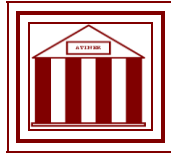


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ARC2016-2002**

**A Research on Preservation and Renovation
Strategies of Spatial Pattern in China's Urban
Historical Blocks against the Background of “the
Belt and Road”: A Case Study of Ayidun
Historic Block in Yining City, Xinjiang Uyghur
Autonomous Region**

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A Research on Preservation and Renovation Strategies of Spatial Pattern in China's Urban Historical Blocks against the Background of "the Belt and Road": A Case Study of Ayidun Historic Block in Yining City, Xinjiang Uyghur Autonomous Region

**Yan Bo
Chen Zhuo
Tan Wenyong**

Abstract

Against the strategic background of "the Belt and Road", the urbanization steps onto an increasingly fast pace in China's northwestern region of ethnic minority. However, the preservation and development of the historical blocks comes into a dilemma, especially the spatial pattern. As an essential element of the structure of the urban historical blocks, its preservation and renovation becomes an important research project upon the shock of rapid urbanization¹. With a case study of Ayidun historic block in Yining city of Xinjiang, the article delves into the preservation and renovation strategies by analyzing its land use, block texture, street pattern, spatial scales, block skyline, spatial pattern of yard and architecture on the premise of respecting its regional characteristics, historical context and place spirit and considering the change of urban economic structure²³⁴⁵⁶. To be specific, the strategies can be summarized as: the core preservation area should be allocated and the land function and ratio should be integrated in the Ayidun historic block; on the basis of high building density but low plot ratio, the traditional block texture with the uniform distribution of buildings and exterior space should be maintained; the smooth fish-bone-shape street pattern should be spread to improve streets and alleys at safety risk; the components and scales of the street space should be optimized; the height of the buildings should be correspondingly controlled; the priority of mosques should be given in the skylines; the historical yards and its conventional spatial pattern should be respected; last but not least, historical buildings should be preserved and meanwhile, better the geographical features and spatial pattern of non-historical regions. It is hoped that the above mentioned strategies can be enlightening about the preservation and renovation of historical blocks in China's northwestern regions of ethnic minority.

Keywords: Ayidun Historic Block of Xinjiang, Historical blocks, Preservation and renovation, Spatial pattern.

¹ Lu Feng. Research of Urban Design with Locality [J]. NEW architecture, 2013,03:18-21.

² Steven Tiesdell, Tim Heath, Taner Oc. Zhang Meiying and Dong Wei. Trans: Revitalizing Historical Urban Quarters [M]. Beijing: China Architecture & Building Press, 2006.

³ Ruan Yisan, Sun Meng. The Study on Some Issues Related to the Conservation and Planning for the Historic Streets and Areas in China [J]. Urban Planning, 2001, 10:25-32.

⁴ WU Lian, WANG Xin. Method of Protection and Renewal on Historical Street District [J]. Journal of Architecture and Civil Engineering, 2007, 01:84-88.

⁵ Lu Feng. Seeking of the Contemporary Regional Architecture Culture: Form Building to City [J]. Architecture & Culture, 2011, 07:44-46.

⁶ Wang Songyi. The research on the protect urban design of history block [D]. Zhejiang University, 2005.

Introduction

With the strategy of “the Belt and Road” proposed and implemented, Xinjiang, as a regional financial center in Onshore-Silk Road core zone, has become a trading, political and cultural junction linking the eastern world and the western world in northwestern China. Under strategic interspace structure in the region of state (Urumchi - Ili – Kashgar, the Iron Triangle of Finance), the State Council proclaimed in writing that Yining City, the capital city of Ili State, will be built as “an important city of west of China to open up to outside world as a gateway and regional center” because of its regional, industrial and cultural advantages, so that, as an international gateway of northwest of China facing Eurasia and regional center in west of north slope of Mountain Tianshan, Yining City’s position will be emphasized once more.

