A Typo-morphological Enquiry into the Evolution of Urban and Architectural Forms in the Huangpu District of Shanghai, China

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ABSTRACT

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This thesis focuses on the evolution of urban tissues of nine urban blocks of Huangpu District of Shanghai from 1842 to 1949, relying on theories and methods developed by urban morphology. It is more specifically a cross-cultural application of the Italian typo-morphological approach to the realities of a Chinese city, which offers a novel interpretation of Shanghai's urban form. By studying Huangpu District's urban tissues, we wish to learn lessons, inspire good design principles, propose new planning approaches, and shed light on the wider consideration of historical conservation in Shanghai and other Chinese cities.

This thesis traces back the formation and transformation of urban and architectural forms in Huangpu District by exploring the street blocks evolution and drawing a typological analysis of residential types of the selected site. The research highlights the particularities and specificities of urban and architectural forms of Chinese cities and illustrates that the Chinese urban culture is enacted in the spatial system, rather than figuratively expressed by the architectural language.

Keywords: Urban morphology, urban tissue, morphogenesis, type, building type, typological process, conservation, Shanghai, China

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Introduction

I.1 Current problems

New urban and economic development is transforming the nature and structure of Chinese urban landscape. Cities have been experiencing remarkable economic growth and dramatic changes over the past few decades, meanwhile, they are suffering the pain of losing their identity, integrity and part of their culture.

Research on Chinese urban form has been burgeoning recently. Many disciplines have contributed to the study of Chinese urban form, including architectural history, urban planning, archaeology and urban geography, undertaken both by Chinese and foreign scholars (Whitehand and Gu, 2006). However, these disciplines have yet to develop cognitive and operational tools able to adequately provide for the planning of contemporary urban form.

Some of Chinese cities' most significant urban problems of the last century have arisen in a context where new urban and architectural form have been developed at an unprecedented speed and to a large scale, but with little or no reference to pre-existing urban tissue and building types. Little attention was paid to local context: inherited built forms, which eventually led to break in continuity in the material culture.

How to solve the conflicts between rapid economic development and historical conservation? How to preserve continuity in the built environment? How to keep the physical, social and cultural value in old city centers? Those questions present big

challenges for scholars, policy makers, government officials, and this generation of people in China.

I.2 Hypothesis

Each city has its own building tradition, building types and urban tissues. Urban and architectural forms denote continuity: i.e. the prevalence of a local typological process. There are few studies focusing on the typological process in Chinese cities. The nature of this process remains largely unknown. The spread of Italian typo-morphological studies in different cultural contexts convinces us of the relevance and utility of cross-cultural applications. Now such research is emerging in China. For example, Guo (2008) recently looked at the transformation of urban tissues in his Ph.D. dissertation on Old Shanghai.

This research aims to verify the existence of urban and architectural forms in the study area that are coherent and consistent with the cultural models of its inhabitants. To some extent, this study is committed to clarify the ways in which the inhabitants, over a given period in a given cultural context, based on their technological tradition, have developed a way of living by their own.

It will also test the hypothesis that a typo-morphological process is at play in the study area, which is remarkably similar to the typo-morphological process recorded in multi-century old European cities. Doing so would open the possibility of cross-cultural explorations of the dynamics of the built environment in the making. Such a process obeys its own rules and has an ontological quality. Yet, since the formation and transformation of the study area occurs at a time of great economic, political and social

upheaval, we will explore how socioeconomic processes impact that typo-morphological process in the neighbourhood.

I.3 Goals

This thesis focuses on a Chinese context. It raises the question of whether the transfer of theories and methods is valid or relevant. Based on our work, we aim to answer the following questions and wish to shed light on the evolution of Linong[1]:

- Is Linong housing stemming from traditional Chinese architecture?
- Is Linong housing an imitation or hybrid of some Western residential forms?
- Is the lack of understanding of the transformation laws one of the reasons causing current problems of losing city's identity, integrity and culture, resulting in an identity crisis in Shanghai and other Chinese cities?
- Could the transformation laws be used to inspire good design principles, to propose new approaches to solve current problems, to shed light on the wider consideration of historical conservation?

Those questions may seem too ambitious in the context of a Master's thesis. We, however, will try to answer the first two questions, and we will then touch slightly the third and fourth questions in the final part of this thesis in order to narrow the gap

[1] Linong has also been called Lilong. According to Shanghai dialect, we choose Linong in this thesis. The term Linong refers to a model of residential architecture that is very common in Shanghai where it flourished in the 19th and early 20th centuries. It is generally described as a mix of Chinese and Western architecture. Linong comes from two words "Li" and "Nong". In Chinese, Li is a word associated with the notion of residential units and five families are made up a "Li"; Nong is an indication for small lanes, so the combination of Li and Nong describes an enclosed residential site based on community and lanes (Guan, 1996), which could be considered as an urban tissue or a piece of city fabric according to Caniggia and Maffei's definition.

between theoretical research and practical planning and to establish tracks for future research.

I.4 Methodology

This research is informed by urban morphology, which addresses the structural qualities of urban form. The study of urban morphology is an inquiry into the nature and structure of urban fabric, an inquiry into its formation and transformation mechanisms, evolution laws (Levy, 1992).

There are three main Schools of urban morphology: the Italian School, the English School and the French School (which will be introduced respectively later in Chapter 2). This study is mainly based on the Italian School's typo-morphological apparatus applied to the realities of a Chinese city. Although Chinese cities show particularities and specificities in their structure and city system compared to the western cities, by adapting the western urban concepts and methodology to a Chinese context, the evolutionary process can be reconstructed.

The results can have immediate implications on urban planning and heritage preservation in the historical districts of Shanghai or other Chinese cities. Malfroy and Caniggia (1986) described the typo-morphological methodology in *L'approche morphologique de la ville et du territoire* (The morphological approach to city planning).

According to Caniggia and Maffei (2001), there are different levels of spatial resolution in the built environment that correspond to different scales of reading:

buildings, urban tissue (urban fabric), cities (urban organism), and territories. This thesis is mainly dealing with the scale of urban tissue.

This thesis is relying on a rich corpus of cartographic and iconographic date, second-hand material on the history of Shanghai and Chinese architecture, complemented by meticulous fieldwork that entailed photographic surveying, data gathering and mapping.

Cartographic and iconographic date, old maps, historical documents, and photographs are used as the basic material for our morphological analysis, which could provide a comparative analysis of the study area at different periods of its development because the evolution of urban tissue is considered as a continuous process.

Comparing to the western cities, the biggest challenge for conducting morphological analysis in Shanghai or other Chinese cities was the scarcity of resources, which is a very serious and common issue in China, which explains in part the low level of research aiming at "reading the landscape" (Whitehand and Gu, 2006). There is a dearth of sources available to urban morphologists in China, particularly true town plans that are comparatively rare (Whitehand and Gu, 2006). Maps of Chinese cities and towns are often inaccessible for the researchers and general public. Published maps of cities and towns are often versions for the use of tourists and visitors, but they are less helpful for serious research.

In China, most studies on historical or residential buildings focus on specific architectural aspects, but insufficient attention has been given to how the types of buildings transformed over time. The systematic records of the construction of ordinary

buildings, including their dates of construction, are very rare in China (Gu et al., 2008), which presents another challenge for the current study.

A collection of historical maps of Shanghai (Zhang et. al, 2001), contains maps of the city and its environs from 1644 to 1949; *Shanghai street directory*, was the earliest complete survey of Shanghai prepared by Chinese Construction Company between 1931 and 1947, shows street systems and plot boundaries of much of the built-up areas of Shanghai; *Old Shanghai map* (Shanghai Library, 2001), reflects various perspectives of Shanghai during the past 150 years; *The Virtual Shanghai digital map repository*, collected by the Institut d'Asie Orientale, includes a large number of maps of Shanghai in the 19^{th}-20^{th} centuries, and other large-scale maps are important sources for the present research. More details on the methods used will be gradually introduced in the sections presenting the results.

Second-hand literature mainly includes collecting secondary information, background reading, reviewing relevant research, etc. All of the previous studies, theoretical or applied, could provide a solid framework in learning and explaining the urban evolution. Secondary materials on the history of Shanghai and Chinese architecture not only offer background information on the historical circumstances affected the study area, but also highlight the particularities and specificities of Chinese urban form and demonstrate that the Chinese urban culture is enacted in the spatial system, rather than figuratively expressed by the architectural language.

Field work is an indispensable part of data acquisition in this research, which not only entails a comprehensive photographic surveying, but also offers opportunities to observe

and document architectural attributes of buildings and streetscapes in the study area. An onsite case study involves travelling to Shanghai, selecting an appropriate site to conduct a case study, visiting Linong redevelopment projects, collecting first-hand data, etc.

There are two parts of data analysis: accomplishing a morphological analysis of the study area and reconstructing the typological process of residential architecture. First, the morphological analysis explores the genesis of the urban form of the area: the evolution of its street system as well as its architectural fabric. Five morphological zones are divided based on their geographical distinctiveness and different morphological characteristics. Second, the typological analysis focuses on the building scale in order to investigate the evolutionary process affecting residential forms in the study area. The existing buildings have been classified into three different types based on different constructive and distributive characters. The analysis goes from general to more specific, starting at the block level before focusing on the building level.

Example studies of this kind include: Muratori (1960) in the lagoon town of Venice, Caniggia (1994, 1970) on Florence and Como, Conzen (1960) in Alnwick, Moudon (1992) in San Francisco, Fortier (1989) in Paris, Gauthier (1997) on Saint-Sauveur in Quebec, Whitehand and Gu (2003) in Beijing and Pingyao, Guo (2008) on Old Shanghai in China, etc.

Shanghai has been called “the key to modern China” (Murphey, 1953). It is an ideal place to conduct morphological study and to test the validity of our research hypothesis because it has experienced different modes of governance under feudal, colonial and socialist rules, and then the opening-up policy (Tsai, 2008). Consequently, the urban

tissue of Shanghai manifests a lot of changes that denote conflicts and contradictions, which are significant for Chinese history of modern times (Wan, 2008).

Despite huge transformations, rampant development and recent renovations, the urban tissue of this study area is not yet drastically altered. Morphological changes are staggering and its distinct morphological characters remain. This phenomenon has attracted increased attention of experts from different fields. In this context, we believe that it is an ideal place to conduct a morphological research. A careful study of the formation and transformation of its urban tissue can offer a new perspective on the historical significance of the Huangpu District. The common patterns and processes of changes in this area have far-reaching implications for Shanghai and cities throughout China.

I.5 Structure

This thesis is comprised of six chapters.

Chapter 1 of the thesis starts with a short introduction of Shanghai's geographic position, climate, history, and unique Haipai culture.

Chapter 2 establishes the theoretical framework for this thesis, elaborates the main domain of urban morphology, introduces the three main Schools of this discipline, reviews the study of Chinese urban form, and discusses the possibility of a cross-cultural application of the Italian typo-morphological approach.

Chapter 3 further clarifies the particularity of Chinese urban form, the respective specificities of northern and southern cities, the patterns and processes of morphological

changes of Chinese cities, and the morphologic characters and transformation of Shanghai in particular.

Chapter 4 focuses on morphological analysis, especially synchronic and diachronic analysis of the study area from 1842 to 1949, reconstructs a theoretical model of the morphogenesis of street blocks, and summarizes the influential factors of morphological features of the study area.

Chapter 5 is reconstructing the typological process of residential types to produce a table of the typological evolution.

Chapter 6 sums up this thesis, by probing into the possibility of using the knowledge of transformation laws to planning and heritage conservation and explores tracks for future research.

1. History of Shanghai

1.1 Geographic position and climate of Shanghai

Shanghai is located at latitude: 30° 42' to 31° 52' N and longitude: 120° 52' to 121° 58' E, sited at the mouth of Yangtze River Delta in middle portion of China's eastern coast and closed to the Pacific Ocean via the East China Sea.

In 2011, the city was composed of 16 districts and one county, covering a total area of 6,340.5 km[22]. The average sea level elevation was about four metres. Most parts of the Shanghai area are flat and belong to the alluvial plain of the Yangtze River Delta except for a few hills lying in the Southwest. There are many rivers, canals, streams, and lakes located within the city.

Figure 1-1: The geographic position of Shanghai.
Source: Hammond, *Community Eclipse and Shanghai's Lilong*, 2006, p.5.

[2] Topographic Features issued by Shanghai Municipal Government, 2011.

Shanghai has a humid subtropical climate and enjoys four distinct seasons. The most pleasant season of the year is from February to October. Summers are hot and humid, while winters are chilly and damp. The city only receives one or two snowfalls per year.

The city's average temperature is about 4.2 °C in January and 27.9 °C in July, for an annual mean of 16.1 °C; it experiences an average 1,878 hours of sunshine per year, with the hottest temperature ever recorded at 40.2 °C and the lowest at −12.1 °C[3].

1.2 A brief overview of Shanghai's history

Shanghai has traditionally been one of the major economic and financial centers of China due to its favourable geographic location. Within the last two hundred years, Shanghai has burgeoned to become one of the world's leading cities, exerting influence over commerce, culture, fashion, finance, industry, transport, etc. It is now the most prosperous city in China and has been widely regarded as the "showpiece" of China's booming economy.

1.2.1 The origin of its name

The name of Shanghai first began in the Song Dynasty (960-1279 AD), named from Shanghai Pu, which was a tributary of Wusong River (Wu, 2008). In Chinese, Pu means small creeks, tributaries or estuaries.

Two nicknames of Shanghai

[3] Shanghai Statistical Bureau Yearbook, 2007.

Hu (沪): in China, Shanghai is officially abbreviated as "Hu". In the Jin Dynasty (265-420 AD), Songjiang (now Wusong River, and Suzhou River) and coastal residents invented a bamboo fishing tool, called "Hu" (扈), and later changed as "Hu" (沪), so Shanghai has its nickname of "Hu"[4].

Shen (申): during the Warring States Period (403-221 BC), Shanghai was once the fief of Chunshen Jun: Huang Xie, the emperor of Chu State, who organized people to excavate the Huangpu River. Therefore, the river had been called "Chunshen River" and Shanghai got another nickname of "Shen".

1.2.2 A short history of Shanghai

Although Shanghai has captured the world's attention for less than two hundred years, its history spans over several thousand years, which could be roughly divide into three periods, the ancient period (the period before 1842), the modern period (the period between 1842-1949) and the contemporary period (the period from 1949 to present times). This study focuses on the modern period.

The ancient period (the period before 1842)

Shanghai's history could be dated back to the Neolithic Period. Some archaeological evidences indicate that more than 6,000 years ago, there were people settled in the present city area, who developed good fishing and hunting skills.

[4]扈 and 沪, in Chinese, have the same pronunciation (hu), but different characters.

Through the Han (206 BC-220 AD), Jin (265-420 AD), Sui (581-618 AD), and Tang (618-907 AD) Dynasties, this area experienced industrial growth and strengthened its economic connections with the hinterland. During the Southern Song Dynasty (1127-1279 AD), under the jurisdiction of Huating County, Shanghai Town was officially established in 1267, marking the first appearance of Shanghai as a city. Shanghai County was officially established in 1292 during the Yuan Dynasty (1279-1368), occupying an area of 2,000 square kilometres (Li, 2004). In 1554, during the Ming Dynasty (1368-1644), for the first time, a city wall was built to defend the invasion of Japanese pirates. During the Ming and Qing Dynasties (1644-1912), this region had quickly grown into major cotton and textile centers, meanwhile, the economy and commerce continued to grow. The Shanghai County's area had covered today's Huangpu District and the old walled city part in 1840.

The modern period (the period between 1842-1949)

After the First Opium War (1839 to 1842) and the signing of the Treaty of Nanjing in 1842, the British Army first entered Shanghai and was followed by other foreign powers. Shanghai was forced to open as a treaty port in 1843. Concessions were created under foreign jurisdictions, which were not subject to Chinese laws.

In 1912, Shanghai's land area had extended to today's size, under the jurisdiction of Jiangsu Province. Shanghai City was officially established directly under the Executive of Government of the Republic of China in 1927.

In the late 1920s and early 1930s, modern industry grew quickly in Shanghai. During this prosperous period, Shanghai was known as "The Paris of the East, the New York of the West". The city not only became an important base of modern industry in China, but also the commercial, financial, shipping, and trading center of the Far East, attracting enterprises and banks from all over the world.

The city fell in 1937 during the Second Sino-Japanese War and remained occupied until the surrendering of Japan in 1945.

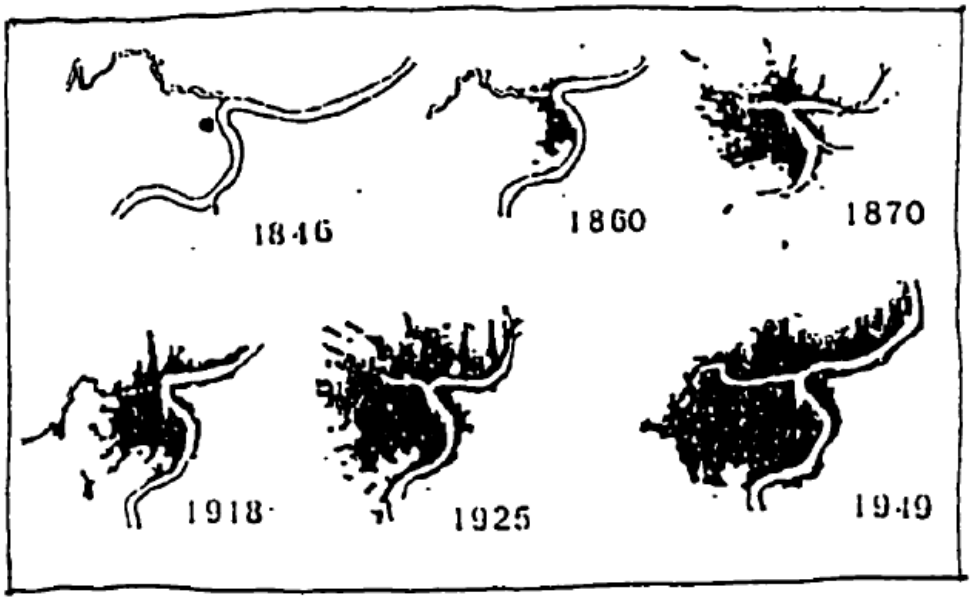


Figure 1-2: The Evolution of Shanghai during 1846-1949.
Source: Zhang, *An Approach to Integrated Urban Historic Conservation,* 1992, p.13.

Contemporary Shanghai (the period from 1949 to present times)

In May 1949, Shanghai was liberated by the Chinese Communist Party and became a municipality directly under the control of the Central Government on October 1st of 1949. This period (1949-78) saw relatively modest investments in housing and infrastructures, the only exception being the industrial infrastructure.

After China's reform and opening-up in 1978, Shanghai has benefited greatly from favourable national policies. Deng Xiaoping's 1991 speech sparked large scale urban re-development in Shanghai, focusing on two distinct regions: Puxi and Pudong. Big urban projects fuelled by the government have been built at an unprecedented pace.

Today, Shanghai has developed into a global city, alongside cities such as New York, London, Tokyo, and Paris.

1.3 Shanghai's unique culture

Shanghai's unique culture, known as "Shanghai Style" or Haipai, has long been considered as a product of integration of native Shanghai culture and foreign cultures. Although believed to be exerting far-reaching influence on economic, social and political aspects, there is no a strict, scientific and commonly accepted definition of Haipai.

Before 1842, Shanghai culture mainly came from the ancient kingdoms of Wu and Yue cultural traditions (the traditional Jiangnan culture). After the opening of its port in 1842, Western influences came in, clashed, combined, merged, mixed, and integrated with traditional Shanghai culture, so "Shanghai Style" or "Haipai" culture gradually formed.

Haipai originated in the fields of painting and drama and this expression was first coined by some Beijing writers around 1920. Haipai and Jingpai (or "Beijing Style") represents two typical Chinese cultures[5]. They have always been considered opposite, for example, Haipai symbolizes rebellious, while Jingpai embodies traditional. Haipai

[5] Jingpai or "Beijing Style", one will find "Hutong or Courtyard Culture"; while Haipai, one will find "Linong or Shikumen Culture".

became more popular as people began to admire its broader possibilities and started to espouse it in various aspects of their life.

The characteristics of "Haipai" can be summarized as following (Wang et al., 1997):

1. Haipai not only inherits traditional cultural elements, but also harmoniously incorporates things with diverse natures. It combines, merges, mixes, and unifies different cultures, "from home and from abroad, of East and West, traditional and non-traditional, and of high and low taste to form a special style of culture".
2. Haipai has glorified the abandonment of outdated conventions, by appreciating creation, exploration and renovation.
3. Haipai gained more popularity than Beijing Style because it has catered for diversified populations and thus combined various characteristics and forms.

Haipai is "ancient and modern, traditional and trendy, open and unique".

2. Theoretical framework

2.1 Introduction

In this part of the thesis, we first introduce the three main Schools of urban morphology in order to establish a theoretical framework dedicated specifically to the Italian School of typo-morphology. We will then review the study of Chinese urban form. Finally, we will explore the possibility of cross-cultural application by postulating that the urban form is a cultural object.

2.2 Urban morphology

Urban morphology postulates the existence of immanent laws: "morphologic" laws governing the spatial organization of a city at different periods of its development. One could recognize the structural permanencies in the urban and architectural forms and the rules governing their transformation over time.

Further, there is widespread acknowledgment that, at its most elemental level, morphological analysis is based on three principles (Moudon, 1997):

1. There are three fundamental physical elements defining urban form: buildings and their related open spaces, plots or lots, and streets;
2. There are commonly four levels of resolution to understand urban form: the building/lot, the street/block, the city, and the region;
3. The compositional elements of the urban form experience continuous transformation and replacement, so they can only be understood historically.

2.3 Three main Schools of urban morphology

In a broad sense, there are three main Schools of urban morphology: the Italian School of typo-morphology (with the founding contribution of Saverio Muratori), the English School of morphogenesis (initiated by the work of M. R. G. Conzen) and the French School of historical morphological analysis (concentrated in the Versailles School).

Recently, some North American researchers from a variety of disciplines have enriched the field. Theories of those Schools are major sources for morphological analysis, which offer theoretical framework and guidance to understand urban morphological apparatus, approaches, methods and some implementations on urban form.

2.3.1 The Italian School

The Italian School also called School of typo-morphology or School of process typology, responded to concerns regarding the contemporary architectural culture, deemed to be in a state of crisis, and attempted to develop a scientific approach to study the built environment as a dynamic system. This approach led to a "paradigm shift" in architecture, planning and heritage preservation.

The Italian School, initially founded by Muratori in the late 1940s, later disseminated and was further developed by researchers such as Caniggia, Maffei, Rossi, Aymonino, etc. Muratori attempted to develop an "operational history" for the cities he studied (in particular Venice and Rome). The most important contribution of the Muratorian School lies in its attempt to build a theory of design based on traditional processes of city building (Moudon, 1995).

Caniggia and Maffei's (2001) most famous book is *Architectural composition and building typology: interpreting basic building*. It develops a theory of historical development of urban forms. For the authors, the building type is to be considered as a "collective project": a result of widely shared cultural values deeply rooted in local traditions. In addition, type is conceived as the temporary result of a never-ending process of transformation of existing buildings, progressively updated to new social and technical needs, leading to a dense and strongly layered architecture. They stress that the historical process seems to be implicit in the building type. The type, typological process, building fabric, and urban tissue are key concepts of typo-morphological analysis.

The typo-morphological approach characterized by the study of building form, tells us that the form of building displays a certain structural permanence despite constant transformation in appearance. Muratori argues that housing types are the main repositories of history; the permanence and continuity is the result of multiple simultaneous events and a continuous human presence in a territory.

We might sum up the key postulate of the Italian School in one simple sentence: the past explains the present and the present contains the seeds of the future.

2.3.2 The English School

The English School emerged in the mid-twentieth century, mainly due to the work of geographer M.R.G. Conzen, who developed a technique called "town-plan" analysis. His ideas are more about how the objects making up urban areas fit together.

In *Alnwick, Northumberland: a study in town-plan analysis* (1969), Conzen attempted to explain the present structure of a town plan by examining its development, investigating how the plan of an old-established town has acquired its geographical complexity, what can be deduced from such an inquiry to help in the analysis of town plans in general, what contribution the development of a plan could be made to the regional structure of a town, etc. The street-system, plot pattern and building arrangement are the key objects of town-plan analysis. The theory of plan analysis he developed opened a new field of research. Of key importance for analysis according to Conzen (1969) are:

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.

For Conzen, understanding the spatial layouts of these objects and sub-systems is the key to comprehend urban form, i.e. the urban system.

2.3.3 The French School

The French School developed in the late 1960s, around the Versailles School of Architecture. Architects Jean Castex and Philippe Panerai, together with sociologist Jean Depaule were the founders. This School rose out of a reaction against modernist architecture and its rejection of history (Moudon, 1997). It has generated extensive methodological tools for the analysis of urbanization processes and related architectural models. Much emphasis has been placed upon the importance of built space for sustaining social practices, and on the built landscape and the social world. Panerai and

Castex's early publications had considerable influence throughout the European architectural community.

Most current studies generally adhere to the postulates of the three main Schools of urban morphology and readily adopt their methodological apparatus, which facilitate rigorous scientific analysis of the urban form. These Schools and their researchers jointly constitute a real urban morphology research circle.

2.3.4 Similarities and differences among the three Schools

Because of different professional orientations, socio-cultural roots, intellectual endeavors and methods, purposes for investigation, etc., there are similarities and differences among those three Schools, all together they create a useful framework in studying urban forms and built landscapes. They also produce knowledge that can support urban design practice.

Differences among the three Schools

The Italian School was started by architects who expressed a keen interest in finding out what kinds of buildings we should build and how we should design them. The English School was founded by geographers. Their methods were more descriptive and interpretative. They were interested in developing theories of urbanization, of how cities come about, but they were not necessarily interested directly in understanding or developing more prescriptive theories of how to plan cities. Whereas the Italians definitely were interested in developing theories of architectural and building design

and were more proactive than the British morphologists. The French were somewhat in-between, consisting of architects as well as geographers, historians and sociologists

Similarities among the three Schools

Besides those differences, there are agreements among the three Schools that the city or town can be "read" and analyzed through the medium of its physical form. They do share a common foundation: looking at the building on its parcel, or on its lot, is the key to understanding the urban forms. The Schools all found that the lot or the parcel and the building(s) built on it, are key elements of urban form.

2.3.5 North American scholars

In America, Anne Vernez Moudon is the most prominent figure, whose work is most closely related to Italian or French typo-morphological studies (Gauthier, 1997). There are also other American researchers, who try to develop tools to make a systematized apprehension of our physical reality.

In Canada, there is still relatively little literature and case studies focusing on this subject, though we know that morphological theories are discussed and taught in the academic world. However, George Baird, John Zacharias, Pierre Gauthier, Pierre Larochelle, etc., have conducted some important typological and morphological research based on a Canadian context.

2.4 The urban form as a cultural object

Urban form is a cultural object, which represents expertise, that is to say, a set of knowledge, experience and technology accumulated in the artefacts. Its "language" belongs to the social body. It can be decoded and understood, which can reveal the profound relationship between individuals and environments and can represent the traditions and habits inherent to a cultural area.

It is the necessary starting point for a theory of cognitive-explanatory urban morphology. It is also the necessary starting point for our thesis that the morphology of Chinese cities is considered as a special cultural object.

This idea means that urban forms are denoting human building activities, that is to say, the action of constructing buildings and cities. Therefore it is possible, according to such premises, to consider the built environment as a physical manifestation of the tradition of the historical interactions between humans and their environment. This approach is different from social sciences, which favour the study of individuals (subjects) in their urban environment.

Caniggia and Maffei (2001) posit that the built environment and the material consumption patterns are deeply rooted within particular culture-historical contexts, and material culture could be seen as the product of adaption with the environment, both culturally, physically and socially.

For Caniggia and Maffei, the type is a cultural model, carried mentally and for the most part unconsciously, which is mobilized by agents when they produce and use the

built environment (Gauthier, 2005, p.83). They consider buildings as extensions of human culture and stress that buildings emerge as a part of what they term the human "experience". That is, our habitats live in our minds, regardless of whether or not they are constructed physically. For them, the building type is considered as a "collective project", the result of widely shared cultural values deeply rooted in local traditions. The way of producing and understanding building requires a cultural standpoint. Buildings emerge from spontaneous consciousness[6] and critical consciousness[7], which are framed by cultural models. Buildings are both "inside" us and "outside" us as they are manifested in the material world. Inside can also be interpreted as traditions, for the spontaneous consciousness comes from the long-term collective experience, while outside embodies the effect of the social forces at work at a particular moment.

2.5 Urban tissue as an object of enquiry

One of the main objectives of typo-morphology is to understand the formation and transformation of urban tissue, which reveals the structural permanence and continuity of the built environment.

The definition of urban tissue

Generally speaking, the term "tissue" is a metaphor that refers to weaving in the textile sector and in biology.

[6] Spontaneous consciousness: "the condition in which every building operator finds himself working in continuity with the inherited cultural experiences" (Caniggia and Maffei, 2001, p.243).
[7] Critical consciousness: "every time the building set of rules codified by systematic experience over time is put in discussion, the building operator has to choose among different alternatives. This condition implies uncertainty and reveals the crisis of widely shared conventional attitude to architecture" (Caniggia and Maffei, 2001, p.243).

"A tissue is to an aggregate what building type is to building: 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 buildings and summing up all interesting aspects, including aggregation. Briefly, it is "a priori synthesis" of "building type"; we can then transfer to the term "tissue" the characteristics of both "building type" and "type" in its more general accepted meaning." (Caniggia and Maffei, 2001, p.119)

Urban tissue (or urban fabric) can be depicted as a set of rules, which is very similar to what Conzen called a plan unit, described as "a unique combination of types of street patterns, buildings and lot configurations" (1960). Therefore, an urban tissue is made of elements belonging to three different sub-systems: the street network—the allotment system—the building fabric. Urban tissue is an expression of the physicality of the urban form, composing of all the physical elements constituting it.

According to Caniggia and Maffei (2001, p.119), the urban tissue has been "structured in time, deriving a system of formative and progressive mutation laws from the intrinsic formation and transformation processes of its prolonged structuring and from its history", which means the concept of the urban tissue is a concept both static (state of urban forms in a given time) and dynamic (ability to change carrier).

The aspects of continuity and renewal of the urban tissues of nine urban blocks of Huangpu District of Shanghai from 1842 to 1949 are the subjects that this thesis focuses on.

2.6 The cross-cultural application of Caniggian and Conzenian approaches in China

Caniggian and Conzenian thinking have spread among urban morphologists through a good deal of Europe and, to a lesser extent, North America, and to a much lesser extend within Asia and Africa (Whitehand, 2007). Research on Chinese urban form, using Caniggian and Conzenian approaches remained limited in the past, which raises the question of what the outcomes would be if such approaches were applied to Chinese contexts (Whitehand, 2007).

Professor Whitehand carried out field surveys in Pingyao, Guangzhou and Zhishanmen area of Beijing (2007) in the past few years, aiming to open up a field of cross-cultural investigation. Professor Tian has investigated building typological process in Guangzhou (2006) and Guo has studied morphological transformation of Old Shanghai area (2008) both applying Caniggian and Conzenian approaches. Those exploratory projects have validated that the key morphological concepts and methods developed and undertaken over many years by urban morphologists in the West could be successfully carried out in the very different realities of Chinese cities.

Although the areas investigated by those researchers represent only a very tiny sample of China's great diversity of settlement forms, more important is the wider cross-cultural implications of those studies. The use of Caniggian and Conzenian approaches to the study of Chinese towns and cities undoubtedly has potential (Gu and Whitehand, 2004). The methods and concepts homed in Europe have been proved applicable under very different cultural conditions in China (Whitehand, 2007).

Morphological research on Chinese cities promises to shed light on the wider significance of concepts and methods in cultural areas markedly different from those in which they were formulated. Simultaneously, a timely contribution can be made to the search for solutions to the acute problems of urban landscape management faced by Chinese towns and cities. Caniggian and Conzenian concepts can offer a promising start. Meanwhile they can also provide a route by which the longer-term need for comparison and integration of ideas with different disciplines and national origins can be fulfilled.

3. Particularity of Chinese urban form

3.1 Introduction

This chapter focuses on clarifying the particularity of Chinese urban form and explaining the two conceptions "shaping" Chinese city, more specifically the southern city and the northern city respectively. This section aims to explore the patterns and processes of morphological changes of Chinese cities, and the morphological characters and transformations of Shanghai, especially during the early modern period (1842-1949).

3.2 Two conceptions "shaping" Chinese urban form

The study of urban form in China could stretch back to very early dynastic times. Generally speaking, the urban form of Chinese cities stands as a symbol of cosmic order. There are two conceptions "shaping" Chinese urban form and planning: rationalist and naturalist. Besides those two conceptions, some other factors have also contributed to shape Chinese urban form, for example, natural climate, geographical location, distance from state control, political regime, etc (Guo, 2008).

3.2.1 Rationalist

The first conception is considered as the "rational" or "Confucianism"[8] theory of an ideal city form, influenced by *"li*" principles, which are related to social and political hierarchical systems. This theory is well described by a classical and very influential book Zhouli , appeared in the middle of the 2nd century B.C.E.

[8] Confucianism is an ethical and philosophical system developed from the teachings of the Chinese philosopher Confucius. The core of Confucianism is humanism.

In the sixth section of *Zhouli*, entitled *Kaogongji*[9] indicated planning rules and the ideal layout of a royal capital, which had a great influence on the construction of Chinese cities, especially on capital cities. According to this section, the ideal city form is a square shape enclosed by walls, subjected to a strict hierarchy: the center is always the most sacred place and the north-south orientation is always higher than the east-west orientation. The sizes of the city or town, or even the dimensions of the streets are commensurate with its positions in the administrative hierarchical system.

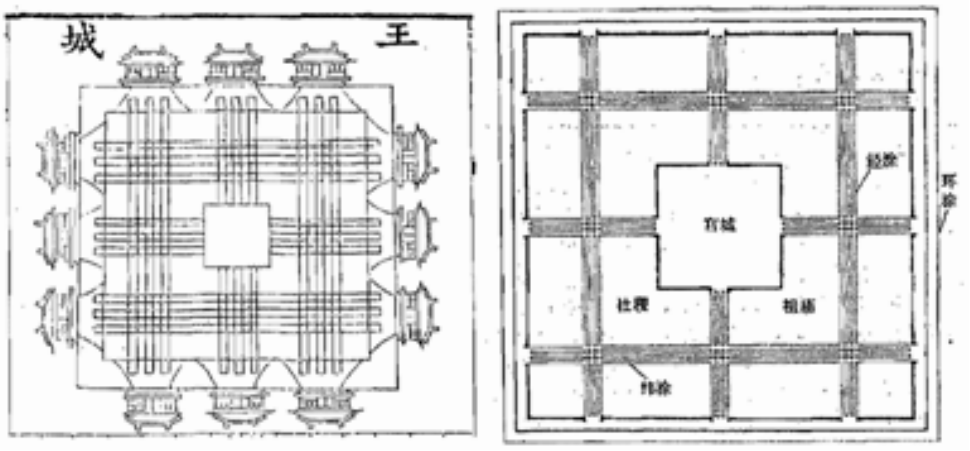


Figure 3-1: Diagram of the ideal city.
Source: Dong, 1998, p.10.

In Chinese ideology, city means a place enclosed and designed to protect its citizens, so most Chinese architectural and urban forms are used to be enclosed by walls, which have become an essential element in the Chinese urban form. Today very few Chinese cities still consist of a series of closed walls.

[9] *Kaogongji* (The Records of Examination of Craftsman) compiled towards the end of the Spring and Autumn Period, is a classic work on science and technology in Ancient China.

3.2.2 Naturalist

The second conception is called naturalist, which reflects a philosophy centered on nature and mainly concerns the harmony between the natural environment and the layout of city (*TanRenHeYi* in Chinese). This model is well described in another classical book *Guanzi*[10]. According to this book, the layout of a city must be appropriate to its natural topography and can fully make use of local natural resources instead of following some rigid patterns. For example, *Fengshui*[11] can be regarded as a Chinese conception of the ideal relationship between nature and the built environment, which is widely applied in urban construction and planning.

