

CHINESE SUPERBLOCK

A STUDY AND DESIGN TOOLS

FOR SUSTAINABLE URBAN HOUSING DEVELOPMENT IN CHINA

中国的超大型街区

MASTER'S THESIS / SARA NIEMINEN



TAMPERE UNIVERSITY OF TECHNOLOGY



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CHINESE SUPERBLOCK

A Study and Design Tools for Sustainable Urban Development in China

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ABSTRACT

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This thesis studies Chinese superblock housing areas, exceptionally large and enclosed high-density residential areas. The most common building type is high-rise apartment buildings. The superblock typology has been the main method for planning and constructing urban housing all over China during the past three decades of rapid urbanization.

After the Chinese economy opened up in 1978, Chinese-Western co-operation in Chinese projects has continuously increased. The co-operation is challenging due to very different cultural backgrounds. This thesis seeks to bridge the gap of the cross-cultural co-operation issues with a study approach respectful of cultural differences.

The study enlightens the backgrounds of the superblock housing areas, and defines the characteristics through an analysis of existing superblock housing areas. The characteristics are further explained from a Chinese perspective, through the Chinese culture and traditions. In addition, the study defines main challenges in relation to sustainable development issues.

The superblock housing areas create unsustainable environments, which lack in human scale and diversity of both the built form and the non-built areas. The environments prohibit pedestrianism and poorly meet the needs of contemporary Chinese urban life.

The goal of the work is to promote sustainable urban housing with a Chinese identity to overcome the challenges. From the basis of the study, practical tools for future planning are created. The design tools combine essential Chinese characteristics with two Western sustainable planning theories by presenting concepts for planning. The concepts form a basis to start planning for sustainable urban housing in China.

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NIEMINEN, SARA: Kiinalaiset suurasuinkorttelit – tutkimus ja suunnitteluvälineistö kiinalaisen kaupunkiasumisen kestävä kehitystä varten

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Tämä diplomityö tutkii erittäin suuria, suljettuja ja tiiviisti rakennettuja kiinalaisia suurasuinkortteleita (eng. 'superblock housing area'). Yleisimpänä rakennustyyppinä kortteleissa on käytetty korkeita kerrostaloja. Suurkortteli on ollut pääväline urbaanin asumisen suunnittelussa ja rakentamisessa joka puolella Kiinaa kolmen viimeisen vuosikymmenen vilkkaan kaupungistumisen aikana.

Sen jälkeen kun Kiinan talous aukesi vuonna 1978, kiinalais-länsimainen yhteistyö kiinalaisissa suunnitteluhankkeissa on kasvanut jatkuvasti. Hyvin erilaisten kulttuuritaustojen tähden yhteistyö on haastavaa. Tämä diplomityö pyrkii kuroma umpeen välimatkaa kulttuurien välisessä yhteistyössä kulttuurisia eroja kunnioittavan tutkimuslähestymistavan avulla.

Työssä suurasuinkortteleita tutkitaan valaisemalla niiden taustoja sekä määrittelemällä niiden ominaisuuksia olemassa olevien suurasuinkortteleiden analyysin kautta. Ominaisuuksia on edelleen selitetty kiinalaisesta perspektiivistä, kiinalaisen kulttuurin ja perinteen kautta. Lisäksi on määritelty suurasuinkortteleiden kestäväälle kaupunkiasumiselle asettamia haasteita.

Suurasuinkorttelit muodostavat epäkestävä ympäristöä, josta puuttuu ihmisläheinen mittakaava ja monipuolisuutta niin rakennetussa ympäristössä kuin rakentamattomissakin alueissa. Ympäristöt estävät jalankulkua ja täyttävät heikosti nykyaikaisen kiinalaisen kaupunkielämän tarpeet.

Työn tavoitteena on edistää kiinalaista identiteettiä vahvistavaa kestävä kaupunkiasumista haasteiden voittamiseksi. Tutkimustyön pohjalta on kehitetty käytännöllisiä suunnitteluvälineitä tulevaa suunnittelua varten. Suunnitteluvälineistö yhdistää oleellisia kiinalaisia ominaisuuksia kahden länsimaisen kestävä suunnittelun teorian kanssa esittämällä suunnittelukonsepteja. Konseptit muodostavat pohjan kestävä kiinalaisen kaupunkiasumisen jatkosuunnittelulle.

摘要

坦佩雷工学院

建筑学

萨拉·涅米恩：中国的超大型街区——关于中国可持续城市住宅发展的研究和设计工具

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关键词：超大型街区，中西合作，可持续城市住宅，中国住宅特色

本论文研究中国的超大型街区，即特大和封闭的高密度住宅区，最常见的建筑类型是高层住宅楼。这种超大型街区一直是中国各地在过去三十年快速城市化中，规划和建设城市住房的主要方法。

中国在1978年改革开放后，西方国家在中国参与的项目合作也不断增加。因为非常不同的文化背景，合作颇有难度。本论文旨在采用尊重文化差异的研究方法，来缩小跨文化合作的隔阂。

本论文分析了现有的一些超大型街区，探究它们的产生背景和特点。并对这些特点进一步从中国文化和传统角度进行了解读。此外，研究还指出了与可持续发展相关的主要挑战。

超大型街区创造不可持续的环境，尺度不人性，建筑和室外空间单调缺少变化。环境很不利于步行，也难以满足中国当代城市生活的需求。

本研究的目标，是推动中国特色的可持续城市住宅建设以应对各种挑战。以研究为基础，本论文为未来规划提出了实用工具。工具即规划概念，它结合了中国的基本特色和两大西方可持续发展的规划理论。愿这些规划概念为中国可持续城市住宅规划打下了一个基础。

PREFACE

My interest in China arose, when I attended a course for planning for sustainable urban development at Fudan University in Shanghai in 2007. No statistic on urban development has been quite as eye opening as seeing the massive construction sites and vapor of pollution before the sun for myself. It so happens that I even stumbled upon the problematic of the thesis subject then. Realizing only after having started this study that the reason for my “short jog around the block” lasting an hour, instead of the intended twenty minutes, was due to the superblock typology.

Because of my will to write about this subject, and a sudden inspiration to improve my Swedish in the meantime, I headed off to Stockholm to write the thesis at Sweco Architects AB, whom I knew to be experienced in sustainable planning. Their knowledge and experience in planning in China turned out to be an indispensable contribution to the results of this work. For this, I wish to thank everybody at Sweco Architects AB in Stockholm for their interest in my work, for the inspiring atmosphere, and for the possibility to glance at the reality of the study subject. Special thanks go to the people at “studio utland” for all helpful discussions and professional comments. I am lucky having had Li Ding as my faithful Chinese translator, and Anna Hesse as my supervisor, guiding me and connecting me to sources of material. I hope my work can contribute to their work in China in the future.

To my supervisor at the Tampere University of Technology, professor Markku Hedman, who, despite the geographical distance, never failed to answer an email, I want to express special thanks for asking the right questions at times of hesitation. Without him, I would also not have Elena De Lisio to thank for her amazingly thorough auditing of the thesis. Her help with the English language and the structure of the work were invaluable.

In addition, Finnish Cultural Foundation is to be thanked for granting a stipend enabling the work on this thesis.

Last but not least, with a smile and a friendly little bow I want express my deepest appreciation for my family: for my father, mother, little brother, and little sister. Thank you for being a rock-solid support through thick and thin, for being the basis of my personal sustainable development.

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INTRODUCTION

In a wider perspective the reason why this thesis was made can be tracked down to the opening-up of the Republic of China (China) in the year 1978. The opening-up triggered two phenomena fundamental for this thesis: China's rapid urbanization and the flood of Western planners interested in taking part in China's phenomenal urban construction.

After almost three decades of near stagnation of the Chinese society during the Mao era in 1949-1978 political reforms were made that opened the Chinese economy up from centrally planned to a social market economy. In addition, further reforms guaranteed a rapid economic growth after the early 1990's and since these events, China has embarked on a journey of transformations of epic speed and scale. The country has risen to the whole world's awareness in just thirty years' time, during which China has urbanized at a pace even faster than that of the Western world during industrialization at the turn of the 19th and 20th centuries. One of the means of the rapid urban construction has been the block structure described as 'the superblock'.

Growing China, urbanizing China

As a result of migration and natural demographic growth, the urban population has increased explosively, so that in 2009 already 44,0% of the Chinese dwelled in urban areas whereas thirty years previously the percentage was just 18,7% (Fig. 1). By comparison with the United States, a similar growth happened roughly during 50 years from 1860 to 1910 (U.S. Census Bureau, 2004). In addition, a "floating urban population" of approximately 150 million people is counted, that is to say about 11,2% of the whole population, which is not included in the figures because these rural-to-urban migrants are not regarded as permanent urban residents according to the citizenship policies, the so-called hukou system (Yan & Chengri, 2007).

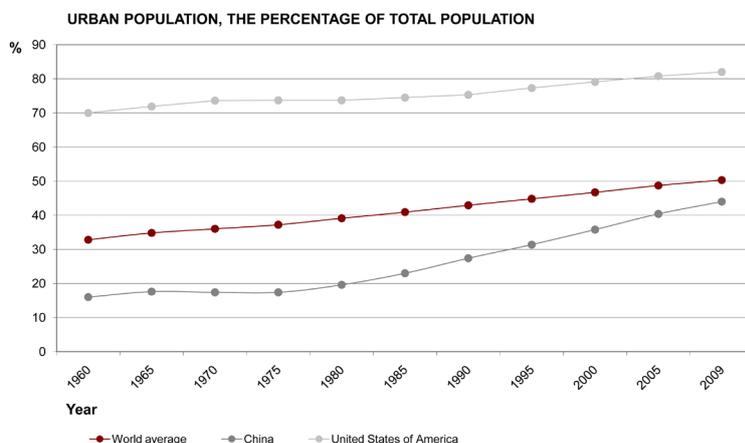


Figure 1. Chinese urban population.

The scale and speed of China's urbanization has been phenomenal even though the percentage of urban population in China is still under the world's average and far from the industrialized countries such as the United States.

[Modified from: World Bank, 2011]

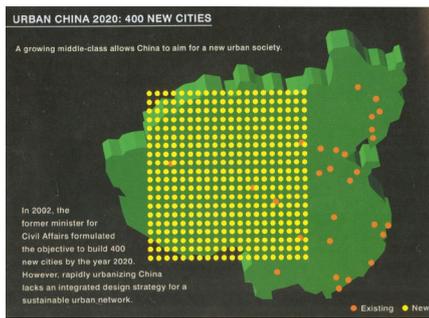


Figure 2. To meet the needs of China's urbanization a target amount of 400 new cities by the year 2030 was formed in 2002. *China's growth also means enormous amounts of new superblock housing areas. [Lehmann, 2010]*

Assuming that the goal is to reach a level of urbanization similar to the highly industrialized countries, the sheer amount of urban population will be tremendous. According to one estimate the Chinese urban dwellers will count over one billion people by 2030 (Lehmann, 2010). The development pattern forces existing cities to grow as well as requires for whole new cities to be built. In 2002, a target of 400 new cities by the year 2020 was formulated by the former minister for Civil Affairs (Fig. 2) (Lehmann, 2010). In this context, the superblock structure, as an efficient and high-density model for housing design and construction, is likely to hold its ground.

Contemporary Chinese housing and the 'superblock'

Chinese cities have grown during two centuries from the hierarchically walled low-rise traditional cities of the feudal period to the dense, mega-structured endless seas of superblocks and high-rise buildings that they are today (Fig. 3). Whether intentionally or just due to the apparent simplicity the superblock structure provides for housing construction, this form of dividing urban land has become the dominant manner of building the new China. As the superblock is becoming ever more strongly a prevalent type of planning for housing areas, as Fraker Jr. (2006) states an estimate of 10-15 superblocks are being constructed in China every day, it is an interesting phenomenon for closer observation.



Figure 3. A high-rise superblock housing area in Beijing. *The superblock housing area model has become a prevalent type of housing area design and construction in the post-reform China.*

Cultural differences as an asset

The Chinese-Western co-operation, the second fundamental aspect of the thesis, is nothing new since China has throughout its history got and searched influences from Western planning. In fact, even the superblock's origins lie in Western urban planning theories. According to Junhua, Rowe & Jie (2001) the beginning of Chinese modern urban housing is seen to have started in 1840 when trade relations were re-established with the West. During this era from 1840 to 1949 housing with Western influences as well as housing based on China's own tradition emerged. During the following Mao era from 1949 to 1978 China's urban housing construction was kept to a low level and the constructed housing was forcefully influenced by Soviet planning practices and industrialization of housing construction. The influences are still visible in contemporary superblock housing areas.

The current era of China's urbanization is even more influenced by the Chinese-Western co-operation due to globalization. In addition to usual adoption of global influences, the stagnation of Chinese planning practices during the Mao era resulted in a stronger need for imported planning solutions after the opening-up. The booming Chinese building industry has attracted urban planners and architects to enter the Chinese market but problems occur in the co-operation. Primarily these challenges emerge from cultural differences, and they vary from misunderstandings in communication to differing planning practices. Xin Lu (2008) describes this through sociologist William Graham Sumner's views of ethnocentrism where everything encountered in cross-cultural communication is scaled and rated with reference to one's own group and its values in the centre. She addresses that to achieve better understanding one should first comprehend the matter at hand with the evaluation system of one's own culture, but it is important then to reflect the assessment back on the value system of the culture at hand (Fig. 4).

Because the different planning practices have their roots deep in the culture, it is important to try to understand the superblock housing areas from the perspective of the Chinese culture, as Xin Lu presents. By looking into the contemporary context and the tradition of Chinese housing, this work seeks to explain the characteristics of the superblock housing areas from a Chinese perspective in order to define what the Chinese essence of them consists of. In a way, it is like understanding a language before speaking it. It is necessary to understand the spatial language of Chinese housing before contributing to new solutions.

The Western perspective is not forgotten either. It forms the basis for the sustainable planning practices in this thesis. More closely, the Western perspective is seen as a wide comparison to the Chinese culture and

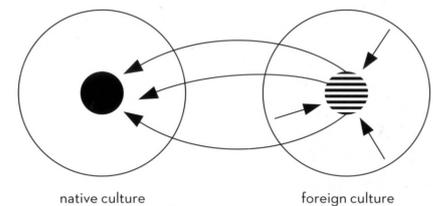


Figure 4. The Chinese-Western co-operation requires consideration of the Chinese perspective.

Jumping out of ethnocentrism and false interpretations by reflecting assessment of a foreign culture on its own value system is used as a viewpoint.

[Xin Lu, 2008]

mainly northern European because of the author's Finnish background. Even though trying to remain objective, it is to be noted that Western nuances in language are unavoidable due the author's background.

Sustainable housing areas with Chinese identity

As a result of speed and adopting outer influences, the current urban housing construction such as the superblock housing areas, has raised questions about the deterioration of Chinese housing tradition. A worry that is not groundless since the new housing construction is most often created by demolishing old traditional low-rise urban housing structures such as hutong housing in Beijing or linong (also known as lilong) areas in Shanghai. Even though the loss of cultural identity is widely stated, Hassenpflug (2009) among others argue that the superblock housing areas, no matter how impersonal they might be, possess in their deepest nature many hidden Chinese qualities. Starting from Hassenpflug's assumptions, it is further argued that the problematic has mainly arisen because regulations and speed have found too few alternative ways of expression in planning.

Furthermore, it is argued that the current state of the superblock housing areas has created obstacles for sustainable urban development in scales from city structure to apartment design. Commonly the superblock model creates residential areas and city spaces that lack in human-scale, pedestrian connections, variety in architecture and flexibility in apartments. To overcome these aspects, the work aims at creating alternative design tools for the planning of superblock housing. By combining Western expertise in sustainable housing design with the essence of Chinese housing it may be possible to find concepts, with which to start planning for housing areas, which both support Western sustainable practices and reinforce Chinese housing characteristics.

PART ONE

第一
部分

The first part of the thesis focuses on the past and present of the superblock housing areas, on their backgrounds and their current state as well as on housing in the Chinese society in general.

Cultural Context of Contemporary Chinese Housing

1.1

In its deepest nature, housing exists to ensure our place in the world, to satisfy our most basic needs. Housing acts as a scene of our everyday lives and it is this, which makes housing and culture inseparable. Housing reflects our culture, is affected by it and on the other hand housing also plays an important role in shaping a society. The state and prospects of Chinese housing are characterized by apposed factors such as growing standard of living and widening economic inequalities, the traditionally strong sense of community and emerging individuality as well as top-down politics that have an effect on the speed and scale of construction.

The last decades of urban transition have not only changed the spatial form of China but, as Friedmann (2005) argues, changed the whole Chinese civilization. The changes after 1978 have shaped all sectors of the Chinese society, Chinese housing among others. Especially the lifestyles and living spaces of urban dwellers have changed extremely, to say the least. Nevertheless, it is not to be forgotten that, despite the recent progress, in many aspects China is still a developing country.

However, the direction of the development of China in the recent decades shows that standards of living have steadily improved. One indicator for this is the floor space ratio per capita, which has steadily risen after the worst housing shortages during the Mao era (1949-1978). The average floor area grew altogether 6.2 square meters during the period of 1978-1999 and was 9.8 square meters per capita in 1999 (Fig. 1.1) (Yang, Chengri 2007). Even if the amount is fairly low compared with Western averages, it counts for nearly threefold growth. Another aspect, which has raised the quality of life is that shared apartments and kitchen or bathroom facilities have become rarer during the last decades (Junhua, Rowe & Jie, 2007).

Figure 1.1. Living standards have improved in general.
The amount of housing construction and the average living space per person have grown explosively after the year 1978.
 [Junhua etc. 2001]

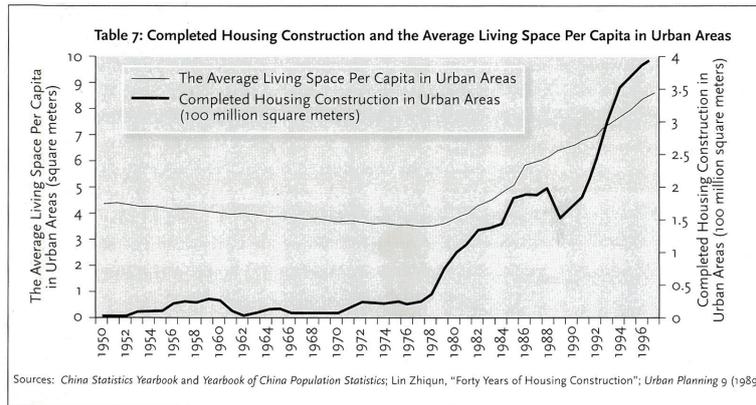


Figure 1.2. Income differences are wide.
An uneven development pattern characterizes the distribution of wealth between Chinese.

According to Tingwei (Yang & Chengri, 2007), China’s urbanization is characterized by two main aspects: its scale and uneven development pattern. The uneven development pattern makes China a country of pronounced opposites both geographically and socially mainly due to an uneven distribution of wealth. Taloussanomat (2011) states that 70% of wealth in China is in the hands of 0,2% of the population, which goes to show that while the amount of rich Chinese rises daily, most of the population still live in poor conditions (Fig. 1.2).



Figure 1.3. Two sides of the coin.
An uneven development pattern is visible in the different forms of China’s urban housing.

In the scale of the whole country, inequalities are apparent between the western part and the coastal regions, the latter having benefited mostly from the results of the development. The positive outcomes of economic wealth are in addition more prominent in urban than in rural regions. Finally, inequalities are prominent in urban areas as well and therefore strongly characterize the physical form of contemporary urban housing in China. (Yang & Chengri, 2007.) In urban housing, the inequalities are visible as a combination of contemporary housing equal to Western in quality existing simultaneously with older dilapidated low-rise housing (Fig. 1.3). Similarly, in the outskirts of cities high-income gated communities exist alongside low-quality high-rise housing areas where it is not unheard of for families to share apartments too expensive otherwise.

Consequently, China is experiencing shortages of low-income housing at the same time as for example in the mid 1990’s 60 million square meters of housing constructed were standing idle just as investment apartments or for the lack of enough well-off buyers (Yang & Chengri, 2007; Junhua, Rowe & Jie, 2001). Some latest evaluations state that nowadays the figures would be around 64 million empty apartments (SBS Australia, 2011). This situation has created severe shortages of affordable housing affecting the low-income part of the population as for example the approximately 150 million migrant workers without hukous. At the same time in the hope of economic gains of the developer or as a means of the government to boost national economy even whole unpopulated cities, ghost towns,

have emerged. (SBS Australia, 2011)

In addition to income levels and physical urban forms, Yang & Chengri's observation of the uneven development pattern can also be seen as differences between younger and older generations. The younger generations were born after the opening-up and have grown-up under global and especially Western influences, in a totally different China as compared to that of their parents and grandparents (Fig. 1.4). Thus their hopes and needs are, quite literally, from a different world as compared to the older generations. Due to this, the ambitions of the younger generations lie in a more individual-oriented development when it comes down to education, profession, family formation and housing choices. (Edelmann, 2008.)

In urban areas this relatively new trend can also be explained by the changes in family structure during the last century. Due to the one-child policy, the traditional large multi-generation family form has developed into a one-child nuclear family housing an apartment (Junhua, Rowe & Jie, 2001). The physical structure of the home has thus become less crowded and the attention has turned from the eldest of the big family to the singular child of the small nuclear family. All in all, the growing financial well-being and the changed structure of society have also enabled the Chinese to start expressing individual needs more. This mostly concerns the middle and high-income part of the population.

Notwithstanding the changes in the meaning of an individual caused by the one-child policy and societal changes and economic growth, the meaning of community remains significantly strong in the Chinese culture, when compared with Western cultures. The strong sense of community is often seen by the Chinese as the force holding the 1.33 billion nation together whereas by Westerners often seen as an act of discriminating individual rights. This mentality of a group being more important than one person is an inseparable part of the Chinese culture. This has also a strong impact on the meaning of a housing area by means of the community it creates and what status the community holds for the individuals. As for the physical form, the sense of community affects, for its part, the tendency in Chinese housing to multiply one solution. This is more logical in China since the communal needs are considered more valuable and thus there might not be that an acute feeling of necessity to provide a wide range of alternatives and there does not yet exist an expressed demand for them as in the Western world.

Another, perhaps more controversial, aspect affecting the number of alternatives in housing is the strong central governance. Due to building codes and other regulations, the amount of housing solutions produced



Figure 1.4. Younger generations have grown-up with Western influences.

The young Chinese (especially with higher income) have become more individual-oriented.

is fairly limited in the current situation. The Chinese culture has always been characterized by a strong centralized rule. During the Mao era this rule was optimized to the maximum and during the post-reform era the top-down principle in the politics remains strong. The government strongly steers housing production.

In addition to top-down politics, the power of the developer has become strong because the transaction of selling land to developers holds city's economic growth strong and thus developers are reluctantly controlled. Therefore the developers have the possibility to reinforce financial gains even to the detriment of the quality or the variability of housing. Again, compared with the pre-reform era, development in the supply of different housing alternatives for differing needs has improved due to the re-establishment of private ownership and the inevitable follow-up of it: the demand-supply structure of the housing production. (Junhua, Rowe & Jie, 2001) Still, the different aspects i.e. communality, top-down politics and economic gains of developers combined bring one to question if the one-sidedness of the constructed environment has gone past communal thinking and truly suffer from lack of alternatives even despite the slight improvements.

The second denominating factor of China's urbanization is scale. To add to the aspect of low number of varieties, the solutions in housing construction are also implemented at an astounding speed and in unimaginable amounts. Speed and magnitude of urban construction have become prominent characters of China's new rise. As a result, China is facing whole new challenges in urban housing due to the emerging mega-structured urban environments. In the background lie both regulations for more dense urban construction as well as the pursued economic profits. The Chinese government has prompt higher density of urban construction since the 1970's. These regulations were tightened further after studies about the diminishing amount of arable land in the mid 1990's so that today at places density in China is reaching the so-called hyper-density (over 2000 people per hectare). (Yan Song, 2007; Junhua, Rowe & Jie, 2001.)

Perhaps as the most convenient manner for high-density construction, high-rise building has widely been adopted alongside the superblock structure for housing construction in China. As the attempt is to ease the housing shortage, the large-scale housing construction is partly understandable. However, with sustainable urban and housing development in mind, one comes to question if the high-rise and large-scaled construction as means of enforcing density are optimal when taking into account other factors, besides mere density.



Figure 1.5. Phenomena of "placelessness" and "otherworldliness".

Large-scaled and impersonal urban environments have psychological impacts especially on migrants moving to urban areas for the first time.

Adding to the high-density construction methods the diminishing locality, which is partly a result of the lack of alternatives in urban construction and partly due to the destruction of old low-rise urban structures, a concept of "otherworldliness", as Rowe (Junhua, Rowe & Jie, 2001) calls it, has become a matter of concern. The phenomenon is arising among the rural-to-urban migrants who are leaving rural regions to work in the mega-structured environments of the cities (Fig. 1.5). The mega-structured urban environments are a fairly young phenomenon even worldwide let alone for the Chinese peasants entering urban areas for the first time.

Another expression of this "placelessness" has turned out to be the weakening ties of urban dwellers to neighbors as the scale of housing communities has grown excessively since the low-rise communities of the first urban housing structures in the 1930's. According to some opinions communality holds strong even among the several thousand residents of a superblock housing area but it is also stated that the spontaneous everyday contact with neighbors in the community has diminished. There are wishes and attempts to re-establish physical forms that enable this natural communal behavior as, for instance, the older low-rise housing structures enable.

In conclusion, the living conditions in the urban areas of China have improved during the post-reform era in general when comparing to the starting level of 1978. Because of the uneven development patterns the starting points as well as points of views among Chinese are highly affected by age and income-level. In the culture of traditionally high sense of community, the individual mindset is gaining ground, especially among higher incomes and the younger generations. The other distinctive characteristic of current China is the highly large scale of the development

compared to the Western world. Alongside built environments, for example, the number of people, car amounts and even the count of pet dogs grow. In the end, it is hard not to question if the high density as a priority has been carried out at the expense of historical versatility and psychologically sustainable housing environments thus far. The need for more locality-enhancing and small-scale community supporting housing solutions is becoming apparent.

1.2

Adaptations of the Neighbourhood Unit Theory in the 1940's and 1950's

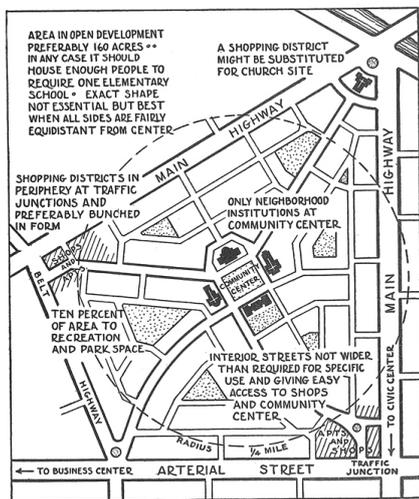


Figure 1.6. The neighbourhood unit theory. Clarence Perry's neighbourhood theory from the year 1929 was the basis of the predecessors of the superblock typology in China. [the New York Regional Survey, 1929]



Figure 1.7. A part of the residential area by China Eastern Railway in Harbin. This housing area was one of the first adaptations of the neighbourhood unit in China. [Junhua, Rowe & Jie, 2001]

The superblock, a large-scaled, individually managed block unit, which is often called 'gated superblock' by Westerners because of its enclosed nature, has its roots in the first large-scaled urban housing areas constructed by the railway companies in northern China in the 1940s. These housing areas were based on a Western theory of 'the neighborhood unit', which was originally introduced by Clarence Perry in the New York Regional Survey, Volume 7 in 1929. The neighborhood unit theory introduced an idea of an area, which was of a pedestrian-friendly size and surrounded by larger arterial roads on each side. It was to be large enough in inhabitant amount in order to accommodate a school within the area. At the time of the theory's origin the proposed amount of inhabitants was 5 000 (Fig. 1.6).

The neighborhood unit theory was first introduced to Chinese planning before the beginning of the funding of the People's Republic in 1949 and was eventually criticized as capitalistic, but there were still some adaptations of it in the beginning of the period of socially planned economy (Fig. 1.7). At that time, the neighborhood unit was considered a viable model for the emerging large-scale urban housing because it gave a solution to the organization and management of supplementary facilities, which had become an important issue. In the early 1950's urban housing areas constructed according to the neighborhood unit model were called "hanglieshi", which means 'lined-up in rows' and refers to the manner of the buildings constructed in rows (Fig. 1.8). The hanglieshi areas were larger in size than the original neighborhood unit theory stipulated and reminded of the current superblock housing areas in size and building layout. (Junhua, Rowe & Jie, 2001)

Although these first experiments of the neighborhood unit theory were replaced with Soviet-style models for the first three decades of the People's Republic, they can be considered to be the predecessors of the

structure of the current superblock housing areas, since they laid the first foundations for the idea of a large-scale, individually managed unit for China's residential area planning.

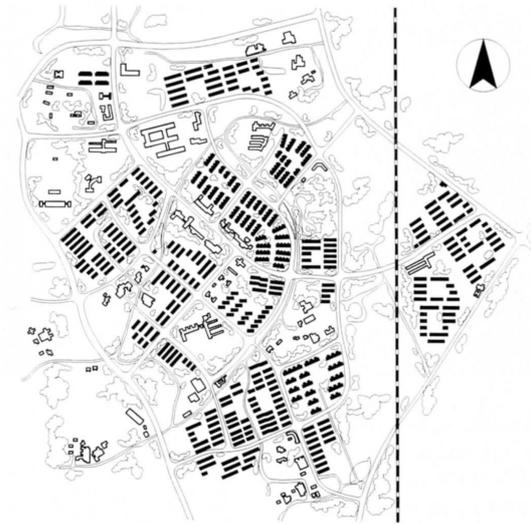


Figure 1.8. Chaoyangxincun Village, Shanghai. "Hanglieshi" housing areas were predecessors of the contemporary superblock housing areas. [Junhua, Rowe & Jie, 2001]

Standardization, industrialization and densification of housing in the Mao era (1949-1978)

1.3

During the socially planned economy, from 1949 to 1978, housing was under public ownership and considered as welfare not a consumer commodity, the motto being "housing first and livelihood second". (Junhua, Rowe & Jie, 2001) Therefore investments in housing construction were really low and China suffered from severe housing shortage. One attempt to ease the housing shortage was the industrialization and standardization of housing construction, which was developed according to the Soviet example. As a result, this era produced mainly very low-standard and unvarying housing, affecting especially the quality of architecture for a long time to come.

In addition to standardization, recommendations about increasing density of residential buildings were put forward in the early 1960's. These calculations about increasing density comprised everything from increasing the amount of storeys, the depth and the length of the buildings to reducing the distance between buildings and the height of the storeys. Both the density recommendations as well as industrialization and standardization of housing construction continue to affect the planning and construction of the superblock housing areas considerably even nowadays.

Despite the different efforts, the Mao era still left behind shortage in urban housing and, therefore, when China opened up there was a great need for increasing housing construction. On the other hand, housing construction was made the new leading asset for achieving economic growth. As a combination of the economy boosting and housing shortages dense and large-scaled housing construction became an unavoidable consequence and was applied all over China. For these needs, the superblock structure has proven to be an effective model for construction. This for one thing explains the popularity of it among local governments and developers. In the construction of both existing and new cities the superblock has become the dominant form of land use in both housing construction as well as in other land uses.