As one of the most important connection cities in “the Belt and Road”, Yining are facing the dilemma from protection and development because of the restructure of historic street in regional economics and trading pattern, improved facility of traffic and logistics, inheritance of minority ethics regional and traditional culture and increased demand and influence of quality of city. Protection and renewal of the urban historic streets can resolve the problem of disorder between historic functions and modern needs through the way of protecting and renewing synchronously physical structures and economic activities, so that it is going to raise a long term and deeper level of vigorous economic growth. Ayidun historic block is one of the four historic and cultural streets in Yining City, and the physical structure cannot meet the demand from economic activities and modern life under the current policies. Interspace structure is a key element of physical structure of urban historic streets, of which the protection and renewal strategy research also is a precondition to lead Yining City, a famous national historic culture city, to the whole world. Based on it, through the analysis and research on the Ayidun historic block interspace structure, this article will try to provide the strategy of preservation and renovation to respect regional, historic, ethnic, and site characteristics under the changing urban economic structure.

Related Concepts on Preservation and Renovation of Historical Blocks and Spatial Pattern

Preservation and Renovation of Urban Historical Blocks Theory and Practice Summary

Combined with the national and international literature study of preservation and renovation of historical block since the beginning of the 20th century, the researchers started to study the protection of heritage buildings, structures and heritage areas from ‘Method Of Historical Monuments’ and ‘Athens Charter’ being published respectively in 1913 and 1933 to the ‘Protection Planning Of Beijing’ which Liang Sicheng put forward for the

reuse of the old city wall in the 1950's. Then the 'Venice Charter', published in 1964, preliminary formed the understanding of integrity and historic significance of historical relics. 'Nairobi Recommendations' and 'Washington Charter', published respectively in 1976 and 1987, gave the further definition of the protection of historic cities and urban areas. With the academic conferences successively held, a comparatively complete protection system of the historical relics and areas was initially formed. Then with the international symposium on "Historical Block Protection" held in 1996 and the 'Law of the People's Republic of China on the Protection of Cultural Relics' published in 2002, various protection regulations come on stage and meeting proposal lead to a more complete research system of historical block protection⁷. The historical block protection presents a 'monomer architecture-historical block-whole block environment-urban history conservation' development process, and the core concerned presents a 'material structure-human elements-material economy' organic circulation.

Definition on Spatial Pattern

The term 'Spatial Pattern' is mentioned in many books and literatures, but its precise definition is complicated. According to the etymology and the great Chinese dictionary explanation, the urban spatial pattern is defined as 'city under the arrangement of the quartet structure and format'. Chen Youhua and Zhao Min, professors from Tongji University, consider that the urban spatial pattern is a reflection of group building layout forms of urban planning.⁸ Li Dehua, from Tongji University considers that on one hand the urban spatial pattern is a result of the city restricted by the natural environment and on the other hand it reflects the differences and characteristic of the urban cultural and historical development process referred to his writing 'Principles of Urban Planning'⁹. Pan An from South China University of Technology, proposes that the city spatial pattern is composed of the geographical environment and human environment which reflect the overall characteristics of the city referred to his paper 'The theory of 'Gestalt' and the protection of the urban spatial pattern of Guangzhou'. Yang Jianqiang, from Southeast University, considers that the urban spatial pattern is the urban material space which forms the overall macroscopic manifestations, also the urban style and features reflected in the overall macroeconomic. It includes the city surface contour, function layout, space form, road skeleton and natural features¹⁰.

In this paper, the author defines the spatial pattern of the urban historic block: the spatial pattern reflects the material pattern. And it is the general

⁷ Huang Yong, Shi Yaling. Review On Historical District Preservation And Renovation Practice [J]. Planners, 2015, 04:98-104.

⁸ Chen Youhua, Zhao Min: Introduction to Urban Planning [M]. Shanghai: Shanghai Scientific and Technological Literature Press, 2005.

⁹ Wu Zhiqiang, Li Dehua: Principles of Urban Planning [M]. Beijing: China Architecture & Building Press, 2010.

¹⁰ YIN Chao. Conservation Dtdudy of Space Composition in Historic City with Nanjing City an Case [D]. Southeast University, 2005.

reflection of urban material space form of characteristic features, the settlement pattern, natural environment and humanistic environment in specific social, economic and cultural background.

Present Condition Analysis and Preservation and Renovation Strategies of Spatial Pattern of Ayidun Historic Block

The Ayidun historic street is facing multiple pressures from the developing and changing urban economic and trading structure and its own problems referring to lagging economic development, declining physical environment, evanescent non-material cultural heritages, etc. Therefore, the research on strategy of interspace structure of protection and renewal is extremely urgent.

