DECONSTRUCTING THE SUPERBLOCK

Urban transformation of the Superblock in Shenzhen city to shape more liveable communities

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COLOPHON

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ABSTRACT

This project addresses the many inhuman-scale superblocks that have resulted from the rapid urbanization of China over the past decades. These superblocks suffer from problems such as poor accessibility and monotonous urban landscape. This project begins with a review of the development of superblocks in the West and in China, where superblocks have inherited the ancient Chinese urban paradigm while also being influenced by modernist urban planning. At the same time, China's land finance policy has created a reliance on superblocks as an urban development model for both government and developers. The need for urban regeneration and urban densification is both a challenge and an opportunity for the transformation of superblocks. Using Shenzhen as an example, two superblocks are selected for analysis and design based on the extent of the need for urban regeneration. By analyzing the network and functional distribution of these two superblocks, the problems of superblocks can be attributed to the abuse of closed neighborhoods and the mismatch between network and activities. In addition, the current urban regeneration model in Shenzhen does not effectively improve the problems of superblocks. Thus, the project proposes that the regeneration units of superblocks should be integrated at the district scale and the degree of integration of the superblock network should be improved. At the same time, existing closed settlements should be replaced by more open block types to produce smaller blocks and more frequent streets, and to match the functions corresponding to the road hierarchy. In addition, supporting block management policies need to be developed. Ultimately these strategies will be shown as urban design scheme that will enable the transformation of superblocks to more livable blocks.

CONTENT

01 CONTEXT

This chapter introduces the personal motivation of this thesis and clarifies the key definitions and relevant Chinese background.

figure 1.1.1 Streetview of a gated residential area

figure 1.1.2 Streetview of an urban village

1.1 Motivation

I had two brief experiences living in Shenzhen. One was in a gated modern residential area (figure 1.1.1) and the other was next to an urban village (figure 1.1.2). These two living experiences are in dramatic contrast. The housing quality in urban village was less desirable, but had what I consider to be the best type of neighborhood I learned in my studies: small, walkable and bikable, and full of different shops. In modern residential areas, although there are gardens downstairs and adequate ventilation and sunlight, outside the community there are only wide roads, repetitive towers, and monotonous walls and hedgerow. Such enclosed super blocks are very common and even predominant in many cities all over China.

During my time living and studying in Europe, I've grown more and more attracted to the comfortable street life that you can easily access to markets, shops, restaurants, parks within a 15-minute slow walk. However, In China's big cities, especially in new districts, there are very few such comfortable walking circles. People often take the subway from one huge residential block to another huge commercial block to spend their leisure time. In the stereotypical shopping malls, no matter how luxuriously decorated, there is always a lack of the surprise and comfort of mind that comes from walking through the streets and experiencing the change between indoors and out.

In 2016, the State Council called for the implementation of "narrow road, dense road networks" in an attempt to reduce the size of blocks and promote the opening of enclosed residential compounds. This has been successfully practiced in some emerging commercial areas and has become one of the most popular places in the city. But many existing superblocks especially residential blocks in the city have still remained unimproved for various reasons. Therefore, this study aims to explore a transformative approach to superblocks in the urban regeneration process, to improve the walkability and diversity of these areas, and to create livable and vibrant environments for people to live in.

1.2 'Block' and 'Superblock'

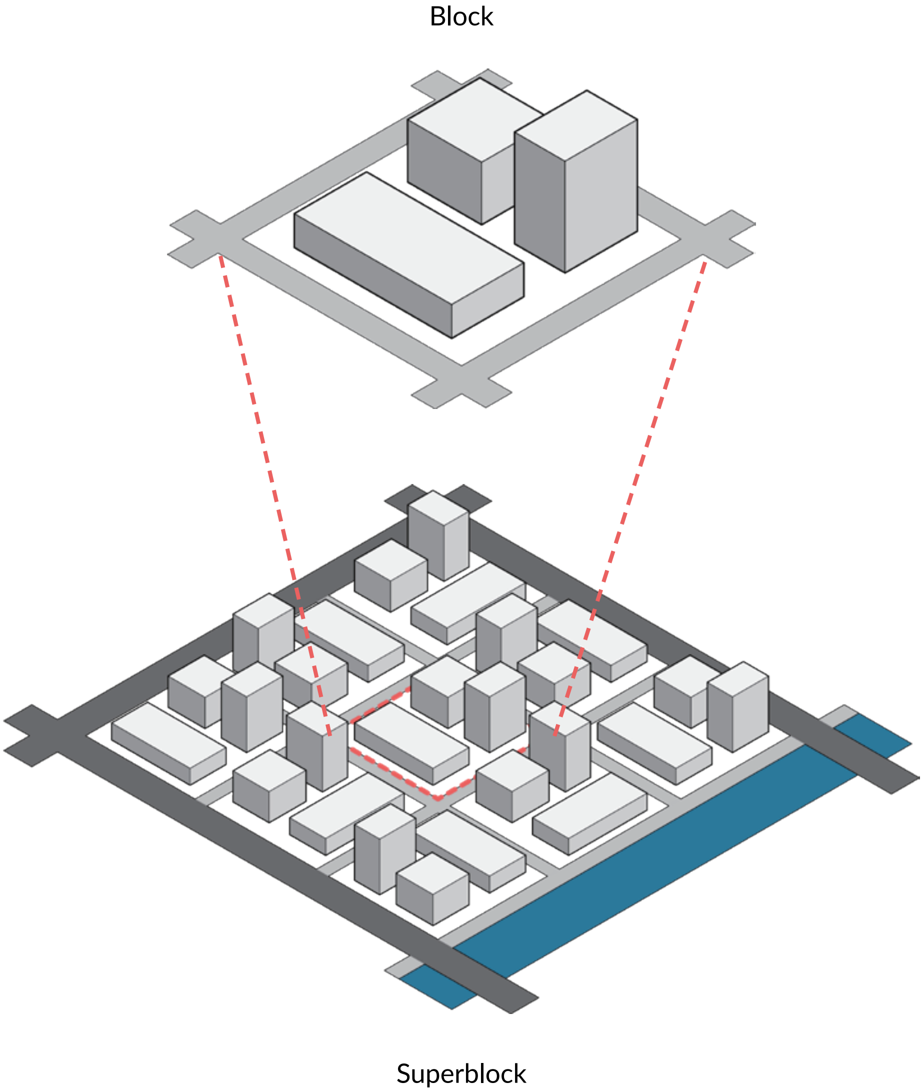


figure 1.2.1 relation between superblock and block

Definition of block and superblock

Block:
A block is a central element of urban planning and urban design. It is generally defined as an island surrounded by streets and capable of accommodating a certain number of buildings and urban functions (figure 1.2.1). The block is the basic unit that makes up the urban fabric. Blocks vary from city to city and region to region but in many cities that were planned, streets and roads are often in a grid pattern (figure 1.2.2).