Today, the superblock is a large-scale block structure, where the urban land is divided by arterial roads into usually square-shaped blocks approximately 300-600 meters times 300-600 meters in size. The rights to develop these blocks of land are sold to developers who are responsible for constructing a prescribed number of housing units, internal community facilities as well as all internal infrastructures (Fraker Jr., 2006). The area is gated or otherwise closed and the inner traffic network of the block is separated from the surrounding grid of arterial streets.

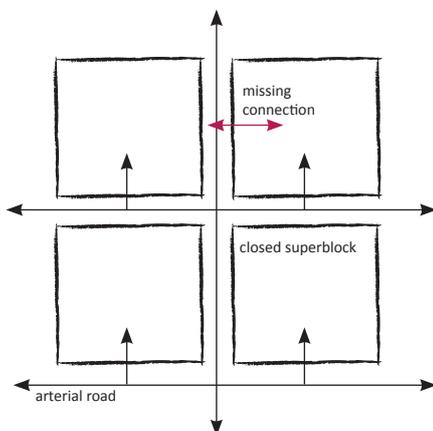


Figure 1.9. Islands in the city.

The superblock is a 300-600m x 300-600m individually managed and closed block structure that creates city structure where the blocks are separate units divided by arterial roads.

After the construction, the superblock housing area is demanded by law to have an area management system, a “neighbourhood committee” usually organized by the developer, which is responsible for the security, cleanliness and common artefacts of the area (Hassenpflug, 2009). The combination of separated inner infrastructures and the maintenance system manifests itself in housing areas that are of highly enclosed nature, since only one or a few entrances connect the block with the city’s arterial road network and the area is not open to the public. Due to this the blocks become introvert in nature, sort of islands in the city structure since they are only accessible to the inhabitants (Fig. 1.9).

The speed-effectiveness of the superblock for constructing cities can be explained by how the superblock functions with a sort of plug-in principle, where the inner infrastructures constructed by the developer are connected to the city’s infrastructures. This requires less infrastructures to be constructed by the city than in cities based on blocks of smaller size. (Fraker Jr., 2006) On the other hand, the size of the block seems to be influenced by the developer’s wish to purchase rather big areas of land to be developed as singular areas presumably due to this practice being highly cost-effective.

The dual construction system between the city and the developers has made the massive and rapid housing construction possible in China.

But it, the superblock structure for housing, has not come without side effects on urban life. These effects on urban life and the challenges the superblock housing area model in its current form sets for the future are highlighted further on in the chapter 4.

Locating Superblock Housing Areas in Contemporary Chinese Cities

1.5

The superblock is a block structure used in urban planning for the division of urban land. These plots of land are developed for different purposes. Furthermore, the superblock structure is also used to construct different types of housing areas. Therefore the superblock housing areas differ in building height and types and in location inside the city. The basic structure of Chinese cities and the main types of housing that exist are briefly explained in order to locate the superblock housing areas studied among other urban housing structures (Fig. 1.10). The superblock housing areas have two main manifestations: centrally located high-income areas, and lower to middle-income areas in the outskirts of the cities. Obviously, there are differences between cities as well as between housing areas themselves, but the categorization is an intentional generalization aimed at providing an overview of the phenomenon.

According to Tingwei Zhang (Yang & Chengri, 2007) the main spatial changes of Chinese cities during the postreform era can be categorized into three different forms of urban space: the new urban space, the renewed urban space and the ignored urban space (Fig. 1.10). Tingwei uses Shanghai as a case study but it is safe to assume that these spatial changes exist in most Chinese cities with some local differences because the central government strongly steers the development of urban areas into a similar direction nation-wide.

The superblock housing areas appear in both the new and renewed urban spaces. The third form of urban space, the ignored urban space, refers to areas where there is concentration of low incomes, migrants and old manufacturing factories. These areas are either traditional housing blocks such as Beijing's hutongs or uncontrolled new urban housing with low living conditions, the so-called "urbanizing villages". Typically, these areas are low or mid-rise in building height and high in density. (Yan Song, 2007)

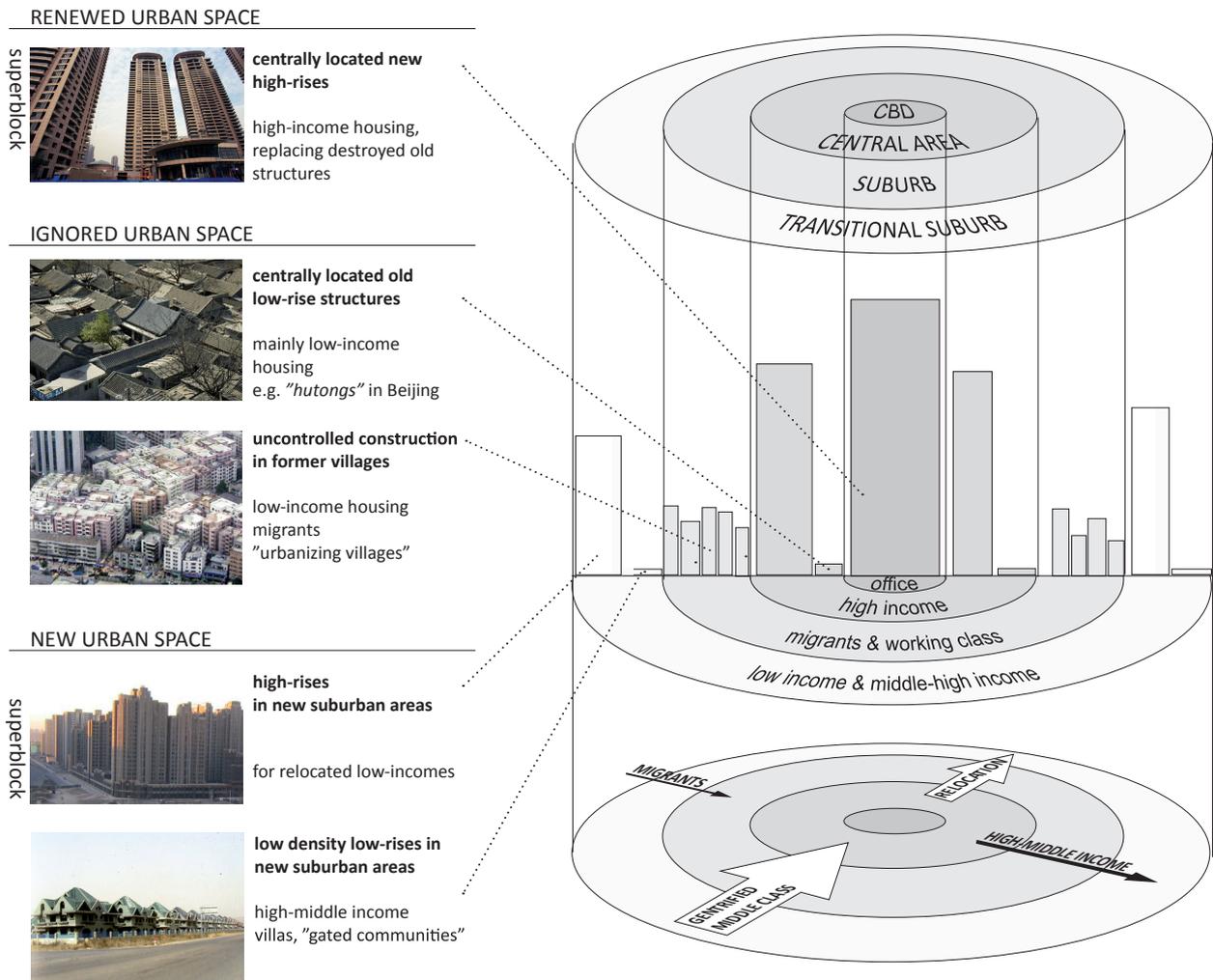


Figure 1.10. The spatial forms of contemporary Chinese cities divided into three different forms of urban space.

The superblock housing areas appear mainly in the renewed urban space and in the new urban space. [adapted from: Yang etc., 2007; Yan 2007; Hassenpflug, 2009]

In the case of the superblock housing areas, the renewed urban spaces play a distinguishable role. The renewed urban spaces refer to new structures that are built after the destruction of old low-rise city structures (e.g. hutongs) in the central areas of the city (Fig. 1.11). This profound and somewhat devastating renewal of the central urban structures is made possible by the relocation process of low incomes from central areas to the outskirts of the city (Fig. 1.10), which has become a typical feature of China's urbanization in the from 1978 on. This phenomenon creates two different types of superblock housing areas. On one hand, areas with middle to high-income residents pop-up in the city centres. On the other hand, new low-income housing areas are built in the outskirts of the cities (transitional suburb) for the relocated population as a compensation for the loss of their homes. The latter type represents the new urban spaces.

In addition, some cities like Shanghai have also catered new low-rise suburban housing areas for the needs of the growing wealthier part of the population. In a way these housing areas are also a manifestation of the superblock, albeit that they remind in their low-density suburban nature more the so-called 'gated communities' typical in the United States. These suburban villa areas are also a form of the new urban space. (Yang & Chengri, 2007) The superblock housing areas described and followingly analysed are mainly those that appear as centrally located, middle to high-income areas.



Figure 1.11. Building marked for destruction.
The renewed urban space is a follow-up of the destruction of traditional low-rise structures such as Beijing hutongs.

11 existing superblock housing areas are analyzed in this chapter, in order to identify the features that define the current superblock housing areas. The cities and analyzed blocks are chosen based on the availability of resource material. From this, the choice of the blocks is narrowed down to ones in the cold climate zone of China with one exception in the extreme cold region (Fig. 2.1). The climate zones affect Chinese building codes, especially those related to heating and lighting and in so doing create slight regional differences to the planning of superblock housing areas. (Fig. 2.2.)



Figure 2.1. The climate zones of China.
The analyzed housing areas are located mainly in cold climatic regions.
[China Academy of Building Research, 2012]



Figure 2.2. 11 existing blocks from 5 cities are analyzed (left).
The overall analysis is done at city structure level of four housing areas in Beijing (a), four in Jinan (e) and one in each of Changchun (b), Taiyuan (c) and Handan (d).
[Modified from: Google Maps, 2011]



Figure 2.3. Beijing blocks (a).
[Modified from: Google Maps, 2011]

There are eleven blocks analyzed in total: four of them are located in Beijing (Fig. 2.3), four in Jinan (Fig. 2.4) and one in each of the cities of Changchun, Taiyuan and Handan. All of the chosen neighborhoods are analyzed at the level of city structure and four superblock housing areas are analyzed more closely at block, building, and apartment level. Observing four of the housing areas more closely, characteristics of the block structure as well as of the buildings and apartments can be distinguished in addition to the features of the overall analysis. The four housing areas analyzed in detail are the Tiangtongyuang north district in Beijing (Fig. 2.3) and housing areas in Changchun (Fig. 2.5), Taiyuan (Fig. 2.6) and Handan (Fig. 2.7).



Figure 2.4. Jinan blocks (e).
[Modified from: Google Maps, 2011]



Figure 2.5. Changchun block (b).
[Wan&Le, 2006]

Figure 2.6. Taiyuan block (c) (furthest right).
[Wan&Le, 2006]

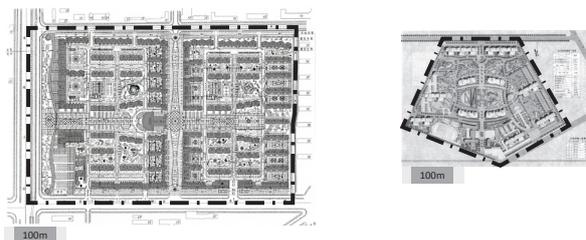
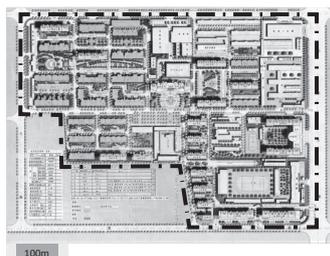


Figure 2.7. Handan block (d).
[Wan&Le, 2006]



The overall analysis of the eleven superblock housing areas reveals the striking similarity of the block layout in the city structure. The first notable common feature is the scale of the blocks. Despite the fact that the blocks do differ in size and shape, in comparison with the Western examples (Fig. 2.8) the magnitude of the size of a superblock housing area is revealed in its full extent. The dimension of one block ranges from blocks with sides of 300 meters to four or five hundred meters, the biggest being even around 600 meters.



Figure 2.8. The edge length of superblocks ranges from 300 to 600 meters.
The large scale of the superblocks (left) becomes apparent when compared with the Western block sizes (above).
 [Modified from: Google Maps, 2012; Eniro, 2012]

Secondly, regardless of city and the location within a city, all of the blocks seem to consist of straight rows of south facing buildings with only a few exceptions in the surveyed examples. The closer examination of the blocks later on shows that in some cases there are also some low-rise masses constructed to the edges of the blocks that face either east or west. However, the general appearance of the superblocks reveals north and south facing buildings that are constructed in neat rows with fixed distances in relation to each other.

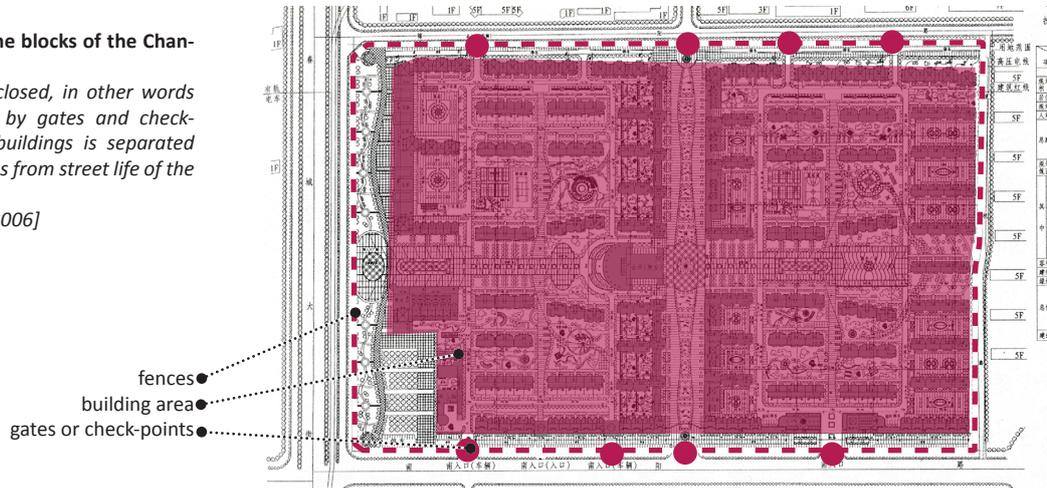
The superblock housing areas are high in building density. The varying distances of the building rows and the differences in the length of the building shadows reveal that the blocks consist of dwellings of different height. The superblock housing areas analyzed seem to be built mainly as middle to high-rise areas. Despite the variety of floor amounts within an area, a common feature is that the sites are usually as packed with construction as the height of the buildings allows. In other words the ground space index (GSI), which expresses the relation between the ground floor area and the whole site area is fairly high. The more commonly used floor area ratio, the so-called FAR number, (or FSI, i.e. the floor space index), which expresses the built intensity of all built structures compared to the site area, is usually high or very high as well. The optimization of the height and intensity of building creates high-density housing areas.

The elements visible at the closer observation of the four housing areas reveal similarities in the ways the blocks are closed or separated from the surrounding city space with block edges. (Fig. 2.9, 2.10, 2.13, 2.14.) Also in the handling of the non-built spaces similarities are visible.

Figure 2.9. The edges of the blocks of the Changchun block.

The housing areas are enclosed, in other words inner traffic is controlled by gates and checkpoints and the area for buildings is separated from the street line and thus from street life of the arterial roads.

[modified from: Wan&Le, 2006]



As mentioned in the previous chapter, the superblock housing areas are encircled with grids of wide arterial roads and the block itself is most commonly closed, so as to prevent outsiders from entering. The analysis shows that the superblocks are closed from their surrounding city structure by fences and gates (Fig. 2.10) or small commercial buildings (Fig. 2.11).



Figure 2.10. The Beijing block.

Area gates and checkpoints are used to control entrances to the area.

[Anjuke, 2011 (above)]

Modified from: Google Maps, 2011 (right)]



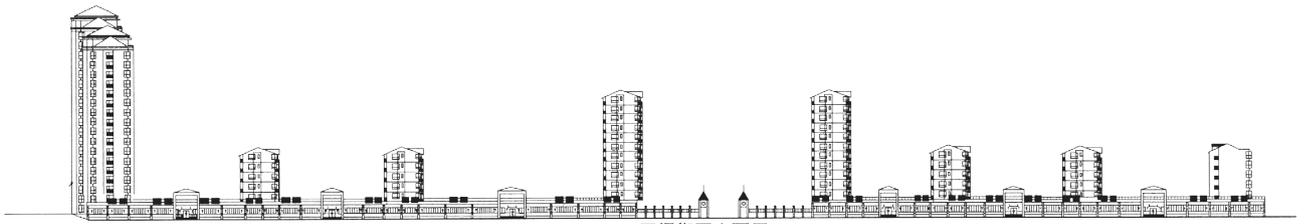


Figure 2.11. Area elevation east of the Changchun block.

Low-rise commercial buildings in between residential buildings stand sometimes on block edges.

[Wan&Le, 2006]

But this is not the only means that weakens the connection between the housing area and the surrounding urban life. The manner of placing the planned buildings away from the arterial street line creates an edge zone between the built areas of the block and the city structures, thus separating the housing area and its life inside from the arterial roads (Fig. 2.12). This building setback from the block edge line has an effect on city space because its vitality is dependent on the connection between streets and buildings. Consequently, the arterial streets of Chinese city structure have most commonly become dominated by large-scaled car traffic as distances become long and city life on the arterial roads unpleasant due to the superblock typology.

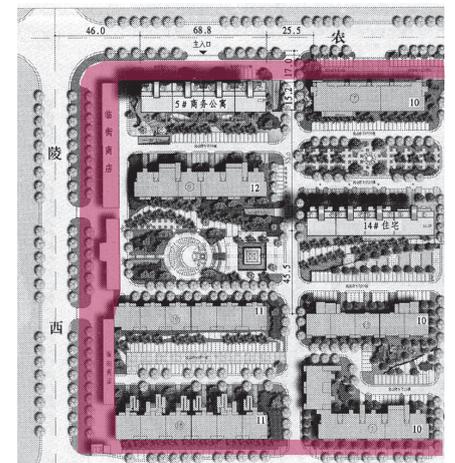


Figure 2.12. Edge zone, i.e. the building setback area in the Handan block.

[Modified from: Wan&Le, 2006]

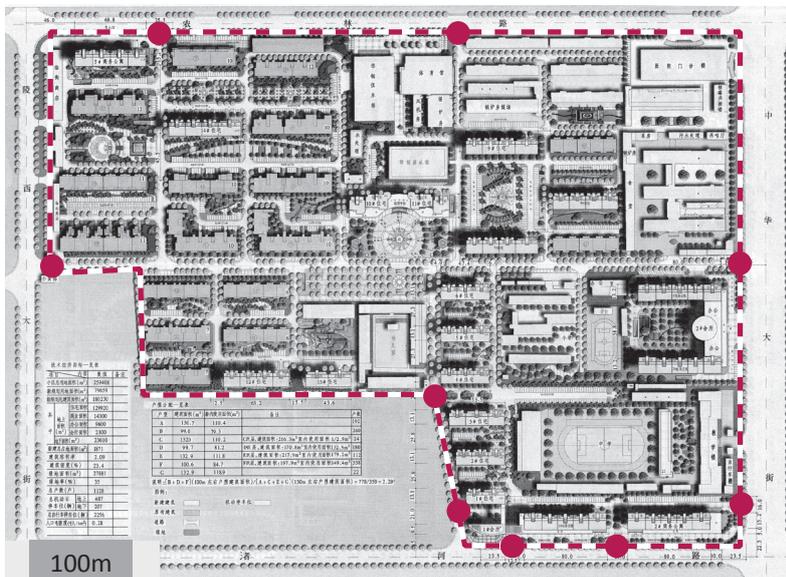


Figure 2.13. Edges of the Taiyuan block.

[Modified from: Wan&Le, 2006]

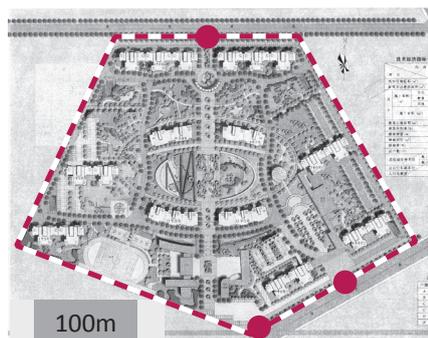


Figure 2.14. Edges of the Handan block.

[Modified from: Wan&Le, 2006]

Non-built Areas: Traffic, Block Setback and Neighbourhood Gardens

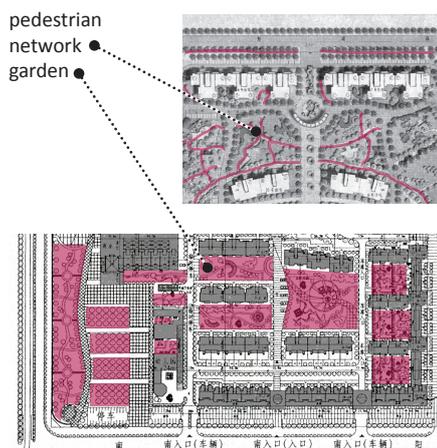


Figure 2.15. The Taiyuan block and the Changchun block.

Large non-built areas and comprehensive inner pedestrian networks are common in the superblock housing areas.

[Modified from: Wan & Le, 2006]

Figure 2.16. The Beijing block.

Verdant neighborhood gardens are a common feature.

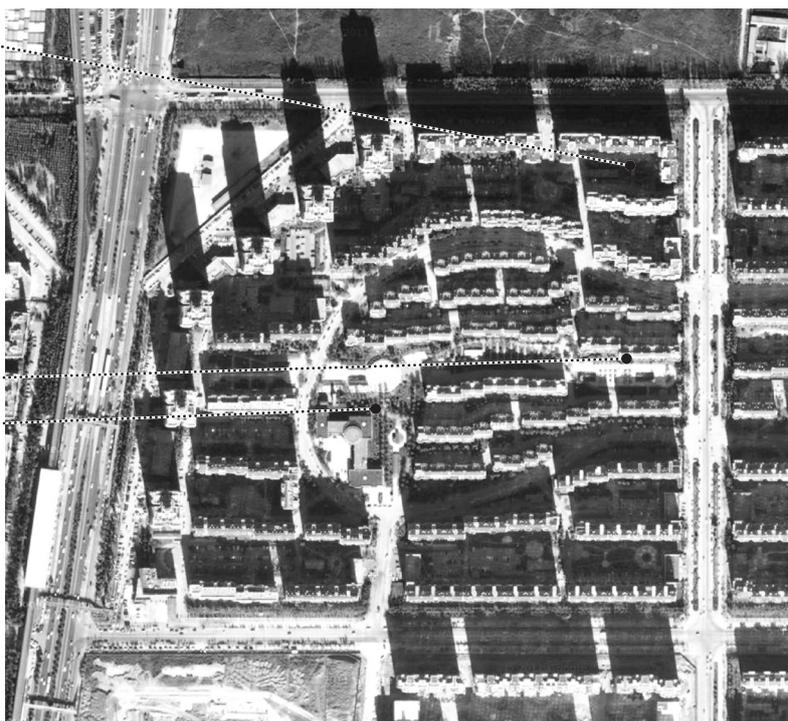
[Anjuke, 2011; Modified from: Google Maps, 2011]



The non-built areas of the analyzed superblocks comprise of traffic arrangements, edge zones and green areas, such as gardens and street side plantings. The characteristics of the non-built areas are naturally closely related to the built areas because the nature of the built areas affects the nature of the non-built space.

Because the buildings are planned away from the arterial street line, a non-built setback zone is created between the city and the insides of the housing areas. This zone is often occupied by trees or low-rise commercial buildings. In the case of the superblocks, the height of the buildings within an area plays a particular role in shaping the non-built areas. The non-built space in between the buildings gains its scale and therefore its core nature through the height of the surrounding buildings. The higher the buildings, the more open space is left in between, which means more green areas and green areas that are larger in scale.

When looking closer at the blocks analyzed, the non-built space in between buildings is occupied by small green areas and larger gardens in addition to the inner streets (Fig. 2.15). Inner pedestrian networks are often planned as verdant gardens. Furthermore, the gardens are visibly Chinese in their style. This can be seen in the landscape designing as a use of organic forms and in the richness of the handling of ground materials (Fig. 2.16). In addition, small pavilions can be found in the midst of the non-built areas.



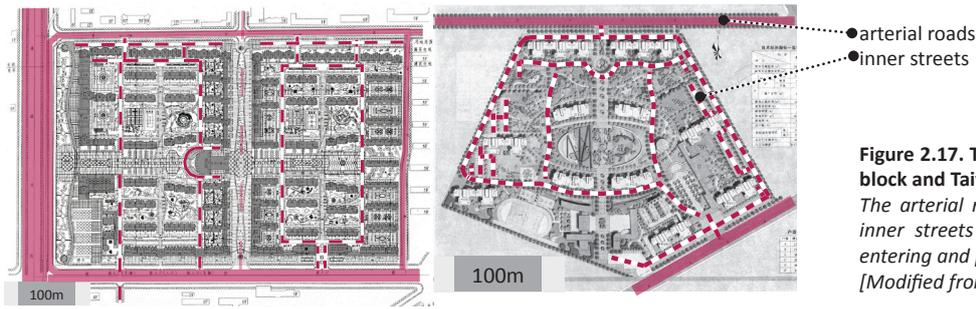
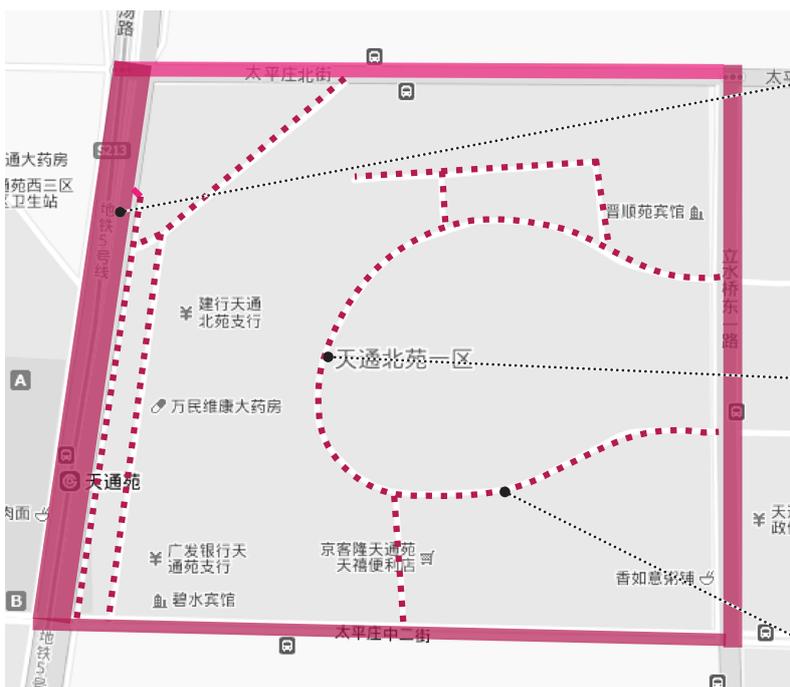


Figure 2.17. The traffic arrangements, Chanchun block and Taiyuan block.
The arterial roads surround the blocks whereas inner streets are for inhabitants and used for entering and parking.
 [Modified from: Wan & Le, 2006]

Due to the plug-in principle, the traffic arrangements become divided into inner traffic structures constructed by the developer and the outer structures, which are the responsibility of the city. In the analyzed blocks this separation can be noted in the way in which the inner streets connected to the arterial roads rarely continue over the roads into other blocks. As most streets inside the housing areas are dead-ends, their main purpose is to enable the inhabitants to drive into the area to reach the parking areas or the underground garages.

Overall, the arterial roads lack in proper pedestrian connections as the grid size of Chinese cities is not pedestrian-friendly and the blocks lack a sufficient number of entrances for pedestrians. Nonetheless, the insides of the superblocks have usually comprehensive pedestrian networks (Fig. 2.17). Because the pedestrian traffic dominates inside the blocks and because the inner vehicle streets are dead-ends and fairly narrow, the inner traffic is slow. Conversely, the arterial roads are very wide and organized into four or more lanes. They are high-speed and continue uninterrupted through the city structures. (Fig. 2.18.)

Figure 2.18. The Beijing block (below).
Wide arterial roads around and inner streets with street-side parking are common in superblocks.
 [Anjuke, 2011 (below);
 Modified from: Map Baidu, 2011 (below left)]



The analysis of building levels shows similarities in the relation between the usual building layout and the green areas inside the blocks as well as in building use, height, density and architectural elements. On apartment level, for example, apartment sizes, layouts, directions, dimensions and room organization show similarities. In the analyzed areas, the buildings are mainly residential apartment buildings. In addition, in all areas there are some buildings for public services or neighborhood use as well. These are without exception the lowest buildings of the housing areas. Usually a superblock housing area contains a kindergarten or an elementary school. To some extent there are low-rise commercial buildings along the arterial roads like in the blocks in Beijing and in Handan (Fig. 2.19, 2.21).



Figure 2.19. The area perspective of the buildings of the Handan block.

The overall appearance of buildings in superblocks is a monotony of global architecture.

[Wan & Le, 2006]

The overall appearance of the buildings in the analyzed housing areas reveals densely built medium to high-rise buildings with similarities between buildings. The similarities are strong to the point of monotony due to repetition of architectural elements between buildings as well as different between floors of singular buildings (Fig. 2.19). The architecture of the buildings resembles in their functional and unadorned nature that of the apartment buildings designed in the Western world mainly in the 1960's to 1980's during the period of modernism. Concrete appears to be the main building material and the façades are a symmetric and functional grid of windows and balconies.

At a closer look some variation can be found. The differences in the height of the buildings seem to create most irregularity inside an area. In the analyzed areas the floor amounts vary between six to nearly thirty floors. In some cases, like in the block in Taiyuan (Fig. 2.20), the height of the buildings is almost fixed but the bigger the block is, the more likely it seems to become that the buildings in the south end of the areas are lower and the height gradually increases to the north or near arterial roads. In addition, the bigger the area, the more likely it is that two or more different building types with variation in building layouts and façades are used. (Fig. 2.21.)



Figure 2.20. Area perspective, the Taiyuan block.

The higher the buildings in a superblock housing area become, the more monotonous the overall appearance tends to become.