This model is in opposition to the rationalist model, suggesting that building a city must consider local circumstances and take advantage of favourable climatic conditions and geographical positions in order to save labour and materials.

3.3 Two typical Chinese cities: the "northern city" and the "southern city"

Influenced by the rationalist and naturalist models, there are two typical Chinese cities: the "northern city" and the "southern city". Chinese cities are often a mixture of those two models. Generally, northern cities are closer to the "rationalist" model while southern cities are nearer the "naturalist" model. This thesis provides an example of the second model. Among many others, the most obvious urban characteristic that distinguishes the northern city and the southern city is their street system.

[10] *Guanzi* is an encyclopaedic collection of philosophical treatises on statecraft collected by Guan Zhong, which was written between the first and tenth century B.C.E.
[11] *Fengshui* could be considered as a special Chinese tradition in architecture. "Feng" means wind and "Shui" is water. *Fengshui* combines the Heaven, the Earth and humans, and seeks harmony between them.

For most traditional northern cities, the street network is a predominant traditional "checker-board street system". Roads are strictly intersected perpendicularly and complied with the four orientations: the south, north, east, and west; and streets are basically directed from south to north or from east to west (Guan, 1996). For example, in Beijing, the two series of parallel streets cross at right angles to form a pattern of equally-sized square blocks dominating the urban fabric.

The southern city form appears to be more "organic" and non-geometric because the environment is more diversified than that in the north. For most southern cities, especially Jiangnan water cites[12], the street pattern is greatly influenced by the river network. It usually lacks a well-formed grid system. Most of the streets are narrow, crooked and developed spontaneously. The outcomes are random, casual and organic. For example, Shanghai's organic pattern street network, associated with the inconsistent mixed grid system, results in urban blocks varying greatly in size and shape.

3.4 Patterns and processes of morphological changes in Chinese cities

Chinese cities have been undergoing a staggering and profound transformation in the twentieth century. One that is still very much in process.

Researchers from many disciplines from China and other countries have contributed to the study of Chinese urban form (Whitehand and Gu, 2006). Different urban forms have been associated with particular periods of Chinese urban development: namely,

[12] Jiangnan water city refers to cities located around the Jiangnan region. Jiangnan region is a geographic area located immediately to the south of the lower reaches of the Yangtze River, including the southern part of the Yangtze Delta.

traditional (pre-1842), early modern (1842-1949), socialist (1949-78) and post-reform (post-1978) (Whitehand and Gu, 2006).

The traditional period (pre-1842) is related to the walled cities and imperial palaces with north-south orientation. The structure of ancient Chinese cities is deeply influenced by the government power and perception of the natural environment.

The early modern period (1842-1949) is related to the influence of Western powers, the establishment of concessions and treaty ports[13], and the demise of feudal dynastic system (Whitehand and Gu, 2006).

The pre-1949 city form is walled settlements based on millennia-old architectural and traditional design concepts (Gaubatz, 1999). The fundamental character of traditional Chinese cities is the functional differentiation and specialization of neighbourhoods, composing a clearly defined urban structure: the entire street network and all major architecture are aligned with the cardinal directions to conform to Chinese geomancy; massive crenellated walls demarcate both the city from the countryside and from internal divisions (Whitehand and Gu, 2006, p.339).

The period related to the socialist development (1949-78) has also been called the Maoist city. Due to decades of civil wars, the urban patterns of the imperial periods had decayed into overcrowded slums, inadequate streets and crumbling monuments by 1949 (Gaubatz, 1999). One of the primary goals of Chinese urban planning during the socialist

[13] Treaty ports were established after the First Opium War in 1842 and granted foreigners legal extraterritoriality.

period was to create a new decentralised and self-sufficient urban form: the *Danwei*[14]. A distinctive socialist urban form emerged as a mix of *Danwei* based city and traditional urban forms. During this period, urban development was achieved through nationwide industrialization, cities were becoming production centres and a new emphasis had been placed on rapid industrial development (Zhang, 2010).

The post-reform (post-1978) period is characterized by high-rise buildings and high-density urban forms. During this period, the socialist city has been abandoned with staggering speed while economic development is strongly emphasized. Changes in the structure and management of urban planning are following changes in political, economic and social developments, which are altering Chinese urban form. A new Chinese urban form is emerging.

The result of the massive physical restructuring of Chinese cities remains to be seen. The overwhelming character of current Chinese urban built landscape is the raw, unfinished look of demolition equipment and construction sites (Whitehand and Gu, 2006, p.350). Nonetheless, the weight and distinctiveness of Chinese culture, combined with the persistence of Chinese socialism, suggest that Chinese cities will remain distinctive well into the future (Whitehand and Gu, 2006, p.351).

3.5 Morphological characters of Shanghai

Before the Opium War, Shanghai was a typical Jiangnan water city among many other southern cities. To understand the particularity of urban form of Shanghai, we must, first

[14] *Danwei*, also called a work unit, is a decentralised and self-sufficient compound urban form designed based on socialist organization and ideology, which is used as a principle method of implementing Communist Party policy. Each Danwei has its own housing, banks, shops, schools, post offices, etc.

of all, understand the characteristics of the Jiangnan water city. Moreover, thanks to the similarity of this type of cities, those that still exist today around Shanghai can serve as a reference for describing the city's original urban form.

3.5.1 Jiangnan: the city of water

Jiangnan water city refers to cities located around the Jiangnan region, which enjoys a wet subtropical climate, subjects to monsoon and has rich water resources abundant with lakes and rivers.

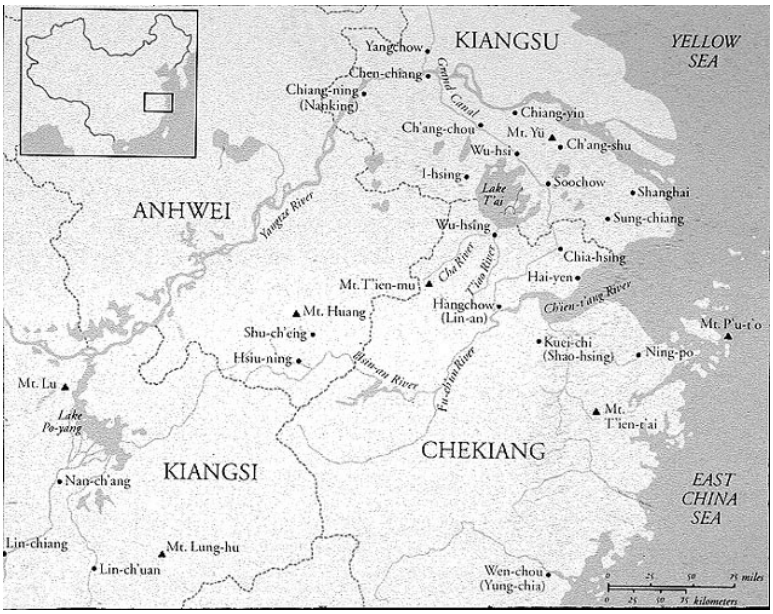


Figure 3-2: The geographical location of Jiangnan region.
Source: https://www.google.ca/search?q=jiangnan+region

For most Jiangnan cities, water is the essential component of the urban form and rivers play a major role in the formation and transformation of the city. The river system is the structural backbone of the city, serving not only as the most important means of transportation, but also as a necessity for daily life. The main streets are often developed parallel to the main rivers and the street network is formed adjacent to rivers.

Cities are born and grow thanks to water; towns and markets also develop along rivers. The cohabitation with water is a factor inherent in the urban form. This cohabitation affects, in particular, how the original town developed into a city, and possibly how this city would flourish in the centuries to come.

3.5.2 Morphological characters of Shanghai before 1842

Before 1842, Shanghai was a very typical Jiangnan water city, which still retains some distinctive morphological characteristics of a water city today.

Shanghai was an organic city organized informally and imperfectly from the beginning because this place has been the results of responses to different needs and circumstances, not the product of a grand scheme. It has been spared from rigid regulations. The city's traditional morphological features were characterized by the city wall, "a double traffic network", countless rivers, and many bridges, etc.

Like most traditional Chinese walled cities, Shanghai was surrounded by a ten-metre high and five-kilometre long wall built in 1554. The wall itself was doubled with an outer moat. Differing from other Imperial rectangular enclosures, the construction of this wall respected the original dimension of the city center (today's Old Shanghai), so the wall had an oval shape. In addition, it was not designed to enclose the city, but simply to protect the city center.

There were six gateways by land, three water gates and twenty bastions. Each gate had a watchtower. The fortification doors serves as important nodes joining inner and outer routes and places for commercial and public activities.

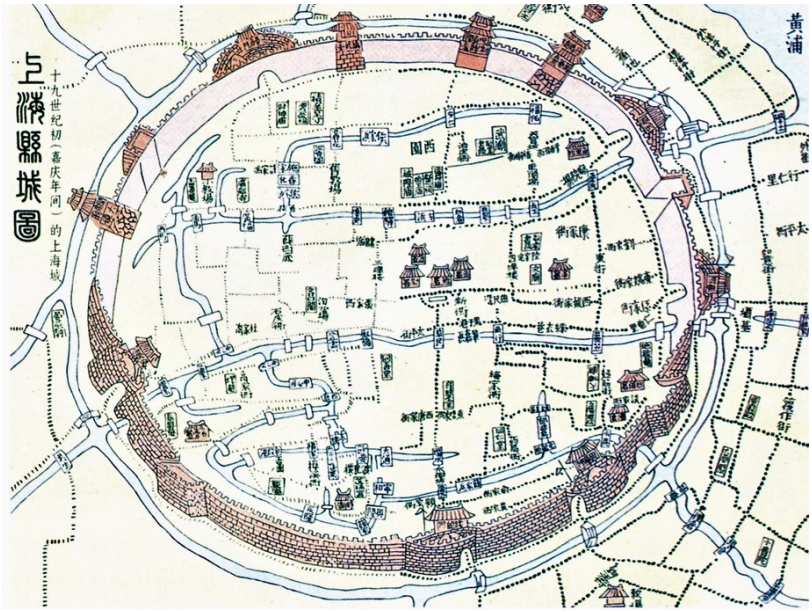


Figure 3-3: Shanghai xiancheng tu[15].
Source: Shanghai cehui zhi, 1999.

Like most water cities, the development of the street network is generally articulated to the river network. “The double traffic network”: a river network and a street network, is combined and complemented with each other. The street network of Shanghai adopts a complex and irregular shape. The streets are small and winding and grown in the form of a “Spider web” (Guan, 1996).

3.6 Morphological transformation of Shanghai

By the mid-19th century Shanghai did not grow naturally and progressively from a traditional Jiangnan water city, but was built on foreign concessions, driven by external foreign forces and developed from a small fishing town to the biggest modern city in China within one century.

[15] This is a coloured reproduction of a Shanghai map in the early 19th century, showing the walled city of Shanghai, with names of bridges, gates, and main buildings in Chinese.

The traditional urban tissue underwent a huge transformation after 1842. The development after 1842 can be divided into two periods: from 1842 to 1949 and from 1949 to the present.

Morphological transformation of Shanghai from 1842 to 1949

The city became a treaty port opening to the West in 1842. The establishment and construction of concessions symbolized the beginning of modern urbanism. It ignited Shanghai's modern evolution and had a huge impact on the development of Shanghai to this day.

Almost all the walls had been demolished in 1912, but the boundaries of the wall can still be traced in the form of a wide circular road constructed later.

The demolishing of the wall in 1912 had a significant impact on Shanghai's urban morphology. According to Guo (2008), at a broader level, before the demolition, central Shanghai was relatively autonomous. Its road network was oriented toward the center of the city. After the demolition of the enclosure, this inward morphological hierarchy disappeared and walled Shanghai became a part of the great city of Shanghai which included the concessions. Among other considerations: at a local level the demolition led significant changes in the urban tissue located around the former enclosure.

During 1842-1949, social, political and economic upheavals, Western culture, new planning concepts, new construction techniques, modern technology, etc., all affected Shanghai's urban form. The development ignited by the concessions of Shanghai at this time was a mixture of modern civilization and local tradition.

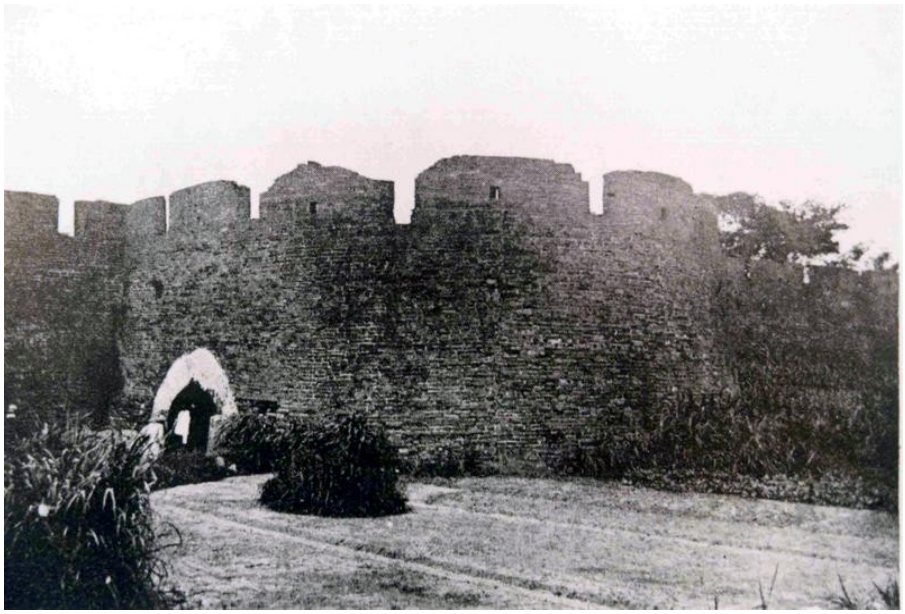


Figure 3-4: Shanghai City wall, estimated dates: 1880-1912.
Source: http://www.vcea.net/VDB/Files/?Table=Image&ID=Image.ID.1722.No.0&Op=O.

Morphological transformation of Shanghai from 1949-present

After 1949, the morphological changes that occurred in Shanghai were astonishing, due to overwhelming economic development and drastic transformations, especially in the last 30 years. Many low-density traditional as well as Linong neighbourhoods of the colonial period have been replaced by high-rise skyscrapers and modern complexes at an unprecedented speed and a large scale, but with no reference to the pre-existing urban tissues. Some of the typical appearance of the water town is disappearing. Ultimately, the city might experience the pain of losing part of its identity, integrity and culture.

4. Morphological analysis of the study area

4.1 Introduction

This chapter focuses on the block level. A morphological analysis of the study area is conducted aiming to produce essential knowledge dealing specifically with its urban form.

Relying on historical and contemporary cartographic representations and on extensive fieldwork, the research explores the genesis of the urban form of the area, namely: the evolution of its street system as well as its architectural fabric in relation to the broader geographical context, both natural and human made. The research then sets about analysing the urban tissues in the area, i.e. the sets of relations that govern the spatial layout of streets, lots and architectural forms.

4.1.1 A brief introduction to the Huangpu District

The location of the study area

The study area is located in the Huangpu District and covers nine urban blocks, spreading over approximately seven hectares, which was once a central part of the old French Concession[16] (see Figure 4-2) and traditionally one of the most prestigious sections of the city. This area has been developed under the colonial rule, which conferred control to foreign powers, in time of rapid speculative development. It has long been regarded as a premier residential and high end commercial area of Shanghai.

[16] The old French Concession refers to the original part of the French Concession (1849-1861), after that, the borders of the Concession were progressively expanded in 1861, 1900 and 1914.

Figure 4-1: The location of the study area.
Source: Shanghai Surveying and Mapping Institute, 2013.

A brief introduction to the Huangpu District

Huangpu District originates and "radiates" from the Bund River. Its development spread gradually from east to west. It has long been considered as the starting point of Shanghai's modernization. This District experienced an influx of prosperous businesses, financial sectors, cultural industries and entertainments. It has long been considered as Shanghai's most prosperous area.

Huangpu District, named after the Huangpu River, is one of the most densely populated urban areas in the world (Population density: 4,200/km^2)[17], located in the center of all Shanghai's 18 districts (see Figure 4-1). Lying on the left bank of Huangpu

[17] Chinese Shanghai 2010 Census Data.

River, it occupies an exceptional geographical location, at the intersection of the city's two largest rivers: Huangpu and Wusong River.

Huangpu District is divided into two parts: Puxi and Pudong, with a total area of 21.07 km^2, the land area of 19.31 km^2, the water area of 1.76 km^2, Puxi occupies a land area of 4.16 km^2 accounting for 21.54%, and Pudong 15.15 km^2 accounting for 78.46%[18] of the District's total are.

In ancient times, Shanghai Pu and today's Huangpu River flowed through this region, Shanghai (city) and Huangpu (district) got their name from these rivers. Most of the geographical area of the territory had formed during the middle of the Tang Dynasty (618-907 AD). From Tang Tianbao (751) until the Song Dynasty, this area belonged to the Huating County. It was under the jurisdiction of the Shanghai County from the Yuan until the Qing Dynasty. After the opening of the port in 1842, Britain, France, the United States, Japan, and several other foreign countries started to build their concessions here. Soon after, this area experienced quick development and became the commercial center of Shanghai.

After Liberation in 1949, Shanghai Municipal Government adjusted the District's administrative boundaries several times. The latest adjustment happened in 2011: the existing Huangpu District was combined with the Luwan District to form today's Huangpu District, also called "new Huangpu".

Nowadays this District is a prime residential area as well as a shopping destination and business center providing all kinds of services. It contains many attractions, including the

[18] Chinese Shanghai 2010 Census Data.

City Hall, the Bund, the world famous Nanjing Road (considered as the pulse of modern Shanghai), Yuyuan Garden, Confucius Temple, Huaihai Road, People's Square (previously the famous Shanghai Racecourse), Shanghai Grand Theatre, Shanghai Museum, Shanghai Urban Planning Exhibition Hall, Xintiandi, etc.

4.1.2 The concessions in Shanghai

Shanghai's concessions times, which lasted one century from 1843 to 1943, were the earliest, largest and longest among all the foreign concessions in the history of modern China. The emergence, construction and development of concessions stimulated the modernization process of Shanghai.

Shanghai's urbanization process was different from that of other traditional Chinese cites', driven by the rural urbanization of outside concessions. Long before port opening, Shanghai was a well-developed commercial centre, but modern Shanghai did not evolve based on the slow expansion of the old walled city, rather it evolved based on outside concessions, which eventually led to the gradual outward expansion, urbanization and modernization of the old city.

Having concessions for such a long time really had a profound influence on the development of Shanghai. First, during this period, Shanghai experienced unprecedented economic growth, especially in trade and real estate. Second, the city underwent major construction and reconstruction. For example, its walls have been demolished, rivers have been filled and its urban tissue has been rebuilt on the basis of a new type of habitat that was particular to that time: the Linong.

For a better understanding the transformation of urban tissue of this period, we will first take a look at the formation of the concessions in Shanghai.

The British Settlement

After Shanghai's port opening, the British first established their Settlement in 1843, which was the earliest and oldest settlement in Shanghai for foreigners.

The original British Settlement was an area located north of the old walled city, based on the west bank of Huangpu River, bordered north by Lijiachang (now Beijing Road), south by Yangjingbang (now East Yanan Road), the western limits were not clearly defined, and the total area was about 73 hectares (Chang et all, 2005). In September 1846, at the location of present Middle Henan Road, Barrier Street was built to serve as the western limit of the Settlement. The borders of the British Settlement expanded in November 1848, by moving the northern boundary from Lijiachang to the south bank of the Suzhou Creek, the western boundary from Barrier Street to Ningcheng Creek (today's Middle Xizang Road), so the total area of the Settlement expanded up to 190 hectares (Chang et all, 2005) (see Figure 4-2).

The American Settlement

The American Settlement was formed officially in Hongkou in 1848 to the north of the British Settlement. In September 1863, the British and American Settlements merged and adopted the name of Shanghai International Settlement. According to the survey of 1893, the total area of the British-American Settlement added up to 712 hectares, and was

renamed “International Settlement of Shanghai” in 1899 (Chang et all, 2005) (see Figure 4-2).

The French Concession

The French Concession was established in April 1849, when the first French consul Charles de Montigny and Shanghai Daotai Lin Gui conceded an area of 66 hectares to build the French Concession, bordered to the north by Yangjingbang Creek, east by the Huangpu River, south by the fortified Chinese city, and west by Zhujiaqiao (today’s South Xizang Road).

After that, the borders of the concession were progressively expanded in October 1861, January 1900 and April 1914. The first two expansions were modest, while in 1914, the concession was greatly expanded, adding east of Xujiahui, north of Zhaojiabang, south of Daxilu (today’s West Yanan Road) to the French Concession, so the total area had expanded up to 15,136 acres (Chang et all, 2005) (see Figure 4-2). The French Concession came to an end in 1943.

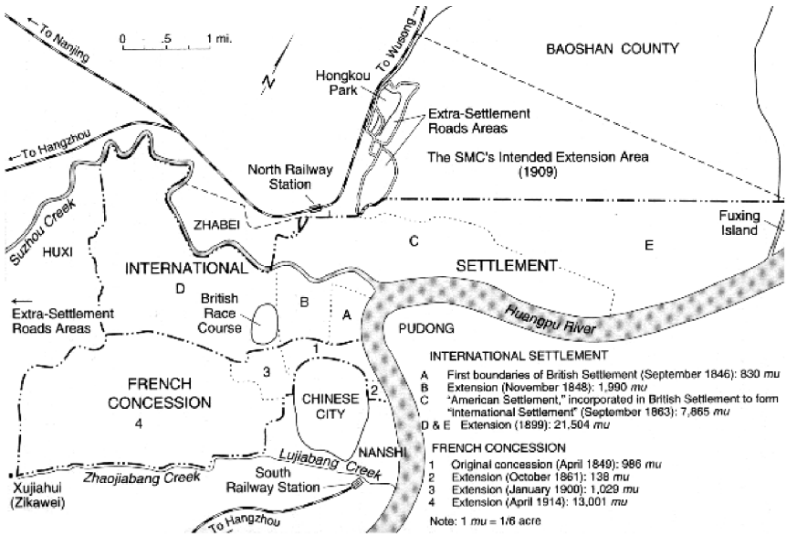


Figure 4-2: The establishment and expansion of concessions in Shanghai (1846-1943).
Source: Lu, 1999.

Morphological characters of the concessions

Shanghai's concessions displayed irregular morphological characters, which were a reflection of an overall lack of planning for development. Different authorities had different interests and they would like to preserve their own independence.

The Chinese controlled the original walled city and the area surrounding the concessions at that time. The foreigners wished to build "states within a state". They were also independent from each other and each had their own government. For example, the French Concession remained relatively independent, charged by the Municipal Administrative Council (conseil d'administration municipale), while the International Settlement was governed by the Shanghai Municipal Council. This later resulted in some absurd administrative outcomes. The development of concessions was not the product of careful planning, but was rather created more or less spontaneously.

4.2 The Shanghai urban blocks

It is essential to first clarify the concept of the "urban block" or "mega block" in Shanghai. We would like to establish a theoretical model of Shanghai urban block and then explain different components of this model before starting the morphological analysis of the study area.

4.2.1 Two theoretical models of Shanghai urban blocks

The Shanghai "urban block" or "mega block", "super block" is delineated by major streets and occupies an important feature within the urban tissue of Shanghai.

As a general rule, the exterior of the blocks is marked by the peripheral streets and crowning tissue (see Figure 4-3), whereas the interior of the blocks is irrigated by the alley system. The urban blocks are similar in shapes: rectangle, but varied greatly in sizes.

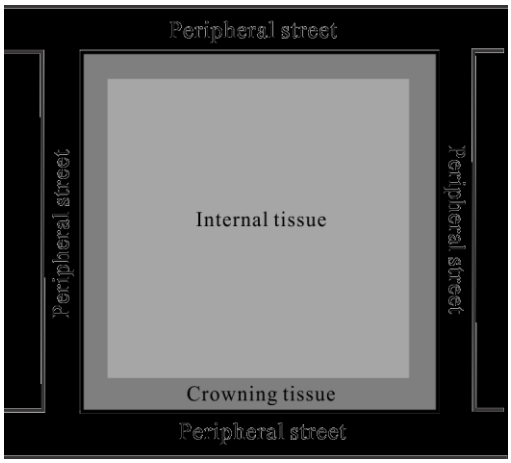


Figure 4-3: Diagrammatic representation of a Shanghai urban block.

Despite of some documentation limitations, for example, there were no cadastral plans in Shanghai; one can still observe two subdivision models of urban blocks: regular layouts and irregular layouts (see Figure 4-4, 5, 6). The subdivision of urban blocks is not in relation to the street structure, but informed by pre-existing agricultural or geographical conditions or later property transactions.

These two models represent two main structural forms of blocks of Jiangnan water cities. They often coexist in the same city. However, in some cities, a pattern clearly dominates over the other or vice versa. For Shanghai, most urban blocks in the old city have irregular subdivisions, while blocks located in the concessions display a slightly more regular configuration overall.

In this thesis, one "Li" or "Fang"[19] refers to one plot (one neighbourhood), called mother parcel; one lot refers to one building lot on which a single building is built. One urban block is constituted by various sizes and shapes of Lis or Fangs. Each Li or Fang has been created gradually over time and produced irregular boundaries.

In the past, different Lis or Fangs located within one urban block were not interconnected. There was always a separating wall between two Li or Fang next to each other, which was due to the financial capabilities of the developers and partially due to a particular security demand by dwellers during wartime periods (Zhao, 2004). Now all those walls have been removed, which has changed the spatial configuration of the whole structure, but the trace of the former enclosed walls can still be found.

In the regular subdivision model, the blocks usually have been subdivided into regular shapes of Lis or Fangs and have orthogonal layouts (see Figure 4-4, 5). The irregular subdivision model is very different from the regular one. Urban blocks have been subdivided into irregular plots that accommodate varied dimensions of Lis or Fangs (see Figure 4-6). Its structure is more complex, but flexible.

[19] *Fang* indicates a type of street pattern, emerged in the Tang dynasty, composing four to six blocks, each of which is one-hundred-pace square, and has an individual gate that is closed at night (Li, 2013).

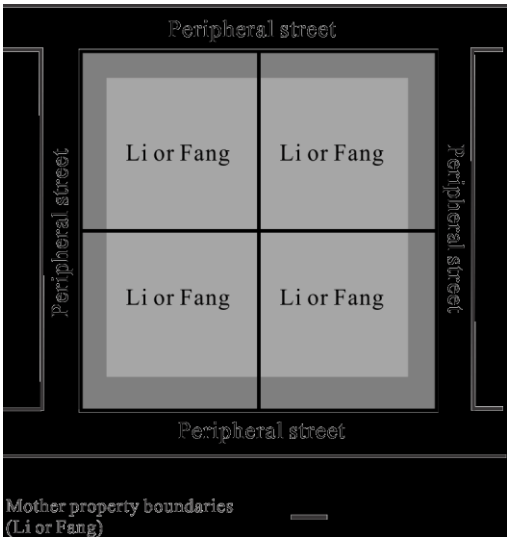
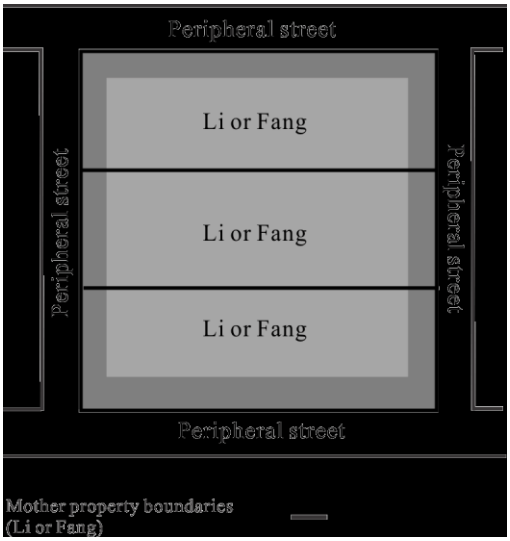


Figure 4-4: A theoretical model of regular subdivision of Shanghai urban block with mother property boundaries.



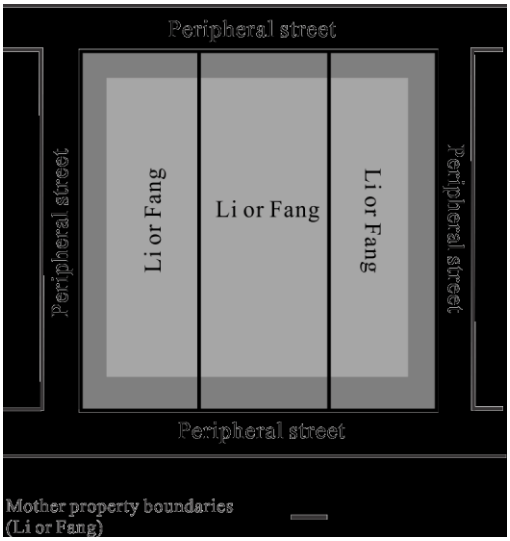


Figure 4-5: Synchronic variants of the theoretical model of regular subdivision of Shanghai urban block with mother property boundaries.

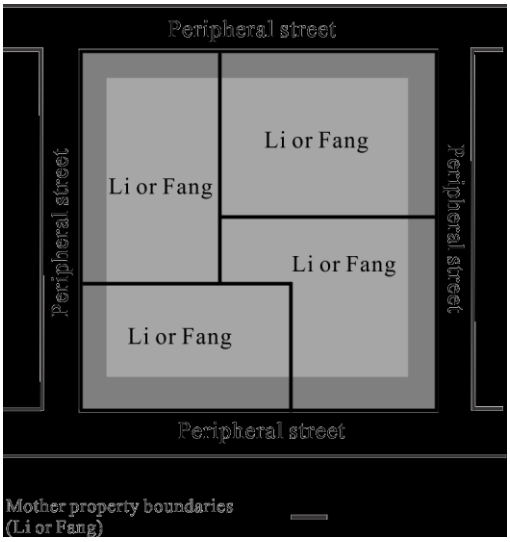


Figure 4-6: A theoretical model of irregular subdivision of Shanghai urban block with mother property boundaries.

The integrated internal alley system includes main lanes and a series of side lanes. Within Lis or Fangs, main lanes are connected to the main entrance of a Li or Fang and perpendicularly communicated with side lanes, mostly oriented north-south forming a clear fishbone structure; they are giving access to the peripheral streets and linking the Li or Fang to the city (see Figure 4-7). Side lanes are giving access to each individual building.

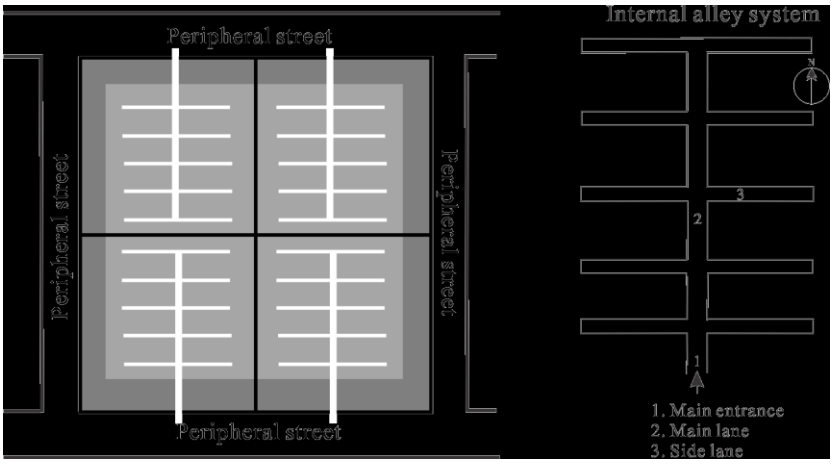


Figure 4-7: A theoretical model of regular subdivision of Shanghai urban block with internal alley system.

The arrangement of buildings within urban blocks follows a simple principle: influenced by traditional Chinese geomancy, a north-south orientation is always preferred for private residence, so theoretically each internal residential lot is maximized by a building facing south, which does not have a direct link to peripheral streets (see Figure 4-8).

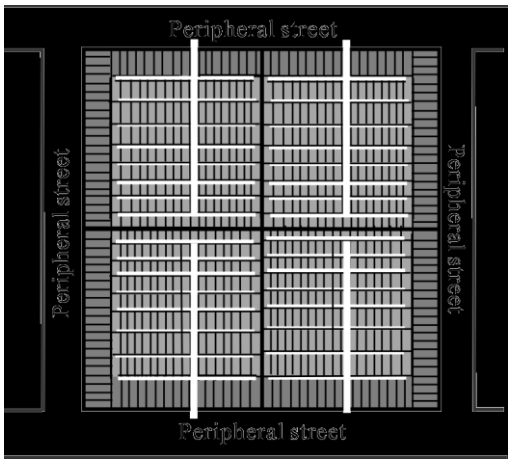


Figure 4-8: A theoretical model of regular subdivision of Shanghai urban block with allotment system.

One could easily find that there is a clear hierarchy behind the Shanghai urban block: regular in urban block—irregular in Li or Fang—regular in allotment.

4.2.2 Morphological features of urban blocks in the study area

Within the study area, nine urban blocks are subdivided into different irregular shapes of Lis or Fangs, occupied by varied sizes and different types of Linongs (see Figures 4-9, 10). This irregularity in the block subdivision, despite huge transformation of the urban tissue during the period 1842-1949, is still apparent today. Different Linongs coexist by adapting to irregular plots. The main Linong types are: Old Shikumen[20] Linong and New

[20] Shikumen is a crucial marker of Shanghai's identity, the most representative form of Shanghai residential building, an essential component of Haipai culture, which has long been considered a symbol of Shanghai's modern urbanization.

Shikumen Linong, among them Old Shikumen Linong is the dominate type, and mostly built as groups.

At first glance, one could distinguish two obvious morphological features of urban blocks in the study area: commercial shops located at the periphery of each block; residential buildings located within each block and bounded by commercial shops (see Figure 4-9). One reason that could explain such a layout is that Shanghai's rapid development and its highly valued downtown land result in every street facade reserved for commercial activities. This can be expressed by an old Shanghainese saying: "An inch of space in the street frontage designates a life-time of fortune".

Figure 4-9: Google Earth view of nine urban blocks in the study area.
Source: Google Earth, retrieved 2014/03.

However, from some historical maps (for example, Map 1939 and 1947) we find in the past, lots of shops had been arranged inside urban blocks of the study area. The reason might be the great location and high land value of this place.

Figure 4-10: Nine urban blocks in the study area.

Figure 4-11: Nine urban blocks with different Linong property lines in the study area.

4.2.3 The general layout and spatial syntax of Linong

Lis or Fangs are occupied by different Linong neighbourhoods.

Generally speaking, each Linong is comprised of commercial shops lined with peripheral commercial streets, residential buildings placed within the urban block and the

interconnected alley system. One or two sides of a Linong are lined with peripheral streets, other sides being enclosed by walls, and the residential buildings located within the block are accessed by main lanes and side lanes. “Exterior” i.e. peripheral commercial shops are accessed directly from peripheral streets. Linongs can be integrated in environments that accommodate all kinds of land uses: some dominated by commercial and residential uses, and others including industrial, institutional, religious uses, etc.

The general layout and spatial syntax[21] of Linongs located within the study area are indicated by Figures 4-12, 13, 14.

Figure 4-12: Nine urban blocks with internal alley system in the study area.

[21] The term spatial syntax includes a series of theories and techniques for the analysis of spatial configurations.

Figure 4-13: Different land uses within the study area.

Figure 4-14: Nine urban blocks with allotment system.

Usually the main lanes are located in the center of a Li or Fang, forming the main circulation space, the convergence point of side lanes and the collective place for communication and exchange. The main entrances leading to the inside of the Li or Fang are placed amidst exterior shops. Side lanes are usually dead-ends giving access to each individual building. Side lanes are connected orthogonally to the main lanes and usually narrower than those. Side lanes are used mainly by local residents and form “community corridors”, which is an essential part of the Linong culture.

Figure 4-15: The branching street network structure of the study area.

The spatial hierarchy of Linong is: street—main lane—side lane, which marks different degree of privacy: public—semi public—private. Linong represents the traditional Chinese housing concept of “closing”: each Linong is enclosed by walls and by exterior commercial spaces facing the streets; each interior house is protected by high walls.

