A Typo-morphological Enquiry into the Evolution of Residential Architecture and Urban Tissues of the Guangfunan area of Guangzhou, China

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ABSTRACT

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Ye Li

This study examines the evolution of the urban fabric of the Guangfunan area in the city of Guangzhou, China from 1840 onward. The initial purpose of this research is to explain the morphological process pertaining to buildings and streets of a traditional neighbourhood by tracing back the initial phase of the urban aggregate and reconstruct a theoretical model of the evolution of the tissues. The research of the study area is comprised of two scales: on the urban tissue scale, it reconstructs the morphogenesis of the street blocks of the Guangfunan area based on cartographic evidences and a field survey; on the building scale, it classifies the existing buildings into separate categories and seeks to provide a chronicle that shows the diachronic development of the existing buildings.

This research demonstrates the possibility to adapt a predominately European research tradition to a Chinese context. As one of the first applications of Italian process typology methods in China, it allows us to propose a new perspective on the issues of urban landscape management and urban conservation planning in China. This research purports not merely to provides a better understanding of the spontaneous and purposeful change of the urban tissues over time, and develop an integrated framework to understand the urban tissue at a time when contemporary Chinese cities are facing great challenges in urban conservation and regeneration. It also seeks to find the potential possibility for incorporating the theoretical research to the planning strategies and policy-making in the practical planning management.

KEYWORDS:
Urban tissue, morphogenesis, building types, typological processes, urban conservation, Guangzhou, China

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CHAPTER 1 INTRODUCTION

1.1 Research context

Urban morphology is more precisely defined as the study of the spatial and physical characteristics of towns and cities as a result of the spontaneous and purposeful building practices governed by a habitus. It relies upon the theories and methods from cultural geography and architecture. Urban morphology is a field that focuses on urban landscapes as well as architecture and natural environments. This approach has been widely explored and applied to diverse urban contexts in European and to a lesser extended to North America in the last few decades. However, the approach of urban morphology of European schools has only been introduced to China recently. Although China has an urban history extending over some 3500 years and the case of this research, Guangzhou, has a history of some 2000 years, the typological theories have not begun to be discussed among Chinese architects until the late 1980s. After then, a wide range of early research on Chinese cities has explored some particular concerns of the economic history (Fu, 1980), cultural factors and aesthetics (Tang, 1998) and historical geography (Zeng, 1991), which have affected the urban transformations. However, the studies thus far have not developed a

theoretical model of the physical changing process, or to adapt such a theoretical approach into a case study in China. The absence of a solid theoretical foundation is a major problem in current practice of urban planning and design, especially for the conservation planning in China. Therefore, this research also seeks to narrow down the gap between the explanatory research and practical application.

1.2 The case study of the Guangfunan area, Guangzhou

This research focuses on the morphological change of the Guangfunan area that illustrates the urban development process. The Guangfunan area is in the west part of Guangzhou, along the west city wall. It was first developed in the Tang dynasty (607A.D.) based on the historical records '*Xin Tangshu* (*The Historical Book of Tang*)'. Yangren Li is the oldest street that has a textual record to date. Its first record can be dated back to the Sui Dynasty (Huang, 1991[1948]). An archaeological excavation in 1911 found a tombstone, which has a record of 607A.D. indicating that the Yangren Fang - which is the core area of today's Guangfunan area - was a private dwelling of Wang (Zeng, 1991). In the core of the Guangfunan area, and parallel to the Yangren Li, a canal named Daguan River was created in 1472 during the Ming Dynasty. This canal was

connected to the west moat and flow into the Pearl River. It provided the Guangfunan area with a convenient condition for trading and transit in both land and seaway. The Guangfunan area was rapidly shaped as a major commercial and residential area in the west part of Guangzhou in the 15th century. It served the commodity trading between the Chinese traders and Western merchants. The Guangfunan area became a commercial and residential part of Xiguan in the Ming and Qing Dynasties and its commercial dominance continued till the period of Qianlong of the Qing Dynasty. In the later Qing Dynasty, because of the fluviatile deposits in the Pearl River, the Daguan River dried out in the branch of Yangren Li, so the municipal government covered the other parts of the river and built houses over that course. The layout and street patterns of this area experienced a significant change following this construction.

In 1912, the newly established Republican government adopted a policy of constructing the *qilous* as part of the urban redevelopment policies. The construction on major commercial streets or on a road along the river side can separate the pedestrian and vehicular traffic. The buildings of Guangzhou city underwent significant transformations from then, but the city has largely maintained its pre-industrial characteristics until the Communist Revolution in 1949. From 1949 onward, the emergence of work units (*danwei*) entailed a

breaking of the continuity of pre-existing block patterns in traditional neighbourhoods where many traditional buildings have been demolished.

In 1982, Guangzhou was nominated on the national list of the Historico-Cultural Cities, as other historical cities such as Beijing, Xi'an and Nanjing. The municipal government began to establish regulations for the conservation areas. In recent decades, during the new wave of city regeneration, drastic transformations in planning preached the optimal land utilization, the demolishing of old types of buildings by replacing them by high-rises, and merge the small blocks into a large-scale one, leading to new types of buildings and street layouts. Fortunately, in the Guangfunan area, parts of the tissue from Ming and Qing Dynasties were spared from the urban reconstruction project, which makes this area a hybridize zone that combines high-rise modernist buildings and historical fabrics. The complexity of the building types and street system makes this area a valuable case study for conducting a research on urban morphogenesis and typological process in southern China.

Although old buildings have been demolished and replaced by high-rises or adapted to new type of architecture, fortunately, a number of street patterns in the Ming and Qing dynasties remains. In the 2000s, the sixteenth Historico-Cultural Conservation Areas (HCCAs) inscribed 21 historical

conservation areas that were urgently in need of development management (*neibu kongzhi lishi baohuqu*). Regulations of historical conservation planning in Guangzhou were set out by the Guangdong Research Institute of Urban and Rural Planning and Design, and the School of Architecture of Tsinghua University in 2005. In 2006, in the proposal of the Master-plan of Guangzhou (2010-2020), the Guangfunan area was identified as a Historico-Cultural Conservation Area (HCCA) (*lishi wenhua baohuqu*). The research institute tried to write a specific regulation and public policy, to promote a conservation project in this community, thus, offering the opportunity to do useful research in this area.

1.3 Research objectives and hypotheses

The primary objective of this research is to perform a morphological analysis in order to understand the evolution of urban tissues in the Guangfunan area, Guangzhou. The study also proposes to identify and characterize the architectural types in the study area and to unveil the western influence in the typological process from the 1840s onward.

This research hypothesizes that a typological process is at play in the Guangfunan area that informs the evolution of the urban tissues and architecture forms during the historical development.

To meet these research objectives and to validate the hypothesis, the research question of this study could be subdivided into three parts. Firstly: how did the inherited building forms and spatial layouts inform the later transformations of the building fabric and urban tissue? Secondly, what do more recent architectural forms owe to the previous architectural types, and thirdly, how did the exotic architecture style adapted to the local culture in influencing the development of a new architecture type?

The analysis of this research is performed according to a two-pronged approach. The first analysis classifies the existing neighbourhoods into different morphological zones, based upon the appreciation of the geographical distinctiveness and morphological characteristics, and reconstructs a theoretical process of the street blocks formation of the Guangfunan area. In the second part of the study, a schematic model is produced that shows the process of the architecture transformation in the study area.

Moreover, in order to narrow the gap between the theoretical research and practical planning, in its final part, this research brings up a general discussion of the strategies of urban landscape management and historical conservation from an urban morphological point of view and explores the possibility of introducing the typology theories in future study and planning management.

CHAPTER 2 LITERATURE REVIEW AND THEORATICAL FRAMEWORK

This chapter presents a brief review of contemporary morphological studies from both theoretical and practical perspectives. Morphological studies, mostly focus on the case of European countries, provide a theoretical foundation to the morphological analysis that is performed in the next chapter. The chapter also examines the historical records that pertain to traditional city forms and residential dwellings of China. This will help to advance knowledge of the early urban morphological research and the history of traditional Chinese urban form. It also lays more solid background information before performing the field survey introduced in this research. Based on a review of Western and Chinese literature on urban morphology, an integrated perspective on urban morphology in different cultural contexts will be explored.

2.1 The origins of urban form researchin the early twentieth-century

The contemporary study of urban form, i.e. urban morphology, has had a long tradition in Germany (Hofmeister, 2004). When geography became established as a scientific discipline in German universities in the 1890s, human

geographers were mainly focusing on two basic questions of "where" and "why" urban places had come into existence. Meanwhile, German scientists have demonstrated an early interest in the study of urban form. Friedrich Ratzel, who was considered the most prominent geographer in this period, tried to find out the motives and factors that might have influenced the aboriginal peoples' choices of a particular location to build up their city. In his treatise 'Die geographische Lage der großen Städte (The geographical location of large cities)', Ratzel (1903) tried to evaluate the particular site and situation chosen for the settlement in the German old walled cities.

In the early 1900s, while the physical geographers were still busy with the descriptions of landforms and the vegetation cover, human geographers started to shift their attentions to the layout of urban places, the streets patterns, transportation lines, open spaces and the three-dimensional building fabric (Hofmeister, 2004). Otto Schlüter is considered as one of the founders in the field of early urban form studies in Germany. Schlüter's treatise, '*Über den Grundriß der Städte* (On the layout of towns)', coined the terms 'Morphology of the culture landscape', and 'Objects shaping the earth's surface' (Schlüter, 1899).

Another geographer who contributed to the morphological studies in Germany is Hugo Hassinger. Hassinger underlined the importance of historical town plans for tracing the original settlement layout. In his publication in 1910,

the treatise *Über Aufgaben der Städtekunde* (On the problems of urban studies), Hassinger also discussed the ancient cartographers' research and the reliability of the old town plans (Hassinger, 1910).

Another significant work that came out later was by one of Schlüter's graduate students, Walter Geisler. Geisler's thesis on Danzig, a city that lies on the southern edge of Gdañsk Bay, showed a detailed investigation of the form of the inner city, and presented the data on land use and building height in detailed color maps (Geisler, 1918). A large number of regional urban studies began to use such descriptive classifications of town plans in the next two decades in Germany.

Sauer's (1925) *The Morphology of Landscape* may be the first to introduce the term of cultural landscapes into the English-speaking countries. Sauer indicates that the provenance of the term of morphology is the biological science, and the studies should emphasis on the 'organic forms' and structure. Following this understanding, there will be a wide range of studies, in sociology and anthropology for example, which could be identified as a part of the urban morphological research.

Thus, for the purpose of exploring an integrated research framework of urban morphology and adapted it to a contemporary Chinese city, it is necessary to have a review of the relevant morphological and typological theories, Chinese

urban form studies, and the tentative research of adapting those theoretical foundation to all inhabited continent influenced by different culture in the last few decades.

2.2 The contemporary research on urban morphology – the Conzenian and Muratorian traditions

European geography received an important impetus in the 1960s. Two new branches of urban morphological research emerged in Europe, following the work of M.R.G. Conzen in Britain and Gianfranco Caniggia in Italy. Conzen developed a method called 'town-plan analysis' in which key aspects for analysis are focused on the town plan, pattern of building forms and pattern of urban land use. In his work, he considered all these three aspects should be the subject of geographical investigation (Conzen, 1960). In Italy, following the idea of "studies for an operative history of cities" which was inaugurated by architect Italian Savertio Muratori (Malfroy, 1998) , Caniggia published his monograph on Como in 1963. He and Maffei brought out the concept of "urban tissue" in their later work (see for example, Caniggia and Maffei, 2001). According to Caniggia, "tissue is the concept of the coexistence of several buildings existing in the minds of builders before the act of building, at the level of spontaneous consciousness as a civil result of the experience of putting together several building and summing up all interesting aspects" (Caniggia and Maffei, 2001: 118-119).

Urban tissue, can be considered as a summation of "formative laws and categories that are as typological as the building type" (Caniggia and Maffei, 2001).

Town plan analysis

Town plan analysis has been mainly developed by M. R .G. Conzen, who has been trained in Berlin and influenced by the work of the pioneers of settlement geography and cultural landscape, notably Otto Schlüter (Whitehand, 1981).

Conzen's study of Alnwick (1960) is one of the most important publications on urban morphology. It had a long lasting influence still have impact 50 years after its publication. In Alnwick, Northumberland: A Study in Town-Plan Analysis, Conzen established a framework of principles that has played a major role in research in this field.

According to Conzen (1960), town plan analysis can be defined as "the topographical arrangement of an urban built-up area in all its man-made features. Town plan contains three distinct complexes of plan elements: 1) streets and their arrangement in a street-system; 2) plots and their aggregation in street-blocks; and 3) buildings or, more precisely, their block-plans" (Conzen, 1960: 7). A number of contributions have been made in the study of Alnwick have proved to be fundamental in the morphological study. First, he established a framework

of principles for urban morphology that has played a major formative role in research in this field. In particular, Conzen recognized the different aspects of urban form of which the townscape or urban landscape is composed, and shown how unitary plan-type areas or 'plan units' could be recognized in two-dimensional cartographic representations. Secondly, he demonstrated the importance of approaching urban form developmentally, thereby minimizing the risk, inherent in a retrogressive approach, of overlooking historical processes that are no longer directly evident in surviving urban forms. Thirdly, Conzen established the individual plot of land as a fundamental feature of a settlement's layout. Cartographic evidence, especially derived from large-scale plans, was shown to be not only indispensible in itself but an important complement of field survey and documentary evidence. The importance of the conceptualization of processes – an activity enhanced by and manifest in the scrupulous choice of terms – was also most effectively demonstrated in Conzen's early work (Whitehand, 1981).

Conzen attempted to combine the plan analysis with the studies of land-use and social geography of the city since the study of Alnwick. In his later work of the plan analysis of an English city centers, Conzen is the first one to introduce some new concepts and developed some existing ideas in urban form research. The most widely used concept that stem from Conzen's theory

is the concept of fringe belts, which use to be familiar by the geographer in central European. According to Conzen's theory, "urban fringe belts are the physical manifestations of periods of slow movement or actual standstill in the outward extension of the built-up area and characterized in the initial stages of their development by a variety of extensive uses of land" (Whitehand, 1981: 15). At the initial stage of the urban construction, many of the functions are squeezed out from the town center, martial training ground for instance, are located beyond the limits of a city. At the second phase of the construction, the exploiting of new plots and more intensive land-use bring transformation and modification of the original fringe belt. This analysis explains and describes the urban growth as a cycle and an evolutionary line based on the material remains of a plot. This concept can be particular use in the study of the areas between the urban and suburban, which usually have observable remains of fringe-belt elements during the city expansion.

Typological approaches

In the morphological research tradition, the typological studies by Italian architects, mainly developed by Saverio Muratori and Gainfranco Caniggia, offers an analogous perspective for the research on urban form.

According to Muratori, the urban planning and urban design theory in the early

19th century has systematically ceased to be a cultural device and rooted in history. Follow this understanding of the city, "he reinforces urban themes with the consideration of architectural organisms" (Cataldi *et al.,* 2002: 3).

Muratori conceptualized the city as an architectural entity. Gainfranco Caniggia continued Muratori's work by theorizing the 'typological process' of the city of Como (Caniggia, 1963). Cannigia's most notable work is that with Maffei in 1979, which has been described by Samuels as "a vehicle for careful and systematic development of typological processes" (Samuels, 1983: 3). Unfortunately, Caniggia's work is almost entirely in Italian and was little known in most English-speaking countries until an English version of his book was published in 2001.

For Caniggia, the urban tissue is made of elements belonging to three different sub-systems, which are the street system, the allotment system, and the building coverage. Caniggia is concerned with the evolution of built forms and sees similarities with the evolution in the biological study. The examination of the evolution of urban fabric allows systematic analysis of how building types have been adapted and change over time. Caniggia was keen to establish a theoretical model of evolution by reconstructing the process. In his research on the historic area of Florence, Caniggia found the primitive building types and original structures, defined as 'the basic type'. By linking all the contents of the

basic type, Caniggia introduces another concept, the 'aggregative type', or 'urban tissue'. It extended the typological research, making a connection between the individual building and tissue (Caniggia and Maffei, 2001). According to Caniggia, the typological process is analogous to a biological process and he tried to explain the urban growth as a continuous process. Based on this argument, the typological method can be used not only when considering the building structure itself, but also, for the explanation of the evolutionary process of a larger area, like a neighbourhood or even a city. The 'type' concept and the organism perspective have been applied widely in the later research.

To put his theory into practice, Caniggia remained actively involved in architecture and building throughout his life. His research extended to several cities in Italy and North Africa, conducted with colleagues and students who continued the Muratorian legacy. The Muratorian School also shows its influence on some applied disciplines, the urban design for instance, as Moudon described that the most important contribution of the Muratorian School lies in its attempt to build a theory of design base on traditional processes of city building (Moudon, 1995).

Conzen, in contrast, emphasizes the distinction between biotic causality and social causality and relatively few of his terms have biological parallels (Whitehand, 2003). For Conzen, understanding the layering of these aspects

and elements through history is the key to comprehending urban form. Followers of Conzen such as J.W.R. Whitehand have examined the ways in which such knowledge can be put to use in the management of historic and contemporary townscapes.

The theoretical basis and methodologies of these two scholar's traditions are totally different at the first sight. The Caniggian School is best known for the building type research, and in particular the historical development of building types while Conzen gives little attention to this aspect but focuses on the issues of morphological periods and urban landscape change. However, these two scholars were similar in their intellectual conceptual approaches, as the two synthesized analytical systems of urban form. After a separate research and independent achievement in their respective fields for the last half century, the similarities in the theoretical and methodological approaches of these two schools has led to the launch of the International Seminar of Urban Form in 1994, which has contributed to establish an interdisciplinary field of urban morphology brings both opportunities and challenges to the field.

2.3 The new morphological and typological approach

After the bloom of the urban fabric research in Europe in the middle of the 20th century, the interest in urban fabric led to international debates and applications in the last few decades. Although Conzen (1962, 1969) and

Caniggia and Maffei (2001 [1979]) have tested the applicability of their ideas in their later work, in the last three decades, most urban morphological research has still focused on historic European cities. There is a need to expand this research to cities that have grown in non-European cultures. In the last decade, a number of research in Asian cities, confirm the validity of the city-building principles identified earlier by the two schools.

New generations of researchers have been developing urban morphology further since the late 1980s. In typological research, Corsini (1997) used the theories and methodology of Cannigia and Maffei and tried to reconstruct the residential building type process before 1930 in the Italian cities of Genoa, Milan and Roma. Corsini identified the evolution from the medieval one-family house to multi-families buildings and proved that the evolution of architecture shows a continuity of the distinct local process. The finding in the rules and laws of the urban landscape development will make a sound bases to the planner to find a suitable modification and adaption in the professional practice. The theory and methodology of Italian school have also been testified to the North America context in the last three decades. Moudon (1986) examined the changing of the built environment in Alamo Square of San Francisco and manage to reconstruct the developmental process of residential architectures from the late 19th century onward. Following the Caniggian tradition, Gauthier (2003) established an

interpretation of morphological process of urban tissues in residential neighbourhoods of Quebec City.

Satoh's research of castle-town cities in Edo period of Japan (1997) is one of the first attempts to adapt the morphological theories on the Asian continent. He summed up four types of grid-pattern castle-town cities by the spatial structures and city landscape in his research. The research focused on the transportation and commercial districts, explore the process of evolution from early modern castle towns. Satoh (1997) examines and demonstrates that the modern development of the castle is adapting to the shape of the early type and argue that the innovative policies and methods based on such a pattern will play an important role in the future town plan analysis. This is an early exploration which using Conzenian methodology in the Asian historical cities. Gu (2010) performed a new research on the morphology of central Auckland that try to discover the rules and laws through the urban landscape development and offer solutions to reconciling conflicts between the new development and conservation.

In contrast, although the traditional Chinese urban form research has attracted scholars' interests for a few decades, most morphological research had used to focus on the results of social and economic forces, which involved almost all aspects of social science. Some of them have introduced the western theories

and methodology developed for the western context, but failed to offer a theoretical model or tried to explain the morphological process in a practical case study. Obviously, each perspective has its own irreplaceable value but there is a pressing need for integrating those separate research and independent achievement which had been done in the last half century as an interdisciplinary field in contemporary morphological studies.

Typological thinking began to be discussed among Chinese architects in the late 1980s and early 1990s (Shen, 1988; Wu, 1990). Associated with increasing communication between China and other parts of the world, a variety of Western architectural and planning ideas and concepts are being discussed by Chinese researchers in last three decades (Dong, 1982; He, 1985; Wu, 1993; Sit, 1995; Xu, 2000). Whitehand and Gu (2006) is the first cooperation between the British and Chinese researchers to have a systematical and detailed analysis of Chinese urban form. In this paper, they pointed out that although some of the Chinese cities have thousands of years of history and they all built up by some specific rules based on the Chinese culture, a lot of documentary and studies were still incomplete, which make it both opportunity and challenge in urban morphological research in China. They also examined the feasibility of using the Conzenian theory in Chinese historical cities, which is a fundamental framework of the following morphological research of the Chinese cities. Whitehand and

Gu (2007a, b) then confirm the applicability of Conzenian method and concepts in geographical areas with a long history, which are Beijing and Pingyao, China, and apart from the areas they usually applied.

When the concept and literature of urban form was first introduced into contemporary China, the Conzenian methodology prevailed over the methods of the Italian school, because morphological research are more systematically introduced to contemporary China by geographers. The unpublished dissertation of Guo is one of the rare studies on urban morphology of a Chinese city that has particularly reviewed the typological concepts and methodology of Italian school. It also convinced the possibility to adapt the Caniggian theory to a Chinese context by applying the theories and principles of Italian school to explain the urban tissues in the case of old Shanghai (Guo, 2008).

Around the same time, after demonstrated that the Conzenian theory can be used in Chinese cities, Whitehand and Gu have cooperated with Chinese researchers, to try verifying whether the typological process of the residential buildings have occurred in the Guangzhou area is similar to the Euro-America cities and following rules similar to those descried in the Italian school theory. This thesis might make another convincing argument that Cannigia's theory and methodology can be adapted in the Chinese context.

2.4 The Historical record of urban form in China

The earliest record that of work focusing on ancient Chinese urban pattern and the distributions of specialized buildings is in *Kaogongji*, the last section of the *Zhouli*, a history chronicles of West-Zhou Dynasty in feudal China, tenth to seventh century B.C.). According to the *Kaogongji*, an ideal city form should be a nine-li square (around 14 km^2) enclosed by a wall that three gates on each side. There are nine arterial streets in both east-west and north-south orientation. Each of the streets is nine-chariot-size in width. In the center of city is the palace. On the left-hand side, usually the east side of the city, outside the palace should be an ancestral temple while the right-hand side should be an emperor's altar. To the south the palace should be face to the emperor's audience hall while the market should be to the north. Both the emperor's audience hall and the market are one hundred paces on each side. This city model was implemented in the city construction for the later thousands years, especially in ancient capital cities like Xi'an and Beijing (Figure 1).

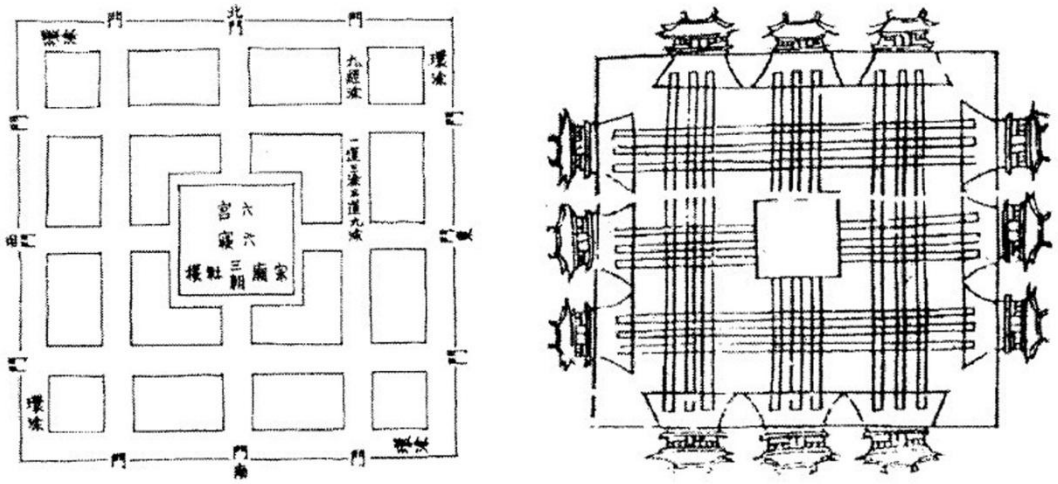

Figure 1 The ideal city form in traditional China. Sources: *Kaogongji*

The second theory which has influenced Chinese urban form is recorded in *Guanzi* that can be traced back to the time of the Warring States (475 to 221 B.C.E.), and compiled by Liu in West-Han Dynasty (around 30 B.C.E.) (Dong, 2004). As an ancient geographical document, *Guanzi* advocate a native philosophy that ideal human settlements should be coherent with their environments. In city construction, 'the natural conditions can be relied on, and the productive advantage of the land can be beneficial, which will support the people's life there and provide for raising livestock' (Xu, 2000, p. 40). This 'natural' concept was usually reflected in the layout of rural villages and the interior configuration of dwelling houses.

The 'rational' and 'natural' principles emphasized by *Zhouli* and *Guanzi* are complementing each other and together constituted the theoretical basis for creating a distinctive traditional Chinese urban form. Although few of these

studies directly discuss the application of historical experience for the present, these historical resources contribute to provide a better understanding of the Chinese distinct cultural identity. On the other hand, the city form of Guangzhou shows more influence of geographical conditions than pre-determined principles in city construction since it is remote from the political center of China and had been under the influence of cross-cultural interaction since it became a prosperous port from the Han Dynasty. Nevertheless, the distributions of ancient specialized buildings in Guangzhou abided by the construction principles mentioned above. Therefore, these principles offer an easier way to match the historical diagrammatic drawing without accurate measurement to the contemporary field survey maps by locating the specialized buildings.

2.5 Traditional residential dwellings and western influence from 1840 onward

Surveys of residential buildings in the *Lingnan* region have been undertaken among the Chinese scholars, especially those focusing their studies on southern China, since the middle of 20th century (Gu, *et al.*, 2008). A number of outstanding studies of traditional dwellings and settlements, including the

plan layout, building structure, and building materials, have been published in the last two decade (Lu and Wei, 1990; Tang, 2004; Lu, 2008).