[Wan & Le, 2006]

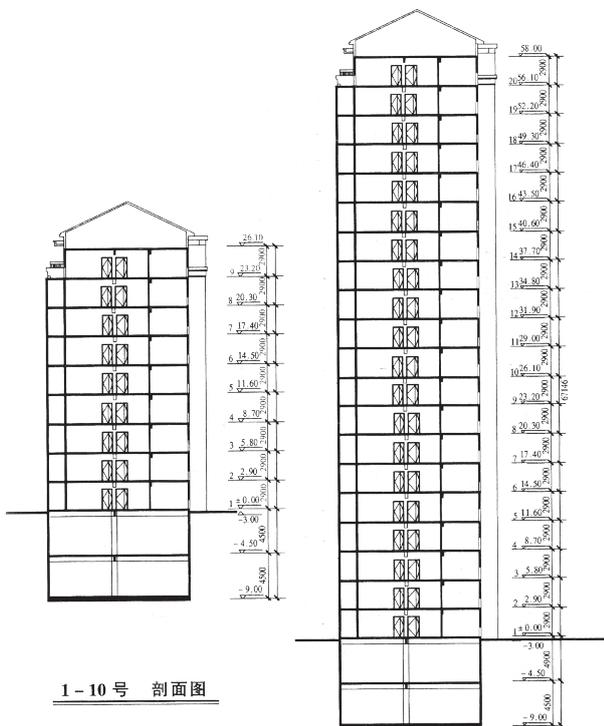
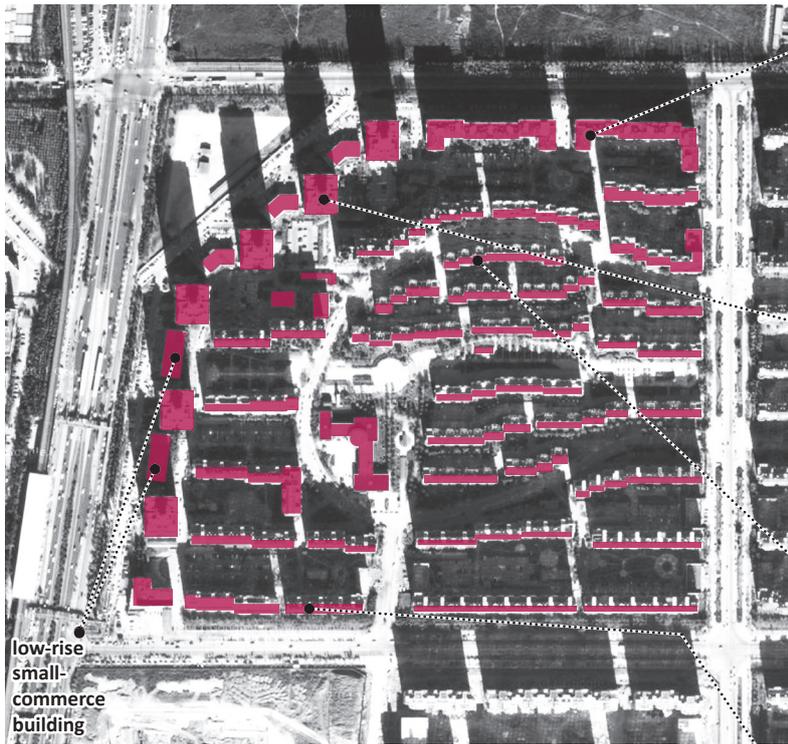


Figure 2.21. Building types and architecture in the Beijing block.
The buildings near the arterial roads and on the north side are higher, and variation in materials or colors of the first floors is typical.
 [Anjuke, 2011;
 Modified from: Google Maps, 2011]

Figure 2.22. The cross sections of two building types of the Changchun block (left).
Figure 2.23. The area elevation of the Changchun block (below).
Variation in building heights is fairly common, especially in larger blocks.
 [Wan & Le, 2006]



According to the selection of blocks in this analysis, the lower buildings tend to be formed in chains of several single units and the highest of buildings are more tower-like in nature. Regardless of height or building shape, however, the main façade is always on the south or south-east side and the staircase and possible elevators are located on the north or north-west side of the buildings (Fig. 2.24).



Figure 2.24. The building types of the Changchun block.
The main façade of the residential buildings is the south-facing façade.
 [Wan & Le, 2006]

When observing the buildings more closely, some mutual architectural details can be detected. Attention is often paid to the first or first two floors of the residential buildings. In these cases, like in the block in Beijing (Fig. 2.21), the first floors differ in size, shape, color, design or material from the floors above. Related to this are the often decorative entrances, which have similar elements as the gates leading to the housing areas and are the elements, which most remind of Chinese architectural tradition among the otherwise anonymous architecture.

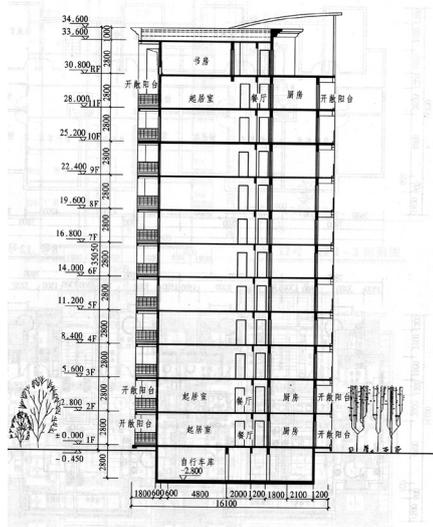


Figure 2.25. Cross section of a building in the Taiyuan block.
Decorative roofs and two-storey penthouse apartments are a feature of the buildings in superblock housing areas.
 [Wan & Le, 2006]

Roof decorations, even on top of high-rise apartment buildings, are common in Chinese superblock housing areas, even though less in the analyzed housing areas, where the roofs are most commonly pitched and flat roofs. The sections and apartment layouts point out that the roofs have a special importance even in the analyzed blocks because there are often two-storey apartments in the top most floors (Fig. 2.25).

In China the apartment size is counted by the number of bedrooms. In other words living rooms are always to be found in addition to bedrooms. In the analyzed blocks the plans show the prevalence of larger apartments over small ones. Hardly any studio apartments or one-bedroom apartments can be found. These apartment types exist only in the Beijing block (Fig. 2.26). Some two-room and five-room apartments are always included in the plans of all of the blocks but the most usual types in this selection of the studied blocks are three or four room apartments.



Figure 2.26. The apartment types of the Beijing block.
Small apartments are a minority in the analyzed blocks whereas three to four-bedroom apartments are the most usual.
 [Modified from: Anjue, 2011]

In general, all the apartments are comparable with Western layout standards when it comes down to room types and their mutual connections and dimensioning. The overall picture is one of apartments that are usable when considering dimensions and inner hierarchy and consist of spaces that are easy to furnish and have sufficiently light. In other words, the selection of analyzed apartments offers very basic and universal solutions for housing needs, the only slight exception being the

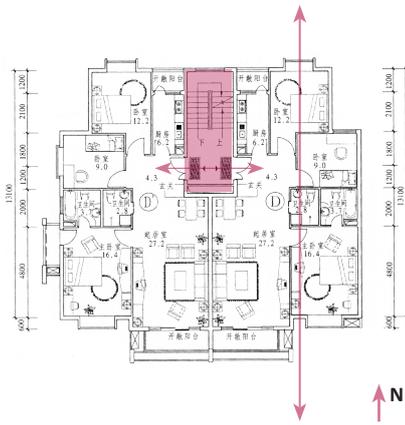


Figure 2.27. A two-room apartment in the Handan block.

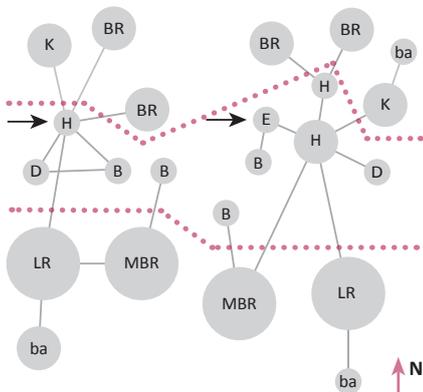
The basic building unit consists of two apartments per staircase and all apartments face both north and south.

[Modified from: Wan & Le, 2006]

two-storey apartments. The housing needs of, for instance, specific age groups or the differing needs and desires of households seem not be considered in the plans.

Based on the analysis of the chosen blocks the most usual building layout in superblock housing areas consists of units of two apartments per staircase (Fig. 2.27). The buildings are then formed by attaching differing amounts of these basic units together into straight or slightly curving rows. This kind of a basic unit layout enables all apartments to face both north and south. Inside the apartments, dimensioning is highly similar to that of Western standards with the exception of the bathrooms rarely being large enough to suite the demands for wheelchair accessibility.

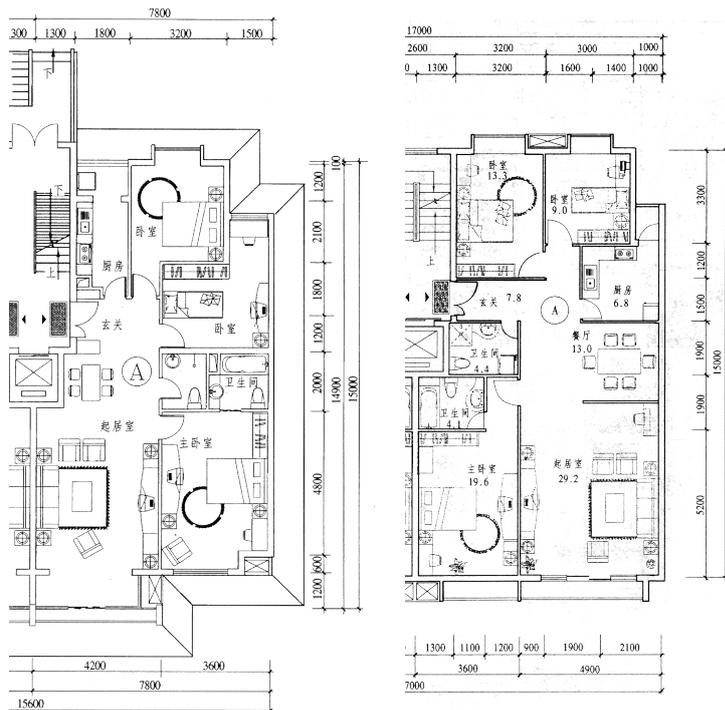
Certain features of the apartments in superblock housing areas stand out in the analysis. Firstly, the location of the rooms seems to be dependent on the orientation so that the spaces can be categorized into three groups: the ones facing north, those facing south and in-between spaces (Fig. 2.28). The kitchen is always facing north and usually joined to a small balcony. In larger apartments one or more of the smaller bedrooms face north as well. In some cases a dining room or a dining space can be situated towards north as well but usually the dining area is located in the middle part of the apartments. Here they are joined with hall spaces and bathrooms. The darkest spaces include storage spaces and separate entrances as well, when there are some. Living room faces, without exception, south as do master bedrooms too. In some larger apartments one or more of the smaller bedrooms are by the south wall too.



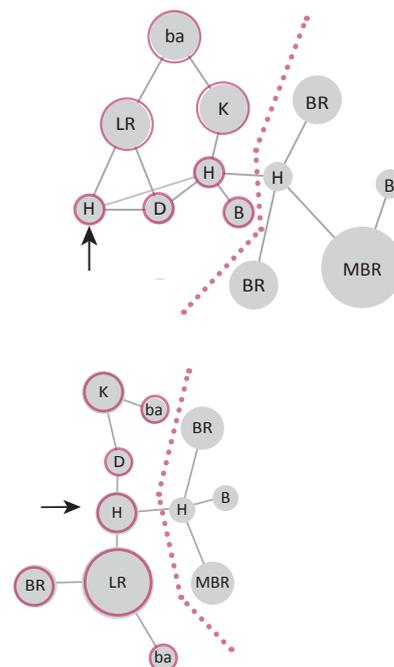
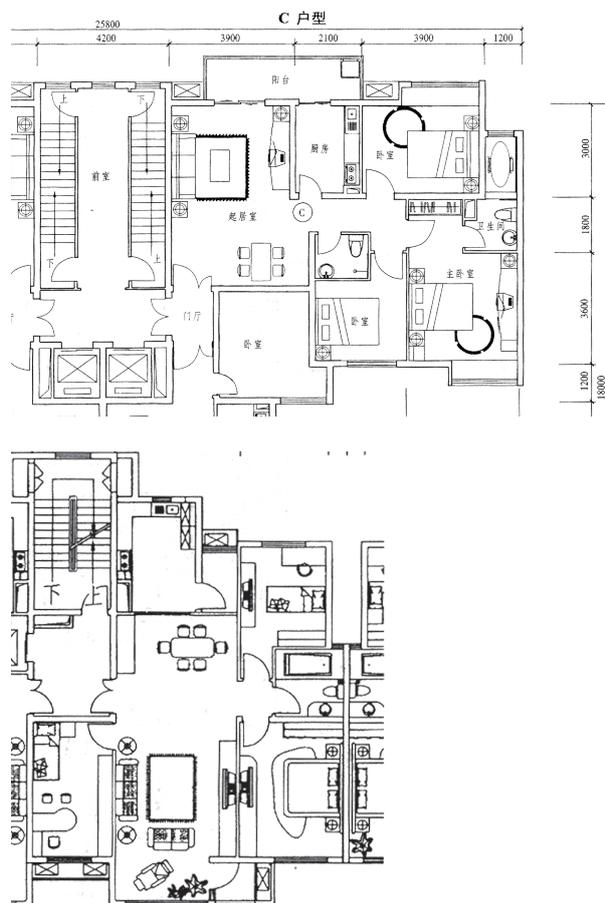
- (B) bathroom
- (ba) balcony
- (BR) bedroom
- (D/DR) dining space/dining room
- (E) entrance
- (H) hall
- (K) kitchen
- (LR) living room
- (MBR) master bedroom

Figure 2.28. A two-room apartment in the Handan block and a three-room apartment in the Taiyuan block and space schemas. 1:250 Spaces are often organized into 3 groups in the layout. The kitchen, smaller bedrooms and sometimes the dining room face north. Halls, bathrooms and often the dining space are in the middle. The living room, the master bedroom and sometimes smaller bedrooms face south.

[Modified from: Wan & Le, 2006]



The second recurring feature is the separation of all rooms into two groups by planning two hall spaces that are connected to each other (Fig. 2.29). Most commonly one of the groups includes two bedrooms and a bathroom. From the other hall one can enter active rooms like the kitchen, the dining room, the living room or sometimes one of the bedrooms.



- (B) bathroom
- (ba) balcony
- (BR) bedroom
- (D/DR) dining space/dining room
- (E) entrance
- (H) hall
- (K) kitchen
- (LR) living room
- (MBR) master bedroom

Figure 2.29. A two-room apartments in the Taiyuan block and a two-room, a three-room apartment in the Changchun block and space schemas. 1:250

Rooms of many apartments are divided into two groups connected to two different hall spaces. [Modified from: Wan & Le, 2006]

The size of the living room usually dominates whereas the kitchen is often either rather small in comparison or its shape unpractical. In the bigger apartments of four or more bedrooms, a large master bedroom with a separate bathroom is highly common. In some three or four-room apartments this combination is possible too.

Almost all the studied apartment layouts have good connections outside through several balconies. Often the balconies are connected to the living rooms or the kitchens (Fig. 2.30). Sometimes there is an entrance to outdoor space from the dining rooms or bedrooms as well. Usually all apartments possess at least two balconies. There is only one apartment type without any but several with three. The balconies are usually quite small in size or narrow in shape but they act as a continuity of the apartments to outside all the same.

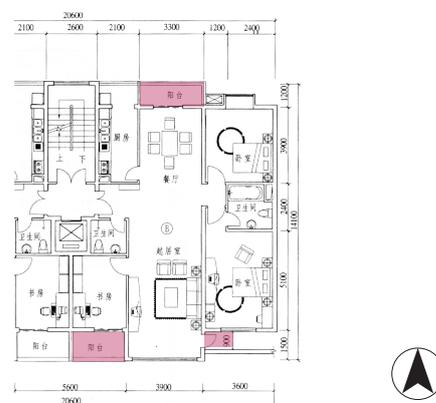


Figure 2.30. A three-room apartment in the Taiyuan block.

Several balconies is a common feature, especially attached to kitchens and living rooms. [Modified from: Wan & Le, 2006]

The lack of separate storage space is common. There is space for closets in most bedrooms and, as mentioned, the spaces are easy to furnish but there rarely are, even in larger apartments, separate storage spaces. Separate entrance spaces are seemingly rare and most of the doors from the staircase open straight to the hall spaces. There are only a couple of apartment types in the selection with a separate entrance space with room for a closet (Fig. 2.31).

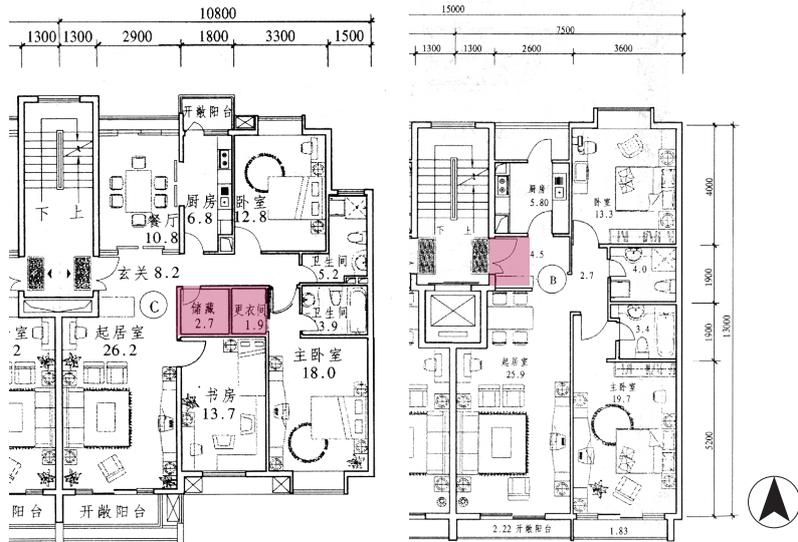


Figure 2.31. A three-room apartment and a two-room apartment in the in the Handan block. 1:250
Separate storage spaces and separate entrance spaces are rare.

The use of two-storey apartments is somewhat common in the analyzed blocks (Fig. 2.32). In the Changchun block there are even whole buildings consisting of two-storey apartments. In several of the analyzed blocks, there are two-storey penthouses on the top two floors of the buildings but in the research this does not come out as a common feature of the superblock housing areas in general.

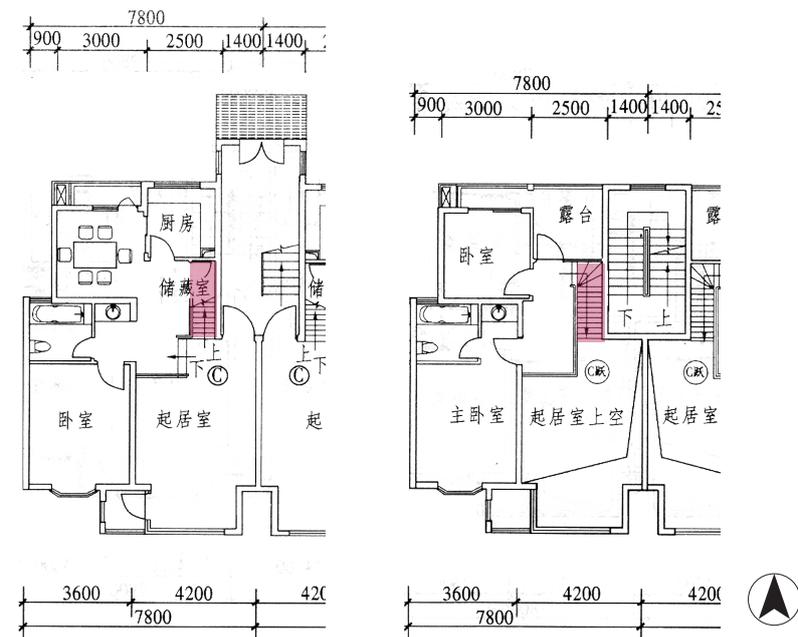


Figure 2.32. A three-room apartment in the Changchun block. 1:250
Two-storey apartments are quite usual, especially as penthouse apartments in the uppmost floors of the buildings.

PART TWO

第二
部分

The second part of the thesis concentrates on studying the characteristics and challenges of the superblock housing areas further, in order to find future sustainable solutions for the planning of Chinese housing areas.

Chapter 3 mirrors the characteristics defined in the analysis with Chinese culture and housing tradition. This provides with a more profound understanding of the cultural values behind the characteristics, and thus, the essence of Chinese housing can be defined. As the analysis revealed, at first glance the superblock housing areas are easy to judge as locality and personality lacking “slabs in a park”. Because of the seemingly impersonal appearance it is simple to jump to the conclusion that nothing “Chinese” is left when, in fact, by observing more closely the Chinese characteristics that have existed in urban housing for centuries are still visible in the superblock housing areas as well.

Outside and Inside Spaces

3.1

In general, Chinese housing areas have been, and still remain, strongly characterized by a clear division into a closed inside space and the open city space left outside. This typology has its roots in hierarchically walled ancient Chinese cities and the traditional courtyard house, the surrounding walls of which clearly separated the outside and inside spaces from each other.

As a combination of the open city spaces and the closed nature of housing areas Hassenpflug (2009, 59) even argues that the very binary code of the contemporary Chinese city consists of open and closed spaces, of outsides and insides. Therefore, the explained features can be seen belonging to these two categories (Fig.3.1). The open city space and edges as part of the outsides of the blocks and south orientation, building appearance, building layout, factors concerning scale, non-built spaces as well as apartments belonging to the insides of the blocks.

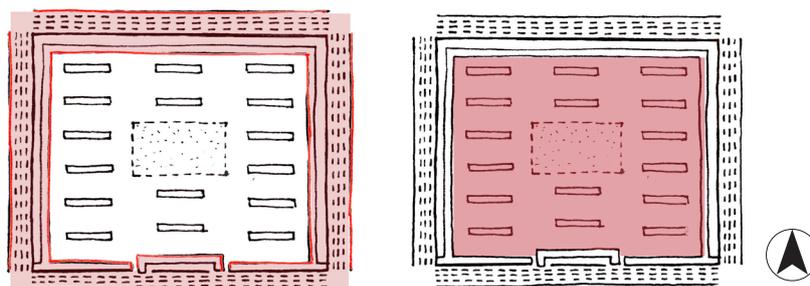


Figure 3.1. The typology of the superblock housing areas divides into outside and inside spaces.

The outside characteristics are closeness, the concept of open space and the edging of the blocks. The inside features are south orientation, similar buildings standing in rows, the large scale in block size, density and building height as well as non-built areas and the typology of the apartment.

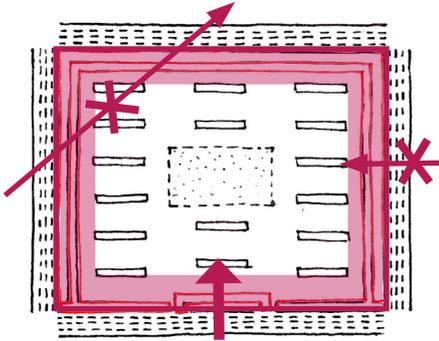


Figure 3.2. The closed nature of the blocks.
The Chinese name of superblock housing areas translates into 'enclosed neighborhood'.

The conception of closeness has a profound effect on the basis of understanding Chinese urban spaces from a Chinese point of view. As the analysis previously showed, the superblock housing areas are secluded from the city structure with fences or small commercial buildings and separated from urban life by an edge zone (building setback area) (Fig. 3.2). This stems from Chinese housing tradition. The Chinese way of living has been based on an introvert system for centuries. The contemporary forms are no exception: the Chinese term for the superblock housing area 住宅小区 (zhù zhái xiǎo qū) translates into 'enclosed neighbourhood'. This goes to show how deeply in the culture the closed nature of housing is rooted.

In practice the closeness of a Chinese housing area not only translates into boundaries or gated areas but also in a clear separation of the outside and inside spaces. By comparison, in the Western housing areas either a connection still continues to exist between the spaces thus linking them together, e.g. through windows to the streets, or the housing areas are not gated, which makes them easy to pass through.

The structures of the society influence the development of the physical form of housing. The Chinese culture has laid very little foundations for public life. Therefore the outside spaces do not carry a strong meaning in the Chinese culture or a reason to open the housing area up to the streets. One example of the closed nature of the Chinese culture can be noticed in the language, in the Chinese use of indirect no's. Boyé Lafayette de Mente (2009) argues that the tendency to avoid saying a direct "no" has roots in the hierarchical Chinese culture. The fear of not knowing what could be considered a punishable crime has over generations led to hide one's opinions with an indirect expression. Similarly, the fear of invasions has characterized China's built environment for centuries. After all, the nation has even tried to close up the whole country with the Great Wall of China.

Today, the need to close housing areas in China seems still often to be explained by the need for security. In a society with ever widening income differences the fear of burglary is probably reasoned, especially in high-income areas. At least it is a natural reason for wishing to close one's own housing area. In addition, nowadays the aspect of noise comes up in the planning of the superblock housing areas. The buildings are not wanted along the arterial roads in an attempt to avoid noise pollution in apartments. Seen that the arterial roads in their current form are often at least four-laned streets packed with high-speed car traffic, this is not an unreasoned concern but also a consequence of the large block model itself.

A peek into the origins of urban housing in China reveals the origins of the closed nature of housing. As mentioned, Junhua, Rowe & Jie (2001) claim Chinese modern urban housing to have started in 1840. Prior to 1840, in the feudal period, the layout of the traditional courtyard house was formed to obtain separation between the outer areas and the inner private space (Fig. 3.3). The separation was achieved with high walls and only one main entrance led to the courtyard. This was to ensure privacy and on the other hand to protect from winds, especially in the northern part of China. The courtyard in turn was surrounded by multiple buildings, which housed several generations of a family.

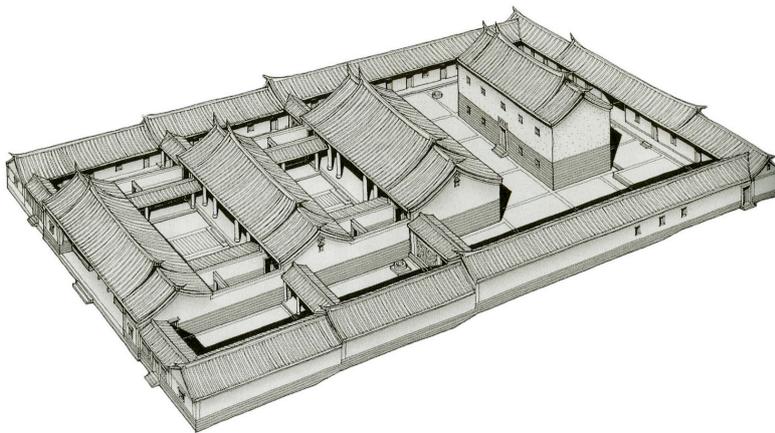


Figure 3.3. A traditional courtyard house in the village of Dingtan, Fujian.

Closeness in Chinese housing has deep cultural roots.

[Edelmann, 2008]

The first types of modern urban housing, i.e. clustered multi-storey housing, were based on the traditional courtyard house system and continued the tradition of closed yards. The clustered multi-storey housing, such as old-style shikumen linongs (also known as shikumen lilongs) in Shanghai, housed smaller families or several different families, and formed crowded urban housing areas with narrow streets. To ensure privacy in the crowded circumstances, the housing units were enclosed by high walls. The housing areas themselves were also enclosed by gates, which led to the inner streets.

The old-style shikumen linongs continued to develop with only slight changes in the apartment layouts during 1911-1937 before the War of Resistance against Japan. At that time the Shanghainese new-style shikumen linong house type as well as the northern courtyard house type, e.g. hutongs in Beijing (Fig. 3.4), was born, both of which still remained closed to give privacy in the cramped neighborhoods.

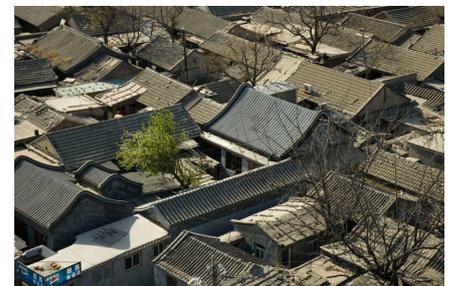


Figure 3.4. A hutong housing area in Beijing.

The hutong housing areas were based on the traditional courtyard house and continued to be closed.

Another cultural feature that explains the closeness of housing areas is the community-oriented culture mentioned earlier. By gating and closing a community, the community is “branded”. The closeness of a community is an expression that clarifies the group and so an act of showing to which community one belongs. Nowadays the closed housing areas have even began to express a certain status for the residents.

Chinese housing areas are also almost consistently closed. The exceptions are the housing areas that exist in what Tingwei described as ignored urban spaces (chapter 1.5), i.e. the urbanizing villages and the old low-rise urban housing structures (linongs, hutongs). The old low-rise housing areas are closed in smaller units, in the courtyard level, but as housing areas they are more accessible than the superblock housing areas where fewer entrances lead to the area. These exceptions explain the status that a closed neighbourhood holds, as only the poorest part of the population lives in housing areas, which are not gated. In addition, the centrally located high-rise superblocks are guarded. This is a clear mark of wealthier residents. (Hassenpflug, 2009; Yang & Chengri, 2007)

It remains to be seen whether or not the changes in the society, such as the strengthening of individuality and new forms of urban life, like commercial activity, will form the Chinese urban life, so that the need for public spaces and willingness to open housing areas to the surrounding roads increases. However, the multiple reasons such as the cultural needs for security and ensuring privacy and the contemporary worry about noise and the aspect of status makes the nature of closeness such culturally interwoven aspect of Chinese housing that it cannot be overlooked.

3.3

Open vs. Public Space

The Chinese concept of open space goes hand in hand with the closed nature of housing. The concept of 'open space' or 'undefined urban space' as an equivalent to the Western concept of 'public' is introduced as to explain how the Chinese perceive the city space surrounding the housing areas (Fig. 3.5).

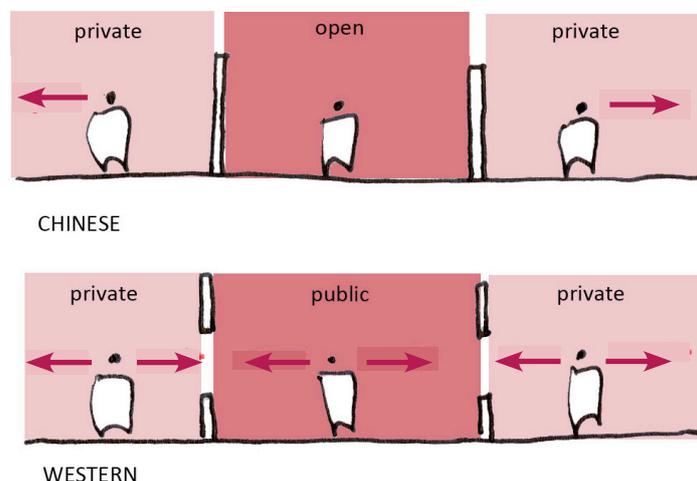


Figure 3.5. The concepts of Chinese 'open space' and Western 'public space' compared.
Traditionally, the space outside of Chinese housing areas has not had meaning making it 'undefined open space' and thus the connection directly from the housing areas to the outsides has been almost non-existing.

The different views on the conception of the “space-in-between” housing areas causes profound difficulties in Chinese-Western co-operation in planning because the views are, for both participants, as built-in as one’s own culture. For the Chinese perspective on the matter, there are several reasons, all of which ultimately lead to examine what the meaning of urban life is in the Chinese culture.

Chinese urban life has evolved more around the concepts of family and community than around public actions or trading as in the Western world and the concept of public space is fairly young for the Chinese city structure. Before 1840 the traditional Chinese city was a hierarchically organized city where different spaces were separated from each other with walls. The concept of public space was near non-existing in the traditional city because of its hierarchical layers and most common activity existed as an extension of home.