Present Condition Analysis and Preservation and Renovation Strategies of Land Use of Ayidun Historic Block

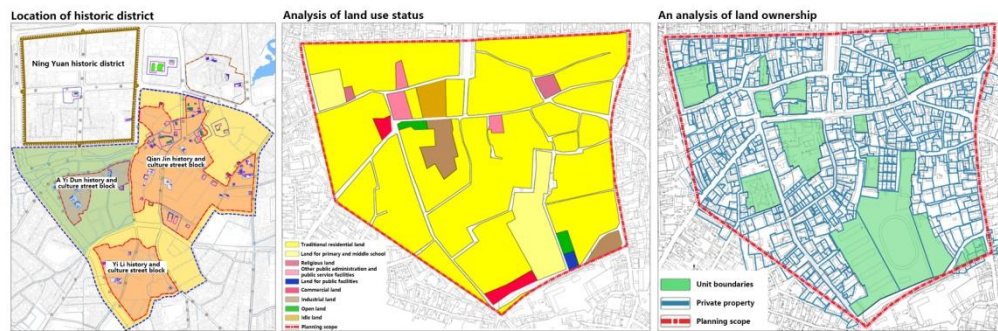
Present Condition Analysis of Land Use of Ayidun Historic Block

According to the related plans, the Ayidun historic block, the Qianjin historic block and the Yili historic block which are located in the Nanshi district of Yining city are closely linked. These three blocks are all situated in the scope of the construction control zone of an ethnic minority area with multi-ethnic minorities called Kazanqi. The research subject is close to the Ningyuan old city site, with Shengli Street on the north and 8th Lane of Yili Street on the south. And its total land area is 35 hectares. There are 640 traditional residential courtyards and 10 public buildings including 2 primary schools, 2 mosques, 2 residential quarters, Yili Pharmaceutical Factory, Hasangqi Residential Committee, Yili Cement Plant, Kazanqi Police Station in the Ayidun historic block. The specific present land functional division and proportion are showed in Table 1 and Figure 1.

Table 1. *Present Construction Land Balance Sheet*

Land code	Land Function	Area of Land (hm ²)	Proportion of urban construction land (%)
R	Residence	25.6	73.00
A	Public Management And Public Service Facilities	3.18	9.07
	Include Administration	0.39	1.11
	Education	2.41	6.87
	Religion	0.26	0.74
B	Commerce	0.44	1.25
M	Industry	0.99	2.82
S	Street	4.52	12.89
	Include: Urban Street	4.52	12.89
U	Public Facilities	0.09	0.26
G	Green Space And Square	0.24	0.68
H11	Urban Construction	35.07	100

Figure 1. Present Construction Land Analysis



Source: Based on the 'Protection Planning of Historical and Cultural City of Yining', 2010; Drawn by the Author, 2016; Drawn by the Author, 2016.

The land use research findings demonstrate that the Ayidun historic block is lack of an explicit regional division and guideline for a better support of preservation and renovation. Moreover, the public spaces, the public management and public service facilities are inadequately-equipped. What's more, the traditional function layout of land use cannot adapt to the present economic and trade pattern changes.

Preservation and Renovation Strategies of Land Use of Ayidun Historic Block

For land-use planning, first of all, divide the core protection areas where the Ayidun Street to the north, Yili Street to the east, the forth alley of the Ayidun Street to the south with 80- 110 meters courtyard boundary the Orchard Street to the west, and it covers a total area of 7.75 hectares. Compared with other construction control zone, the core protection area must obey the guiding principle which contains new-built, expanded and rebuilt principle, pattern of street style and features protection principle, revision and reconstruction principle and the environmental elements protection principle. New buildings are banned in historical and cultural core protection area, the style and features of the new and extension buildings in the construction control zone ought to coordinate with the traditional historic district, the height of the buildings must be controlled too. Secondly, optimum adjustment on the present land-use layout: 1) set up commercial and residential area along the Orchard Street and Ayidun Street with 'front shop-back home' or 'downstairs store-upstairs dwelling' form to increase the vitality of historic blocks, response to "mass entrepreneurship and innovation" demanded by the government to protect traditional national commercial culture. 2) Increase the land area for the square, curb-side parking, public service facilities. 3) Move the original Yili state pharmaceutical factory, then part of its original area can be adjusted to a residential area and the area for exhibition building in order to develop it as a typical region. 4) On the basis of the tourist resources and their distribution in the historic district in Ayidun, and the planning design, it can be turned into a folk hotel experience zone in the south part of the Orchard Street and tourism products commercial district in the north part; The west part of the Ayidun