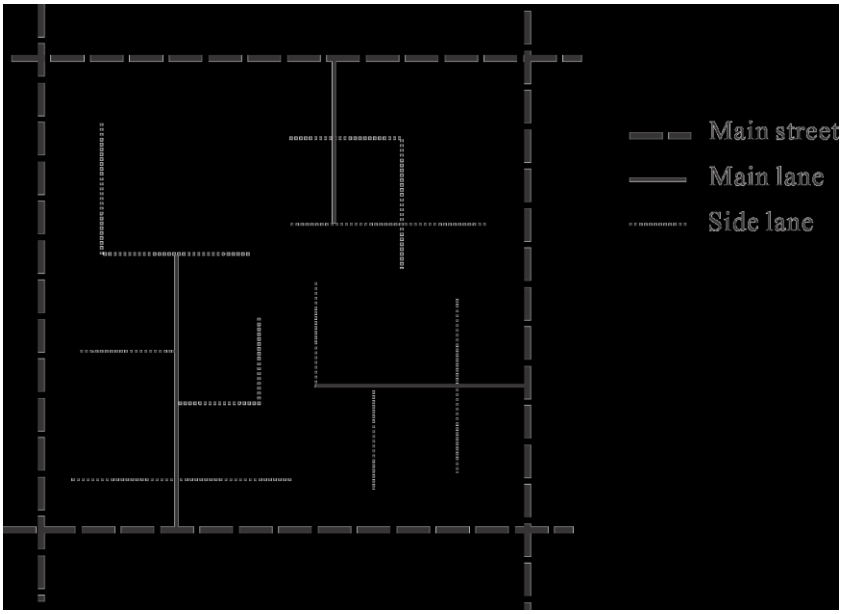


Figure 4-16: A theoretical model of the spatial hierarchy of Linong street system.

The arrangement of buildings within urban blocks follows a simple principle: each plot is enclosed by walls, within which different models of Linong neighbourhoods have been developed. The interior buildings do not have direct links with peripheral urban streets.

From Figure 4-15, we deduced that the street network structure of the study area constitute a tree branching structure. The peripheral streets line up with commercial shops and provide spaces for busy commercial activities and traffic circulation. The main lanes and side lanes give access to residential buildings. The main lanes are constantly connected to the peripheral streets, the side lanes are extended from the main lanes without being directly linked to the peripheral streets, and they are usually cul-de-sac and without completely go through the block or neighbourhood. This tributary street network structure is “organic” and flexible, well adapting to the uneven subdivision of urban blocks of Shanghai.

4.3 General analysis of the morphogenesis of the study area

This section analyses the general morphogenetic process of the urban tissue of the study area by tracing back its initial phase of urban development to recent. This process has been influenced by many factors and can be reconstructed based on historical documents and cartographic evidence.

By retracing the evolution of the study area, including the establishment and demolishing of the city wall, the expansion of the French Concession, the gradual filling in of the rivers, and the opening of different streets, we will produce a theoretical model reconstructing the formation and transformation process of the urban tissue of the study area.

For the allotment system, the building lots in the study area are informed by the basic unit of house in Jiangnan region: jian[22]. Due to the land pressure and population growth, the majority of buildings along peripheral streets are one-Jian building, and for the bay width of one-Jian is around 3.6m to 4.2m in the study area. We will refer to a module dimension of 4×16m to reconstruct the development of the study area. This module could characterize the initial phase of the development.

Before 1554, the geographical situation of the study area was that there were many waterways located here. There was a large water network flowing throughout this region. It was probably mainly made of vacant farmlands waiting for further development. Initially, there were no streets and built-up areas, no “detailed” plan subdivision (see

[22] Jian: (a basic spatial unit), indicates the space between two rows of columns, which is the basic measurement unit of the residential buildings.

Figure 4-18-1).

The study area was adjacent to the old walled city. The establishment of the city wall in 1554 had a huge impact on the morphological characters of the study area (see Figure 4-18-2).

For most water cities, the early spontaneous settlement usually appeared along the rivers, bridges, or old city walls, especially around the fortification gates of the city wall, and numbers of those settlements grew eventually to create a city. Bridges are the intersections of the street network and river systems, which also have a great impact on the morphological character of the city, for example, some roads are opened based on bridges. Within the study area, from east to west, nine bridges were erected along Yangjingbang (see Figure 4-18-6), and the opening of later roads was based on some of those bridges. One indicator for this was because every street name includes the word *"Qiao"*, which means bridge.

We posit that the first spontaneous settlements appeared within the study area located along two fortification gates of the city wall (New Northern Gate and Northern Gate) and one old bridge: Sanmaoge Bridge (see Figure 4-18-3). After the establishment of the city walls, those gates became very important nodes, so an early spontaneous settlement appeared near those gates. Sanmaoge Bridge built around 1553 on Yangjingbang, was the earliest bridge we found in the study area, and later became an important matrix road: South Henan Road.

The division of urban blocks in the study area started around 1850, right after the establishment and construction of the French Concession. All the streets located within the study area came into shape around 1863 except Renmin Road and East Yanan Road (see Figure 4-18-5, 6, 7), but the road construction in the Concession was still in an early stage. The functions of the blocks further developed driven by the quick economic development. At this stage of development, for the study area, the densification of blocks was fulfilled by different sizes of Linong neighbourhoods, especially Old Shikumen Linongs.

The street system in the concessions was almost created in accordance with utilitarian and economic purpose rather than systematic planning. A clear-cut, checker-board street system pattern in the study area was predominant, which was more or less influenced by some modern urban planning concepts or methods, maybe unconsciously in some cases. The particular clear-cut, checker-board street system pattern in the study area will be discussed in detail later in 4.4.1.

From 1870 to 1910, urban blocks within the study area were undergoing dramatic changes, characterized by an accelerated densification process, and each block within the study area had been constructed completely and occupied by Linongs.

On 19 January 1912, almost all the city walls had been demolished, only one tower and a short section of the wall has been kept, a wide circular road constructed on the traces of the old wall, called Renmin Road. The Yangjingbang was filled in 1914 and later became the East Yanan Road (see Figure 4-18-8). The curves of the road reflect the twists and

turns of the old river. The French Concession experienced further expansion in 1861, 1900 and 1914 (see Figure 4-18-7).

After that, some blocks experienced reconstructed based on a newer architectural form: the New Shikumen. Other blocks adjacent to Renmin Road have been demolished in order to make room for the expansion project of Renmin Road (see Figure 4-18-10). From 1949 until now, despite huge transformations, rampant development and recent renovations, morphological changes are staggering in this area and the distinct morphological characters are not yet drastically altered: the traditional urban tissue is kept.

The following section retraces graphically the morphogenesis of the study area within the broader context of the walled city and the concessions.


Huangpu River
Suzhou Creek
苏州河
黄浦江
Yangjingbang
洋泾浜
Fang Bang
方浜
Zhao Jia Bang
肇嘉浜


Huangpu River
Suzhou Creek
苏州河
黄浦江


Huangpu River
Suzhou Creek
苏州河
黄浦江


Huangpu River
Suzhou Creek
苏州河
黄浦江


Huangpu River
Suzhou Creek
苏州河
黄浦江
1860


Huangpu River
Suzhou Creek
苏州河
黄浦江
Around 1863 ~1900

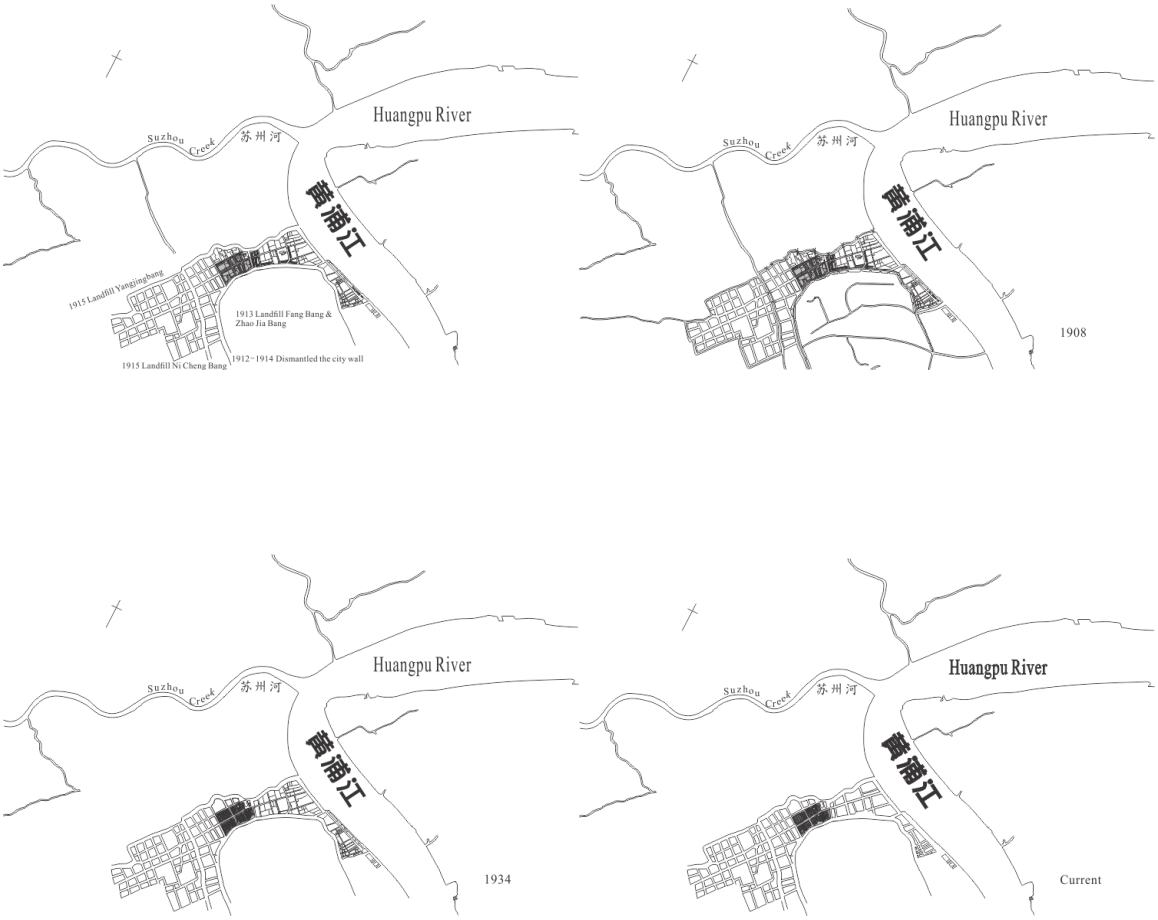
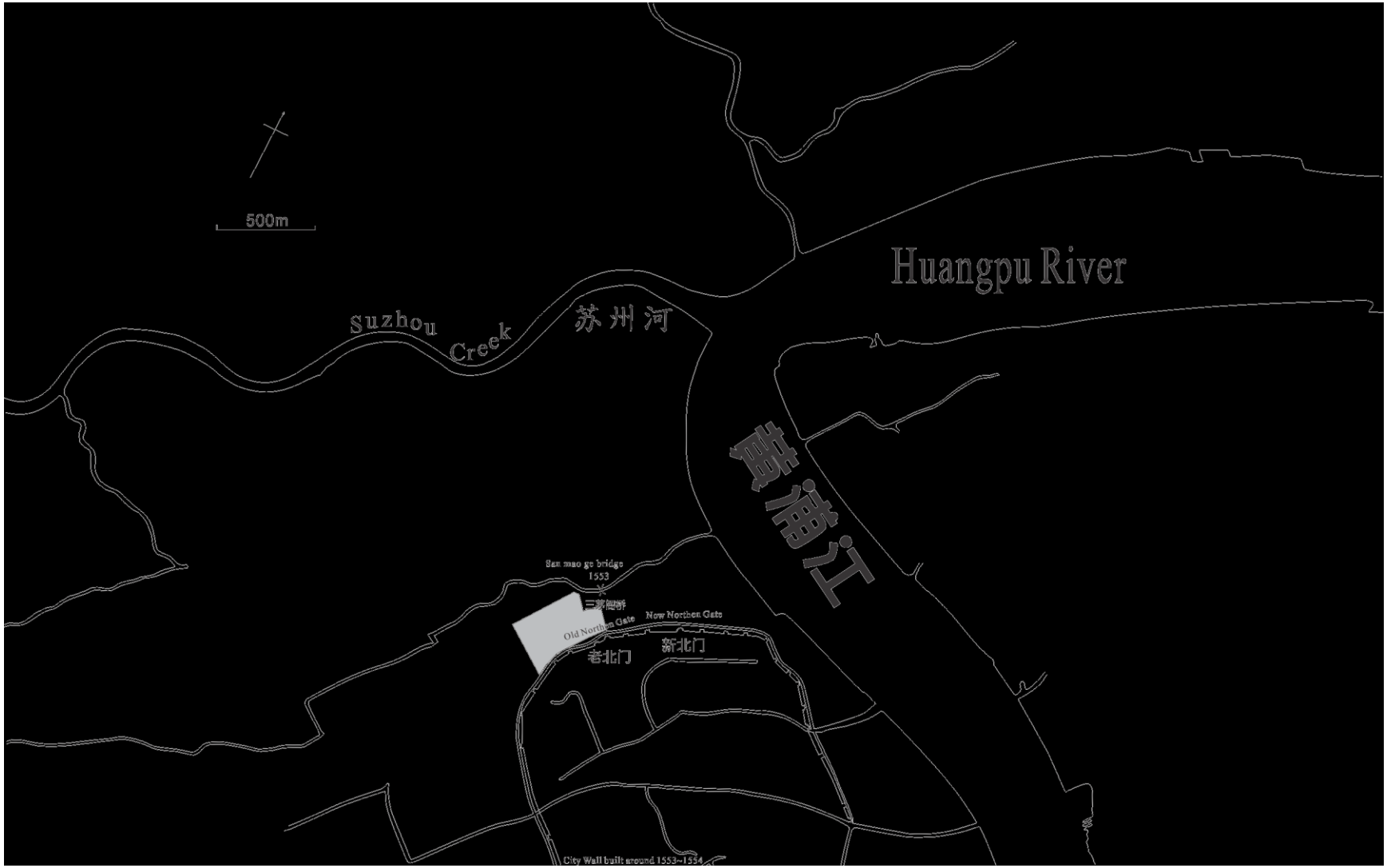
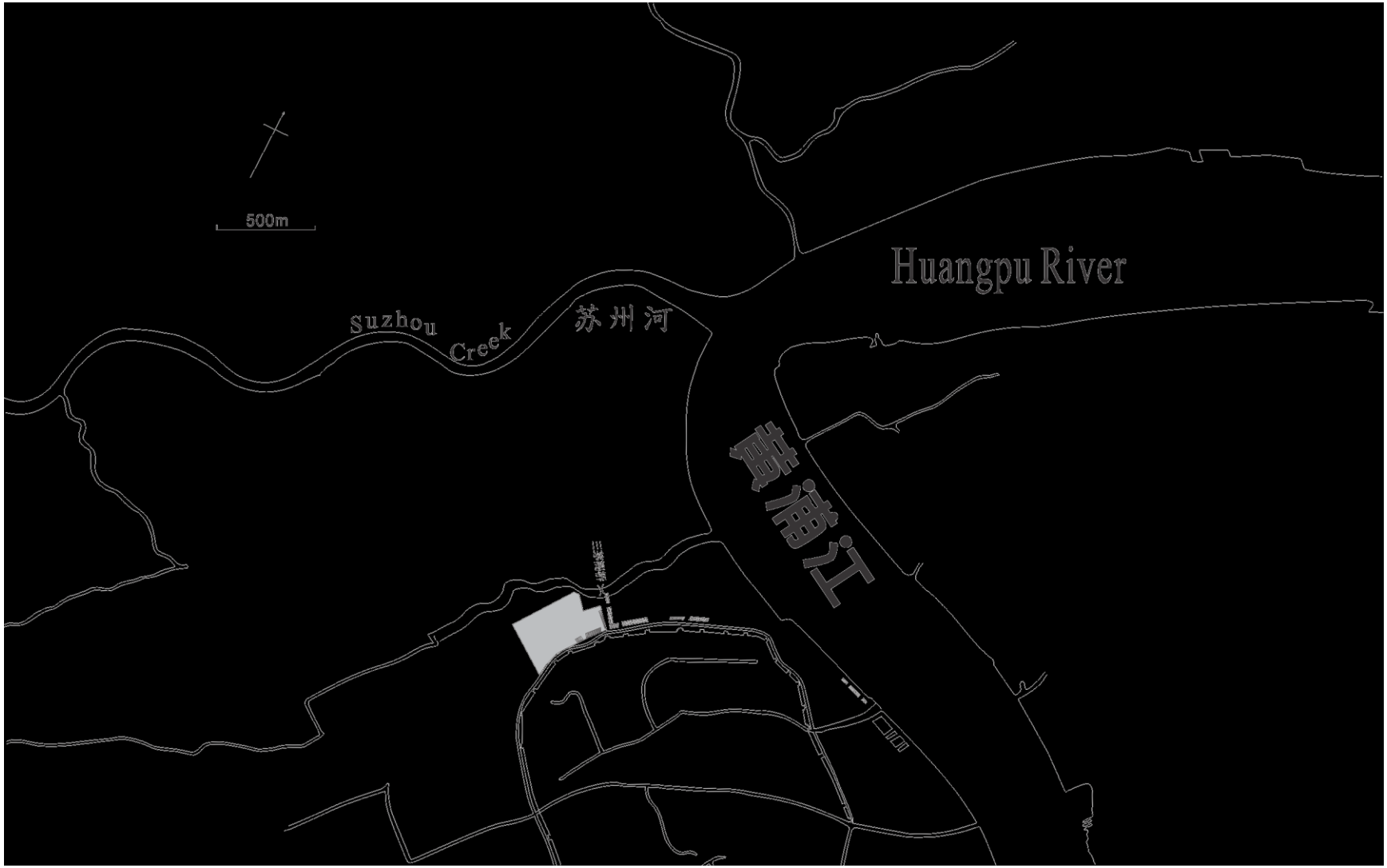


Figure 4-17: The general morphogenesis of the study area (chronically ordered from left to right and from top to bottom).

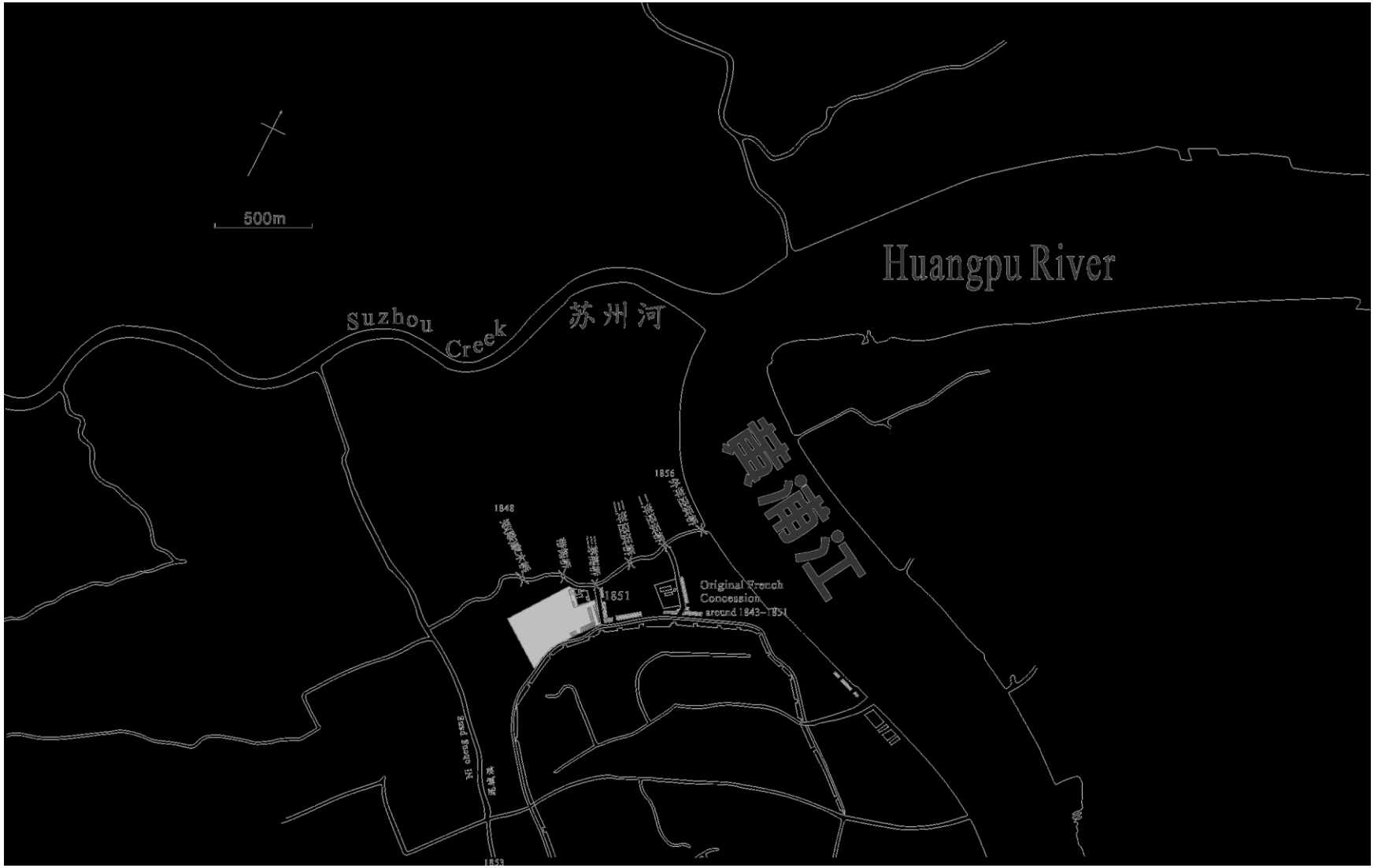
1) Geographical situation before 1554 with the hydrographic system.



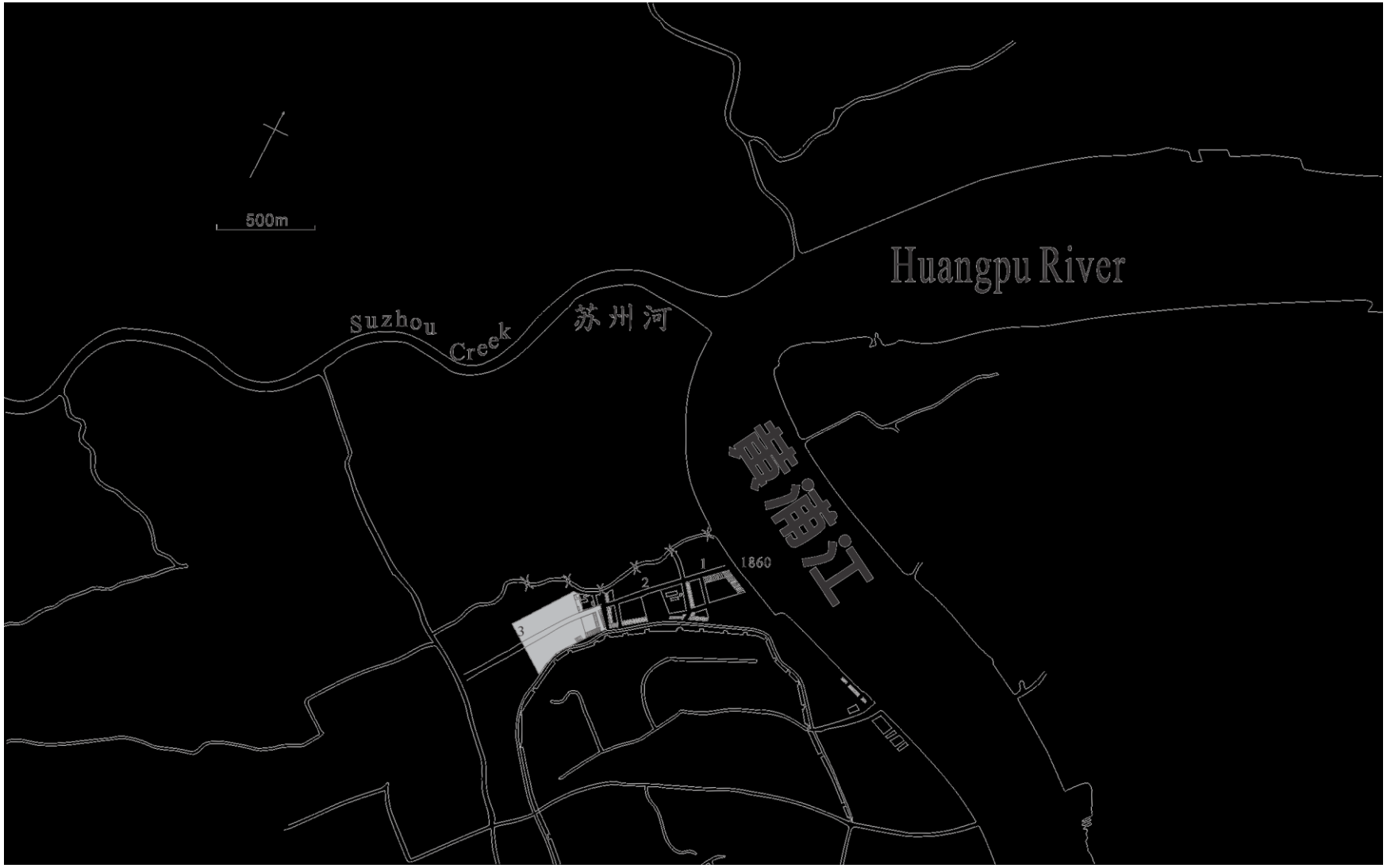
2) The city wall built in 1554 and Sanmaoge Qiao built around 1553.



3) Early settlements outside the city wall before 1842.

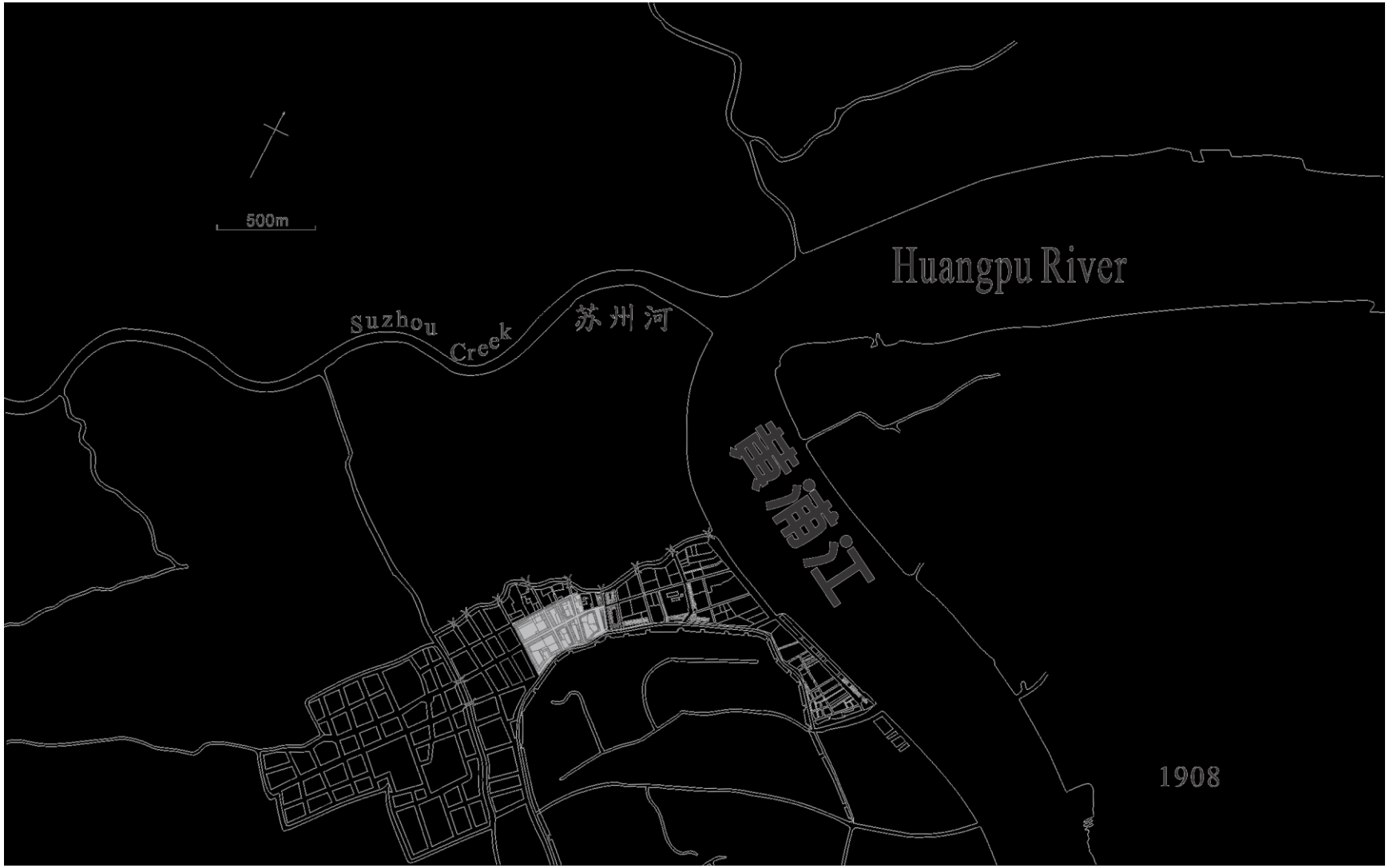


4) The establishment of the original the French Concession around 1843-1851.

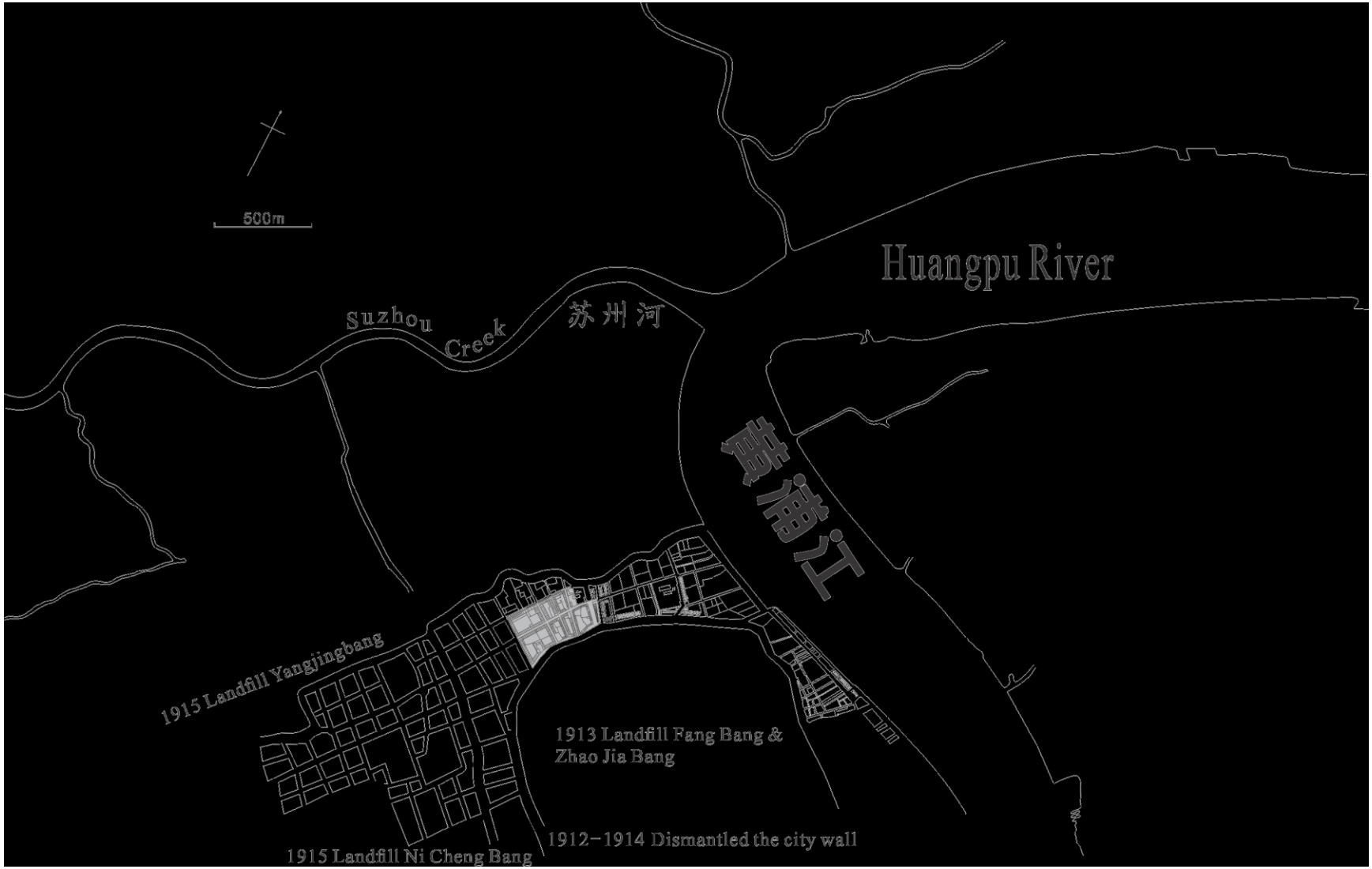


5) Extension of Rue Du Consulat and the French Concession before 1900.

6) The complete division of urban blocks and formation of the street pattern in the study area around 1863-1900.

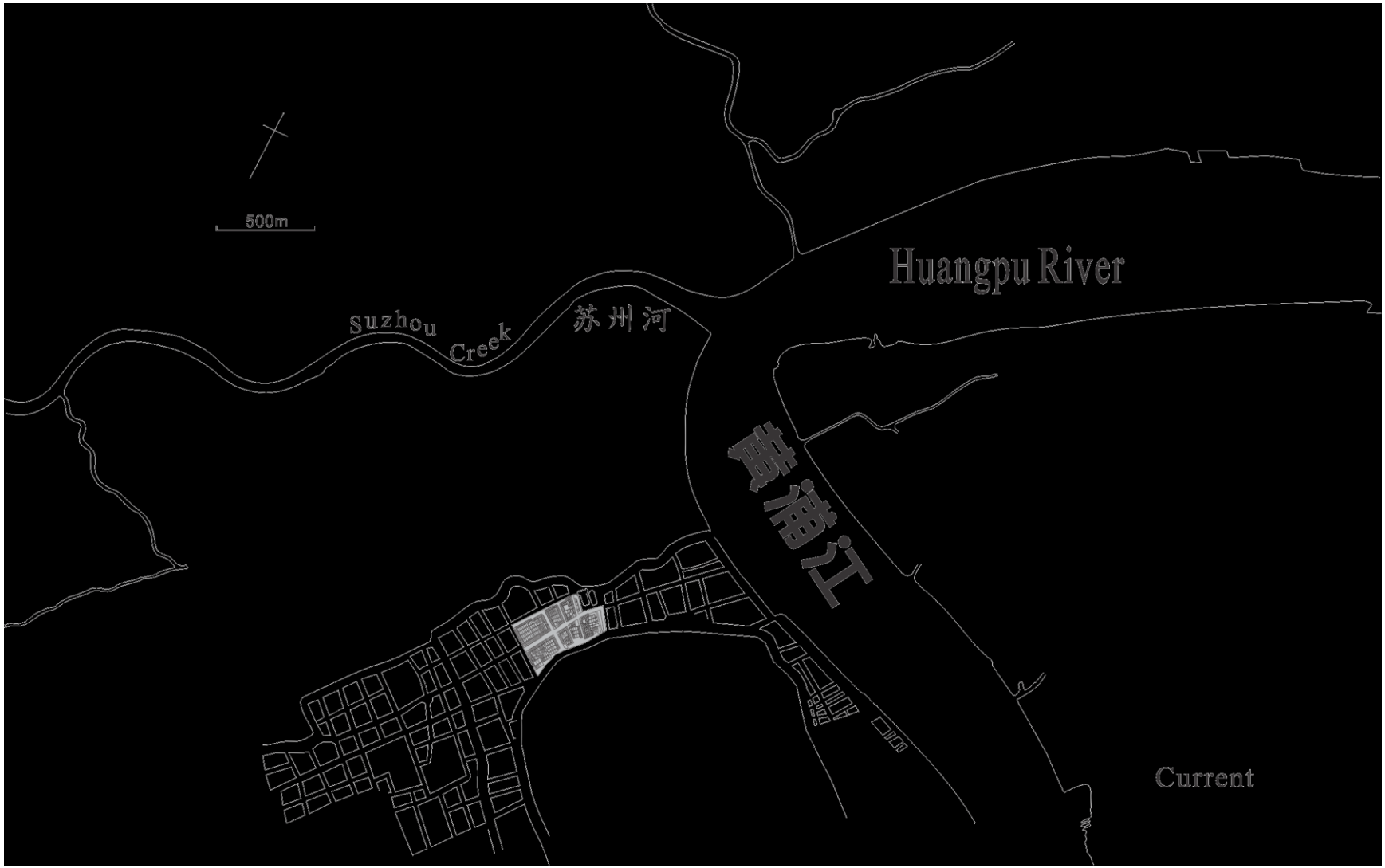


7) The building reconstruction around 1902 and further expansion of the French Concession around 1914.