After 1840 when China was forced to open up to foreign trade, spaces for more public use emerged in the Chinese city (mainly in the trading ports such as Shanghai). The housing units with their courtyards remained closed but spaces for trade emerged in the cities. This development came to a stop when the Republic of China was first founded. During the Mao era (1949-1978) the walls of the traditional cities were torn down but the nature of the space in between housing areas became undefined once again due to the communist model of the society, which did not encourage public activity. (Junhua, Rowe & Jie, 2001)

Since the opening-up in 1978 there seems to be an emerging need for public spaces as the society keeps changing. The concept of public space is widely discussed among Chinese planners. This for one lets to assume that the changes in the Chinese society are requiring more public spaces as new activities are emerging. Already, for example, spaces for common activities like dancing are needed. However, mostly the open space is still seen as undefined urban space, for instance, as spaces of transportation only. The open spaces are not seen as spaces for staying but as functional spaces to reach the most important: the family and the community. Even spaces considered to be “public” in regards to their usage, such as city parks, are often gated thus diminishing the public nature of them.

Some public spaces have emerged into the Chinese urban environment. There are types of public squares, which are created either as power symbols, commercially oriented or as neighbourhood squares. There are also pedestrian streets for commercial activities. (Hassenpflug, 2009)



Figure 3.6. Men playing on the street in a village near Shanghai.

The Chinese open space gains features of public space where the community's semi-public activities spread to the streets. In super block housing areas the spreading to arterial roads is nearly non-existing.

The undefined urban space, the open space, gains meaning most easily through family or community on a neighbourhood scale. Again, showing how a strong role the community holds in the Chinese culture. Denotations of this are the emerging small family businesses in street-level apartments where goods are sold to passers-by through apartment windows. Often the open spaces, which have been claimed by a semi-public activity, i.e. where the living spreads from apartments to the streets, function as public space in the Chinese city (Fig. 3.6). In the community-oriented culture of China this spreading from private to the open happens fairly easily. Hassenpflug (2009) even argues that to become meaningful, an open space needs revaluation through a family, that is, it needs to be community-based in order to work.

To sum it up, the modern Chinese city is an open city but quite rarely public in the sense the Western planners perceive public. There are open spaces for commerce and services. These functions appear in the city centres and sub centres in form of streets and squares. Still, the spreading of the family or community from the apartments to the streets remains the strongest and most natural type of activity in the open spaces, thus transforming them into somewhat public spaces.

As the analysis revealed, in addition to the building setback from the block edge line, the superblock housing areas are bordered from the outside by walls, fences or small-commerce buildings (Fig. 3.7). As mentioned earlier, the closed nature of housing runs very deep in the Chinese culture. In fact, the Chinese concept does not only mean the separation of private housing spaces from surrounding city space, which is natural for Western housing, but typical for the Chinese concept of edges is that they break off the connection between housing and the surrounding city space.

The Chinese concept can be described with a drawing that has outlines already drawn, inside of which one is supposed to colour, that is to say, build. In comparison, the Western variant forms edges through the process of building. (Fig. 3.8.) Therefore, the edges of Chinese housing areas are strong making it fairly difficult for life within the housing area to connect or spread to the surrounding city space.

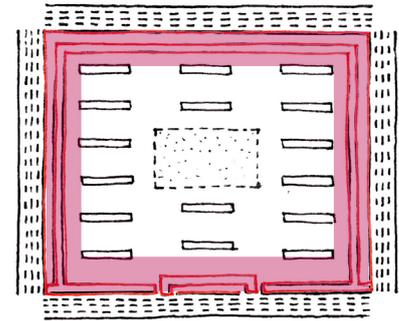


Figure 3.7. The edges of the superblock housing areas.
Clear and strong edges of housing areas is a highly ingrained feature of Chinese housing.

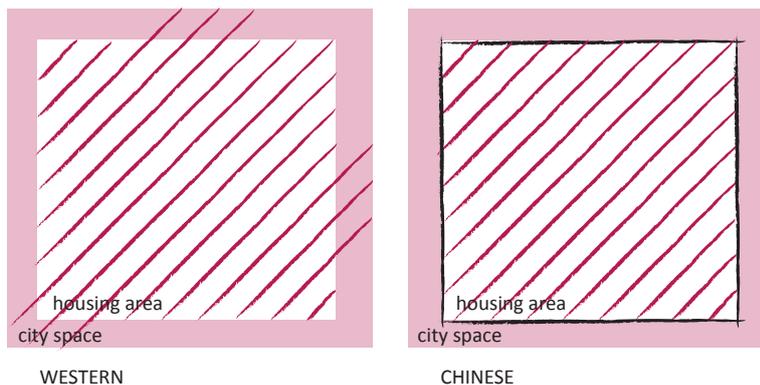


Figure 3.8. The typology of edging a housing area in the Western countries and in China.
In China, the insides of a housing area are separated from the open space by clear edges and thus the spreading of a housing area into city space is limited.

The manner of using clearly defined strong edges in separating housing areas from outer areas has continued throughout the development of Chinese urban housing. However, now that the Chinese urban way of life is experiencing rapid changes both in the urban form as well as in the actual urban activities, this separation has started to cause side effects on the urban space. One proof of this are the unofficial small businesses emerging to street-level apartments.

Furthermore, the effects on the urban space indirectly strengthen unsustainable development by reinforcing car traffic. As a combination of the wide arterial roads, the large block structure weakening pedestrian traffic, and the introvert nature of housing areas, the superblock housing areas create urban environment that will, according to Frakers Jr.'s (2006) estimate, force people to use cars on trips, which are now made by walking or bicycling by 80% of the people.

The traditional form of using building walls as a separating structure has diminished due to regulations of planning apartment buildings away from

the street line. This setback area forces to plan the buildings typically some fifteen meters from the block edges. The edge zone is reserved for infrastructures and partly it is to prevent the noise pollution of the wide arterial roads from reaching the residential buildings.

Often the blocks are just enclosed by fences or walls to prevent unwanted intrusion but, in many places, the small-commerce buildings are used as defining borders. These buildings only open up to the arterial roads thus acting as fences of the block and cutting the connection between the housing area and the city space. They have sprung since the opening-up has triggered commercial activity and the need for commercial spaces for small or family businesses has increased.

Furthermore, the clear denotation of borders of housing areas has raised the significance of the gates leading to the closed areas for centuries. Like the analysis showed, the gate is a distinctive character and is, in fact, a very typical Chinese feature. The gates have traditionally been decorative and distinct in nature. In the hierarchical Chinese society, the size, material and decoration of the gates of a house reflected the status and wealth of its owner. In the traditional courtyard house, the gate was situated in the south wall according to fengshui principles, where it is preferred nowadays too. (Hassenpflug, 2009)

3.5

South Orientation of Buildings

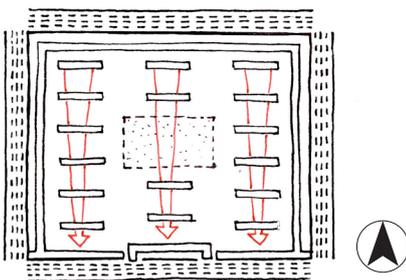


Figure 3.9. The strong and distinctive south orientation of the buildings.

The south orientation is a combination of tradition, fengshui geomancy principles, climate, regulations and status factors.

The strongest characteristic of the superblock housing areas emerging from the analysis is the direction of the buildings. This seems to have only one option: the main façades face north and south (Fig. 3.9). The south orientation in China is a traditional, cultural, climatic, and status-related factor in housing. The lack of other orientations of housing might also suggest the lack of given options available in planning and regulations. On the other hand, it is widely argued that there even is not market for other kinds of buildings. Anyhow, the south facing building typology lays so deep in the Chinese culture that it is fairly difficult to come around and gives very reluctantly other options.

The origins of the south-facing ideology lay in fengshui geomancy, which is the traditional Chinese practice of planning the placement of a building into its surroundings. Especially in the northern parts of China, where the climate is colder, the south direction ensured a warm inner courtyard and a good micro-climate. In the traditional Chinese house of the feudal period this meant that the courtyard was oriented to the south where the

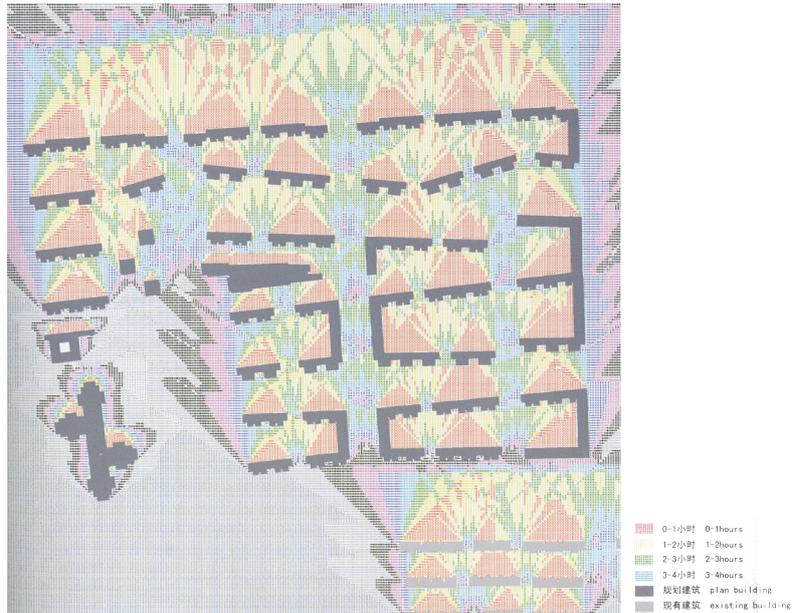
main gate was also situated. Therefore, the most secure and sunlit place for a building became the space at the north end of the courtyard facing south. Due to the hierarchical structure and the elderly-respecting family culture, the 'elderly house' was situated at this most important place. This is the ultimate reason why an apartment facing south nowadays prompts one's status and has, for its part, made the south-facing apartments the most popular. (Hassenpflug, 2009)

The south-orientation existed also in almost all the forms of modern urban housing that followed the traditional courtyard house (see Fig. 3.18, p. 50). As the family structure changed, the housing units became smaller and the function of the elderly house became obsolete in the clustered multi-storey housing of the semifeudal period. Still, the front yard and main rooms of the old-style shikumen linong houses faced south where the main entrance to the courtyard was also placed. From the same period the northern courtyard house type (e.g. hutongs) consisted of buildings facing also east or west but even there the courtyard and the main rooms were oriented towards south. When coming to the period of socially planned economy, the 'hanglieshi' residential areas were characterized by multiple straight rows of buildings. These rows faced either south or south-east.

The Soviet models applied during the Mao era in China introduced buildings directed otherwise. There were some residential areas constructed that introduced the perimeter block model to China where the buildings formed an inner courtyard. The west-east facing buildings of this block type were, however, considered unsuitable for the Chinese climate and replaced with standard designs fitting the Chinese environment. Basically this meant that the apartment buildings planned according to Soviet models were transformed and planned so as to guarantee at least one room facing south. (Junhua, Rowe & Jie, 2001) After the opening-up this tendency has continued further and strengthened by building regulations to the point that the singular buildings facing south have become rows of south-facing masses.

Nowadays the climatic factors are the strongest argument for the strict orientation of the buildings. It is claimed that the south-orientation ensures the best sunlight and ventilation conditions in the Chinese climate (Glickman & Lin, 2006). Sunlight regulations are very strict and define everything from the time required for apartments to receive sun light per day to the amount of bedrooms facing south. (MIT Building Technology) (Fig. 3.10.) This leaves very little room for variations, at least for the time being.

Figure 3.10. Sunlight analysis.
A calculated analysis is required to demonstrate that a design fulfills the sunlight regulations.
 [Sweco Architects AB, 2010]



Since the technical properties and isolation of the buildings in China is still mostly low quality, the Chinese climate with its hot summer sun and low winter sun becomes the strongest explanatory factor for the south direction being so highly prompted by the regulations. In the summer, a south-facing building decreases the heat load of the apartments because the sun is at its highest when in the south thus reaching the inner spaces only with difficulty. In the winter, on the other hand, when the sun shines very low it shines from the south during the day thus giving maximal lighting to the apartments. (Fig. 3.11.)

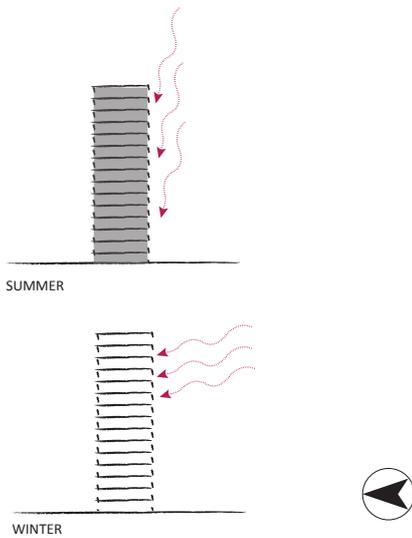


Figure 3.11. Climatic factors prompt the south orientation.
The south-orientation guarantees most sunlight in the winter, but the hottest summer sun is avoided.

The different factors from tradition and status to contemporary regulations have made the south-facing buildings such a self-explanatory feature in Chinese housing planning that all other options that Western planners present are repeatedly turned down, as stated e.g. in the article (Brown, 2010) in National Geographic. The planning of the south-facing buildings has developed to the point that the south direction is taken for granted in the Chinese culture that the apartment markets insist on a strict orientation by arguing that others do not sell. This, despite how monotonous the built environment has become due to buildings facing mainly one direction.

As shown in the analysis, the most contemporary superblock housing areas in China seem to consist of replicas of one or only few buildings. The second distinctive characteristic related to the buildings is how they are constructed mostly in rows (Fig. 3.12). The combination of these factors makes the superblock housing areas a startling sight for Western architects. Due to different developers and different aims, projects are different when it comes to the level of similarity of the architecture and layout in one area. All in all, the tendency to produce direct copies of buildings in a housing area is more common than in the Western world, where the similarities between buildings are usually limited to fewer elements. For the similarity of design solutions in Chinese superblock housing areas, there are reasons, which lay in the culture of a strong sense of community, but much can be explained as a result of the developers' attempts to optimize their economic gains.

Despite the rapidly strengthening phenomenon of individuality, the community still plays an important role in forming one's identity. In this context the similarity of buildings within a community becomes more logical. The whole area expresses the status that individuals of a community share, and therefore a unified nature of the design solutions feels more natural to the Chinese mindset than to the Western. Hassenpflug (2009) argues this by saying that the common identity is a virtue because it represents the belonging to a community and especially the middle class wants to express its welfare by showing the belonging to a community because the similarity of design solutions within an area strengthens the sense of community.

The other side of the coin, i.e. the developer's power in deciding the outcome of the design solutions is highly dependent on the economic aspects of constructing. In this sense the almost direct copying of one building naturally cuts down planning and construction costs. This manner of construction is quicker and more efficient but obviously, in the worst case the results are large-scaled and uninviting environments. On the other hand, in the current economic situation, architecture is becoming an instrument for successful marketing according to Hassenpflug (2009). Especially in high-income housing areas the developers attract buyers by adopting varying design solutions. This explains the roof decorations and the use of different colours (Fig. 3.13). The importance of the roofing has its roots in the Chinese building tradition where the roof on top of a carefully constructed frame was the highlight of the building. (Edelmann, 2008)

The rowed layout of the blocks can partly be explained by the developer's attempts to plan and build effectively but it also stems from the Chinese building regulations as well as from the Soviet models during the era of

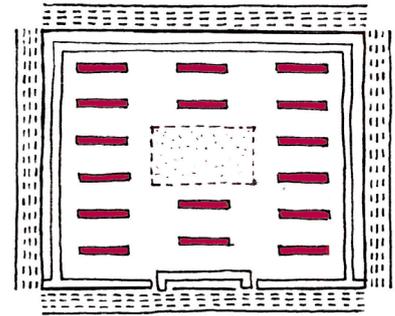


Figure 3.12. The row layout and similarity of architecture of buildings.

Both the strong sense of community as well as developer's power and attempts for economic gains affect these features.



Figure 3.13. Roof architecture in a contemporary superblock housing area.

A decorative roof has traditionally been important in Chinese architecture.

[Hassenpflug, 2009]



Figure 3.14. Tian Yi Town Masterplan, Wuxi, China.
Row layout variation by schmidt hammer lassen architects.
[schmidt hammer lassen architects, 2012]

socially planned economy. The Soviet models were the first adaptations of industrialized housing construction and the tradition of saving costs in construction by building as simply as possible still seems to hold in the industry. However, the current Chinese building regulations have a strong effect on the similarity of architecture and the row layout of the buildings. The Sunshine Regulations clearly define the distance between buildings and the demand for amounts of south-facing bedrooms. As a result of optimizing construction in the frame of the regulations, the end results are, as most monotonous, just rows of south-facing buildings.

The shift to using design solutions in promoting the housing area construction implies that the people wish for more variations in planning and architecture (Fig. 3.14). When adding to this the strengthening individuality, the market's demands can be expected to second this trend even more in the future.

3.7

Scale: Block Size, High Density and High-rise Buildings

The scale, in regards to block size, building height and density, is a common denominator of the superblock housing areas. Chinese building regulations stipulate requirements for high density, which thus far have most often been implemented as high-rise building especially in central areas of cities. As mentioned, China has suffered from housing shortage in urban areas, especially during the Mao era and in the beginning of the post-reform era. To the present day the fierce urban development has eased the shortage in one area but China is still struggling with the need for low-income housing.

Overall, the promotion of high-density construction has been the policy to tackle the shortage from the 1950's onward, with a special emphasis on high-rise building. For this reason most of the superblock housing areas consist of buildings with over ten floors. Ultimately, the massive structure of the superblock is due to the need for rapid construction too: the large block with sides of 300 to 600 meters demands for less infrastructures for the city to build and is therefore a quick construction model that facilitates the provision of housing. (Fig. 3.15.)

The origins of the means for achieving high-density in urban construction lay in the recommendations about increasing density of residential buildings that were put forward in the early 1960's. These calculations



Figure 3.15. The superblock structure in comparison with Stockholm and Tampere.

*The scale of the blocks is mainly explained by its speed-efficiency when constructing housing.
[Modified from: Google Maps, 2011; Eniro, 2012]*

about increasing density comprised all of the dimensions of the buildings, i.e. the length, number and height of storeys and distances between buildings. The effectiveness was refined to the extreme without that much consideration to other aspects of density except for the amount of square meters per hectare.

The calculations stipulated, for instance, that when the depth of a room is less than 11 meters, each additional meter in depth adds 1,000 square meters of floor space in one hectare. After the depth of a room is 11 meters the floor space increase will be relatively small when increasing the room depth further. Furthermore, when the length of the house is between 30 to 50 meters, an additional 10 meters will produce an additional 800 square meters of floor space in one hectare, although the increasing margin will be noticeably smaller when the length of the house is more than 60 meters. For the front distance between houses the calculations stipulated that when reduced to 10 percent of the buildings' height, the floor space will increase 700 to 1,000 square meters in one hectare. (Junhua, Rowe & Jie, 2001)

The density requirements are understandable in the light of the diminishing amount of arable land, the increasing amount of urban population as well as the increasing standard of living and the following rise in floor space ratio per household. These combined, set special needs for high-density solutions.

As mentioned before, China is in some parts already facing a hyper-density of 2000 person per square kilometer. The prospect of causing harmful psychological changes in the urban population sets challenges for high-density solutions. Wu Liangyong (Junhua, Rowe & Jie, 2001) states that the questions regarding the number of floors still puzzle the Chinese architects and planners, but the answers "should not be limited to only one direction" and "new thinking will be needed". There is an arising need for more human-scaled high-density among the Chinese urban population. For example, the small-scaled old block structures have started to attract attention among the Chinese as well as the Western professionals.

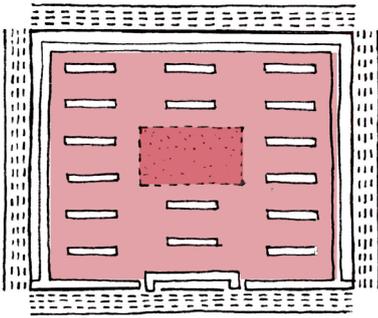


Figure 3.16. The non-built inside areas consist of gardens and inner traffic arrangements.

The inner traffic is slow to secure a safe housing area and the gardens are partly a traditional Chinese feature and partly to tempt buyers.

The features of the non-built spaces defined in the analysis are explicable by the tradition of closed neighbourhoods and courtyard gardens as well as current needs of vehicle parking (Fig. 3.16). To further define the analysis of the gardens, the neighbourhood garden in superblock housing areas is a centrally located semi-public green area in the middle of the neighbourhood that is rich in structures and decorations.

A courtyard has traditionally been an ingrained part of the space language of Chinese housing and gardens are beloved in Chinese culture (Fig. 3.17). In the superblock housing areas this traditional element has taken a new form as neighbourhood gardens. The former family yard has developed into a neighbourhood yard and is similarly a representation of the tradition of Chinese introversion and ultimately an expression of community.



Figure 3.17. The non-built inside areas consist of gardens and inner traffic arrangements.

The inner traffic is slow to secure a safe housing area and the gardens are a traditional Chinese feature and partly to tempt buyers.

The trend of neighbourhood gardens is partly a means of the developers to lure residents by creating enjoyable green recreational areas in the block. For the Chinese mentality the neighbourhood garden seems to suit well because it has a strong socially integrative force among the residents.

Furthermore, the superblock housing areas are often totally free from car traffic. The parking lots are naturally situated inside the housing areas but the car traffic is separated from the inner pedestrian streets and driving through the block is highly limited. Partly the parking facilities are also underground or under deck structures. This further strengthens the separated nature of the inside and outside of the blocks, since the traffic systems are not connected. The inner streets of the housing areas are in connection with the neighbourhood garden and are most often park-like in nature, thus bringing human-scale to the space between the high-rise buildings.

The different features of the apartments revealed by the analysis can be explained partly through the Chinese housing tradition and also as a result of Western influences in different times. The most distinct characteristic that stems from the Chinese housing tradition is the orientation of the main rooms (the living room and the biggest bedroom) southwards. This feature can already be seen in the very first forms of urban housing where the main rooms were placed towards south and supplementary spaces facing north.

To these first forms, i.e. clustered multi-storey housing, the emphasis on the south façade came from the positioning of the elderly house in the traditional courtyard houses. The aspect of south-facing rooms has become such an ingrained feature of Chinese housing throughout centuries that nowadays it is reflected in the building regulations as well. These building regulations, which strongly lean on the climate factors explained earlier, state that every apartment has to have at least one bedroom facing south. [MIT Building Technology]

The basic building unit of two apartments per staircase can be explained by the need to create south-facing rooms as well, because such unit type ensures south-facing rooms to both apartments. During the socialist planned economy the “2-2-2 dwelling unit” was a popular building solution for ensuring south-facing apartments. This type was modified from the Soviet models to suit the Chinese context, which meant that the inner corridor plan was turned into one without apartments facing only north. The 2-2-2 dwelling unit consists of three two-bedroom apartments per staircase that all have south-facing rooms (Fig. 3.18.). Two of the apartments face both south and north, whereas the middle apartment is directed only to south. (Junhua, Rowe & Jie, 2001) This dwelling unit is considered to suit the Chinese context and continues to affect the contemporary Chinese housing design greatly.

The use of only two apartments per staircase can be further explained by recommendations to apply both south and north facing apartments in Chinese contexts due to them improving natural ventilation (e.g. Glicksman & Lin, 2006).

The emphasis on bigger apartments cannot be explained by housing tradition since large apartments are a phenomenon of the latest decades. Because China suffered from severe housing shortage before 1978, the planning of larger apartments was redundant, since they would end up being inhabited by several families. After the 1920's, the land prices in urban areas started soaring up and with the rising rent rates, families started sharing apartments and even rooms. This tendency remained during the communist reign even though attempts were made to increase the floor ratio per person.

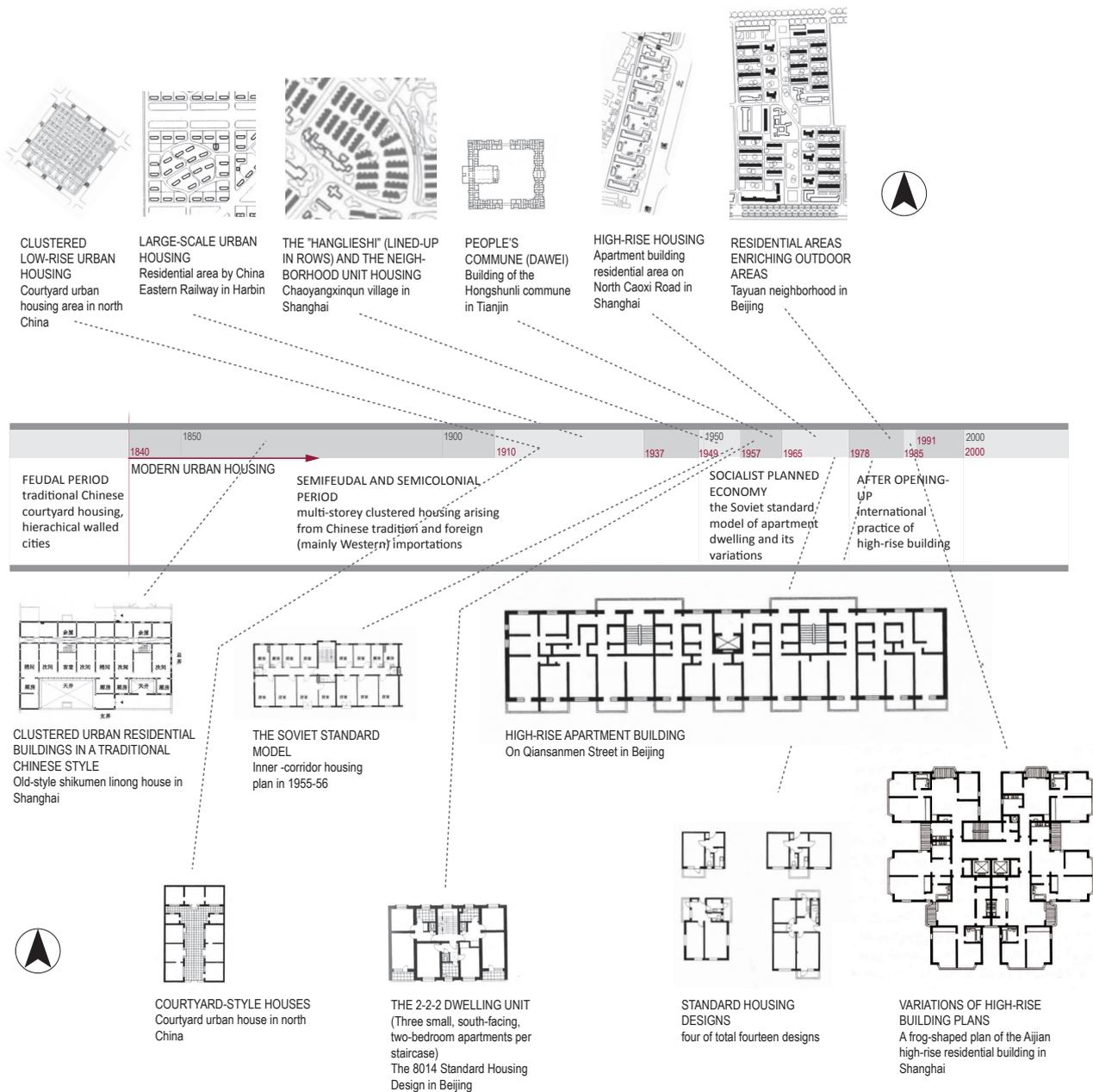


Figure 3.18. The development of modern urban housing in China.

Many contemporary features of Chinese housing design have either their roots in tradition or have been greatly influenced by foreign models.
[Based on: Junhua, Rowe & Jie, 2001]

The development has began to shift only in the recent decades of economic growth become to shift to one family per one apartment. Still, the low-incomes and migrants are forced to share apartments, whereas in areas for people with higher income, the tendency has been towards rapidly increasing apartment sizes. As the analysed blocks are directed to people with higher income, the lack of smaller apartments is due to this.

The division of the rooms into three groups according to the distribution in the layout supports the orientation and density requirements in China. Since the building depth is significant, some rooms in the middle are inevitably left without windows. Therefore, the hall spaces, the bathrooms and sometimes the dining area are situated in the middle. Because the

living room and one bedroom need to face south this leaves the rest of the rooms on the north side. The other factor of typical room division, the system of dividing rooms into two groups attached to two different hall spaces, appears to be a character of the standard housing designs of the 1980's where it appears for the first time. In bigger apartments this is a fairly easy manner of dividing active rooms from more private bedrooms.

The kitchen has also traditionally been located in the northern side of apartments since this side is cooler for food storage. For example in the first urban housing forms this was even necessary since there were no appliances for storing food. For the same reason, a balcony attached to the kitchen has become a very usual feature of Chinese apartments. (Junhua, Rowe & Jie, 2001)

In comparison to the long tradition of a north-facing kitchen, the almost lavishly large living room is a fairly young phenomenon since living rooms did not start to appear in Chinese housing design until the 1960's. At that time, housing design was under strict control and planning living rooms was not allowed. Therefore the first living rooms were situated in the middle of the buildings as spare space. These apartments were called "the small, lighted living room type" and it acted as a kick-start to the planning of living rooms in later decades. (Junhua, Rowe & Jie, 2001) The current form of a dominating large living room as seen in the analysed apartments is probably due to Western influences to Chinese housing design after the opening-up. Similarly, another feature derived from American design practices is the use of master bedrooms. The concept of a master bedroom with an own bathroom suits the elderly respecting Chinese culture as well and has thus become popular.

Since the profession of architecture and housing design alike suffered decades of stagnation during the Mao era, the adoption of foreign planning practices was inevitable in the light of the explosive urban growth after the opening-up. Therefore, for example, the dimensioning and room hierarchy share similarities with modern Western housing design. The elements adopted from Western practices are fairly basic, since the need for quick and functional basic solutions was the first priority.

As seen in the analysis, some variations in the apartment layouts, such as the two-storey apartments, are applied. However, it remains a future challenge for Chinese housing design to start finding solutions for the different needs of various groups of people. The aspects complicating sustainable housing development, such as the lack of low-income housing, the increasing household sizes as well as the ever-growing density of urban areas and the need for better high-density housing solutions are, in the light of the analysis, not being addressed.

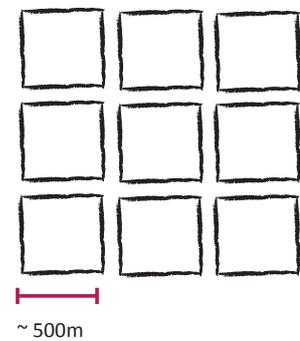
The superblock housing area as a model for planning housing has played and continues to play a significant role in shaping Chinese cities as well as Chinese housing. Therefore, its future development is not at all insignificant for China, or for the world, for that matter. The challenges that the superblock housing areas set for sustainable urban housing development need to be acknowledged in order to start planning for a more sustainable future.

Large Block Size and Applications of High Density Lack in Human-scale

4.1

The superblock as a structure for land division creates city spaces that strongly discourage pedestrianism. It is not uncommon that in a superblock city structure one has to walk half a kilometer to the next street corner. This scale of city structures increases the amount of vehicle traffic as the distances become unattractive for pedestrians or bicyclists (Fig. 4.1). The increase in vehicle traffic in turn does not support sustainable urban development due to their environmental effects.