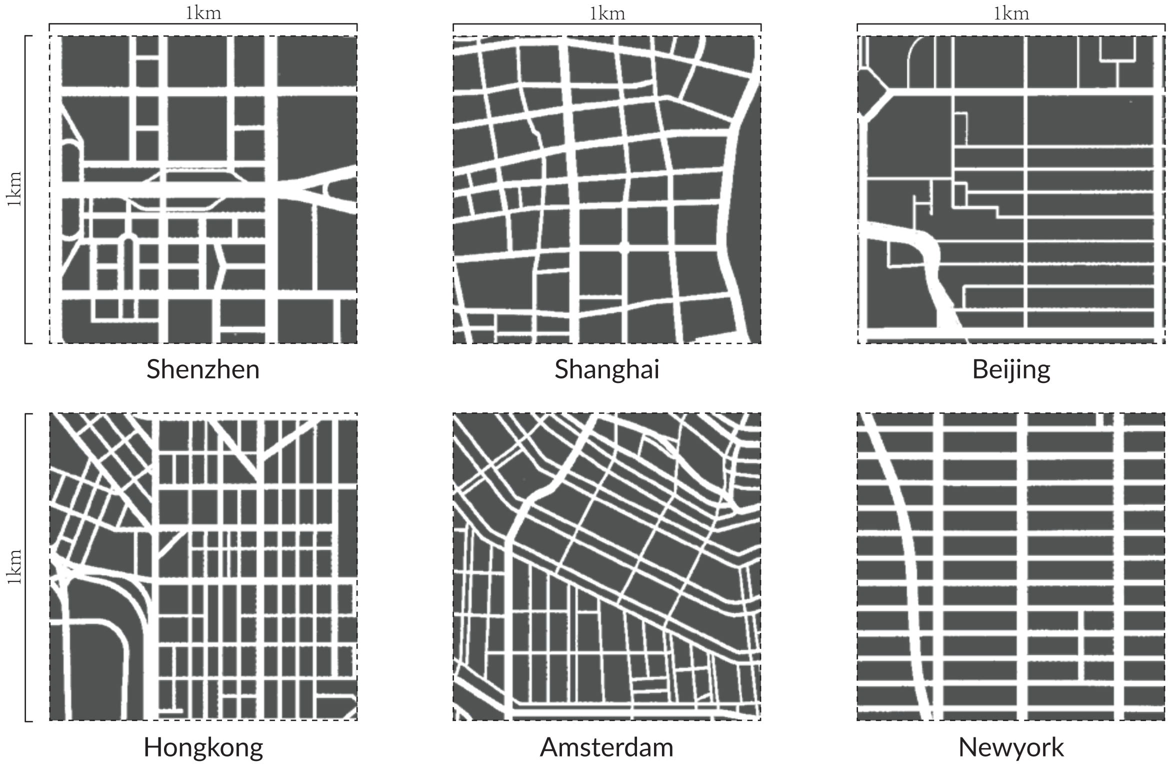
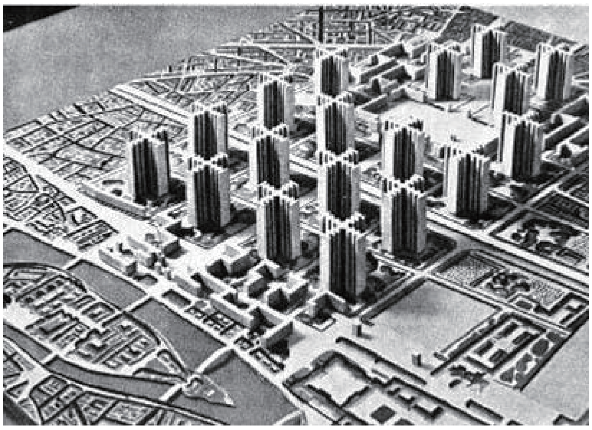


figure 1.2.2 blocks in different cities

Superblock:
A superblock is usually defined as an area bounded by arterial roads (or the distinct physical boundary such as a water body, railway, etc.) and containing multiple sub-blocks further divided by secondary roads. The arterial roads usually consist of multiple lanes with a width of 20-50 meters, thus creating clear boundaries and strong separation between superblocks.

The use of the superblock in the west is closely allied with the history of Modernism. One of the reasons for the emergence of the superblock as an urban form was to respond to the overcrowded old cities of 19th century Europe and to provide a new paradigm for new suburban development. Various planners were trying to release more open space to get more air and sunlight in response to the poor urban living conditions. One of the famous schemes was the "Ville Contemporaine" proposed by Le Corbusier (figure 1.2.3). In this proposal for a city for 3 million inhabitants, a strict zoning divides the city into segregated commercial, business, entertainment and residential areas. tower residential buildings are rationally organized and surrounded by open, park-like spaces, to balance the density and quality.

On the other hand, the hierarchy of roads caused by the heavy use of automobiles is a direct reason of the widespread use of superblocks as an urban form. When the main mode of transportation in cities is mainly walking and horse-drawn carriages, urban streets are spaces with both transportation and activity functions, so there is no significant difference in width and speed of movement. At the end of



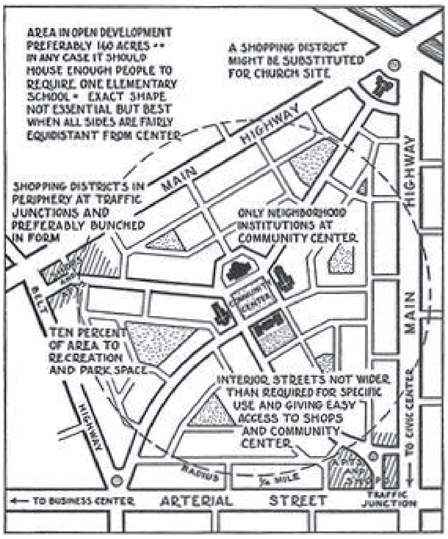


figure 1.2.3 (above) Ville Contemporaine
figure 1.2.4 (right) Neighborhood Units

the 19th century, in order to meet the needs of motor vehicles moving at high speeds, more and more urban arteries were built that were different from the previous streets. These major arteries within or across the city form a 'super-grid' completely different from the fine texture of the old city, thus creating a number of superblock cells between the grids. At the same time, many planners were exploring ways to organize the spaces within superblocks to reduce the disruption of community life by automobile traffic. Clarence Perry proposed the superblock model of ‘Neighborhood Units’ in 1929, which became one of the paradigms of modernist planning theory (figure 1.2.4). In a neighborhood unit, the internal road network maintains limited connections to the super grid to reduce traffic flow to ensure internal neighborhood safety; public spaces, schools, churches, and other community’s facilities are located at the center of the unit, while functions like shopping area are arranged close to the boundaries to excluding nonlocal traffic.

Based on the concept of the ‘Neighborhood Unit’, more superblock design schemes and practice cases have emerged one after another. These superblocks all exhibit introverted characteristics. Their internal roads maintain a limited connection to the super-grid. After the 1960s, in order to avoid theft and street violence, even some gated superblocks with closed management appeared, such as Stuyvesant Town in New York (figure 1.2.5). At the same time, the Soviet Union was practicing a similar model of superblock planning to that of the United States. In the context of the socialist system, factories, party and government agencies formed units that managed and distributed facilities within the enclosed superblocks (figure 1.2.6). The development of Chinese superblocks has been heavily influenced by these planning paradigms.

The overly closed superblock model has been criticized by the New Urbanism movement. They argue that this superblock planning model focuses too much on car travel at the expense of the human scale, leading to the loss of street life, and is not conducive to the stimulation of urban vitality and sustainable development. (Jacobs, 1961)

figure 1.2.5 Stuyvesant Town in New York

figure 1.2.6 3rd microdistrict "Kurkino" on the outskirts of Moscow

1.3 Chinese Superblock

Superblocks are not unique to China, but they are widely considered to be very common and even dominant in most cities in China. It has even almost become the basic unit of urban development in China (figure 1.3.1 & 1.3.2). Each superblock often contains several, and sometimes just one residential cluster. These communities typically consist of mid- to high-rise slabs and towers in a landscaped setting, supported by small-scale retail services and community facilities. Public access is limited by a mixture of walls, fences gates and guardhouses. This combination of enclosed community and coarse-grained street network is the main characteristic of Chinese superblock. It has become a important component of China's urban planning since 1949, especially after the economic reforms of 1978. As Monson (2008) argues, Superblock development as a meta-typology has been a vehicle for China s urbanization.

Over the past few decades, China has experienced such rapid spatial development that it has not had time to consider the quality of space at the human scale. China aims to reach an urbanization rate of 70% by 2050. In 2019, the figure exceeded 60 percent, according to the National Bureau of Statistics (2019). This means that China's urban development needs to shift from the original speed-first to a more people-centered spatial quality. One of the major challenges will be how to transform China's superblocks to more livable urban spaces after they have met the task of rapid urban expansion.

In this section, I will intorduce the reasons for the widespread use of Chinese superblocks from a historical-cultural and political-economic perspective. This is also one of my research sub-questions.

figure 1.3.1 Housing Cluster in Shanghai, China

Superblock in Beijing

Superblock in Shanghai

Superblock in Wuhan

figure 1.3.2 Similar superblocks in different Chinese cities

Historical Origins

Much of the research on Chinese superblocks inevitably reviews the paradigm of ancient China's cities. The urban structure of super-grid and superblock has long existed in the urban history of China. It can be traced back to thousands of years ago, a book called 'Kao Gong Ji (Artificers' Record)' proposed an ideal city model. In this book, the city is divided by the main road into several square blocks surrounded by walls. Each of the blocks corresponds to a different social class and urban function. This kind of urban block is called Li Fang and reached its peak in practice in the Tang Dynasty (618-907) in Chang 'an which is now Xi 'an (figure 1.3.3). It was used as a tool for spatial planning and social control that ties a land subdivision system with a social hierarchical classification and manages and controls social security and movement (Chen, 2017).