In order to establish a chronology and reconstruct the process of the architectural types in the Guangfunan area of Guangzhou, it is important to review the historical documents and early research of the traditional residential architecture and rural settlements before starting the fieldwork.

There are several early dwelling types that are existent around west Guangzhou. The basic dwelling types found in the west rural of Guangzhou, which is the study area located, are the *zhutongwu* and the *Xiguan Dawu* (Lu and Wei, 1990). After the Opium War of 1840-1842, Guangzhou became a colonial treaty-port city. The western architectural techniques and styles are mixing with the traditional building types and cultivated a new architecture type, the *qilou*.

Zhutongwu

The basic architectural unit in the plan of *zhutongwu* is *one-jian*, which is about 4 meters in width. With only one room and a corridor in width but up to five rooms deep (Lu and Wei, 1990: 51), the shape of the *zhutongwu* is usually an elongated rectangle. The interior circulations of the house are connected by the corridor on one side and there are patios between the rooms for day lighting.

In the suburban area, the kitchen is usually apart from the principal part of the house. Therefore, in some cases, a *zhutongwu* aggregate comprises several single *zhutongwu* that share a large courtyard in front of the houses and the kitchens are in the other side of the courtyard (Figure 2). This aggregate of *zhutongwu* can still be found in suburbs and surrounding small-towns in the early days (Lu, 2008: 68).

In the city area, due to the pressure on space, especially along commercial streets, some *zhutongwus* in the city were transformed into multi-story buildings in the late-nineteenth century (Gu, *et al.,* 2008).

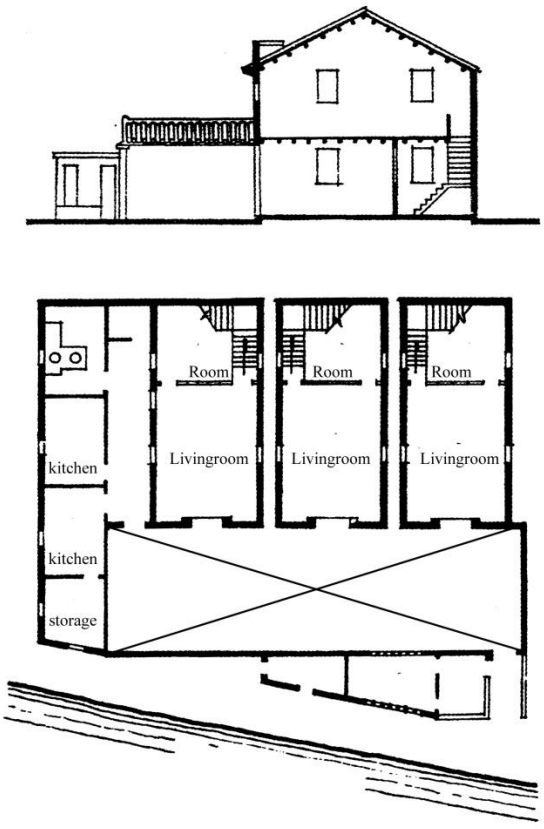

Figure 2 Ground plan and section of a *zhutongwu* in rural Guangzhou. Sources: Lu (2008: 67)

Xiguan Dawu

Xiguan Dawu is an indigenous dwelling type in Guangzhou which is named after the Xiguan district (Gu, *et al.,* 2008). Xiguan was a plain with marshy depressions to the west of the line of the city wall in Song Dynasty (Zeng, 1991). It inherited the features of *sanjian lianglang* house which is a 3-*jians* wide house that has a symmetrical layout and a small courtyard but still retains some of the

characteristics of the *zhutongwu* (Lu and Wei, 1990; Pan and Peng, 2002; Zhu and Chan, 2006) (Figure 3).

Figure 3 Ground plan of a *Xiguan Dawu*. Sources: Based on the map of Lu (2008: 78)

The basic plan of the Xiguan Dawu is characterized by two passageways on both side of the central block of rooms to access the side rooms (Gu, *et al.*, 2008). It was mainly constructed in the Xiguan district of the city between the 1820s and the beginning of the Republic period and mostly owned by merchants and government officials (Zeng, *et al.*, 1997).

Qilou

Qilou, also known as Veranda or Arcade house in the literature (Lin, 2000; Lin, 2006, Chen, 2006), is a local architecture in Southern China, especially in Guangzhou. There are controversial interpretations for the origin of *qilou* in academia. According to Fujimori, "the history of modern architecture is originated from the colonial-veranda style" (Zhang (ed.) 2004: 21). Lin summarized the alternative statements of the origins of *qilou*. According to Lin (2006), the colonial-veranda style can be traced back to the colonial India. The British colonists combined the characteristic of British style and the aboriginal architecture model of *Bungal* in India and created a new type house to acclimate the humid-heat climate in India. This new Euro-Bungal type house has blossomed in Southeast Asia and began to influence mainland China after the Opium War (Lin, 2006). Japanese researchers Matsumura and Zenno have made an analogous assumption and named it a 'hybrid type'. According to Matsumura and Zenno, "the European culture influenced Asian countries, including the local life style, human behaviour and architectural type, the hybrid type buildings is being adapted to the new life style which is mixing up the European architectural technique and the local culture and behaviour" (Zhang (ed.), 2004: 6). The research offer several typical examples of the

hybrid-type-building, including the *shophouse* in Singapore, the *qilou* in South China and modern pile-dwellings house in Thailand.

Another school of thought assumes that *qilou* originates from the colonnade and religious structures which can be dated back to ancient Greece. "*Qilou* is an exotic type of building type that derives from the prostyle building" (Zhang (ed.), 2006: 130). In the 18th century, the colonnade blossomed again with the neoclassicism and the colonnade is not only use in the religious structures but also adapt to the commercial buildings in the form called open arcade in central Europe. As the largest port of the old Silk Road for thousands years and the treaty-port city in the late Qing Dynasty, the open arcade building was introduced to Guangzhou because of the international commodity trade. This is believed by some to be at the origin of *qilou* (L. Lin, 2006).

However, according to some nativist researchers, the type of *qilou* is a variation architectural-creation of the traditional Chinese dwelling house. The *qilou* in Guangzhou would be a form deriving from the *zhutongwu*, "it is a false appearance that the *qilou* is origin from the western countries" for the Qilou just syncretizing the western decoration style in the pediment and relief sculpture of its façade but the ground plan is totally based on the *zhutongwu* (Pan, 1996: 4).

Conclusion

All of these morphological and typological studies have provided a new

perspective on the principles of learning and explaining the urban evolution. Although there are gaps between these perspectives, they point to the possibility of an application in Chinese urban studies. First, the town plan analysis and architectural type research offer a solid foundation for the morphological analysis. The idea of dividing the urban development into different morphological periods over time can be adapted to China, which has a long history and where such classifications have been quite common. This will be explored in the later fieldwork. Secondly, the adaptation of morphological concepts makes it possible to engage into an interdisciplinary research in professional practice. Thirdly, some of the more important developments are at the conjunctions of those two bodies of ideas from Conzen and Caniggia. The relationship between the typological process and the morphological periodization offers a striking example in the recent researches. Finally, the research methods and the successful practical case study presented in the literatures offers a solid analysis framework which can be used as a source of reference and adapted to the Chinese culture in the later work of this thesis.

The historical records on the urban construction and the research on traditional architecture offer secondary sources on the historical development, especially from 1840 onward, in the study area. Although the research did not reach unanimous conclusions on the origin of the traditional buildings, these

previous studies offer some valuable perspectives on the local residential dwellings in South China. All of these researches and maps are sources of information for the present research, and provided basic maps and reference data for the field surveys.

CHAPTER 3 METHODOLOGY

The research methods employed in this study derive mainly from urban morphology. They entail the use of historical and contemporary documents, in order to proceed to a theoretical reconstruction of the urban tissues genesis. Field work has been conducted including a photographic survey.

Cartographic materials and city plans in different age, field survey, historical painting and photographs were thus used as the basic material for the morphological analysis. The cartographic analysis aims to explore change to the urban fabric over time. The historical maps and documents provide data of the spatial arrangement of the research area. A comparative analysis of the research area at different periods revealed the changes to the plots, streets and buildings.

The focus on cartographic information and inherited artefacts, which is central to the urban morphology methodology is particularly relevant to the Chinese context, since much archived historical material has been lost because of the civil war between the Republican government and the Communist Party (1945~1949) and during the 'Cultural Revolution' (*Wenhua Da Geming*) (1966~1976).

In the meantime, secondary sources offer background information on the

historical circumstances that have affected the study area. According to Conzen, the material culture of the city is changing through time and can be divided into different morphological periods (Conzen, 1960). In an area that has some 1400 years of history, the material culture has undergone some significant changes through the different construction cycles, including the changing of building function, the reorganization of inner space and the subdivision of the blocks or buildings. However, not all the trajectories through these periods remain visible in the artefacts found in the field. In this case, the textual documents written by historians and the archaeological discovery would offer secondary sources for this research.

Comparing to the western cities, compiling the historical maps and data for morphological analysis in Guangzhou or any other Chinese city is more difficult because of the lack of accurate historical maps showing building block-plans, the lifespans of the buildings, as well as massive demolitions and replacement by new high-rises during the city regeneration, especially post-1990 (Whitehand and Gu, 2007b; Gu, *et al.*, 2008). A collection of all the historical maps of Guangzhou, which include the walled-city and the rural environs, from 1685 to 1949 was published in 2003 (Zhou and Xiao, 2003). However, most of these maps were not prepared based on the accurate measurement. They are rather diagrammatic drawings and only show little more than built-up area and streets.

However, a sizeable number of dwellings still exist in the study areas or the blocks nearby, especially the blocks above and along the old watercourse, which have left some tangible evidence in the present city landscape that could help to reconstruct the morphological process. Some surviving streets and fragments of building fabric in the core of the study area and adjacent areas, which have been recorded as built at the same period, are also a major source for investigating the development and redevelopment of building types.

The first systematic urban survey of Guangzhou was conducted by Guangzhou Land Bureau (*Guangzhou Tudiju*) from 1926 to 1935 (Whitehand, *et al.*, 2011). Over 3000 maps were drawn manually as part of the survey[1]. Most of them are sorted and bound in two volumes, entitled Guangzhou *minguo jingjie tu* (Map of land divisions and boundaries in Guangzhou in the period of the Republic) in 1933 (Whitehand, *et al.*, 2011). They are now in the possession of the Guangzhou Urban Development Archives. All the maps, initially drawn in the scale of 1:600 at the start and then changed into 1:500 in 1933, show the streets and blocks of much of the built-up area of Guangzhou in an accurate measurement, and had been used as base map for later surveys post-1949. During the last few decades, there have been several urban surveys in the new

[1] Source: Website of Guangzhou Urban Development Archives http://www.gzuda.gov.cn/news/view.asp?id=XW20030226114040210 6&fdID=CL20030305153405 1295&tbColor=&trColor=&publishtime=&KeyWord=. Access on December 3rd, 2012.

built-up area that complement the previous maps. The latest version of the large-scale plans of the city was prepared by Guangzhou Urban Planning and Design Survey Research Institute in the 1980s, and has been subjected to minor modifications several times during the last three decades to document changes due to the rapid urban construction. All of these maps are the most important sources for supporting a morphological analysis in this research.

Field work is another indispensable method for data acquisition in this thesis research. Observing and mapping architectural attributes of buildings and streetscapes in the field work completed the lacking cartographic data and also offer an opportunity to conduct a comprehensive photographic survey in the area[2]. The historical painting and old photos will be used to triangulate data produced by cartographic analysis and the contemporary photographic survey, hence helping to reconstruct the historical spatial composition of the research area over time. By comparing these tridimensional data would help to discover the changes of spatial composition and space throughout the process, and the decorative pattern on the façade would help to identify the age and style of the buildings in the research blocks. The research seeks to produce a series of maps that display the spatial syntax of the urban tissues over the period as well as to reconstruct the typological process that has marked the evolution of the

[2] For more details information of the field work, see Appendix.

residential architecture.

Urban evolution can be considered as a continuous process. By tracing the tissue characteristics and material forms through the cartographic analysis, this research aims at producing a theoretical reconstruction of the overall architectural and urban evolution.

As already stated in the previous sections, all of these previous studies, theoretical or applied, have provided a wide perspective of the principle and established a solid framework in learning and explaining the urban evolution. The old Chinese city shows different characteristics in its structure and city system compared to the western cities. Yet, by adapting the western urban concepts and methodology to Chinese city form, the evolution process in Chinese city can be reconstructed.

CHAPTER 4 ANALYSIS OF THE MORPHOLOGICAL PROCESS IN THE GUANGFUNAN AREA

The morphological process of a city or an area is influenced by a wide range of factors that could alternatively be tackled, not only by social sciences such as the political and economic science but also by geology, hydrology in natural sciences. In order to trace a more precise outline of the process, the historical documentary research will be a foundation that helps to reconstitute the developed timeline of the city.

On the basis of the historical records and secondary resources, the first part of this chapter will present the development process of ancient Guangzhou, including the walled city, the shoreline of the Pearl River and the fringe belt area. The purpose of this documentary analysis that based on historical records dated back to the 6th century is to retrieve some basic but essential factors that have influenced the morphogenesis of the study area. The second part of this chapter will produce a theoretical model reconstructing the morphogenetic process of the Guangfunan area on a meso-scale, based on a systematically analysis of the cartographic evidence. This research is a theoretical reconstruction on the scale of street networks and built allotment system. Consequently, the study area will be subdivided into different morphological zones, based on the natural

conditions and evolution patterns. A description of the spatial characteristics and transformative processes of each zone will be presented at the end of this chapter.

4.1 The historical geography and urban development of Guangzhou

In order to understand the morphogenetic process in a specific area of the city, a general study of the historical background on a city scale is a prerequisite before zooming in to an area and launching the research on a block scale. The first section provides a general picture of the city development of Guangzhou city, including the wall city area and its surrounding rural environment, based on a compiling of historical documentary and secondary resources. The walled-city system, rural commercial streets and canalization of Pearl River, and the factors which have strongly influenced the morphological process of the city, have been categorized in separated subsections besides the natural geographic conditions while compiling. This compilation offers a more detailed context of the pre-existing conditions specific to the study area for periods that predate the very first accurate map. It also offers a sound basis of textual records that is useful for reconstructing the theoretical morphogenetic and morphological process in the later research.

4.1.1 The physical geography of Guangzhou

Guangzhou, which is also known as Canton, is located in the southern part of China, specifically at the latitude of 23°06′ North and longitude 113°17′ east. Lying near the head of the Pearl River (*Zhujiang River*) Delta and at the confluence of navigation flow of *Dongjiang* River, *Xijiang* River and *Beijiang* River, the water resources were plentiful in old Guangzhou city. By having a stand back of the Baiyun Mountain and facing to the Pearl River, there are four significant landforms could be found in Guangzhou (Zeng, 1991: 2).

(i) Low mountain ranges. This landform is basically at the range of Baiyun Mountain which was formed in the Cretaceous period and was reshaped by the diastrophic activity in the Tertiary period. As it stated in the previous chapter, most of the ancient Chinese cites show the coherence between human settlement and natural environments in their construction. The low mountain ranges become a natural boundary of the city and directly influence the developing patterns of the wall-city in the Song Dynasty, which will be discussed further in subsection 4.1.2. (ii) Rolling hills. Because of the crustal motion, even though the altitude of the highest layer of hills is no more than 100 meters, the rolling hills in Guangzhou were shaped into the steep cliffs and became a physical barrier of Guangzhou city. (iii) Mesa. The mesas in Guangzhou are 10 to 20 meters above the river. This land became the original part of the old Guangzhou city. As the similar situation of the low mountain ranges, the Mesas are formed

in the Tertiary period and the old Pearl River swept over the mesas into some small valleys in the later periods. Most of these valleys are north-south orientation and were used to build the city moats in the feudal periods of China. Some of them remains today and become a part of the city flood-prevention project in contemporary Guangzhou. The bedrock beneath is flat and firm that makes the mesas to be a suitable area for the city expansion and new construction from 1068 to 1077 during the Song dynasty (Yang and Zhong, 1996; Zeng, 1991). (iv) Plains. The plain area, in the west part of the city, is mainly composed by the sediment and canals aggradation of the Pearl River. This area has been named Xiguan Plain and divided into two parts, upper Xiguan and lower Xiguan (Zeng, 1991: 381). The upper part developed into villages and farm land whist the lower part became a commercial-residential community since the Ming dynasty (1368—1644 AD) and reached its height in the Qing Dynasty while Guangzhou was designated be the only export terminal for commercial exchange between China and other Western countries in 1757 (Yang and Zhong, 1996). The ramification of the Pearl River flows through this area, from east to west, left a bunch of ponds and deep trench that constitute a congenital advantage for the shipping and commodity exchange.

Guangzhou has a subtropical climate with an average annual temperature of 22.8°C. The lowest temperature is normally found in January, averaging

18.3°C and the highest temperature in July, averaging 32.6°C. The annual average precipitation ranges from 1600 to 2600 mm. Because of the impact of the East Asian Monsoonal (and less importantly Indian monsoon), about 80% of the rainfall comes in the period of April to September with highest concentration in spring. The humidity is high in all seasons and the average relative humidity is 80%. This stems principally from the wetland environment and the basin-like terrain of the city (Wang and Yang 2004). Because of the high precipitation, a well-organized drainage system of the city have been emerged from the Song dynasty and well developed by the Qing Dynasty, and all of these drainage systems had become one of the particular fabrics in the Guanfunan Area.

4.1.2 The general evolution of the ancient Guangzhou

With a population of 10.33 million and a total area of 7287 km² (Guangdong Statistical Bureau, 2009), Guangzhou is the largest city in southern China and the sixth most populous city in the nation (Wang and Yang, 2004). The historical record of its early development can be dated back to 2800 years ago (Zhou and Xiao, 2003: 124; Zeng, 1991: 203). The oldest record is found in the ancient record written by Guo that traced the city history back in 862 B.C.E. (Zeng, 1991: 203). The record shows that Guangzhou, originated name Chuting, is the capital city of Chu, but there are barely any anthropologic remains that could be found

today besides some secondary resources like the historical documents to testify for this period (Zeng, 1991). Based on the records, the original 'Chuting' is a small village located on a rolling hill by the riverside, which does not shows any walled-city features. The physical city wall was first built after China had been united by the First Emperor of Qin in 221 B.C.E. During the Han (204 B.C.E. – 220 A.D.) and Jin (266 – 420AD) Dynasties, it became a prosperous port. Meantime, even if the walls of the old city had not expanded much, some modification of the city configuration have been done and the grid pattern and axisymmetric tissues, which are two important features of the Chinese city, began to appear in the urban form of Guangzhou.

Figure 4 The change to the walled area of Guangzhou over history

Figure 4 shows the expanding city wall of Guangzhou city. The first wave of the city development was during the Sui (581-618 A.D.) and Tang (618-609 A.D.) dynasties. A new type of street pattern named *fang* emerged in the Tang dynasty. The ideal *fang* system, composed by four to six blocks, each of which is one-hundred-pace square (about 60 by 60 m^2), and has an individual gate that is closed at night. Although Guangzhou is not one of those typical ideal ancient Chinese cities like Beijing and Xi'an of northern China, the *fang* pattern still

exerts an influence on the new built area of the city. The remains of a gridiron system still influence the contemporary roadway design in some historic sites of the city. By the middle of Tang dynasty, Guangzhou had developed into the center of international trading in the empire and the largest port for linking China with the Asia and Middle East countries (Zeng, 1991). With the increase of the trading, a huge number of merchants and missionaries settled down in the city. The feudal commissioner's office developed a new outer neighbourhood, *fanfang*, based on the ideal *fang* pattern, to the west of the old city, near by the city wall. This new built area is a well-developed community which includes residential area, markets and mosques that became a part of the inner-city in the Song dynasty.

The second wave of urban development of Guangzhou unfolded under the Song dynasty, from 960 to 1279. The city wall in the Song dynasty was expanded several times because of the economic development and the population increase. Two newly built walled-cities adjoin the inner-city, which named East and West city according to their locations, have tripled the area of the city. The city transformed from a single walled-city to a triplets walled-city and this triplex-city system (*Song san cheng*) become the prototype of Guangzhou in the later construction (Yang and Zhong, 1996: 120). The Central city (*Zicheng)* overlaps almost perfectly with the inner-city of the Tang dynasty. This part of the

city had been divided into three functional zones that parallel the Pearl River in the city layout from high to low altitude. The upper zone is the administrative office in feudal China and the lower zone is the commercial area of the city. The lowest part of the city is an area reclaimed from the river, which developed into a new commercial street in Song Dynasty and expanded to the Guangfunan area along the watercourses in the Ming and Qing dynasties (Zeng 1991). Although there is no surviving accurate map of Guangzhou city in the Song Dynasty, the minute description of historical records and the later secondary sources (Zeng, 1991; Yang and Zhong, 1996) suggest that the street system of the Central city inherited a similar street pattern and urban form of traditional Chinese cities and displayed some features of the traditional Chinese city layout; for example, the orthogonal or 'T' shape street system and the quadrate blocks. Despite the crisscrossing system, Guangzhou had a number of streets that are developed along the canals or even use the canals as part of the circulation system inside the wall city (Zeng, 1991; Zeng, 2006). There were at least 62 bridges left as tangible evidence by the end of the Qing Dynasty (Zeng, 2006). A historical map of the early Ming Dynasty (Figure 5)

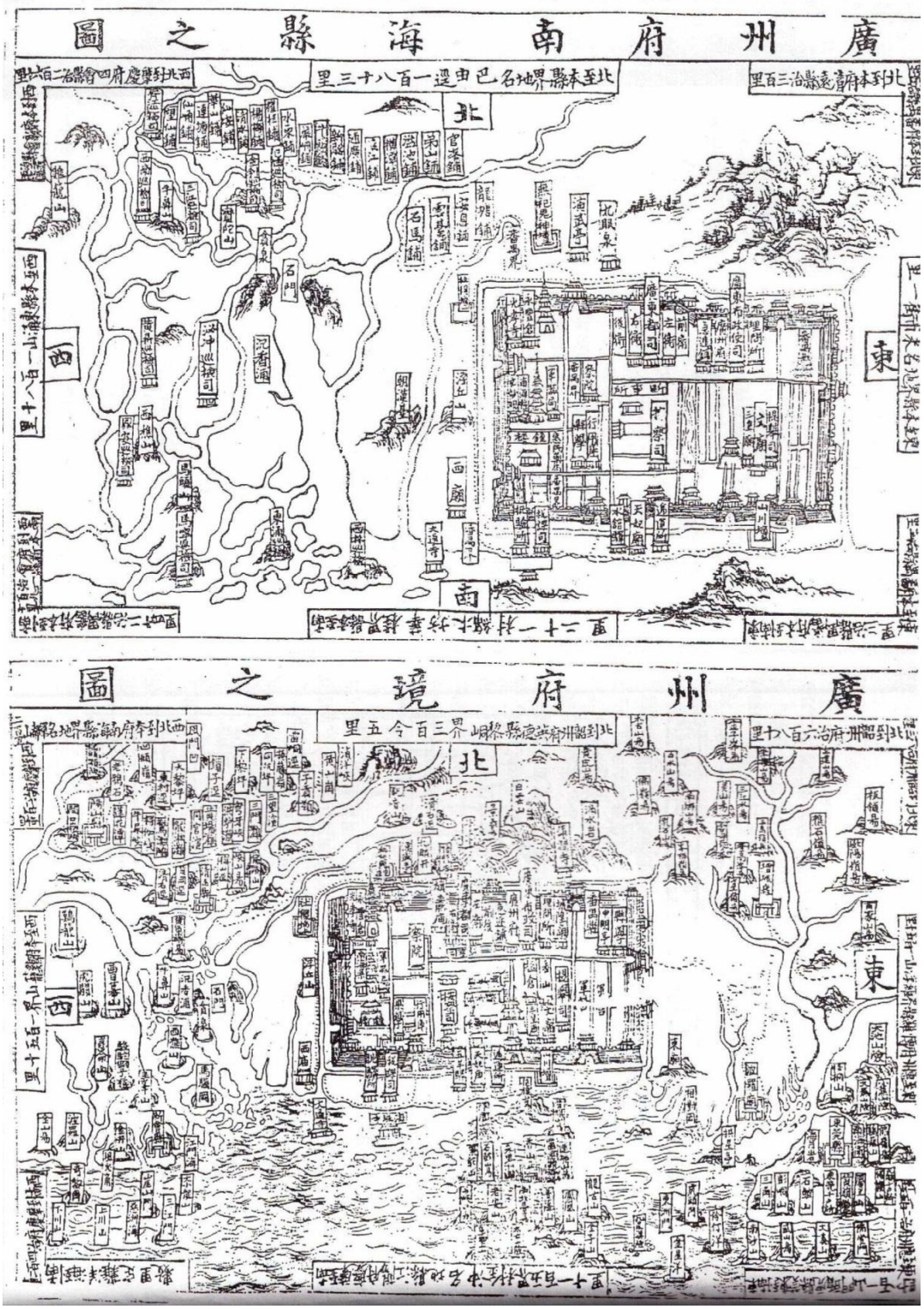

Figure 5 A historical map of Guangzhou in the Ming Dynasty. Sources: Zeng (1991: 348)

shows these features and illustrates that the city model of the Song Dynasty is

the prototype of Guangzhou for the last centuries. The East city (*Dongcheng*) was built for warehouses and colleges (*shuyuan* and *xuegong*). The street pattern in the East city is similar with the Central city based on the historical records (as cited in Zeng, 1991). The construction of the West city (*Xicheng*) began in 1071, with the perimeter of 6000 meters and 7 gates (Zeng, 1991). The urban form of the West city was shaped by geographical location, the physical conditions and the urban functions. Therefore, it displays several different features to the other two cities.

First of all, the West city was built on the deposited area of Pearl River to the west of the Central city and the city was built for international commercial trading that had been rising from the Tang Dynasty. With a mass of tributaries which were left for the expanding infill area along the Pearl River (Figure 6), the street pattern in the West city was not only strictly followed the gridiron-road system but also shows the impacts of the river branches. Several major roads of the West city are developed along the river and there are two parallel primary roads in the West city, which are known as Changshou Rd. and Xihua Rd. nowadays, connect to other towns of the Pearl River Delta from the Song Dynasty. Some minor road appeared later that conformed to a gridiron system, while others were following those old navigable canals that correspond to the historical records and remaining material evidence found by geologists (Zeng

1991: 91-92). Comparing with the other two cities, there were various architectural types in the West city, which echo the multi-cultural demographics of this part of Guangzhou. The Flowery Pagoda, the main structure of an ancient Buddhist temple, and the Huaisheng Mosque, which is located a few blocks next to the temple, are two significant ancient religious institutions in the West city area that indicate the multi-cultural integration between aboriginal inhabitants and Muslims.