Adding to the long distances caused by the block size, the closeness of the superblock housing areas further diminishes the free flow of pedestrians and bicyclists (Fig. 4.2). There are different views on the strictness of the closed nature of the blocks according to different sources and some argue that they are, in fact, possible to pass through even though apparently closed for the use of the community only. However, passing through the superblocks is not without difficulty. According to locals, there is a phenomenon of creative shortcuts emerging from the superblock housing areas to the surrounding city space, such as to stations of public transportation. The most extreme shortcut was through a window of a



"CITIES IN A CITY"

Figure 4.1. The large block size creates city space, which complicates pedestrianism.

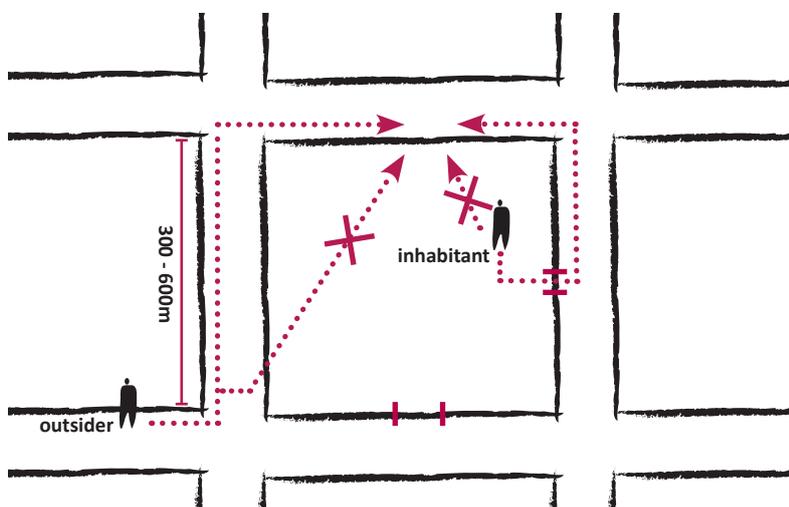


Figure 4.2. In addition to the size, the block's enclosed nature creates uninviting urban space for pedestrians. The distances in the city space become wide because the blocks are hard to pass through.

bank, under which a chair was placed for climbing out of the window and reach the arterial road. Even this single story only shows the necessity to re-evaluate the block size in relation to the level of closeness of the blocks because the consequences on sustainable urban development are drastic.

The second aspect caused by the scale and the speed of construction in China, are the high-density requirements of the superblock housing areas. The large-scaled and monotonous environment of the superblock housing areas causes challenges especially for socially sustainable development. Due to the combination of high-rise buildings and the strict Chinese sunlight regulations, the most common manner of area planning has become the solitarily standing middle to high-rise buildings with wide distances in between.

The spatial language emerging from this starting point has produced and continues to produce built environment that is, especially at the ground level, difficultly perceivable for a human sensory apparatus, which best functions at distances less than 25 meters. As the size of the communities becomes larger and the distances between people within the community become wider, the sense of community diminishes thus leading to unsustainable development. (Fig. 4.3, Fig. 4.4.)

Figure 4.3. High-rise buildings lack in human-scale.
The connections of neighbours in the non-built spaces weaken due to large-scaled yards.

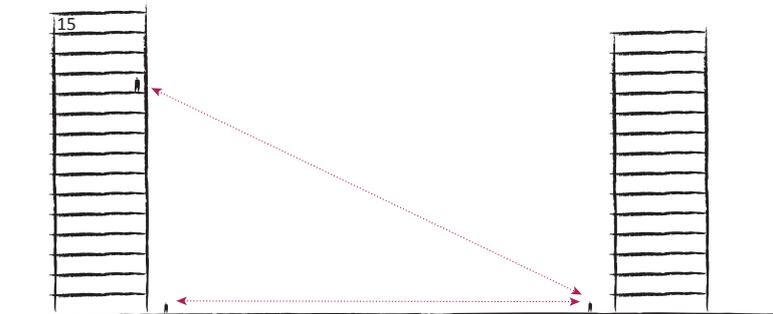
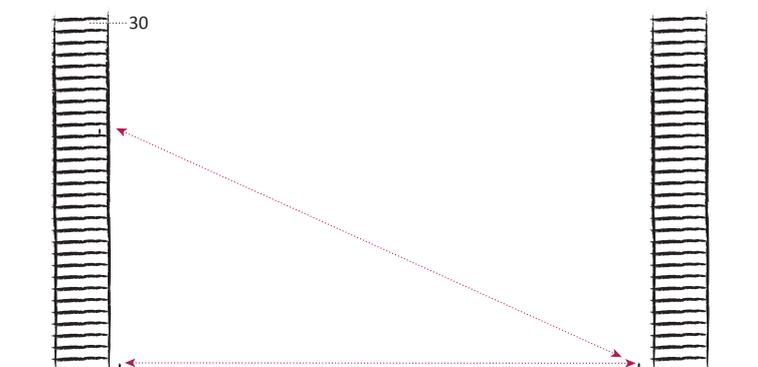


Figure 4.4. The worst case scenario.
The distances between 30-storey buildings are over 100 meters.



When aiming for human-scaled and pedestrian-friendly housing in China, the key question is how the need for high density is interpreted

into physical structures, since the need for high-density housing cannot be avoided in the case of a 1.3 billion people country where the urban population is growing explosively. The current and one-sided approach to reaching high-density in superblock housing areas should be re-evaluated in relation to other desired qualities of built environments and not just in relation to floor area ratio numbers and amounts of built square meters.

The issue of sustainability and building density does not only revolve around the wished amounts of square meters but it is, in fact, a question of the amount of people per square meters as well as a question of the quality of the environment created. In other words, there is a need for better density that takes into consideration factors such as human-scale, quality of outdoor areas and strengthening of the sense of community. In order to the superblock housing areas to develop in a sustainable manner, the need for density should rather be seen as a process of maximizing the quality of high density not as maximizing the amount of square meters only.

Strong Block Edges an Obstacle for City Life

4.2

In the light of the recent changes of the Chinese civilization, as big a challenge for the development of urban life in China as that of the large scale is the phenomenon of strong edges of the superblock housing areas (Fig. 4.5). The handling of the edges of housing areas stems from a long Chinese tradition and is ultimately highly linked to the need to close housing areas from surrounding spaces. However, the market economy has brought with it new forms of urban life. As the growing welfare and education level of people are unavoidably pushing the limits of the controlled society towards a more open one, the strong edges fail to support the emerging modern Chinese lifestyle.

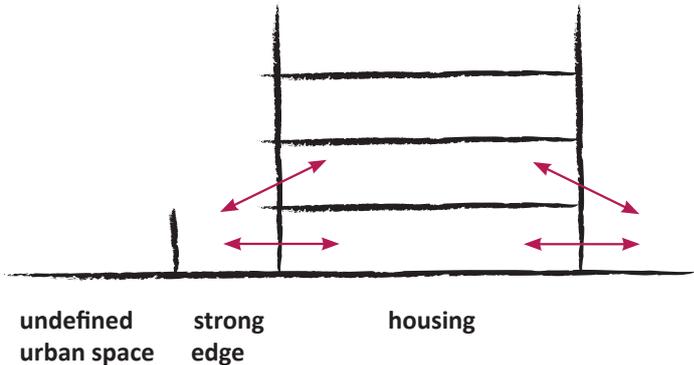


Figure 4.5. Strong edges make urban spaces uninviting.
The strong edges fail to support modern Chinese life-style.

The lack of the connection between housing areas and city space has strengthened vehicle traffic but, in addition, there is a lack of good quality street life and of small business spaces along the arterial roads. On the other hand, the superblock housing areas can, due to their introvert nature and large neighborhood size, be considered as cities within a city. In that case, the urban life could be pictured to take place within the neighborhood. But even in that mindset, the lack of ground level usage in the buildings inside the housing area does not support the needs for modern Chinese urban life.

Chinese have found creative ways to overcome these restrictions created by the lack of soft edges, for example by taking shortcuts through buildings or by selling goods from apartment windows to passers-by. This kind of creativity only highlights the urgency of the need to incorporate soft block edges into the planning of the superblock housing areas in the future. After all, one aspect of sustainable urban development is that of supporting peoples' needs and good-quality urban life.

4.3

Monotonous Environments

The interchangeable design solutions, row layout of buildings and low amount of differing housing solutions all add up to the monotony of the superblock housing areas. The row layout and south-facing buildings (Fig. 4.6) combined with the lack of variation in design solutions make the environments of the superblock housing areas highly monotonous.

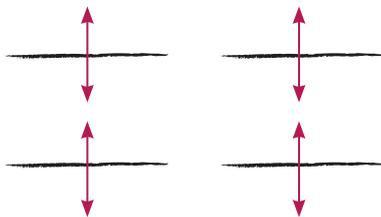


Figure 4.6. The south-facing buildings standing in rows creates monotonous housing environment. There is a lack of creative variations for the south orientation of the buildings.

The monotony of the superblock housing areas is a challenge for sustainable urban housing development because it creates unrecognizable and large-scaled housing environments. In addition to the large scale of the environment, the monotony of the superblock housing areas leads to the phenomenon of 'placelessness' thus diminishing the recognizability and sense of place of a housing area.

The lack of housing solutions for different needs of different types and groups of people can be seen as a monotony of apartment layouts. As the Chinese culture becomes more individually oriented, and as the need and importance for sustainable urban housing development grows, more specific apartment solutions should be created for differing needs.

For example, the lack of smaller apartments is becoming apparent as the average size of the households keep shrinking and the real estate prices

increase continuously. In addition, the need for two-generation apartments is increasing. As more families have two working parents and the daycare options are low, many families need the help of the grandparents. Last, distances within Chinese cities have grown considerably as cities have expanded and new solutions for having a possibility to do business without having to leave home are becoming actual.

Inequalities and Lack of Long-term Solutions

4.4

The widening gap between social ranks is a phenomenon causing tension in the Chinese society. In housing these inequalities are strongly visible as well. It can be seen as the gentrification process, which is linked to the demolition of traditional low-rise structures of old village areas. Furthermore, the shortage of low-income housing is a crucial matter, in which the gentrification process plays a harmful part.

The matter of low-income housing shortage is a crucial challenge to be solved in order for China's housing to develop in a socially sustainable manner because the need for affordable housing is so strongly linked with the basic living conditions of so many. On the other hand, the physical separation of social classes in the city structure needs to be tackled as well as the concentration of different social strata to different parts of the city only strengthen the uneven development pattern of urban areas.

However, these matters concerning inequalities are challenges that require big changes in other levels of society, in matters such as citizenship policies, before they can be solved by housing design. In addition, as the foundation of the design work in this thesis leans to the co-operation of Western planners in Chinese projects, the subject of low-income housing is not addressed because the projects Western planners are involved in are almost without exception related to high-income housing projects.

Another matter that has raised concerns about the rapid urbanization process of China is the feeble state of long-term solutions in planning and constructing. Here the question revolves around the quality of the contemporary forms of planning and constructing and whether or not they are going to stand the test of time.



Figure 4.7. A fallen building in Shanghai.
Long-term thinking is lost in the hurry to build fast. The speed and lack of skilled workers and planners cause problems.

Partly this is due to the speed of China's urbanization. The fastness of it has created a situation, where challenges are emerging in many aspects, such as in keeping the skills of construction workers up-to-date. There are in fact reports of newly-built buildings that have collapsed due to unprofessional planning or construction work (Fig. 4.7) as well as countless complaints of Western planners about there not being enough skilled workers to put their planning solutions into being . For China's sustainable development this short-sighted manner of planning and building has already created challenges for a long time to come.

The lack of long-term thinking in planning is also visible in the lack of variations. In the name of sustainable development, the need for long-term thinking as well as more variations and flexibility of solutions at all levels of planning in China is of high importance.

"The Principles of Green Urbanism" developed by Steffen Lehmann (2010) and Jan Gehl's "Cities for People" (2010) are at the heart of the sustainable approach of this thesis.

Without pouring into to the matter of arguing the importance of sustainable planning in general, it is rather just pointed out that the need for sustainable planning has been apparent for decades. The need is even greater in the Asia-Pasific including China, where, due to the vast population base and the attempts for higher quality of life, much of the whole worlds' future direction of development is decided (Lehmann, 2010).

Sustainable planning in China should not insist on compromises in attempts for higher quality of life, neither should it be considered as a playground for Western planners to correct the environmental mistakes the development of the Western countries has caused. However, the Western knowledge gained through making those mistakes can contribute in helping China and other countries in the Asia-Pasific to reach a higher standard of living in a manner that leans to sustainable principles from earlier stages.

The Principles of Green Urbanism

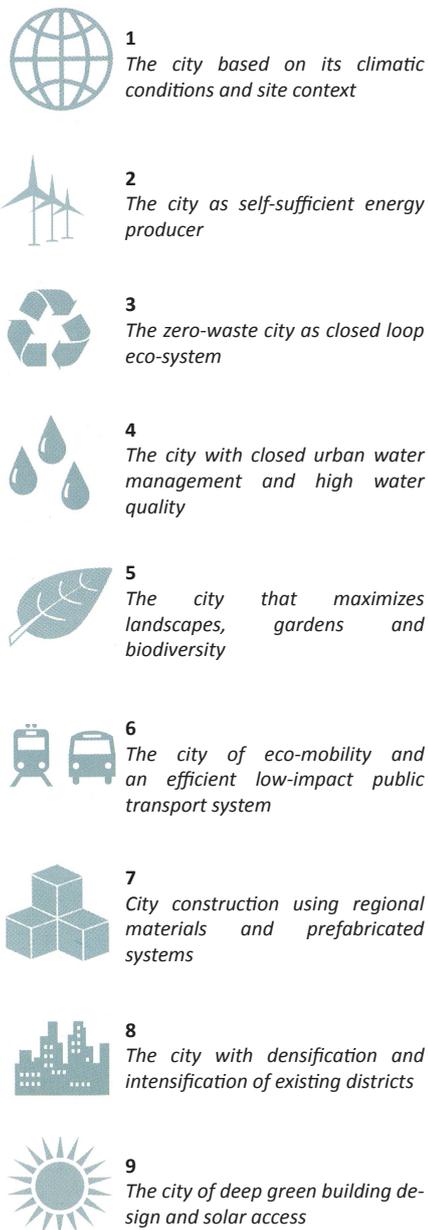
5.1

Generally, sustainability is divided into ecological, economic, social, and cultural aspects. This implies the all-reaching complexity of sustainable development in its deepest nature. The Principles of Green urbanism stem from this complex and all-embracing view on sustainable development and form a holistic method of planning.

Lehmann (2010) states that sustainability is not just a set of technological innovations but a set of mind, "integral to the profession of architecture" and an all-reaching approach in attempting to create a vibrant city. The principles are also always to be adapted to the particular context, to the cultural environmental economic and social situation of the site planned. This is a complex and interlinked process of planning, which requires unique solutions. Flexibility in both the planning process and the design are essential. Finding a sustainable planning solution entails balancing multiple different aspects at the same time and thus "making the best out of the situation" in the meaning of striving for the most effective solutions by addressing correct problems and utilizing existing good qualities.

Lehmann introduces fifteen inter-linked principles not only for

Figure 5.1. The 15 principles of green urbanism
Lehmann's theory is a holistic urban planning theory based on 15 interlinked and all-embracing principles of sustainable planning.



professionals in planning but also for other parties involved in creating urban environments. He stresses that one principle does not exist without the other and that, according to site and type, the aspects need to be taken into consideration as a whole, finding a balance from the basis of the assignment at hand. Compared to the co-operative force of experts from different fields in concrete projects, the application of Lehmann's principles in this work is naturally narrower and in some cases limited. However, such a comprehensive view for planning, even when stripped down to basics, is a firm starting point for any design work.

Lehmann's fifteen principles of green urbanism are briefly as follows (Fig. 5.1).

- The first principle, climate and context, refers to the city as base on its climatic conditions and site context. The basic starting point of planning is naturally the site and its unique conditions such as orientation, solar radiation and topography to mention just a few.
- The second principle, renewable energy for zero carbon dioxide emissions, denotes the need for a city to be a self-sufficient energy producer rather than a fossil-fuel based energy consumer.
- The third principle, the concept of zero-waste city aims at turning waste into resource by creating means for closed-loop eco-systems.
- The fourth principle of water emphasizes the importance of recycling water and maintaining a high quality of water for drinking.
- The fifth principle, landscape, garden and biodiversity as a principle imply integrating landscapes, urban gardens and green roofs to maximize biodiversity in urban areas.
- The sixth of Lehmann's principles, sustainable transport and good public space: compact and polycentric cities, highlights the importance of public transport, walking and cycling compared to car driving as well as the meaning of public space as a connection between transportation possibilities. Included is also the importance of creating a compact network overall.
- The seventh principle is local and sustainable materials with less embodied energy and it promotes the usage of local or regional materials due to lower transportation needs. It also describes prefabricated modular systems as a means of building design especially in building affordable housing.
- The eighth principle, density and retrofitting of existing districts, promotes making urban areas more attractive through intensification and densification by the means of mixed-use urban infill, compactness through vertical building, creating new business opportunities, promoting public transportation, creating flexible inner-city working and living typologies and by upgrading public spaces to mention some.
- The ninth principle, green buildings and districts, using passive design principles, introduces low-energy and zero-emission building as a part

of sustainable cities. This includes principles of passive design and deep green building such as solar architecture, natural cross-ventilation, night-flush cooling and mixed-use concept for compactness.

- The tenth of Lehmann's principles, 'the livability, healthy communities and mixed-use programs' refers to aspects of housing that promote healthy and livable communities, which diminish gentrification and improve the effectiveness of public transportation. This is achieved with mixed-use programs, i.e. by mixing different user groups, multiple housing typologies and introducing a 24 hour cycle to areas. Essentially these changes aim to changes towards more sustainable lifestyle choices that the mixed-use housing areas offer. This principle also denotes the importance of creating affordable housing and states that the amount of public (social) housing should be up to 40 to 50 percent of all private developments.
- The eleventh principle of local food and short supply chain describes urban farming in different forms at different scales from local food production to roof top gardens as to reduce transportation and packaging needs.
- The principle number twelve seeks cultural heritage, identity and sense of place by maintaining and enhancing a city's or region's identity, unique character and valued urban heritage. This is reached by paying attention to materials, history and population desires. The goal is to avoid interchangeable design by applying grass-root strategies such as protecting built heritage, creating business opportunities and supporting creativity thus reaching the essence of place.
- The thirteenth principle, i.e. urban governance, leadership and best practice, refers to policies of urban governance and its role in enhancing qualities such as public transport, good public space and affordable housing. This principle highlights the importance of empowered citizenry that is to say promotes community participation.
- The fourteenth principle, education, research and knowledge, further emphasizes the importance of the public awareness by promoting sustainability education on all levels to reach changes in life-styles.
- The last of Lehmann's principles for green urbanism, strategies for cities in developing countries, takes up the special situation of the developing countries where the combination of rapid urbanization, amount of population and attempts for higher quality of living set special demands for sustainable development. This fifteenth principle aims for harmonizing the impacts of rapid urbanization by introducing the need for specific strategies for the developing countries such as low-cost building solutions, appropriate technology transfers, job creation and diversification, slum upgrading and mass housing typologies. The ultimate goal of this is to find more sustainable growth for the developing countries, especially for Asian metropolitan cities for the time being.



10
The city with special concern for affordable housing and mixed usage



11
The city of local food supply and high food security



12
The city of public health and cultural identity: A safe and healthy city



13
The city of urban governance and sustainable procurement methods



14
The city of education and training in a sustainable urban development



15
Particular sustainability strategies for developing countries

[Lehmann, 2010]

When it comes down to the superblock housing areas, an emphasis on the human aspect and on creating socially sustainable housing areas for people is needed. Jan Gehl (2010) introduces a human-oriented and city life strengthening approach to planning in his book “Cities for People”. This theory is used as a basis for a human-scaled approach to the design solutions.

People are at the heart of Gehl’s theory. It is stated that people are our ultimate client and also ultimately the ingredient that makes a city. Life and activity are a city’s greatest attraction, that is to say the people are a city’s greatest attraction. The theory argues that the human dimension is an urgently necessary planning principle and that after 50 years of applying the theories of modernism a step back towards creating cities for people should be made by architects and urban planners. Gehl rationalizes this by arguing that Western planning has travelled from planning of city spaces to planning separate buildings that do not create lively space in between buildings, to come all the way back to people, to city space as spaces supporting human activity and to human-scale.

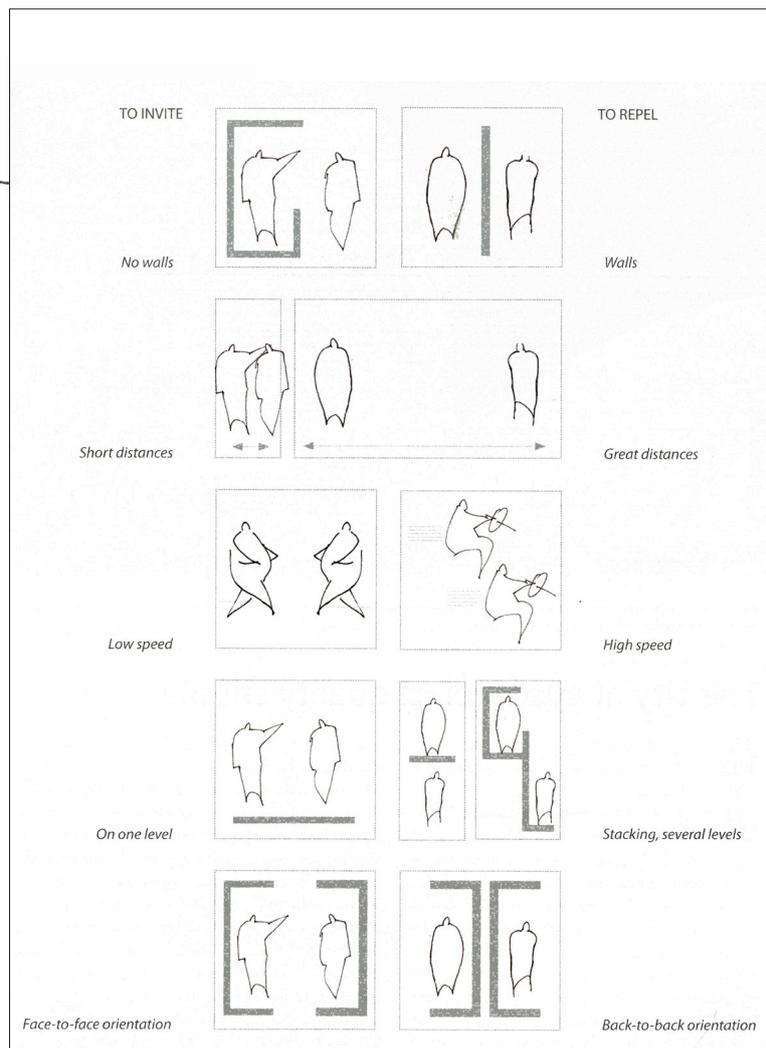
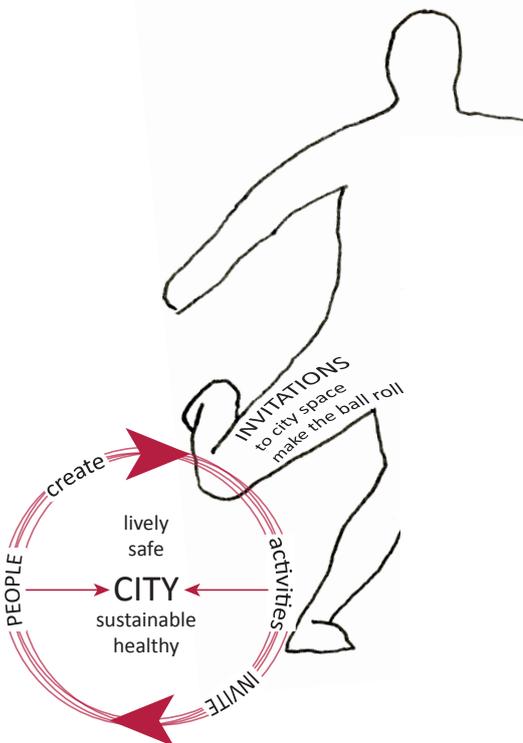


Figure 5.2. Designing invitations to city space.
 Inviting people to city space by improving pedestrianism lies at the heart of the theory.
 [based on Gehl, 2010]

As the space typology of the superblock housing areas greatly reminds the urban spaces of modernism it is appropriate to introduce Gehl's theory as it addresses exactly the challenges this approach to planning creates for environments. The city is, in fact, a sum of its people as well as a housing area is as lively as it is made possible to live in and experience by its inhabitants.

The key objectives of Gehl's theory are to achieve lively, safe, sustainable and healthy cities. In order to achieve these objectives Gehl encourages planners to invite people to city space. This is reasoned with the phenomenon that inviting people to city space lures more and more people to join. This in turn creates more city life, which ultimately leads to a better city. That is to say, exponential growth of city life follows when once triggered with solutions of planning. (Fig. 5.2, Fig. 5.3.)

To reach the goals of lively, safe, sustainable and healthy city the human-scaled approach is introduced as a combination of improvements in the circumstances of pedestrians, cyclists and city life in general. The improvements are concrete ways in which the city space can be formed to suit the experience of human senses and slow movement. Among the different methods are mixed-use planning, the importance of well-planned public space, active ground floor designing and paying attention to detailing of city space.

Fundamentally the theory is based on the physical features and limitations of people. The human dimensions ultimately dictate the usability of city space because the space is perceived and used from the basis of our senses and thus the experience of space is dictated by their advantages and restrictions. Gehl describes a human being as a linear, frontal, horizontally oriented and upright creation of evolution. This means that people's senses are mainly oriented ahead: walking straight forward is the most natural direction, we see clearly ahead, peripherally to sides, a little down and least upwards (Fig. 5.4) . The system of our eyes has developed to match the earth-bound horizontal experience, in other words we have a horizontally developed sensory apparatus. In addition, we are able to observe our surroundings most comprehensively at speeds of five to fifteen kilometers per hour, that is to say, when we are walking or cycling. In other words, we are pedestrians. Therefore our environments, city spaces, should primarily be created for pedestrians.

Gehl's theory is adaptable to various cultures due to case studies in different cities around the globe. It is stated that the attraction of better city space is valid in various cultures, climates and different economies or social situations. Therefore, it is assumed here that for the most parts the principles are possible to be adapted to China's cities as well. Furthermore,

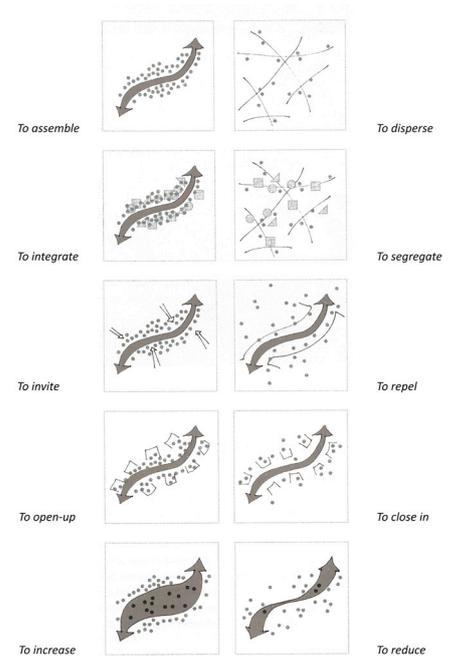


Figure 5.3. Principles of planning cities for people.

A mixed-use, cohesive and logical city structure is a good basis for city life. [Gehl, 2010]

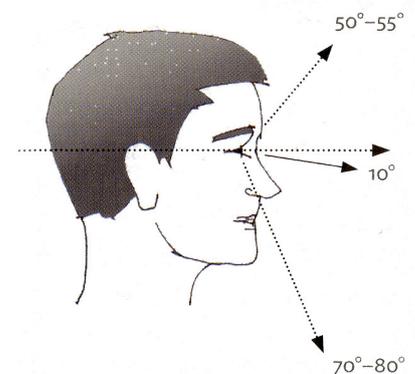


Figure 5.4. Human being is a pedestrian.

Human senses are mainly oriented to the route ahead and movement is fairly slow. [Gehl, 2010]

the four principles, the lively, safe, sustainable and healthy city create a self-strengthening loop system where everything affects everything. The key is to find solutions for physical form that trigger this development, to find ways to issue tempting invitations to use city space.

At the core of all four principles is strengthening pedestrianism. The first principle, the lively city, refers to the phenomenon that the more people are invited to walk, cycle and stay in city space the more people do so thus creating lively city spaces. The importance of attractive public space is emphasized.

A lively space for its part makes a city safer as well because the more activity there is in city space during different hours of the day the more secure we feel. Furthermore, aspects that create a safe city are short walking distances, attractive public spaces and a cohesive city structure where walking and cycling is possible. In addition, a variation of urban

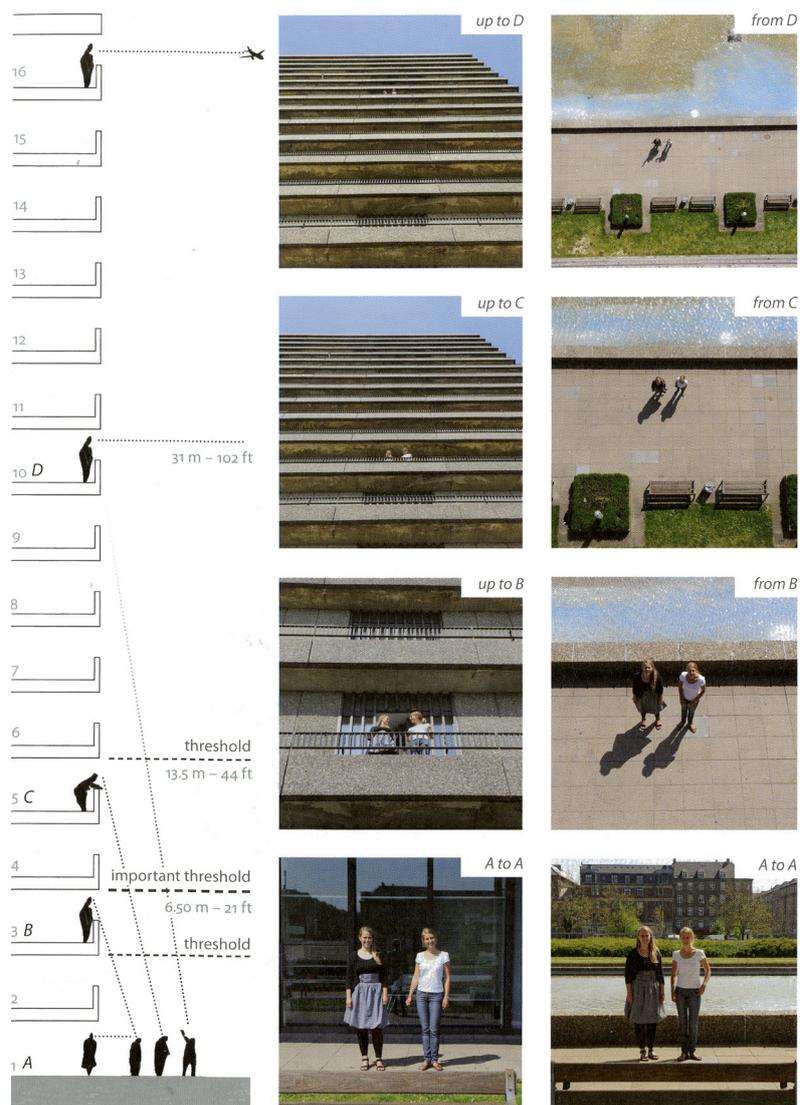


Figure 5.5. Street life creates a lively city.
The connection between buildings and street is lost after the fifth floor.
 [Gehl, 2010]

functions, which is achieved by mixing uses and citizens from different backgrounds, builds up a sense of security.