Street can be turned into a characteristic food street, the central part can be optimized into a folk activities zone combining with the folk exhibition building and cultural Square and the east part can be improved to the traditional arts and crafts street. Under the circumstance that the historical building and courtyards are concentrated in the historic district, make the forth alley of Ayidun Street into a traditional residence tourist area. Optimized land functional division and proportion are showed in the Figure 2 and Table 2.

Figure 2. Optimized Land Functional Division



Source: Drawn by the Author, 2016; Drawn by the Author, 2016; Drawn by the Author, 2016.

Table 2. Optimized Construction Land Balance Sheet

Land code	Land Function		Area of Land (hm ²)	Proportion of urban construction land (%)
R	Residence		21.35	60.88
A	Public Management And Public Service Facilities		3.62	10.32
	Include	Administration	0.36	1.03
		Cultural Facilities	0.42	1.20
		Education	2.66	7.58
		Religion	0.19	0.54
B	Commerce		0.39	1.11
S	Industry		8.51	24.27
	Include: Urban Street		8.18	23.32
U	Public Facilities		0.3	0.86
G	Green Space And Square		0.89	2.54
H11	Urban Construction		35.07	100

Present Condition Analysis and Preservation and Renovation Strategies of Block Texture of Ayidun Historic Block

Present Condition Analysis of Block Texture of Ayidun Historic Block

The “figure-ground relation theory” is a research based on the ratios between the building volume as the entity (figure) and the open space (ground) as the virtual. On one hand, the total building density of the historic district in Ayidun is 33%, it belongs to a high building density and low volume ratio. The

district includes many low-layer traditional residential buildings with a courtyard and a few newly-built multi-storey residential buildings. On the other hand, streets plane goes into natural bending state.

The block texture research findings demonstrate that the history of the Ayidun historic block growth process has the characteristics of spontaneity, which leads to show the diversity, changeability and instability of the relationship between the residential shapes and its outer space (Figure 3). This relationship doesn't mean that the block is in a mess. Inversely, it shows the real residential production mode and lifestyle and it also reflects the local economic and social development¹¹.

Figure 3. *Figure-ground Relation of Ayidun*

Figure ground relation



Source: Drawn by the Author, 2016; Drawn by the Author, 2016.

Preservation and Renovation Strategies of Block Texture of Ayidun Historic Block

One of the goals on the preservation and renovation of historical blocks is the continuation of the inhabitants' regional lifestyle. With the development of the society and economy, protecting and optimizing the original block texture is a powerful and efficient way to achieve this goal. First of all, maintaining the basis of a high building density but low plot ratio; Secondly, the traditional block texture with the uniform distribution of buildings and exterior space should be maintained and optimized. It includes: 1) Optimizing the traditional folk building plane and the spatial form of the courtyard. 2) Renovating the green space system of courtyards. 3) Adding small roadside green space on some certain idle lands and building a greening system with the formation of dot, line, face combined with canal and river system. 4) Adding some evacuation squares with characteristic styles and features and some public squares including religious squares around the mosque in certain points of the historical block (Figure 4).

¹¹ He Yi, Deng Wei. Research on the Prototype and Types of Architectural Texture in Historic District [J]. Urban Planning, 2014, 08:57-62.

Figure 4. *Present Block Texture Analysis and Optimized Block Texture of Ayidun*



Source: Drawn by the Author, 2016; Drawn by the Author, 2016; Drawn by the Author, 2016.

