urban restoration is critical for modernizing urban government systems and enhancing people's quality of life. China's urbanization has evolved gradually away from incremental expansion and toward stock renewal. Chengyang Jihongtan district has used the advent of high-tech industries to revitalize inefficient land, convert land uses, and enhance the industrial structure. It will make city operations more efficient, improve space quality, and make living and ecological environments better.

The school's building site is an industrial brownfield, and the area surrounding it is densely populated with temporary industrial plants. The regional government invested in superb educational resources in the hope of establishing a new urban environment centered on an ecological campus. The area's regeneration strategy is built around the "campus-city" relationship. By considering the campus and the city as a single organism, a holistic regeneration process is applied to improve the area's quality and foster synergistic development of the campus-industry-city triangle. These also fit with the adaptive reuse development goal.

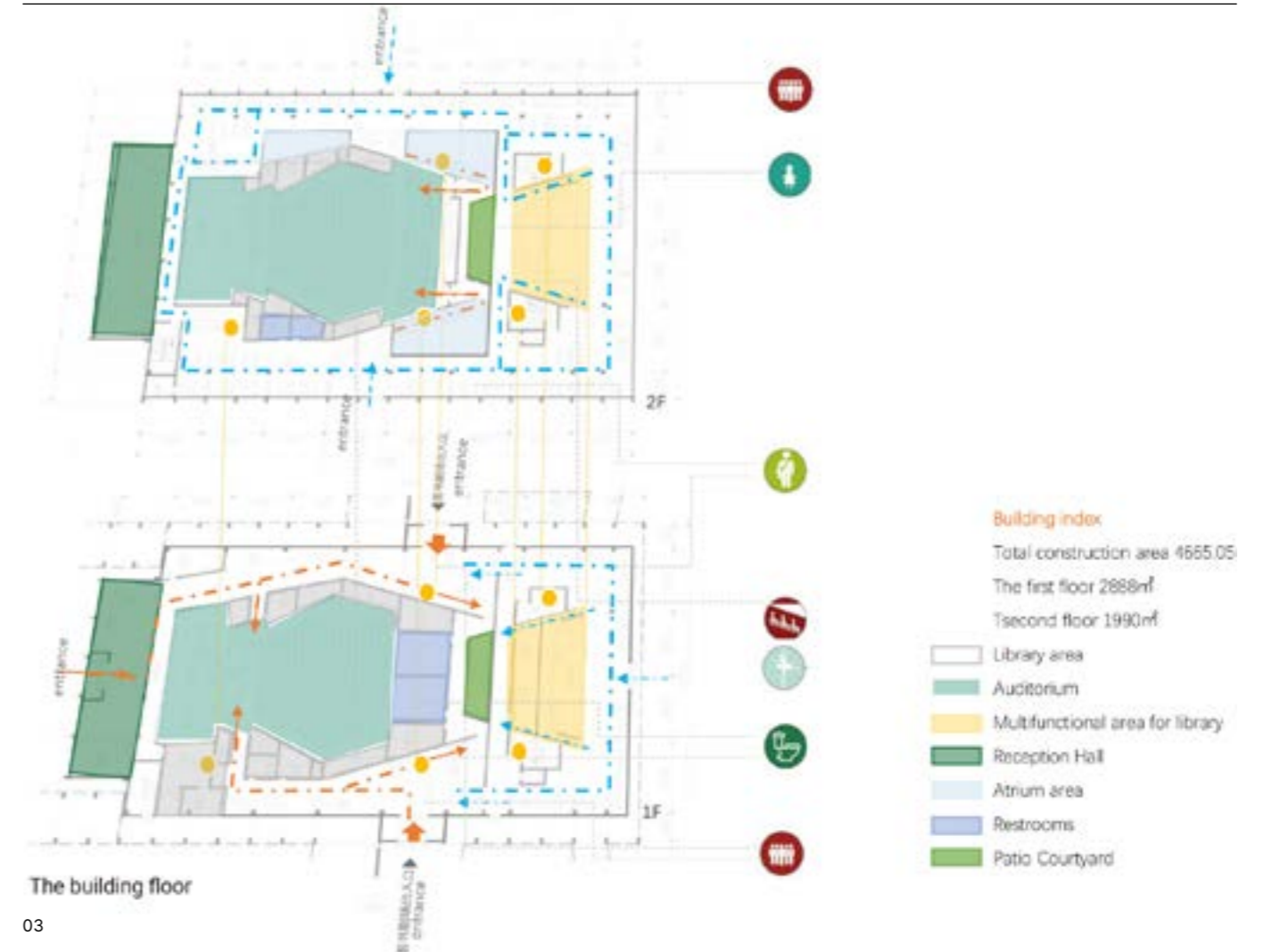
- 01. Relationship between the building site and the surrounding properties,source by TYDI
- 02. The surrounding for the site ,source by TYDI
- 03. The library building and its section ,source by author
- 04. Functional unit of the teaching building, source by author