It was not until the Song Dynasty (960-1279) that the development of the commodity economy and the declining control of imperial power led to the gradual replacement of superblock walls with more liberal street plans, even though the courtyards of cities and private homes were still surrounded by walls. The use of streets as public space at that time can be observed in the famous painting Qing Ming Shang He Tu (Riverside Scene at Qingming Festival) (figure 1.3.4). The Ming Dynasty (1368-1644) and the Qing Dynasty (1636-1912) were both periods of high centralization of imperial power in China. Although superblocks were freed from the constraints of wall structures, localized enclosed areas were once again increased to delineate the boundaries of property or people.

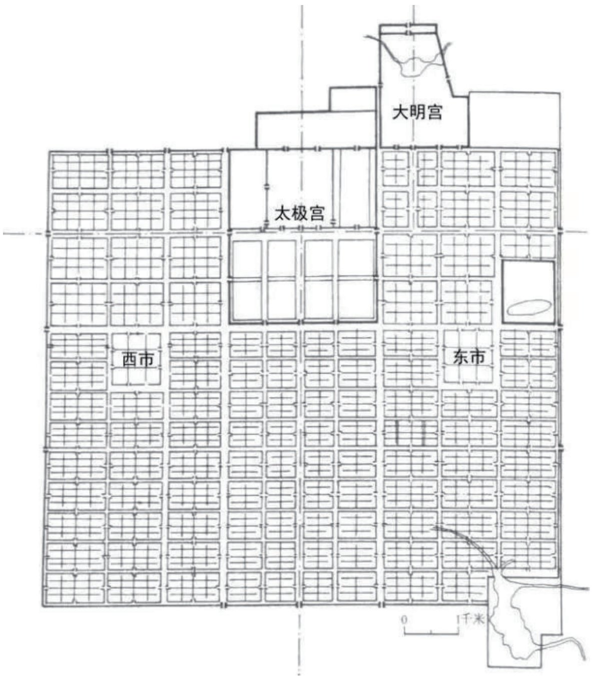


figure 1.3.3 Plan of 'Li Fang'

figure 1.3.4 Qing Ming Shang He TU

After 1949, private land within urban areas was gradually nationalized and private ownership was replaced by state-controlled welfare. State-owned enterprises then became the main provider of all urban work and social services. At the same time, industrialization became the focus of national development. Influenced by Soviet urban planning, residential communities were built around production-oriented sectors such as state-owned enterprises in a walled area, with mid- to high-rise strip buildings as the main residential building type. These settlements are called Danwei, which literally means "work units" (figure 1.3.5). Danwei is both a spatial unit and a social structure, becoming an independent component of superblock.

Although the social organization of the Danwei has existed for only a few decades, the influence of its spatial form on urban planning has continued to this day. The land scale of the Danwei, the standardized building form, and the closed management mode are still inherited by most of the present residential areas (Xiaoqu/Micro District) (figure 1.3.6).

Overall, the urban structure of the superblock and supergrid has long existed in most Chinese cities as a means of dividing space and managing citizens by the urban authorities. The degree of openness of the superblock is closely related to the control of daily commercial life by the authority. Meanwhile Chen (2017) emphasizes that the use of wall structures has never completely ended in China and remains prevalent and deeply rooted in the Chinese way of thinking. Probably, it is unrealistic to completely overturn the superblock and walled residential area in the design. The structure of the superblock should be maintained while the interior should be more carefully divided. In addition, the scope of application of the wall also needs to be re-examined to achieve a balance between the residents' need for closed private space and more open urban public space.

figure 1.3.5 Baiwan Zhuang, a Danwei in Beijing

figure 1.3.6 A Xiaoqu in Beijing

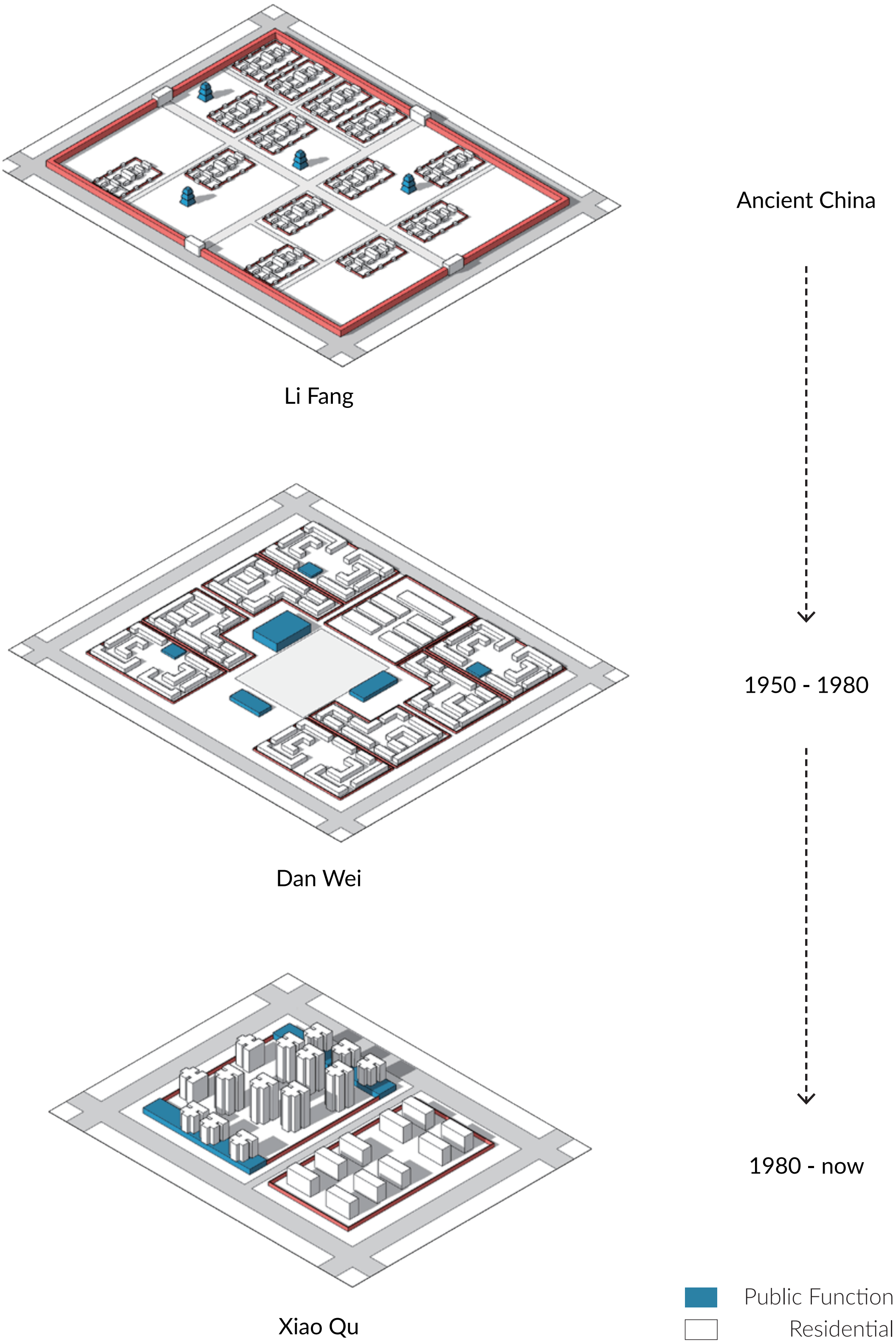


figure 1.3.7 Historical change of Chinese superblock

Political and economic impact
The historical paradigm of the city and the long-standing tradition of control over collective life have led to a certain preference for supergrids and closed superblocks in Chinese urban planning. However, the economic reform of land finance after 1980 accelerated the massive use of this urban form in various cities throughout the country.