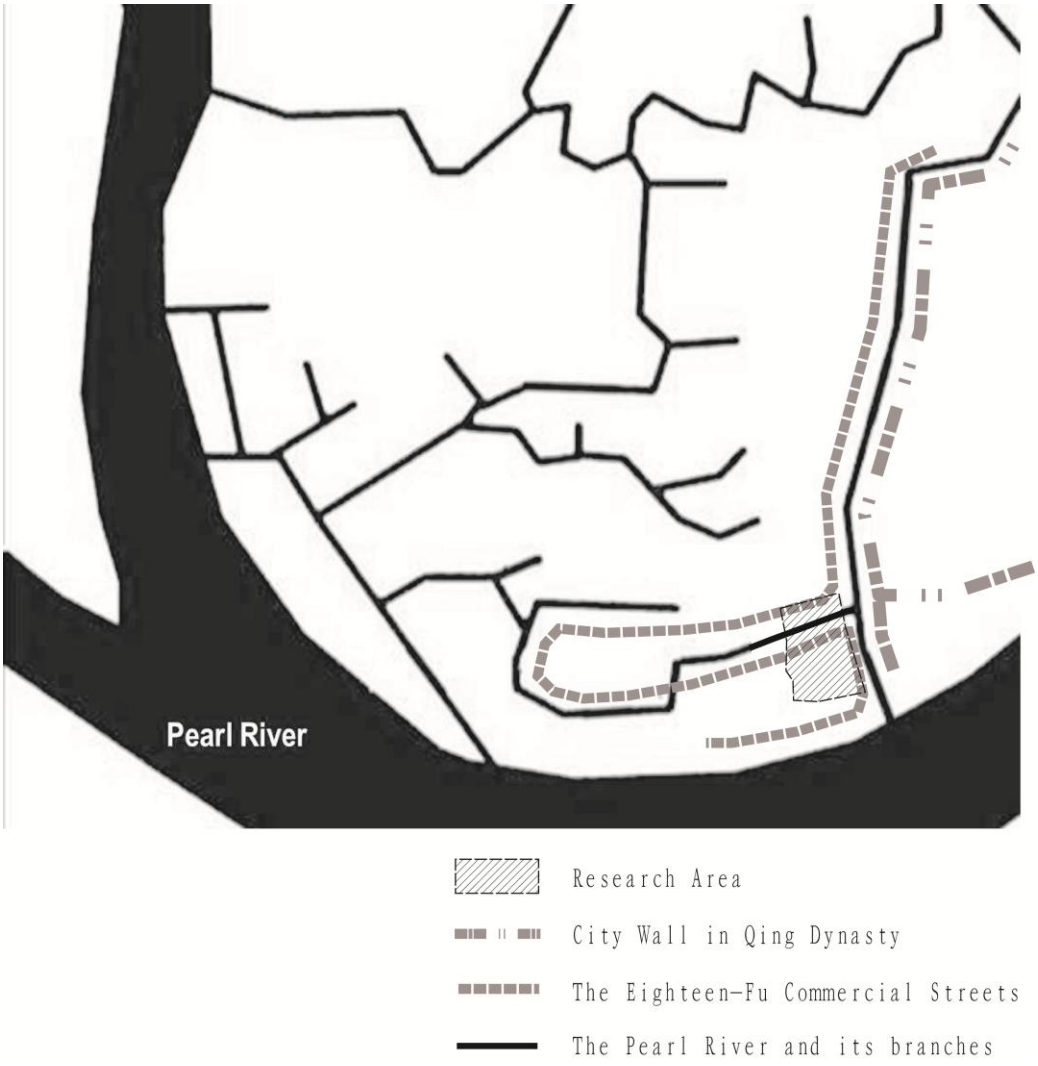

Figure 6 The navigable canals, deposited area and shoreline of the Pearl River in Qing Dynasty

With the population increasing rapidly in later few centuries, the Guangzhou city had been expanded three times in the Ming Dynasty (1368-1644). The first development was in 1370, when the government merged the three cities of the Song Dynasty in one, by rebuilding the city wall (as cited in Zeng, 1991) (Figure 4). After the creation of the 'triplex-city', the appearance of the Ming Guangzhou city shows a rectangular gridiron plan layout and some old navigable canals that had been transformed into new city moats surrounded the city in the south, east and west sides (Zeng, 1991). With the continual improvement of the street system and architectural technology, most of the main streets and landmarks in the Ming period remained and left some geographical evidences in the recent archaeological surveys. The later development of the city spreads for 2.7 km to the north and entailed the construction of a new north city wall by steep cliffs of Mt. Yuexiu and reinforcement of the south part of the city in 1565AD (Guo, 1991[1599]) (Figure 7).

Figure 7 The old city wall on Mt. Yuexiu in the Ming Dynasty. Sources: http://www.lwa.com.cn/

After these three urban expansions, the city pattern of Guangzhou had stabilized in the following few centuries. During the Qing Dynasty (1636-1912), the scope of the city remains the same as it was in the Ming Dynasty but only extended a short north-south orientation wall (*Jiyicheng*) for flood defences of the commercial area on the new fluvial plain (Zeng, 1991). Most of the urban development and building construction during the Qing Dynasty occurred in the eastern and western rural areas of the city.

4.1.3 The development of the rural area and the early fringe-belt of Guangzhou

Leaning-to the Baiyun Mountain and facing to the Pearl River, the location of the Guangzhou city coheres with the ideal human settlements concepts according to some Chinese ancient philosophy. Yet, the mountains and rivers also became the natural barrier of the city expansion in the north-south orientation after the major reconstruction and restoration in Ming. Therefore, the rural area to east and west of the city had developed rapidly in the Qing Dynasty, especially in the late Qing, after the first Opium War of 1840-1842. In the late Qing Dynasty, the feudal government adopted a policy of seclusion. As a result, Guangzhou had been the only port in foreign trades for decades before the first Opium War. The reclusive policy hampered China's social progress and its trading in the world market, but promoted the economic development and urban construction of Guangzhou in a short period, right a few years before and after the Opium War. After the Opium War, Guangzhou became one of the treaty-port cities. The influence of the western countries did not only appear in the economy but also in urban construction and social life.

Associated with the *lizhi* traditions of feudal China, the religious institutions were amongst one of the most common building types of the city and most extensive land-use. Although Guangzhou was never the capital city of any dynasty, so that there is no imperial worship architecture, the temples of Heaven and Earth for example, testify of their importance in the city. However, besides

some Buddhist and Taoist temples for most aboriginal inhabitants, there are a number of Islamic mosques that built in the Tang Dynasty and Christian churches after Christianity spread to Guangzhou in the early 19th century. Most Buddhist and Taoist temples followed a courtyard layout which has a resemblance to the residential courtyard house besides larger slated yards and grander main structures. The churches and mosques were sited near to the *fanfang*, the residential neighbourhood of foreign merchants. Generally, these institutions tended to locate in the urban fringe because of the availability of space in the fringe area. Many of them were located just right inside the city wall. However, a few institutions tended to use the rural area outside the wall, as the village could offer more spacious sites. These sites have been embedded in the later developed commercial-residential area.

On the basis of the diagrammatic maps of Guangzhou in the Ming dynasty and the historical records, some institutions are known to have survived from the 6th century, the Hualin Temple for example. With these precise cases, all recorded religious institutions could be roughly located on the plan prepared by Guangzhou Research Institute of Urban Planning and Design (Figure 8).

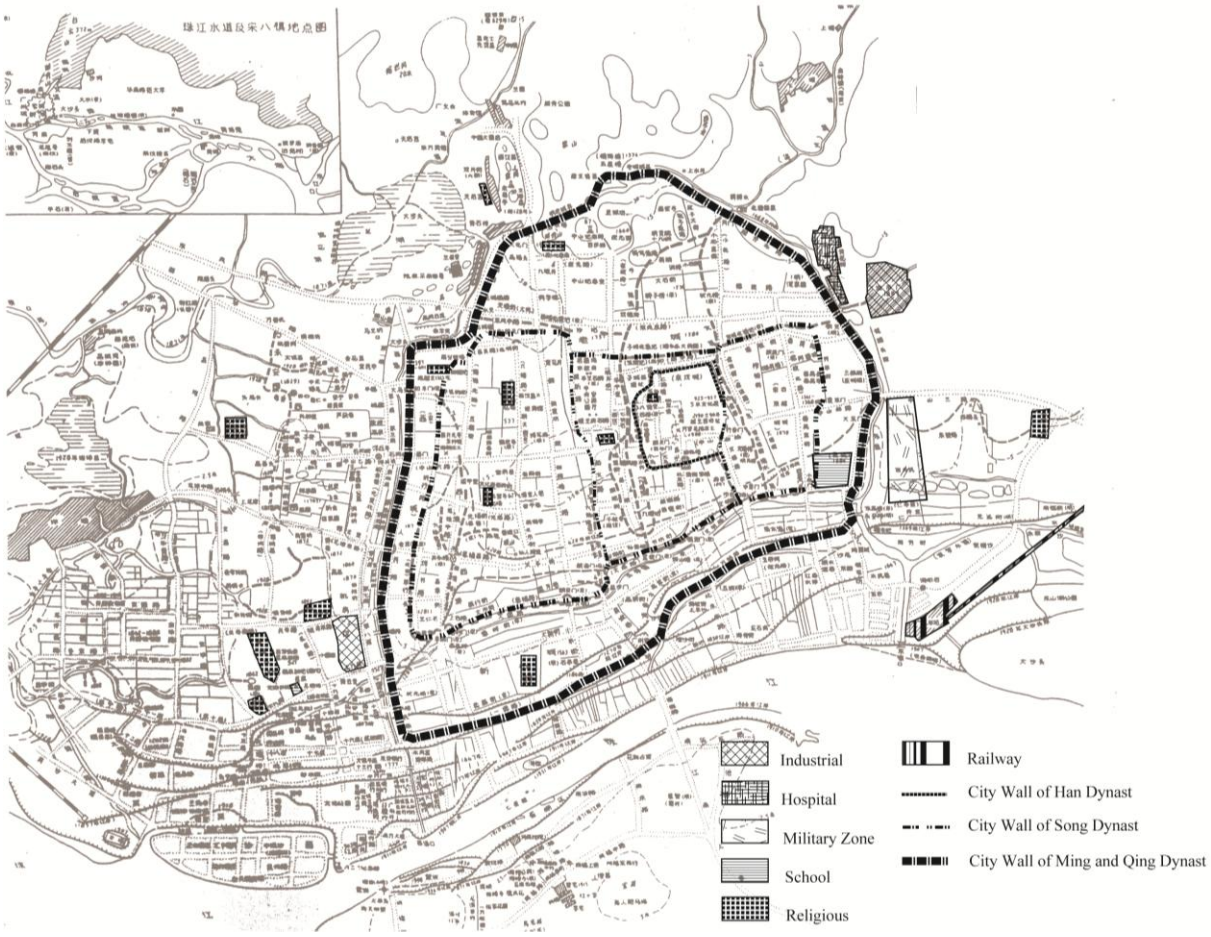

Figure 8 A diagrammatic map of all the religious/garden/military/industrial buildings in the Qing Dynasty

From this map, it would seem, at least twelve religious sites, one military training ground, one school site, one textile industrial zone and one feudal mint site were located on or outside the city wall by the late Qing dynasty. Many historical institutions suffered damage and their sites were occupied during the New Cultural Movement in the early 20th century. For example, several structures including the main building of Hualin Temple were torn down to widen the roads in 1924 (Luo, 1996: 96), and the Dong-jiaochang military site

began to be used for athletic purposes in 1932. A subsequent destruction occurred during the Cultural Revolution between 1966 and 1976. Despite these ravages in the last century and the rapid construction since the 1980s, most of the historical institutions located on the fringe-belt area to the west of the city wall have left some tangible evidence in the present-day urban landscape.

Despite the well-developed physical form of the inner city and due to the natural barrier of the mountain and river, the city expansion of Guangzhou trended to occur in the rural areas to the east and west, as known as Dongguan and Xiguan (means the east and west frontier pass of the city in Chinese), in the late Qing dynasty. Although both Dongguan and Xiguan areas were developed at the same period, dated back to the Ming dynasty, villages in the Dongguan area were less developed because of the unfertile soil (Zeng, 1991: 421-422). Therefore, only a few garden sites and villages names could be found recorded but no physical structure remains. The other significant site in the Dongguan area is a 140,000-square-meter military site with more than a thousand barracks which was built in the Qing dynasty (Zeng, 1991).

In contrast to the Dongguan area, the Xiguan area which associated with the city wall, a complex canalization system with multiple navigable canals and deposited area, constituted an area with diversiform morphological tissues. A series of historical paintings of the late 19th century have captured some

characteristic blocks of the Xiguan area (Figure 9). The navigable canal is one of the most important parts in commodity transaction and cross-cultural communication in feudal dynasties. For example, the Hualin Temple is the oldest Buddhist temple in Guangzhou according to the records (Huang, 1993[1948]), and the Eighteen-Fu area, which first emerged at the upstream of west city moat in Ming dynasty and blossomed along the canals that feeds into the Pearl River in the Qing period, had been the most thriving commercial area till the early 20th century and still are the major commercial street in the west of Guangzhou. Further development of the Xiguan area occurred during the Qing dynasty while a large planned traditional residential area replaced the rural farm land to the northwest of the Eighteen-Fu area and the Thirteen-Factories blossomed since the late 18th century. Hence, the urban fabric in Xiguan area reflects the culturally blended traditions of both China and Europe.

Figure 9 Historical painting of the Xiguan area by anonymous Chinese artists. Source: Liwan District Archives Bureau. http://www.lwa.com.cn/

4.1.4 The commercial streets along the canal in the Xiguan area

As described in the previous section, the Xiguan area is basically developed from the deposited area of the Pearl River. The watercourse of the river and canals left tangible evidence of their influence on the formative pattern of this area. According to the historical records and Zeng's research in 1991 and 1996, the oldest record of the shoreline dated back to the Liang Dynasty in the 6th century stated that the Hualin temple was close to the waterfront. With the shoreline's moving riverwards to the south (Figure 10), the waterfront commercial area extended as far as the shores on the new deposited area and the old shoreline left to be the matrix road of the area. Some of them declined and were replaced by new built dwellings. There are two significant examples of the waterfront commercial patterns in the Xiguan area, the Eighteen-Fu and Thirteen-Factories.

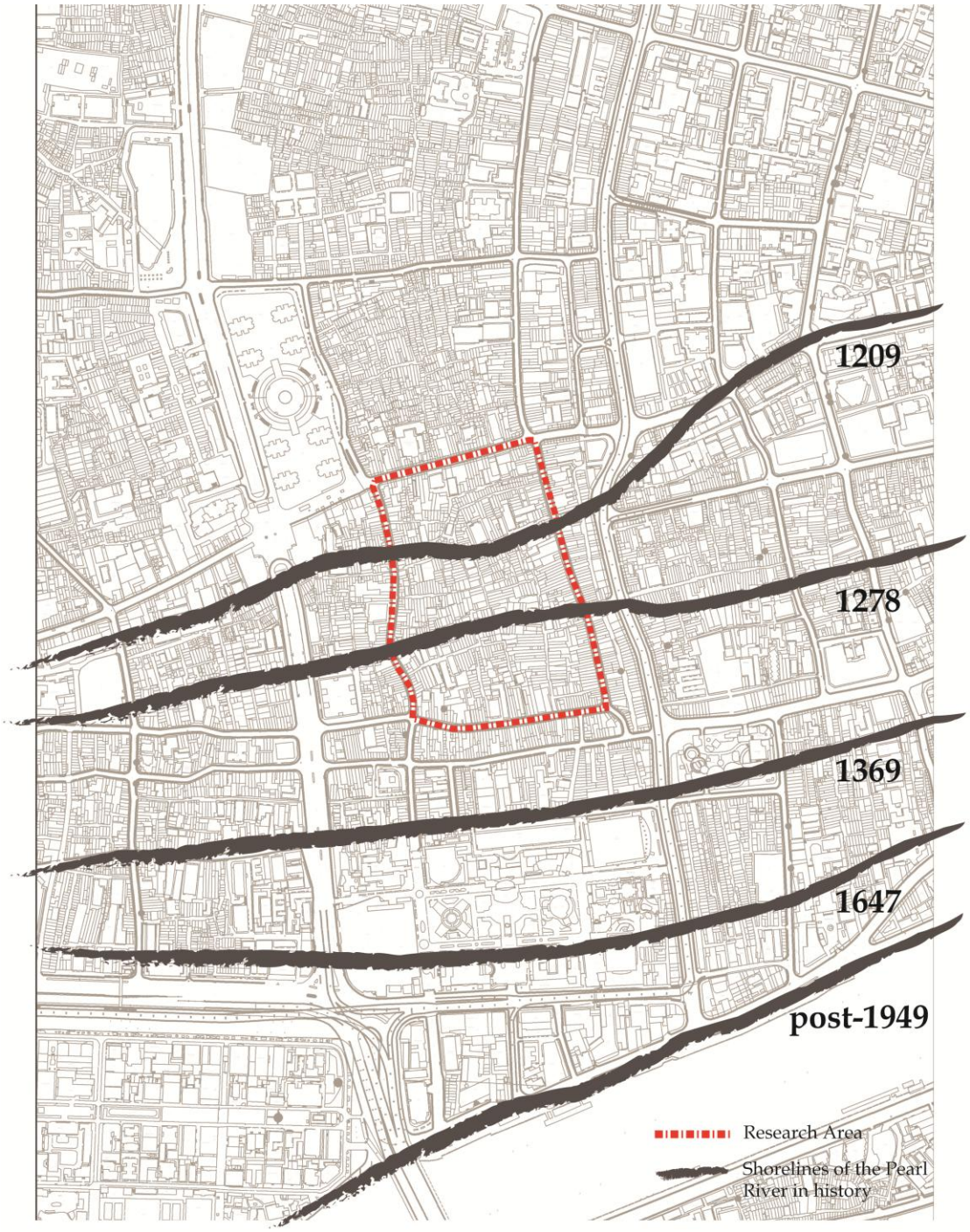

Figure 10 The changes to the shoreline of the Pearl River over history

In Cantonese, the word "Fu" means the commercial street that developed along the river. The Eighteen-Fu area is constituted by eighteen commercial streets which have numbers for names. The Eighteen-Fu area first emerged at

the upstream of west city moat in the Ming Dynasty. It blossomed along the canals that flow through the Xiguan area and fed into the Pearl River. In the Qing Dynasty, this area had developed as a major commercial hub which had exchanges with the world. The sector was important not only for Guangzhou but for China as a whole (Zeng, 1991; Gu, *et al.,* 2008). The main streets in the Eighteen-Fu area appear to be shaped by the canals and there are several settling routes that permeate into each block over the areas according to a fishbone shape. Some of the commercial streets were divided up by industrial agglomeration. For example, the area from No. 7-Fu to No.8-Fu was a textile industrial factory in 1860s. The old-style Chinese private banks were gathered along the No.18-Fu Street (Z. Zeng, 1991). Some of these commercial streets declined when the canals dried out or had been converted into part of the drainage system, the whole Eighteen-Fu area had been the most thriving commercial area until the early 20th century and still have been the major commercial area in the west of Guangzhou.

The Thirteen-Factories is a planned settlement built on a reclamation area of Pearl River for the western merchants. It dated back to the Emperor Kangxi of the Qing dynasty allowed foreign merchants to trade with China in four cities, including Guangzhou in the 1680s (Huang, 1993[1948]). After the western trade was limited to the port of Canton in mid-eighteenth century, the

Thirteen-Factories become the only legal and well developed settlement of the Western merchants and compradors who were the employees of those Western firms. The Factories had gain importance in the 18th century and retained its dominance for western trade well into the mid-nineteenth century, before the First Opium War (Huang, 1993[1948]; Zeng, 1991; Farris, 2007). After the Qing regime signed the Treaty of Nanking in 1842, which forced the government to open four other ports to foreign merchants, the Thirteen-Factories was no longer the sole port for foreign trading in China and gradually lost its dominance between the two Opium Wars. Most of the factories burned down during the Second Opium War between 1856 and 1860 and the western merchants relocated on an island to the other side of the river, which became an enclave later. Despite this, the architecture style in Thirteen-Factories showed a blending culture of Chinese and European traditions, which is readily apparent in a deep long lot with courtyard system in the spatial configuration but also in westernized facades and decorations (Farris, 2007) (Figure 10). This specific type of architecture still prevails in most part of the commercial and residential areas of Xiguan that had been considered as the origin of *qilou* (Lin, 2006).

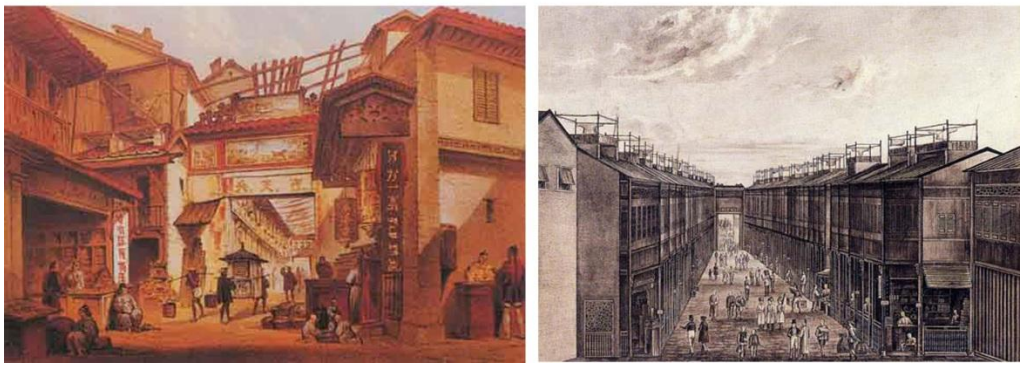

Figure 11 Historical paintings of 13-Hongs by anonymous Chinese artist. Resource: First Historical Archives of China and Guangzhou Municipal Government (2002:100).

4.2 The general evolution of morphological zones of the Guangfunan area

In the last section, three essential factors that have influenced the construction of Guangzhou have been identified. The development of the city offers a historical context of the research. This section provides a theoretical reconstruction of the morphogenetic phases of the Guangfunan Area, from the time of its creation to its recent development. The main work of this section is presented in two parts which detail the evolutionary processes and delineate the morphological zones respectively. The first part provides a general evolution of the Guangfunan area on the premise of the previous research. Then, zooming in the research on the block scale offers an opportunity to examine the process of the morphological phases in a finer scale and to proceed with a plot-by-plot survey. Based on cartographic analysis and field survey, a theoretical reconstruction of the morphogenetic process of Guangfunan Area can be inferred,

despite of the limited historical plans with accurate scale mapping.

However, this might disregard some particularities in understanding the characteristic of the morphological process that can be revealed when classifying the blocks into different morphogenetic zones and preforming a similar analysis in each segment. Consequently, the second part of this section seeks to examine the characteristic of urban tissues in every single morphogenetic zone and with more accuracy, focusing on the street network, allotment system and building footprints.

4.2.1 The principal characteristics of the Guangfunan area

A diagrammatic map of 1900 divided the built up area into six different zones based on the natural conditions and city development (Figure 12).