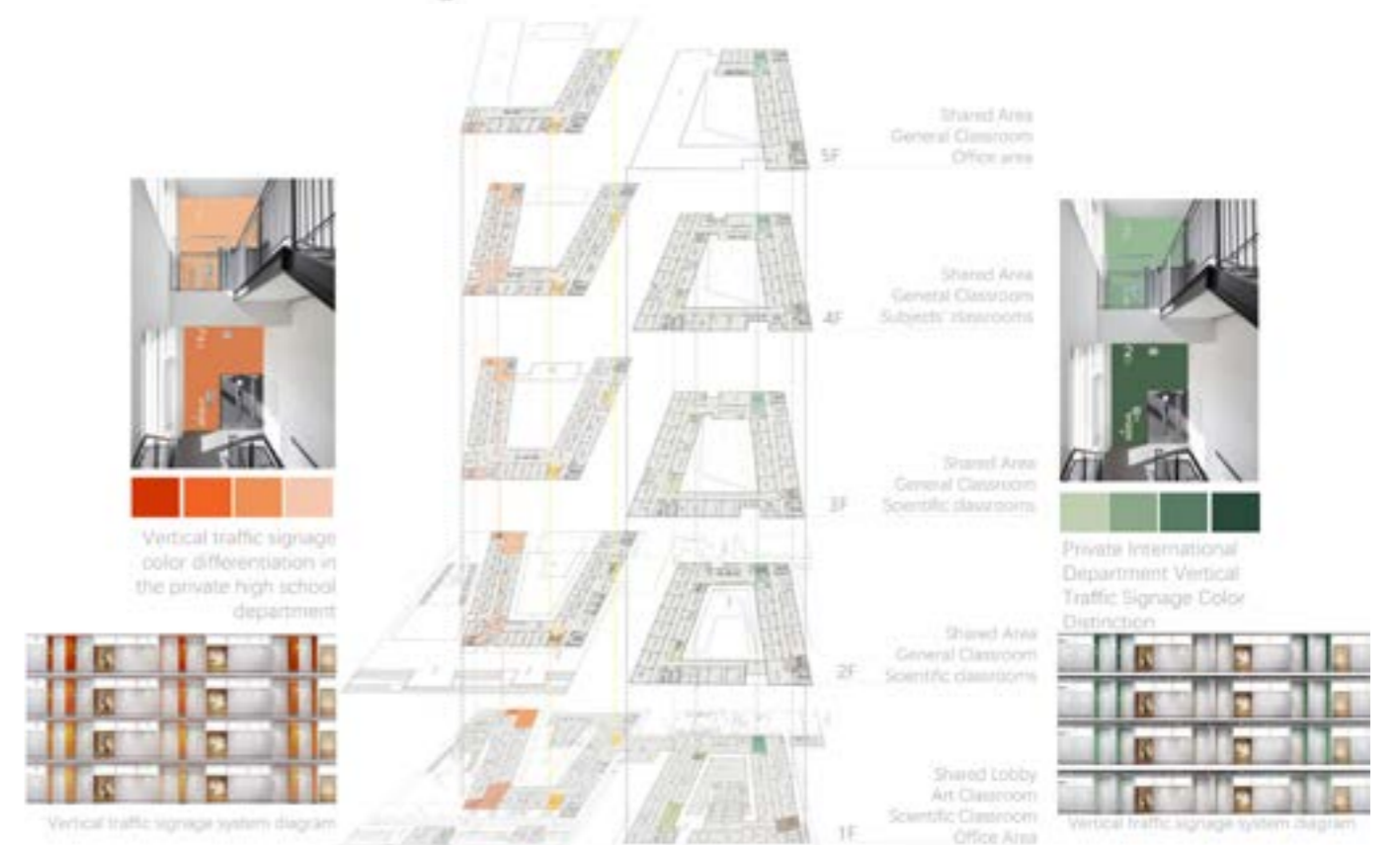
01



02



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- 01. The ground floor of the library,Source by author
- 02. The first floor of the library,Source by author
- 03. The public hall,Source by author
- 04. Auditorium ,Source by author
- 05. The public area of the ground floor in international school ,Source by author
- 06. The public area of the first floor in international school ,Source by author
- 07. The classroom in international school ,Source by author
- 08. The corridor in private school ,Source by author

Although the structure is new, the designers used a majority of adaptive reuse concepts in designing the school's interior. Along with intervention tactics for insertion and installation, the designers incorporated the building's original structure into the design to limit the use of new materials. Additionally, because most of the neighboring industries are associated with high-speed rail, there are relatively more metal and composite material manufacturers. Most of the interior decoration materials were supplied by these adjacent companies. On the one hand, local materials are used to help the development of local industries. On the other hand, carbon emissions are reduced during transportation to reduce the impact on the environment.



01



02



03



04

- 09. The corridor in private school ,Source by author
- 10. The classroom in private school ,Source by author
- 11. The public area of the ground floor in private school-1 ,Source by author
- 12. The public area of the ground floor in private school-2 ,Source by author
- 13. The dance room ,Source by author

The original construction structure of the school indoors is used as the interior material to minimize the use of new materials.



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07 Conclusion Sentences

The main sentences that came out of the research are as follows:

PART 1

- 01 Adaptive reuse for historic structures is based on conservation — first, then finding uses for the property that serves the public interest, which means transferring urban legacy and architectural art to future generations is its obligation.
- 02 The core of adaptive reuse for building stock is to extend the — useful life of existing architectural assets by adding new uses that meet contemporary needs.