Before 1980, the Danwei provided most of the housing for urban residents as part of the social welfare. And urban land was owned by the state and could not be illegally transferred by any individual or organization by selling, buying, or renting. However, The Communist Party wanted to maintain the land policy on the one hand, and to exchange land for money for urban development on the other. Thus, reformers tried to separate land use and ownership in coastal special economic zones such as Shenzhen, thereby establishing a real estate market and developing private housing. In 1987, for the first time in Shenzhen, a plot of land measuring more than 5,300 square meters was agreed to be sold to the China Aviation Technology Import and Export Corporation for 1.06 million RMB, starting China's land leasing system (Shenzhen Economic Daily, 2010) (figure 1.3.9). Therefore, Shenzhen is the key research city for this project.

The land leasing system has brought many benefits to local governments, but at the same time the central government has given local governments more responsibility for local development, which has resulted in local governments' dependence on land revenue (figure 1.3.8). Land has become a very important source of revenue for local governments and has influenced the morphological structure of cities. Municipalities are both planners of urban land and beneficiaries of land leases. superblock can be very easily offered to developers for unified development, which maximizes the return on investment and reduces additional infrastructure expenditures. Thus, the top-down approach of dividing cities into superblocks using a supergrid serves the needs of local governments to grant land and develop their cities well.

Sevtsuk (2017) believed, one cannot propose a new superblock without rethinking the land-ownership, housing, and fiscal policies of Chinese cities. There is no way to make China's superblocks better if only a specific spatial design is provided. Therefore, it is very important to establish rules and guideline for both government and developers to balance urban quality and practical interests

figure 1.3.8 The first state-owned land auction was held in Shenzhen in 1987

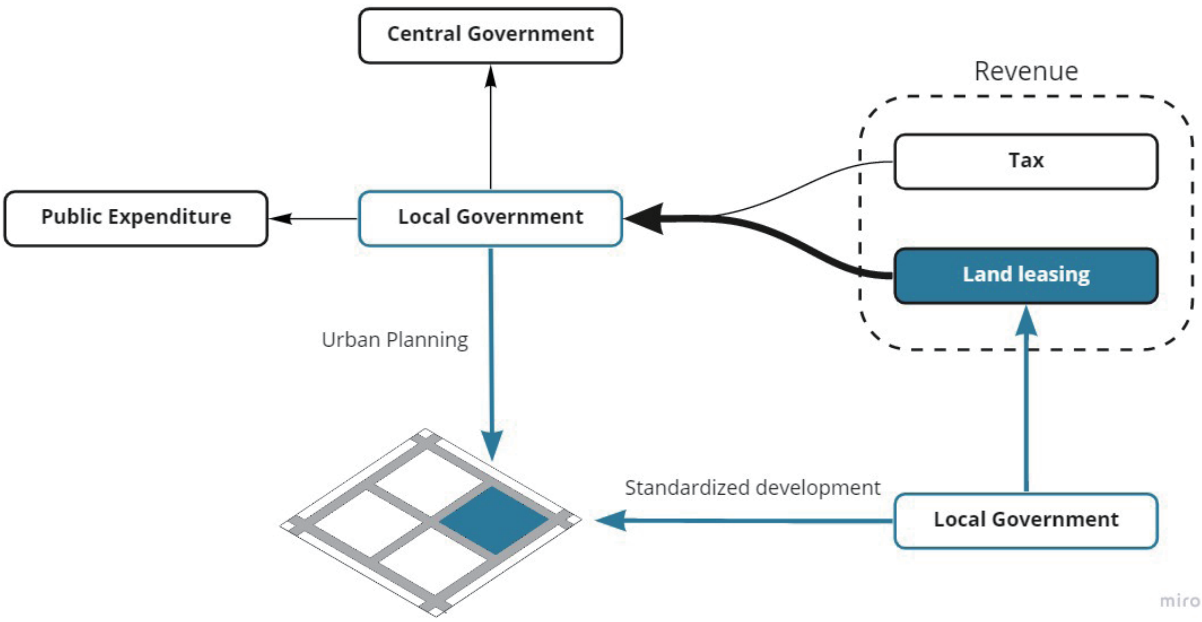


figure 1.3.9 Superblocks satisfy the local government's dependence on land finance

1.4 Context of Shenzhen

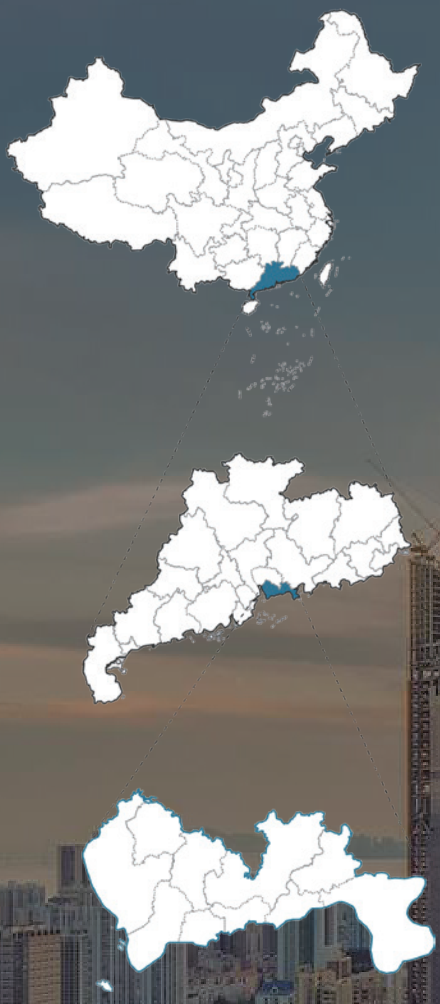


figure 1.3.10 Location of Shenzhen

Shenzhen is located in southern China, bordered by the Pearl River and Lingdingyang to the west and connected to Hong Kong across the Shenzhen River to the south (figure1.3.10). It is one of the four central cities in the Guangdong-Hong Kong-Macau Greater Bay Area. Unlike cities that grew out of ancient towns, such as Beijing and Shanghai, the area where Shenzhen is located was only villages and farmland until 1980s. Shenzhen's urban form owes a lot to its rapid modern urbanization. Today, Shenzhen covers an area of 115.07 square kilometers, with a population of about 13,4 million (Shenzhen Statistical Yearbook, 2020)

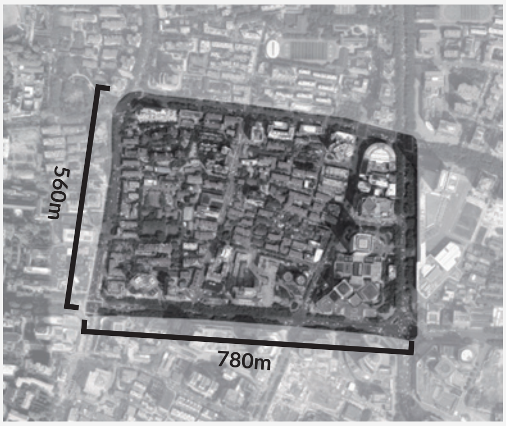
After the Third Plenary Session of the 11th Central Committee in 1978, then Chinese leader Deng Xiaoping proposed a policy of reform and opening up, gradually opening China's markets and attracting investment. Shenzhen, as the first special economic zone, became the testing ground for many of China's new policies, including the opening of the private real estate market and the land leasing system. This system has had a profound impact on the widespread use of superblocks in China. Therefore, I believe that Shenzhen will provide a rich research sample for this project and will also be the site for subsequent design trials.

02 PROBLEM FIELDS

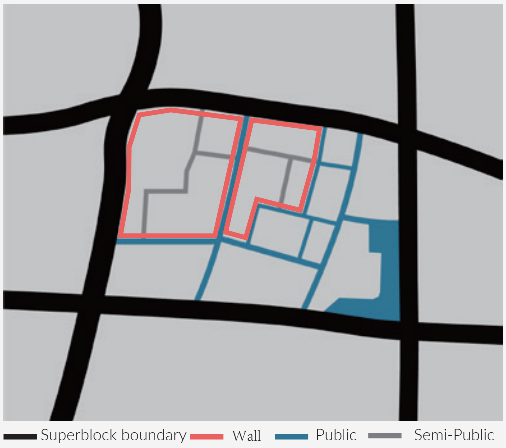
This chapter will use a empirical and theoretical methods to state the problem fields to be adressed by the research.