Figure 12 Historical map of Guangzhou in 1900. Source: Zhou and Xiao (eds) (2003)

The Guangfunan area was located on the edge of the Xiguan area and right along the city wall. Yangren Li is believed to be the oldest street. It used to be the

waterfront area of the Pearl River and has a textual record to date back to the 6th century (Huang, 1991[1948]). There is no historical record about the built-up area in the study area by the 6th century except some secondary sources indicating the existence of specialized buildings and rural dwellings. An archaeological excavation in 1911 found a tombstone has a record of 607 A. D. indicated that the Yangren Fang, the core area of today's Guangfunan area, was a private dwelling of Wang (Zeng, 1991). Hualin Temple was close to the waterfront back then as stated in the last section (Figure 13a). With the shoreline moving gradually towards the southwest direction, following the fluvial deposits, the farmland and vegetation area developed into small town in the Song Dynasty. A sizeable commercial and residential settlement spread along the coastline and canals, while the sea lanes of merchant service connecting the trades between China and more than fifty countries (as cited in Yang and Zhong, 1996, p: 132). This settlement on the fluvial area is the first built up area to the west of the Song Guangzhou City but also the origins of the Eighteen-Fu in Ming and Qing dynasties (Figure 13b). Parallel to the Yangren-Li, a canal named Daguan River was built in 1472. The Daguan River, which flowed through the Xiguan area and fed into the Pearl River, creates a more convenient conditions for trading and transport in both land and seaway in the Guangfunan area. It provided a unique geographical advantage in the development of Guangfunan while the

Eighteen-Fu began to blossom along the canals in the Ming Dynasties. Therefore, at least three of the Eighteen-Fu were rooted in and around the Guangfunan area in the Ming Dynasty. Between the No.9 and No.16 Fu area, No.14 Fu developed right along the canal Daguan River in the Ming period and remained one of the primary areas of western trade of Guangzhou until the canal began to dry out in the early nineteenth century (Zeng, 1991; Zeng, 2006). By the Qing dynasty, the Daguan River dried out from its upstream and the deposited watercourse was replaced by residential dwellings, which tremendously changed the layouts and part of the street systems. A catastrophic fire burned down the buildings in the No.15 to No.16 Fu areas in 1822 necessitating the redevelopment of the commercial streets and the rebuilding of the dwellings. No.15 and No.16 Fu lost their dominance when most of the merchants moved out and relaunched their business in other locations after the fire. Most rebuilt lots changed the land utilization form commercial to residential use. These new structures closely followed the original models on the ground plan, but showed western neoclassical external ornament on the façade. After the rebuilt of the lots, the street patterns and allotment system maintained a similar structure to that in the last century. (Figure 13c)

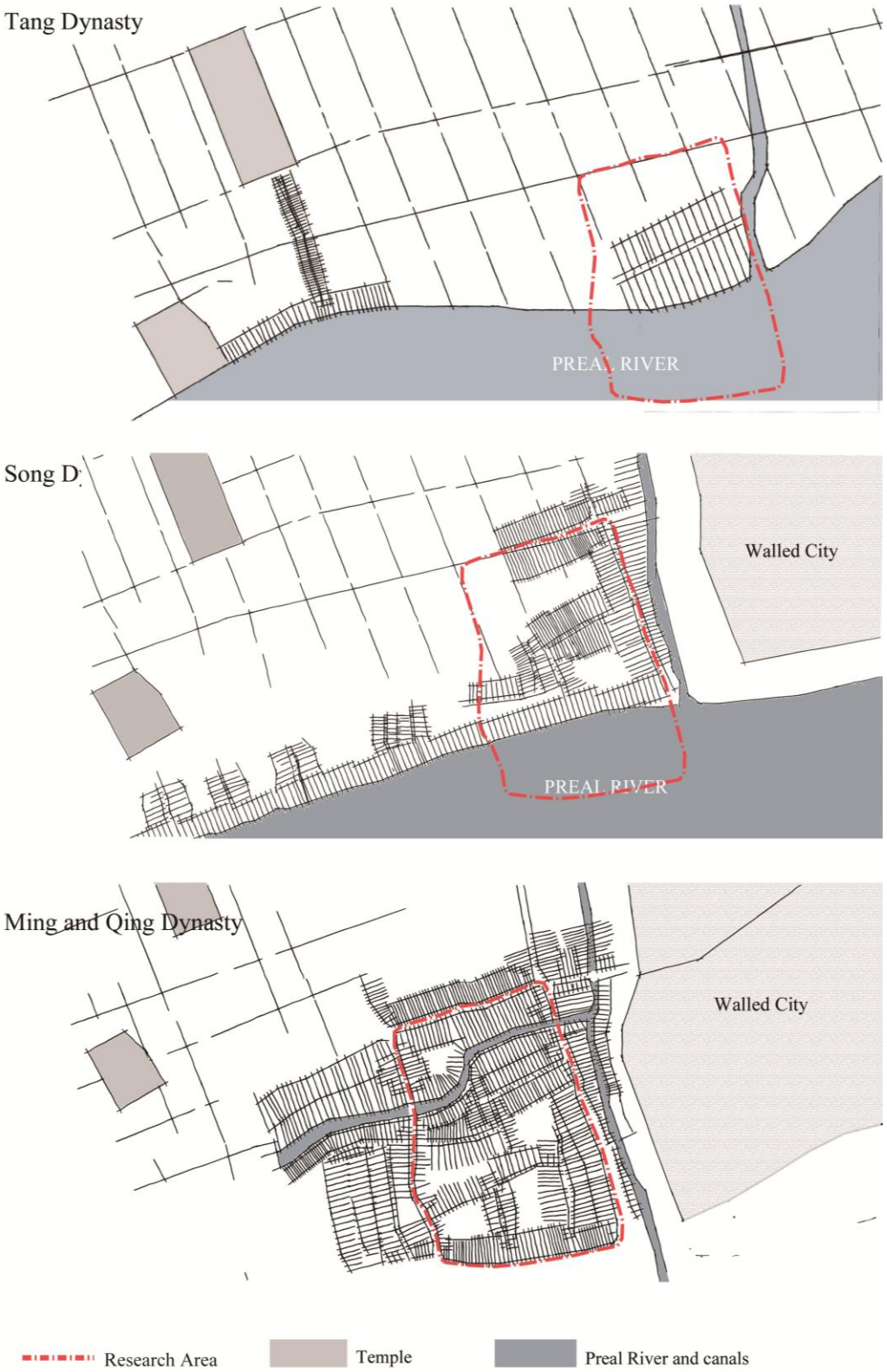

Figure 13 The theoretical reconstruction of the development of the lots in the Guangfunan area. (a) Tang Dynasty; (b) Song Dynasty; (c) Ming and Qing dynasties

Unlike the inner city, the route-structure in the western suburbs did not inherit the classic grid structure of the traditional Chinese city (Zeng, 1996). The street pattern in Guangfunan has two recognisable characteristics: a more tributary structure and broken-line shape (Figure 14).

Figure 14 The streets patterns of the Guangfunan Area. (a) The streets in the Guangfunan area before 1900; (b) The streets in Guangfunan area in the 1920s; (c) The streets in the Guangfunan area in the 1950s; (d) The streets in Guangfunan area in 2009. Based on the historical maps of Guangzhou in 1888, 1900, 1918, *Mingguo Jjingjie tu* of the 1930s, and urban survey maps post-1949.

The tributary structure in the Guangfunan area is a typical hierarchical street system with deep branching settling routes that effectively connect the residential buildings to commercial streets and marina. The first in the hierarchy of streets in the Guangfunan area are the commercial streets No.9-Fu and Heping Dong Rd. No.9-Fu street is one of the surviving ancient commercial streets from the Ming Dynasty that maintained its dominance to this day, while Heping Dong Rd. is a major artery bringing traffic from Xiguan area into the city centre. Two minor access routes intersect to the two major roads at a right angle and delineate the boundary of the study area. Instead of rectilinear shape, the connecting routes in Guangfunan are adapted to the direction of canals and show a broken-line shape. With a systematic use of cul-de-sacs, the residents and merchants can reach the main street from the dwellings and warehouses on the backstreet conveniently but also keep their privacy in the private courtyard (Figure 15). In addition, the recognizable broken-line shape of the street is affected by the high density land use in Guangfunan during the mercantile development of the west suburbs. Besides the warehouse on the back side of the commercial street, there were thousands of textile worker living in the core of the Guangfunan area when the textile industry peaked in the 18th century. The landlords sought to maximize the efficiency of land use, which led to the irregular shape of the connecting routes run through the study area and divide it

into several irregular blocks on multi-scales. All of these internal routes were interconnected to improve the accessibility in the later development. Yet, the broken-line footprint of the previous routes pattern has persisted. Moreover, as one of the Historico-Cultural Conservation Areas (*Lishi Wenhua Baohuqu*), there are a sizeable number of historical fragments that still exist on the streets of the Guangfunan area. The most obvious one is the stone paved streets that distributed in traditional residential neighbourhoods. These stone paved streets could also indicate the sequence of construction time (Figure 16).

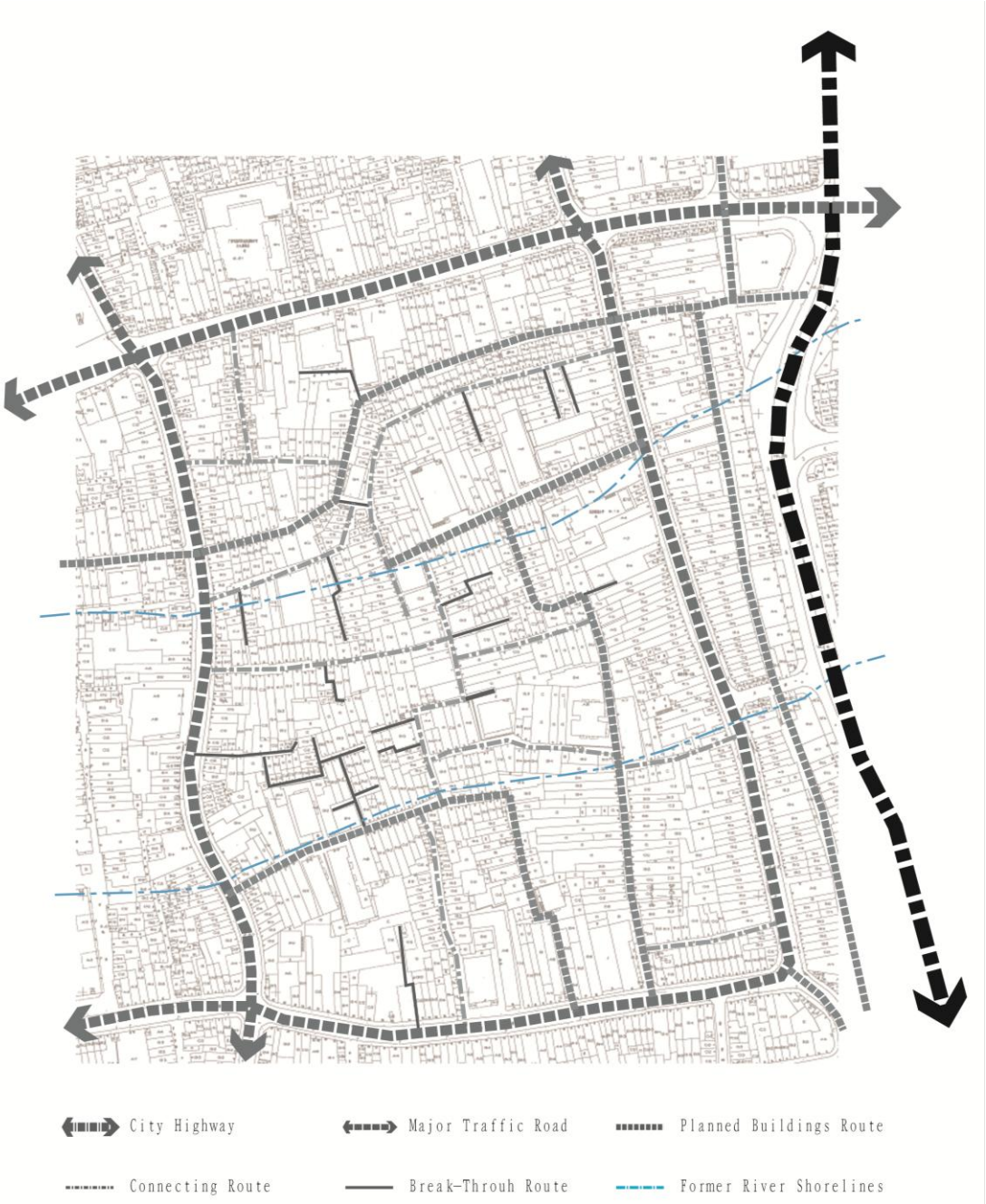

Figure 15 Street hierarchy in the Guangfunan area.

Figure 16 Stone paved streets in the Guangfunan area. Sources: author's photographs

In respects of the building allotment system, the lots in Guangfanan area are informed from the basic unit of dwelling house in Lingnan region: *jian*, which is a basic measurement unit of the buildings with the width of 4 meters (Lu and Wei, 1990: 198-199; Lu, 2008: 66). Before the rapid development of commercial and city construction, *sanjian lianglang* house was one of the most widely occurring building types in rural Guangzhou (Lu, 2004: 518; Lu and Wei, 1990: 48; Tang, 2005: 123; Lu, 2008, p. 73). However, with the pressure on space in the major commercial street frontage and the population growth, most lots in Guangfunan were narrowed down to one *jian* width and the pre-existing buildings started to adapt to a new building type, the *zhutongwu*. Although the origin of the *zhutongwu* house is still controversial, the shortage of space would

have been one of the key factors that influence the narrowness of this building type. The basic plan of *zhutongwu* is a combination of one-room-and-one-aisle layout that fits the width of 4 meters. The depth of the building is in accordance with the building lot and could spread out up to 20 meters (Lu, 2008: 67). Although there are a sizeable number of irregular lots, the site was converted to the form of buildings, especially in the infill tissues of the intersections. Because of the irregularity of the streets pattern, the long-narrow lot is the typical tissue in the study area. Hence, the long narrow lot is considered to be the module of the built lot in the Guangfunan area during the reconstruction of the urban aggregate in this study.

4.2.2 The morphogenetic zones in the Guangfunan area

The fundamentality of the morphological analysis, in both Cozenian and Caniggian schools, is to understand how the urban tissue has developed and to try to reconstruct the process based on artefacts and spatial forms deposited in the existing tissues. Therefore, after a careful comparative analysis of the historical maps and survey plans in different periods, a detailed block-by-block field survey was required in this research. During the field survey, the basic information of each building, such as the height, land utilization and building types had been taken down by both manuscript and photograph for later analysis and mapping. In the blocks along the main street, the boundaries

between two different units have been drawn along the center of the streets. In the blocks that have been occupied by an entity of buildings or other structures, the boundaries have been drawn by the boundaries of built lots based on the survey map *minguo jingjietu*.

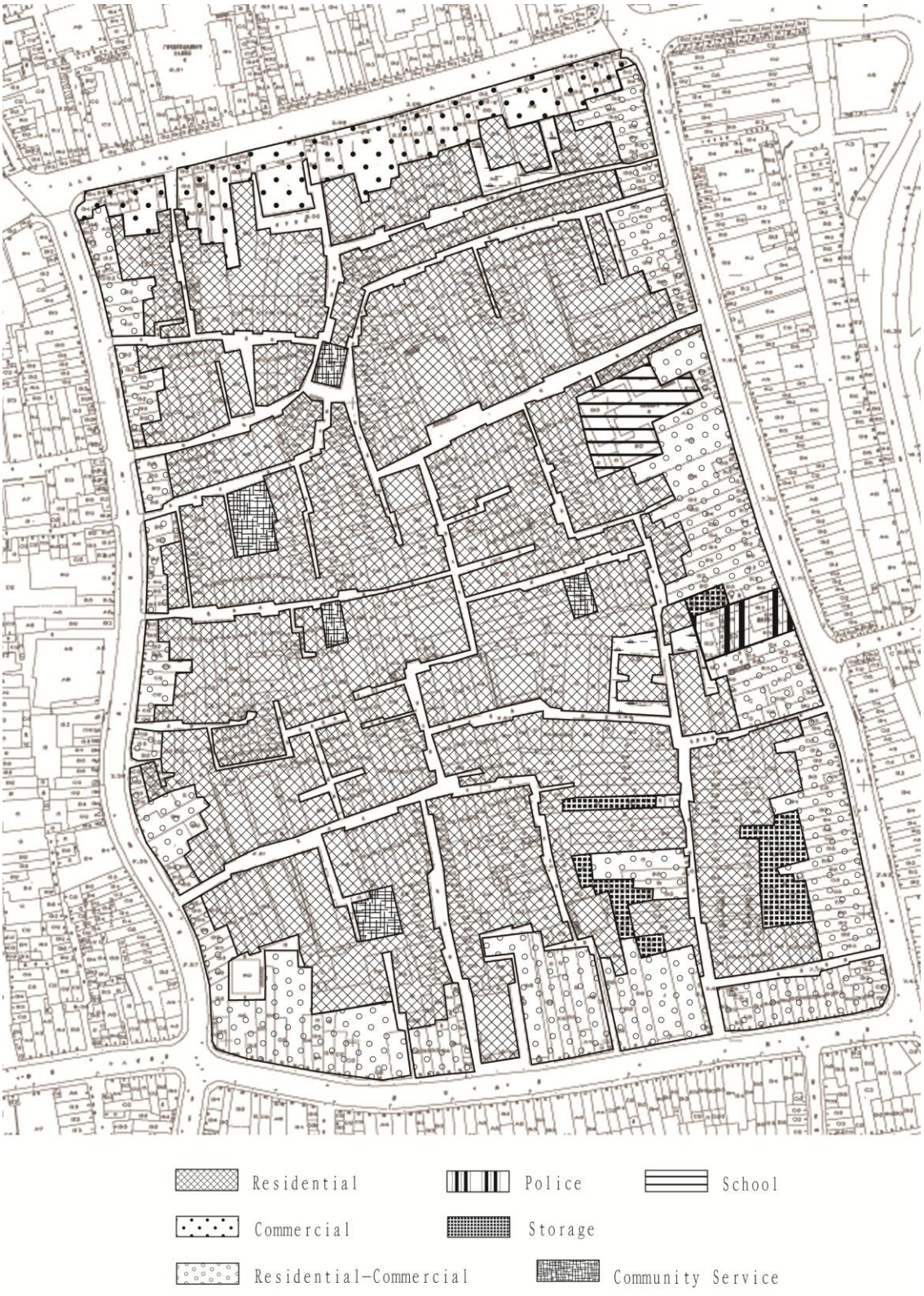

Figure 17 Map of land utilization of the Guangfunan area

Figure 18 Map of the building periods in the Guangfunan area

Figure 19 Map of the building height in the Guangfunan area

Figure 15 to Figure 19 comprise the characteristics of the urban landscape and urban tissues of the study area in classified and mapped based on their

respective morphological attributes components. The boundaries could be distinguished from the tangible evidence on the urban fabrics, for example the watercourse or the planned routes that following by a stripe of typical buildings. Due to a significant part to the previous allotment system, most residential building redevelopment in the post-1949 period was tended to be vertical extension or interior reconfiguration among the study areas. Five zones can be identified as the first order in the meso-morphological analysis of the study area by gathering their base on the natural break and land utilization (Figure 20), and each of them will be elaborated by giving a representative block as an example:

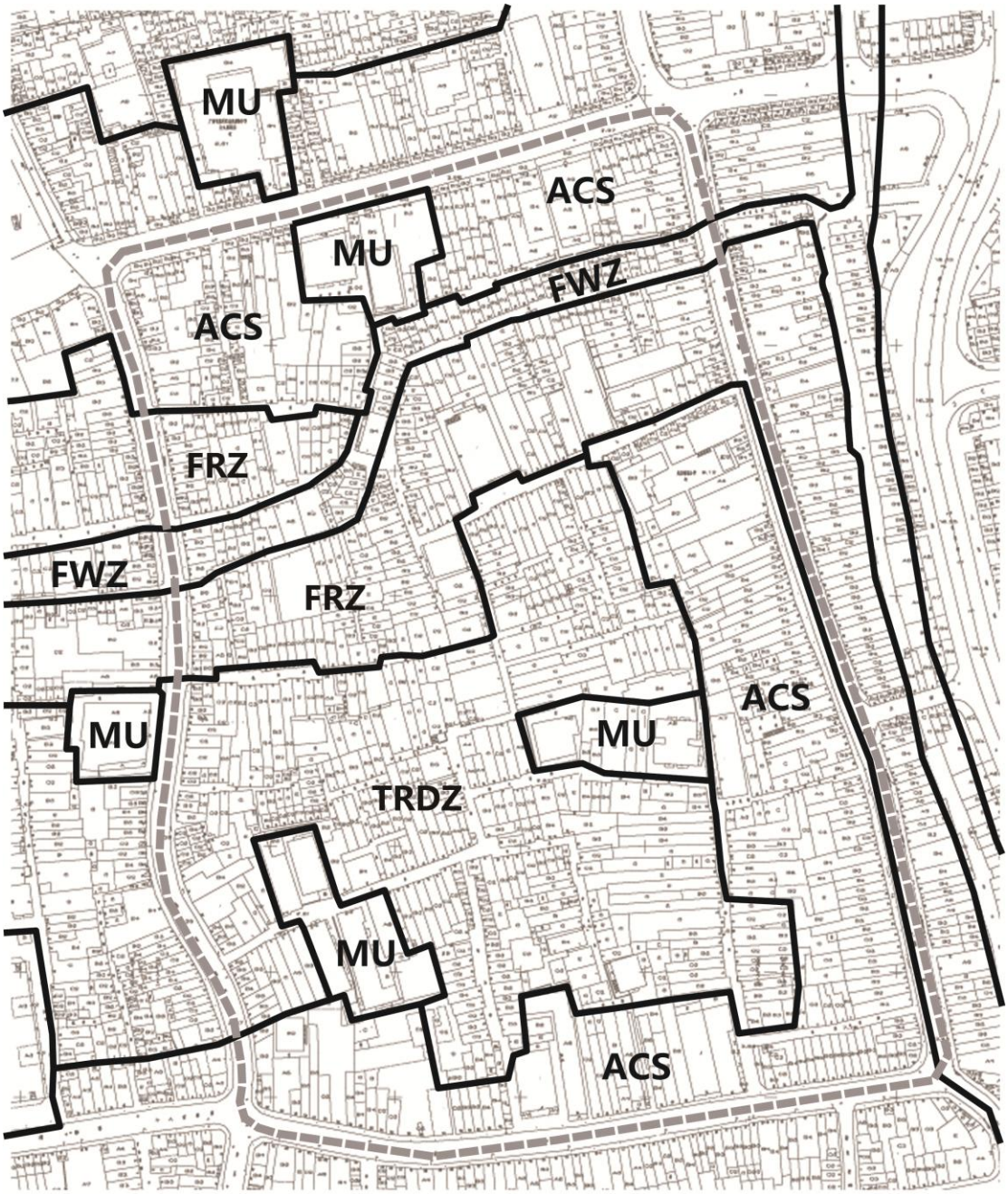

Figure 20 Five morphological zones in the study area.

(I) Former Watercourse Zone

The Former Watercourse Zone (FWZ) is located right above the watercourse of Daguan River and the west city moat, two branches of Pearl River that played an important role in the course of growth of the whole Guangfunan area. Both leave a tangible watercourse shape in the study area. The development of the urban tissues in the FWZ has been strongly influenced by the watercourse of the former river, as well as the shape of built lots that were created on reclaimed river land.

Following the natural conditions, the organization of the allotment in the FWZ presents a natural shape and boundary derive from the former watercourse, and the dimension of the lots fits the width of the river as described in historical records. There is considerable evidence that shows that the width of the canal was approximately 15 meters and the Qingyunxiang and Deyunli was used to be the edge of the river. According to *Guangzhou Chengfangzhi*, a historical document which records the physical geography and human geography of Guangzhou, Daguan River was canalized in 1472 AD and substantially restored and improved in the following decades.

Since the study area is in the upstream that had completely dried out since the early 19th century, most of the allotment might have been modified and lost the original character of the buildings during the twentieth century. Hence, the initial phase of the tissues in FWR had lost most of the characteristics even if the

boundary lines remain unchanged. Therefore, the theoretical reconstruction of the initial phase required further field work in order to assess the plots located along the canal in downstream, where the first generation of urban building fabrics still exists. The accurate survey map in 1933 (the map of land divisions and boundaries in Guangzhou in the Republican period) shows a discernible deposited area of the canal in the next block from Yangxiang Road to Zhuji Road (Figure 21).

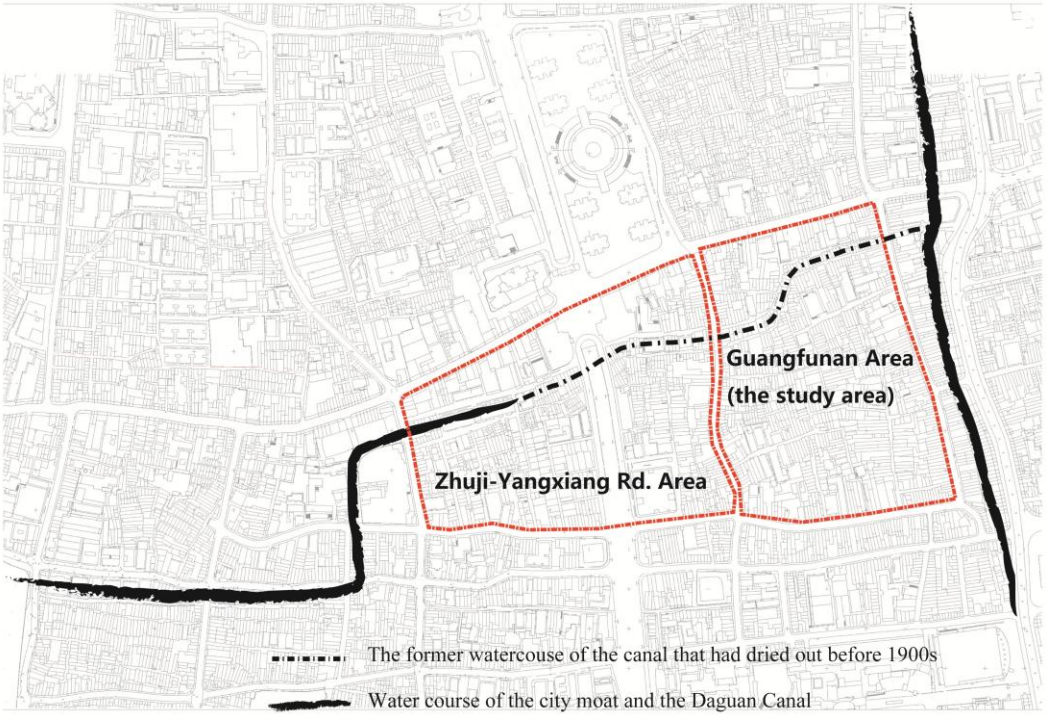

Figure 21 The location of the Zhuji-Yangxiang Rd. area.

By using the map of 1933 as the base map and comparing it to the later maps, the cartographic evidence shows the evolution of the former watercourse zone in Yangxiang-Zhuji Road blocks in the last century, which would help to characterise the phases of the FRZ during the canal dried out and reconstruct the morphological process of the urban tissues' evolution.

With the canal narrowed and dried out in the last two centuries, the former watercourse has been replaced by buildings. At the first stage, small houses were built up along the new bank of the canal (Figure 22). Based on the orientations, the address of these small buildings faced to the streets along either side of the river, Qingyunxiang or Deyunli, and with access to the canal in the backside of the buildings. Since the orientation of the small house is not a planned and organized but mostly based on the natural conditions of the canal, there is also no regular pattern of the addresses of the buildings on the watercourse. Accordingly, the addresses of these buildings on the former watercourse still do not show a regular pattern and some of them might even have their addresses found on both riversides during the plot-by-plot survey. At the second stage, when the watercourse had narrowed down, the drought out area had been replaced by courtyard and patio, and the pre-existing small buildings started to extend themselves in both horizontal and vertical ways to fit into the new lot area. As previously stated, the natural shape of the

watercourse played a crucial role in shaping the streets and allotments in FWZ. Therefore, the dimension of the built lots has been limited by the river and the ratio of plot width to plot depth is about 1:1 to 1:2. Although this is not the ideal ratio for *zhutongwu*, these buildings still keep the one-room-and-one-aisle characteristic in the internal configuration which fits the width of approximate 4 meters in each lot. They constitute a synchronic variant of the generic *zhutongwu* type, in particular an adaptation of the type to unusual circumstances.