Present Condition Analysis and Preservation and Renovation Strategies of Street Pattern of Ayidun Historic Block

Present Condition Analysis of Street Pattern of Ayidun Historic Block

The road system of the Ayidun historic block is complicated. The main streets in the area include Orchard Street, Ayidun Street with lots of branches extended. Typical Important branches include the 4th branch of Street Ayidun where the most historical buildings are distributed, the 8th branch of Street Yili where the resettlement area and the resettlement school are located, Guangming Street where enterprises and institutions are located. Ayidun Street and its branches extended constitute a typical fish-bone structure which reflects the history of the spontaneous growth of historic blocks and has strong regional characteristics. There are two types of Branches, one is the impasse type and the other is the pass-through type (Figure 5). Most elements of the branch interface are walls and gates. Most impasse-type branches are built by the local residents. This situation leads to the collective privacy passage which becomes the common transport and storage space of neighbors. The passage reflects the privacy of a group. In addition to the traffic function, branches are also communication spaces of the neighborhood.

Through the research of the street pattern we found that the streets are created in a process, in which the later residence is leaving the passage to the earlier residence (in traditional settlements). The pattern causes some disadvantages such as the poor accessibility of the street in the Ayidun historic block, some narrow branches and a lot of impasse branches, which make the fire safety problem of blocks become increasingly prominent.

Figure 5. *The Type of Street Pattern of Ayidun*

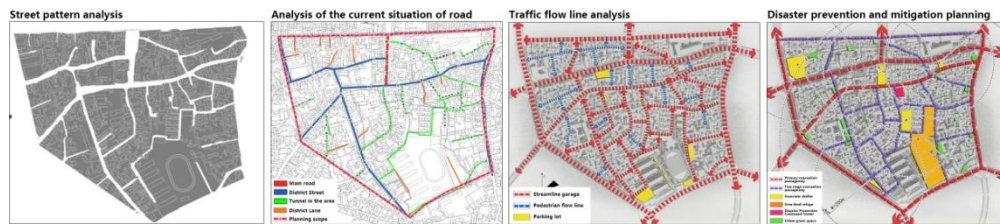


Source: Drawn by the Author, 2016; Drawn by the Author, 2016; Drawn by the Author, 2016.

Preservation and Renovation Strategies of Street Pattern of Ayidun Historic Block

According to the street pattern of Ayidun historic block, first, people should save the formation of the fish-bone structure and the pass-through type branches. Second, create an accessibility system. Third, set the level of fire-fighting passages and provide a public emergency shelter. It shows that solving the fire safety problem is the most important part in the preservation and renovation of the street pattern (Figure 6).

Figure 6. *Present Street Pattern Analysis and Optimized Street Pattern of Ayidun*



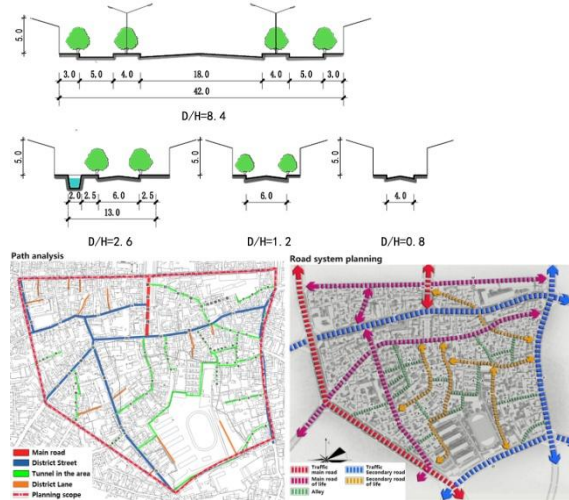
Source: Drawn by the Author, 2016; Drawn by the Author, 2016; Drawn by the Author, 2016; Drawn by the Author, 2016.

Present Condition Analysis and Preservation and Renovation Strategies of Spatial Scales of Ayidun Historic Block

Present Condition Analysis of Spatial Scales of Ayidun Historic Block

The width-to-height ratio (D/H) of the street space is an important form character of a historic block. To maintain the spatial scale of original streets in renewal, the main approach is to control the width-to-height ratio of the street interface. The width-to-height ratio of a street is closely related to the feeling of people in the street. When $D/H < 1$, the interference of buildings to streets is too strong, people will feel oppressed. When $1 \leq D/H \leq 2$, the relationship between streets and buildings is balanced. When $2 \leq D/H \leq 3$, the street and the building is too separated which makes people feel unsafe. When $D/H > 3$, the interaction between streets and buildings disappears. Through the investigation and research, the typical road cross-section and the width-to-height ratio of Ayidun historic block are shown in Figure 7.