The third principle, the sustainable city, refers to city structure that reduces resource consumption, limits emissions and decreases noise level. A key aspect of sustainable city is the so-called “green mobility”, that is improving pedestrian, bicycle and public transportation possibilities. Improving green mobility then gives a boost to the attractiveness of public space. The fourth aspect of the healthy city emphasizes the positive effects of pedestrianism on public health.

According to Gehl’s (2010) observations of his case studies, a lively city is achieved by providing short logical routes between city spaces, which are small enough to be experienced from the perspective of a human. A clear hierarchy between city spaces provides good basis for experiencing the city in a trouble-free way. The combination of small city spaces, logical routes and a clear hierarchy creates a city as process, the movement of people in city space, that is to say the livability of a city. A certain amount of density is also required to achieve a livable city.

This means a reasonable population density combined with a compact built structure and acceptable walking and biking distances as well as good quality city space. What Gehl emphasizes in comparison to high density is the need for better density. This is an aspect considered when thinking about the proper height of the buildings. It is argued that the connection of the insides of buildings is drastically lost after the fifth floor (Fig. 5.5). Since the street level creates the basis for city life creating density with buildings higher than five floors must be considered carefully so that one does not end up diminishing the compactness of the street level.

Regarding the street level Gehl introduces a concept of soft edges (Fig. 5.6). The soft edges refer to the eye-level semi-private zone between buildings and city space. This is the space where city meets building,

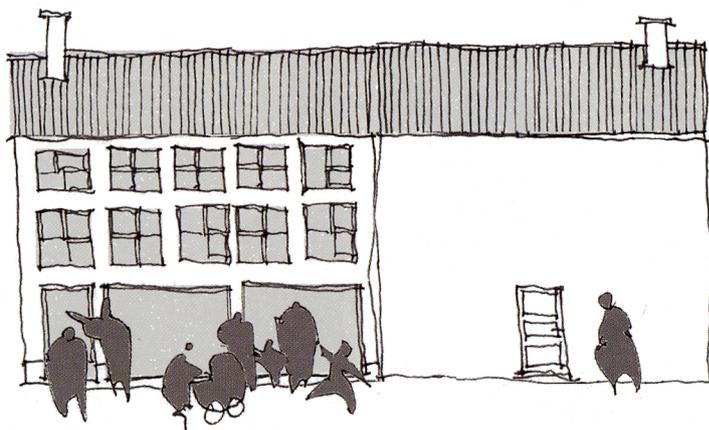


Figure 5.6. “Soft edges” create liveliness.
City life is dependent on the design of the first floor.
[Gehl, 2010]

the transitional zone that ultimately defines the space that is created. The edges offer a certain feeling of organization, comfort and security. The soft edges also create opportunities for lingering such as sitting or gathering and thus add to the liveliness of a city. Gehl argues that no other aspect than active and lively edges has such a great impact on the life and attractiveness of city space. The quality of ground floors is very crucial to a city's overall appeal. "Life grows from the edges in towards the middle" (Gehl, 2010).



Figure 5.7. Pedestrianism and public transportation.

Walking, bicycling and TODs form the basis of a sustainable and a healthy city.

Furthermore, the safe city is achieved with prioritizing pedestrian and bicycle traffic (Fig. 5.7). On one hand the feeling of security increases because promoting light traffic gathers more people to city space and on the other hand the traffic safety is concretely increased when car traffic is reduced. The feeling of "eyes on the streets" that is reinforced by having activities on the ground floors, in the soft edges of the buildings, preferably in different forms at different times of the day. To enable this, a city needs to be based on mixed usage. By mixing functions and people, the activity of the city increases and thus feeling of security strengthens. As a near opposite "defensible spaces" need to be guaranteed as well. This calls for a clear physical demarcation between private and public spaces to support social structures and a persons' feeling of security.

As Gehl's principle of the sustainable city leans much on promoting pedestrian, bicycle and public traffic, it forms a basis for cheap, near-silent and non-polluting traffic system that uses less resources as well as concretely less city space. The interplay with traffic oriented development (TODs) and pedestrian or bicycle traffic is to be reinforced in order to achieve a functioning and quick traffic system. It is also important, especially in low-income urban societies where the income differences are high, to achieve this efficient net of transportation methods so that different social groups have equal opportunities to use the transportation network and thus equal opportunities to engage in city life. The possibilities to engage in city life by foot or bike are the basis of the principle of the healthy city. By providing with possibilities for physical challenges as a part daily life keeps up public health in a natural way. A more car-free city is also less polluted and less noisy. On the other hand it is far easier to remain also mentally satisfied in a city that is lively, safe and sustainable.

In conclusion Gehl's theory states that by increasing concerns for pedestrians, bicyclists and city life in general can provide with very satisfactory opportunities for all four areas of development thus creating livelier, more sustainable, safer and healthier city spaces to suit the urban life.

This practical chapter of the thesis seeks give design tools for of planners and architects participating in Chinese housing projects. The concepts form a basis to start planning for housing areas that both support sustainable principles and suit the Chinese context.

These methods are an overview and a selection of countless possible solutions. They offer a wide range of tools to start planning for sustainable Chinese housing areas. The concepts are, for the most part, linked to each other and should, thus, be used separately only with care. Emphases should be chosen among the concepts according to the context and project aims of individual design works.

A special emphasis is on creating socially sustainable housing areas. The planning tools are based on the analysis of the Chinese characteristics and on the sustainable planning principles introduced previously. They address the challenges, which the superblock housing areas in their current form set for sustainable urban housing development in China.

The essential challenges addressed are the scale of the housing areas, i.e. the size of the block and the solutions for high-density, and the strong block edges as well as the monotony of the superblock housing areas concerning building layout, building height, architecture and housing typologies. The challenges are addressed at block, building and apartment level with eighteen concepts (A1-G2) under seven different themes (A-G).

A. Block Size



Figure 6.1. Principle # 6: eco-mobility and public transport system.

Public transport, walking and cycling, and a compact transport network are enabled with a smaller block size.

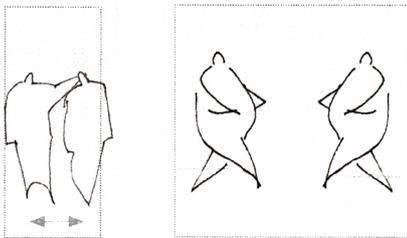


Figure 6.2. Short distances and slow movement guarantee a people-friendly city.

Different types of street grids contribute to street hierarchy and logical routes.

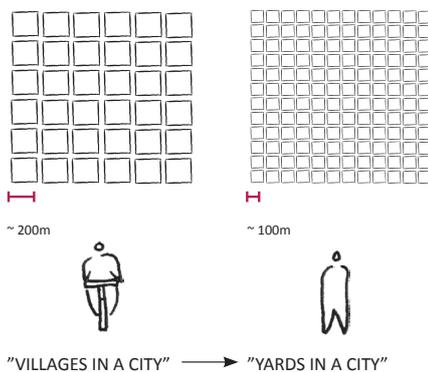


Figure 6.3. A smaller block size is paramount for sustainable urban development.

The size of the superblock housing areas should be reduced to no more than 200 meters a side.

Both Lehmann's and Gehl's theories put a great emphasis on creating solutions that enhance pedestrianism and strengthen public transport and bicycling (Fig. 6.1, Fig. 6.2). Accordingly, the size of the superblocks appears impossible for sustainable urban development in China. Small block size and short distances are needed in order to create a cohesive city structure, which enables slow movement (Fig. 6.3).

A short distance in a city structure can be defined as the maximum distance that people are usually willing to walk, before considering taking the car. A common average is five minutes. As people walk at an average speed of 5 km/h, the maximum "short distance" becomes 400 meters. Therefore, the starting point for any design work of housing areas should be a block size of maximum of 200 by 200 meters. This way the furthest point of the block is within a five minute walk.

A city structure that enables good possibilities for slow movement links public transportation to the reach of people. In addition to reducing the block structure, a clearer hierarchy of streets needs to be established in order to create logical routes. This is achieved by introducing different types of roads and streets with different main usage to the city structure. The shorter and more logical routes ensure a good basis for traffic oriented development (TOD's).

When reducing block size in China, the neighborhoods created should still be enclosed, because enclosure is a fundamental aspect of Chinese housing typology (Fig. 6.4). Even though a large neighborhood unit is widely adopted and accepted in Chinese housing area production, the advantages of a smaller block size on sustainable urban development and lively city life are so positive that smaller but stronger neighbourhood units need to be encouraged in planning for housing areas. The enclosed nature of smaller housing areas can be achieved by gates and by creating housing that is introvert in its built form thus ensuring a feeling of secured housing area and a strong sense of community. In practice, the introvert built form of housing means avoiding direct contact of residential usage with streets surrounding the neighbourhood.

A1. Reducing the block size of the superblock housing areas should take place gradually. Therefore, it is appropriate to begin with dividing the blocks with primary streets, which are narrower than the arterial roads. Since the maximum is established at 200 meters, in first stages the superblock sizes should be reduced to 150 - 200 meters by 150 - 200 meters.

A2. An even smaller block size of 50 - 100 meters by 50 - 100 meters is advisable for inner city development where the emphasis is on creating vibrant city life in between residential blocks. In addition, when

the first stage of reducing the superblock size becomes more familiar, the blocks should be further reduced to this size in the future.

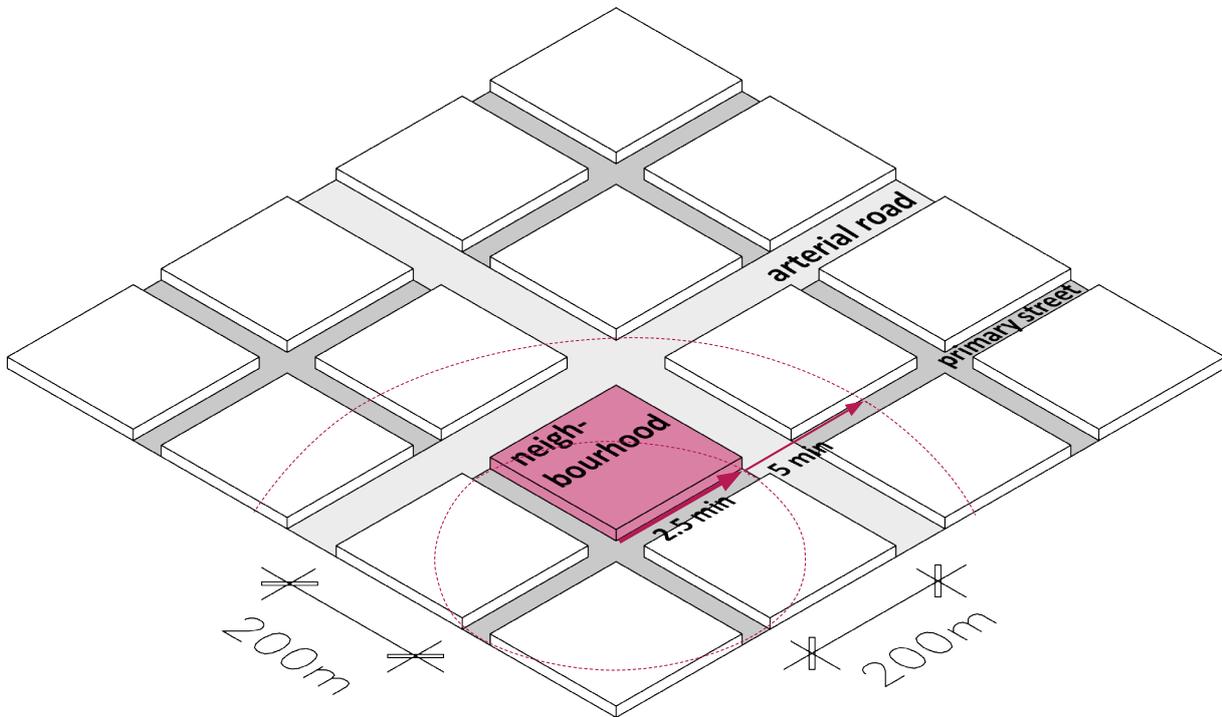
A3. As a third option, the blocks can be planned with future urban development in mind. Where a small block grid is not an option, the inner infrastructures of the larger blocks can be planned to make it possible to divide the block into smaller units in the future. This means defining the building areas and planning inner traffic with consideration to connectivity with the inner traffic arrangements of the surrounding blocks.



Figure 6.4. Enclosed neighbourhoods.
Reducing block size should simultaneously enable enclosed neighbourhoods.

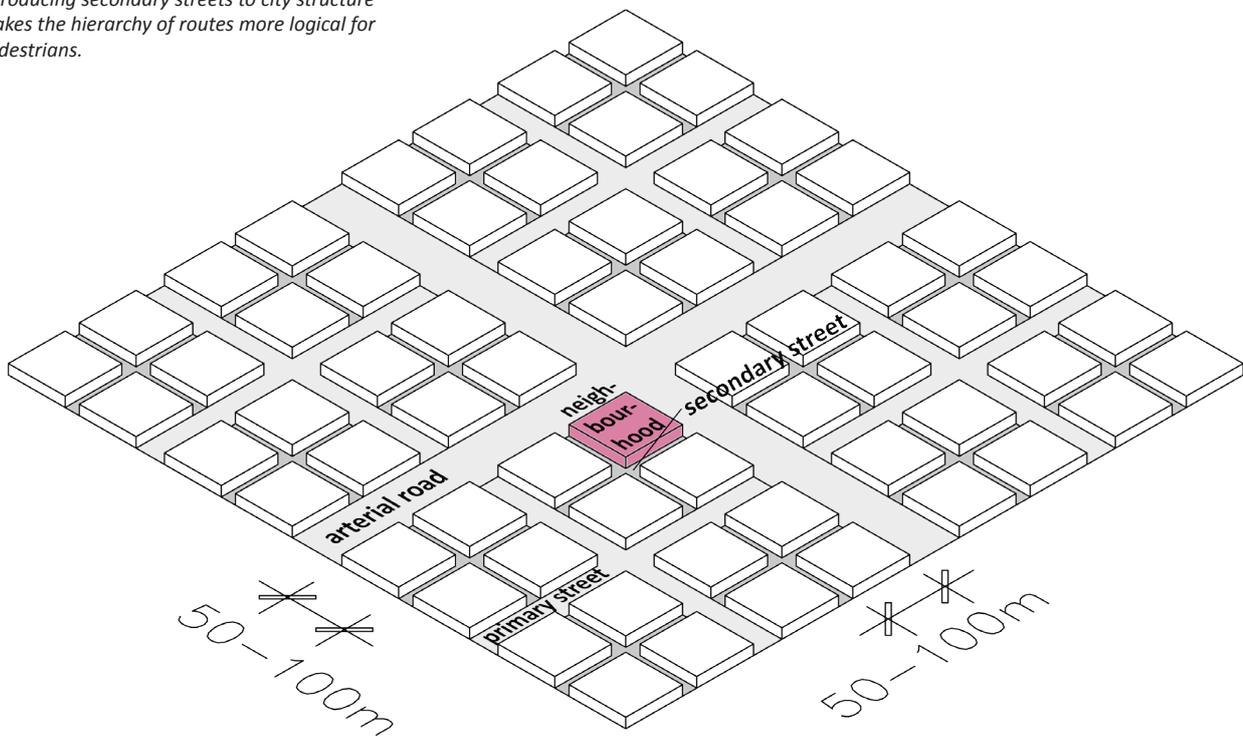
A1. City of Cyclists

Blocks of 200 x 200 meters ensure walkable distances to public transportation.



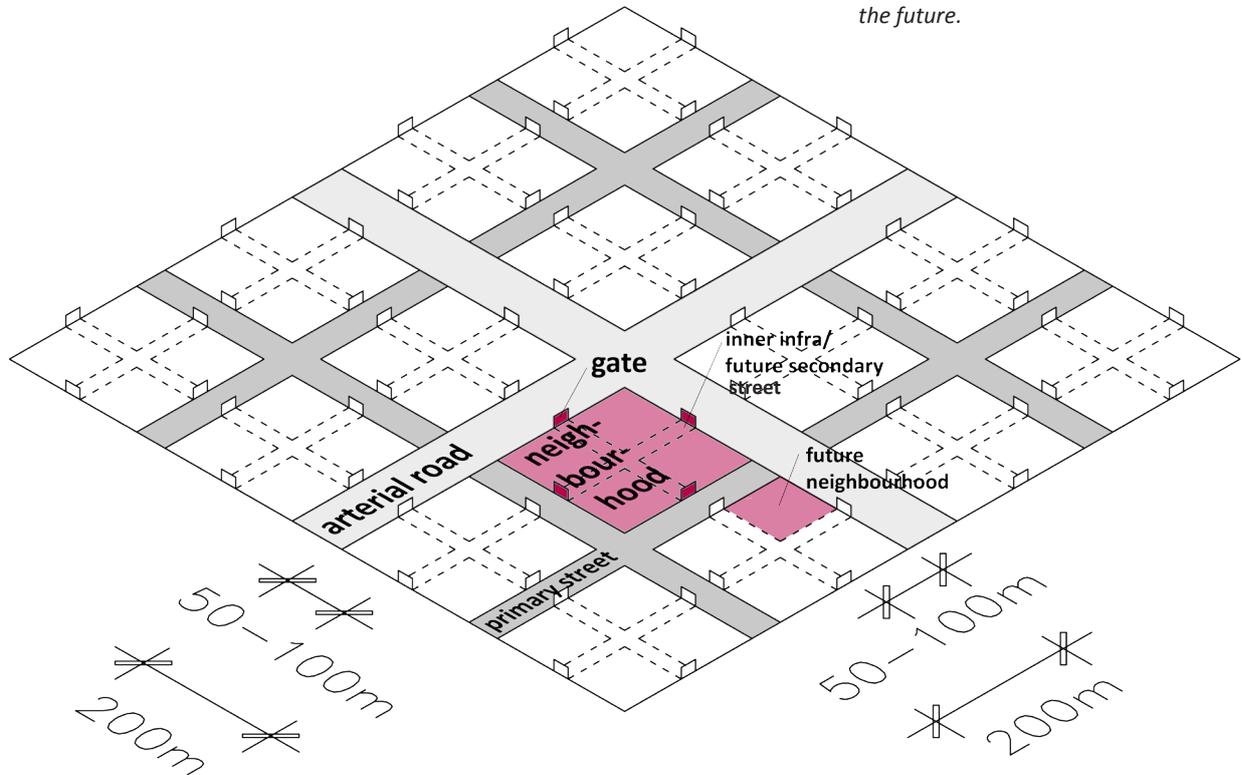
A2. City of Pedestrians

Introducing secondary streets to city structure makes the hierarchy of routes more logical for pedestrians.



A3. City of Future Openess

By defining building areas and organizing inner infrastructures in planning now, the blocks can be opened-up to smaller ones in the future.



B. Block Edges



Figure 6.7. Soft block edges are the basis for vibrant city life.
New typologies of Chinese block boundaries need to be created.

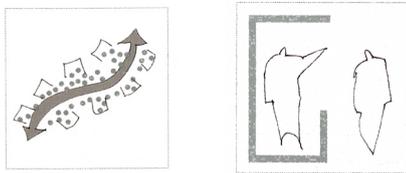


Figure 6.8. "To open-up" and "no walls" invite people to city space.
Urban structures and activities need to be opened up to city space at the edges of Chinese housing areas.

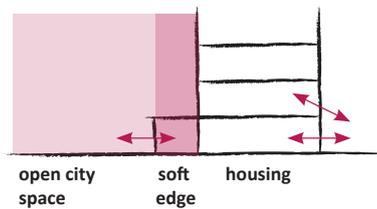


Figure 6.9. Schema of a new and softer Chinese block edge.
A direct contact of residential usage with city space is unnatural for Chinese spatial language and should be avoided.

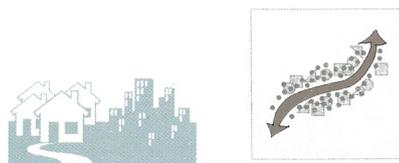


Figure 6.10. Principle # 10: "special concern for mixed usage" and integrating different uses.
Mixed usage forms a basis for vibrant and diverse city life and needs to be encouraged.

Because of the recent changes in Chinese urban life, the need for spaces for city life is growing. As Gehl implies, the edges of blocks are highly important to the city life (Fig. 6.7). Chinese city spaces need soft edges. A soft edge is achieved with opening up a connection between urban space and the buildings and by designing the edges to support urban activities (Fig. 6.8). Designing a lively first floor is especially vital.

As mentioned, a direct connection between housing areas and urban space, which is common in the Western world, is not suitable in the Chinese cultural context. Therefore, new typologies for creating boundaries of Chinese residential blocks are needed. (Fig.6.9.)

B1. As the modern Chinese urban life requires livable city space, such as open first floors, and as the Chinese nature of housing areas calls for an enclosed and walled inside space, the edge zone can act as a wall between city space and housing. The edge zone is a buffer zone between the two different kinds of spaces, opening outside while, at the same time, closing the housing area inside. Activities should be divided accordingly. The active belt calls for usage, which promotes urban life and increases the quality of city space. The urgent need for small business premises is addressed in the planning of the first floors where services from restaurants to selling goods and offering services are placed.

Mixed usage should be further promoted to ensure sustainable urban development in China (Fig. 6.10). For this the challenging east-west buildings can be of use. Offices and service spaces find their place above street level filling the gaps of the east-facing and west-facing sides of the blocks in cases, where these kinds of activities are suitable on behalf of the blocks' location in the overall city structure. In the future, the need for combinations of living and working is likely to increase. Flexible solutions, such as soho apartments, which are not, in the light of the regulations, only residential use, would fit the east-west-facing buildings masses.

B2. The concept B2 bridges the gap between the setback zone and urban space. As the setback distance is defined in the building regulations of most cities, a planner needs to be prepared to accept its existence and to plan accordingly. Functions that open up to city space can be achieved by creating lighter built structures into the setback area, i.e. around the residential usage. The small business buildings at the street level create comfortable and human-scaled open space.

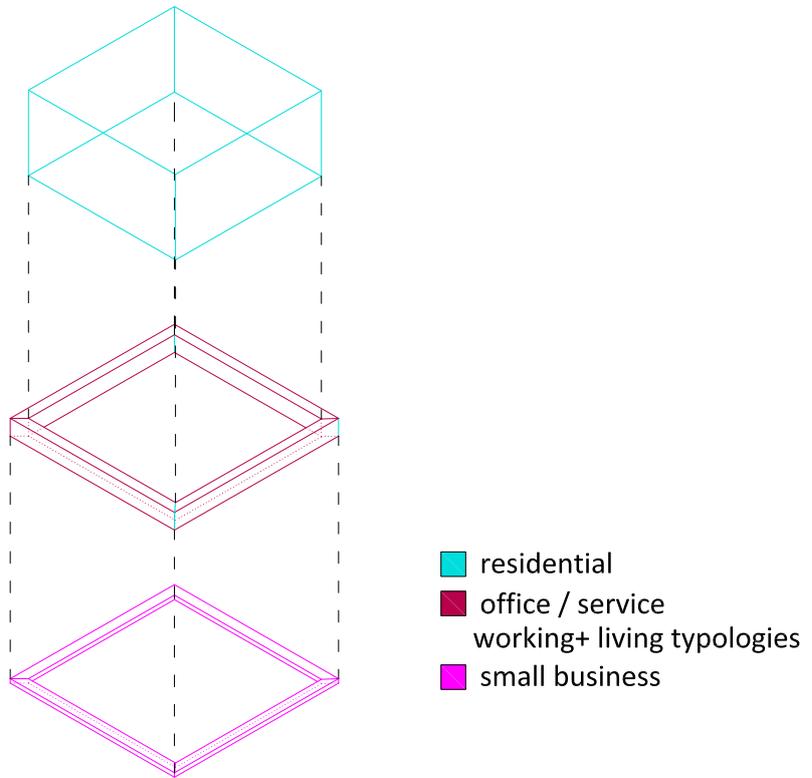
On the other hand, by paying attention to the detailing of the architecture of the residential buildings facing the surrounding roads, the quality of the city space increases. Even though the windows of the residential buildings are lifted above street level to ensure an enclosed neighbourhood,

vertical elements and, for example, varying materials in the treatment of the façades create liveliness to the urban space. A clearly structured city space is inviting and thus the activity of the urban space increases. At the same time pedestrianism is promoted, as the urban space becomes more structured with hierarchy of streets as well as more enjoyable through activities and focal points created by the block edges.

B3. The concept B3 introduces a variation for a tight but soft block edge, where the building masses are designed all the way to the arterial road line. In this case, it is important to find combinations of residential usage and other activities that ensure the need for an enclosed housing area. Because of this secured nature of housing, the concept is called “modern Chinese city wall”. The secured nature is achieved by avoiding a direct contact of residential usage with the city space. Where unavoidable, the residential usage opening-up to surrounding streets should be placed into upper levels and other activities of the “active belt” should be placed near arterial street level.

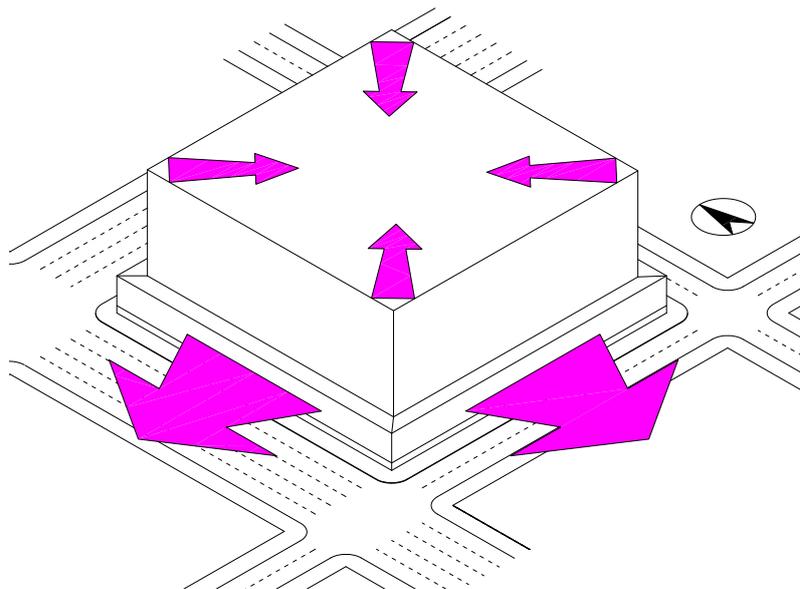
B1. Mixed Usage

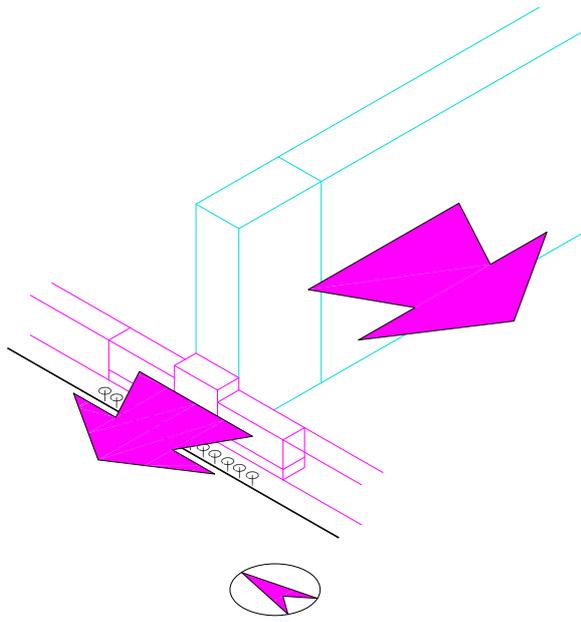
The promotion of mixed usage in Chinese city space combined with the need for soft edges: other than residential usage is placed on the active belt, which encloses the housing area.



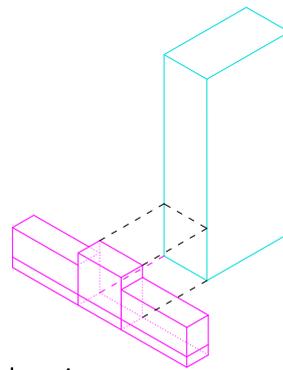
Schema of the block structure.

The active belt opens up to city space creating a soft block edge, residential usage closes in making the housing area feel secure.



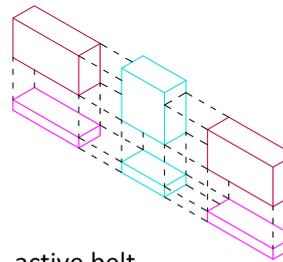


- housing
- active belt



housing

- housing
- active belt



active belt

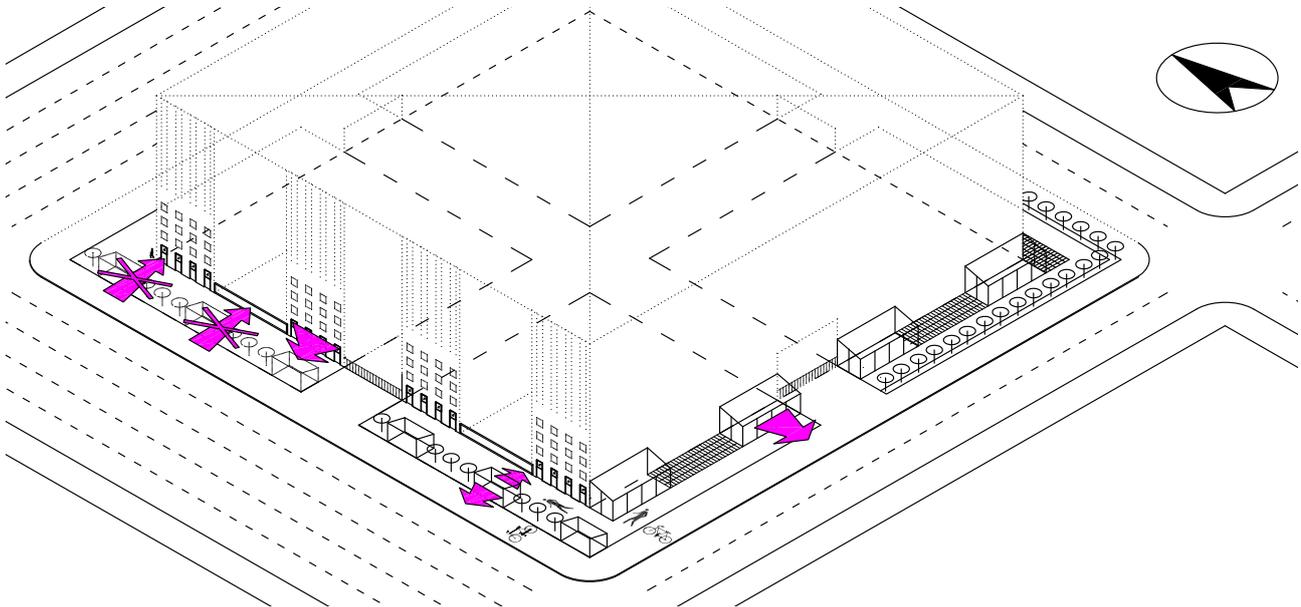
- working+living
- office / service
- small business (commercial, service)

Schema of the block edge in detail.

The south-facing residential usage is attached to the active belt with new typologies, which combine working and living. Direct contact of residential usage with surrounding urban space is avoided.