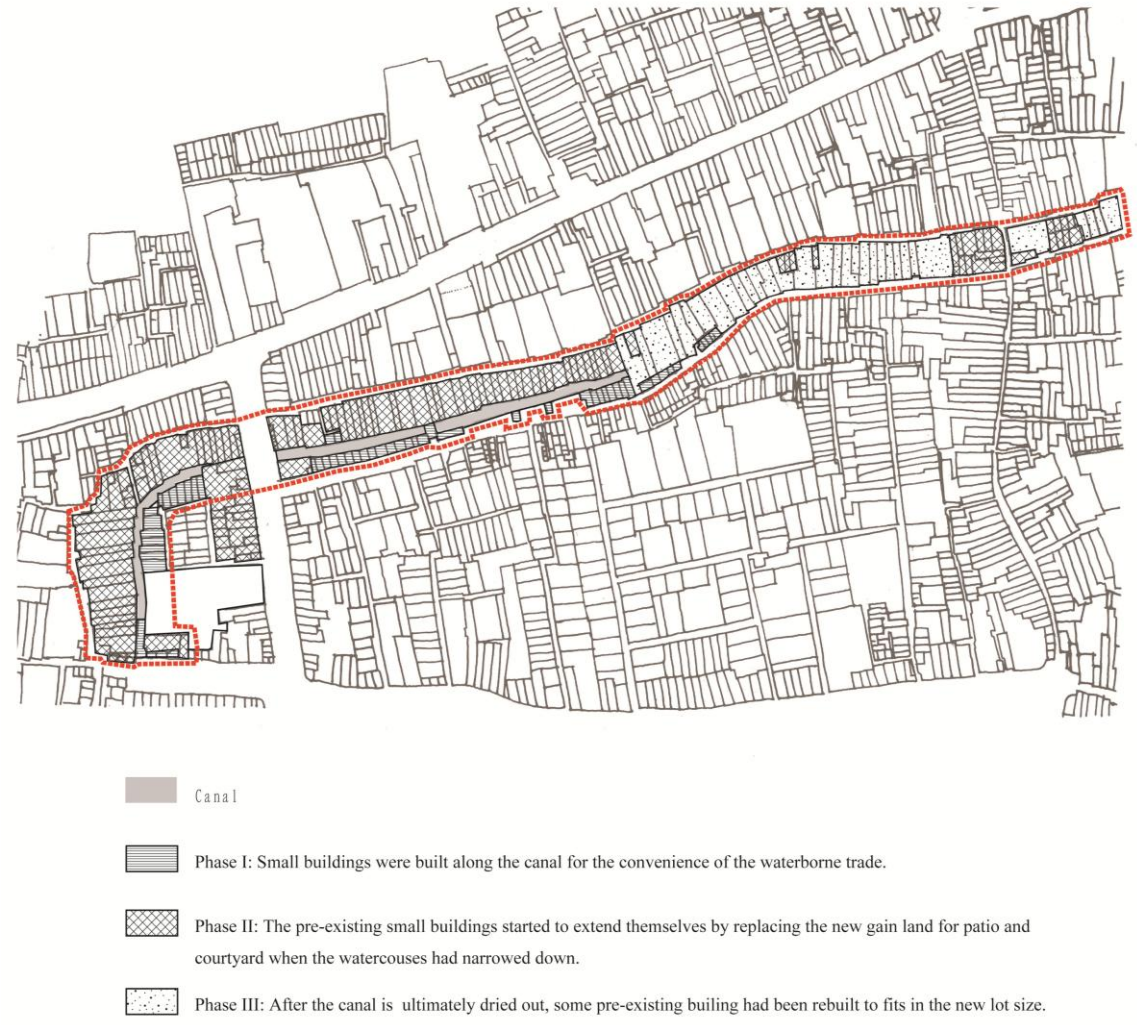

Figure 22 The theoretical reconstruction of the built environment of the Former Watercourse Zone

(II) Former Riverfront Zone

The blocks along the former watercourse which have been partitioned into the category of the Former River front Zone (FRZ) were a serial of linear commercial blocks that developed along the river and had become a part of the Eighteen-Fu area after the Daguan River had been canalized in the 15th century (Figure 23). The streets in FRZ have a traceable branching pattern in the route structure. To the south of the canal, the streets in FRZ share the characteristic of branching routes in tree-like configurations, associated with the T-junctions and a bristling of cul-de-sacs that perpendicular to the former canal. These break-through routes also increase the accessibility from the waterfront shopfront to the warehouses and dwellings at the backstreet (Figure 24).

Phase I: Linear blocks built along the canal

Phase II: Perpendicular to the canal, new break-through routes that developed during the process increased the accessibility of the blocks. The pre-existing lots that located at the corners had to subdivide into several small lots and change the oreintation of buildings.

Phase III: Building alteration or addition post-1949

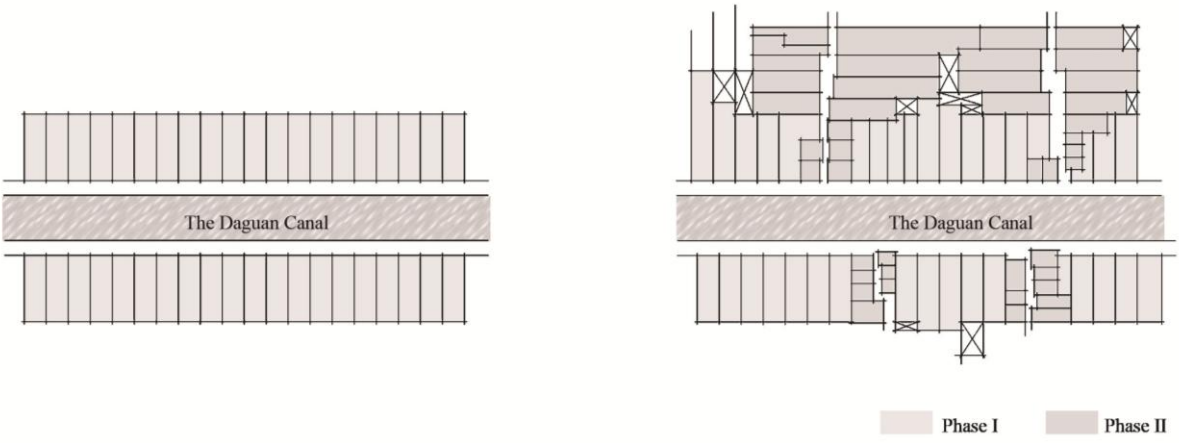

Figure 23 The theoretical reconstruction of the built environment of the Former Riverfront Zone

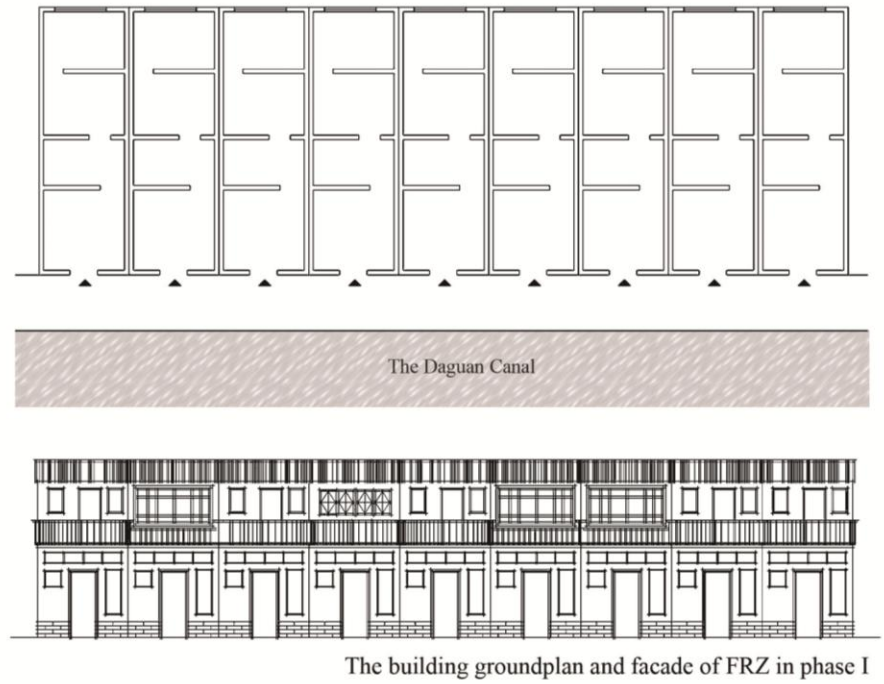

Figure 24 The subsequent transformation of the building orientation and street frontages of the Former Riverfront Zone

However, the waterfront commercial location had lost its advantages after the canal dried out in the early 19th century, so that most of the built lots underwent a change, especially the land utilization in the later development. The most common change is from commercial to residential. The buildings to the south of the former canal and addressed to Qingqiuli were used to be the No.14 Fu unit but left only a memorial marina after the canal dried out. Most the buildings along Qingqiuli are adapted dwellings that had a floor plan resembling to a *zhutongwu*, but with a grocery on the first floor. Most of these buildings near the former marina still have the elements of the waterfront architecture, such as the small stair outside the building that could be trace back to the private marina along the city moat (Figure 25).

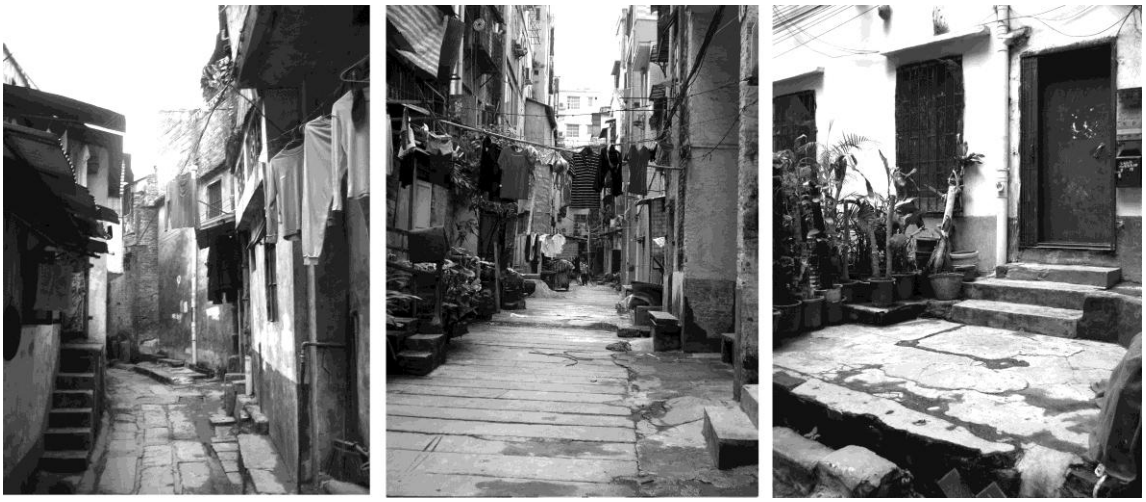

Figure 25 Photos of the private marina, streets and dwellings in *Qingqiuli*.Sources: author's photographs.

(III) The Traditional Residential Dwelling Zone

The Traditional Residential Dwelling Zone (TRDZ) consists of a sizeable standard traditional built lot that is approximately based on the 4-meter width *Jian* module in the core of the study area (Figure 26). Most lots in TRDZ were occupied originally by *zhutongwu*, the most common building type in the Xiguan area. In most cases, dwellings were first built back to back and deployed in a linear shape. Each of them was occupied by a single family. The most widely prevalent allotment in TRDZ is a rectangle lot in 1-*jian* wide, which could be consider as a basic unit in this area. Therefore, the lots in TRDZ allow the most diverse transformation during the process among the whole study area. The rectangle lots are easy to combine together to be a doubling allotment in later transformation because of their regular shape. In some cases, the buildings along the traffic road have been converted into commercial use and subdivided to accommodate multiple shopfronts. In contrast, buildings in the L-shape lot would have a small courtyard in the back, which allows natural light down through the rooms. This is an effective way for getting more natural light in some particularly deep long lots (Figure 27).

Figure 26 An aerial view of the Traditional Residential Dwelling Zone. Sources: author's photograph

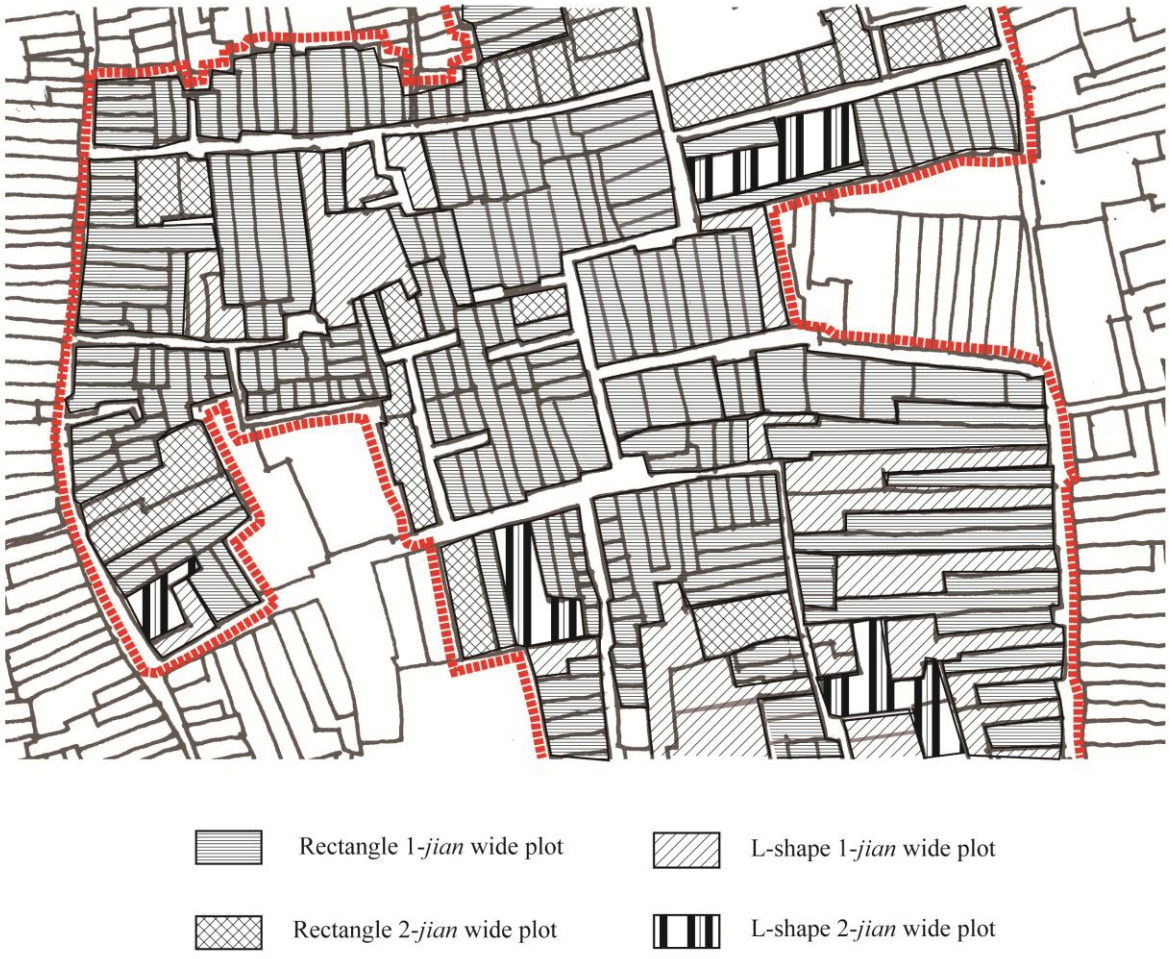

Figure 27 **Different types of lots in the Traditional Residential Dwelling Zone (TRDZ)**

In some cases, *mingziwu* is intermixed into the sites that are dominantly composed of *zhutongwu*. The *mingziwu* is sometimes considered to be a pair of *zhutongwus* for its two *jians* width (approximately 8 meters) in ground plan. However, *mingziwu* is an asymmetrical building type that with the explicit functions and the rigorous structure. The principal part consists of the living room and bedrooms, while the kitchen and storage that are connected by the lightwells on the other side are usually regarded as the auxiliary part of the

house (Lin and Sun, 2004: 18). As was it stated before, the ground plan of the *mingziwu* is not completely axisymmetric, but this does not overly impact on the regularity of the street frontage and the spatial experience in the neighborhood since the façade of the *mingziwu* is divided into two parts and the *mingziwu* shares a lot of characteristics with the *zhutongwu*, in both functions and internal configuration (Gu, *et al.,* 2008). Due to the greater pressure on land, most of these buildings were subdivided at some point to accommodate several households or were reconstructed as multifamily buildings that have a ground plan resembling to *zhutongwu*. Considering the depth of the built lots, a three stories apartment on a 4 by 20 meters lot could be subdivided to house up to nine households.

The streets in TRDZ are narrow and most of them are impassable to motor cars. Most of the connecting routes in the neighborhood are less than 3 meters in width and with a broken-line shape. Some irregular alleys are mostly 1 to 2 meters in width, and the most convenient transportation service is bicycle. In some cases, a cul-de-sac with a width that is less than 1 meter is the only street that connects a group of dwellings to the connecting routes. These alleys and cul-de-sacs constitute the internal transport network in TRDZ, especially in the core of the units (Figure 28).

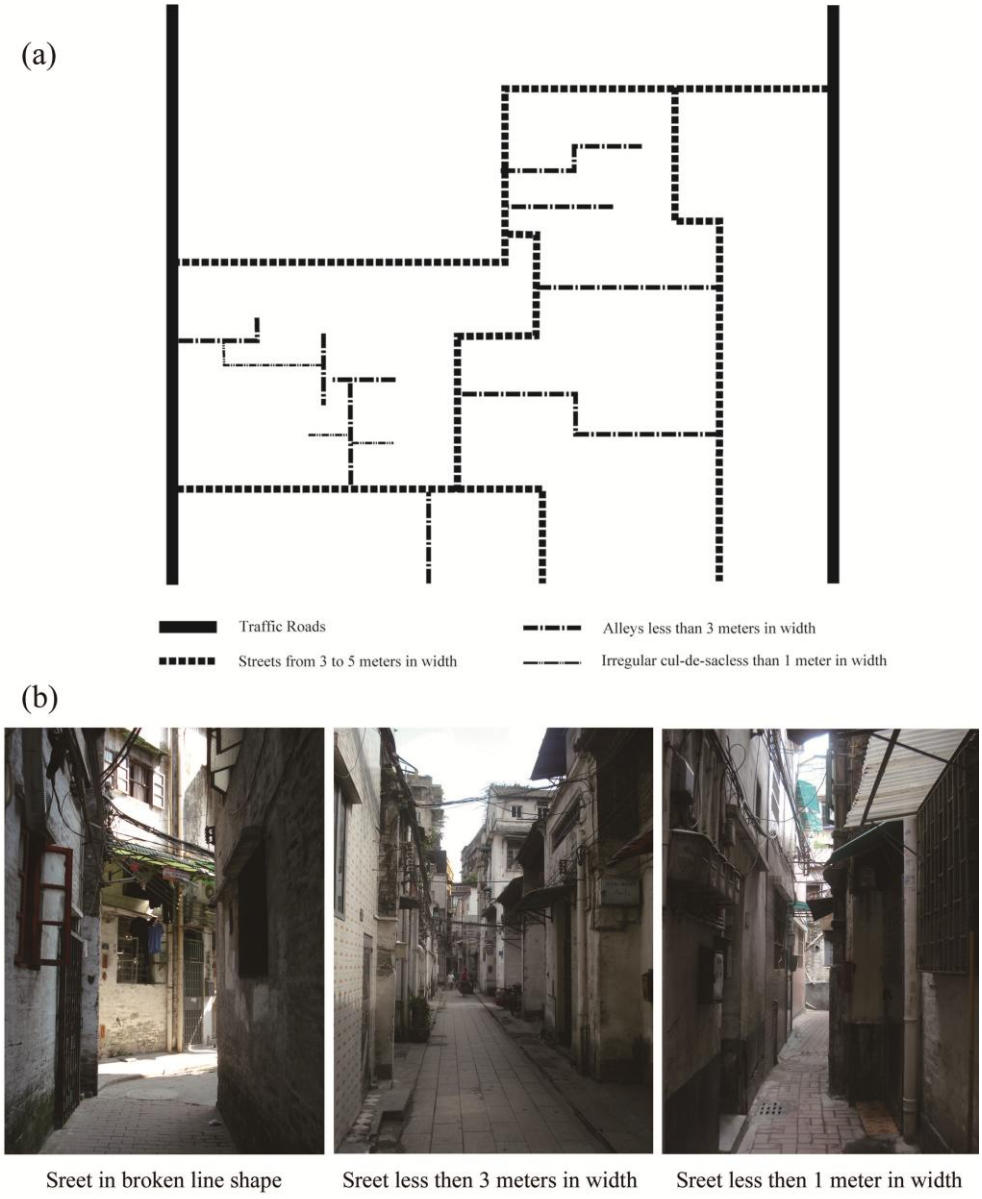

Figure 28 (a) Diagrammatic map of the street width in the Traditional Residential Dwelling Zone(TRDZ); (b) Photographs of street views in the Traditional Residential Dwelling Zone (TRDZ)

Generally, the Traditional Residential Dwelling Zone is basically a branch of high-density neighborhoods with a walkable distance to the public service around. The features of these neighborhoods such as the narrow lots and

streets reflect local traditions and climate but, the denser populations and irregular narrow streets also increase risk of inhabitant safety in the event of fire.

(IV) The Ancient Commercial Street

The Ancient Commercial Street, as known as the Fu unit, is made up of a branch of long ancient commercial streets derived from the commercial street along the city moat and western commercial intercourse in the Ming dynasty. The No.9-Fu in this research is one of the surviving ancient commercial streets that and has been designated as one of the Historico-Cultural Street Blocks (*Lishi Wenhua Jiequ*) of Guangzhou in 2005 (Guangdong Research Institute of Urban and Rural Planning and Design, and School of Architecture, Tsinghua University, 2005). Characterized by the specific building type, the *qilou* - a hybrid building type that mixes the traditional Lingnan dwellings and Western-influenced facades and decorations - the Fu unit represents the characters of traditional commercial-residential neighborhoods in Xiguan area (Figure 29).

Figure 29 Photograph of *Qilous* in No. 9-Fu. Sources: author's photographs

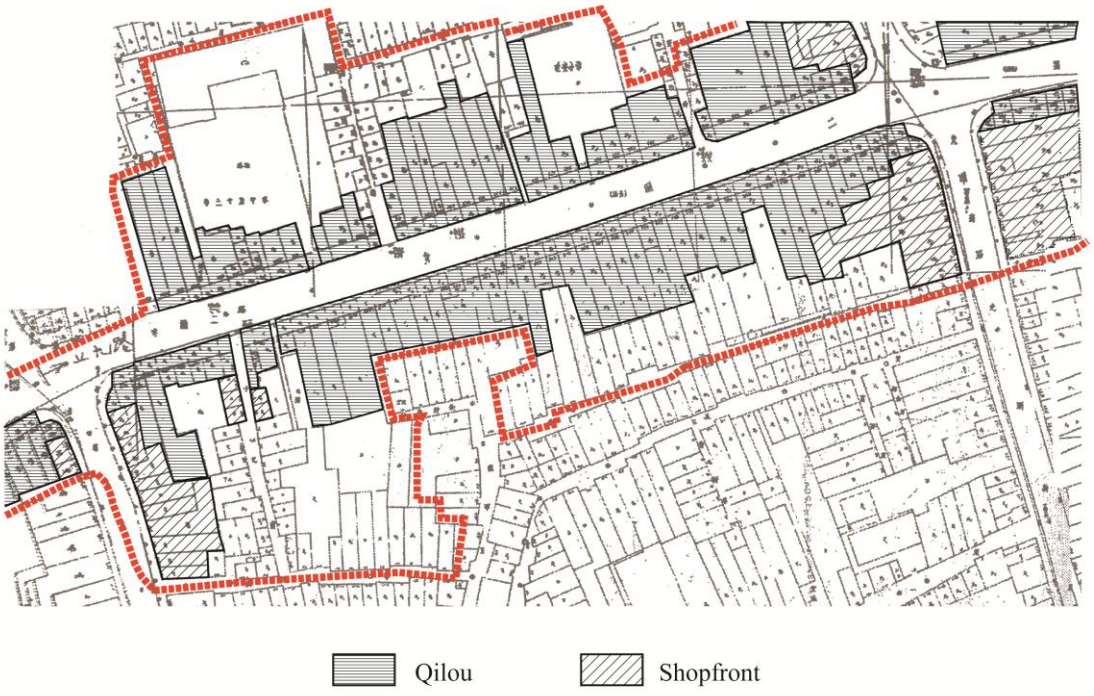

Figure 30 The distribution of *Qilou* and shopfronts in the ACS zone in the 1930s

The word *qilou* was first officially published in an urban redevelopment policy of the newly established Republican government in 1912. The purpose of redeveloping the street with *qilou* is to separate the pedestrians and vehicular traffic of the city, especially on the major commercial streets (Zheng, 1999; Lin, 2001). According to the map of 1933, *qilous* have been widespread on major commercial streets or on a frontage to the road along the river side of Eighteen-Fu area (Figure 30). By the end of 1940s, over 40 kilometer of *qilous* had been built in Guangzhou (Zheng, 1999).

Since the original *qilous* were redeveloped based on the pre-existing dwellings, the internal floor plan of *qilou* shared considerable similarities with the *zhutongwu* and *mingziwu* that already mentioned in the last subsection. Most buildings on No.9-Fu only changed the frontage to shops and added a colonnaded pavement during the redevelopment. The *qilous* on No.9-Fu represent a good example of the combination of commercial frontage and residential back house.

From 1980s to 1990s, in order to widen the roadway, Guangzhou started to narrow the pavement by tearing down the *qilou* streets which had not been designated in Historico-Cultural Conservation Areas (HCCAs). On the purpose of keeping the regularity of the pattern of building frontages in HCCA, the *qilou* shopfront on No.9-Fu survived during the new urban regeneration. However,

this did not happen in the cases of the back houses. Some back houses have been completely separated from the shopfronts and changed landlords. In some other cases, a row of dwellings that right behind the *qilous* have been torn down and rebuilt an edifice by the real-estate company (Figure 31).

Figure 31 New built edifice behind the *qilous* from the 1980s onward. Sources: author's photographs.

(V) The Modern Unit

Finally, there is a major distinction in the spatial structures between the blocks have been designed as the Modern Unit and the previous categories. These blocks should be regarded as 'exceptions' in the study area, for they do not manifest the "continuity of typological process" (Caniggia and Maffei, 2001: 55-56) during the development. In some cases, the pre-existing dwellings had been demolished and replaced by *danweis*, an enclosed territorial form that used to organize the urban population during the planned economy period. Another

wave of built lots amalgamation and building reconstruction of the study area occurred right after the economic reform policy in 1978, especially in the post-1990s period. The modern style buildings are usually built on amalgamated lots with great height and mass, which is distinct from the traditional dwellings (Figure 32 and 33).

Figure 32 Transformation of the land utilization and lot size in the Modern Unit

Figure 33 New built edifice created after the 1980s in the Modern Unit. Sources: authors' photograph.

With the differences in building type, built lot size and even land utilization, the previous tissues of these lots have been effaced and substituted by modern physical forms. In the Modern Unit, the previous urban fabrics no longer exist, nor do they exert any significant influence in the reconstruction. This fracture phenomenon does not fit the morphological process, but it represents a manifestation of the centrally-controlled planning system that characterized contemporary China from 1949 onward.