Figure 7. *Present Spatial Scales and Optimized Spatial Scales of Ayidun*



Source: Drawn by the Author, 2016; Drawn by the Author, 2016; Drawn by the Author, 2016.

The block spatial scales findings demonstrate that the majority of the streets in the Ayidun historic block give a sense of affinity for people due to its affinitive spatial scale. In terms of the elements of street space, the findings also demonstrates the lack of infrastructure including the streetlight and the mat formation, the lack of landscape elements including the river system and the greening system and the damage of the street features and the street space from illegal construction. And these are all attributed to the low-level economic development of the historic block and the weakness of street-protection consciousness.

Preservation and Renovation Strategies of Spatial Scales of Ayidun Historic Block

According to the spatial scales of the Ayidun historic block: 1) Maintain the traditional width-to-height ratio of street space. 2) Protect and optimize the elements of street space including the infrastructure and the landscape elements. 3) Classify the street and grade the road cross-section and then formulate the guideline.

Present Condition Analysis and Preservation and Renovation Strategies of Block Skyline of Ayidun Historic Block

Present Condition Analysis of Block Skyline of Ayidun Historic Block

The existing buildings are mainly for 1-2 layers. Meanwhile, there are also some multi-storey residence and multi-storey temporary dwellings existing. Ayidun is an ethnic minority historic block where there are some larger-scale mosques. And these constitute the special block skyline system of Ayidun.

Preservation and Renovation Strategies of Block Skyline of Ayidun Historic Block

According to the block skyline of the Ayidun historic block, the local regional ethnic culture should be respected: 1) Maintain the mosque's dominance in the block skyline system. 2) Regulate the style and features of the existing multi-storey building and control the height of the new building. According to the 'Historical and Cultural City Protection Planning of Yining,' buildings should not be more than 2 layers in the core protection area, and 4 layers in the construction control zone (Figure 8).

Figure 8. Present Block Skyline and its Principle of Ayidun



Source: Drawn by the Author, 2016; Rendering, 2016; Drawn by the Author, 2016.

Present Condition Analysis and Preservation and Renovation Strategies of Spatial Pattern of Yard of Ayidun Historic Block

Present Condition Analysis of Spatial Pattern of Yard of Ayidun Historic Block

The residential dwelling in Ayidun is based on the family unit. The spatial pattern of yards is roughly the same: 1) Courtyard space conformation is generally introverted. The building is adjacent to one-side or two-side wall, with other walls forming a courtyard. 2) The yard is a place of daily routine, hospitality, planting and recreation. 3) The existing buildings are mainly for 1-2 layers. The architectural plane forms are mostly rectangular planes, others are trisquare-type planes because of the lack of building land. 4) The building plane functional division and the rectangular plane functional division are basically the same. Secondary structures, such as warehouse, toilet, are set in the corner of the courtyard¹².

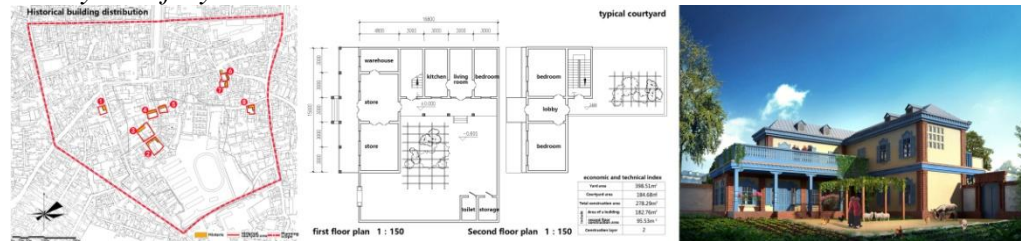
Preservation and Renovation Strategies of Spatial Pattern of Yard of Ayidun Historic Block

There are eight historical courtyards which are all typical traditional houses existing in the Ayidun historic block and maintain the spatial pattern of

¹² Wang Xiaodong: An Architect's Footprint in West of China [M]. Beijing: China Architecture & Building Press, 2007.

the typical courtyards. This is not only for the continuation of material features of Ayidun, but also for the respect of the regional lifestyle¹³ (Figure 9).