2.1 Coarse-grained Subblock, Walled Enclaves and Poor Accessibility

Two distinctive features of Chinese blocks are the coarse-grained sub-block division and a large number of walled enclaves, which results in extremely low density of public roads within the super block. A study of Nanjing's superblocks (Ge, Hausleitner, 2017) founds that Traditional superblocks have smaller plot sizes, are morphologically diverse and have remarkable differences between edge and interior in comparison with superblocks in the new district. The newly built superblock has less sub-block and lower public street density (figure 2.1.1). This difference is even more striking when compared with other countries. Comparing the superblocks with similar locations and sizes in China

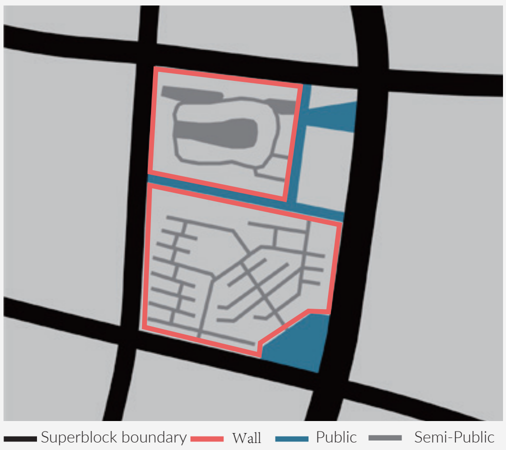


Traditional superblock in Nanjing, China



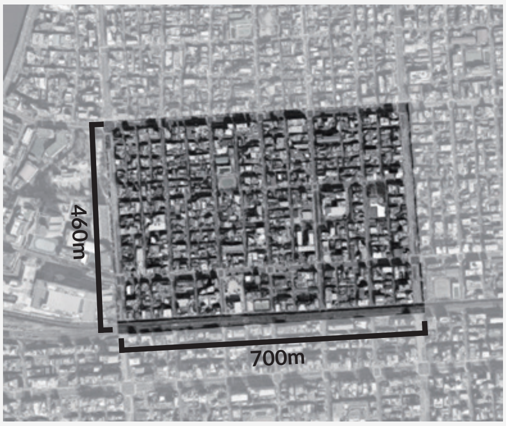
public space and block division

new-built superblock in Nanjing, China



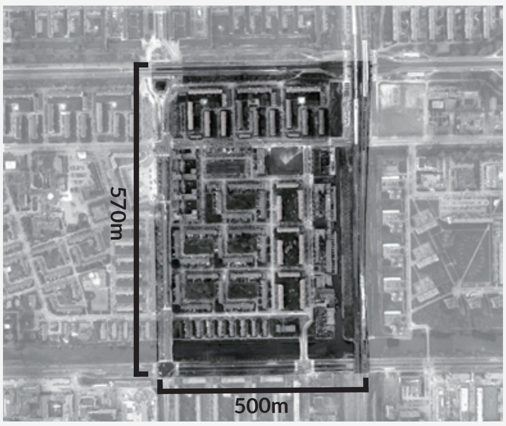
public space and block division

figure 2.1.1 Comparison of old and new superblocks in Nanjing and abroad, we can find that the road density of the Dutch superblock is 6 times that of China, while that of Japan is nearly 10 times (figure 2.1.2).

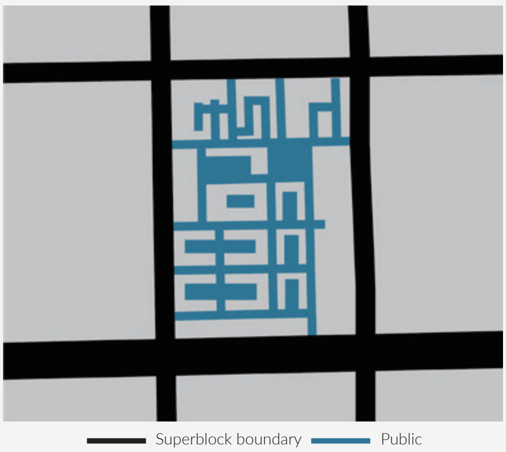


Superblock in Tokyo, Japan

public space and block division



Superblock in Amsterdam, Netherlands



public space and block division

figure 2.1.2 Comparison of superblocks in China, Japan and Netherlands

The huge size of China's superblocks is a hindrance to both pedestrian and vehicular accessibility. This enormous scale is due in large part to the fact that the enclosed residential area does not open its internal streets to the urban public and leaves motor vehicles and pedestrians to move only along its monotonous boundaries (Figure 2.1.3). Therefore, low intersection density can only give very few route choices. Jacobs's analysis (1993) of successful streets around the world has led him to suggest that the frequency of cross streets contributes to the diverse pedestrian qualities of a street and smaller blocks are more walkable.

This coarse-grained road network of large tracts of land is more susceptible to traffic congestion (Sun, 2007), with major roads take the vast majority of the traffic burden (figure 2.1.4). A study in Jinan City showed that residents living in closed superblocks rely more heavily on cars, and the average travel energy consumption of residents is 2.5 times that of open mixed-use blocks. (He, Christopher, 2011). Air pollution caused by traffic congestion poses serious health risks to residents.

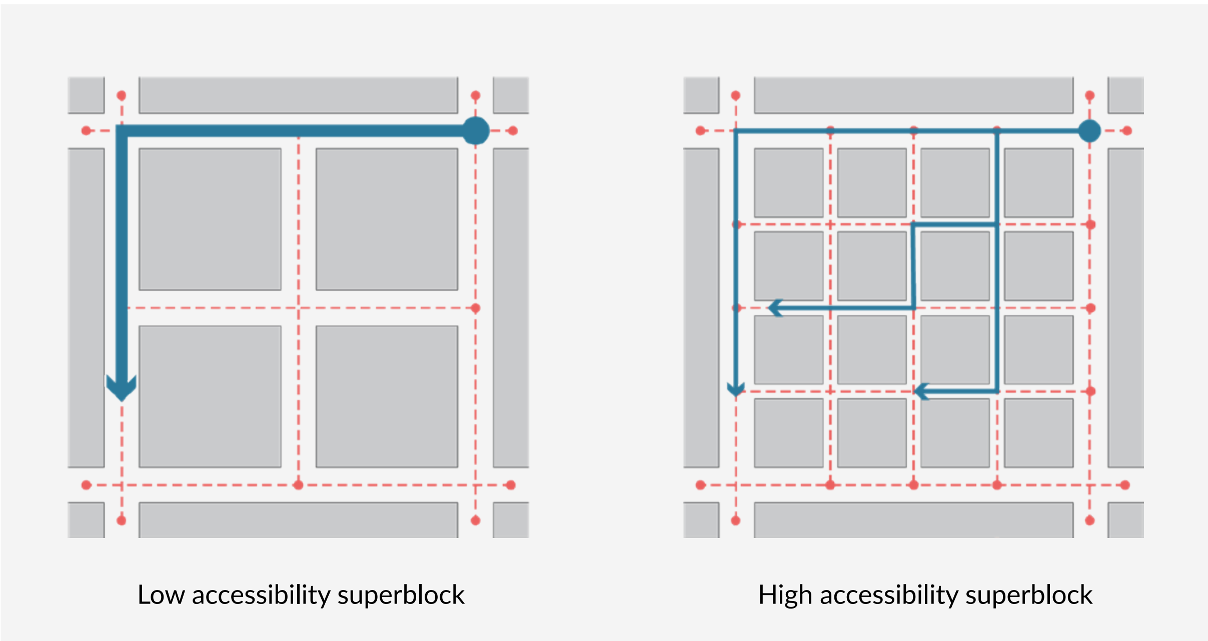


figure 2.1.3 A comparison of traffic patterns between closed superblock and open block