8) The demolishing of the city wall and fill of Yangjingbang from 1912-1915.

9) The complete evolution of urban blocks in the study area around 1934.



10) The current situation 1949-present.

Figure 4-18: A theoretical reconstruction of the formation and transformation process of urban tissue of the study area. (The study area marked in grey)

4.4 The street networks and streets categories within the study area

In order to better understand the particular clear-cut, checker-board street system pattern in the study area, in this section, we must first acquaint ourselves with the two different street networks of Shanghai and the base of modern street network, and then categorize different streets in the study area based on Caniggia and Maffei's (2001) definition.

4.4.1 Two different systems of street networks

Comparing with the walled Shanghai and the area bordering the British Settlement along the river, one can see that there were striking contrasts between concessions and traditional neighbourhoods of that time (see Figure 4-19). The most obvious and remarkable difference was the street network: the street network in the old walled city was organic in nature; meanwhile a clear-cut, checker-board street system pattern in the concessions was predominant (Guan, 1996).

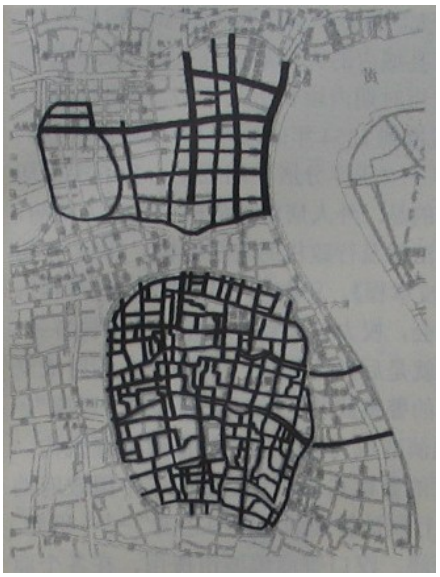


Figure 4-19: A comparison of the street network: south Chinese city and north concession.
Source: Yang, 2004, p.17.

The base of modern street networks

Land Regulations of *1845* has instated a system of urban roads, which was the base of Shanghai's urban network and the embryo form of a modern city. More specifically, according to *the Regulation*, the street network was constructed from: the Yangpu coastal road along the Huangpu River and from there it took the form of a network comprised of a chessboard of six paths from east to west, perpendicular to the Yangpu street, and two roads from north to south and parallel to the Yangpu street, which produced a fairly regular orthogonal form (see Figure 4-20) (Chang et al., 2005, p.27).

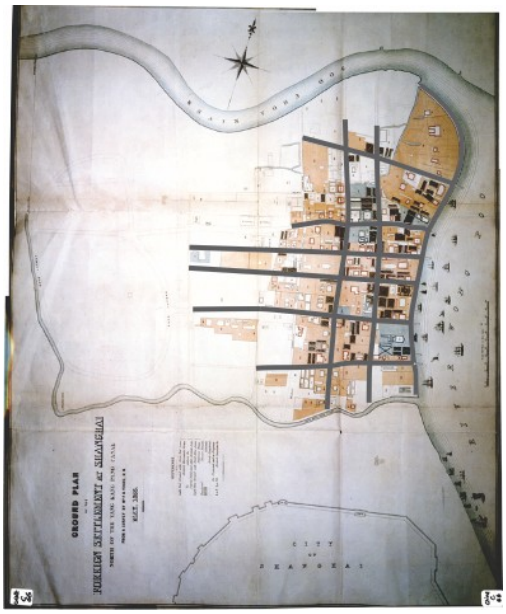


Figure 4-20: Modified Ground plan of the Foreign Settlement at Shanghai - North of the Yang Kang Pang Canal.
Source: Virtual Shanghai, from a survey by Mr. F.B.Youel R.N. Shanghai Municipal Archives.

From this system of urban roads, one can see the desire to connect with the Huangpu River, serving as a starting point for the establishment of the concession road network to facilitate transport and commercial development. This system acknowledged of the importance of the Huangpu River, the walled Shanghai was rather based on self-defence

concerns, and for this reason, the Huangpu River was completely ignored (Chang et al., 2005). Like in most European cities in the Middle Ages, the evolution of the road system of Old Shanghai was more the product of a "natural" process than a planned one (Guan, 1996).

4.4.2 Streets categories in the study area

4.4.2.1 The opening of different streets within the study area

In this section, we will study the opening of different streets in the study area.

The earliest streets in the French Concession were constructed on the basis of the pre-existing country paths of rural area, which definitely influenced the later division of urban blocks. Naturally and clearly, the tow path running along the Huangpu River, the rural paths, the brooks among the fields, scattered cemeteries, etc., had all contributed to the formation of the early grid road system in the French Concession.

A line roughly perpendicular to Yangjingbang was fixed as South Henan Road around 1851, initially named Henan Road, was the first modern street opened after the establishment of the concessions in Shanghai and is the earliest street found in the study area (Chang et al., 2005). South Henan Road was once an important linkage between the French Concession and the British Concession.

For water cities, the development of the street network is often connected to the configuration of the river network. The street network often opens depending on the installation of privileged sites located along the main rivers of the region. The streets

built in parallel to streams often become main shopping streets of the city and more developed road network eventually grows around them.

For example, East Jinling Road, parallel to Yangjingbang, built around the Qing Xianfeng years (1860), was the most important commercial street within the study area with arcade-style buildings, located in the center of the French Concession in mid-19th century and served as the political and economic center of the French Concession. Because the Consulate of France was located there, it was called Rue Du Consulat or the Consulate Road. This road experienced three phases of development. The original part of the road only extended from the French Bund (now East II Zhongshan Road) to Church Street (now South Sichuan Road). Tongzhi four years (1865), the road was first extended west to the old North Gate Street (now South Henan Road), then to South Xizang Road. Tongzhi thirteen years (1873), the Municipal Administrative Council widened this road to 13.3 metres; in October 1943 it was renamed Jinling Road, and in December 1945 it changed to its current name after the Anti-Japanese War (see Figure 4-22) (Zhu and Huang, 2008).

South Zhejiang Road, South Fujian Road and South Shandong Road were developed based on bridges erected along Yangjingbang. South Zhejiang Road opened around the mid-19th century. South Fujian Road and South Shandong Road opened in 1863. From traces of their old names, respectively Dongxin Qiao Road, Zhengjia Mu Qiao Road and Daigou Qiao, all the names include a Chinese character: Qiao, which could indicate their origins.

From reconstructing the formation and transformation process of urban tissue of the study area (see Figure 4-18), we deduce that Shengze Road, Jinmen Road and Songxia Road appeared a little bit later. We notice that the names of those streets are different from the other street names addressed earlier. There is no orientation words including in their names, for example, “South” or “East”, which might be another indicator of the different categories of routes, besides Songxia Road and Jinmen Road are located within former urban blocks.

Today’s East Yanan Road developed by filling in Yangjingbang in 1914 and was named Edward VII Avenue. Yangjingbang has also been called West Yangjingbang, named after Yangjing port, meandering from east to west and was one of the tributaries of the Huangpu River. The International Settlement and the French Concession were separated by the Yangjingbang River. Various residential buildings and a large number of businesses have been established on both sides of Yangjingbang long before and after the establishment of the concessions.

Figure 4-21: Boats on the Yangjingbang Creek.
Source: Virtual Shanghai, Estimated dates: 1900-1913.

Figure 4-22: The opening of different streets within the study area.

4.4.2.2 Definition of four categories of streets

Caniggia and Maffei's theoretical model of urban tissue formation process patterns (2001) is the useful starting point for our reconstruction of the street block system.

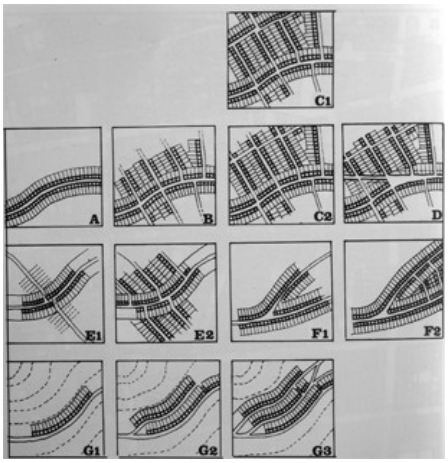


Figure 4-23: The theoretical model of urban tissue formation process patterns.
Source: Caniggia and Maffei, 2001, p.130. (A: building along matrix route, B: building along planned building route, C1: formation of connection route between planned building routes with the subsequent formation of planned building routes continuation, C2: formation of connecting routes between planned building routes subsequent to the extension of planned building routes. D: break-through street formation. COROLLARIES: E1, E2 building along matrix route and along derived planned building routes, in the event of intersection between two pre-existing pure routes; F1, F2 building along matrix route and along derived planned building routes in the case of forking of a pre-existing pure route; G1, G2, G3 building along matrix route and triggering off of planning building routes in steeply sloping area.)

The street is the most resilient element of a town plan. According to Caniggia and Maffei (2001), there are four types of routes related to the urban tissue formation process: the matrix route (perxorso matrice), the settling route (also called the planned building route), the connecting route, and the break-through route. In *Architectural composition and building typology: interpreting basic building*, the authors clearly define each route and the characteristics of buildings along them. They argue that the specialization of functions of streets depends upon their relative position in the urban system in regards to urban barriers. In an urban settlement, streets assume different roles and functions, and they are the principal components of the urban structure.

The matrix[23] route is usually built before any urban development, to link a settlement to another, or to a site (industrial or agricultural, etc.), and the route is most likely to be curvilinear. According to Caniggia and Maffei (2001), "A route crossing through the territory to connect two poles in the most direct way. Due to the presence of natural obstacles, it almost never has a linear development (p.127)". The recognition of matrix routes gives birth to the tissue in spontaneous development phase and to the unifying axes and dividing axes.

The settling route (also called the planned building route) is built specifically to give access and serve lots. There is no building or lot without a route to give access to it. The settling routes are usually orthogonal to the matrix route (Caniggia and Maffei, 2001).

[23] Matrix definition (Caniggia and Maffei, 2001, p.127): "something within or from which something else originates, develops, or takes form". Therefore, it is possible to conduct the analysis from the past to the present: trying to understand how from a simpler form things evolved to the current situation. According to the process typology theory, a type displays each time the remnants of former time while serving as matrix of future types.

The connecting route is built mainly to connect streets between them. In some conditions it may bear plots. “Connecting routes connect two successive planned building routes (Caniggia and Maffei, 2001, p.132)”. They are usually orthogonal to the latter.

The break-through route is built after the edification of the urban tissue to connect two poles. It is built by enlarging an existing street and/or by cutting through an existing fabric. Break-through route “refurbishing an existing building tissue to more easily connects already existing polar points” (Caniggia and Maffei, 2001, p.135).

4.4.2.3 Streets categories in the study area

Based on Caniggia and Maffei’s definitions and different morphological features, the streets located within the study area could be classified as following:

Renmin Road, East Yanan Road and South Henan Road are matrix roads, which existed before any urban development. They are curvilinear and appeared in spontaneous development phase of the urban tissue, foreshadowing the later systematic development.

East Jinling Road and East Ninghai Road are settling routes, developed from east to west, which were built specifically to give access and serve lots, perpendicular to the Yangpu matrix street[24].

South Zhejiang Road, South Fujian Road, South Shandong Road could be classified as connecting routes because they are connecting streets between them and linking two successive settling routes: East Jinling Road and East Ninghai Road.

[24] The street network was constructed from a single point of reference: the Yangpu matrix street along the Huangpu River.

Shengze Road, Songxia Road and Jinmen Road are break-through routes, which were developed after the edification of the urban tissue and were built by cutting through the existing fabric.

Figure 4-24: Different types of routes in the study area.

4.5 Influential factors on morphological features of the study area

The distinct morphological features of the study area are influenced by many factors. We will briefly discuss five important factors in this section.

The first factor is the natural geographic position, humid subtropical climate of Shanghai and the traditional Chinese geomancy. A north-south orientation is always preferred for private residence in China, so in general, streets oriented east to west or rivers oriented in the same direction become main commercial streets. Streets running from north to south are less important and become secondary streets. Within neighbourhoods, most main lanes are oriented north-south.

A second factor is the irregular subdivision of urban blocks and the financial capabilities of the private owners and developers. Such conditions make it hard to come up with a standardized pattern for the city grid. These foreign developers came to Shanghai to make a fortune quickly, bearing no long-term prospects or plans in management and civic plan (Wu, 2008). Different foreign governments have done little to coordinate and bring up all the parts together (Guan, 1996).

A third factor pertains to regulations issued by the Shanghai Municipal Council at the beginning of the construction of the concessions, for example, *Land Regulations* of *1845*, which made great contributions to the development of the street system, for example, the direction, width, pavement, and facilities of the streets, marked the beginning of the implementation of modern planning methods in China (Chang et al., 2005).

A fourth factor is the distance from the Huangpu River, which influences and determines the importance of a piece of land (derived by economic-oriented principles) and consequently influences land uses. With the deep westward from the Bund toward East Jingling Road, the functions of the buildings change from political, financial and trading purpose to commercial, residential and living space.

The fifth factor is Western capitalist commercial culture. The commercial needs have been given the highest priority and residential needs came next.

4.6 Syntactic analysis of the five morphological zones

This section presents the results of a synchronic analysis to illustrate the different syntactic features of five morphological zones.

Based upon their geographical distinctiveness and differing morphological characteristics, the area could be subdivided into five morphological zones, namely morphological zones A, B, C, D, and E[25] (see Figure 4-25).

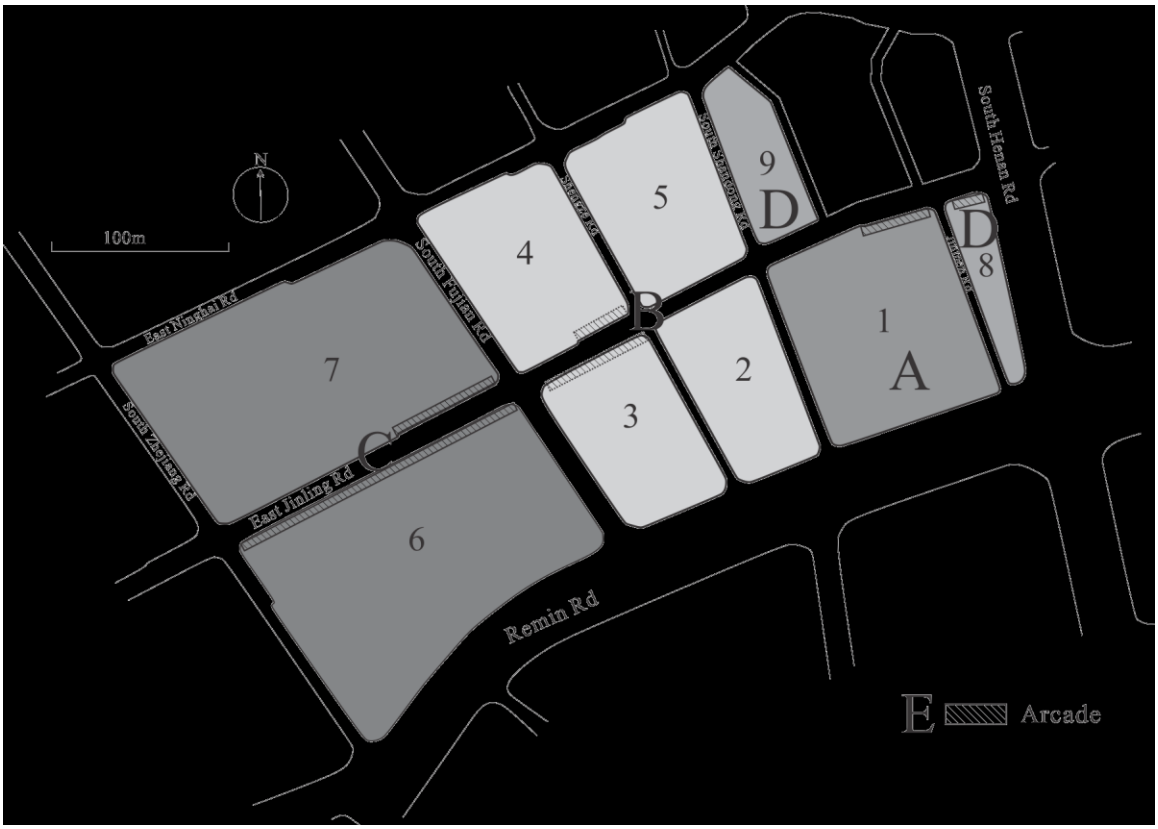


Figure 4-25: Morphological zones located within the study area.
Source: Modification of Shanghai Surveying and Mapping Institute, 2013.

4.6.1 Morphological zone A

Morphological zone A is framed by South Shandong Road, East Jinling Road, Jinmen Road, and Renmin Road, containing only one urban block (Block 1) (see Figure 4-25), which can be classified as a residential block. From the following morphological characteristics of zone A, we could verify that this tissue is older than other morphological zones, showing significant differences from what had hitherto prevailed.

[25] Morphological zone E refers to arcade-style buildings along East Jinling Road.

The development of zone A seems to correspond to the initial period of road construction in the French Concession (1840s～1860s)[26].

In section A, residential buildings are placed inside the block where they are bounded by rows of commercial shops facing busy peripheral streets. The eastern parts of commercial shops (No.279-269 East Jinling Road) along East Jinling Road are arcade-style buildings. The openings of main entrances leading to the Linongs situated within the block are placed amidst Jinmen Road, Renmin Road, or South Shandong Road (see Figure 4-27).

The orientation and arrangement of plots in zone A was probably conditioned by the layout of the water network. A map from 1851 (Figure 4-26) indicates that there were many waterways located in the French Concession and there was a large water network flowing throughout the region. We might still find some old traces of small rivers, brooks and waterways. One significant trace would be the former division walls between different Linongs, which are strong evidence tended to conform to the general direction of small rivers flowing through it (see Figure 4-27). Those rivers have conditioned the positioning of different plots and lots.

[26] The three morphological periods of the road construction process in the French Concession are the initial period (1840s～1860s), the period of maturity (1870s～1910s) and the period of climax (1920s～1940s).

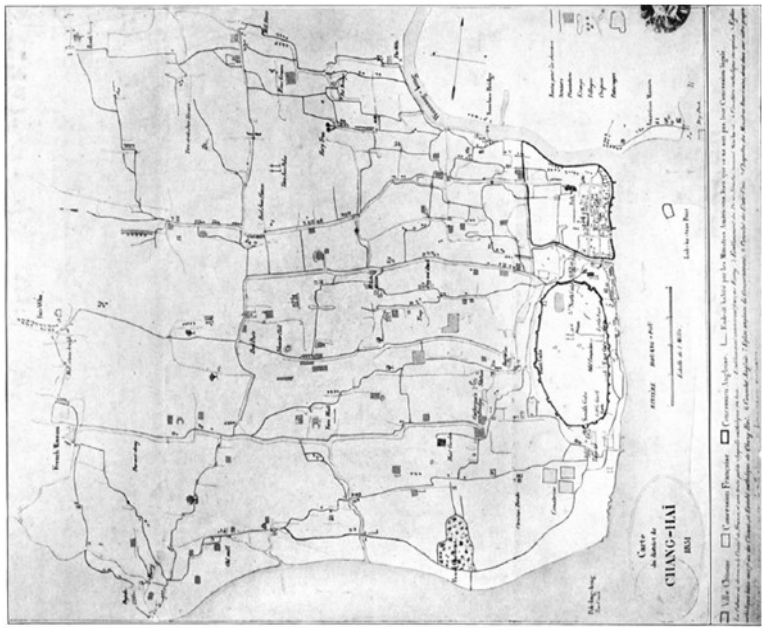


Figure 4-26: Concessions in 1851.
Source: Maybon and Fredet, 1929.

The structure of this zone is the most complex among all five morphological zones. The sector was among the earliest to urbanize before land routes were fully developed. The original block division in A was relatively free, with a seemingly arbitrary shape and no regularity. The types of plots within this block are quite irregular and patchy and the arrangement of buildings within plots can be divided in two ways: obeying either a regular composition or an irregular one. This irregularity in the plot subdivision remains visible despite the changes that have occurred since the origin.

Within zone A, four Linongs (Yuqing Fang, Dongxin Li, Huangsheng Fang, and Jili Fang) of different sizes coexist that are adapted to irregular plots (mother parcel, see Figure 4-27). Those plots are comprised of Old Shikumen of various sizes and their variants, for example, one-Jian, two-Jian, or three-Jian. Buildings accommodate different kinds of land uses, dominated by commercial and residential uses. The majority of lots have a rectangular shape. The developers had tried to stick as much as possible to

rectangular shape lots, but the general configuration of this land forced them to resort to variable shapes and sizes. Few individual units have very irregular sizes. There was a big adjustment of the depth of lots in A. It is impossible to identify foundation type for this area.

The orientation of individual buildings not always have a north-south orientation, some units are oriented south-north, east-west, or even northwest-southeast orientation, because the main consideration of the early stage development was to build as much houses as possible and was apparently paid little attention to ventilation, lighting, etc.

There are some specialized buildings located in zone A. For example, Jingcheng Elementary School is located within Yuqing Fang, and a few factories also located in A.

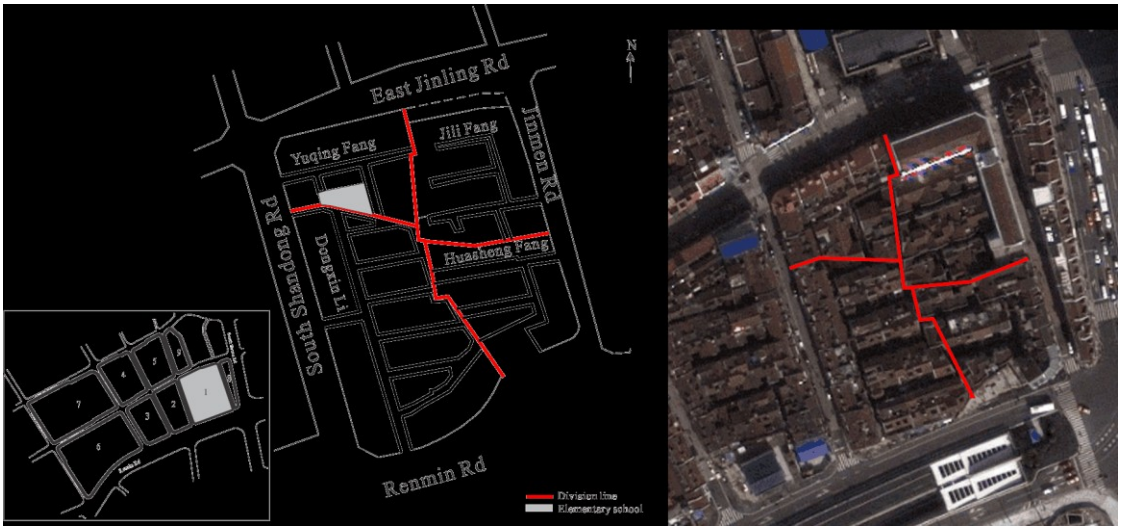


Figure 4-27: The structure of morphological zone A.
Source: Google Earth, retrieved 2013/11.

4.6.2 Morphological zone B

Morphological zone B includes four urban blocks [27] (see Figure 4-28). The development of zone B might also correspond to the initial period of the road construction process in the French Concession (1840s～1860s). Zone B includes Mingde Li, Jingyi Li, Xinkang Li, Zhonghua Li, Chengzhi Li, Baoxing Li, Weixiang Li, and Huicheng Li, composing slightly regular plots (see Figure 4-28).

Influenced by a different street layout, zone B presents different morphological characteristics than zone A. The structure and plot subdivision of zone B is relatively simple. Within B, residential buildings are still placed inside each urban block, bounded by commercial shops along peripheral commercial streets. Block 3 and the eastern section of Block 4 (No.228-214 East Jinling Road) along East Jinling Road are arcade-style buildings. Block 2 and Block 3 are subdivided into different rectangle strips. There are no big differences between the main lanes and side lanes. They are connecting major roads: South Fujian Road, Shengze Road, or South Shandong Road, which is not so common in typical Linong neighbourhoods, because for them, the side lanes are usually cul-de-sac. Block 4 is divided into two parts with similar shapes, and Block 5 is divided into 3 plots. The majority of internal residential buildings are still of the Old Shikumen type, mainly composed of one-Jian, two-Jian, and a few are three-Jian.

If one observes carefully, the majority of lots within zone B are rectangular shapes and the arrangement of buildings within B shows some regularity. A majority of residential

[27] Respectively framed by South Shandong Road, Renmin Road, Shengze Road, and East Jinling Road (Block 2); Shengze Road, Renmin Road, South Fujian Road, and East Jinling Road (Block 3); Shengze Road, East Jinling Road, South Fujian Road, and East Ninghai Road (Block 4); South Shandong Road, East Jinling Road, Shengze Road, and East Ninghai Road (Block 5).

buildings have a north-south orientation, but a few are oriented east-west, and only one has a south-north orientation. Regularity in orientation might indicate that, at this stage of development, developers were paying more attention to ventilation and lighting problems.

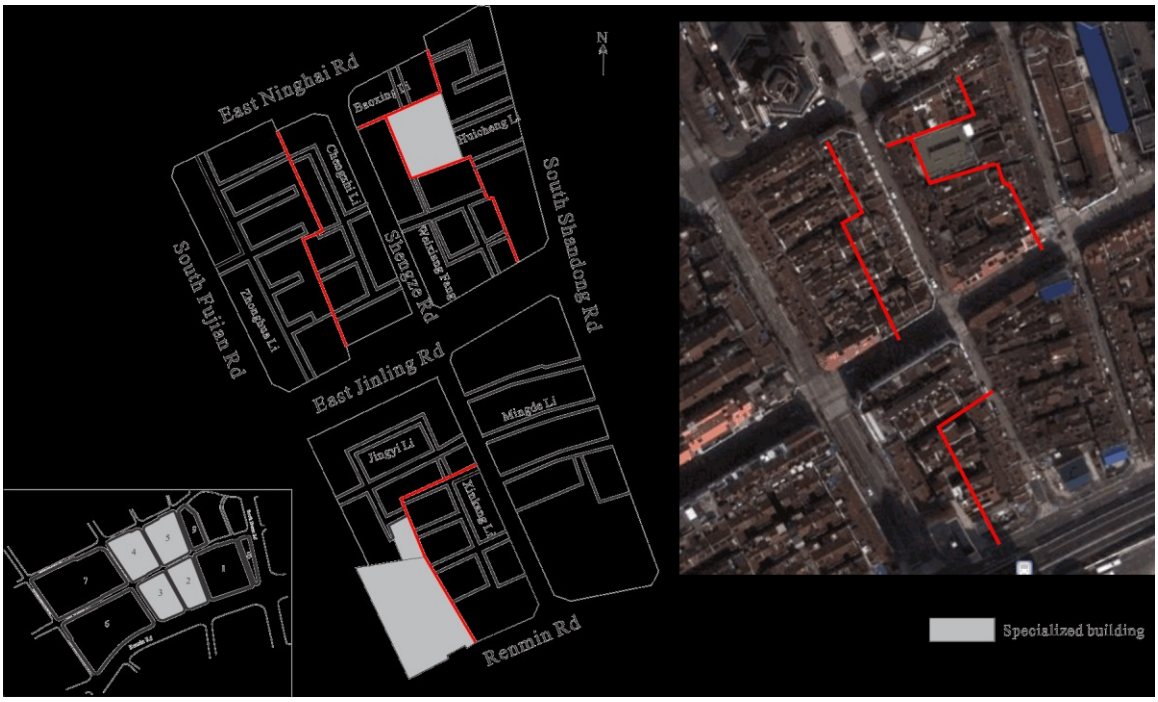


Figure 4-28: The structure of morphological zone B.
Source: Google Earth, retrieved 2013/11.

One of the biggest differences between zone A and B is that, for B, there are no entrances leading to the inside Linongs, placed amidst Renmin Road. One possible explanation for this could be that the former city wall had not been demolished yet; the water would still constitute an obstacle to the south between the French Concession and the old walled city.

The openings of Linongs within zone B are greatly influenced by the East Jinling Road. In zone B, the entrances of Linongs have been placed predominantly amidst East Jinling Road, for example, Zhonghua Li and Weixiang Li. One also finds that Baoxing Li opens

towards East Ninghai Road, which developed simultaneously to East Jinling Road, but that was economically less important (which might explains why there are no arcade style buildings along East Ninghai Road).

For the exterior commercial buildings, one can see an obvious contrast within the same block because that seems to correspond to the building reconstruction, which would have to comply with the Municipal Administrative Council's 1902 "The arcade street stipulation". For example, in Block 4, buildings along the South Fujian Road are two-story one-Jian Old Shikumen, while buildings along Shengze Road are three-story one-Jian New Linong. Such difference might be used as a good indicator of the sequence of the opening of roads. These considerations strengthen our hypothesis that Shengze Road is a break-through road that appeared after the edification of the urban tissue.

There are some specialized buildings located in zone B, for example, one church and three schools located in the left corner of Block 3 (see Figure 4-28).

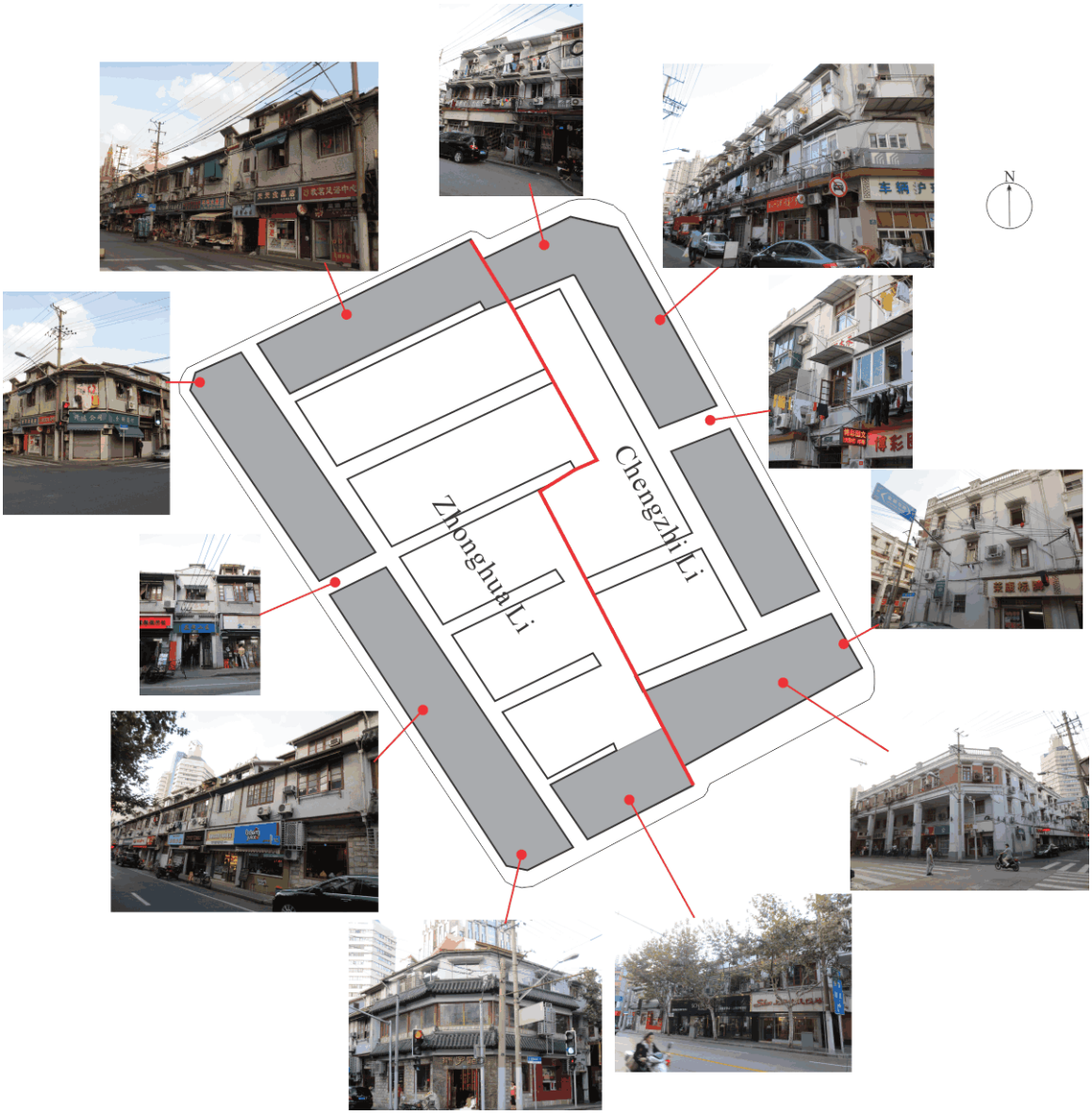


Figure 4-29: Different architectural models within block 4.

4.6.3 Morphological zone C

Morphological zone C is comprised of two urban blocks[28] (see Figure 4-30). The development of zone C also seems to correspond to the initial period of road construction in the French Concession (1840s～1860s), but this tissue is a little bit newer than

[28] Respectively framed by South Fujian Road, Renmin Road, South Zhejiang Road, and East Jinling Road (Block 6); South Fujian Road, East Jinling Road, South Zhejiang Road, and East Ninghai Road (Block 7).

morphological zone A and B, showing some differences from what has hitherto prevailed. Zone C includes Bolin Li, Minguo Li, Baoan Fang, Duxing Li, Baoxing Li, Anji Li, Jinfu Li, and Ji'an Li.

Linongs located within zone C present a hierarchical alley system. Consequently, the distinction between the main lanes and the side lanes also became more obvious. The main lanes are becoming wider and busier, providing better ventilation and lighting as well as the possibility of vehicular access. One thing worth mentioning here is that in zone C, more main lanes of Linongs are running north-south, which is different from zone A and B. For example, zone C displays the famous and typical "fish-bone structure" of Linongs, which was not so obvious in the other morphological zones.

The main entrances of Linongs within zone C are not only affected by the presence of the prominent East Jinling Road, but also influenced by the rise and development of Renmin Road and East Ninghai Road. For example, one finds entrances of Linongs placed amidst East Jinling Road, East Ninghai Road and Renmin Road.