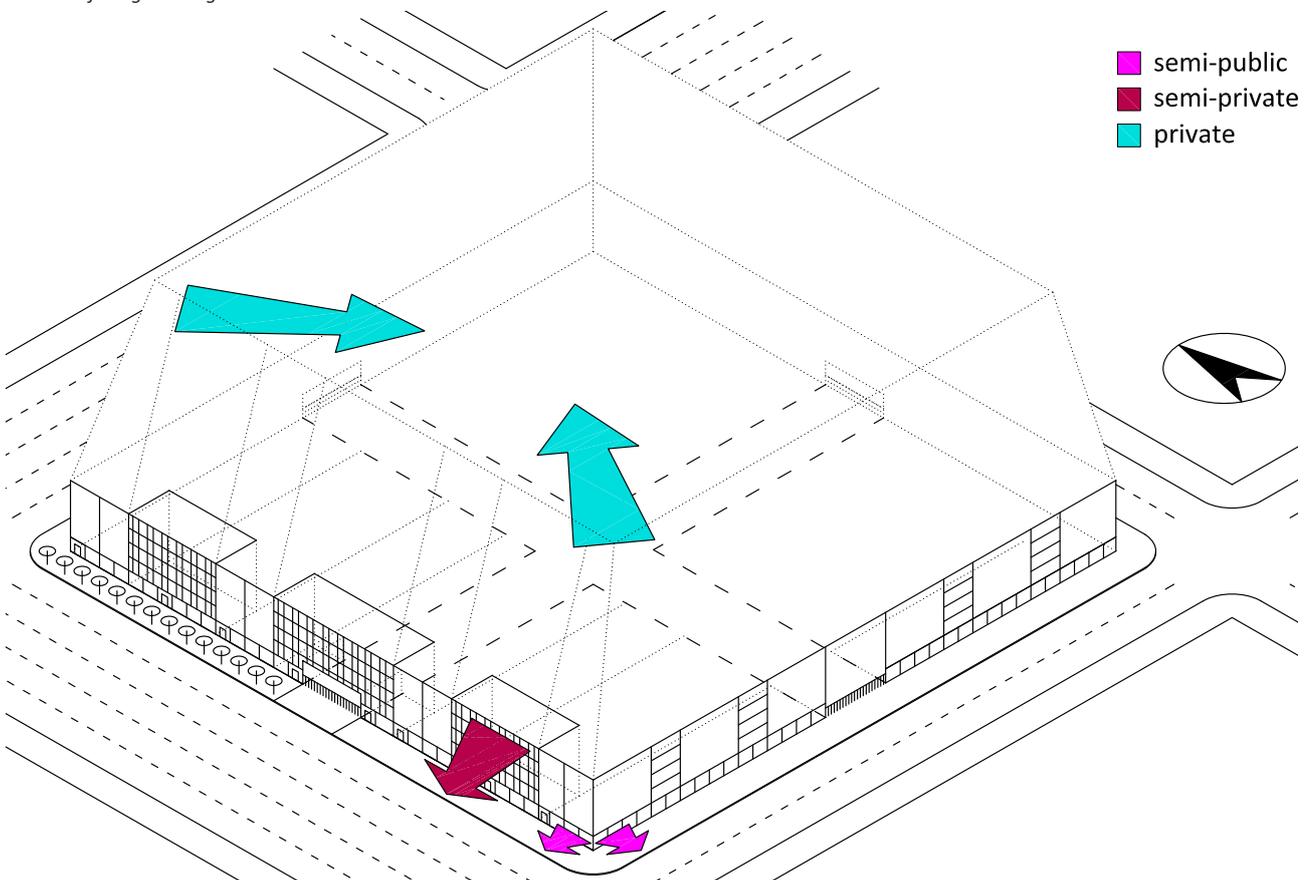
B2. Lively Setback Zone

If a setback zone is required, liveliness to the city space should be created with light structures and details of the façades facing the arterial roads.



B3. Compact but Soft Block Edge

When planning to the arterial road line, attention should be paid to designing an open first floor and adding other than residential usage to east and west facing building.



Requirements for high density of Chinese housing areas are unavoidable in the light of sustainable urban housing development. Lehmann's eighth principle about densification, and the fifteenth concerning mass housing solutions for the developing areas of the Asia-Pacific, emphasize the need for high density solutions of urban areas. Accordingly, Gehl stresses the need for better density in order to create compact cities with human-scaled environments. In China's situation, "better density" can be achieved by creating new variations of how to interpret the density requirements into built form in a human-scaled manner.

Usually the density of a constructed area is expressed as floor area ratio (FAR) (sometimes known as floor space index, FSI), which expresses the built intensity of an area and is calculated by dividing gross floor area with plan area. The FAR is used extensively in China as well. Using this one value to measure the quality of a housing area is a one-sided approach to building density and neglects to survey the nature of the environment created. Therefore, this approach easily leads to solutions that lack in characteristics required for qualitative urban environments.

C1. An indicator developed by the Delft University of Technology in the Netherlands, the Spacemate, includes three other variables into the examination of density thus giving a method for examining density in relation to the nature of built form and open spaces (Fig. 6.12). The Spacemate is a tool to examine both quantitative and qualitative features of space usage. The Spacemate ultimately indicates that same level of FAR/FSI can be reached with different spatial solutions, thus giving more starting points for planning high-density housing areas.

According to Spacemate, the level of urbanization of the spatial solution is determined to a large extent by the pressure on non-built space, the OSR, which expresses the openness of an area. The smaller the OSR value the compacter the area is. This means that spatial solutions of different heights or varying FAR/FSI can be considered similar, for example urban, when it comes down to the nature of the environments. For planning this gives room to find spatial solutions of different heights and compactness that all meet the required level of density.

The limit values for density need to be defined individually to each design project. Based on the study in this thesis, some guidelines can be defined for the use of the Spacemate. At early stages of a design work, different massing concepts can be mirrored with the defined guidelines. The massing solution should fall within the defined range on the Spacemate diagram. The guidelines are as follows:

- The average amount of levels (L) should be around five floors. This is the basis for human-scaled environment because, as Gehl argues,

C. Human-scaled Density



Figure 6.11. Principle # 8: densification and intensification, # 15: sustainability strategies for developing countries.

Human-scaled solutions for high density need to be created in China.

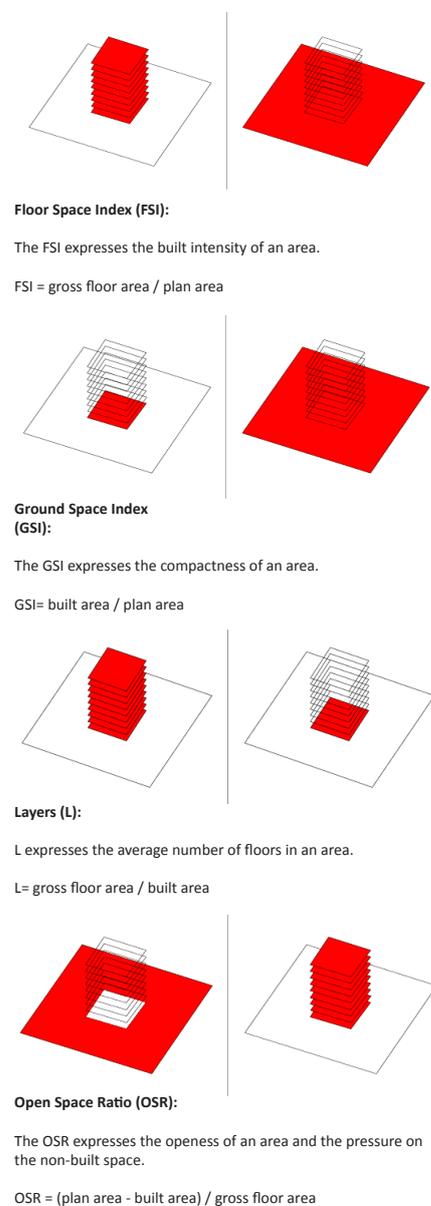


Figure 6.12. The indicators of the Spacemate.
The Spacemate system is a tool for measuring both quantitative and qualitative aspects of space usage.
[Permeta, 2011]

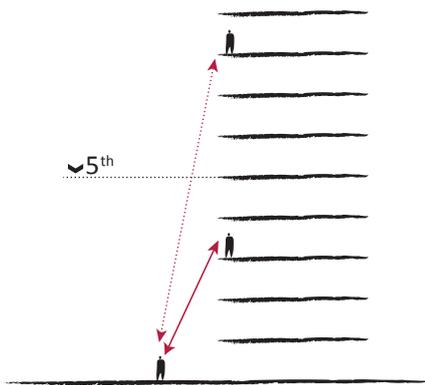


Figure 6.13. The connection between buildings and street is lost after the 5th storey.
In order to plan a lively neighbourhood, the connection between outdoor ground level and the buildings needs to be strong.

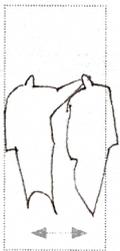


Figure 6.14. Short distances.
An average of 5-storey buildings guarantee human-scaled open spaces within a neighbourhood.

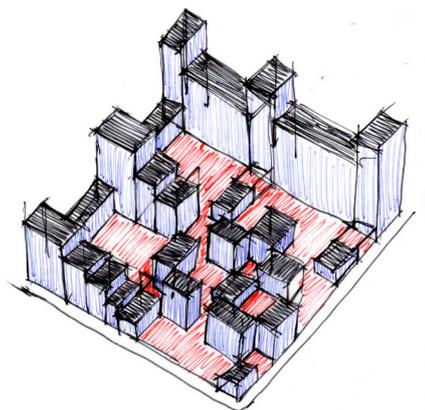


Figure 6.15. A sketch of varying building heights.
All masses for residential usage face south.

the connection between the ground level and a building is drastically lost after the fifth storey (Fig. 6.13). In addition, distances under 25 meters in urban space are most suitable for human interaction (Fig 6.14). For the sunlight regulations to be fulfilled, a building distance of 25 meters is achieved with 5-storey (or lower) buildings.

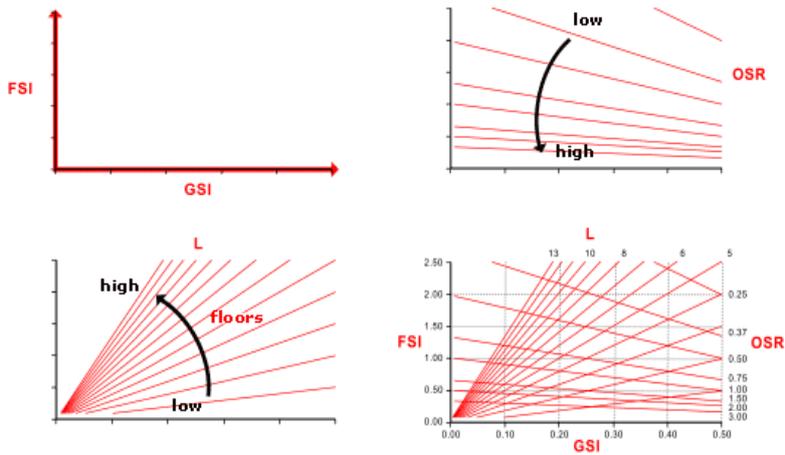
- The OSR value should be under 0.5 to achieve environments considered as urban or highly urban. On the other hand, with Chinese sunlight regulations, a OSR value of under 0.25 is near impossible.
- The FAR/FSI requirement is rarely under 1.5 when planning housing areas in China.
- The main range for building heights should be up to 9-storey buildings because it is a threshold value in Chinese building regulations. After 9 floors, the regulations become stricter. In addition, the average of 5-storey buildings is still achievable with this maximum.
- Leeway of building heights for singular cases is left at both ends. Where a very high FAR of 2.5 is needed, 15-storey buildings can come into question. On the other hand, where low and dense urban housing is needed, as for example when building new urban infill among low-rise traditional urban housing structures (e.g. Puurunen, 2006), compact 3-storey structures can be utilized.
- In addition, attention should be paid on maximizing the amount of people within an area when, for example, deciding the average size of apartments. In the end, density is not so much about the amount of square meters but the amount of people per square meters. Luxury often comes with the expense of sustainable development.

C2.

More liveliness can be achieved by varying building heights within a housing area (Fig. 6.15), especially within larger blocks. The varying heights diversify the visual image of the built structures and the different building types can be designed so as to serve different housing typologies better. In addition, variations of building heights automatically creates hierarchy of the non-built spaces because the sizes of the non-built areas vary.

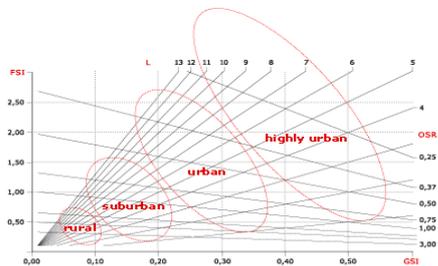
C3.

When the emphasis in planning is on very high FAR/FSI values of more than 2.0 and on 9- to 15-storey buildings, the sense of community of the neighbourhood should be prompt with design solutions focusing on building levels individually. These vertical communities can be created with simple measures such as creating common spaces or paying attention to designing the entrances to apartments as to reinforce natural encounters between neighbours.



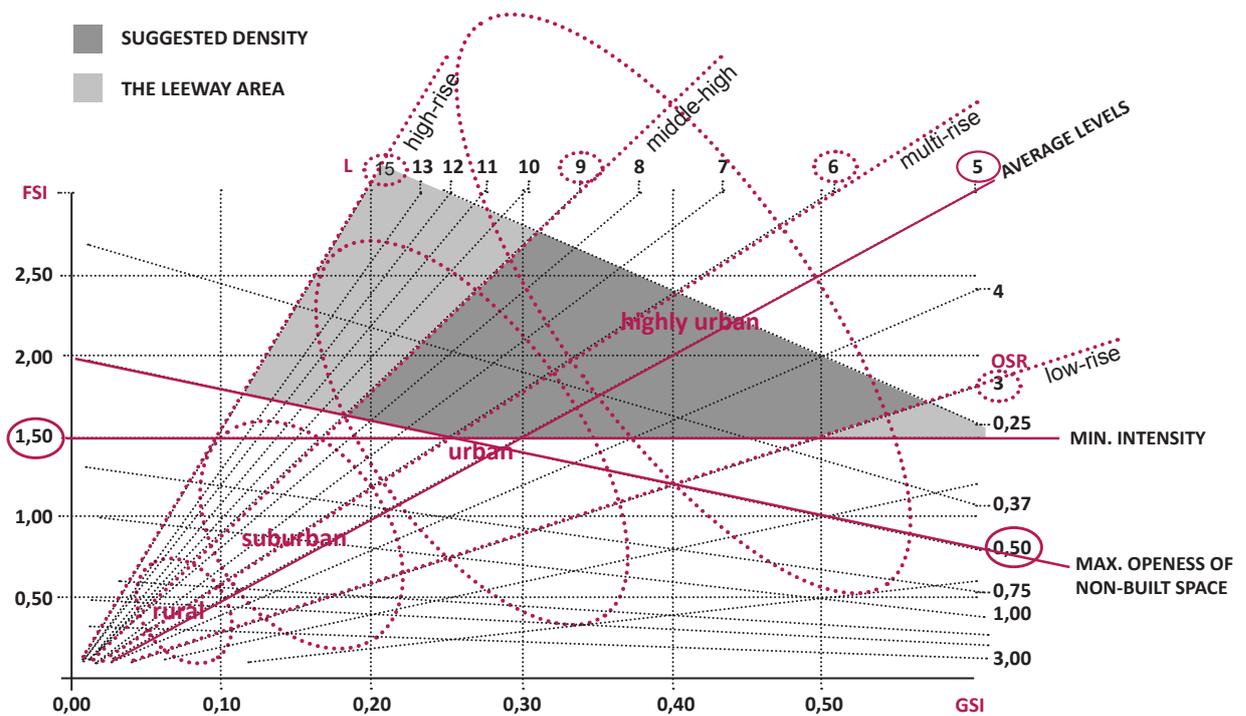
C1. Qualitative as well as Quantitative

The Spacemate is used to compare different massing concepts to reach qualitative density.



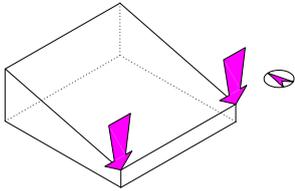
The parameters of the Spacemate diagram separately and combined. [Permeta, 2011]

The proposed guidelines in the Spacemate diagram. The suggested range in the diagram guarantees dense and human-scaled residential areas. [Modified from: Permeta, 2011]

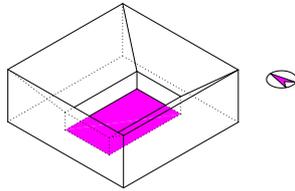


C2. Varying Building Heights

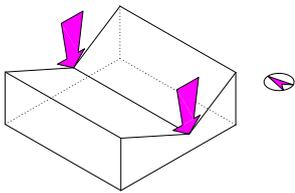
Differing heights of buildings creates liveliness to both built form and open spaces.



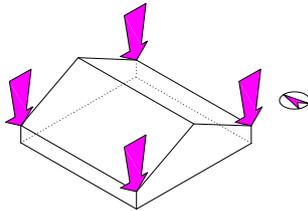
maximizing south-facing wall



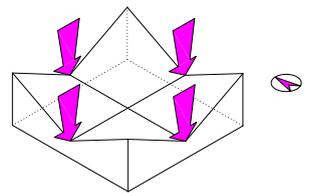
neighbourhood garden



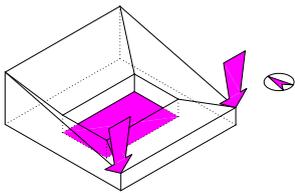
highlighting middle



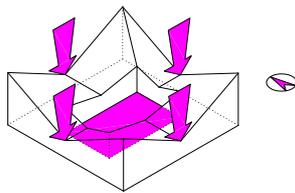
middle axis



highlighting corners

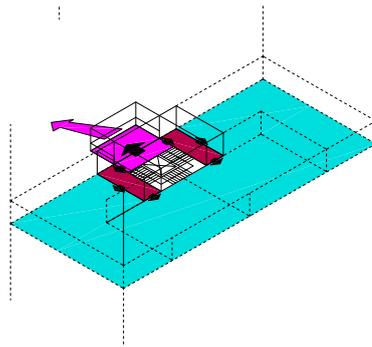
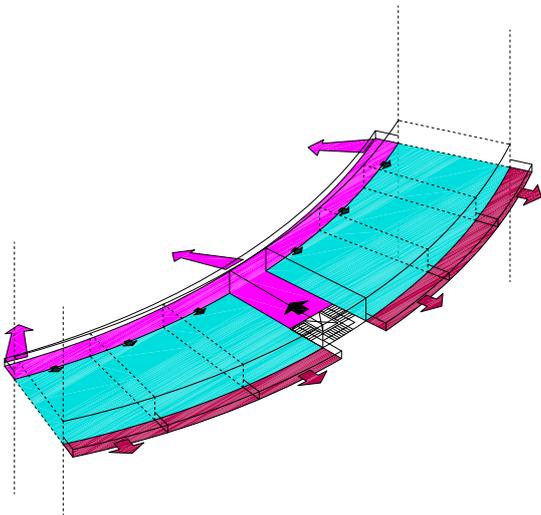


combinations

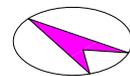


C3. Vertical Communities

Semi-public spaces increase interaction of neighbours living on the same floor.



- semi-public
- semi-private
- private



As mentioned, an open space gains features of public space where the community tends to spread. The insides of neighborhoods can be more livable where a semi-public activity such as family and small business activities are allowed to spread to the courtyards. The goal of paying attention to the non-built areas of the housing areas is to guarantee appropriate spaces for different types of neighbourhood activities thus strengthening the sense of community (Fig. 6.16.).

For the spreading to be successful, a clear hierarchy of attractive yards and a zone of semi-private outdoor space along the building edges are needed. Here, varying building heights and lower building masses with human-scaled spaces form a good basis for human-scaled dimensions of the outdoor areas. In addition, the semi-private outdoor spaces form livable first floor design within a housing area thus connecting the built forms with the non-built areas.

Furthermore, qualitative and human-scaled outdoor spaces encourage local food production within a community. They also form a solid basis for maximizing biodiversity of new Chinese housing areas. (Fig. 6.17.)

D1. The concept D1 describes one possibility for creating yard hierarchy to Chinese housing areas. As the main entrance is commonly towards south, a semi-public transition from city space to the neighbourhood is appropriate after the south gate. This larger open space of the neighbourhood can be lined with service or commercial activities on the first floor, where needed.

Hierarchy in the neighbourhoods' open spaces gives a feeling of mastering the space around one's home. Human-scaled courtyards are perceivable by human senses and therefore give a sense of security. It is also easier to get to know neighbours when the community's open spaces are in smaller units and hierarchically clear. Knowing one's neighbours adds up to the sense of security too and strengthens the sense of community.

D2. A lively neighbourhood life calls for soft building edges that reinforce the activity of the neighbourhood. A soft building edge consists, for example, of semi-private outdoor spaces, which invigorate neighbourhood life. Balconies, roof terraces and apartment yards that have a connection to the neighbourhood's outdoor space are all variations of such semi-private spaces.

D. Building Edges and Neighbourhood Gardens

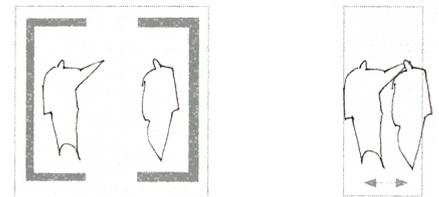


Figure 6.16. Face-to-face orientation and short distances.

Soft building edges and human-scaled dimensions of the neighbourhood's open spaces create livable neighbourhood.



Figure 6.17. Principle #5: maximizing landscapes, gardens and biodiversity, #11: local food.

Livable outdoor spaces of neighbourhoods form a good basis for cherishing biodiversity and for local food production.

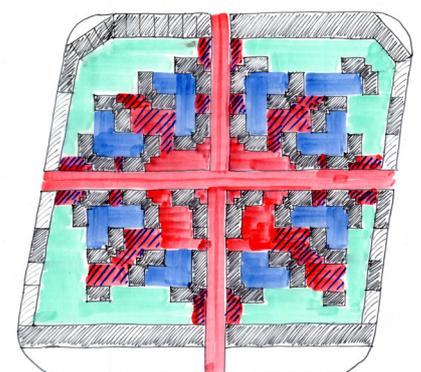
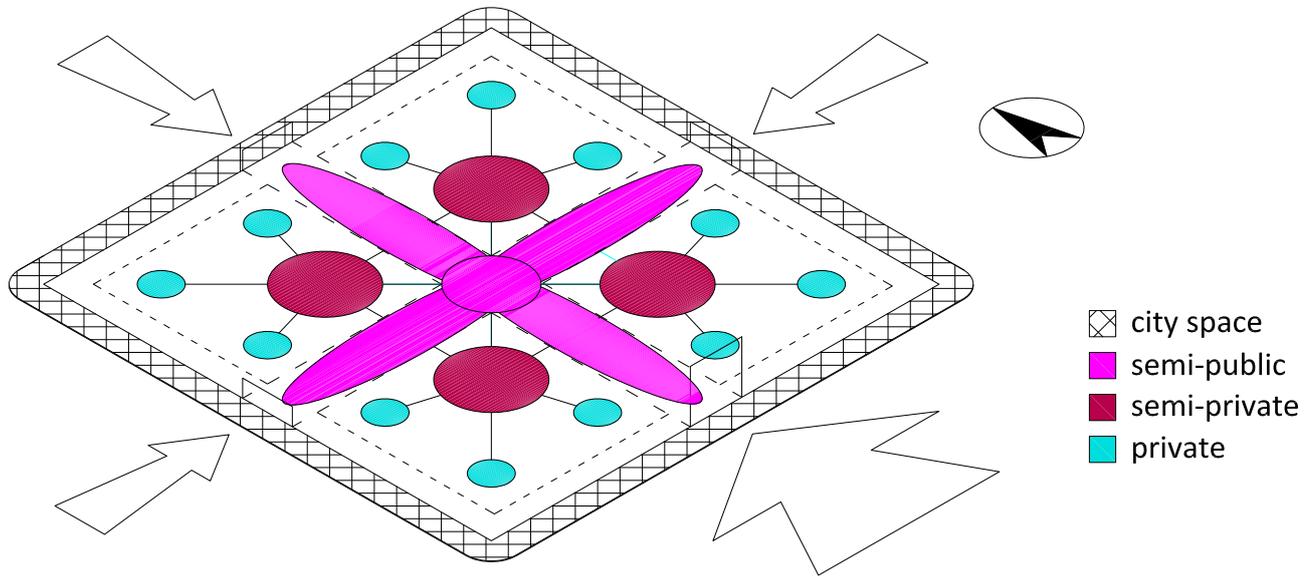


Figure 6.18. Sketch of a neighbourhood with outdoor spaces of different nature in between the black building masses.

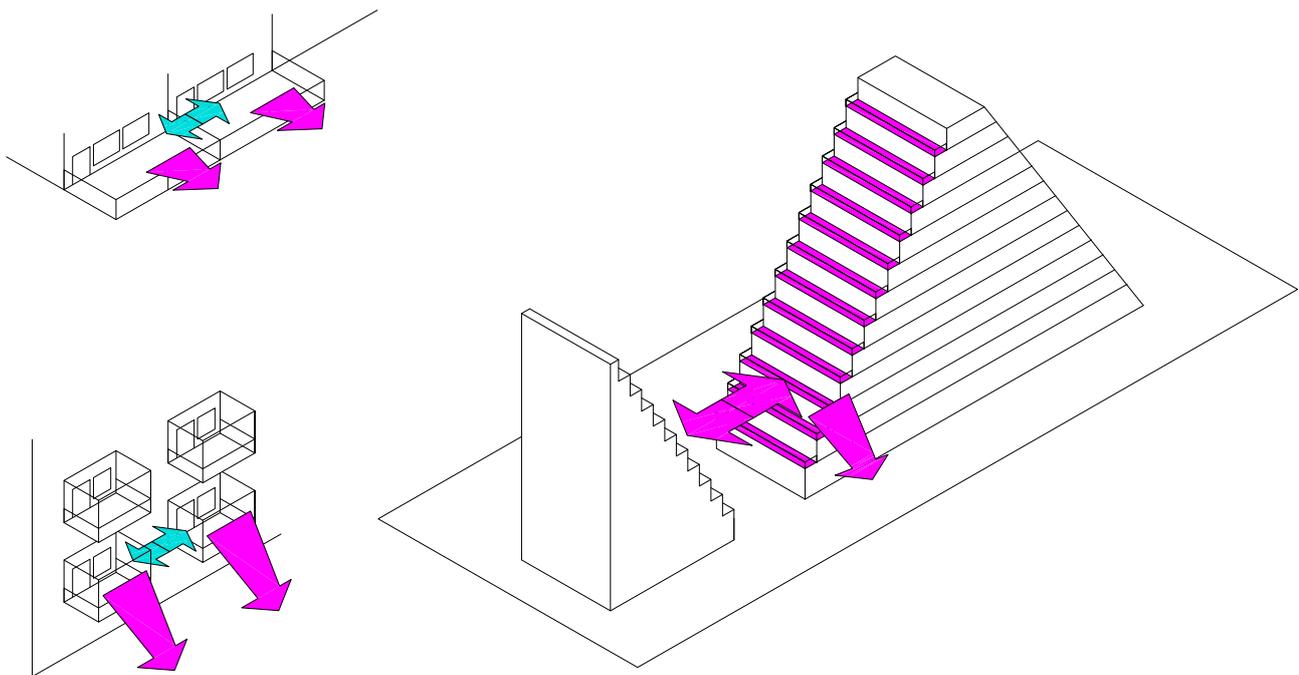
D1. Hierarchy of Outdoor Spaces.

Clear sequences of different kinds of neighbourhood yards and gardens are a solid basis for an active community.



D2. Semi-private Building Edges.

Soft building edges invigorate neighbourhood life.



Diversity in the built form of contemporary Chinese housing areas can be achieved by avoiding interchangeable design. Possible solutions for this is the variation of the south-facing building masses, utilizing traditional Chinese influences on building design, and diversifying building types with modular systems.

E1. The first and clearest challenge is to avoid the usual row layout of south-facing residential buildings. Because the demand for south-facing buildings and apartments is so culturally ingrained, it is advisable to pay special attention to it when planning. On the other hand, buildings facing south create optimal possibilities for taking advantage of passive solar energy in China (Fig. 6.19), so all in all it is beneficial to search for creative forms for creating south-facing buildings when planning for housing in China. The emphasis should be on creating better space in between buildings. Due to the previously suggested average height of 5-storey buildings, this matter becomes fairly easier because a human-scaled environment is guaranteed. Solutions to the building rows that form a clearer hierarchy of non-built spaces and different types of outdoor neighbourhood spaces are suggested in the concept E1 to inspire.

E2. Due to the diminishing cultural heritage of architecture, also Western professionals are well advised to appreciate traditional and local features when designing. Lehmann's twelfth principle states the importance of enhancing the essence of place through consideration to local characteristics (Fig. 6.20). Traditional features help to overcome the monotony of architectural design. As for Chinese architecture, consideration to roof architecture and to designing entrances or gates, as well as to utilizing motives from the culture in general are possible starting points. Naturally, the traditional elements have to meet the needs of contemporary Chinese urban life, planning and construction in order to work in a natural way as a part of a design.

E3. As Lehmann states in the fifteenth principle, mass housing solutions need to be developed in developing countries so that sustainability can be reached whilst ensuring a higher quality of life. One means for mass housing is applying modular building systems. (Fig. 6.21.) Due to the speed of Chinese housing construction, for example simple and multipliable design solutions are recommendable. One example is to utilize a selection of simple apartment types for creating several different building types. As stated, varying building types have an invigorating effect on the neighbourhood's outdoor spaces. With such simple design methods lively neighbourhoods can still be created.

E. Diversity of Built Forms

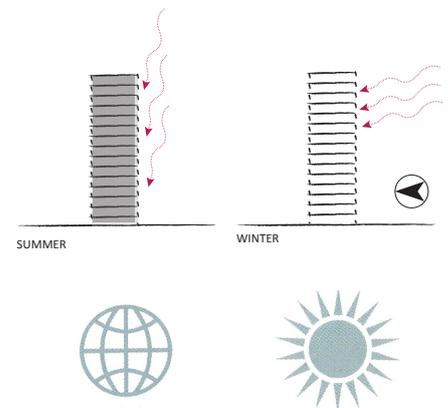


Figure 6.19. Principle #1: climatic conditions and site context, #9: deep green building and solar access.

South-facing building masses are both an important cultural aspect as well as a good basis for energy-efficient design.



Figure 6.20. Principle #12: cultural identity.
Traditional elements strengthen the essence of place and contribute to diversity of built environments.



Figure 6.21. Principle #7: prefabricated systems, #15: sustainability strategies for developing countries.

Modular systems are a simple design method for creating simultaneously mass housing as well as diverse environments.