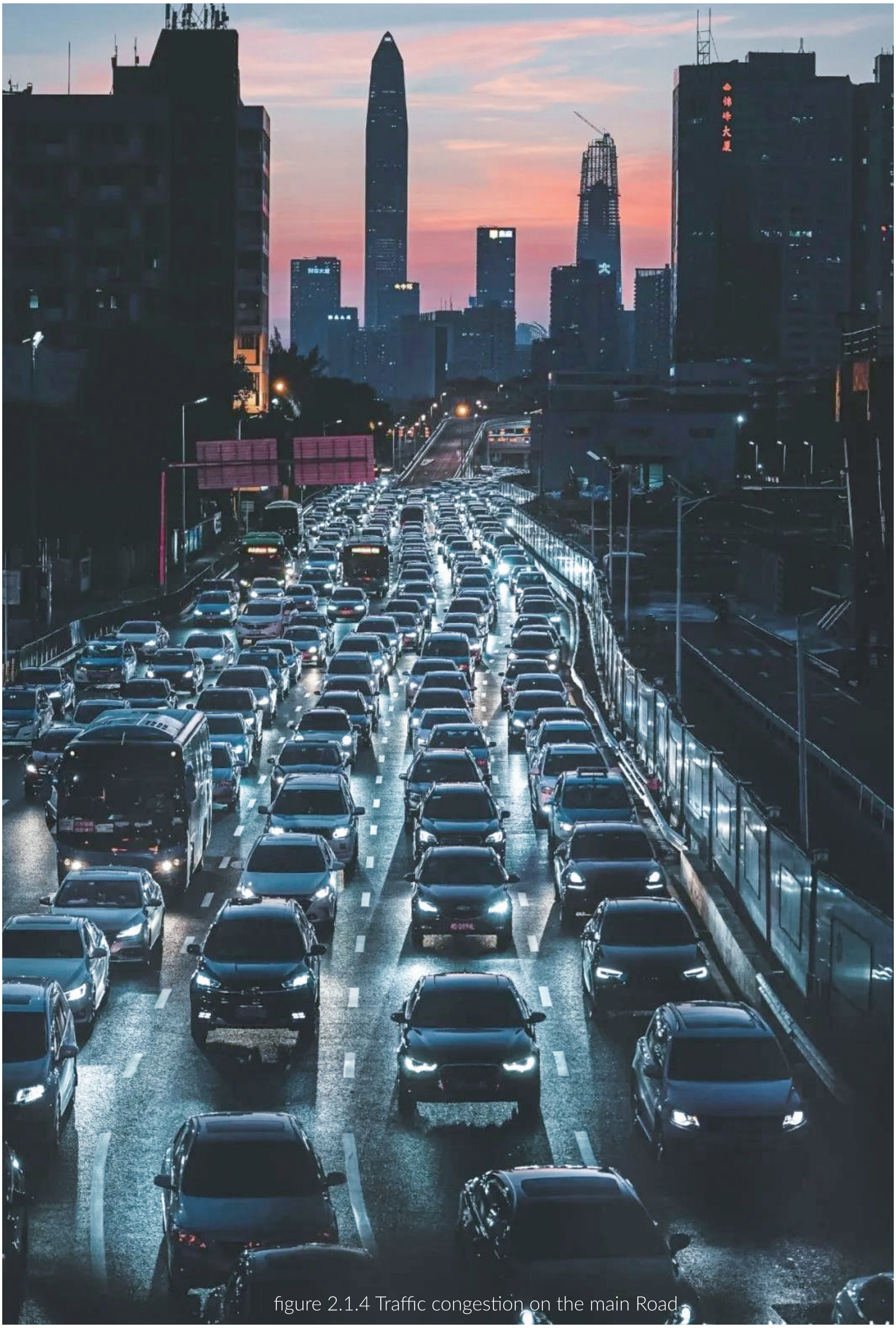


figure 2.1.4 Traffic congestion on the main Road

2.2 Lack of Diversity

The parcels within superblocks are often contracted by a single developer and designed in isolation as an enclave enclosed by walls and consisting of standardized buildings and repetitive structures (figure 2.2.1). In such modern neighborhoods, a tendency towards homogeneous urban form which promotes high-rise and low ground coverage results in the vanishing of edge-interior relationships (Ge, Hausleitner 2017). It is like an urban island that take no part in an overall social or spatial narrative and it inhibits continuity of public and semipublic spaces between blocks (Johnson, 2020).

figure 2.2.2 A residential area under construction in Beijing

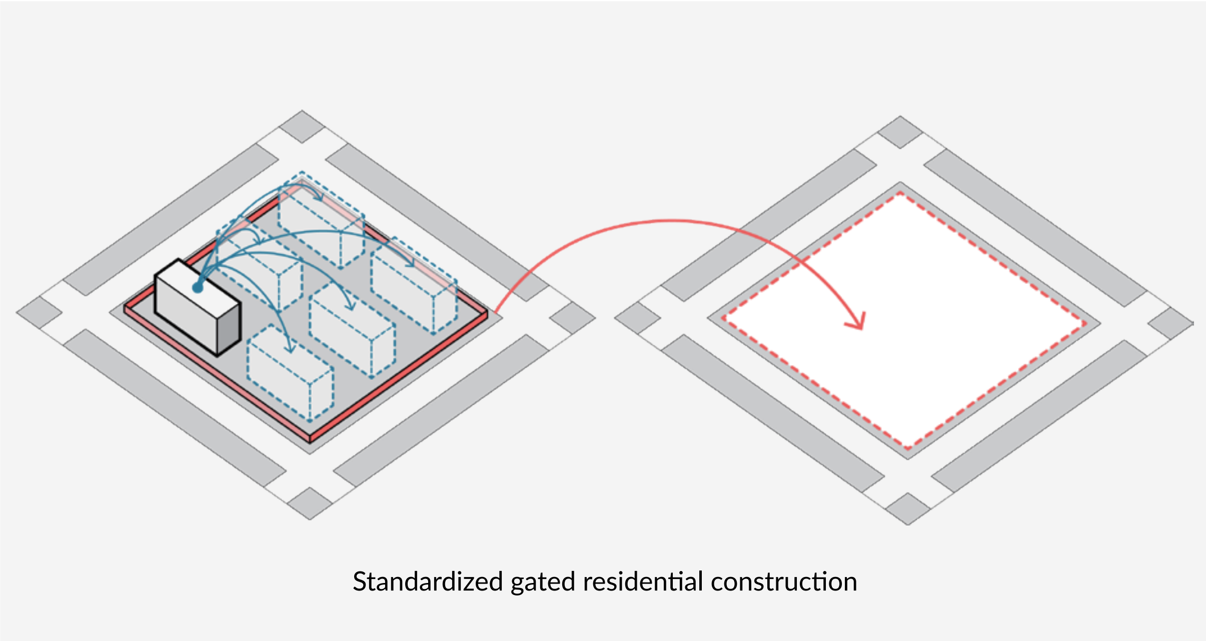


figure 2.2.1 Development mode of superblock

More importantly, most superblock developments today, especially those at the urban peripheries, are predominantly single-use residential subdivisions that include only minimal public amenities. The contemporary superblocks, in general, have fewer collective activities and daily functions than their socialist predecessors, Danwei. Repetitive buildings, single functions, and the extensive use of walls create an unpleasant, monotonous streetscape that takes away the diversity and vitality of urban space (figure 2.2.3 & 2.2.4).

What's more, the homogeneity of functions and low street densities make the superblock lack the ability to adapt to flexible changes in the future. Rowe (2016) argues that urban block needs to have an inherent capacity to foster reasonable and flexible change when necessary during urban growth and change due to fluctuating market forces. Large urban blocks in China lack this ability to flexibly shift uses over time. In addition, because zoning restrictions (e.g., FSI) are applied to the entire block, it may not be possible to achieve a higher density level when the street block is close to the public transport station, thus inhibiting the city from obtaining a more efficient TOD development model (stokols, 2017).

figure 2.2.3 The ubiquitous high-rise superblock in China

figure 2.2.4 The view in an area of Shanghai that's mostly made up of gated communities.

2.3 Home-work Separation and Socioeconomic Segregation

Once the Danwei provided welfare housing for city dwellers as a symbol of socialist values. Today's superblock developers prefer to provide exclusive, luxurious and secure housing to meet the needs of the new lifestyle of the urban middle class. They offer private gardens, recreational facilities, and underground parking in walled and gated enclosed settlements, although there is no clear evidence of activation of public space in this gated community (Stokols, 2017). Regardless of whether the location is more in the city center or suburban, the walled superblocks negatively reinforce the separation of urban classes and groups. An enclosed community of the wealthy may be built within a dilapidated immigrant enclave or next to an old housing estate (figure 2.3.2), and there is a relative lack of public space that allows residents from different communities to interact with each other. A study has shown that the neighborhood relationship between residents in the access control community is relatively lacking (Miao, 2003), and the residents of high-rise apartments have almost no social interaction (Yao, 2020).