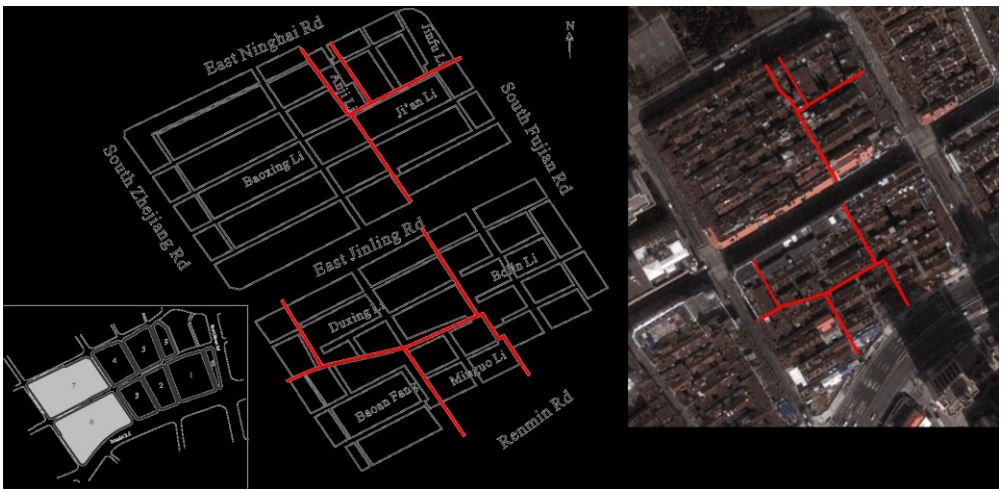


Figure 4-30: The structure of morphological zone C.
Source: Google Earth, retrieved 2013/11.

The arrangement of residential buildings within zone C had been improved a lot by paying more and more attention to ventilation and lighting problems, because almost all the individual buildings are facing the south, with only a few exceptions to the rule. Baoxing Li illustrates the regularity of the spatial layout in zone C (see Figure 4-31).

Old Shikumen is the dominating architectural type in zone C, but a newer building type has emerged: New Shikumen. Baoxing Li and Duxing Li display New Shikumen Linongs, which were built or rebuilt around 1923 and 1932. The majority of the residential buildings are composed of one-Jian, two-Jian, and a few are three-Jian. A majority of lots have a rectangular shape.

By comparing the Old Shikumen Linong with the New Shikumen Linong, we found that the size of the Linong neighbourhoods increased sharply. Because of limited land and financial ability of the small developers, the Old Shikumen Linong was rather small in scale compared to the New Shikumen Linong. New Shikumen Linongs were developed at a much bigger scale with often hundreds of buildings. The number of housing units per row and the total number of houses per Linong of Old Shikumen Linong were less than New Shikumen Linong. For example, Baoxing Li contained 110 buildings on 11,423 square metres, which is the biggest Linong located within the study area. The spatial layout of New Shikumen displays more and more regularity and openness.

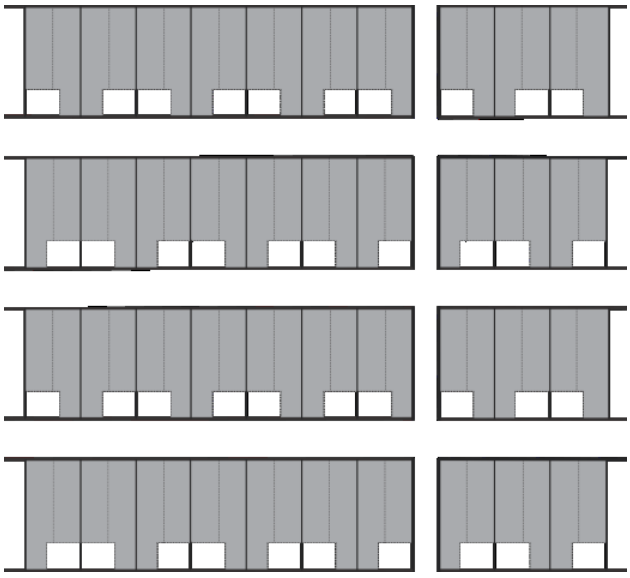


Figure 4-31: The alignment model of two-Jian Shikumen (based on Baoxing Li).

We observed two distinctive feature of New Shikumen in zone C: Tingzijian[29] and Guojielou[30], which had been built to take full advantage of space and increase the visibility of the Linongs.

Block 6 mostly contains rectangular or trapezia shaped plots, because Renmin Road curves in some places, several plots have been distorted. Block 7 has mostly rectangular shaped plots.

One of the biggest difference between zone B and C is that, in zone B, there is no entrance leading to the inside Linongs, placed along Renmin Road, but for C, some Linongs place their entrances along Renmin Road. One possible explanation for this could be that during this period of development (1840s～1860s), the demolishing of the

[29] Tingzijian is a small room, located between the first floor and the second floor, the second floor and the third floor, at the top of the kitchen, or at the turning point of the stairs, occupying small space, very hot and humid during the summer. Tingzijian was used as servant's quarters and, in many cases, rented.
[30] Guojielou: an arcade building usually located at the entrance of a Linong, but a few located within Linong connecting main lanes seems to be hanging in the air, which increases the recognition of Linong. This arcade building was beginning to appear more on the later stage of New Shikumen.

city wall in 1912 changed the morphological features of blocks located around it. For example, the morphological hierarchy towards the interior of the city disappeared and the old walled city and the French Concession started to merge.

4.6.4 Morphological zone D

Morphological zone D includes two unique blocks: Block 8[31] and Block 9[32] (see Figures 4-32, 33), which could be classified as commercial blocks. At the first glance, we found that the morphological features of the two blocks are quite different from previous urban blocks: commercial shops at the boundary of each block and residential buildings inside bounded by those shops. The morphological features of those two blocks are slightly different from each other due to different route implementation. Jinmen Road and Songxia Road are two break-through roads running through the blocks, but they had been developed differently.

Commercial Block 8, today's Shanghai Manhattan Jinling Business Hotel, is located at a particular site: the intersection of South Henan Road and Renmin Road. The morphological features of Block 8 are greatly influenced by the location of the former old Northern Gate and the importance of the South Henan Road.

[31] Block 8 is framed by South Henan Road, Renmin Road, Jinmen Road, and East Jinling Road.
[32] Block 9 is framed by Songxia Road, East Jinling Road, South Shandong Road, and East Ninghai Road.

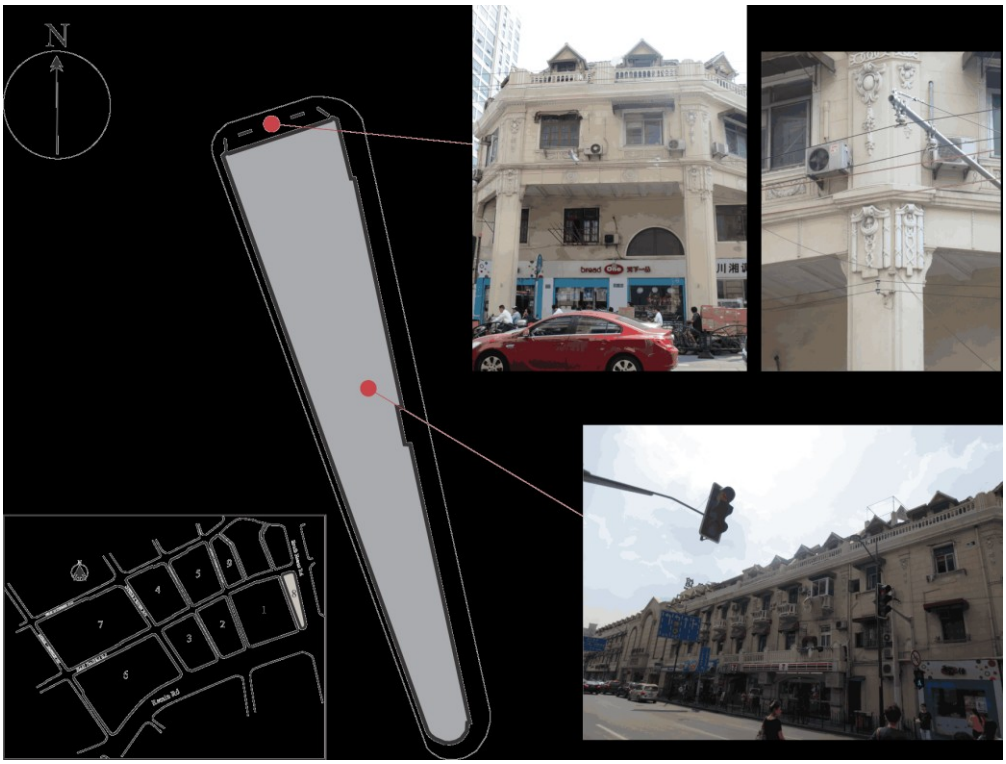


Figure 4-32: Block 8: Shanghai Manhattan Jinling Business Hotel.

The whole irregular long strip shape plot is entirely occupied by one single concrete four-story building. Totally there are 24 one-Jian units, 20 units adopt an east-west orientation by facing South Henan Road, while four arcade style units along East Jinling Road use a south-north orientation. The main entrance is located at No. 58 South Henan Road. The whole building has a western three-section character. The facade facing South Henan Road adopts some western architectural styles and features, for example, the hipped roof, the white marble balconies, the brackets with elaborate carvings and paintings, the off-ground open space (the corridor in the second floor and fourth floor), etc., increasing the sense of uniqueness and openness by taking full advantage of the corner position, which is crucial for commercial activities.

Block 9 was originally part of the Poste de Police Mallet's annex, which was built in 1864. Poste de Police Mallet was one of the six district police stations of the French Concession. In 1935, the old site had been transformed to a ten-story building, still used by the Poste de Police Mallet. Today, this building is occupied by the Huangpu Police Station. From the historical map (for example, the map of 1947), we could observe that Songxia Road did not exist at the beginning. Maybe because the erection of the ten-story building, the different parts of the old Poste de Police Mallet merged together and moved into the new building, they did not need the annex buildings, so the former annex site became Block 9.

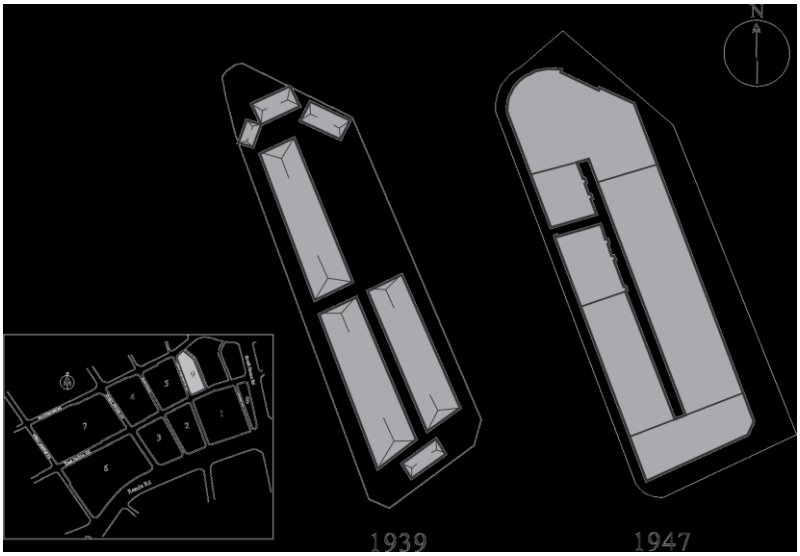


Figure 4-33: The transformation of Block 9.
Source: Chinese Construction Company, 1939 and1947.

Block 9 is also different Block 8. The irregular long strip shaped plot is framed by placing two rows of commercial units back to back facing different streets. There is a back lane between them, but there are no residential units located inside. For Block 9, although the buildings are all attached to each other, from the different architectural styles, the obvious breaks and ruptures between party walls shared by adjacent buildings,

the different heights of aligned main facades, etc., we could assume that Block 9 experienced different phases of development, or by different developers or builders.

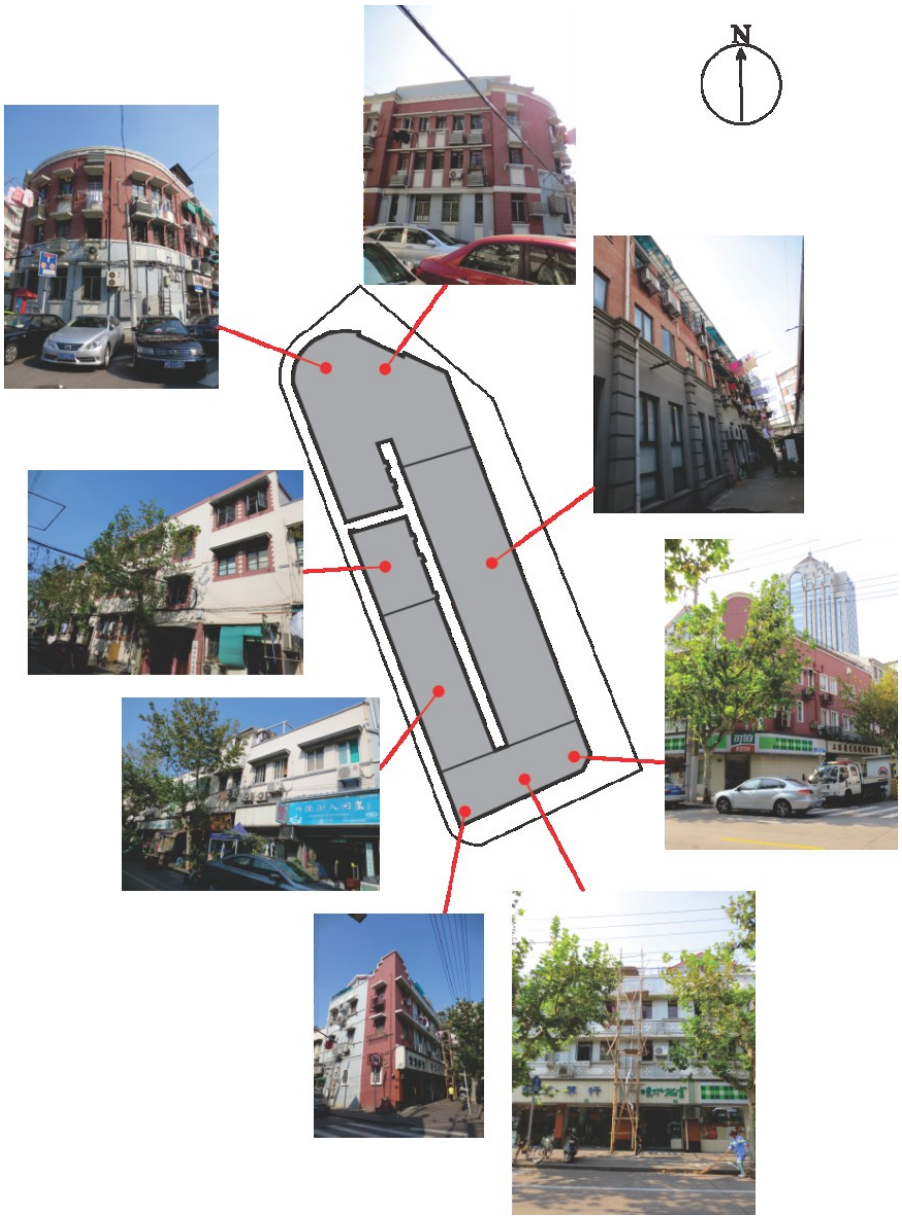


Figure 4-34: Different architectural styles within Block 9.

In morphological zones previously presented, there were no residential units placed among peripheral streets. However in Block 9, there are some units along exterior Songxia Road reserved for residential uses, and some units have been used as storage

facilities or factories. This is much due to the particularity of Songxia Road, located along the specialized building: Huangpu Police Station, calling for security and trying to offer more privacy, so we might conclude that the importance and different functions of pertinent streets play an important role when shaping urban tissue around it.

4.6.5 Morphological zone E

Morphological zone E refers to arcade buildings located along East Jinling Road.

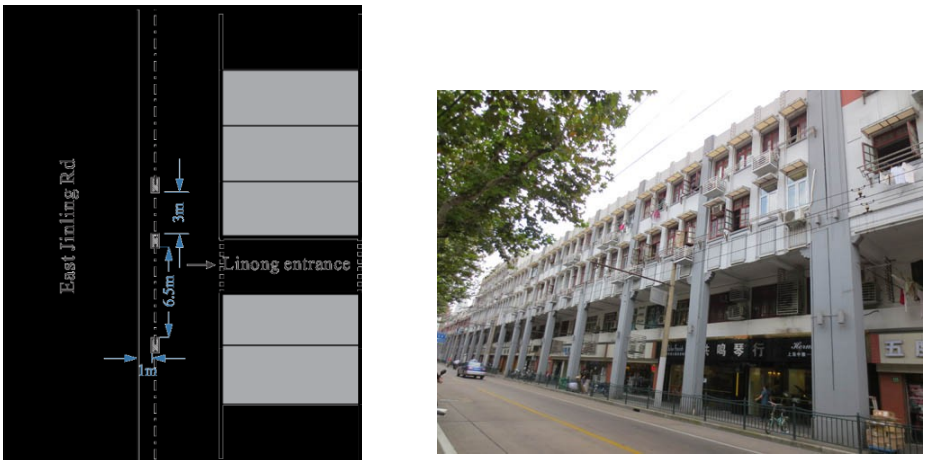


Figure 4-35: The arcade style buildings along East Jinling Road.

There are conflicting explanations for the origin of arcade buildings in Shanghai.

Wu (2008) posits that a plausible explanation for the origin of arcade buildings could be that the early settlers from Southeast Asia have imported and transplanted Indian colonial-veranda porch style buildings to Shanghai. The earliest architectural styles in the concessions, no matter they were for residential, commercial, or institutional buildings, all included verandas. The settlers would have relied only on intuitive knowledge or memories, as the buildings were built by local craftsmen using local materials and

construction techniques (Wu, 2008). This type of architecture was named: "Compradoric Style"[33] in Shanghai.

Another popular explanation is that the arcade is an architectural form originating from the Canton area. After the Opium War, many people moved to Shanghai from Canton or Fujian province, to settle in the French Concession, where they would build Guangdong arcade-style architecture along the East Jinling Road.

Whether this model was originally developed based on Indian colonial-veranda, or Southeast Asian porch buildings, or Guangdong arcade-style, as some authors argue, it is ill-adapted to local geography and climate (Wu, 1996). Arcades were originally developed in tropical and subtropical regions in order to adapt to heat and rainy weather. The natural climatic conditions in Shanghai are not suitable for such an architectural form. Arcade-style buildings in Shanghai did not prevail for long and their construction has soon been abandoned (Wu, 1996). East Jinling Road is the only arcade street in Shanghai.

In the early 20th century, the arcades started to appear in the eastern part of East Jinling Road. Arcade buildings were built in accordance with "the arcade street stipulation" promulgated in 1902 by the Municipal Administrative Council (Zhu and Huang, 2008). Since such stipulations were edicted in a context of building reconstruction, we can still find some older buildings without arcade to this day in the area.

[33] According to Wu, "Compradoric Style" is a combination of Comprador and Doric Style, which is an ancient Greek architectural style and its main manifestation is "Doric Order" (2008).

When arcades are part of the local building tradition, they form a continuous network, which is not the case in the study area. When series of arcades are interrupted, the system loses all its functionality, as an essential character is to provide a continuous network of protected sidewalks.

We argue that arcade style buildings along East Jinling Road might be an expression of "exoticism". Our contention is that the arcade-style street is an expression of a crisis, more specifically "exoticism": the consequence of resorting to an architectural stylistic expression, an architectural "language", borrowed from a different cultural area, a different era, or from a "stylistic repertoire" produced by a specific "critical" tradition (Caniggia and Maffei, 2001, p.31-42).

Figure 4-36: The relationship between arcade style building along East Jinling Road and urban tissue.

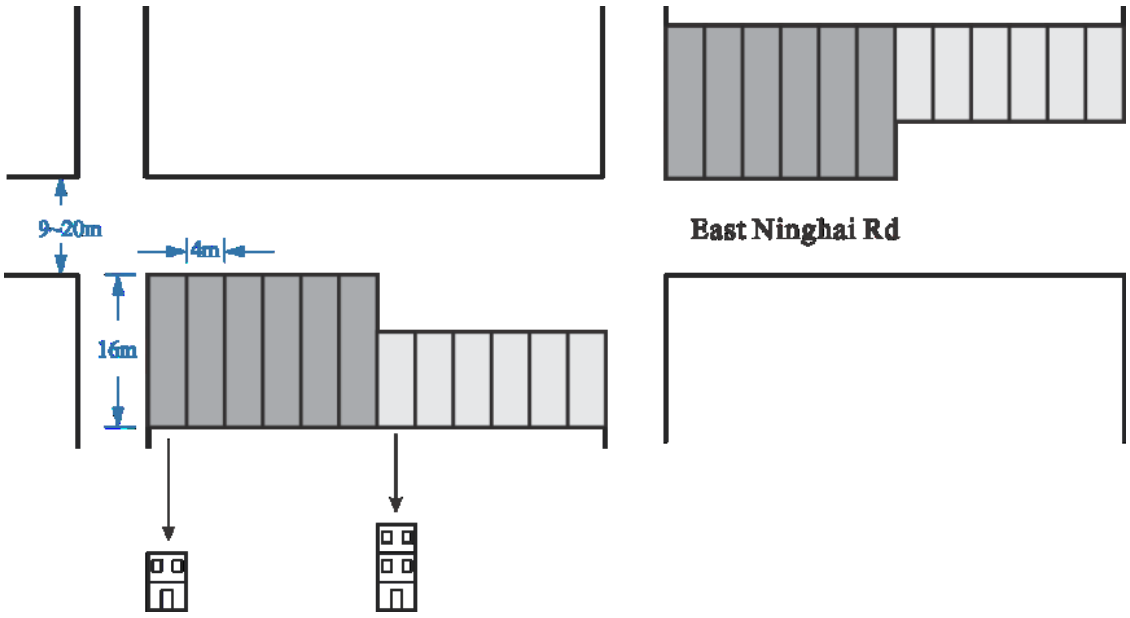


Figure 4-37: The relationship between commercial building along East Ninghai Road and urban tissue.

4.7 Diachronic analysis of the study area

Diachronic analysis is to study transformational dynamics. The diachronic analysis usually includes: phases (formation, transformation, growth, densification, mutations, urban fallow[34], etc.), structural permanencies (what remains the same throughout changes), tendencies (continuity in change and regularity in transformation), and sequences (characteristics order in phenomenon appearance).

The morphological evolution of the study blocks

The evolution of the study area corresponded to the three morphological periods of the road construction process in the French Concession: the initial period (1840s～1860s), the period of maturity (1870s～1910s) and the period of climax (1920s～1940s) (Chang et al., 2005).

[34] Buildings are destroyed, plots are aggregated to create larger lots, and new buildings will be built.

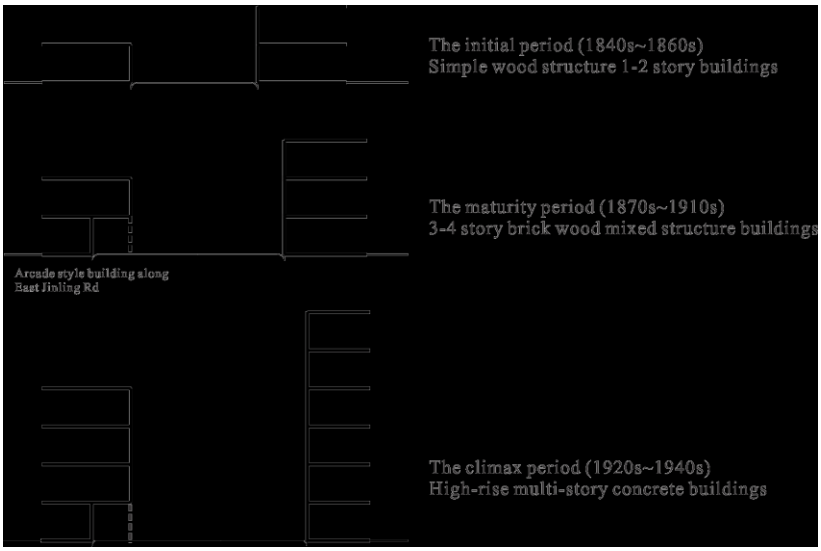


Figure 4-38: The road construction process and section view of the street within the study area.

The initial period (1840s～1860s)

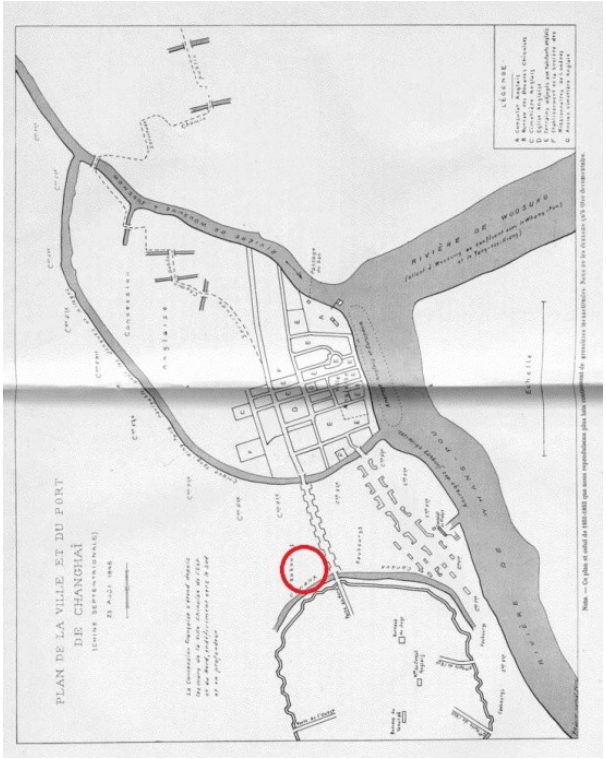


Figure 4-39: Plan de la ville et du port de Changhaï (the study area is marked in red).
Source: Maybon, Ch-B., Fredet, Jean, 1848.

This Map of the city and port of Shanghai in 1848 (Figure 4-39) indicates the early day situation following the opening of the port in the French Concession. From this map, we

could observe that the study area used to be rural, agricultural and swamp areas. It mainly consisted of wetland, which was "brooky, reedy, with many tombs scattered around there" (Chang et al., 2005). Initially, there were no streets and built-up areas, no "detailed" plan subdivision in the study area, which was probably mainly made of vacant farmlands waiting for further development.

Soon after the establishment of the French Concession in 1849, the division of urban blocks in the study area started. The earliest street, South Henan Road, opened in 1851. The initial built-up blocks were irregular in shape, with one or two-story wooden buildings scattered irregularly within those blocks. Various functions of buildings like residential, commercial and storehouse coexisted.

After 1860, functions of the blocks further developed due to the quick economic development. All the streets located within the study area came into shape around 1863 except Renmin Road and East Yanan Road.

The period of maturity (1870s～ 1910s)

From 1870 to 1910, urban blocks within the study area underwent dramatic changes. The period of maturity was characterized by a rapid densification process, also called repletion phase, which could see "the gradual intensification of building density in an existing plot pattern" (Conzen, 1969).

Figure 4-40: Map of the French Concession in Shanghai
Source: Modified from Maybon & Fredet, 1871, p.272.

An 1871 Map is by far the most detailed map of the French Concession for the early period. All roads and major buildings are named.

For the study area, the densification phase was fulfilled by different sizes of Linong neighbourhoods, especially Old Shikumen Linongs at this stage of development. We could observe the early division of urban blocks in the study area, notice significant intensifications of building density compared with the 1848 map, each block within the study area had been constructed and occupied by Linongs, but there were still large vacant lands left, especially within Block 1, 3, 4, 6, and 7. Some specialized buildings appeared, for example, the Poste de Police Mallet, built in 1864, occupied one large block. It was later reconstructed, and its old annex became Block 9.

Figure 4-41: Plan de la concession française à Shanghai 1882.
Source: Modified from Imprimerie de Erhard, 1883.

From the French Concession in the Shanghai map of 1882 (Figure 4-41), we could observe that most of the study area had been fully constructed and occupied by Linongs by that year. One can observe further densification of buildings compared with the 1871 map. Only a few vacant lands subsisted in Block 6 and Block 9.

We can observe distinctive morphological features of urban blocks in the study area at this stage of development. All the blocks within the study area are predominately residential blocks, which was influenced by the distance from the Huangpu River. For example, eastward from East Jinling Road, near the Huangpu River, there were large financial and trading institutions, office and commercial buildings, to the westward blocks, there were more and more Linong houses.

The climax period (1920s～1940s)

During the climax period, the most obvious change was plot metamorphosis (mostly subdivisions or consolidation) (see Figure 4-42), which was clearly showed by Cadastre - Plans des sections (1902)[35].

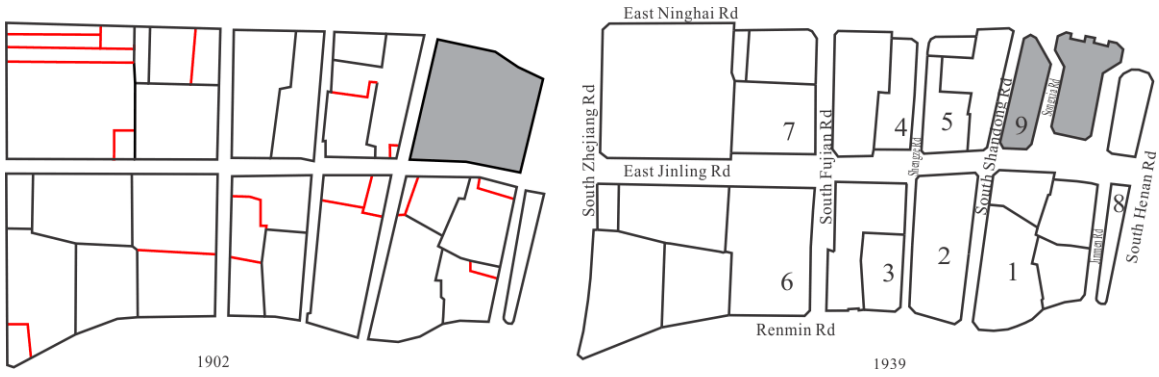


Figure 4-42: The lot metamorphosis of urban blocks in the study area.

A 1947 map (see Figure 4-43) from Shanghai street directory clearly illustrates the street system and allotment system in the study area. From this historical map, we found that a significant number of shops had been opened within the core of urban blocks. The reason might be the great location and high land value of this area, determined by the importance of the East Jinling Road.

[35] Cadastre - Plans des sections (1902), Source: Author(s) Concession française de Shanghai, Virtual Shanghai. Additional mention: "Dressé sous la Présidence de Mr. P. Brunat par J.J. Chollot, ingénieur du Conseil".

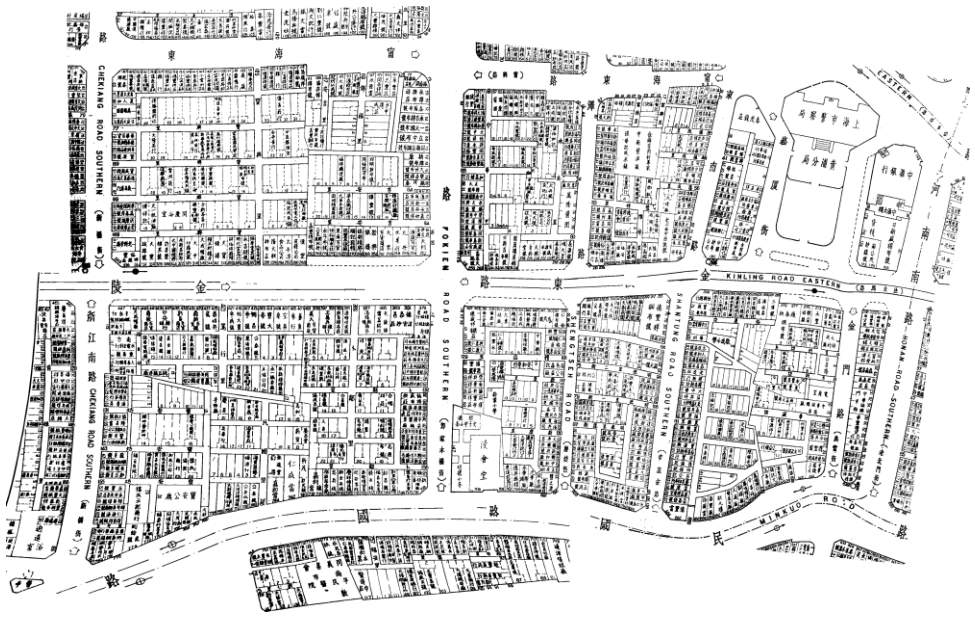


Figure 4-43: The map of 1947.
Source: Shanghai street directory, 1947.

The map of 1947 shows some building repletion and lot metamorphosis[36]. The most obvious example happened in the western portion of Block 7: six small plots were merged to form one big plot (see Figure 4-42). The biggest Linong neighbourhood in the study area: Baoxing Li had been built on this big plot. The same phenomenon happened on the eastern portion of Block 6. Two smaller plots merged together to create one big plot, on which Bolin Li was built. From this map, we also noticed that Block 9 came into shape. It was transformed by the construction of the so-called old annex of the Poste de Police Mallet.

During this period of development, one could also observe the phenomenon of feedback loops[37] described by Conzen (1967). Duxing Li located in Block 6, built in 1932, is a typical example of this phenomenon. Its predecessor was Deshan Li. An old

[36] According to Conzen, physical transformations take two forms essentially: metamorphosis of plot patterns and building repletion (1969). Lot metamorphosis refers to subdivision or consolidation of plots, building repletion refers to the gradual intensification of building density in an existing plot pattern.
[37] Feedback loop: new architectural forms retrofit into the former tissue (Conzen, 1967).

tissue comprised of Old Shikumen that was replaced by a new architectural form: New Shikumen.

It was also worth mentioning that some prominent specialized buildings were built, for example, churches, schools, factories, etc. From 1939 to 1949, most of the morphological features of those blocks remained unchanged.

Current situation

From 1949 until now, morphological features of the study area remain relatively unchanged: the traditional urban tissue has been preserved.

Among the few changes affecting Blocks 1, 2, 3, and 6, buildings adjacent to Renmin Road have been demolished in order to make rooms for the expansion project of Renmin Road.

Presently, in the study area, residential buildings still occupy the core of the blocks. They are bounded by rows of commercial shops facing peripheral streets. There are no commercial activities inside urban blocks, except for a few barber shops and bicycle repair shops, perhaps because the economic center moved further westward, with the rise of Joffre Road (now Huaihai Road).

Some high-rise apartment buildings have also recently appeared in the northern parts next to the study area by amalgamating small patchy plots and demolishing Linong neighbourhoods (see Figure 4-44). Such appearance of commercial-residential complexes

alters significantly the urban tissue, as it breaks with the historical continuity of the urban form.

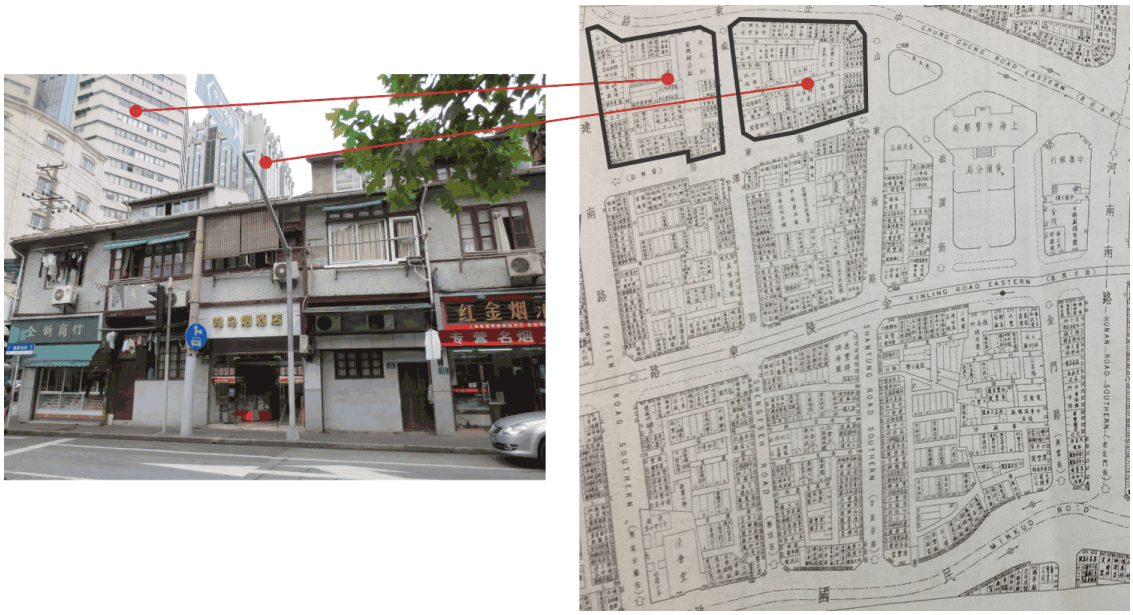


Figure 4-44: The high-rise commercial-residential complex on the left breaking the historical continuity of urban tissue as illustrated by a 1947 map to the right.