Figure 9. Location of Historical Courtyards and Optimized Spatial Patterns of Courtyard of Ayidun



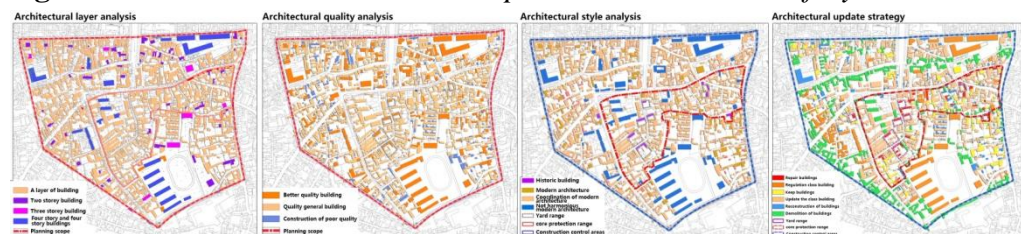
Source: Drawn by the Author, 2016; Drawn by the Author, 2016; Rendering, 2016.

Present Condition Analysis and Preservation and Renovation Strategies of Architecture of Ayidun Historic Block

Present Condition Analysis of Architecture of Ayidun Historic Block

According to the actual investigation and study: 1) The existing buildings are mainly for 1-2 layers but their quality is fair. And the quality of multi-storey residence and multi-storey temporary dwellings is better. 2) Identify the historical buildings and classify the buildings due to the coordination of the regional features (Figure 10).

Figure 10. Present Architecture and Optimized Architecture of Ayidun



Source: Drawn by the Author, 2016; Drawn by the Author, 2016; Drawn by the Author, 2016; Drawn by the Author, 2016.

Preservation and Renovation Strategies of Architecture of Ayidun Historic Block

Retain the historical buildings. Classify each building and optimize the regional features and spatial layout (Table 3).

¹³ Chen Zhendong: Xinjiang Residential [M]. Beijing: China Architecture & Building Press, 2009.

Table 3. Preservation and Renovation Strategies of Architecture¹⁴¹⁵

Preservation and Renovation Method of Architecture	Preservation and Renovation Policy
Historic building	Historic buildings are not permitted to be dismantled. They keep the original height, appearance, dimension, structure, color and valuable interior components. On the premise of the protection of interior components, it is allowed to optimise the interior facilities.
Repair building	Repair the traditional building with ‘repair outside, improve interior’ principle. Maintain the traditional characteristics of the façade, especially the traditional commercial and residential architectural style such as local windows, roof, gingerbread; Repair the appearance, reinforce the building structure, improve the indoor day-lighting and ventilated condition; Bring in the infrastructure.
Remediation building	According to the traditional building façade, renew the ‘new outside, old inside’ buildings.
Keep building	Keep and strengthen the maintenance measures for the continuation of traditional style of modern architecture.
Renovate building	Renovate the building which has no regional and traditional styles and features into traditional forms
Regulate or reconstruct building	For incongruous modern buildings over six floors, facade renovation, such as adding traditional architectural symbol and extending traditional regional color, should be promoted in order to avoid damaging the styles and features of the whole block. Demolish, rebuild or drop layers of the certain buildings according to the need.
Demolition building	Demolish the buildings or structures which hamper the construction of green space and urban roads, or affect styles and features of historical blocks.

Conclusions

Preservation and renovation of the historic block interspace structure is a concentrated reflection conforming to its regional economic and trading restructure of the Ili State under “the Belt and Road” Policy. Conforming to the trend of world multi-polarization, economic globalization, cultural diversity and social informatization , and maintaining the global free trade system and the open world economy, this article provides a preservation and renovation

¹⁴ LI Heping. Preserv Ation and Rehabilitation of Old Buildings in Historical District [J]. Urban Planning, 2003, 04:52-56.

¹⁵ Wang Xiaodong. The Past and Now of Regional Buildings in Xinjiang [J]. Urbanism and Architecture, 2006, 08:10-15.

strategic guidance of spatial pattern in China's urban historical blocks based on the research of the present condition analysis and preservation and renovation strategies of land use, block texture, street pattern, spatial scales, block skyline, spatial pattern of yard and architecture of Ayidun. And its strategies can be enlightening about the preservation and renovation of historical blocks in China's northwestern regions of ethnic minority.

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