The superblock has exposed some of the challenges of the social stratification and socioeconomic segregation (Johnson, 2020), especially for new migrants in cities who do not have the money to buy a home. These migrants have to live in overpopulated urban villages or in superblocks far from urban centers. However, large urban parks, plazas, and commercial blocks and job opportunities are often located only in the center of a district or the core area of the city. This exacerbates the separation of jobs and housing. It is also difficult to form stable communities and support networks for settlements on the urban fringe. Stokols (2017) argues that closed communities in contemporary China may offer respite from the outside, but they rarely facilitate a gradual mediation between the most public center of a district (such as a subway station or commercial cluster) and the innermost areas of a residential community.

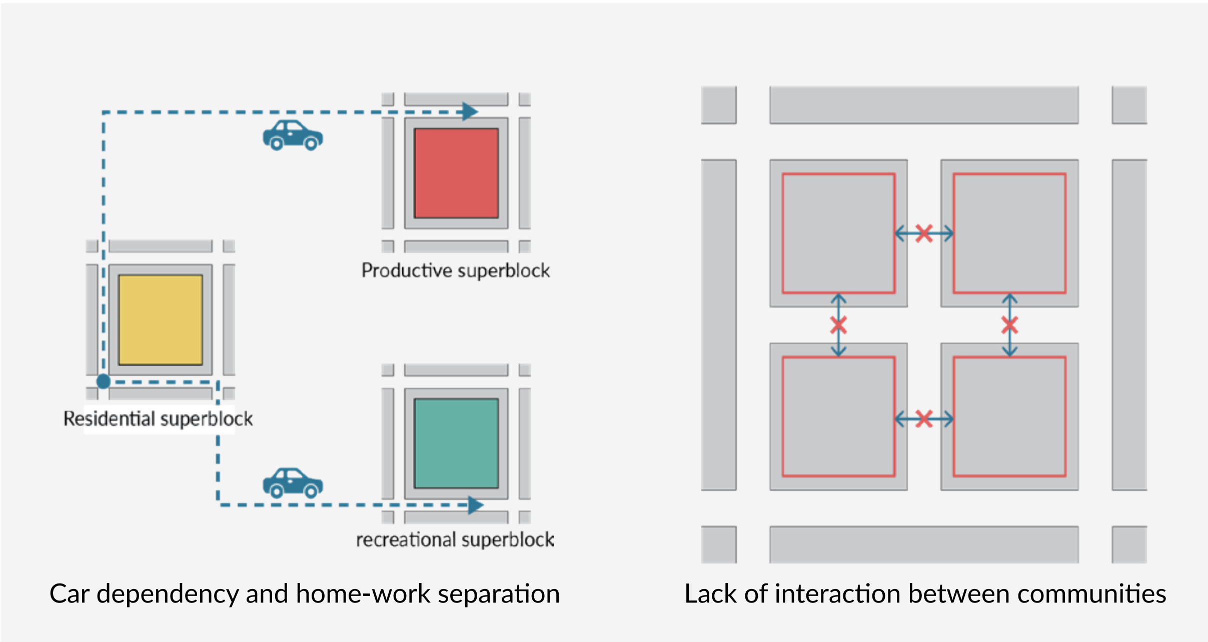


figure 2.3.1

figure 2.3.2 A luxury gated residential area besides an slum in Shenzhen

2.4 Housing Shortage in Shenzhen

Shenzhen is one of the fastest urbanized cities in China (Figure 2.4.1), with built land accounting for more than 40% of the total urban and rural land area while this indicator is only 24% in Hong Kong. According to the 'Shenzhen Overall Land Use Planning 2006-2020' (2013), the proportion of built land in Shenzhen should be controlled to less than 50% by 2020. Shenzhen has almost no land left for urban expansion In 2012, for the first time, the supply of stock land in Shenzhen exceeded new land. This means that Urban renewal and urban densification have become the main tasks of Shenzhen's urban development in the future.

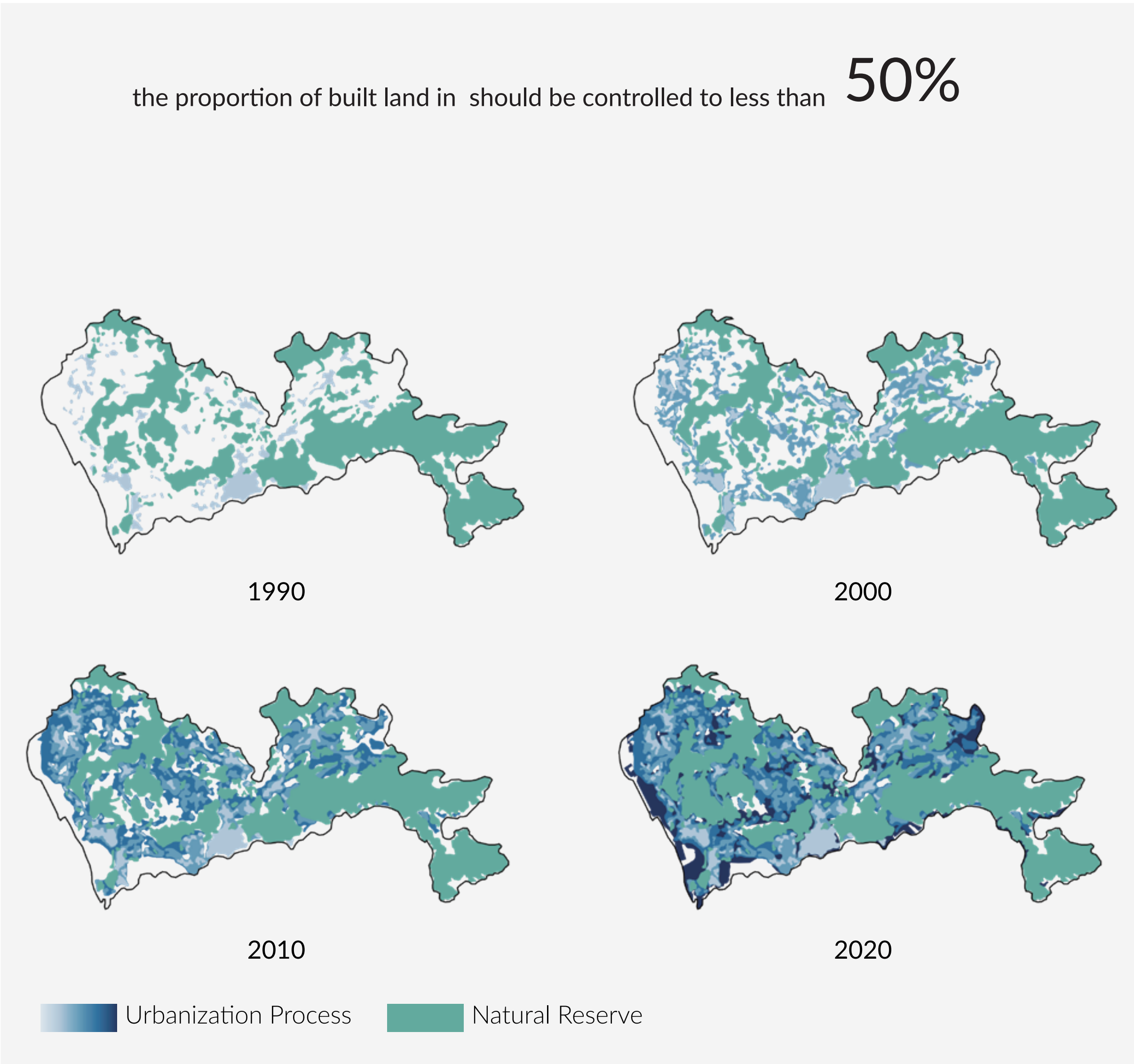


figure 2.4.1Urbanization process of Shenzhen

Shenzhen is also one of the fastest growing cities in terms of population. There was 410,000 population growth in 2019 (figure 2.4.2), and growth rate is in the 5th place among Chinese cities (figure 2.4.3). The massive influx of people has also caused a shortage of housing supply in Shenzhen. The per capita living area in Shenzhen is only 22 square meters while this number is 49 in Amsterdam. According to the latest policy, by 2035, 1.7 million new housing units will be built and at least 1 million will be designated as housing units for non-local professionals, affordable homes, and public rental flats.