4.8 Conclusion

Based on historical and contemporary cartographic representations and extensive field work, this chapter analysed the general morphogenetic process of urban tissue of the study area by tracing back its initial phase of urban development. It has tried to reconstruct the evolution of the urban tissue of the study area, while highlighting factors that have influenced and determined the course of such an evolution.

The huge transformation and diachronic development of the study area since 1842 followed a progressive sequence. This significant transformation mainly took two forms: building repletion and plot metamorphosis. Initially there was no strict plan subdivision. Most of the study area's existing buildings were built between 1870 and 1930. They are

predominantly two or three-story residential Shikumen Linongs. After their initial development phase, there were feedback loops, which also affected the morphological features of the study area.

The main morphological changes during this period were as follows:

First, during this period, the analysis of five morphological zones reveals that the east-west urban development has called for more regularity. The hierarchy behind Shanghai urban block: regular in urban block—irregular in "Li" or "Fang"—regular in allotment had been retained, allowing us to identify structural permanence.

Second, during this period, the traditional street spaces were preserved. This tributary street network structure in the study area has not been changed. By placing commercial shops along peripheral streets, the spatial continuity of commerce along the street-facade has remained. The spatial hierarchy of Linong: street—main lane—side lane, marking different degrees of privacy: public—semi public—private has prevailed throughout the period.

Finally, the particularity of Shanghai urban form was insured. During the 1842-1949 periods, Linong neighbourhoods in the study area are still introverted and characterized by their enclosures. Such traditional characters insured and preserved the continuity and integrity of the urban tissue.

5. Analysing typology

5.1 Introduction

This chapter focuses on the building scale in order to investigate the typological process affecting residential forms in the study area.

By reconstructing the typological process, one can discover the rules and laws through which the urban landscape develops and to which any new design could then be related. These rules govern the place of a building in the urban tissue, the relationship between building and lot, building and street, and the architecture of the building itself (Gauthier, 1997). The more closely a development follows these rules, the better it will fit in with existing buildings, forming, in turn, the basis for future variations (Corsini, 1997).

The study area is very rich architecturally. The field work was a rewarding experience offering great opportunities to admire exquisite and exotic characters of a wide variety of buildings. Spending more than forty days there, strolling around different Linong neighbourhoods and chatting with Linong dwellers, I started to enjoy the unique charm of Shikumen houses and began to learn to appreciate the cross cultural environment of Chinese and French at the same time. I explored, documented, measured, took pictures, studied, and surveyed some Shikumen houses and different Linong neighbourhoods. Finally I also familiarised myself with some Linong redevelopment projects.

5.2 Type and typological process

At the centre of Caniggia and Maffei's (2001) work are the notions of type, typology and typological process.

5.2.1 The notion of type

The notion of type is to be understood here in the sense of a set of conventions, norms and unwritten rules, which together form the conceptual framework whereby at an accurate historical time and in a given cultural milieu to build houses (Gauthier, 1997, p.30).

> *Type is, therefore, the conception of the building produced: it is total projection-initially conceptual, when it comes into being, and then logical, when we examine it, of existing building, shaped according to the "house concept" that exists in the builder's mind at spontaneous consciousness level and is in force in a given historic moment, resulting from the succession of "house concepts" that developed before that moment in history (Caniggia & Maffei, 2001, p.54).*

The theory distinguishes a *priori* type and a *posteriori* type. A *priori* type proceeds at the spontaneous level, as a code that organizes information on what and how to build; as a code about which builders generally have only an intuitive knowledge.

Posteriori type is, meanwhile, a building scientist who wants to describe the contents of a *priori* type (Malfroy, 1986). The *posterior* type is an abstract object, an instrument of knowledge, which aims to identify common properties and essential categories of apprehended objects (Caniggia, 1994). In other words, it is the type as related after the fact by means of scientific analysis.

Types are the result of sedimentation of building practices and ways of living. They are the result of adaptations by trial and error to socio-economic conditions. By definition, it is always changing in order to achieve maximum efficiency, or a state of dynamic

equilibrium (Gauthier, 1997). A type is a group of objects that share some common characteristics and is derived from the same generative rules. The type is the set of conventions and norms developed in the course of building experience (Gauthier, 1997). The type is a cultural model, carried mentally, and for the most part unconsciously, which is mobilized by agents when they produce and use the built environment (Gauthier, 2005).

The grouping into types is based on retrieving characters shared by a group of buildings or, symmetrically, by discriminating different characters. The analysis entails establishing categories. When identifying a type, i.e. or the group of buildings that manifest a type, one looks at similarities and differences. The similarities or typical characteristics mean what looks like and shared patterns, while the differences or atypical characters, or dissimilarities mean what distinguishes one group of object from another[38]. In this thesis, focuses on categories of characters in particular analysis: the constructive and distributive characters[39].

5.2.2 Types and their variants

The foundation type is "a type of building which, in a certain time and place, represents the majority of buildings because it identifies the codified family residence standard" (Caniggia and Maffei, 2001, p.107).

[38] Pierre Gauthier, 2011.

[39] Pierre Gauthier (2011): it is considered the structural characteristics insofar as discriminating, especially where technological changes have had a decisive impact on the spatial properties of the buildings concerned, for example, when the adoption of a new model of roof allowed saving space. Regarding the characters related to the spatial distribution, we chose especially mutations affecting the distribution of housing against each other, the mutations affecting circulation to provide access to different housing and, in one case, a mutation in relation to the spatial organization of the internal housing (clearly identifiable by the appearance of a projection on the main body of the building).

For Caniggia, the "foundation type" is the type of constructive solution that best reflects the functional requirements prevailing at a particular time and in a given cultural area. It represents a synthesis of the innovative features that have succeeded in imposing themselves as collective values (Malfroy, 1986).

Caniggia and Maffei (2001) also identify variants of types, such as synchronic variants of the foundation type, synchronic variants of the relative position, syntopic variants of the type, and diatopic variants. We will introduce those notions later when the situation arises.

5.2.3 The notion of typological process

By examining types as they are progressively transformed in successive phases, one can obtain the "typological process" (Caniggia and Maffei, 1979). Fundamental to typological concept is the sequence of developments whereby a new building type supersedes an existing one, and adaptations of the existing type provide the basis of a new one (Gu, 2006). The typological process shows gradual changes and striking continuity in the formation and transformation processes of building types.

The mechanics of change are most affected by progressive variations in existing buildings. Widespread, albeit limited, adaption of an existing building makes it apt to the continuous pursuit between formation and transformation process of buildings and parallel process of changes in needs (Caniggia and Maffei, 2001). In actual facts, the contribution of widespread changes can only be read at prolonged intervals, comparing a new order to its previous version.

5.3 The particularity and originality of traditional Chinese architecture

To initiate a typological study of residential buildings of the study area, it is necessary to start with some basic investigation of traditional Chinese architecture and in particular of the Jiangnan water town dwelling forms.

Traditional Chinese architecture enjoys a long history: "The architecture of China is as old as Chinese civilization" (Liang, 2001, p.215). Over centuries, the principal characteristics of Chinese architecture have remained largely unchanged before the introduction of Western building methods during the late of 19th century, but the main changes being on the decorative details (Liang, 2011).

5.3.1 The particularity and originality of traditional Chinese architecture

First, one needs to understand the particularity and originality of traditional Chinese architecture comprised of Chinese urban form.

The Chinese building has a highly "organic" quality, which throughout thousands of years has retained its organic qualities, "due to the ingenious and articulate construction of the timber skeleton where the size, shape, and position of every member is determined by structural necessity" (Liang, 2011, p.211).

Traditional Chinese buildings consist of a raised platform, forming the base for a structure with a timber post-and-lintel skeleton, which in turn supports a pitched roof with overhanging eaves (Liang, 2011, p.216). This bony construction permits complete freedom in walling and fenestration, and by the simple adjustment of the proportion between walls and openings, renders a house practical and comfortable in any climate,

and due to its extreme flexibility and adaptability, this method of construction could be employed everywhere (Liang, 2011).

In addition, the building unit is strictly standardized and its components and overall layout are often connected to the social status of the occupants. The buildings are placed in a strict hierarchy, which follows the social class structure.

The oldest architecture book surviving: *Ying Zao Fa Shi*[40] (Building Standards of the Song Dynasty 960-1279) contains a detailed description of materials, dimensions, colors, assembly methods, etc. (Liang, 2011).

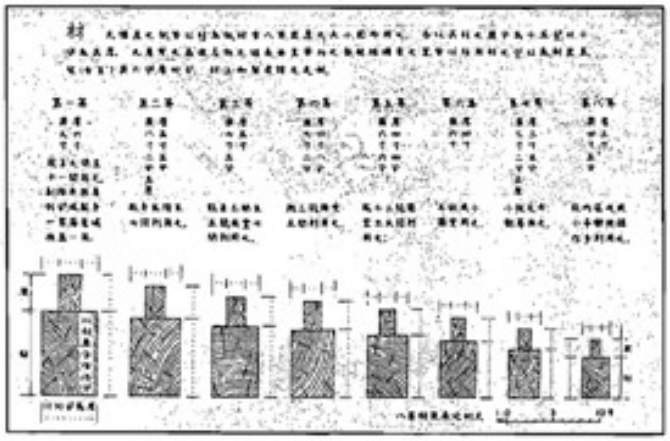


Figure 5-1: Standardization of wood materials.
Source: Liang, 1998, p.16.

Moreover, the Chinese ancient buildings always appeared in group of units. Most of traditional Chinese architecture is characterized by buildings or building complexes that occupy the whole property. Enclosed open spaces are delineated by the building itself. Buildings or group of buildings follow a similar model for almost all categories of

[40] Rules compiled by Li Jie, recorded the Imperial Minister of Public Works from 1092 to 1105 AD towards the end of Empire of the Northern Song (960-1127).

buildings. It goes as follows: the construction takes place around a north-south axis, and three or four buildings constructed around a courtyard form a house unit, which is still enclosed by walls, subsequently, a series of interconnecting units composed a bigger house or a palace (Guo, 2008).

5.3.2 Common features of traditional Chinese architecture

There are certain common features of Chinese architecture, regardless of specific regions or uses.

The most important feature of Chinese architecture is its emphasis on the horizontal plane, in particular a heavy platform with a large roof floating over it, with the vertical walls not well emphasized. Chinese architecture stresses the visual impact of the width of the buildings.

Another important feature is its emphasis on symmetry and balance, connoting a sense of grandeur, which could be found everywhere in Chinese architecture from palaces to farmhouses. Buildings and building complexes are constructed around a central room or hall, additional buildings or rooms of equal numbers and sizes are added on either side if needed (Cao, 2004).

There is a hierarchical composition in traditional Chinese architecture achieved by placing buildings in a property according to strict rules. Buildings with doors facing the front of the property are considered more important than those facing the sides. The older family members live in the northern rooms, the young live in the wing-rooms, and a southern room is constructed as a living room or study (Cao, 2004). In multiple courtyard

complexes, the central courtyard and its buildings are considered more important than peripheral ones.

This type of axis-centered, symmetrical building principle, combined with a hierarchical layout for the entire building complex, reflects the aesthetic standards of balance and harmony of traditional Chinese architecture.

5.4 The classification of building types in the study area

Based on different constructive and distributive characters, three main types of buildings and their variants have been identified in the study area: Old Shikumen, New Shikumen and commercial shops located at the periphery of each blocks (the latter could be roughly classified into two types: one with arcade and one without arcade).

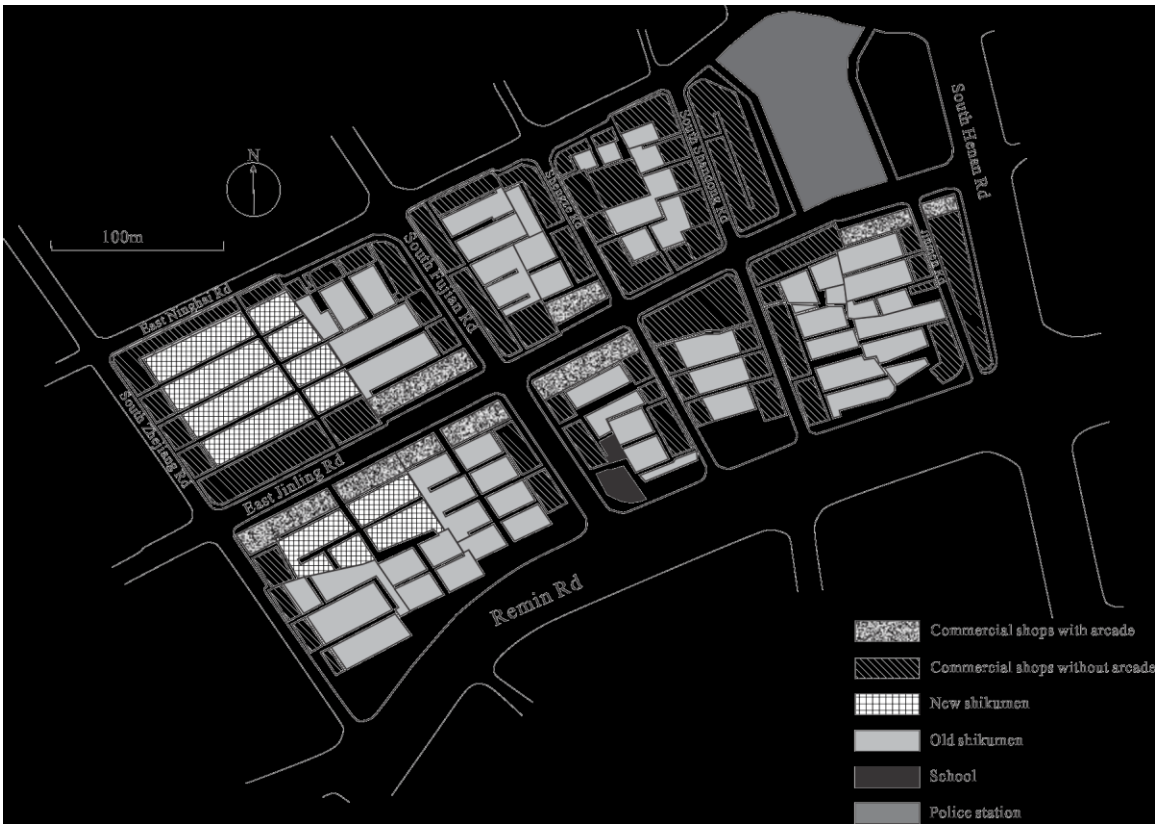


Figure 5-2: Survey and classification of building types in the study area.

5.4.1 An antecedent type: Sanheyuan

The traditional Jiangnan residential building: Sanheyuan

The spatial organization of the Shikumen is informed by the layout of the traditional Sanheyuan. A Shikumen could be considered as a compact version of the Sanheyuan. We will then start with a short introduction of the most common indigenous housing type in Jiangnan area: the Sanheyuan.

Sanheyuan is generally considered as a simplified form of Siheyuan[41], which is comprised of four sections and enclosed a central courtyard or "sky well". A Sanheyuan is a three-side courtyard house and generally composed by a main body located in the north and east-west wing rooms. It is usually a brick and timber structured one-story building, the main rooms facing south, and the central Jian used as the reception hall, or Ketang, which is the place for sacrifice and reception (Cao, 2004). Courtyards enclosed by low walls are found at its front and back. As the family expanded, more structures would be built along its central axis, forming a set of two or three courtyards. "Such spontaneous building activities slowly sprawled, sometimes layering upon former ones", and their accumulation often resulted in a picturesque townscape (Liang, 2008).

[41] A Siheyuan is a residential type: a courtyard surrounded by four buildings, which is commonly found throughout China, especially famous in Beijing.

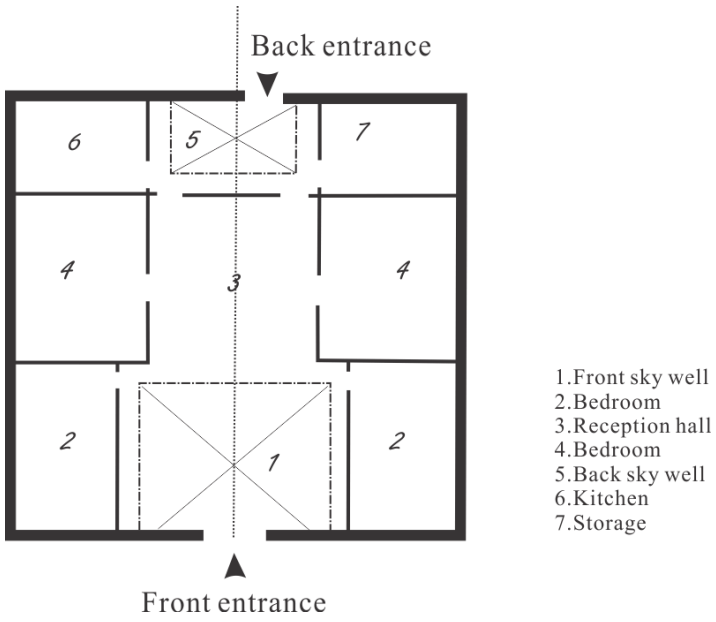


Figure 5-3: The basic structure of a Sanheyuan.
Source: Modified Cao, 2004, p.13.

5.4.2 Old Shikumen

There are two types of Shikumen identified in the study area: Old Shikumen and New Shikumen (which has also been called modified Shikumen in the literature).

The most recognizable residential type located in the study area is the Old Shikumen. The spatial arrangement of building components, their architectural styles, and construction features indicate that the Old Shikumen were built at an early time (mostly before 1900), so such buildings manifest the foundation type of this urban tissue. It is also the dominant type in the study area, numerically speaking.

5.4.2.1 The social-historical context of Old Shikumen

Throughout the imperial dynasties of China, individual residential houses were built on small scales by their owners, who supervised and financed the building process (Samuel, 2008). The traditional layout was inherited from the past. This general pattern of

construction was controlled by certain government regulations, depending on the city's ranking in the imperial system (Liang, 2008).

However with the stipulation of the *Land Regulations of 1845,* this situation started to change. Foreign merchants had been granted the right to lease land in Shanghai to build houses for themselves or for sale or rent, although not to the Chinese, because the settlements were reserved for foreigners only. Such a situation would soon change as civil wars pushed many Chinese refugees to Shanghai from neighbouring Jiangsu and Zhejiang provinces into the concessions to seek asylum where the situation was relatively stable and secure. The Chinese population grew drastically and reached 110,000 between 1855 and 1865, so there was a great need for packing as many housing units as possible into any piece of single land (Guan, 1996).

Foreign landowners started to build some low cost, simple wooden houses and rented them to Chinese refugees to make a quick profit. Those houses generating good profits were the first residential buildings in the settlements, and later on 8,740 such houses were built in the early 1860s (Liang, 2008). Those hastily built houses have been considered the "embryo" of what will later become the Shikumen. They only lasted temporarily for their poor quality and vulnerability to fire.

Shikumen emerged as the demand justified. It could be built quickly, on a large scale while creating better living conditions than previous wooden shelters. In 1872, the first Old Shikumen (Xingren Li) was built in the British Settlement. It retained a lot of rural characteristics, but underwent some adjustments to "fit" the real estate market (Wu, 2008).

Old Shikumen characters

The Old Shikumen is still a courtyard-hall centered dwelling. The doors had been considered a very important architectural feature and the most prominent parts were the stone framed black wooden doors. The door frames at this early stage were plain and simple without much decoration. The whole structure was relatively closed off when viewed from outside.

Figure 5-4: The stone framed black wooden doors of an Old Shikumen.

A | B

C | D

E

A: The view of sky well of one three-Jian Old Shikumen;

B: The view of an Old Shikumen from a side lane;

C: The back door of one Old Shikumen;

D: One example of the fenestration of an Old Shikumen;

E: Old Skimumen decorated with traditional Chinese elements.

Figure 5-5: Photos of Old Shikumen.

The dimensions of the Old Shikumen

The size of the lots that accommodate the Old Shikumen is quite variable. Most of the lots have a rectangular shape. The whole lot is about 10.8-12.6 metres wide and 16 metres deep (the front courtyard is 4 metres, the hall is about 6 metres, and the kitchen or back room is about 6 metres). Each Jian is 3.6-4.2 metres wide. The front courtyard is around 12 square metres, while the back service courtyard is usually only half size of the front courtyard: 1.2m -1.5m in width also functioned as a sky well (Shanghai Zhi, 2011).

Most individual buildings adopt a north-south orientation. Not all Old Shikumen have a north-south orientation at this stage of development because the main consideration was to build as many houses as possible and not to pay much attention to orientation, ventilation, lighting, etc. Each residential building maximizes its narrow lot with a front and back entrance leading to a side lane, so there are no open spaces (Guo, 2008).

The aggregation mode of Old Shikumen is that adjacent buildings are attached to each other by sharing a party wall, there are no obvious breaks or ruptures between the party walls. They gear with each other very well, maybe because all the adjacent buildings are built at the same time and by the same builder. Most of the time, the main facades are aligned and have the same height.

Each Old Shikumen is enclosed by a 5-metre high brick wall, which encloses the lot, representing the Chinese tradition of enclosure. Access to the neighbourhood could be controlled through the main entrance located in the main lanes (see Figure 5-6).

Circulation and access to Old Shikumen

The spatial hierarchy of the Old Shikumen is: street—main lane—side lane. Such spatial layout produces different levels of privacy: from public to semi public and private. The side lanes between two rows of Old Shikumen are only about 2.5-3 metres wide and usually are cul-de-sac, but they are interspaces for almost everything, used as communal places shared by families or neighbours for outdoor activities, and as everyday 'community corridor", which eventually become essential parts of the Linong culture. The main lanes are about 3 metres wide, and there is not much difference between the main lanes and the side lanes at this stage of development.

The residents of Old Shikumen

The Old Shikumen is spacious and suitable for traditional extended families. The residents of Old Shikumen were much diversified and many earliest residents were wealthy gentry who fled from the civil wars.

The builders of Old Shikumen

Foreign property developers became the first modern real estate speculators in China and marked the start of a modern real estate market (Wu, 2008). However, during this period (before 1900) the Chinese compradors[42] and contractors had a greater influence on the development of Old Shikumen than their foreign bosses (Liang, 2008). The Old Shikumen was built with local materials, knowledge and expertise using local building tradition. Many of these houses retained the traditional courtyard layout and incorporated many local vernacular motifs (Liang, 2008).

[42] The term means the Chinese contract suppliers or buyers who worked for foreign corporations in China.

The spatial organization and typical structure of the foundation type: three-Jian

By examining and observing the variety of footprints of Old Shikumen in the study area, we conclude that the foundation type of its urban tissue is presumably three-Jian, which has also been known as *Yijianliangxiang*[43] (one-Jian with two wings).

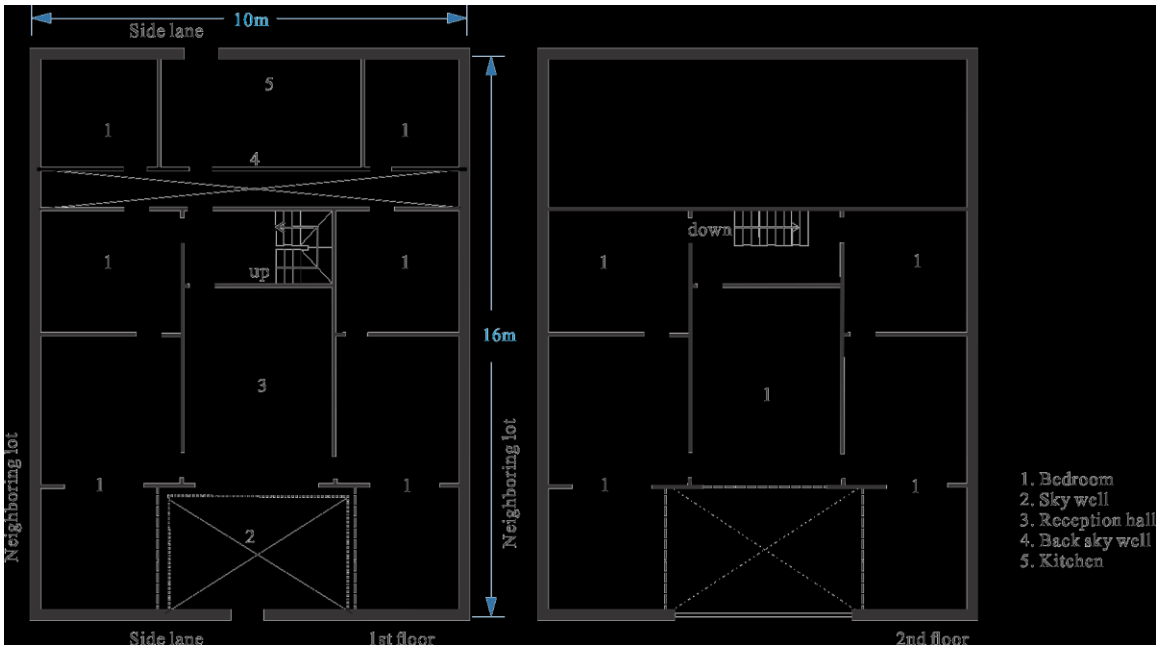
For a three-Jian, the main body consists of a two-story timber structure building with brick walls. The first floor is comprised of a small courtyard (called Tianjing or "sky-well'', referring to its well-like space), a reception hall (or Ketang) placed on the central axis used as dining room or ancestral room, and two wings flanked symmetrically used as bedrooms or for other purposes. The courtyard contributes to natural lighting and ventilation of the rooms.

Stairs leading to a second-floor are located at the back of the reception hall. The structure of the second floor is similar to the first floor.

Behind this main body, there is a one-story building with a sloped roof reserved as service area (later built as a two-story structure), including a smaller backyard (which functions also as a sky well, known as back Tianjing, which is usually only the half size of the front Tianjing), a kitchen, storage rooms, and a back entrance.

The building can be accessed from both the front and back entrance through side lanes.

[43] Xiang: traditional name for a complete secondary room (Guan, 1996)



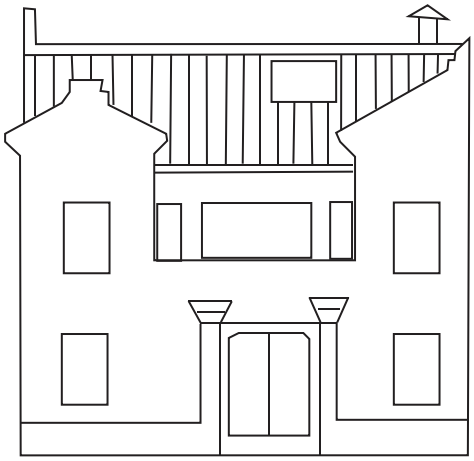


Figure 5-6: Plan, exterior elevation and section of three-Jian Old Shikumen.
Source: Adapted from Cao, (2004).

Different variants of the foundation type

Different synchronic and syntopic[44] variants of the three-Jian foundation type can be observed in the study area. Synchronic variants are found when: "Modifications were made in order to fit into non-standardized constraints and in such a way that the yield of the type invariably decreases" (Caniggia and Maffei, 2001, p.246). These are the one-Jian and two-Jian variants.

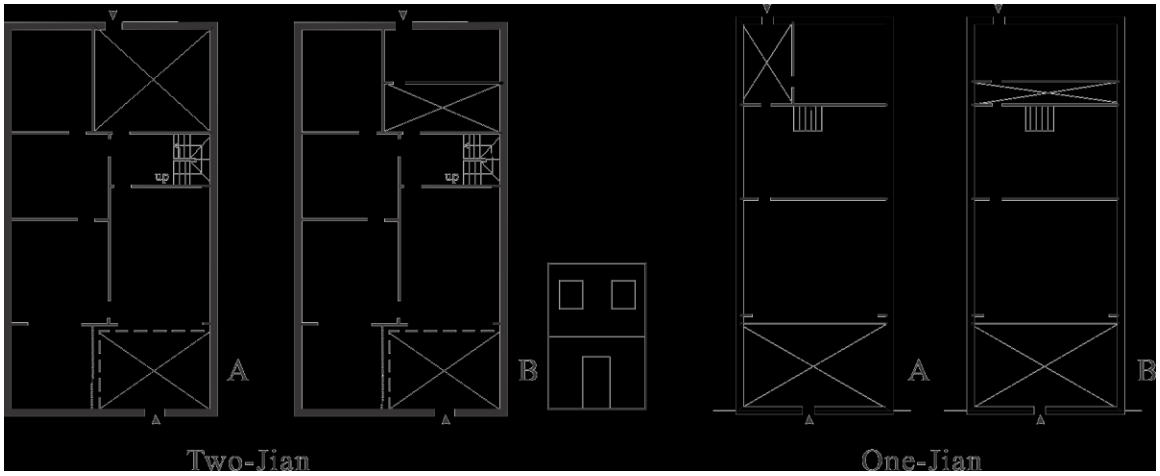


Figure 5-7: Plans of two-Jian and one-Jian Old Shikumen and their variants.
Source: Adapted from Cao, (2004).

Their presence is mainly due to very patchy and irregular subdivision of urban blocks, different sun-facing and different social and cultural needs within the same cultural area at the same time. For example, the majority of the lots occupy a rectangular shape, but some lots have been forced to resort to variable shapes. Moreover there is also a big adjustment of the depth of the foundation type. The orientation of the buildings is not always north-south; some are using south-north, east-west, or even northwest-southeast orientation. A good example would be the specific adaptations of which a type is the

[44] Syntopic variant: "the total amount of modifications occurred to a building type within the same cultural area at the same time according to different social and cultural needs" (Caniggia & Maffei, 2001, p.246).

result employed by a different social group. “Usually the greater the number of Jian, the more prestigious and wealthier the family is” (Wang, 1989, p.47).

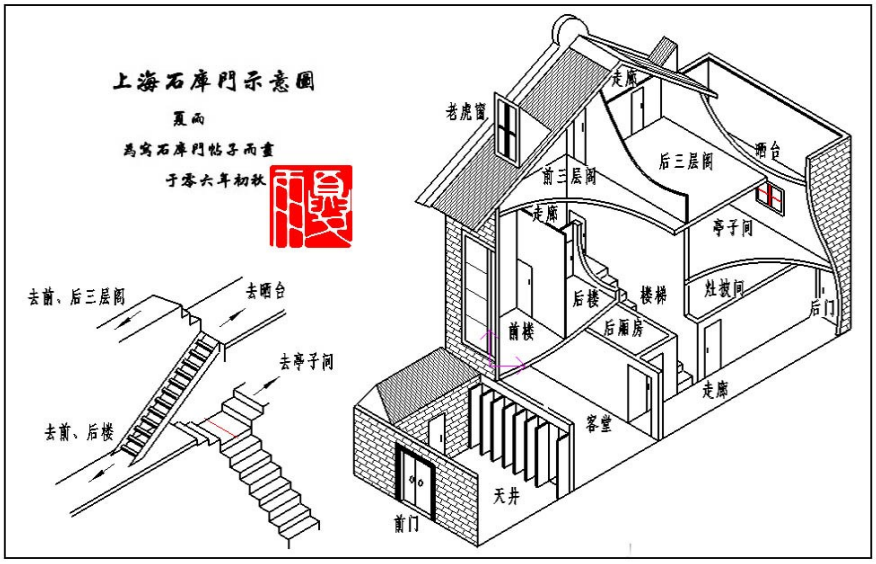


Figure 5-8: An axonometric view of one-Jian Shikumen.
Source: http://shimg.focus.cn/upload/photos/10178/hOrYZI6u.jpg, received 2013.

5.4.2.2 Old Shikumen Linongs examples in the study area

1. Minguo Li in zone C

The Minguo Li is bordered by Duxing Li to the north, Renmin Road to the south, Baoan Fang to the west, and Bolin Li to the east (see Figure 5-9). The main entrance is located at 760 Renmin Road. The 3 metres wide main lane, running south-north, splits the site into two parts. The side lanes are about 2.5 to 3 metres wide and orthogonally connected to the main lane.

There were 29 buildings built in total in Minguo Li, but 15 of them were demolished due to the expansion of the north part of the former Minguo Road. Now there are 14 left.

Among them, eight are two-Jian buildings, and six are one-Jian buildings. All are orientated north-south.

All original buildings are two-story high with wood-brick structure, have a sloped roof and dormer windows. Originally, the exterior walls were painted with white lime plaster, but some of them, especially the walls of the first floor have been renovated by using red bricks. When viewed from outside, the most prominent parts are the famous stone framed black wooden doors. With the high brick wall, the structure was relatively enclosed. From the following pictures, we could see many traditional elements, for example, the traditional gable walls, like Matou or Guanyin are prominent (see Figure 5-11).

There are no toilet facilities or public washrooms built in this neighbourhood, only some garbage tank located near the entrance. Many families are still using night stools, so they have to empty their night stools everyday by themselves.

After demolishing 15 buildings along Renmin Road, some green space has been added on the previous lots. Now for safety reasons, one extra green iron door has typically been added just in front of the black wooden doors to protect the buildings adjacent to this road. Seven previous internal residential buildings now face the public Renmin Road directly, with only the front green space as a buffer zone, which has changed an essential spatial feature of this Linong neighbourhood.

In the past, each Linong was enclosed by walls, and there were no go through lanes between neighbouring Linongs. For example, Minguo Li is adjacent to Duxing Li, Baoan

Fang, and Boling Li, they are separated by walls, now those walls have been demolished, but we could find traces of the previous enclosing walls.

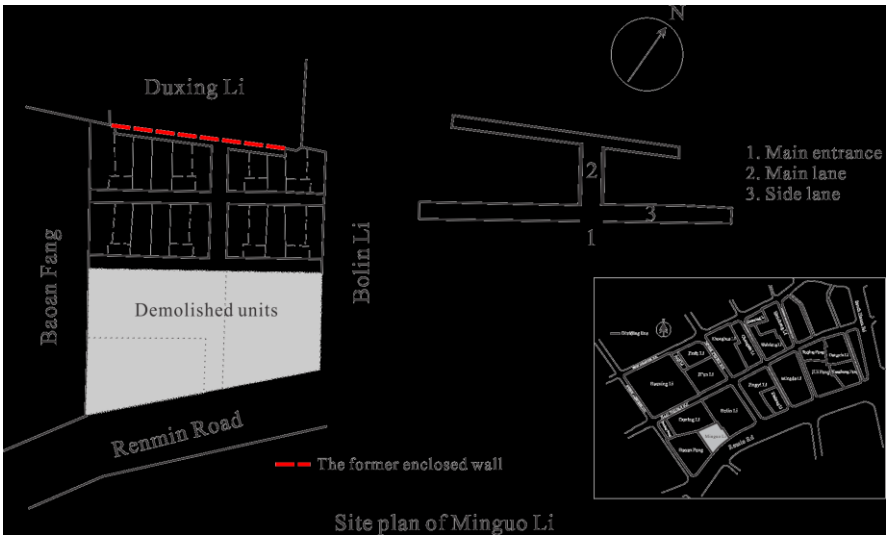


Figure 5-9: Site plan of Minguo Li.

A, B: The traditional Matou or Guanyin gable walls of Minguo Li; C, D: The trace of the former walls enclosing Linong; E: The main entrance of one Old Shikumen located within Minguo Li; F: The main lane of Minguo Li; G: The main entrance of Minguo Li.

Figure 5-10: Photos of Minguo Li.

2. Zhonghua Li in zone B

Zhonghua Li is bordered by the East Ninghai Road to the north, East Jinling Road to the south and South Fujian Road to the west and Chengzhi Li to the east (see Figure 5-11). The main entrance is located at 246 East Jinling Road. The side entrance is located at 85 South Fujian Road. Both the main lane and side lanes are about 3 to 3.5 metres wide. The side lanes are orthogonally connected to the main lane.