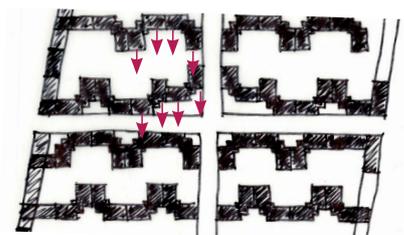
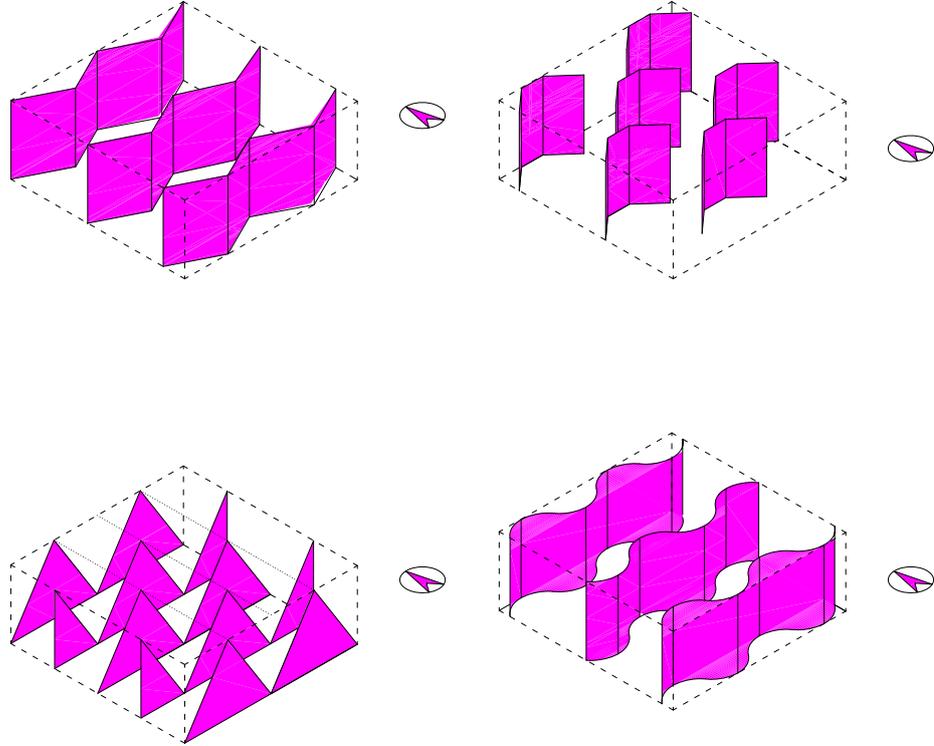


Figure 6.22. Sketch of south-facing buildings with variation of the built form.

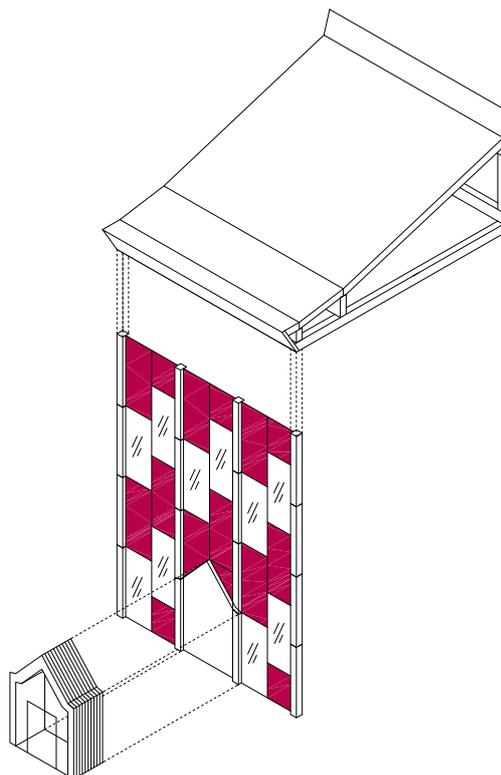
E1. Variation of South-facing Building Masses

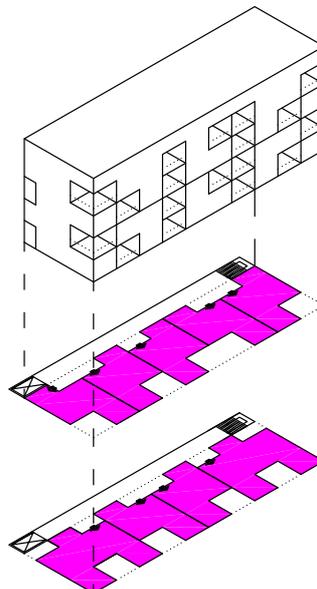
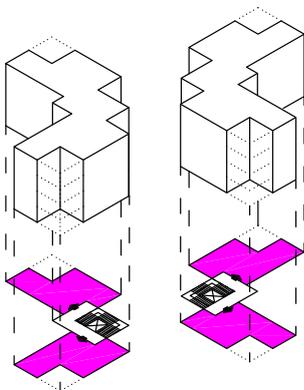
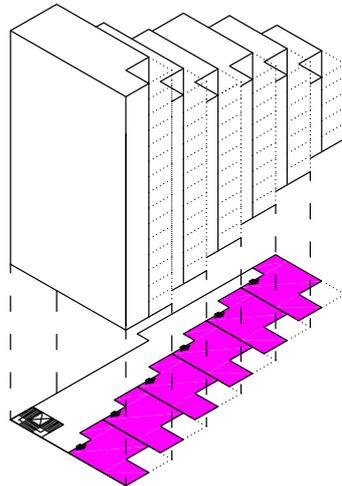
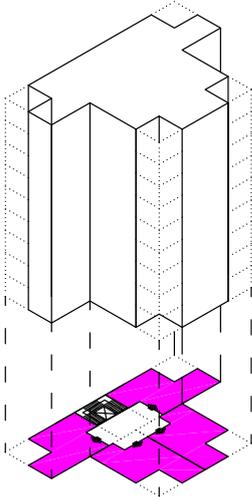
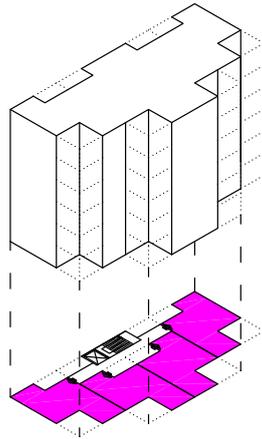
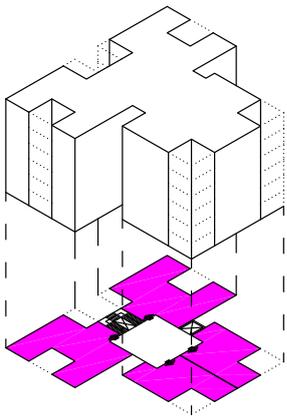
Creative variations of south-facing buildings form lively space in between buildings.



E2. Traditional Influences on Building Design

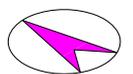
Inspiration from Chinese culture and consideration to traditional elements, such as roof architecture and entrances, contribute to a diverse environment.





E3. Diversity of Building Types with Modular Systems

Lively environments can be created with simple design methods such as by creating several different building types with the same apartment types.



F. Outdoor Connection of Apartments



Figure 6.23. Principle #5: biodiversity, #9: solar access, #11: local food

Private outdoor spaces such as balconies, apartment yards or roof terraces can increase passive solar energy gains and biodiversity.

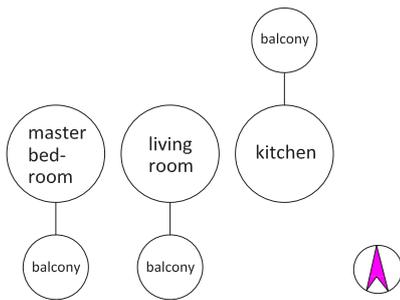


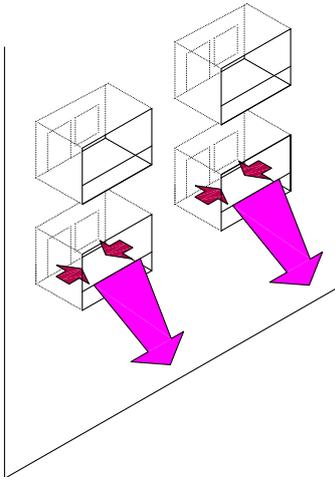
Figure 6.23. Typology of Chinese balconies.

A connection to outdoor spaces should be from the master bedroom and the living room towards south and from the kitchen towards north.

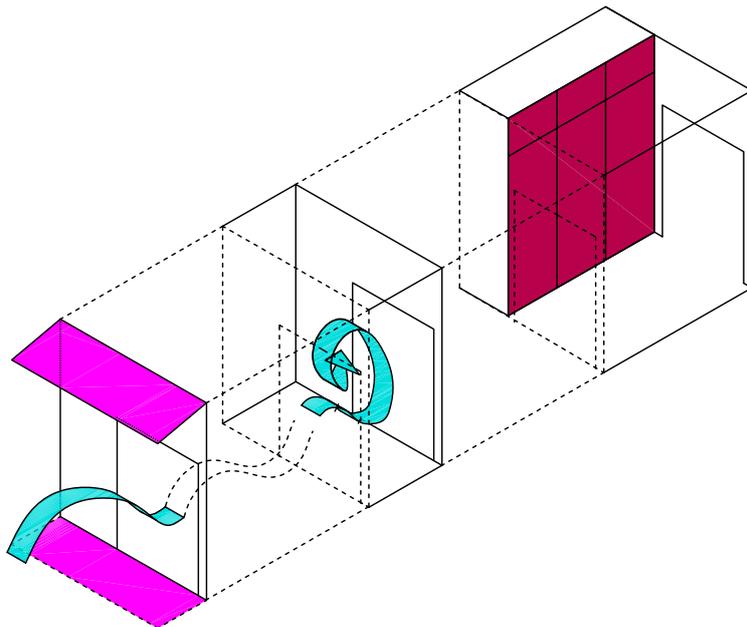
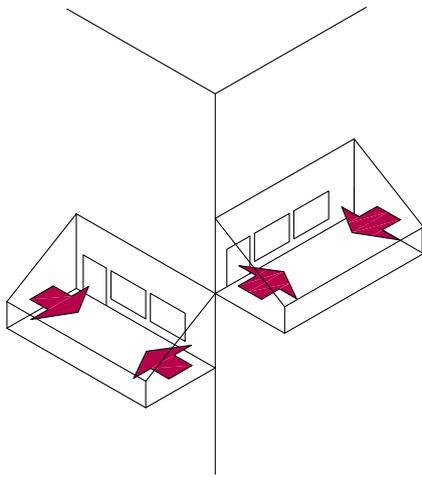
F1. The edges of the apartments play an important role in the quality of a home. A connection to outdoor space is important for human beings, and in dense urban areas it is important to create private outdoor connections alongside semi-private ones. To guarantee the liveliness of a neighborhood and the sense of community, privacy needs to be secured, so that interaction with the neighborhood around would not feel forced upon a person. A private outdoor connection can be created with balconies, roof terraces and apartment yards, where the visual connection from other apartments or the neighborhood's outdoor areas is limited. In addition, entrance to the apartment should take place gradually. This ensures a gradual transition from the neighborhood's outdoor space or the staircase to the privacy of one's own home. The gradual transition can be formed by planning entrance spaces, porches or wind boxes. The entrance spaces should also have storage spaces near apartment entrances.

F2. Sustainability can be further strengthened with apartments outdoor spaces by utilizing them for maximization of passive solar gain and for green building. For example, a sun room, a semi-warm transparent outdoor space as a continuance of the apartment, has the advantage that it can increase the time that warmth of the sun is stored within an apartment. When the sun warms up the apartment and its sun room during the day, the structures store the heat gain, which then spreads from the structures to the space during the night. In China's conditions the sun room needs to be shaded with a roof or other structures above. Otherwise the heat loads become too big during the day in the summer.

Green building has several advantages from local food production to providing oxygen. Plants and other green structures improve the energy-efficiency of an apartment because they provide shade in the summer thus diminishing the need for air conditioning. On the other hand, in the winter the leafless green structures allow maximum daylight. Green building also protects the buildings from climate stress such as rain and are an excellent addition to ensuring privacy of the apartments.



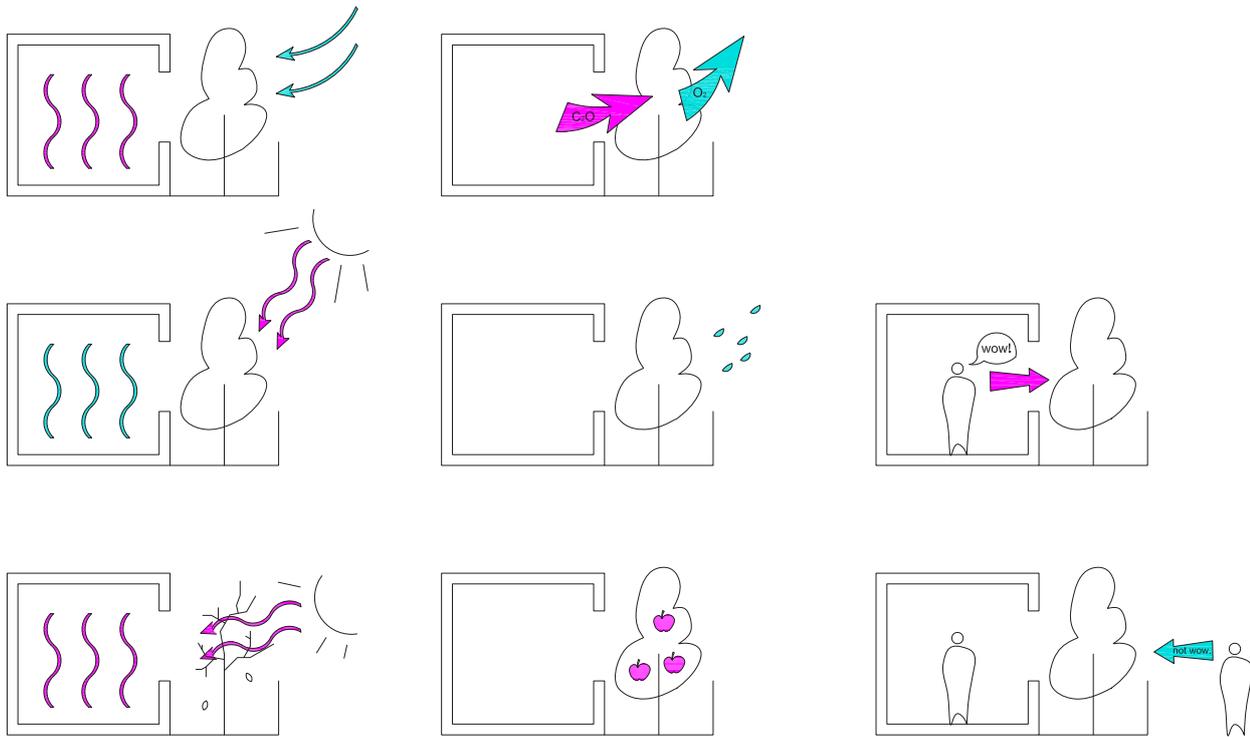
F1. Private Outdoor Connection
In dense housing areas, a private and peaceful outdoor connection increases the feeling of security.



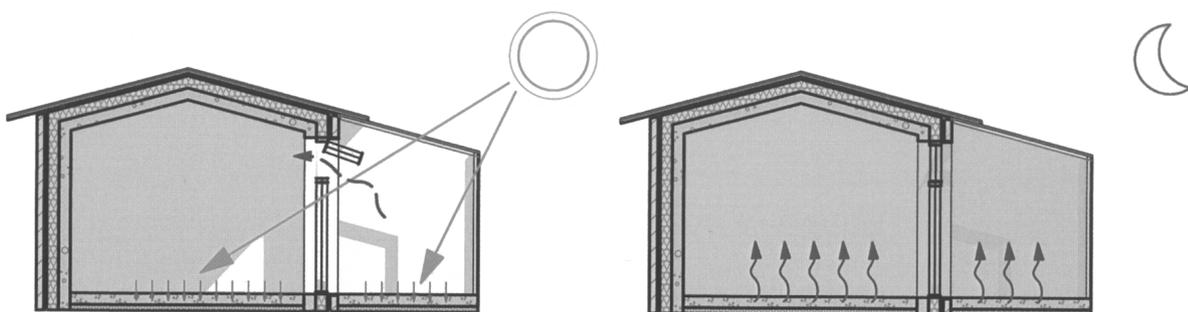
A gradual entrance from under an entrance roof to the energy-saving wind box and further to the entrance hall with storage space.

F2. Energy-efficiency and Green Building

Apartment edges can be utilized for increasing energy-efficiency and biodiversity.



The advantages of plants and trees along the apartment edges.



A sun room increases the energy-efficiency of a building.

[Modified from: Silmaa, 2011]

Housing design should meet the needs of the residents in order to be sustainable. Two approaches to strengthening sustainability of Chinese apartments are presented here. First of all, there is an urgent need for apartments planned for specific needs that stem from the changes in the Chinese society. Secondly, new housing typologies contribute to densification of the urban structures (Fig. 6.25).

In designing apartment solutions in China, some basic starting points should be remembered in order to create housing that suits the Chinese context (Fig 6.26). These main characteristics are dividing the spaces into north-facing and south-facing, designing good outdoor connections. Furthermore, important is to design a master bedroom, a big living room and a separate kitchen.

G1. As mentioned, in the contemporary China's situation there is a need for two-generation apartments and apartments attached to small business spaces. The two-generation apartment enables the grandparents to live near in order to take part in taking care of the grandchildren when their parents are working. This need stems from the need and willingness of both parents to work, of long working days as well as from the shortcomings of the day care systems. The need for small business spaces is also increasing. As this kind of activity is already emerging in street level apartments, it would be logical to create small business spaces attached to apartments on ground level.

Smaller apartments and apartment-level mixed-use solutions are needed for sustainable urban housing development as well. As the analysis showed, smaller apartments are a minority but they are important for sustainability. The amount of square meters per capita should not rise over what is needed for qualitative living because the more square meters, the more construction and spaces to be warmed-up and on the other hand, the less arable land. The sustainability of mixed-use solutions is based on synergy advantages. For example, combining living and working eases the pressure on commuting .

G2. Flexibility of apartment layouts decreases the need to change apartment when needs due to life situations change and gives the possibility for inhabitants to tailor the spaces to suit their needs. There are several possibilities for creating flexible apartments. One possibility is to design a fixed module of spaces, which need vertical consideration. These spaces are commonly the kitchen and bathrooms. The fixed module of the wet spaces can be situated, for example, near the staircase thus leaving the rest of the apartments flexible. Or, they can be situated near the middle of the apartments where it is darkest. A third option in Chinese housing design, is to utilize the two hall space organization system when planning for flexible apartments thus leaving the sides of the apartment flexible.

G. Mixed Usage & Flexibility



Figure 6.25. Principle #8: densification, #10: mixed usage.
Creating new housing typologies, which meet the needs of Chinese dwellers better and mix different uses densify urban areas.

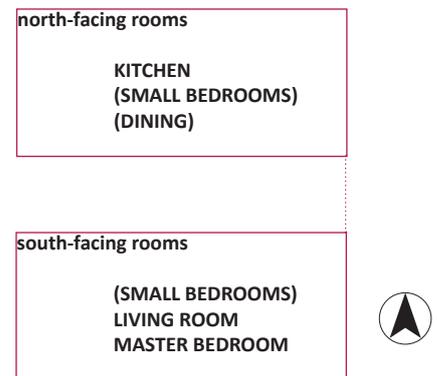
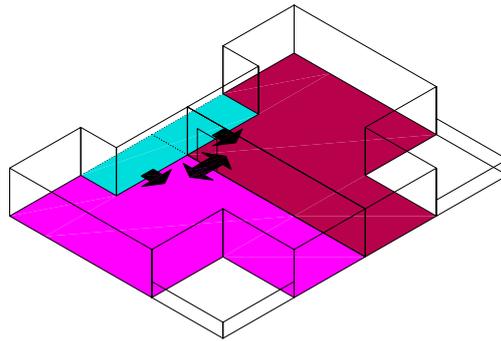


Figure 6.26. Schema of important features about room organization in Chinese apartment layouts.

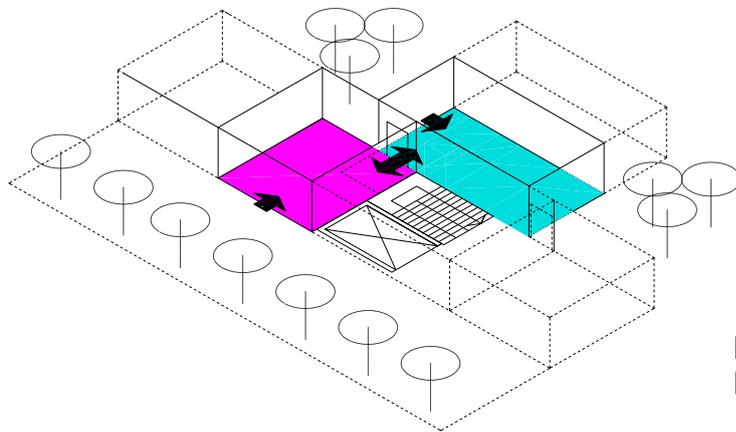
G1. Apartment Types for Differing Needs

In contemporary China, there is a need for two-generation apartments, smaller apartments, apartments attached to small business spaces as well as for other living and working combining typologies.



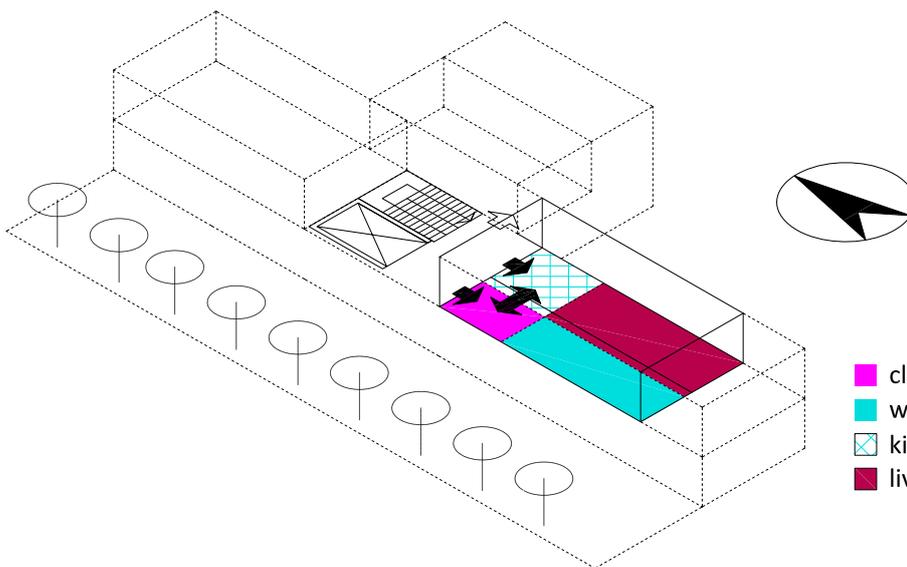
- common entrance
- parents
- grandparents

two-generation apartment



- apartment
- small business space

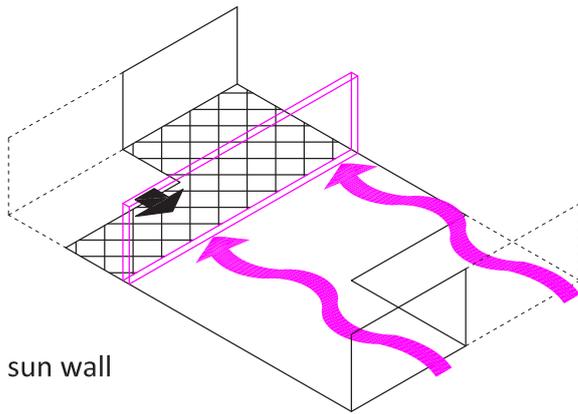
1st floor living+working



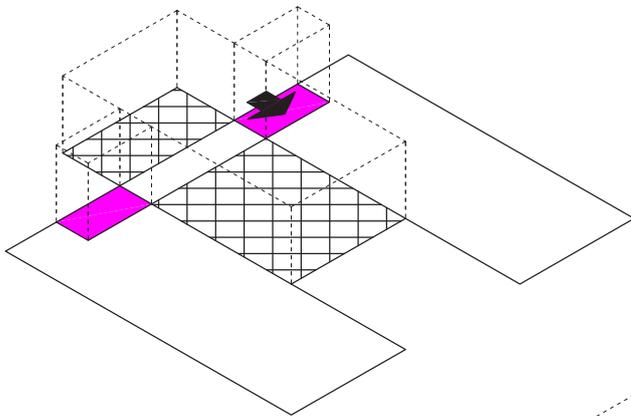
- client space
- working space
- kitchen / bathroom
- living spaces

2nd+ floor living+working

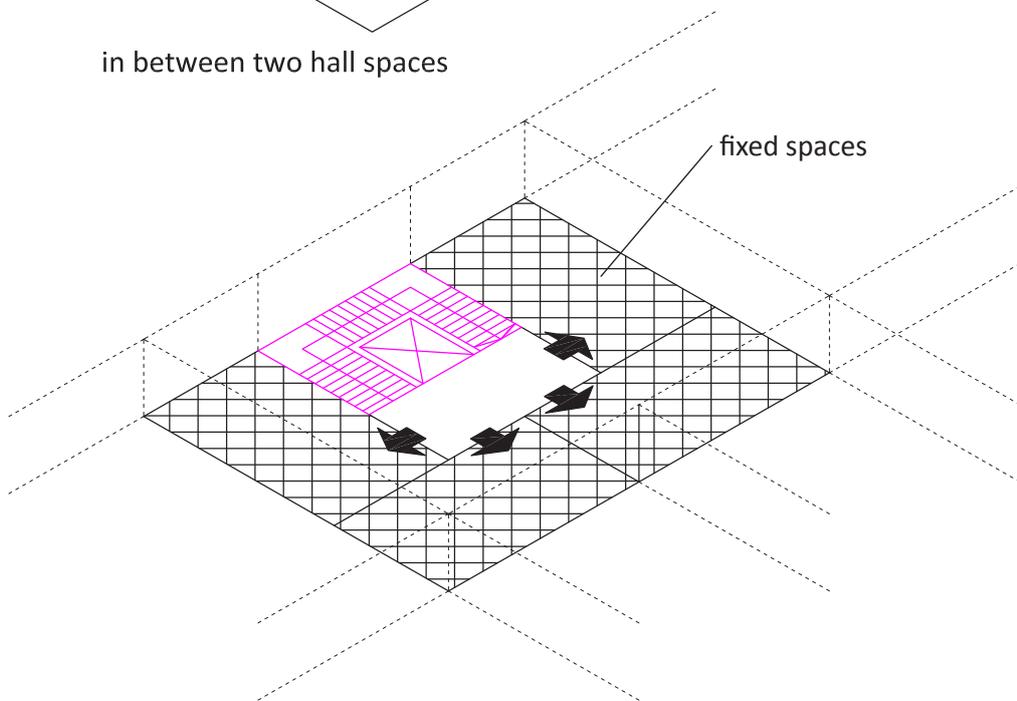
G2. Individuality with Flexibility
Simple measures for creating flexible apartment types improve the life cycle of apartments.



sun wall



in between two hall spaces



fixed spaces



EPILOGUE

With the presented set of design concepts there is hoping that fellow architects and planners find inspiration and a firmer basis to start planning for contemporary Chinese housing areas. Then this thesis will have achieved its goal. It will have contributed, for its fraction of a part, to the enormous work there is to be done on the sustainable development of China.

The wish is one day to see the historically long and rich Chinese cultural tradition to find its glory in a contemporary Chinese form in, naturally, a sustainable manner.

In the end one thing is certain; challenging cross-cultural adventures, whole new exciting worlds and a wider, stronger perspective to planning awaits to be found by all those curious, open-minded and brave enough to welcome it. Hopefully, this thesis can be of guidance on the way to those expeditions.

Thus ends this adventure, which, at the beginning of the most beloved Chinese New Year, the Dragon's Year, is hopefully just the start of very many new ones.

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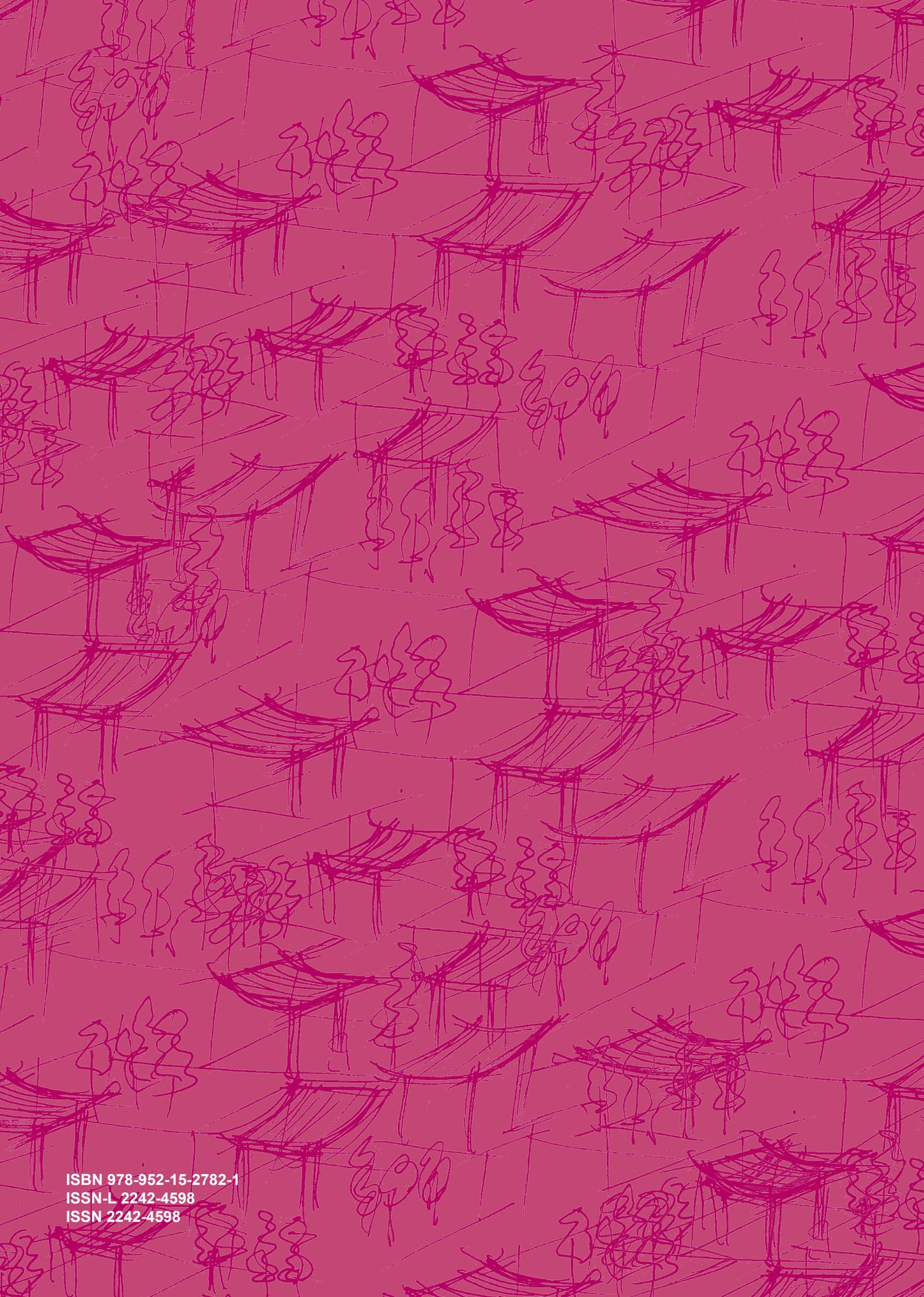
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