This chapter provided a general picture of the evolution of the Guangfunan

area by divided it into different morphological zones and provided an overall assessment of the evolution of the street network and allotment system of each zone. Yet, a better understanding of the transformation of the building types in the study area, would offer a more comprehensive analysis of the morphogenesis of the area. Also, it would be of great practical value for urban planners and policy-makers who show their concerns on the urban morphology and urban conservation during the city regeneration.

CHAPTER 5 THE BUILDING TYPE PROCESS OF THE GUANGFUNAN AREA

In the previous chapter, the maps and surveys allowed for the retracing of the initial phases of development of the built lot and for a theoretical reconstruction of the urban tissues genesis in a traditional neighbourhood. It suggested that the formation and transformation of the streets and built lots in the Guangfunan area followed a sequence of adaptation that the new types are superseding the existing ones while the existing types were also informing the architecture of the new ones. Therefore, in order to have a better understanding in the formative laws of the typological process in the study area, this chapter seeks to examine the typological process on a more refined analysis by focusing on the buildings per se. Similar to the general process that examined in chapter 4, this part of research intend to examine all the existing buildings in the Guangfunan area and to classify them into separate categories based on characters of the buildings (Figure 34). The purpose of building type classification, as far as this research is concerned, is to distinguish different kinds of building types that emerged after the Opium War in a succession over time. Therefore, this part of research focuses particularly on the traditional dwellings and their variants. It also seeks to explore the possibility to establish a progressive line that shows the diachronic

development, for the period since 1840, of the building types in the Guangfunan area.

Figure 34 The building types in the Guangfunan area

5.1 The classification of building types in the Guangfunan area

5.1.1 Sanjian Lianglang House

As it stated in the previous chapter, *Sanjian lianglang* house is one of the most widely adopted basic building types in rural Guangzhou (Lu, 2004: 518; Lu and Wei, 1990: 48; Tang, 2005: 123; Lu, 2008: 73). However, no typical *sanjian lianglang* house had been recognized during the field survey, and its basic form is almost extinct in central Guangzhou (Gu, *et al.,* 2008). Still, *sanjian lianglang* house is regarded as the basic building type that has influenced the later development of dwellings within central Guangdong Province (Lu, 2008: 74). Therefore, a quick review of features of *sanjian lianglang* house is useful for the later research. As its name suggests, *sanjian lianglang* house is 3 *jian* (approximately 12 meters) in width and has a symmetric layout with the courtyard and living room deployed along a longitudinal axis, and two adjacent bedrooms on either side. The small courtyard provided shade and facilitated natural ventilation, which has practical advantages for the subtropical climate in Guangzhou, especially in the summer time (Tang, 2005). Two other smaller rooms on either side of the courtyard that were used as kitchen and storage are referred to as *lianglang* (Lu, 2008: 73) (Figure 35).

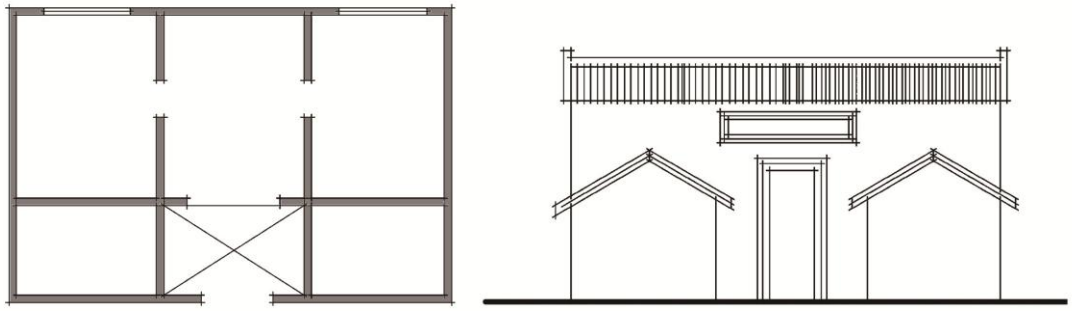

Figure 35 A sample of floor plan and façade of a *sanjian lianglang* house

The main part of the house sometimes has a small attic added for spares. In some cases, the entrance of the house is on the side door of a building that leading directly from the kitchen instead of the courtyard in front. The most traditional version of the *sanjian lianglang* house is a house with a mixture of brick and timber frame structure with a highly decorative grey brick wall and wooden beams (Pan and Peng, 2002; Gu, *et al.,* 2008). Several features of *sanjian lianglang* house are affected by *fengshui*, such a back wall without a window and the sloping roof of the kitchen and storage that must lean toward the courtyard (Gu, *et al.,* 2008; Lu, 2008: 73-74). In some well-planned rural village, a group of *sanjian lianglang* house were tightly arranged in a row and orientated to south or southeast and usually have a pond and ancestral hall in the front of the aggregate (Figure 36).

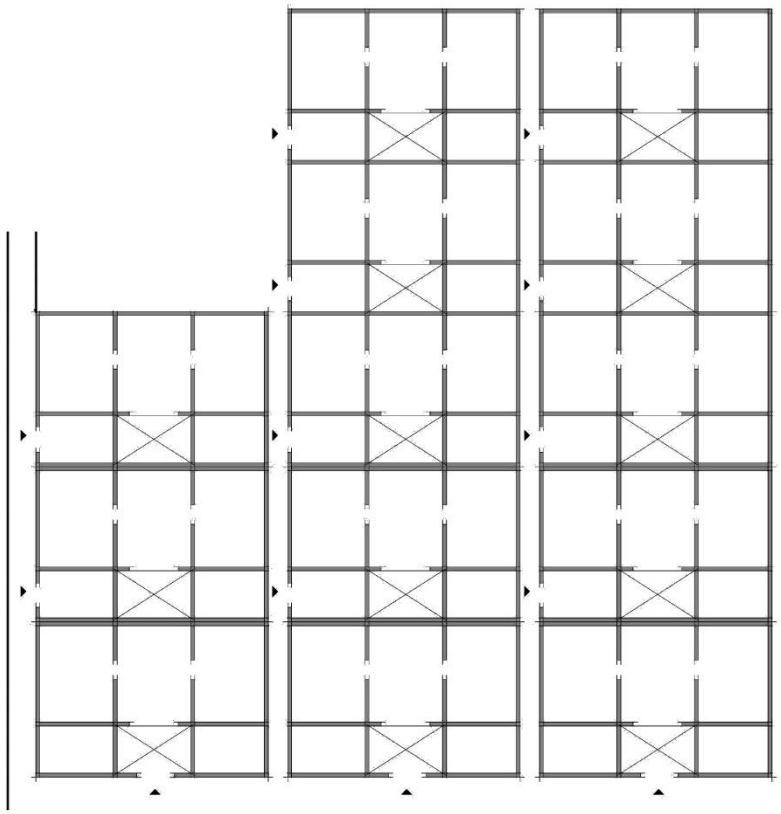

Figure 36 Diagrammic map of the comb-like layout aggrgate of *sanjian lianglang* houses

This comb-like layout aggregate are common in towns surrounding Guangzhou area (Lu and Wei, 1990: 18-19; Tang, 2004a: 127-144; Lu, 2008: 38-39; Gu, *et al.*, 2008: 100).

5.1.2 Zhutongwu and Mingziwu

Zhutongwu and *Mingziwu* are regarded as two basic building types in the city area of Guangzhou (Gu, *et al.*, 2008). The essential of the *zhutongwu* is constituted of a living room, bedrooms and a kitchen that are, in most cases,

connected by a lightwell from the principle part of the house. The origin of the *zhutongwu* house is unknown, but the shortage of space in the city area would have been one of the key factors that explain the narrowness of such buildings (Gu, *et al.,* 2008). To some extent, the *zhutongwu* could be regarded as a narrow and deep version of the *sanjian lianglang* house, since these two types share almost the same components in their layout, though they are a few differences in the sequence of rooms. The courtyard of the *sanjian lianglang* house has adapted to the lightwell that connect the main functional rooms to the kitchen and also allows natural light down through the rooms. *Mingziwu*, on the other hand, is sometimes considered to be a doubling of *zhutongwus* for its two *jians* width layout. Although *mingziwu* is not strictly symmetrical in its layouts, *zhutongwu* and *mingziwu* do have a lot of commons on the living functions. Considering the internal configuration, three sub-types of *zhutongwu* could be identified in Guangzhou area in the previous research (Lu, 2008). All these sub-types still have partly remains in the study area that could be found in the field (Figure 37).

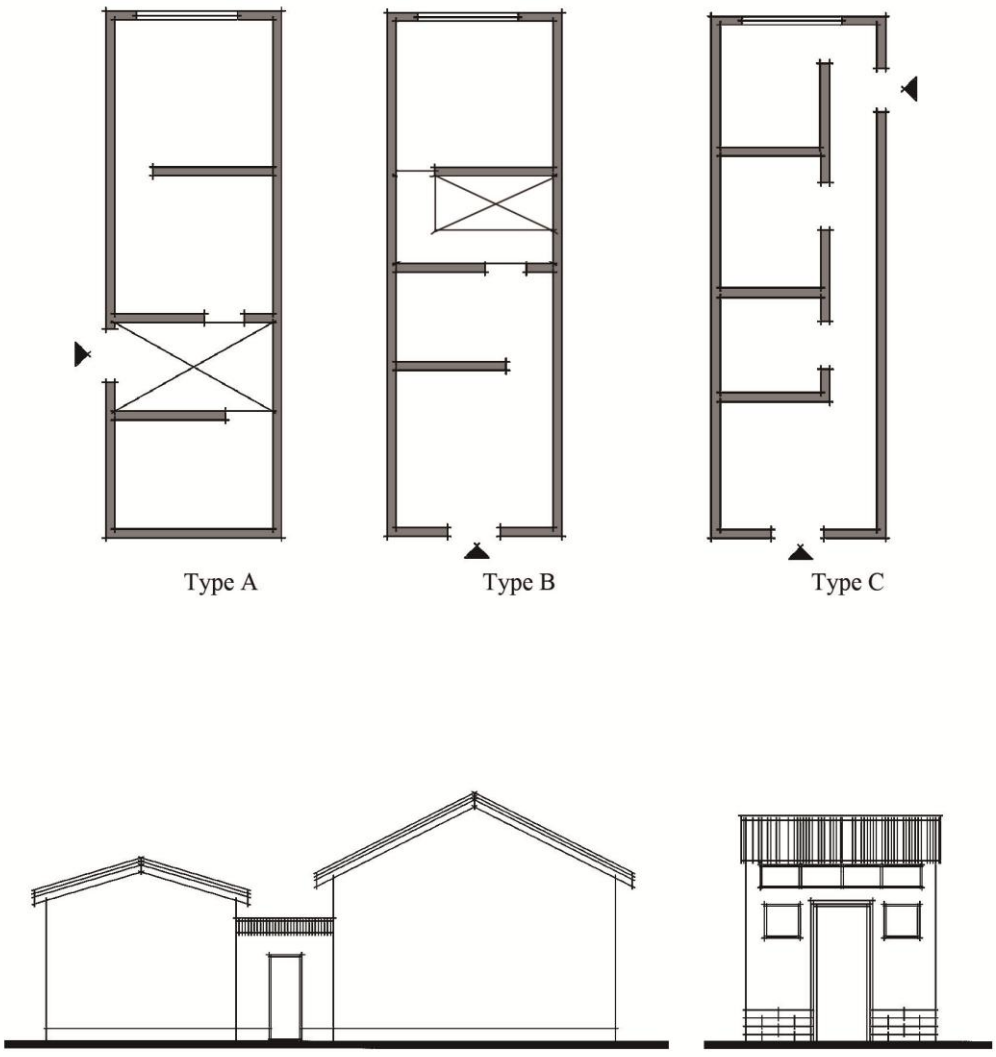

Figure 37 Floor plan and elevations of three types of *zhutongwu*

The A-type refers to the one that with its kitchen completely separated from the principal part of the house. The purpose of the separation is believed to reduce the risk of fire. Since the main entrance of the house is on the side of a

building, this sub-type would adapt more easily in the built lot which located at the corner of the streets. However, this layout in the other hand had increased the inconvenience in wet season. Therefore, this type is almost extinct within the city area during the evolution.

The most significant characteristic of B-type is the kitchen that is situated in the front of a house, at the street frontage. It connect to the main entrance of the building directly and face to the street. The main part of the house is at the rear. A semi-open corridor with shield is added on the side of the lightwell to avoid the rain in wet season. In the city area, due to the pressure on space, the living room and bedroom are adjacent in order to fits the depth of the built lots. In those cases, additional skylights are added on the roof of the living room and bedroom to get more natural light.

The C-type is typical in the core area of residential neighbourhood in Guangzhou area, especially where there is a greater demand for space. A corridor on either side of the house connects all rooms from the entrance. There is no lightwell in the C-type, or in some cases, it has been occupied for other function because the lack of space. Instead of that, a skylight above rooms is an effective way to gain natural light for its tight arrangement of floor plan. Contrarily to the B-type, the kitchen of C–type is at the back of the house. If the house is the first in a row and next to an intersection, it might have an additional

side door open to the street from the kitchen.

The C-type is most widely prevalent sub-type in the Guangfunan area, where it could be considered as the 'foundation type', for it represented the standards of a single family residence in the Guangfunan area, before the Opium War (for discussion on the notion of 'foundation type', see Caniggia and Maffei, 2001: 107). It has two variants as parallel existence types in other morphological zones of the study area before the Opium War.

The first variant (Type C_I) refers to the small house first emerged in the Former Watercourse Zone (FWZ) while the Daguan canal started to dry out. Some built lots are only 6 to 8 meters deep in the original size. The limitation of space triggered the vertical extensions of the buildings, since the needs of fitting all basic functions in a small plot.

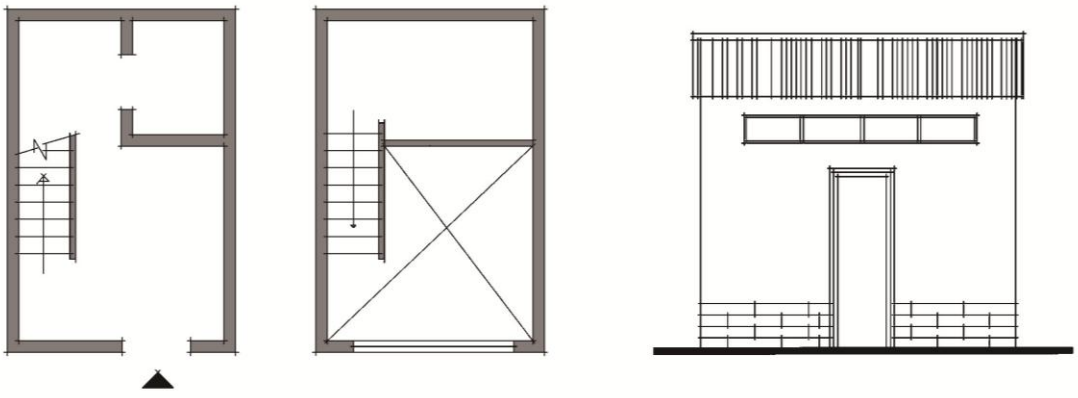

Figure 38 A sample floor plan and façade of the C_I-type

By adding a small mezzanine floor, the variant C_I-type was adapted to a

sub-type with a small interior stair that separates the bedroom and living room in different ground levels (Figure 38). Some of the C_I-type buildings are extended vertically in later transformation by adding another storey on top of the building. This original version of this sub-type barely existed in the Former Watercourse Zone nowadays, yet in some minor back streets in the study area, a few C_I-type buildings are still remain in the field (Figure 39).

Figure 39 Photographs of *zhutongwu* in the study area. Sources: author's photographs.

On the other hand, with the watercourse narrowed down, the drought out area had been replaced by courtyards or lightwells, which later have been rebuilt with a new building, or occupied by the extension part of the pre-existing building when it extended horizontally. These two progressive transformations gradually led to a new iteration of *zhutongwu*, as a multifamily house (Figure 39). One of the characteristics of most *multi-family zhutongwus* in the study area is a

mixture of material on the façades, since the internal configuration of the building had been adapted and redecorated several times during the process, the material and architectural style of different periods had also reflect to the façade of buildings (Figure 40 and 41).

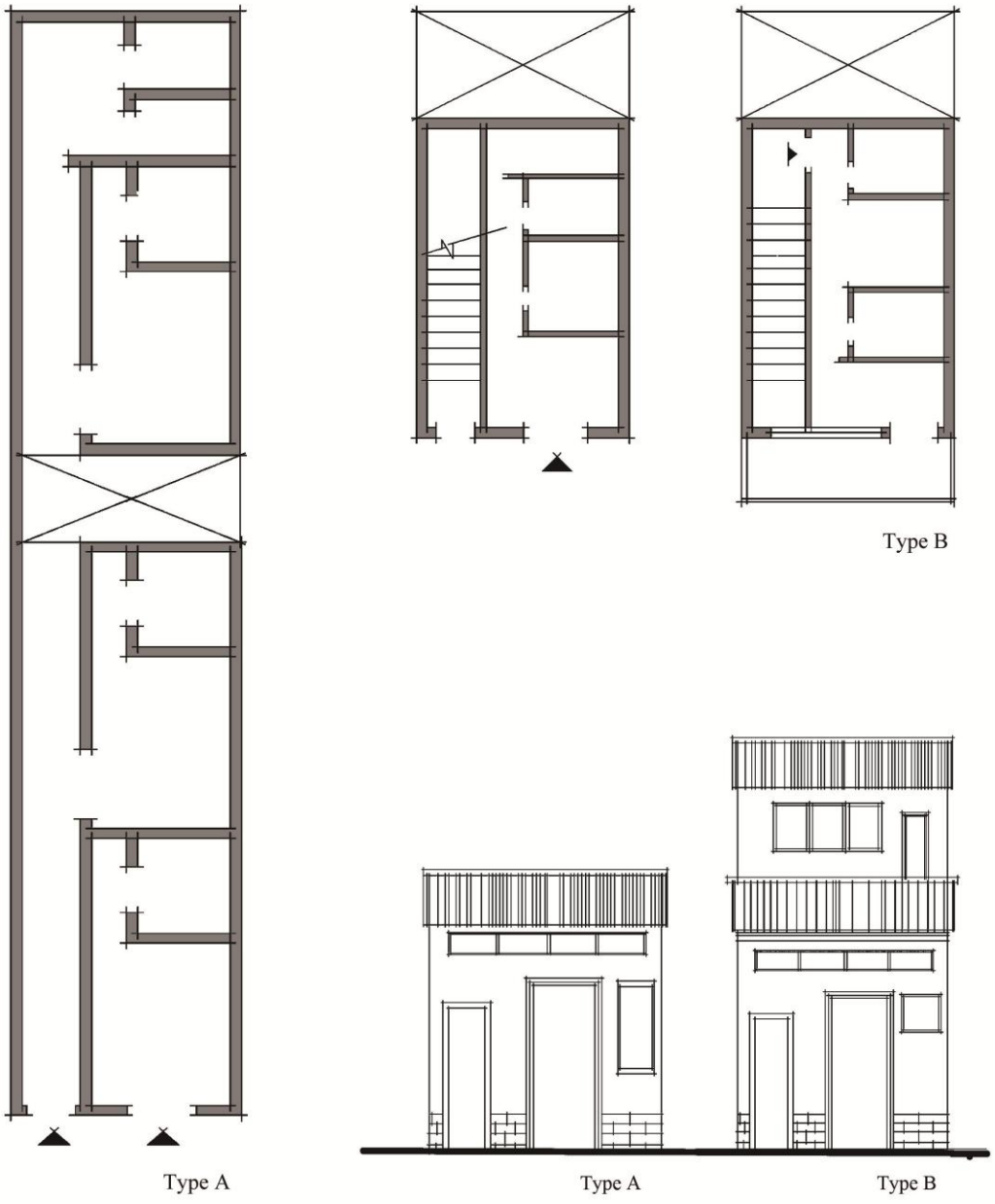

Figure 40 Floor plans and façades of two types of *multi-family zhutongwu*

Figure 41 Photographs of the mixture of material on façades of *multi-family Zhutongwus*.

Sources: author's photographs.

In the other case, the variant (Type C_{II}) that split up from the original *zhutongwu* has an undifferentiated internal configuration of the ground plan but only change the function of the living room into the shopfront (Figure 42).

The development of merchant activities triggered the need to acquire a more specialized space for a shopfront. In some cases, this subtype was adapted from single-storey to multi-storey in the later process. The purpose of this adaptation is to satisfy the need of commercial and residential function of the small independent craftsmen and traders. These buildings retained a similar floor plan to that of *zhutongwu* but the arrangement of the interior space is reconfigured. The street frontage has been changed to store and arranged a studio or storage at the back and the bedrooms were moved to the upper floor.

With the shop extended and occupied the ground floor, the interior stair that used to lead to the bedrooms was moved to the side of the house where it is completely separated from the shop (Type $C_{II\text{-}2A}$ and Type $C_{II\text{-}2B}$). This mixture of commercial and residential space is regarded as the prototype of *qilou*.

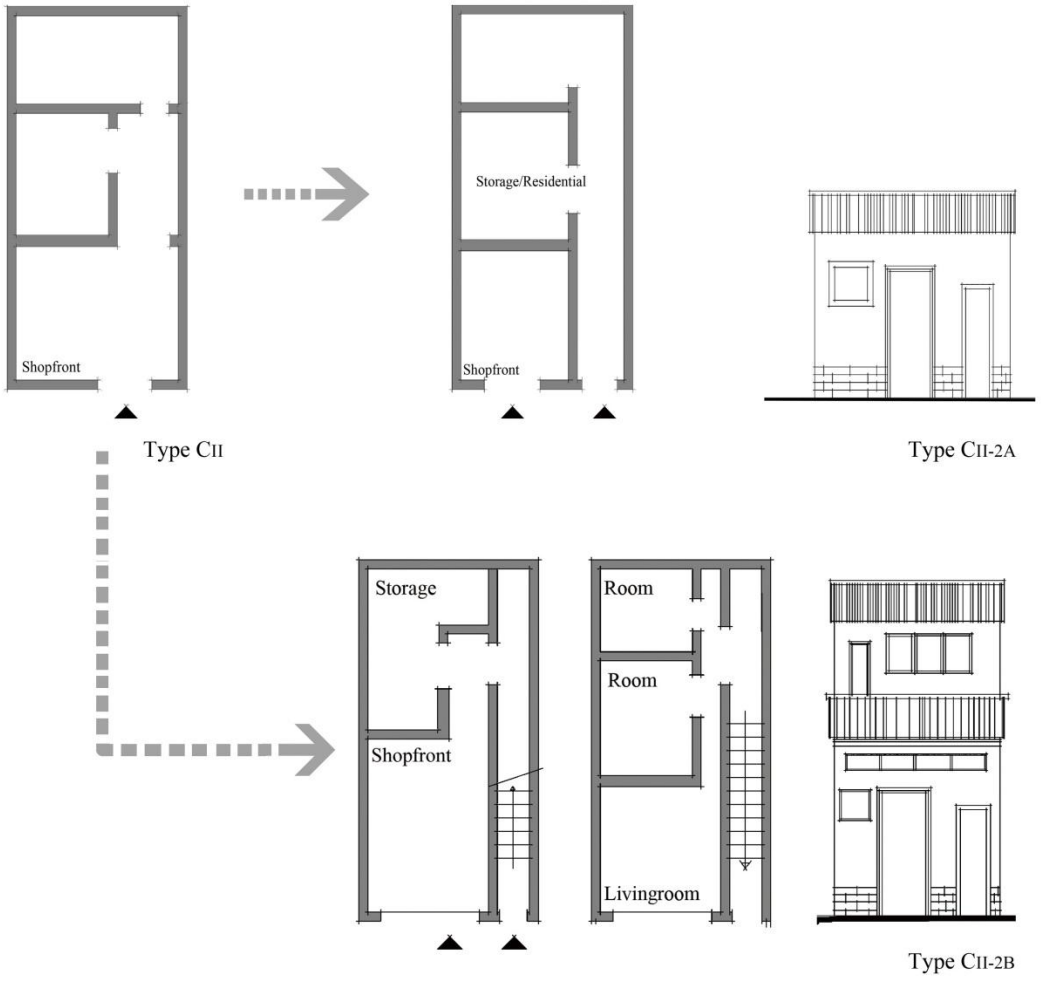

Figure 42 The subsequent transformation of the variant sub-type from C_{II} to $C_{II\text{-}2A}$ and Type $C_{II\text{-}2B}$

5.1.3 Qilou

As mentioned in the literature review, the origin of the *qilou* is controversial in previous architecture history, though all the research reach a consensus that *qilou* is a mixture of indigenous and Western characters. Essentially, the layout and internal configuration of *qilou* has considerable similarities to the sub-types of *zhutongwu* that was described in the previous section, but syncretizing the Baroque or Rococo styles in the pediment and relief sculpture on its façade (Figure 43).