There are 72 buildings built in Zhonghua Li in total. Among them, there are eight commercial buildings along East Jinling Road, 24 along South Fujian Road, and 12 along East Ninghai Road. All those buildings are two-story one-Jian with wood-brick structure. The ground floors are occupied by all kinds of shops and second floors are reserved for residences. Twenty-seven two-story wood-brick structure Old Shikumen buildings are built inside. Among them, five are two-Jian, and the rest are one-Jian. All the interior buildings have a north-south orientation; except a few buildings (see Figure 5-11, marked in grey) that have an east-west orientation. For the safety concerns of the residences, one extra iron door have been added in the main entrance, because the main lane is connecting East Jingling Road and East Ninghai Road, so people cannot use it as a shortcut.

As with previous Minguo Li, we still found typical characteristics of Old Shikumen in this Linong, for example, wood-brick structure, sloping roofs, dormer windows, black wooden doors, white lime plaster walls, etc. From the structure of this Linong, we could

confirm that the main concerns behind building Old Shikumen was to pack as many houses as possible and ignoring orientation, lighting, ventilation problems, etc.

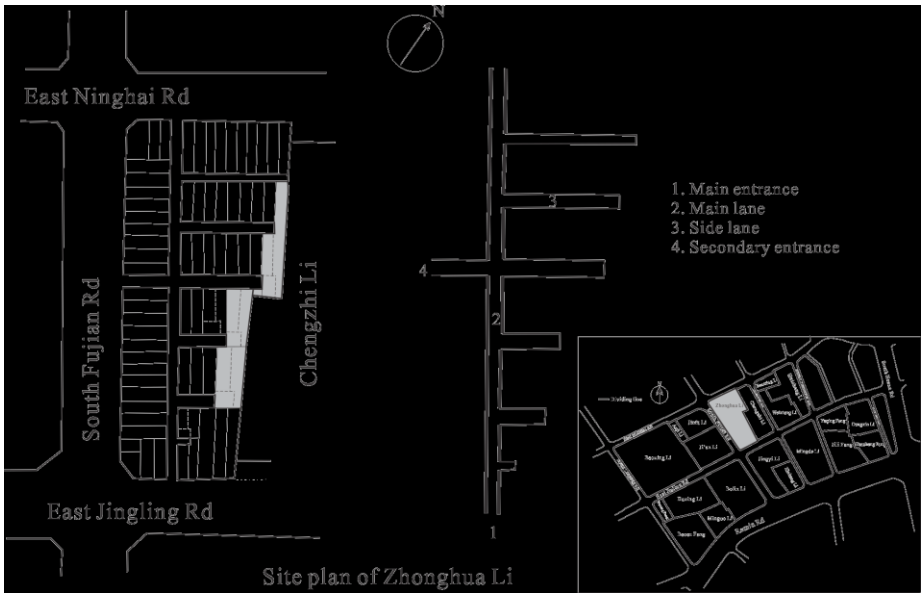
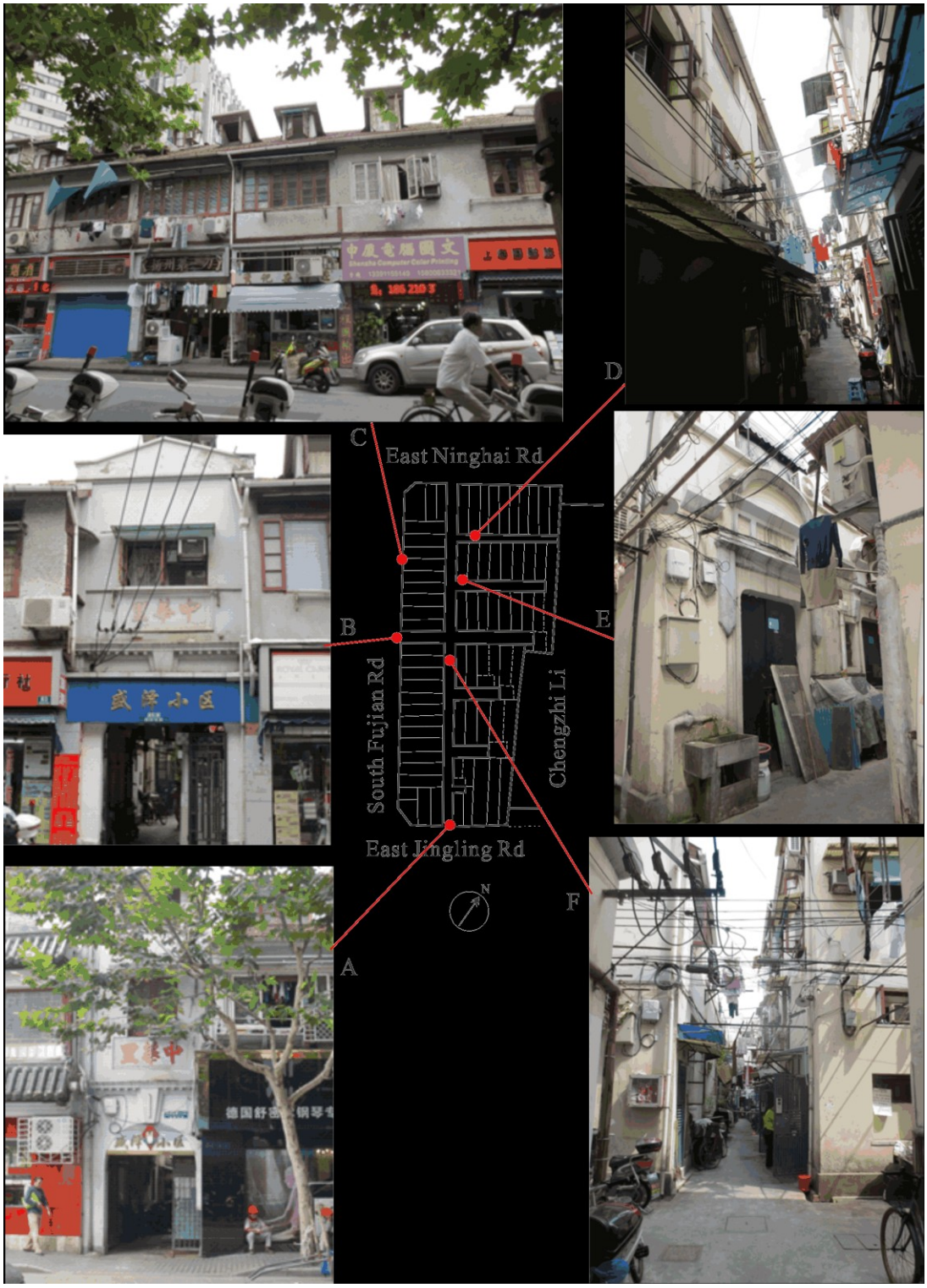


Figure 5-11: Site plan of Zhonghua Li.



A: The main entrance of Zhonghua Li; B: The secondary entrance of Zhonghua Li; C: Commercial buildings of Zhonghua Li located along South Fujian Road; D: The view of the side lane of Zhonghua Li; E: The front door of one Old Shikumen located within Zhonghua Li; F The view of the main lane of Zhonghua Li.

Figure 5-12: Photos of Zhonghua Li.

5.4.3 New Shikumen

New Shikumen emerged and started to replace Old Shikumen around 1910s. Their development reached full height in 1920s (Wu, 2008).

5.4.3.1 The social-historical context of New Shikumen

The Xinhai Revolution, occurred in 1911, overthrew China's last imperial dynasty: the Qing Dynasty, marked the end of China's imperial system, which not only had a huge impact on the development of local economy and the establishment of national industry, but also had a great influence on the social structure of traditional Chinese families. The traditional extended big family pattern had been broken, replaced by small, medium size, non-traditional immigrant families. Many villagers were attracted to Shanghai to seek for a better living by its growing new industry, the population continued to grow steadily and reached 2,000,00 by the start of the First World War and the housing prices had increased a lot and land speculation had become more and more intense (Guan, 1996).

Old Shikumen occupying big land were seen as unsuitable for development in Shanghai any further. The New Shikumen was developed as a response. By modifying the structure of the Old Shikumen, the New Shikumen can not only accommodate more people, but also increase land use efficiency, which has been developed at a much bigger scale with often hundreds of housing.

New Shikumen characters

A remarkable improvement made to the plan of the New Shikumen was the abandonment of the traditional central distribution of three-Jian. The traditional multi-generational families tended to disappear, so the wings would become redundant.

Compared with the Old Shikumen, the appearance of the New Shikumen had changed. Instead of using white lime plaster, the outer walls of the New Shikumen used water brick, red brick, blue brick, or even mixed bricks. Matou or Guanyin was no longer being used. One big change of New Shikumen was the rear one-story building, which became a two-story building with a flat roof, and a small bedroom was added on top, called Tingzijian.

An important distinction was that the New Shikumen was no longer adorned with stone framed doors (Figure 5-13 suggests the contrary). The lintel decorations had become more complicated. New Shikumen started to include some Western architectural elements, for example, arches, triangular, semicircular, floral, rectangular shaped designs, etc. which mimic the decoration of frieze of upper windows often found at the time in Western architecture. Those ornaments were one of the most distinctive features of the New Shikumen. In some New Shikumen, the classical Western pilasters appeared on both sides of the doorframe as decorations. Another characteristic of the New Shikumen was the balcony, which was usually nowhere to be found in traditional Chinese residential buildings. In short, New Shikumen architectural style was assimilating some Western elements, especially in the ornamental elements of the facades.

Figure 5-13: The doors and windows of New Shikumen ornamented with Western architectural elements.

The dimensions of New Shikumen

The New Shikumen is enclosed by lower brick walls. The height of the walls has been reduced from 5 metres to 4 metres, and the size of the front courtyard shrank to 2m by 3m (Wang, 1989, p.47-50). The whole building now occupies a smaller lot, the width of

one-Jian had been reduced slightly from 3.6m-4.2m to 3.2m-3.9m, and the depth of a lot decreased to about 14m (Shanghai Zhi, 2011).

Circulation and access to New Shikumen

New Shikumen are still accessible from both a front and a rear entrance.

New Shikumen buildings are paying more attention to ventilation and natural lighting, which were mostly ignored in the Old Shikumen. Almost all the houses are facing the south and all lanes now became more spacious. The distinction between the main lanes and the side lanes became clearer. The average width of the main lane had been increased to 5 metres, taking into account the access by automobiles, and the width of the side lanes were about 3 metres.

The residents of New Shikumen

New Shikumen were compact and smaller compared with Old Shikumen. The residents of New Shikumen were mainly manufacture workers who migrated from the countryside, or small size, nontraditional households.

Separation of functions

The layout of New Shikumen, saw a change from horizontal layout to a vertical deployment. A new separation of functions between different rooms emerged (Guan, 1996). Now the ground floor was used more for day-time family activities while the second floor was reserved more for night-time.

Unlike, the Old Shikumen, which re-enacts traditional enclosure architecture, the New Shikumen is characterized by reduced height for exterior walls that are adorned with more windows. New Shikumen had departed from the inward-looking spatial model.

Yet for the most part, "The Shikumen type of linongs, no matter Old or New, still favoured a traditional way of living. Highly introspective, houses fostered an intense sense of privacy and tranquillity, which kept out the hustle and bustle of the city and the sight of the public (Guan, 1996, p.39)".

The typical structure of the two-Jian type

After examining and observing different footprints of New Shikumen in the study area, we conclude that the leading type is the two-Jian.

The two-Jian Shikumen only retained one side of the front and rear wing. In order to gain more space, some New Shikumen also had a main body with two or three stories and a flat-roof service building with two stories. The structure remains mixed brick-and-concrete bearing walls. The living area was still placed in the front and the rear was kept as the service area. Now a staircase had been placed next to a lateral wall of the house (see Figures 5-14, 15).

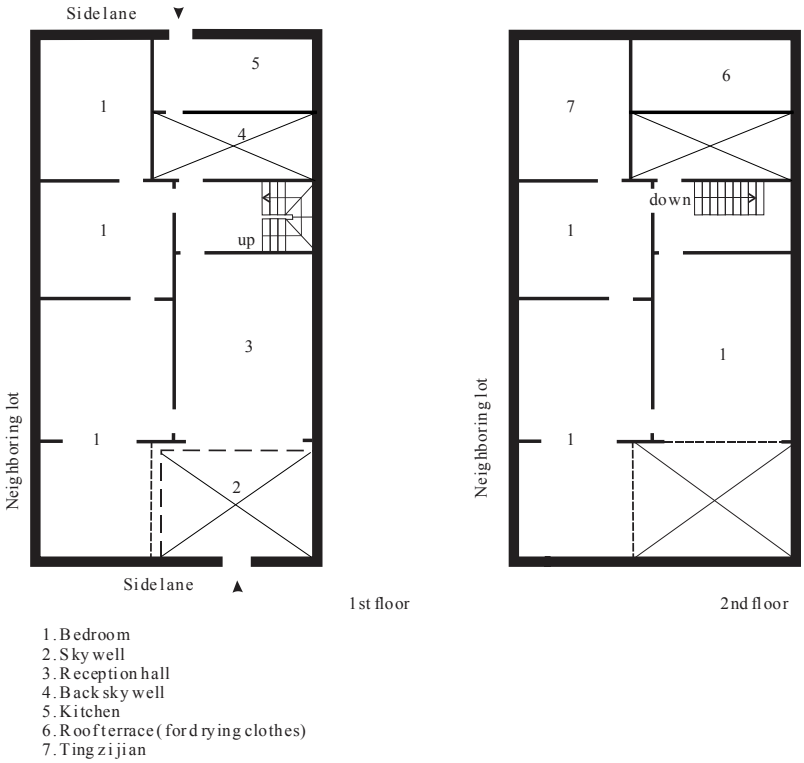


Figure 5-14: Plan of one two-Jian New Shikumen.
Source: Adapted from Cao, (2004).

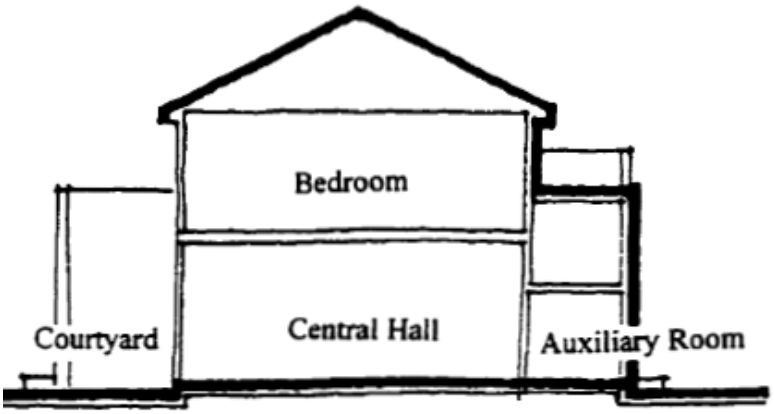


Figure 5-15: Section of one New Shikumen.
Source: Sheng, 1987, p.36.

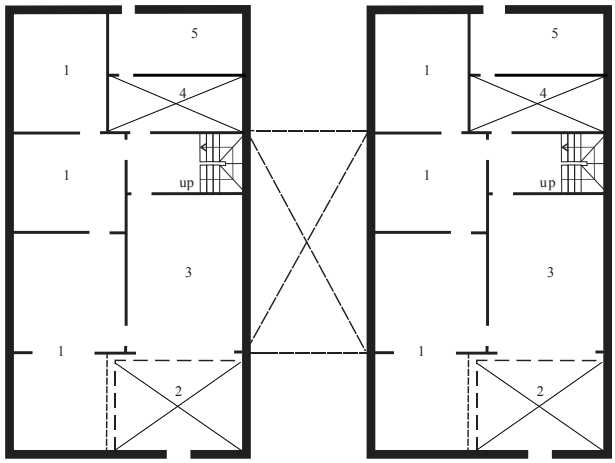


Figure 5-16: Plan of one two-Jian New Shikumen with Guojielou.

Different variants of the two-Jian type

There are different variants of two-Jian and one-Jian type. The different number of Jians in the house was to accommodate dwellers from different social groups and varying economic means. Again, the majority of lots present a rectangular shape, but a few lots displayed variable shapes. The depth of two-Jian type had also been adjusted for different lot sizes. There are different orientations of individual units besides north-south, for example, east-west and west-east.

5.4.3.2 New Shikumen Linong examples in the study area

1. **Baoxing Li in zone C**

Baoxing Li, built in 1923, is among one of the best preserved Shikumen Linongs in Shanghai. It is bordered by East Ninghai Road to the north, East Jinling Road to the south, South Zhejiang Road to the west, and Anji Li and Jian Li to the east (see Figure 5-17). The whole plot is square-shaped. The total construction area is about 11,423 square metres (Shanghai Zhi, 2011). The main entrance is located at 300 East Jinling Road. The

99-metre long and 4-metre wide north-south running main lane splits the site into two parts. The main lane is very busy and noisy because it is connecting two major roads: East Jingling Road and East Ninghai Road. Although it does not allow vehicle to go through now, for the convenient reason, there are lots of passers-by using it as a shortcut, which brings strangers and evokes the safety concerns for the residents. The accessibility through this entrance needs to be well controlled.

There are four side entrances located along South Zhejiang Road, respectively 109 South Zhejiang Road, 99 South Zhejiang Rd, 89 South Zhejiang Road, and 77 South Zhejiang Road. The side lanes are about 3 metres wide, orthogonally connected to the main lane.

In total, 110 buildings were built in Baoxing Li. Among them, there are 24 low-rise two story commercial buildings along East Jinling Road, 20 along South Zhejiang Road, 27 along East Ninghai Road, which are all one-Jian. The ground floors are all occupied by shops while the residences are located above. 38 two-Jians were built inside this Linong, which are two-story wood-brick structure New Shikumen, but now some of them had been expanded to three or four story due to the land pressure and speculation. One special building inside is a four-Jian building, which was originally used as a public bath house. All the buildings have a north-south orientation. Baoxing Li has a very clear fish bone structure. By a staggered arrangement of individual units, the lighting and ventilation problems had been greatly improved. From the pictures one could observe that the lintel decoration of New Shikumen became more complicated with Western

architectural elements, for example, triangular, semicircular, arc, floral, rectangular, etc (see Figure 5-19).

From the 1920s to the 1930s, shops were abundant along East Ninghai Road and South Fujian Road. The trading business was thriving. The area became a gathering place specialized in selling blue color clothes. After the outbreak of the Chinese-Japanese War (July 7, 1937—September 9, 1945), the population in this area soared. Before the Liberation, Baoxing Li gathered famous tycoons like Huang Jinrong, Du Yuesheng, Zhang Xiaolin, and other different juntos, many casinos and brothels were also located in the area. The composition of residents was very complicated. Baoxing Li had become old Shanghai's notorious "Three Bao and one Zhong (Sanbaoyizhong)", commonly known as "Bow Alley"—considered a filthy place.

After the Liberation, in April 1951, Shanghai's first neighbourhood committee was established in Baoxing Li. Since 1990, Baoxing Li has been transformed to a harmony neighbourhood with clean, tidy and pleasant environment after many years' efforts. Now Baoxing Li has become a good place for residents to live and work.

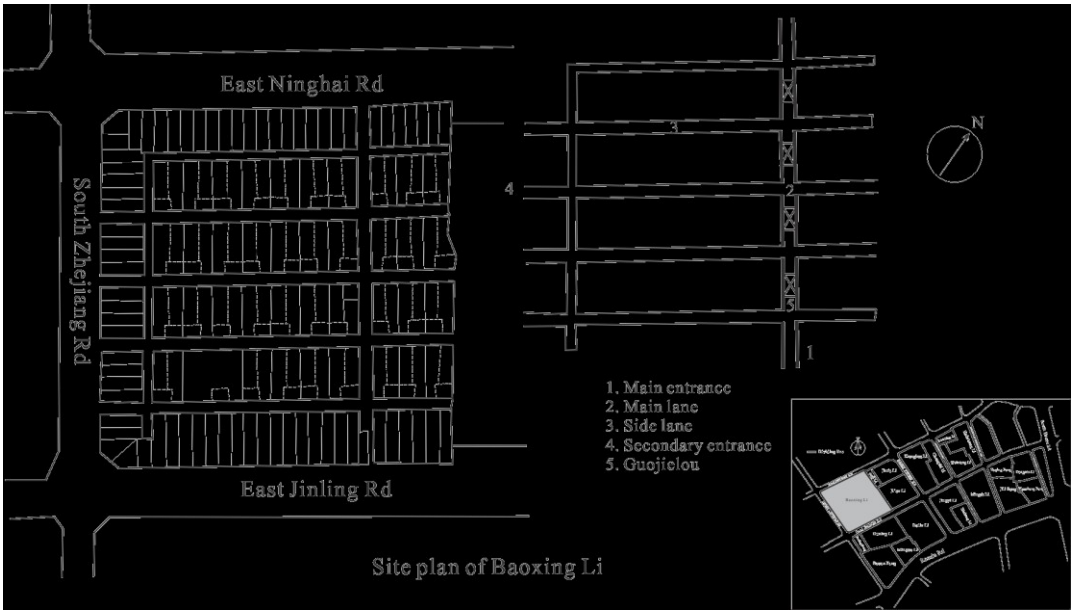


Figure 5-17: Site plan of Baoxing Li.

A: The main entrance of Baoxing Li; B: The main lane of Baoxing Li; C: A bird view of Baoxing Li; D: Guojielou.

Figure 5-18: Site plan of Baoxing Li.

2. **Duxing Li in zone C**

Duxing Li was rebuilt in 1932 and its predecessor was Deshan Li. It borders East Jinling Road to the north, Fuxing Fang to the west, Baoan Fang and Minguo Li to the south, and Boling Li to the east (see Figure 5-19).

The total construction area is 6,987 square metres (Shanghai Zhi, 2011). The main entrance is located at 423 East Jinling Road. The 4-metre wide and 54-metre long main lane running north-south splits the site into two parts. All side lanes are 3 metres wide, orthogonally connected to the main lane.

In total 36 buildings were built in Duxing Li, among them, there are 10 one-Jian, medium-rise, four-story, arcade-style commercial buildings along the East Jinling Road. The ground floor is fully occupied by shops, while the residences are located above. There are 26 buildings located inside this Linong, which are mainly low-rise, three-story brick-wood structure of the New Shikumen type. Among them, 19 are one-Jian, six are two-Jian, and one is a three-Jian. Not all have a north-south orientation; four are using west-east.

Part of the main entrance is occupied by a small musical instrument store. There is also some equipment near the main entrance for residences to exercise. The main lane is wide and busy, but no vehicles are allowed to pass through, except bicycles. At the back of some units, there are some water tanks. The interior residential area is very quiet and calm compared to the busy exterior East Jinling Road. Duxing Li is well preserved by the

municipality, especially the arcade-style street along East Jinling Road, attracting tourists worldwide.

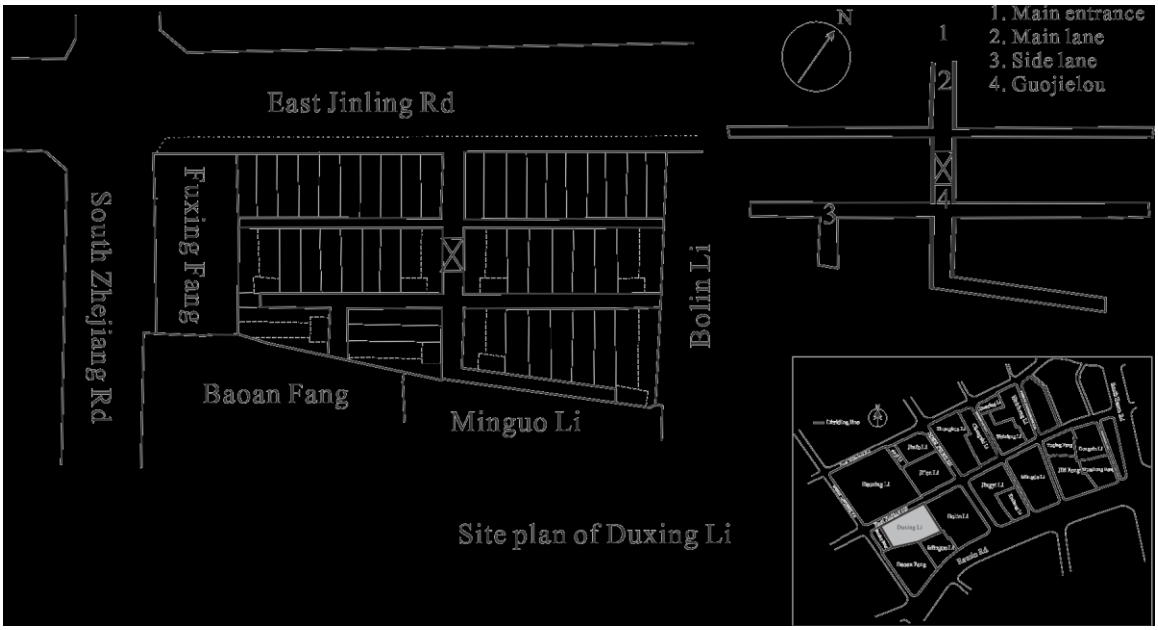
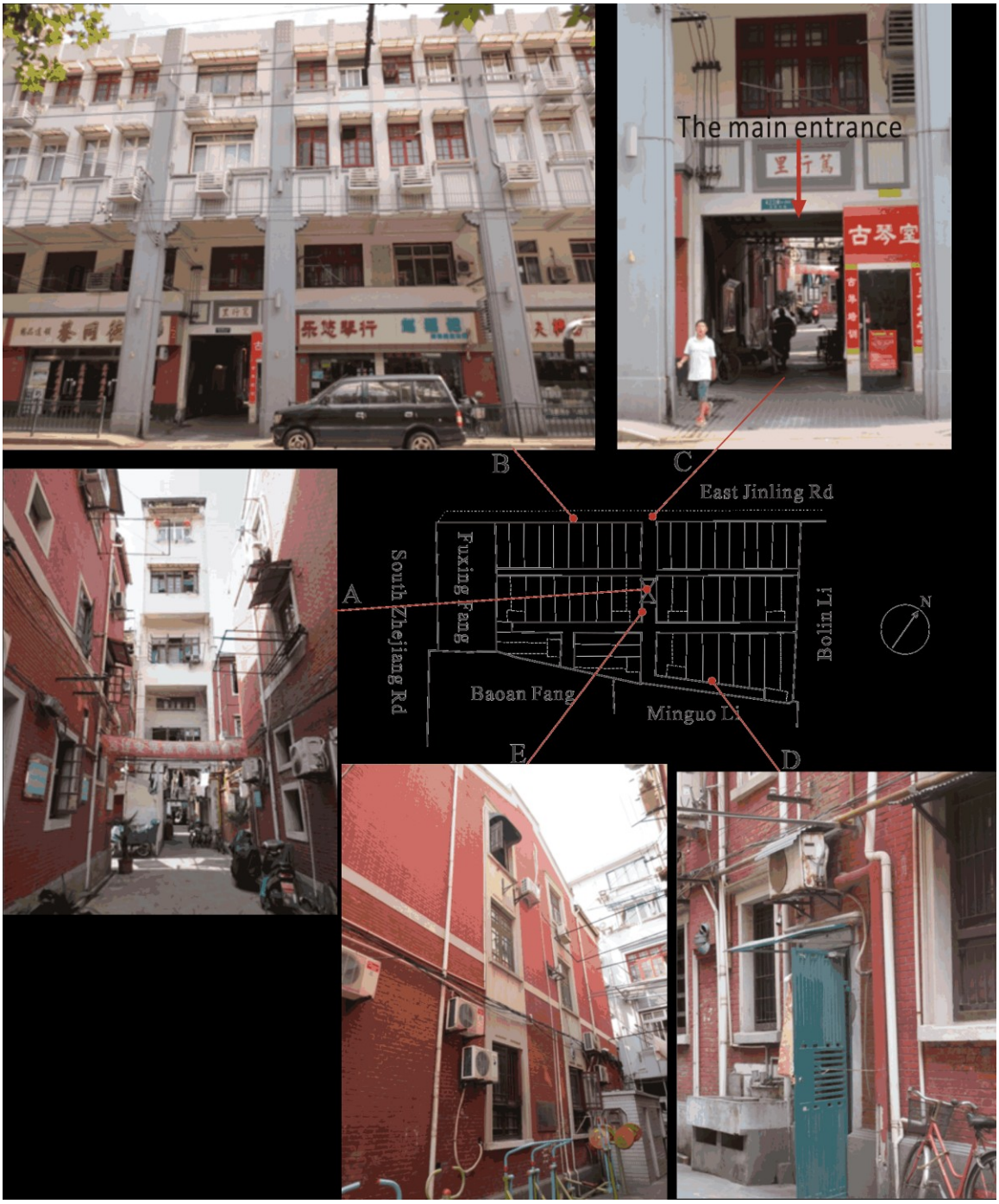


Figure 5-19: Site plan of Duxing Li.



A: Guojielou of Duxing Li; B: The arcade commercial buildings of Duxing Li along East Jinling Road; C: The main entrance of Duxing Li; D: The back entrance of one New Shikumen located within Duxing Li; E: One example of the fenestration of New Shikumen.

Figure 5-20: Photos of Duxing Li.

5.4.4 Subsequent Linongs

Due to the limited size of the study area, we could not cover all types of Linong houses. In order to get a clearer and more complete understanding of the evolutionary process, by studying secondary sources, a brief introduction to subsequent types of Linongs can be useful. New Linong, Garden Linong[45] and Apartment Linong[46], were an inevitable outcome of social, political and economic upheaval. Each type was stimulated by the fast growth of the local economy, increased population density, development of modern technology, changing social structure, etc.

From the 1920s to the 1930s, due to the development of New Linong and Garden Linong, Shikumen buildings no longer prevailed and gradually became lower class shelters. Meanwhile contemporary architecture from Europe and the United States spread massively in China, the concrete structure was employed on a large scale, the steel structure emerged and the number of floors of buildings increased significantly (Chang et al., 2005). During this period, the buildings gradually abandoned the traditional enclosure and traditional wooden construction methods.

New Linong won significant success, which was the most popular and favourable among others, had been constructed on a large scale, and it is also the one encountered most often nowadays. New Linong can be divided into three types: one-Jian, one-and-half-Jian, and two-Jian. They were generally three-story high, while only a small number of them are two-story. Different models prevailed depending on the size of the lot. There

[45] Garden Linong was a unique semi-detached or detached dwelling designed for a specific income group.
[46] Apartment Linong was an improved model of the Garden Linong, developed on the basis of the Garden Linong, especially in the 1940s.

were some differences in the layout of those models. With wide variety of modification and combination in sizes, layout, standards, etc. those models could provide a diverse range of housing options to meet different needs of residents (Guan, 1996).

After the 1930s, New Linong further developed and evolved to a higher standard: Garden Linong. The layout changed from a narrow long strip type into semi-detached or detached houses, focusing on increasing open spaces and green areas. Most of Garden Linongs have grand gardens to show off the wealth and privilege of their owners. Garden Linongs also have a variety of styles to suit different tastes of their customers, for example, European, French, Spanish, English, etc.

Figure 5-21: Photo of one Garden Linong.

Apartment Linong was similar to contemporary apartment buildings and generally consisted of five- to seven-story and had a concrete-framed structure (Guan, 1996). Because the population continued to grow, land became more and more precious; constructing Apartment Linong was more profitable. The overall layout had become

more tight and compact. Few dwelling units had been placed on the same floor of one building, and then a number of buildings formed building groups. In such buildings, individual residential units were generally small.

5.4.5 Residential buildings with shops located at the periphery of each blocks

The commercial shops located at the periphery of each blocks in the study area could be roughly classified into two types: one with arcade and one without arcade.

The residential buildings with shops are a combination of commercial frontage and residential units on upper floors. They were based on pre-existing urban tissue and building types, so the interior floor plan shared great similarities with Shikumen or New Linong depending on their construction date. Due to the high land pressure, majority of the commercial shops were one-Jian buildings. Some of them combined the shop fronts of two or three one-Jian buildings to accommodate larger stores. All sorts of shops together form a colourful street facade, "a buffer zone between two domains—public space at the front and a more private space at the back" (Zhao, 2004, p.64).

Compared with Shikumen or New Linong, all residential buildings with shops eliminated the front sky wells and high enclosing walls by facing the streets, the reception hall converted to shops.

Commercial shops without arcade could also be classified into two types. One group of them were built at the same time with the internal residential buildings starting from the 1860s. They were usually two-story high, one-Jian buildings. Another group were reconstructed later than their interior residential buildings started in the 1900s, due to the

road widening process in the French Concession. Most of them were three- or four-story high, one-Jian buildings.

The commercial shops with arcade emerged in accordance with The Municipal Administrative Council's "The arcade street stipulation" promulgated in 1902 (Zhu and Huang, 2008), under the circumstances of building reconstruction. The lot length has been reduced due to the construction of arcade. All of them were located along the East Jinling Road. Initially they were two- or three-story high, one-Jian buildings, but most of them had been added to four-story high.

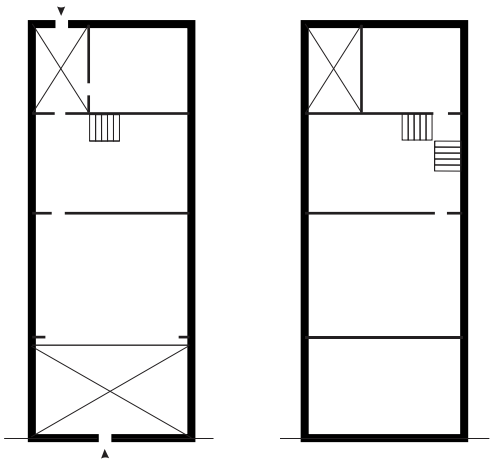


Figure 5-22: Plan of one one-Jian Shikumen.

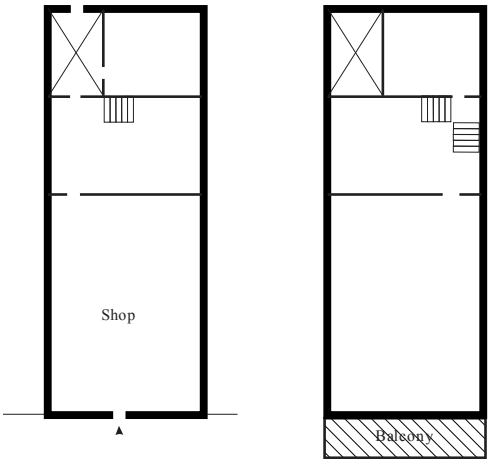


Figure 5-23: Plan of one-Jian commercial shop.

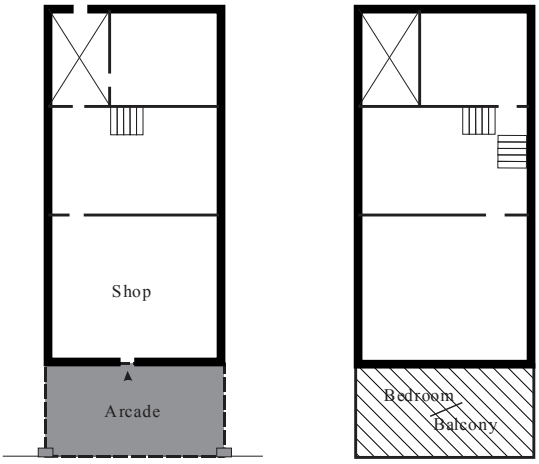


Figure 5-24: Floor plan of one one-Jian commercial shop with arcade.

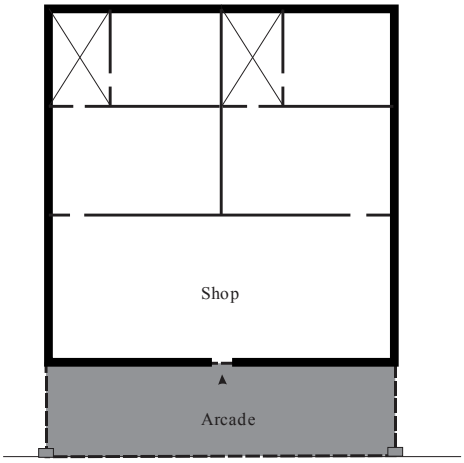


Figure 5-25: Floor plan of one two-Jian commercial shop with-arcade.

5.4.6 The typological process of Shikumen Linong

Knowing Shikumen Linong is essential for anyone who wants to understand the soul of Shanghai. This is the outcome of the economic, social and political upheaval of that period that had accompanied changes in the building construction techniques, land tenure system, social structure, and lifestyle of its residents.