- 03 Adaptive reuse of urban renewal is essentially an important tool for — urban planning and requires the support of relevant government policies. Adaptable reuse should be given more attention to help the local economy and make the area more livable.
- 04 It is important to understand and respect the historical — context of the buildings in question. Allowing regeneration or extending its life is a central objective of design interventions. The implementation process must preserve its materials and techniques, as well as distinguish between old and new levels. Simultaneously, extensive research and studies are necessary.
- 05 Adaptive reuse occurs in monolithic buildings with a complete — structure whose architectural expression on the exterior tends to be “the contrast of the host structure and the new addition.” Fragmentation or clusters of buildings tend to have an architectural expression of “the correspondence of host structure and new addition.” Due to the internal environment’s stability and controllability, this type is more likely to exhibit a “multi-level preservation” expression. Furthermore, in the process of adaptive reuse of the built environment, “holistic expression and seeking inspiration in the original” and “host structure as material for the new building” as the aesthetic foundation are more accessible to apply in practice than “preservation of the scene and spirit of the place.

PART 2

- 06 The area's regeneration strategy identifies appropriate new uses — for the district's historic and cultural structures while maximizing their preservation. Subsequently, through a variety of intervention strategies, these historic structures can be repurposed, providing for a sustainable upgrade of the area.(Case 1)
- 07 The local government invests in high-quality educational — resources to revitalize industrial brownfields. The “campus-city” relationship is one of the design principles of the renewal. This helps the growth of the campus-industry-city together.(Case 2)
- 08 The original construction structure of the school is used as the — interior material to minimize the use of new materials. Additionally, materials produced by local are used to aid in the growth of local companies and to lessen the transportation process's carbon imprint.(Case 2)



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