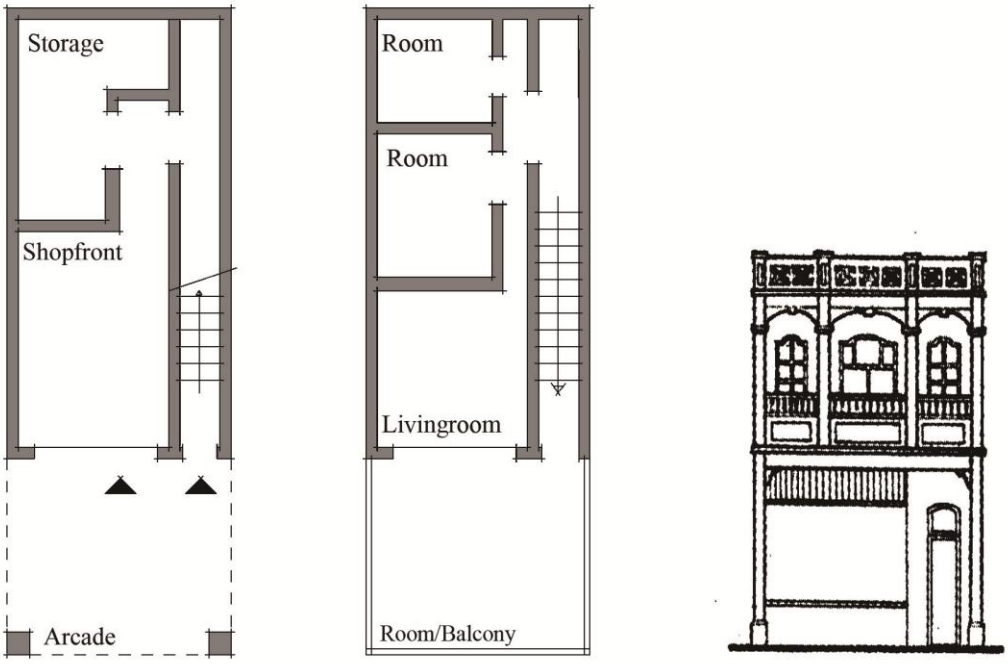

Figure 43 Floor plans and façade of a *qilou*

In 1912, the Republican government adopted a policy to acquire the space for constructing *qilous* on major commercial streets or on a street front along the

river side in the urban revitalization plan after they took power from the Qing regime. Since then, *qilous* became widespread within Guangzhou in the first few decades of 20th century. According to the official statistical documents, more than 40 kilometers of 'arcades' had been built between 1912 and late 1930s (Zheng, 1999). The arcades added in front of the buildings are not only a successful case in the separation system of pedestrians from vehicles, but also provide the shade to the pedestrians. In the case of the pre-existing streets, the arcades were first built as an additional structure that attach to the pre-existing buildings but using a different material and decorative styles. The built lots enlarged their size to accommodate these new additions with arcades, and gradually led to a new built *qilou* that fits the new built lot area. The western characteristic façade of *qilou* reflected the impacts of a variety of Western architectural styles on indigenous dwellings, and this Westernized style have been influence the building construction of Guangzhou in the last few decades (Figure 44).

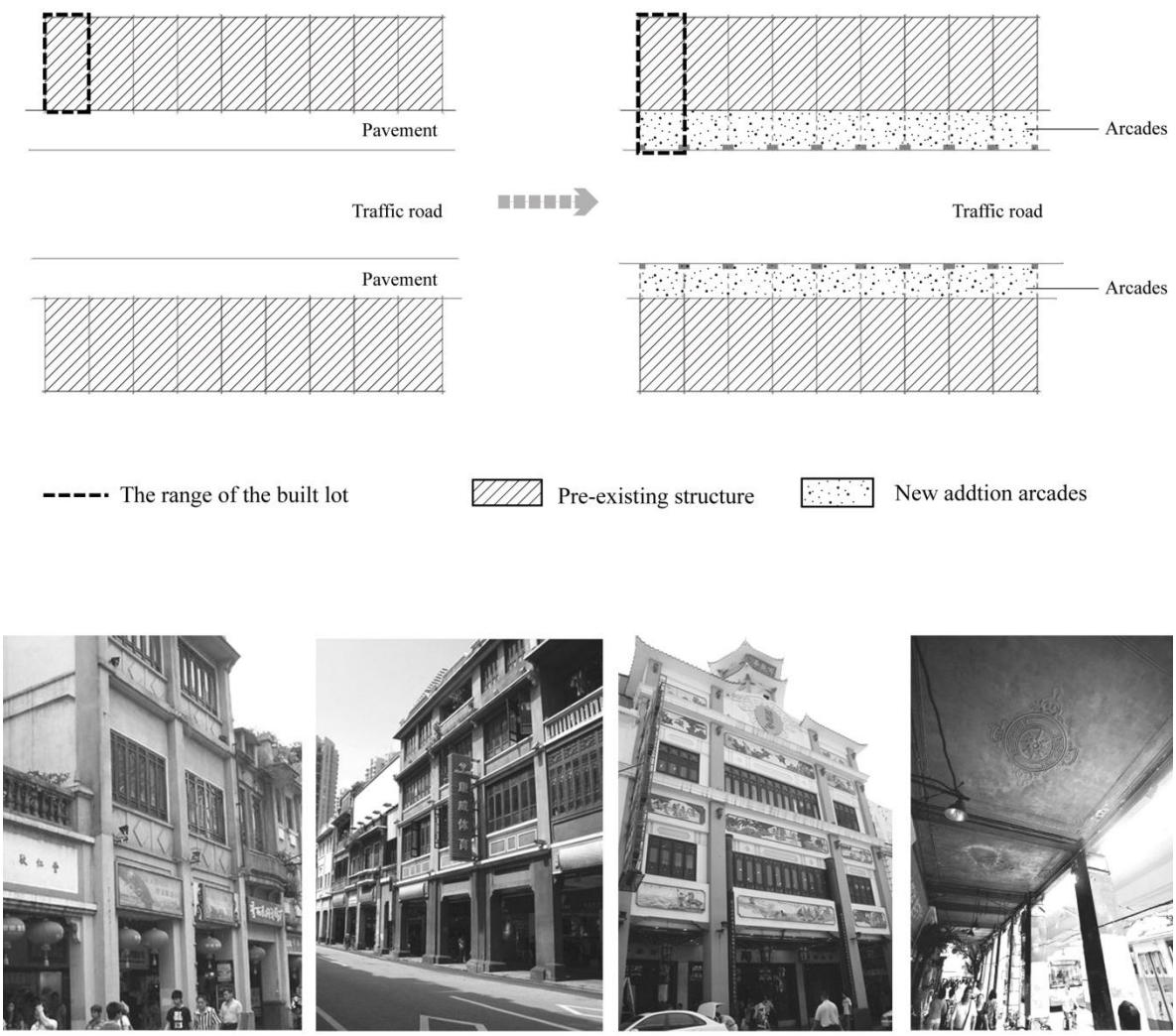

Figure 44 The subsequent transformation and façade design of *qilous*. (a) The built lots that have new built 'arcades' in the Republic period. (b) Various architectural styles of the façade design of *qilous*. Sources: author's photographs.

5.1.4 Zhutongwu apartment house

There are a sizeable number of apartment buildings that were constructed before 1949 still exist in the Guangfunan area. By comparing the floor plan with those single *zhutongwus* built in the 19th century, the successive process between

zhutongwu and the apartment house is evident for they share considerable similarities in the floor plan (Figure 45 and 46). With the floor plan of several *zhutongwus* built in line, this *zhutongwu* apartment building is regarded as a more economical land use version of *zhutongwu* for it not only extended the original zhutongwu in both horizontal and vertical direction, but also accommodated more inhabitants in a single apartment building. Each apartment house has an independent power and water supply and drainage system to maintain the daily operation of the building. The lightwells between two households in the building is also the only facility to get natural light and ventilation. Therefore, natural light barely reaches the ground of the room at rear. In addition, the depth and narrowness of the built lots and lack of systematic fire alarm system also increase risk of inhabitant safety in the event of fire. Some of these apartment houses are "doubling" in the later development, by combining two built lots together and constructing two apartment houses that share the interior stairway and lightwells (according to process well described for Italy by Caniggia and Maffei, 2001: 88-89) (Figure 47 and 48).

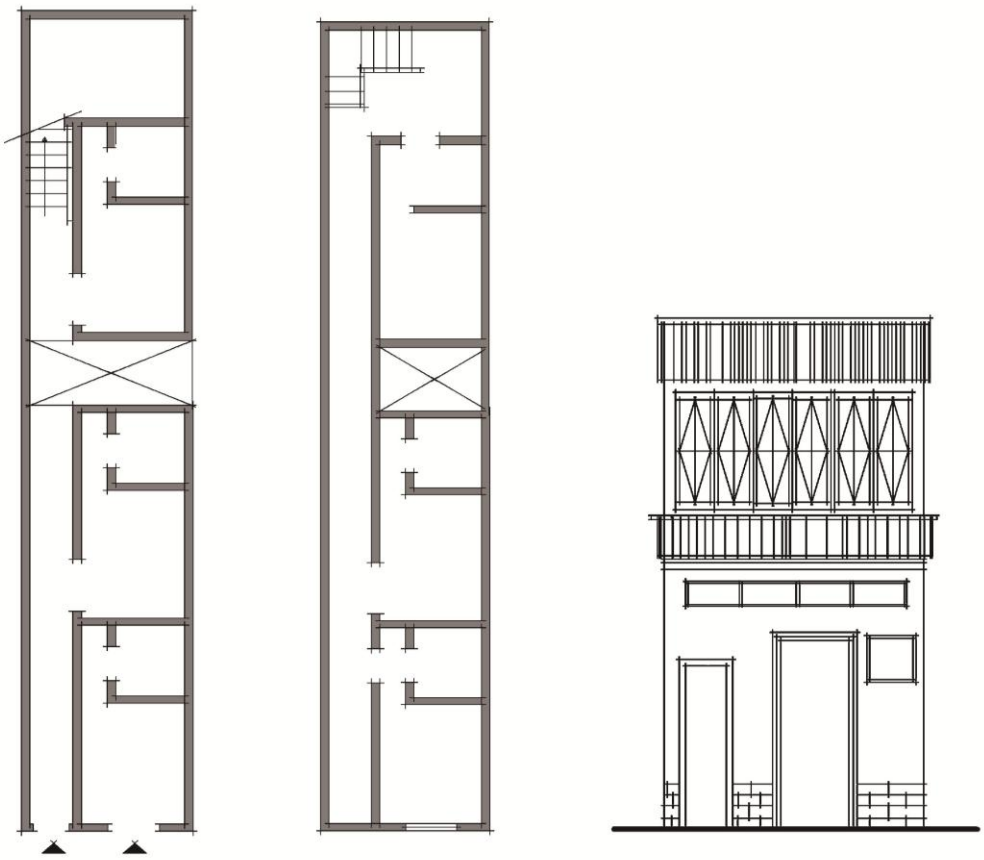

Figure 45 A sample floor plan and façade of a *zhutongwu apartment*

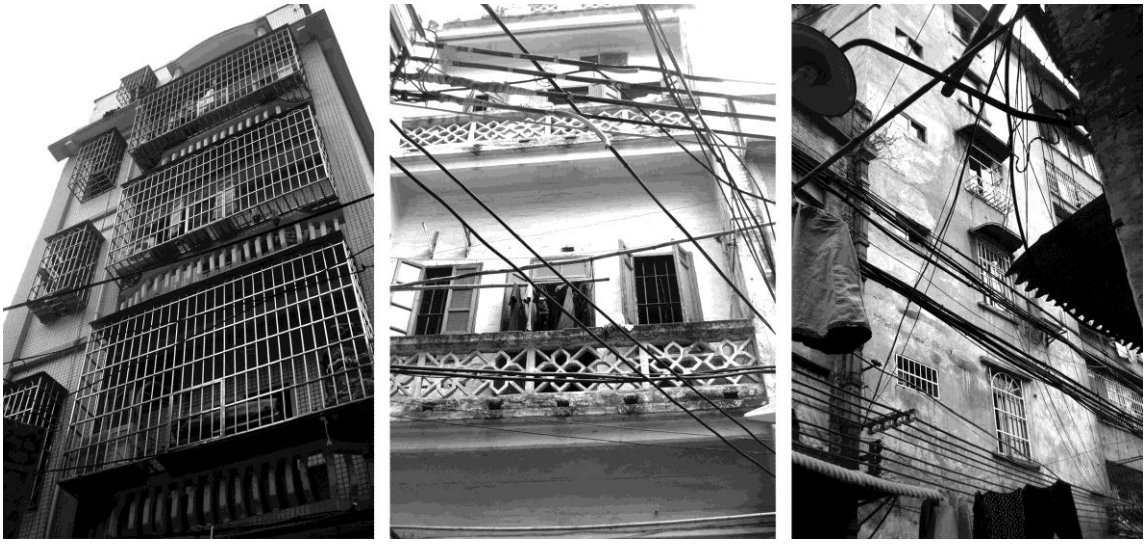

Figure 46 Photographs of *zhutongwu apartment* in the Guangfunan area.

Sources: author's photographs.

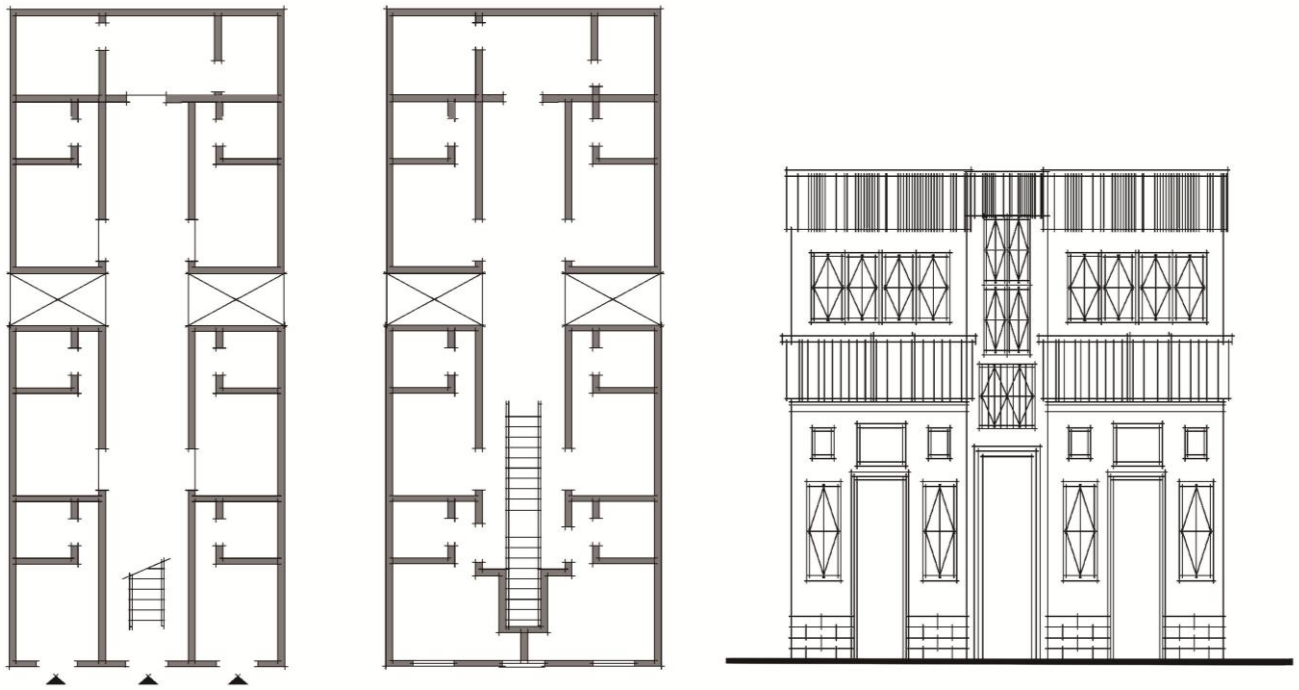

Figure 47 A sample floor plan and façade of the *Doubling zhutongwu apartment*

Figure 48 Photographs of *doubleing zhutongwu apartment* in the Guangfunan area.

Sources: author's photograph.

5.2 Interpretation of building typological process in the Guangfunan area

To date, all building types and most of their variants in the Xiguan area have been recognized by scholars in the previous research. The studies offer some valuable perspective on the local dwellings in South China, especially in building type study. However, most of them focused on the building type classification but failed to integrate the evolutionary laws as a successive process.

On the basis of the building type classification of the study area (Figure 34), this part of study seeks to examine and interpret the formative characteristics of the existing building types in the Guangfunan area, and to establish a progressive line that show a deductive developmental framework of traditional dwellings house in Guangzhou.

In order to examine the diachronic changing affecting the residential dwellings in the study area, the building area have to been classified according to construction periods. However, in the absence of official building records, the building period in the Guangfunan area could only been roughly assessed based on the field surveys. Taking 1949 as a time dividing point, there are two main categories that could be identified during the survey, pre-1949 and post-1949. On the other hand, by comparing the historical records and maps of the

Guangfunan area from different periods, the accuracy of time range for some specialized buildings and blocks could be narrowed down to a decade (See Figure 18 in Chapter 4, subsection 4.2, p.70).

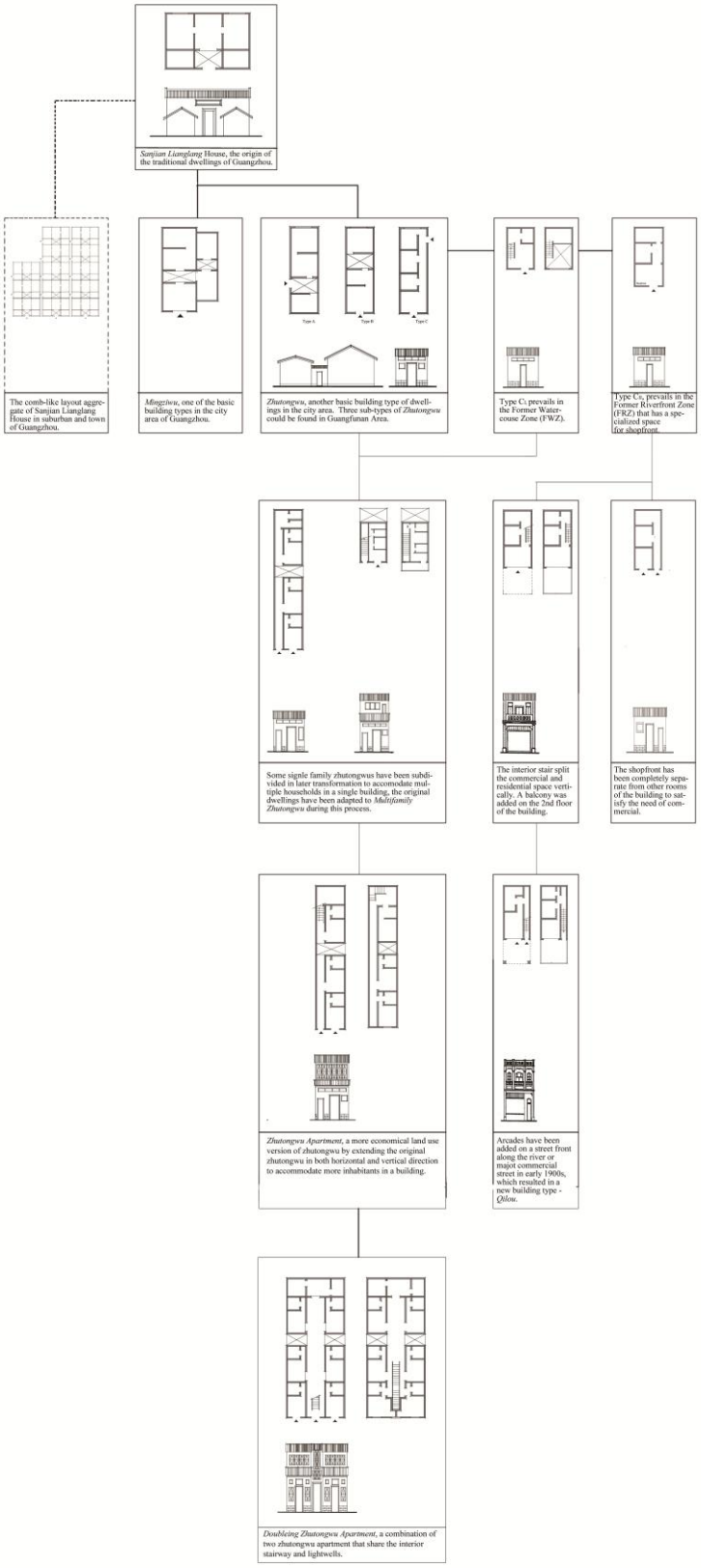

Figure 49 The building type process of residential dwellings in the Guangfunan area

Figure 49 shows the hypothetic process of historical development from the *sanjian lianglang* house to *zhutongwu apartment* building. According to the analysis, five stages have been identified during the typological process, based on a characterization of the transformations. Doubling and conversion of the building lots are two characteristics that are associated with the first stage of the process. In rural Guangzhou, the single *sanjian lianglang* had been in adapted to a type that Caniggia and Maffei (2001: 88) term 'row house' by connecting the single house that orientated to south and placing a comb-like layout according to the subtropical climate and *fengshui*. On the other hand, as the previous section postulated, *zhutongwu* could be regarded as a modification of the *sanjian lianglang* house that in order to fit the functions to the narrow lots tissue within the city area. Therefore, the progressive changings of z*hutongwu* and *sanjian lianglang* house are in large part connected in the conditions outlined in this study.

In the Guangfunan area, the single-family *zhutongwu* with a kitchen at the rear (C–type) has been identified as the foundation type in the study area. At the second stage, the C-type *zhutongwus* were built to fit the narrow lots in the neighbourhood to accommodate one single family. Meanwhile, its two synchronic variants, which mentioned in subsection 5.1.2, emerged to fit to the non-standardized tissues where the canal dried out. Because of the need of greater dwelling density, some of these original dwellings were subdivided in

later development to accommodate multiple households in a single building. The most common modification during this process is to completely separate the upper floor from the ground floor by adding an external door on the frontage and using the separated original interior stair as the access to the upper floor. In some particular deep lots, the buildings were successively doubled along a longitudinal axis, and the stairs were moved in the lightwell between two buildings for space-saving. This modification is very likely an intermediate form between *zhutongwu* and *zhutongwu* apartment house. However, it has been difficult to assess the building interior during the field survey, as most buildings in the Guangfunan area are private residence. Without the solid evidence that record the time of changing and the access to inspect the building interior configurations in detail, it is difficult to confirm the accuracy of the assumption of intermediate form. Nevertheless, the continuity between the *zhutongwu* and *zhutongwu* apartment house is a reliable speculation base on the transformative rule that is revealed by studying the process.

In the later stage, the doubling occurred in the *zhutongwu* apartment house by combining several *zhutongwu* apartment houses in row. Usually, this adaption has been achieved by combining every two *zhutongwu* apartments with a shared stairwell. This amalgamation of the precious built lots triggered the changing of the module of aggregates in the study area in more recent stages.

This doubling of apartment houses is regarded as the model for those apartment buildings that built after 1949 in the study area.

The influence of exotic architecture in the study area is another characteristic during the transformative process of the building. Though the initial purpose for adding an arcade on the frontage of the traditional *zhutongwu* with a shopfront is to separate the pedestrians and vehicular traffic on the major commercial streets, this adaptation prompted a new typological transformation that was accompanied by the introduction of the west decoration style into the traditional dwellings in Lingnan region. *Qilous* represent a coexistence of different interpretation of *zhutongwu* that mix the Chinese and western culture from 1840 onward and have been one of the significant features of the commercial-residential building type within the city of Guangzhou and the surrounding towns.

However, the continuity of the spontaneous building progress has been interrupted by the socialist construction after 1949. The amalgamated lots that were housed by *danweis*, which also known as work units, and the previous dwellings had been replaced by community buildings (for discussion on the notion of *danwei*, see Lu, 2006: 47-51). In the last few decades, with the increasing liberalization of China's economy, the *danweis* units declined and the blocks have been rebuilt as commercial-residential complexes.

CHAPTER 6 CONCLUSION AND DISCUSSION

6.1 Overview of research findings

This thesis is a morphological analysis of a traditional residential and commercial neighbourhood in Guangzhou, China. The initial purpose of this research is to explain the morphological process of the existing buildings and streets of a traditional neighbourhood by tracing back the initial phase of the urban aggregate and reconstruct a theoretical process of the tissues' evolution. It also seeks to establish a progressive time line that illustrates the formative and transformative rules that have informed the evolution of the buildings during their historical development.

This research is comprised of two main sections: on the street block scale, it reconstructs a hypothetic process of the street blocks of the Guangfunan area base on the cartographic evidence and field survey; on the individual building scale, it classifies the existing buildings into separate categories and seeks to provide a chronicle that shows the diachronic development of the existing buildings.

First of all, morphological zones in traditional neighbourhoods were built upon the geographical distinctiveness and morphological characteristics. The

classification of the morphological zones served as a starting point to understand the transformation of the neighbourhoods under the influence of changing natural environment and cross-cultural interactions.

The results of the analysis at the street blocks level demonstrate the existence of common features in street networks and buildings allotment systems of the same morphological zone that are informed by the formative and transformative processes of which they are the temporary result. In fact, the street networks uniformly share a deep branching tributary structure in the study area, though each morphological zone has distinctive features. In addition, during the period being studied, the constant module of the built lots, *jian*, has created a degree of uniformity in the dimensions and physical form of the dwellings and settlements.

The second part of the analysis was performed at the building scale. Starting with traditional housing studies, the classification of the existing buildings types has provided a framework for understanding the diversity of the dwellings and settlements in the study area. Five stages have been identified for the period being studied in this research. These stages, understood in relation to the changing morphological conditions observed in the tissue, pointing to the existence of a typological process that sees new architectural forms deriving from previous ones in accordance with the constraints and

potential for change ingrained in the morphological systems of the tissue and of architecture. A schematic model of the historical development of the dwellings in the study area does not only represent the spontaneous progress in building typology but it also implies a specific succession between the building types as part of the chronological development. In addition, this analysis also examined the building forms that reflect the cross-cultural interaction from the late 19th century onward. The formation and transformation of the *qilous* in Guangzhou demonstrate the wider effect of the Westernization in the early 20th century, as well as the successive process of the traditional building forms.

6.2 The application of urban morphology in practical planning management

As it mentioned in the research context, the study area was demarcated as a Historico-Cultural Conservation Areas (HCCAs) *(lishi wenhua baohuqu)* in 2005. And with the revival of the idea of urban conservation, there is a city's conservation plan of this area to regularize the urban redevelopment in all the areas considered to have heritable features, including the buildings quality improvement and control the building height. However, the attention of the urban morphology and building typology seems has been insufficient in this conservation planning. The gap between the pure morphological research and

professional practice is still profound. In fact, a morphological analysis is suggested to be a preliminary research of urban redevelopment projects, especially those in the historical district. Therefore, from an urban morphological point of view, suggestions for improving future conservation planning are described as follows.

Morphological theory posits that the built environment is made of various components, including street system, plots and buildings that relate one to another. All of these components derive their feature from various contexts and show the individual characteristics. They also relate to one another during the historical transformation process. Therefore, all these components should be considered as a synthesis in the practical planning project and for the policy-making.

At the street level, the narrowness of the street in the neighbourhood is a major problem in transportation studies. Yet, in a neighbourhood that predominantly occupied by the single storey traditional dwellings, the width of the street fits the ideal aspect ratio of the spatial configuration. Therefore, maintaining a degree of uniformity in the aspect ratio during the process of widening the streets is important for the redevelopment; otherwise the street space will lose its identity even if the street line and building lots remain unchanged.

Secondly, a succeeding building with an appropriate scale is one of the issues of crucial importance at the built lot level, since a large-scale redevelopment on an amalgamated block would create a dramatically different image and spatial pattern in urban tissues. In contrast, a multi-storey redeveloped building that retains the module of the traditional built lots in its ground plan while amalgamating two lots is usually inconspicuous through the street unless it located on a conspicuous spot that directly facing to an intersection.