After reviewing how the Shikumen Linong has evolved from the Sanheyuan to the New Shikumen, a clear evolutionary process is revealed.

Between the type of Shikumen Linong and traditional Sanheyuan of Shanghai, there is a great syntactic similarity and typological continuity. Many Linong researchers argue that the Shikumen is an imitation or a hybrid of traditional Chinese houses and Western residential forms, especially British townhouses in the late nineteenth century.

After carefully studying the evolution process of Linong housing, we posit, that the emergence of Linong is, for the most part, the spontaneous result of the transformation of traditional Chinese habitat under the pressure of land speculation, but also the evolution of the traditional type, which is conditioned by local morphological conditions. The Linong embodies indigenous Chinese dwelling culture and behaviour.

To further consolidate our argument, the first Linong houses built in the British Settlement were already arranged in rows, but there was no obvious evidence that the arrangement of row Linong was an imitation of the row houses popular in British of that time. Row Linong seems to be a solution to land pressure problems and strong land speculation spontaneously adopted in Shanghai, especially in areas with high densities.

There is obviously some influence of exotic architectural changes accompanying from traditional Sanheyuan, to Old Shikumen, to New Shikumen, but this influence appears to be rather superficial. During this process, Chinese architecture started to blend traditional elements with Western contemporary techniques. More specifically, the spatial layout had changed from a horizontal layout deployed around a courtyard pattern to an off-the-ground, more vertical dwelling. The lot size tended to become small and compact, the number of stories increased, the interior modern facilities became more common, the exterior decorations became more westernized, architectural characteristics converted from traditional inward-looking character to Western open atmosphere, etc.

However this settlement's spatial organization patterns, symmetry and hierarchy of space persist, the basic design principles behind the Shikumen Linong did not change, and the absolute order of homes based on Chinese hierarchy and harmony remained. The morphological feature of Linong varied little from site to site, and this structure suggests a physical layout that transits from tradition towards modernity. The relationship between building and building, building and lot, building and street followed the same principles. Each residential building maximized the use of the given lots. Although the difference between the main lanes and the side lanes became more and more obvious, the traditional spatial hierarchical distribution had not been altered: still ranging from public streets to semi-public main lanes and more private side lanes.

Some building's distributive and stylistic characters have remained in spite of change. The structure of Shikumen similar to traditional Sanheyuan maintained the traditional Chinese architectural features, for example, horizontal deployment**,** bilateral symmetry

and hierarchical composition. Different parts of the houses were still constructed around a central axis and followed the same order: the formal entrance—sky well—reception hall—back sky well—service area. The sky well was surrounded by the reception hall and bedrooms, the staircase was located behind the reception hall, the back sky well had a strip shape, and finally the kitchen, storage, service area were located at the back of the house. The importance of north-south orientation principles has persisted, for example, the formal entrance, the master bedrooms, and the owner's main activities areas were all facing south, while the exit, the kitchen and the service areas were located at the north of the buildings.

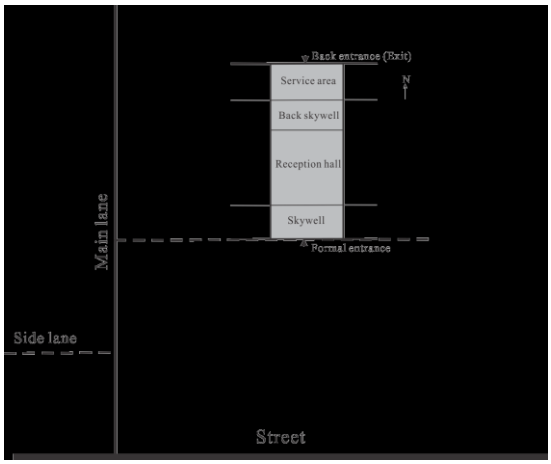


Figure 5-26: The traditional spatial hierarchical distribution and structure of Shikumen.

Linong, "exterior outfit might have changed but its inherited spirit didn't" (Guan, 1996).

Table structure of typological evolution

The typological evolution is presented in the form of a table illustrating the process and transforming types built in the study area. Vertically, the table presents the diachronic typological evolution. In horizontally, rows display synchronic variants of the same.

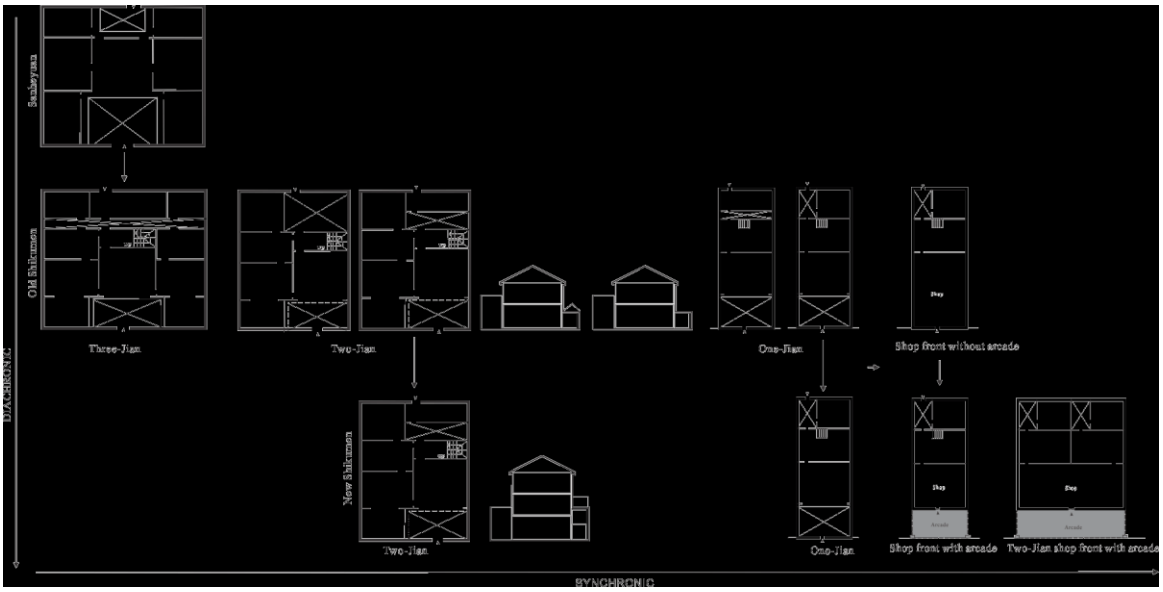


Figure 5-27: The typological process of Shikumen in the study area.

5.5 Informal field talks

Although the Shikumen is the old-time glory of Shanghai's fascinating history, most of them have seriously deteriorated due to overcrowding and lack of maintenance. Many have been rapidly demolished, giving way to high-rise apartment buildings, and its great beauty may only exist in the memory.

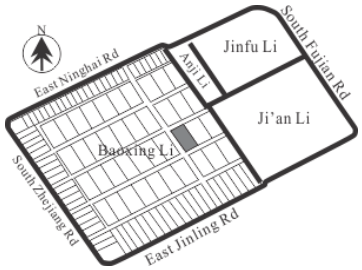
When I was doing my field works, traveling between different Linongs, taking pictures, observing the architectural details of Old and New Shikumen, measuring the dimensions of houses, sidewalks, width of lanes, etc. many residents were very interested and they came to me and asked lots of questions.

In order to better understand the current situation of Shikumen to enrich the field work, the author had some informal talks with Shikumen residents. When finding I was doing some research related to Linong housing, several people were eager to share their thoughts, and I had a good exchange with two of them in particular. The "older lady" has been living in one Shikimen for over fifty years. The "younger lady" has been living in the same place for over thirty years. This building was originally a two-story, two-Jian New Shikumen, which has been expanded to three-story and subdivided to house people from different backgrounds.

Currently there are 16 families living in this Shikumen. The living area per family is only a few square metres and the living condition of each family is quite shocking and really unbearable. Residents are living in crowded, cramped and closet-sized spaces. Every inch of space has been fully used as storage spaces. There is several water taps placed outside and inside the house used by different families. Sixteen electricity metres are located just beside the entrance. When one enters the courtyard, the space is full of housewares, and every corner is heavily packed. One could imagine that living in such a place requires a good dose of "Shanghai ingenuity".

When asked "What do you think of Shikumen Linongs? Are you happy to live here? What could be the future of those Shikumen?" I was quite shocked by their answers. Both ladies expressed that they do not want to live there anymore, the living conditions are too poor, and they are hoping that those Shikumen could be demolished so that they could get compensations from government or developers, and then move out. They mentioned

many times that the inadequate sanitary condition is the biggest problem facing all Shikumen.



A

B

C

A: Electricity metres located beside the entrance;
B: House wares heavily packed everywhere;
C: The crowded, cramped and closet-sized living space.

Figure 5-28: Photos of visited Shikumen.

Shikumen also serves as a mirror of social life. These neighbourhoods usually have a highly mixed population. According to those ladies, now most of the residents are short term tenants, they choose to live here for its great location, ease to get to their work places, many bus stops and metro stations are nearby, but they usually do not have long term plans to stay.

The ownership and property rights are very complicated. These houses were allocated to ordinary citizens after the confiscation of housing in the 1950s. They are now owned and managed by different private owners and local housing authorities, so it is quite difficult to govern their management. Not much regular maintenance work has been done due to fragmented property rights. The maintenance of the building is seriously insufficient and the building deterioration is severe. A lot of Shikumen have become enclaves for households with unstable income and low socioeconomic status. Despite their historical and cultural values, these old neighbourhoods have long been associated with a lifestyle of "little citizens" (xiaoshimin) in Shanghai.

A body of literature as well as films and stories have explored the intimate relationship between Shikumen neighbours, which have been considered a great charm of Shikumen and an essential part of the Linong culture. The author spent more than one month there, travelling between different Linongs and meeting different kinds of residents. There are always residents looking at you through their windows and doors or inside their houses, someone even come out and confront you and ask "what are you doing here?", but one can feel that the intimate relationship between neighbours is not the same as before, the

sense of community and responsibility is not as strong as before, the quickly changing social composition of its residents might be one reason for that.

5.6 Experiencing Xintiandi

The author has also visited the most famous Linong redevelopment project in Shanghai: Xintiandi, which was part of the French Concession from the mid-nineteenth century to the early twentieth century. The Shikumen houses in this area were mostly built by French developers in the 1920s.

Xintiandi was redeveloped from an old-fashioned Shikumen neighbourhood into a unique and popular commercial and recreational center by introducing a modern urban lifestyle into the old buildings and lanes. Today, Xintiandi has become a cultural icon of Shanghai and a precious reminder of Shanghai's history.

A | B

A: View of Xintiandi; B: Renovated Shikumen lane in Xintiandi.

Figure 5-29: Photos of Xintiandi.

Now there are hot debates concerning Xintiandi projects. Some scholars argue that although the basic layouts of Linong are kept, the historical features are preserved, but the original context is gone, which breaks with historical integrity. This preservation is

"skin preservation" by simply displaying certain historic features, or what is being conserved here are only "the shells of old buildings".

Another strong argument is that although the old buildings and lanes have been preserved or reconstructed, the original low-income people have been driven out of sight. These Shikumen houses have become exclusively for local elites, foreigners and tourists. The indigenous low-income residents have been "strategically" excluded and relocated to suburban areas. Although these residents have been offered resettlement housing or compensation, it is argued that many people have been suffering chronically because of breaking intangible and tacit bonds and social networks that have been created between them and their housing for years. The developers are targeting a niche market for privileged groups: wealthy Chinese locals, people from other provinces, and foreigners, by building luxury housing complexes one after another in the neighbouring areas. In this case, the culture of old Shanghai becomes a selling point for marketing the gentrification projects.

Other scholars argue that this adaptive reuse method is the best way for preservation since the historical buildings have been protected and the economic benefits have been assured.

The significance of the Xintiandi projects brings into not only the commercial success, but also the sharp focus on the need to reconcile economic boom with conservation of the historical urban form.

5.7 Current situation of the study area

Nowadays the study area is a prime residential area as well as shopping paradise and business center attracting many tourists, but it is facing the problems of serious deterioration, lack of maintenance and risking demolition. Part of it, or all of it, could disappear soon.

For the study area, a lot of money and efforts have been spent on preserving the exterior appearance of building, especially of the commercial units along East Jinling Road, but they are quite superficial and are only "skin preservation". For example, the street facades and some exterior residential units along Renmin Road (caused by demolishing) were renovated or repainted with little respect to the original features, which could result in the loss of authenticity and uniqueness of the place. No much work has been done for the interior residential houses, which are extremely needed for its residents.

The study area has great historical value. Located in the oldest portion of the French Concession, some Shikumen houses or Linong neighbourhoods are among the original ones in Shanghai, which provide an invaluable resource for research and preservation. For example, Map 1876, indicating some earliest Linongs located in the French Concession, we find Bolin Li and Jian Li, which have survived until today. Besides this, famous Baoxing Li, built in 1923, Shanghai's first neighbourhood committee was established here in 1951, is among one of the best preserved Shikumen Linongs in Shanghai. There are many other different styles of architectural buildings coexisting in exterior streets.

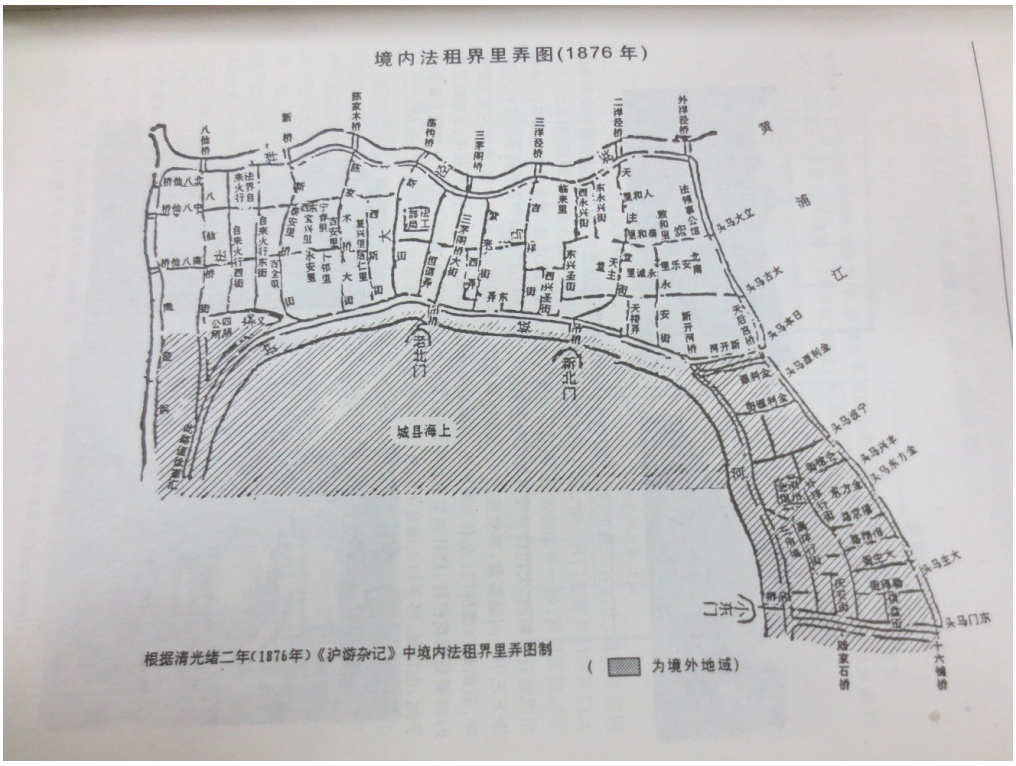


Figure 5-30: Linongs located in the French Concession in 1876.
Source: Virtual Shanghai, 1876.

This area was built for commercial activities since the beginning. By reviewing historical maps, there were many banks, shops, companies, etc., located inside Linongs, which is different from traditional Linong neighbourhoods, where only residential units are located within Linongs. "The Second Nanjing street"—East Jinling Road, located in the center of the study area, one of the ten most famous streets in Shanghai today, was the most important and prosperous street and is the only street in Shanghai with arcade style buildings. East Jinling Road has been converted as a modern shopping and leisure paradise, which has become a brand of Shanghai and one of the classic places of Shanghai tours.

This area occupying a great location than Xintiandi, one greatest Shanghai attraction: Yuyuan Garden is nearby; within walking distance from the Bund; Renmin and Yuyuan

metro stations located just opposite Block 8; not to mention there are many bus stops within the areas, etc.

By studying Xintiandi project, we find that insufficient attention of the urban morphology and building typology has been paid in this conservation planning. For the study area, new approaches or future conservation plans should be based on a morphological perspective (see more details in chapter 6).

5.8 Conclusion

The typological process of Shikumen Linong in the study area shows that different types are progressively transformed and there is a sequence of adaption that the new types are superseding the existing ones while the existing types were also informing the architecture of the new ones. The typological process allows identifying the relationship with an antecedent type assessing such temporal relationship could help to understand the phenomenon of deriving an older type to a more recent type. It allows observing how certain conditions may determine and condition the typological evolution.

The construction of the study area could be considered as a very recent example in relation to the buildings of Italian cities that have been the subjects of many case studies. Moreover, this construction occurred at a period of history that saw accelerated change in construction techniques with the consequence that architectural forms are less grounded in the local tradition than they are in other ancient urban tissues.

By drawing the typological process, we can discover the rules and laws through which the urban landscape develops and to which any new design must be related. The

traditional local housing types are of great potentials to be redeveloped and they hold great potentials for the creation of new types.

The analysis of the evolution of Shikumen Linong shows the continuity of distinct local typological processes in Shanghai, which has been proved remarkably similar to the typological process recorded in multi-century old Italian urban tissues, and the concepts of typological process have proved to be a useful way to explore the cross-cultural explanation of urban morphological ideas.

6. Conclusion

This thesis proposed a morphological analysis based on the Italian typo-morphological School methodological apparatus applied to Huangpu District of Shanghai. It illustrates the possibility of cross-cultural application of such methods. We are giving one interpretation among many others to understand the morphological characteristics of Chinese urban tissue.

6.1 Key findings

This thesis focuses on the evolution of the urban tissues of nine urban blocks of Huangpu District of Shanghai from 1842 to 1949 by tracing it back to the initial phase of urban development.

The urban development of study area started soon after Shanghai's port opening in 1842 and the establishment and construction of the old French Concession in 1849. This area was once a central part of the old French Concession and has been developed under the colonial rule, which conferred control to foreign powers, in time of rapid speculative development. The historiography on those districts usually emphasizes Western influence on the architecture.

Relying on methods developed by the Italian School of urban morphology, this research shed lights on the spatial forms that have emerge in this peculiar economic, political and social historical context. In doing so, this thesis highlights the particularities and specificities of urban and architectural forms that are neither entirely Chinese nor Western, as one could expect. This work has the merit of highlighting connections to the

Chinese urban tradition that lay less in the materiality of the architectural objects per se, than in spatial configurations that the said objects manifest.

There are two main analytical sections of this thesis.

First, relying on historical and contemporary cartographic representations and extensive fieldwork, a morphological analysis of the study area was conducted aiming to produce essential knowledge dealing specifically with its urban form by focusing on the block level.

The evolution of the study area was in continuity with the integrity of traditional urban tissue despite all changes by keeping some key morphological characteristics and allowing us to identify structural permanence. This historical development of the urban tissue follows a sequence.

The most distinctive morphological feature retained was the traditional subdivided of Lis or Fangs. Li and Fang play the role of a morphological unit. In the past, different Lis or Fangs located within one urban block were not interconnected and separated by walls, which have been removed now.

Li and Fang define an enclosed piece of land that is then subdivided into building lots. A group of Lis or Fangs is then enclosed within a "mega block" that is delineated by wide streets lined with stores on the ground floor and residential units on the upper floors that are accessed from "the back", i.e. from alleys situated in the interior of the block. This spatial layout is quite unique. The commercial streets have the similar appearance of such streets in the West, but their spatial structure differs fundamentally from the latter,

as the stores belong to the commercial street, whereas the upper residential floors units belong to the Lis or the Fangs that are situated behind. By maintaining this mode of subdivision some characters of the traditional urban form were perpetuated.

The network of commercial streets is rather orthogonal, though the urban blocks that it delineates vary in size. The orthogonal character of the blocks is somewhat deceiving, as it masks the fact that the perimeter of the Li and the Fang that the blocks house can be irregular. Such disparity is a bit puzzling. It raises the question of why the Li and Fang, as morphological units of the tissue, do not conform to the overall regularity of the block in some instances. Unfortunately, the research cannot offer a good answer to this important question due to the lack of cartographic information on earliest periods of occupation of the land. Our hypothesis would be that such irregularities are due to pre-existing conditions pertaining to agricultural exploitation of the land, including for instance irrigation systems, but such a hypothesis would have to dealt be within future research.

Each Li and Fang is occupied by a "Linong." The term Linong refers to an urban tissue comprised of an alley system, which includes main lanes and a series of side lanes, as well as their adjacent built lots. The main lanes are connected to the main entrances of a Li or Fang. Side lanes are then deployed perpendicularly to a main lane, forming a fishbone structure. The main lanes are giving access to the peripheral streets and linking the Li or Fang to the city's main arterial system. Dead-end side lanes are giving access to each individual building.

Five morphological zones in the study area have been classified based on their distinctive geographical and morphological characteristics. Although their morphological features vary, there is a clear hierarchy among different morphological zones and blocks: regular in urban block—irregular in Li or Fang—regular in allotment system. The tributary street network structure and the spatial hierarchy of the Linong: street—main lane—side lane, marking different degrees of privacy: public—semi public—private, were well respected and the structure of traditional streets was maintained.

By focusing on the building level, the study led to the characterization and classification the existing buildings into three different types: Old Shikumen, New Shikumen and commercial shops located at the periphery of each blocks. A typological analysis of residential types contributes to a better understanding of the formative laws of typological process that sees new architectural forms deriving from previous ones in accordance with the constraints and potentials for change ingrained in the morphological systems of the tissue and architecture.

The evolutionary process of Shikumen from traditional Sanheyuan, to Old Shikumen, to New Shikumen revealed by this research shows that the emergence of Linong is, for the most part, an unplanned response to land speculation and to the will of increasing density, but also the result of the transformation and evolution of the traditional Chinese habitat type, which is conditioned by local morphological conditions. In other words, purposeful speculative development did not lead to any kind of "master planning." Rather, the developers turned to a known mode of partitioning: the Li and the Fang, and worked

from there. The Shikumen Linong embodies indigenous Chinese dwelling culture and behaviour.

There is obviously some influence of exotic architectural changes accompanying the evolutionary process, Chinese architecture started to blend traditional elements with Western architectural forms and building methods, but this influence appears to be rather superficial, mainly happened on exterior decorative details.

The main changes includes: the spatial layout changed from horizontal to more vertical dwelling, the lot size became small and compact, the number of stories increased, more modern facilities been equipped, the traditional inward-looking character converted to Western open atmosphere, etc.

Despite all those changes, the basic design principles behind the Shikumen did not change. Its spatial organization patterns, symmetry and hierarchy of space persist, and the absolute order of homes based on Chinese hierarchy and harmony remained. The relationship between building and building, building and lot, building and street followed the same principles. Each individual residential lot houses a building oriented north-south. Similarly to traditional Chinese residential forms, Shikumen Linong is a courtyard centered dwelling, whose spatial layout replicates an old sequence of rooms: formal entrance—sky well—reception hall—back sky well—service area.

It could be argued by this study that the Chinese urban culture is enacted in the spatial system, rather than figuratively expressed by the architectural language. A reading that

focuses on the “surface” of things could easily overemphasize the Western influence on Shanghai.

After reviewing the evolutionary process of Shikumen, which had a great syntactic similarity and typological continuity with traditional Jiangnan dwellings, we validate our audacious hypothesis that the emergence of Linong was a spontaneous result of the transformation of traditional Chinese habitat under the socio-economic condition and pressure of land speculation, which was coherent and consistent with the cultural models of its inhabitants. We also verified our assumptions that this typological process has been marked by a tendency toward greater complexity and a trend toward specialization.

This research enhances our knowledge of the transformation of the urban tissue of Huangpu District, which can not only offers a new perspective on the historical significance of the Huangpu District and a novel interpretation of Shanghai’s urban form, but also provides far-reaching implications for cities throughout China.

The Chinese cites has undergone significant changes over the past few decades. The current urban metropolis form is largely generated under the rules of economic growth, contributing to ecological crisis and diminishing the value of the quality of individual places. Unlimited growth and the disappearance of diversity characterises the construction of the current metropolitan form. Cities are suffering the pain of losing their identity, integrity and part of their culture. Better links between morphological research and practical applications can contribute to improve the situation.

This research illustrates the usefulness of typo-morphological approach that addresses the structural qualities of the form. The results can have immediate implications on urban planning and heritage preservation in the historical districts of Shanghai and other Chinese cities, but they open up as well on very interesting theoretical questions on the ways in which apparent cultural clash between China and the West has been mediated in the material culture.

How could the transformational logic of the urban tissue revealed by this research help to solve practical conservation problems of Shanghai in contemporary time?

Nowadays there are many challenges facing preservation and conservation of Linong. First, there are huge numbers of Linong neighbourhoods located in Shanghai, covering almost 40% of the residential fabrics (Guan, 1996). The preservation task is quite daunting. Second, the ownership and property rights are very complicated, so it is difficult to manage. Third, due to fragmented property rights not much regular maintenance work has been done, the maintenance of buildings is seriously insufficient and building deterioration is severe.

To make things worse, many low-density Linong neighbourhoods have been replaced by large-scale, high-rise complexes at an unprecedented speed especially after 1990. The construction of those complexes often occupies one entire urban block sometimes merging several urban blocks to create a very large one, which creates a dramatic change in the spatial patterns. The traditional mode of subdivision of urban blocks no longer exists. This transformation is inducing a morphological discontinuity, which results in an architectural identity crisis.

This new type of architecture affects the urban form of the city on several levels. It does not only have a negative impact on the urban tissues resulting in the loss of traditional streetscapes and the disappearing of community-based forms of social, cultural and economic heritage, but also have a negative impact on the street network.

From an urban morphological point of view, the transformation during the period after 1949, the non-compliance with the laws of evolution or the disrespect of morphological continuity is one of the causes of losing the city's identity and integrity. The general disrespect for the urban tissues becomes a major problem for conserving historical districts in Shanghai and other Chinese cities.

A commercial approach, or "skin preservation", as illustrated by Xintiandi, has in fact produced a very sterile form of urban conservation in Shanghai. Insufficient attention has been given to urban morphology and building typology in this conservation planning strategy. There is a profound gap between pure morphological research and professional practice.

The lack of a theoretical and empirical work has limited the effectiveness of local authority's preservation plans. The application of Conzenian and Caniggian thinking offers us an alternative conservation approach, which does not only need to classify the existing building types, but also requires integrating the types into a developmental framework. In fact, a morphological analysis is suggested to be a starting point and one of the foundations for research of urban redevelopment or conservation projects, especially those in the historical districts.

In order to solve current conservation problems and propose new approaches to improve future conservation plans, based on the research findings of the study area and from an urban morphological point of view, suggestions are made as followings.

First, the "structural permanence" has ensured the continuity of urban identity, which marks the strong heritage values of historical centers. For example, the evolutionary process of the study area and Shikumen revealed that the traditional subdivided of urban blocks, the tributary street network structure, the spatial hierarchy of the Linong, Shikumen's spatial organization patterns, symmetry and hierarchy of space and the absolute order of homes based on Chinese hierarchy and harmony remained.

The ignorance of transformation laws would cause a discontinuity in changes. This ignorance could also lead to inefficiency in conservation measures, which is one of the causes of the current urban discontinuity of Shanghai (Guo, 2008).

Second, the built environment is made of different components and sub-systems, including street network, the allotment system and the building fabric that relate one to another and show distinctive characteristics. The individual sites and buildings should not be treated in geographical isolation; instead they are an integral part of the historical process. Looking at the built environment as a system, allows planners to go beyond the logic of discrete objects, and embrace the complexities of urban tissues (in both spatial and functional terms).

Third, Caniggia and Maffei (2001) posit that the urban form is a cultural object, which is deeply rooted within particular culture-historical contexts. Material objects and the

built environment in particular, are not conferred the same status in China and in the western world. The “essence of things” might be what matters in the East.

Chinese cities are considered as a special cultural object, which are very different from Western cities, so it is necessary to develop analytical urban morphology methods and techniques adapted specifically to Chinese cities, as they have special characters and composition rules that are specific.

In order to sustain the particularity of Chinese cities and create quality urban spaces, based on this thesis, we suggest in a theoretical and epistemological level, the possibility of conserving Chinese cites should be based on the knowledge of Chinese context and specificities of its urban tissue.

6.2 Scope for further study

Due to limited time and costs, there are some limitations of this thesis. For example, the relatively small size of the study area, only covering nine urban blocks, is located within the French Concession, which is different from other parts of Shanghai and has its own particularities. The limited period of time being studied (1842-1949) is only one small part of Shanghai’s 6000 long and profound history.

Moreover, it is difficult to access the buildings’ interior during the field work because most of the buildings in the study area are private. Those limitations might have profound effects on the outcome and generalization of this study. Of course, this research is merely a small step towards the establishment of a new approach and it seems that much older urban tissue of Chinese cities remains a great unknown.

The cross-cultural application in China could suggest a step towards fulfilling the much larger task of creating an international comparative framework. Though the amount of research to date on Chinese urban form is tiny relative to the extent of Chinese urbanization, it provides an important foundation for future research.

This original research is a starting point for future research in this field, whose goal is ambitious. We are expecting that the output could shed light on wider consideration of historical conservation. We hope to see more enhanced study in the future.

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Appendices

Appendix 1: List of Linongs located in the study area

Anji Li	安吉里
Baoan Fang	保安坊
Baoxing Li	宝兴里
Bolin Li	卜邻里
Chengzhi Li	承志里
Dongxin Li	东新里
Duxing Li	笃行里
Huasheng Fang	华盛坊
Huicheng Li	汇成里
Jian Li	吉安里
Jili Fang	吉利坊
Jinfu Li	锦福里
Jingyi Li	精益里
Mingde Li	明德里
Minguo Li	民国里
Weixiang Li	惟祥里
Xinkang Li	新康里
Yuqing Fang	裕庆坊
Zhonghua Li	中华里

Appendix 2: Chinese Dynasties and Periods

Name	Date
Sanhuangwudi 三皇五帝	ca 2500- ca 2205 BC
Xia 夏	ca 2205- ca.1767 BC
Shang 商	ca 1767-ca 1122 BC
Zhou 周	1122-221 BC
Warring States Period 战国 Warring States Period	403-221 BC
Qin Dynasty 秦	221-206 BC
Han Dynasty 汉	206 BC-220 AD
Three Kingdoms 三国	220-265 AD
Jin Dynasty 晋	265-420 AD
Northern and Southern Dynasties 南北朝	420-589 AD
Sui Dynasty 隋	581-618 AD
Tang Dynasty 唐	618-907 AD
Five Dynasties 五代	907-960 AD
(Northern) Song Dynasty 北宋	960-1126 AD
(Southern) Song Dynasty 南宋	1127-1279 AD
Yuan Dynasty 元	1279-1368
Ming Dynasty 明	1368-1644
Qing Dynasty 清	1644-1912
Republic 中华民国	1912-1949
People's Republic 中华人民共和国	1949-

Appendix 3: Glossary of Chinese words in the thesis

B	
Back Tianjing	后天井
Baoan Fang	保安坊
Baoan situ Temple	保安司徒庙
Baoxing Li	宝兴里
Blue brick	青色砖
C	
Chinese Construction Company	中国营运公司
Chu	楚
Chunshen Jun	春申君
Ci	慈
Confucius Temple	城隍庙
D	
Daigou Qiao	带钩桥
Danwei	单位
Daotai	道台
Daxilu	大西路
Deng Xiaoping	邓小平
Deshan Li	得善里
Dongxin Qiao	东新桥
Dougong	斗拱
Du Yuesheng	杜月笙
Duxing Li	笃行里
E	
East Jinling Road	金陵东路
East Ninghai Road	宁海东路
Eryangjing Qiao	二洋泾桥
F	
Fang	坊
Fangbang	方浜
Fengshui	风水
Five Jian Siheyuan	五间四合院
Fude	福德
G	
Gong Mujiu	宫慕久
Guangzhou	广州

Guanzi	管子
Gui Lin	桂麟
Guojielou	过街楼

H

Haipai	海派
Han Dynasty	汉朝
Hongkou	虹口
Houjiabang	候家浜
Hu	沪
Hu	扈
Huaihai Road	淮海路
Huang Jinrong	黄金荣
Huang Xie	黄歇
Huangpu District	黄浦区
Huangpu River	黄埔江
Huating County	华亭镇
Humen Treaty	虎门条约

J

Jian	间
Jiangnan	江南
Jiangsu Province	江苏省
Jin Dynasty	金朝
Jingpai	京派
Jinmen Road	金门路

K

Kaogongji	考工记
Ketang	客堂

L

Li	里
Li	礼
Li Jie	李诫
Li zhi	礼治
Lijiachang	李家场
Lingnan	岭南
Linong	里弄
Lujiabang	陆家浜
Luwan District	卢湾区

M

Matou	马头墙
Middle Henan Road	河南中路
Ming Dynasty	明朝
Mingde Li	明德里
Minguo Li	民国里

N

Nanjing Road	南京路
Nanking Treaty	南京条约
New Huangpu	新黄浦
Nong	弄
Nongtang	弄堂
North Baxian Qiao	北八仙桥

O

Old Shikumen	老式石库门

P

Pearl River	珠江
People's Square	人民广场
Pingan	平安
Poste de Police Mallet	麦兰捕房
Pudong	浦东
Puxi	浦西

Q

Qiao	桥
Qinglong County	青龙镇

R

Renmin Road	人民路

S

Sanbaoyizhong	三宝一中
Sanheyuan	三合院
Sanhuangwudi	三皇五帝
Sanjianliangxiang	三间两厢
Sanmaoge Qiao	三茅阁桥
Sanyangjing Qiao	三洋径桥
Shanghai	上海
Shanghai cehui zhi	上海测绘志
Shanghai cehui zhi bianzuan weiyuanhui	上海测绘志编纂委员会

Shanghai Grand Theater	上海大戏院
Shanghai Municipal Council	工部局
Shanghai Museum	上海博物馆
Shanghai Pu	上海浦
Shanghai Urban Planning Exhibition Hall	上海城市规展览领馆
Shanghai xiancheng tu	上海县城图
Shanghai Zhi	上海志
Shen	申
Shengze Road	盛泽路
Shikumen	石库门
Siheyuan	四合院
Small Sword	小刀会
Songhu City	淞沪
Songjiang	松江
Songxia Road	松下路
South Fujian Road	福建南路
South Henan Road	河南南路
South Shandong Road	山东南路
South Zhejiang Road	浙江南路
Sui Dynasty	隋朝
Suzhou Creek	苏州河

T

Taihu	太湖
Taiping Heavenly Kingdom	太平天国
TanRenHeYi	天人合一
Tang Dynasty	唐朝
The Small Sword	小刀会
Tianjing	天井
Tianzifang	田子坊
Tingzijian	亭子间
Treaty of Whampoa	黄埔条约

W

Waiyangjing Qiao	外洋泾桥
Wu	吴
Wusong River	吴淞江

X

Xianfeng years	咸丰年间
Xiangfang	厢房
Xiaoshimin	小市民

Xingren Li	兴仁里
Xinhai Revolution	辛亥革命
Xintiandi	新天地
Xixin Bridge	西新桥
Xuejiabang	薛家浜
Xujiahui	徐家汇

Y

Yangpu	杨浦
Yangtze River	扬子江
Yijianliangxiang	一间两厢
Ying Zao Fa Shi	营造法式
Yue	越
YuYuan Garden	豫园

Z

Zhang Xiaolin	张啸林
Zhaojiabang	肇家浜
Zhejiang Province	浙江省
Zhen	镇
Zhengjia wood Qiao	郑家木桥
Zhonghua Li	中华里
Zhouli	周礼
Zhujiaqiao	朱家桥
Zunde Li	尊德里
Zunde Tang	尊德堂