The conflict between the traditional and modern forms, especially in a historical district, is one of the most knotty challenges in current urban conservation and planning management. According to the research findings that mentioned before, there is a spontaneous process during the development of the building type, which means the new building type is regarded as a superseder of the pre-existing one while the adaptations of the pre-existing type provide the basis of a new one. Therefore, the schematic model presented in this research is a basis of conservation plan that lay emphasis on preserve the historical features and traditional urban landscape units. It also provides important reference information during the design of the new construction and the revitalization of the traditional building forms.

6.3 Contribution and further research

The idea of the typological process sheds light on the continuity in the components of urban form during the historical development and unveils the significance of the intrinsic relations between the urban tissues and spatial configurations. Although this concept has been introduced into China for more than two decades, most achievement in the previous research have accomplished the goal of classifying the existing building types but stopped short of integrating the types into a developmental framework that shows the change of the buildings over time. Due to the limitation of official records, the sequence of construction of blocks and ordinary dwellings in Guangzhou are rare. Therefore, the morphological reconstruction and schematic models presented in this research are "speculations", i.e. grounded theory that stems from inductive reasoning.

Nevertheless, the major contribution of this research is the establishment of the schematic model that shows the building typological process of a traditional residential-commercial neighbourhood that just west of the line of the most recent city wall in the Guangzhou area. This research also contributes to put forth a new perspective in the urban form study by considering the historical development of the urban fabrics as a successive sequence and integrate the

process of the traditional dwellings in a progressive line.

Secondly, as one of the rare studies on urban morphology and building typology of the Chinese cities that apply the theories and principles of the Italian school, it put the previous typological study in Chinese traditional dwellings a step forward by applying the Caniggian approach of typology and urban tissue study in Chinese context. The research demonstrates that the typological theory of the Italian school could be adapted to the Chinese culture and explain the typological process of Guangzhou. Moreover, it implies the possibility to expand this type of research to other cities in China.

Thirdly, this research provides a new perspective on the issues of urban landscape management and historical conservation planning in China. The city development in China has undergone significant changes since the process of rapid industrialization began three decades ago. However, because of the weak connection between urban morphology study and practical planning process, most new built form of post-1949 shows excessive neglect of urban heritage. Hence, this research enhances our knowledge in the transformative law of the urban tissues and provides a chance to find the potential possibility for incorporating the theoretical research to the planning strategies and policy-making in the practical planning management of Chinese urban studies.

In conclusion, the theoretical morphogenetic/morphological research is one of the foundations in urban conservation planning. The approach of this type of studies provides implications for both practitioners and policy makers, who regarding the relationship between the urban form study and historical conservation planning and seek to establish an appropriate link between traditional and contemporary urban forms during the urban regeneration.

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APPENDIX

The purpose of this appendix is to elaborate on the survey methods used during fieldwork. It provides for instance information on how the photographic survey has been conducted and on data has been generated.

The research area has been divided up in ten sections by streets to avoid duplication in field. For each area, a base map has been prepared, which contained information on the street network, the allotment and building footprints. A preliminary assessment of the morphological conditions of each area has been conducted prior to fieldwork, in order to identify general patterns in plotting and building footprints as well as to identify unusual configurations (that could denote older tissues; more recent transformations; or tissues adapted to atypical circumstances for example).

The survey of each section is comprised of four different parts: 1. Observing and mapping attributes of each building (land-use, building height, period of apparent construction); 2. Observing and collecting data of buildings representative of the area and/or the period considered (composition and architectural details of the façade, floor plan); 3. For each street, taking photos of the streetscape (to be later compared to second hand iconographic material such as ancient paintings of the area); and, 4. Identifying and mapping specialized buildings and built lots that display atypical architectural or tissue forms.

After the fieldwork, building attributes were tabulated, mapped and triangulated with cartographic representations of lots, buildings footprints and streets configuration and dimensions; morphological areas were then delineated, by triangulating fieldwork data and information from secondary sources.

Figure 50 The division of research sections in the field work.

Figure 51 The streetscape of the study area

Selected example of mapping building attributes in field (Section E)

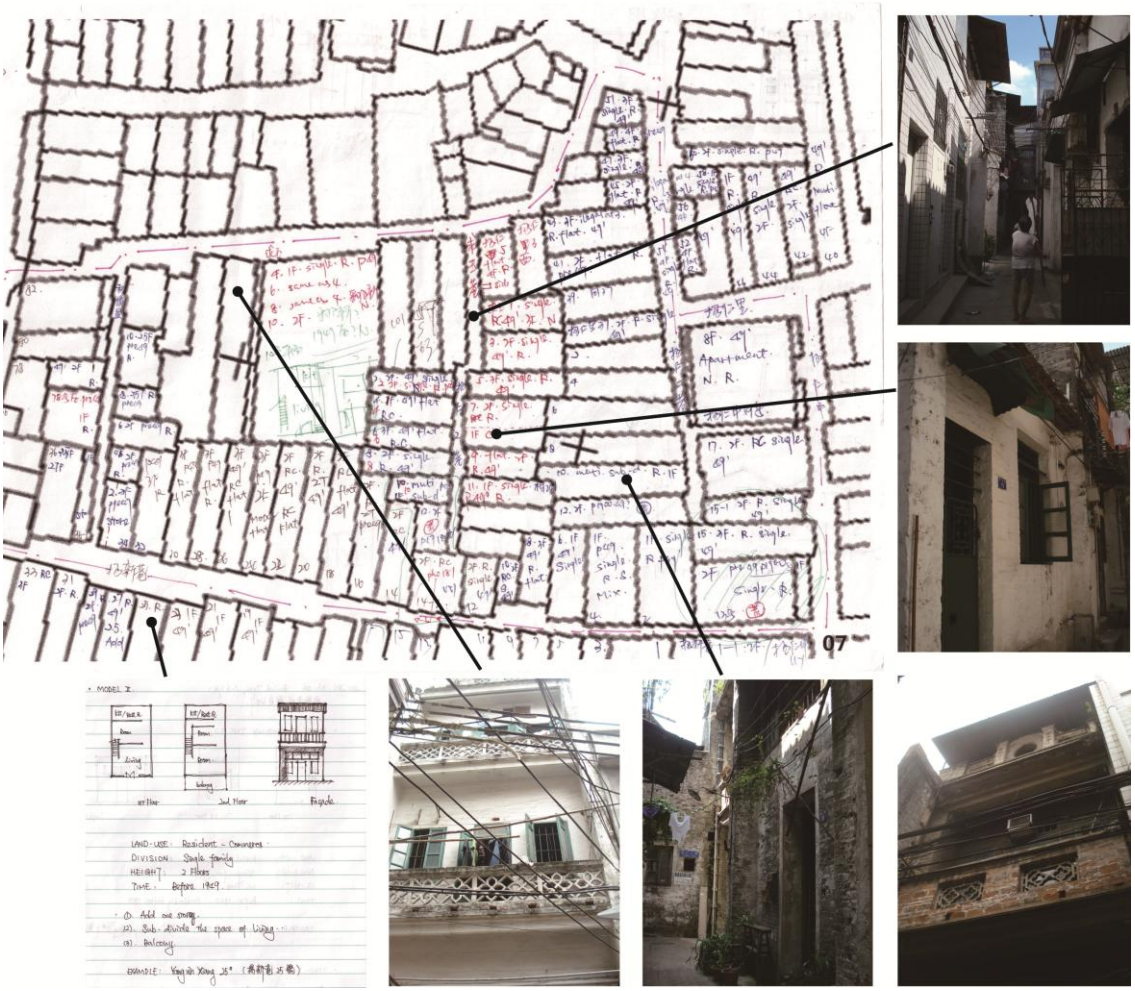

Figure 52 Mapping building attributes of Section E

Street	No.	Building Type	Building Height	Land Use	Periodization	
Yangxiang	82	Multi-family+Commercial	3	Resi-Com	Post-1949	
	80	Commercial+Storage	3	Resi-Com	Post-1949	
	78	Multi-family+Commercial	3	Resi-Com	Post-1949	
	76	Commercial	3	Resi-Com	Post-1949	
	72	Commercial+singlefamily	3	Resi-Com	Post-1949	
	70	Commercial+singlefamily	3	Resi-Com	Post-1949	

	68	Commercial	3	Resi-Com	Post-1949	subdivide
Hejing-li	1	Single family	2	Residential	Pre-1949	
	2	Single family + Storage	2	Re+Storage	Pre-1949	
	4	Single family	2	Residential	Pre-1949	
	6	Single family	2	Residential	Pre-1949	
	8	Single family	2.5	Residential	Pre-1949	
	10	Multi-family	2.5	Residential	Pre-1949	
Yangxinxiang	2	Single family	1	Residential	Pre-1949	
	4	Single family	1	Re+Storage	Post-1949	
	6	Single family	1	Residential	Pre-1949	
	8	Multi-family	3	Residential	Post-1949	
	10	Single family	2	Resi-Com	Pre-1949	
	12	Apt. house	2	Resi-Com	Post-1949	
	14&14-1	Multi-family+Commercial	2	Resi-Com	Post-1949	
	14,-2	Multi-family+Commercial	2	Resi-Com	Post-1949	
	16	Single family	2	Residential	Pre-1949	
	18	Apt. house	2	Resi-Com	Post-1949	
	20	Single family	2	Residential		
	22	Multi-family	2	Resi-Com	Post-1949	
	24	Multi-family	3	Residential	Post-1949	
	26	Multi-family	3	Residential	Post-1949	
	28	Multi-family	3	Residential	Post-1949	
	30	Multi-family	3	Residential	Post-1949	
	32	Multi-family	3	Residential	Post-1949	
	34	Single family+Storage	2	Re+Storage	Post-1949	
	36	Multi-family	3.5	Residential	Post-1949	
	36-1	Storage	1	Store	Pre-1949	Addition?
Yangrenzhong	13	Vacant? Subdivision?	2	Residential	Pre-1949	
	15	Single family	3	Residential	Post-1949	
	15,-1	Single family	2	Resi-Com	Post-1949	
	17	Single family	2	Residential	Post-1949	
	19	Apt post49	8	Residential	Post-1949	Post 1980?
Yangren-2	2	Single family	2	Residential	Post-1949	
	4	Single family+Com	1	Resi-Com	Post-1949	
	6	Single family+Com	3	Resi-Com	Post-1949	
	8	Vacant	2	Residential	Post-1949	
	10	Vacant	1	Residential	Pre-1949	
	12	Vacant	2	/	Pre-1949	
Qiuyuxiang	1	Single family+com	3	Resi-Com	Pre-1949	
	2	Single family	2	Residential	Pre-1949	

	3	Single family	2	Residential	Post-1949	
	4	Single family	1	Residential	Pre-1949	
	5	Single family	3	Residential	Post-1949	
	6	Single family	1	Residential	Pre-1949	
	7	Single family+com	2,/1	Resi-Com	Post-1949	
	8	Single family	2	Residential	Pre-1949	
	9	Multi- family	2	Residential	Post-1949	
	10	Single family	2	Residential	Pre-1949	
	11	Single family	1	Residential	Pre-1949	

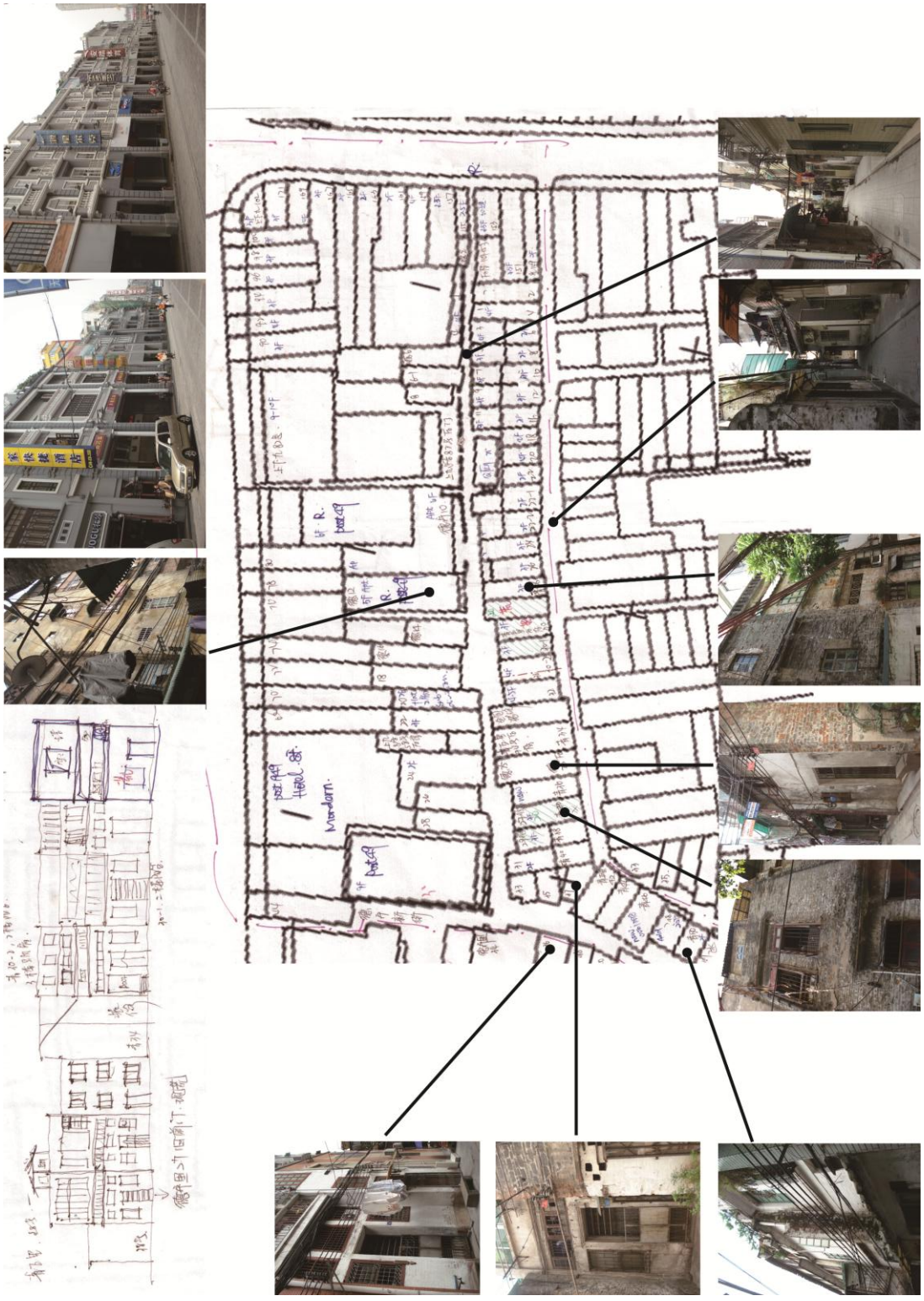

Figure 53 Mapping building attributes of Section A

Figure 54 Mapping building attributes of Section B

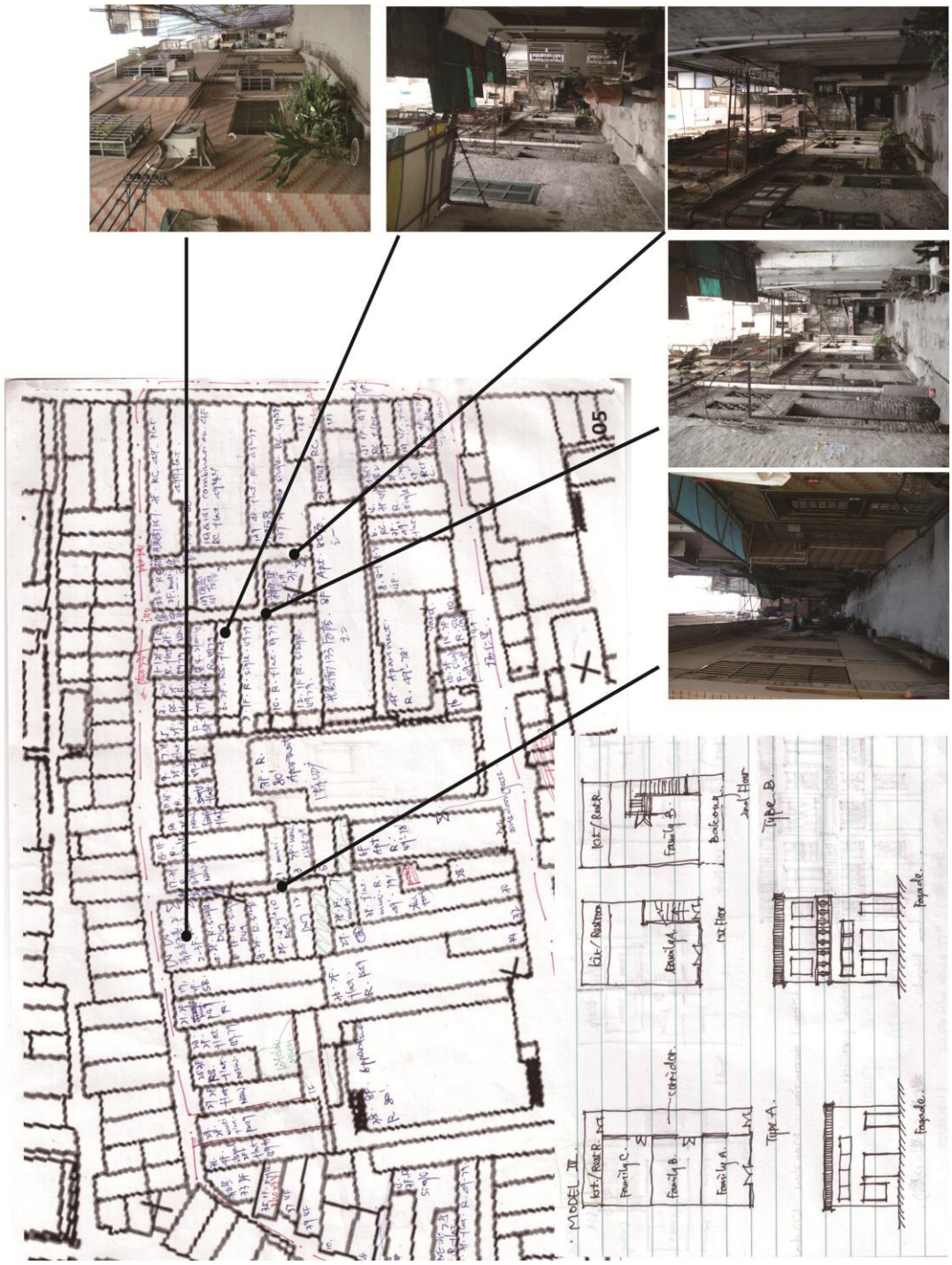

Figure 55 Mapping building attributes of Section C

Figure 56 Mapping building attributes of Section D

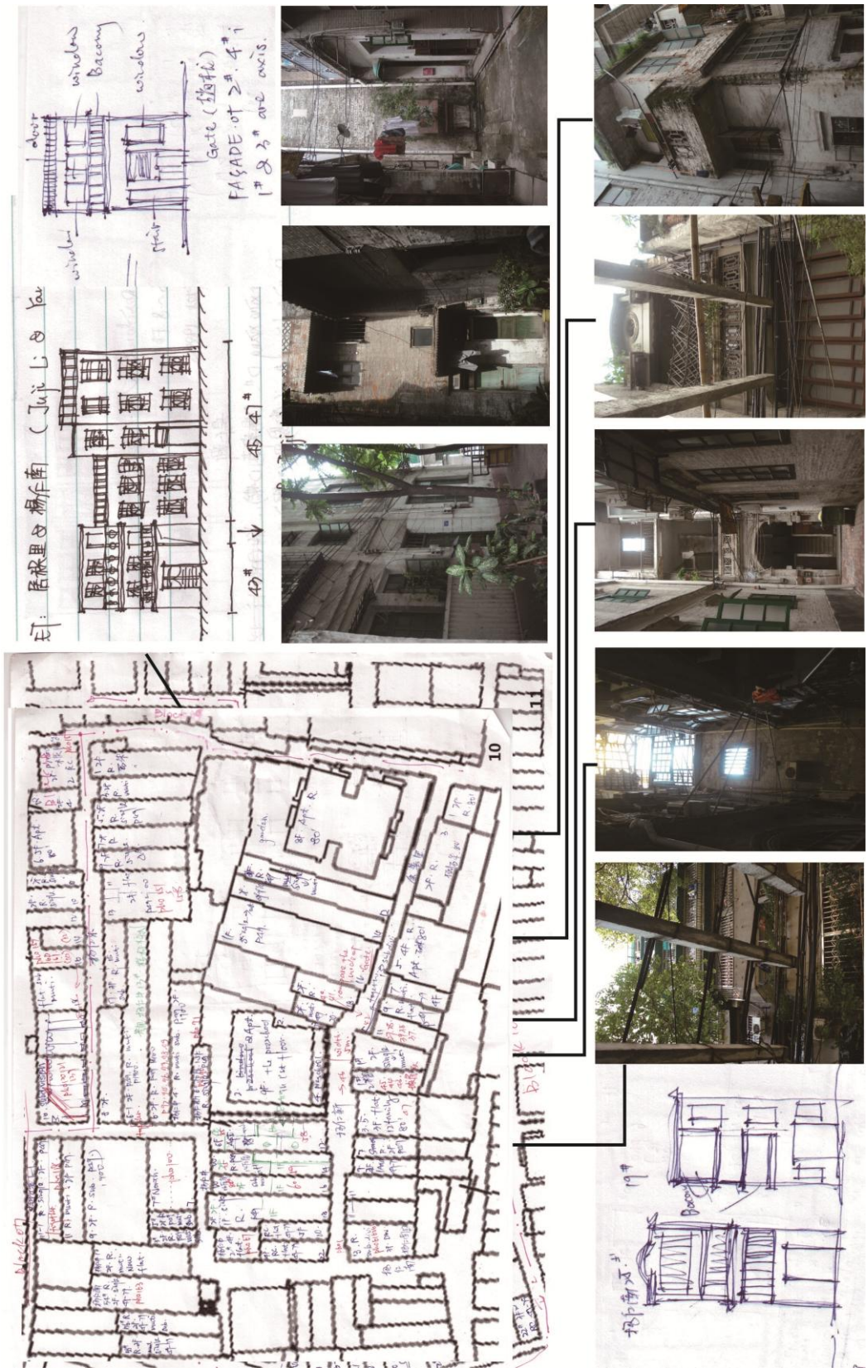

Figure 57 Mapping building attributes of Section F

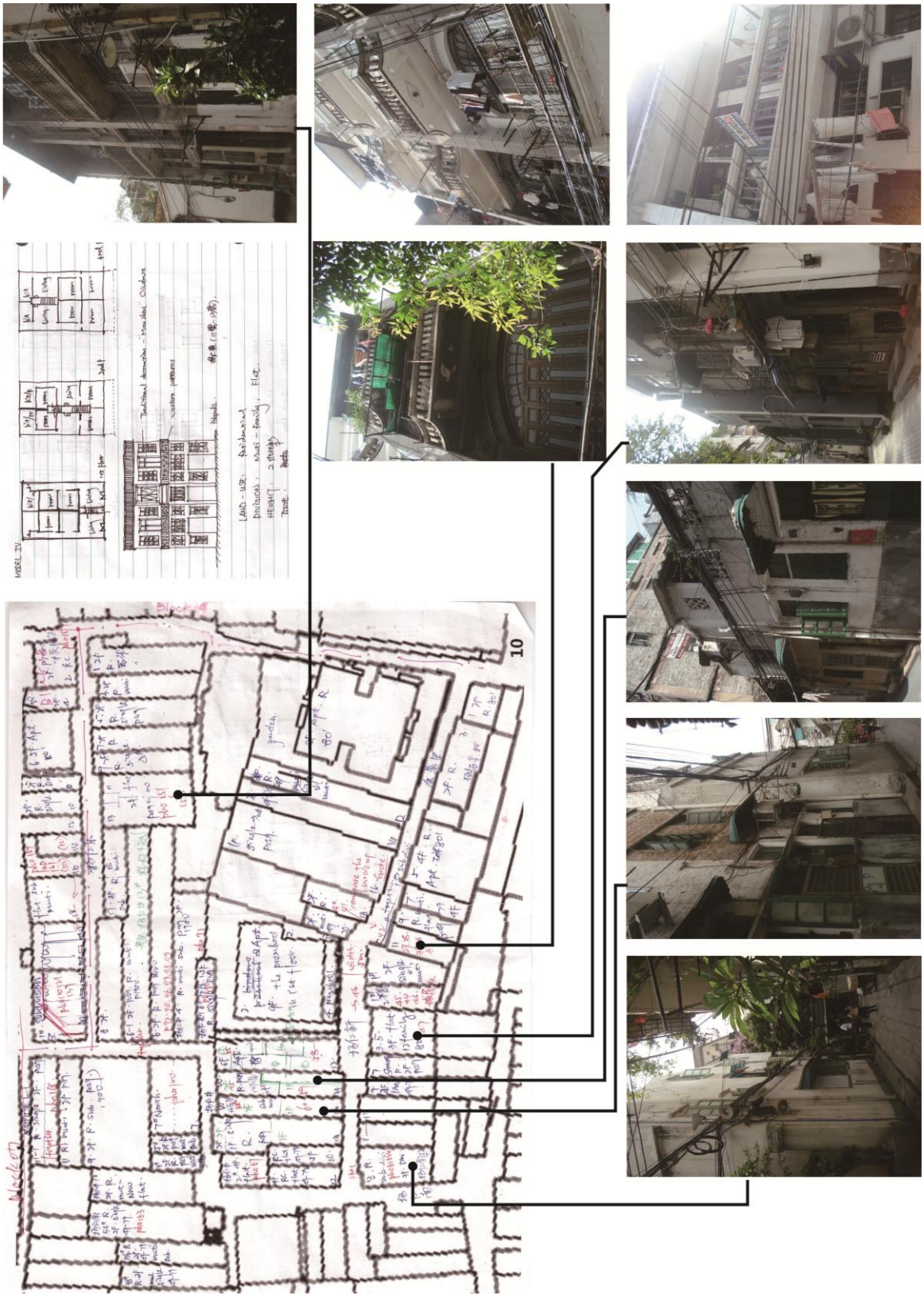

Figure 58 Mapping building attributes of Section G

Figure 59 Mapping building attributes of Section H

Figure 60 Mapping building attributes of Section I

Figure 61 Mapping building attributes of Section J