figure 2.4.2 The change of permanent resident population in Shenzhen from 1999 to 2019

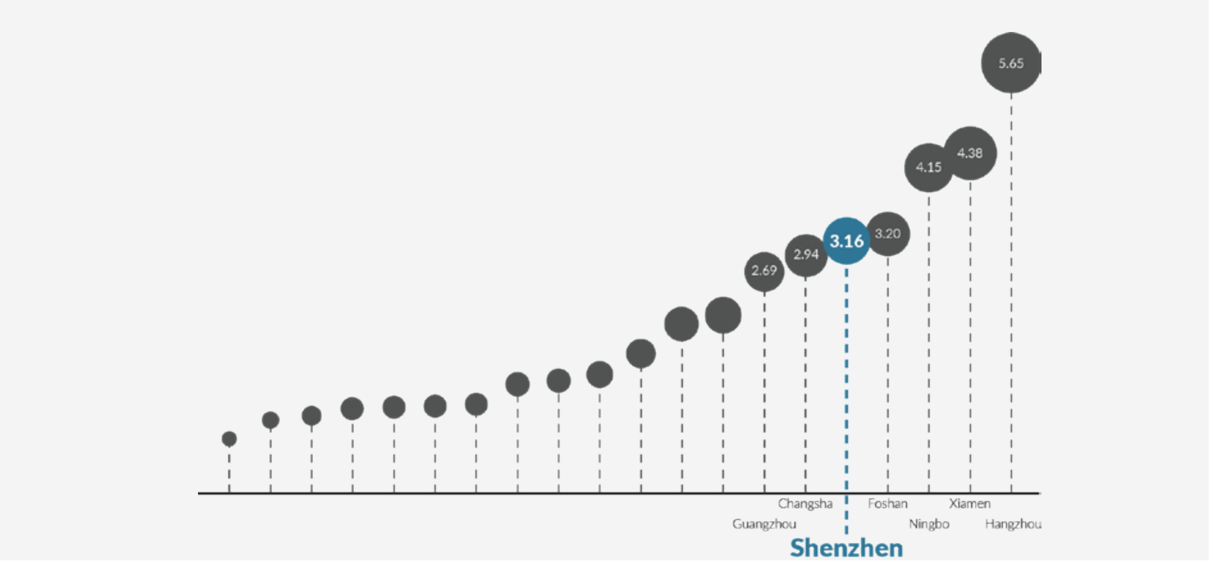
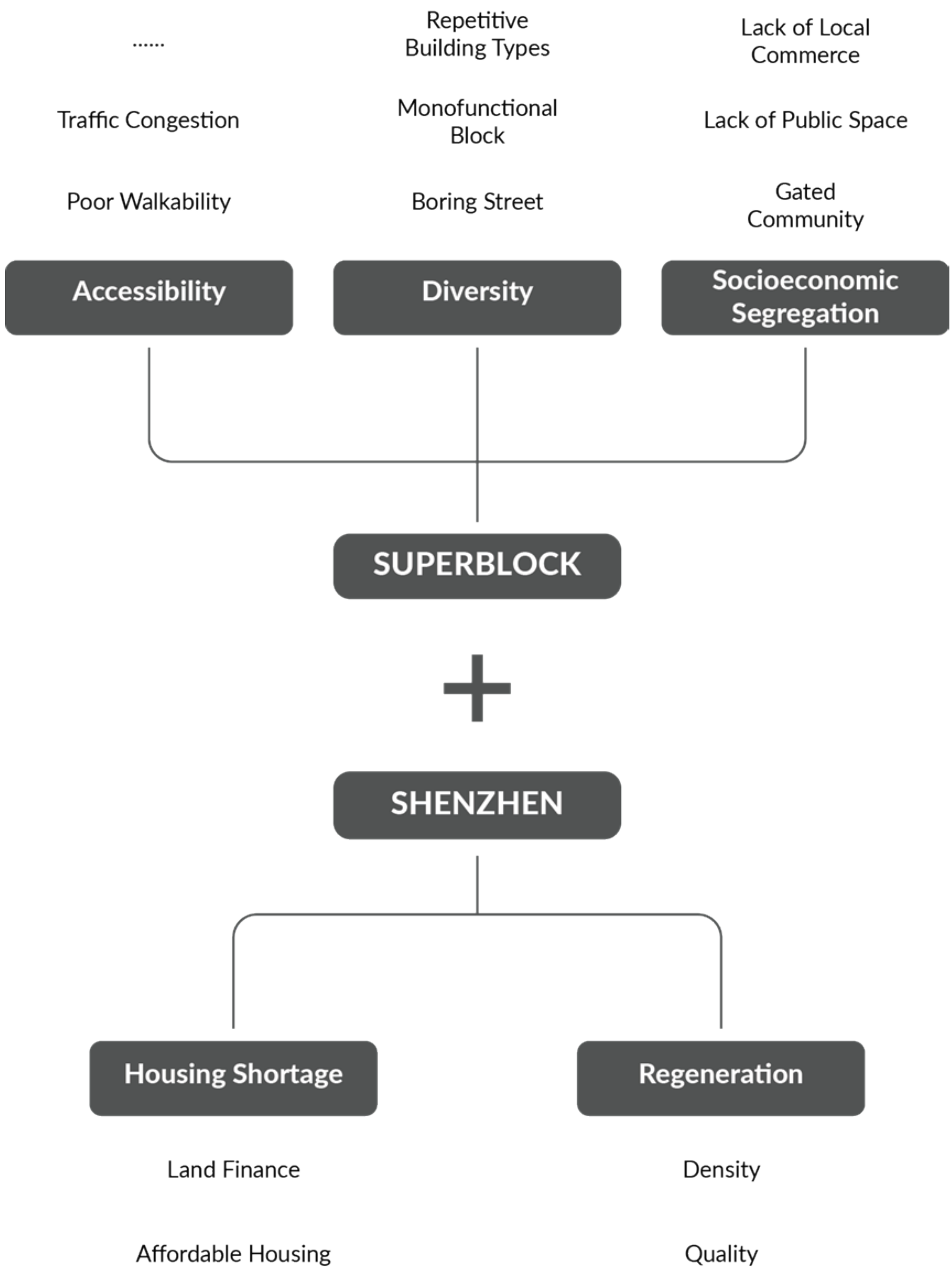


figure 2.4.3 Ranking of urban population growth in 2019

Since Shenzhen was the first place to experiment with commodity housing development, it has a large number of early built superblocks. Limited by the population and construction technology of the time, their density and environmental quality no longer meet the needs of today. However, they occupy the most central land in the city. Such superblocks are included in the shantytown renovation or old housing renovation plans, although only a very small number of them can be successfully implemented due to various stakeholder conflicts. According to incomplete statistics, there are about 700 old neighborhoods in Shenzhen that meet the conditions of the shantytown renovation policy, of which nearly 70% are concentrated in the three administrative districts of Luohu, Nanshan and Futian. Among them, 349 in Luohu District, 215 in Futian District and 198 in Nanshan District (Zhang, 2020). how will these old superblocks respond to the city's housing needs in the future is a major problem that Shenzhen is facing.

figure 2.4.4 Redeveopement project in Shenzhen



......
Repetitive Building Types
Lack of Local Commerce
Traffic Congestion
Monofunctional Block
Lack of Public Space
Poor Walkability
Boring Street
Gated Community
Accessibility
Diversity
Socioeconomic Segregation
SUPERBLOCK
+
SHENZHEN
Housing Shortage
Regeneration
Land Finance
Density
Affordable Housing
Quality

Problem Statement

Over the past 40 years, the speed of urbanization in China has been remarkable worldwide. Satisfying the government and developers' pursuit of efficiency, superblocks have dominated urban construction across the country as a template for urban development. While superblocks have met the needs of China's rapid urbanization over the past decades, their poor accessibility and functional homogeneity have led to a loss of street vibrancy and even to socio-economic segregation.

In recent years, the Chinese government has realized that this extensive development model needs to be changed and cities should shift from rapid expansion to a more elaborate densification in built-up areas and improve the quality of living for residents. The urgency of Shenzhen's urban regeneration has further highlighted the problems of superblocks. Transforming existing superblocks into higher density but more vibrant and more livable communities is a challenge for Shenzhen and many Chinese cities.

03 METHODOLOGY

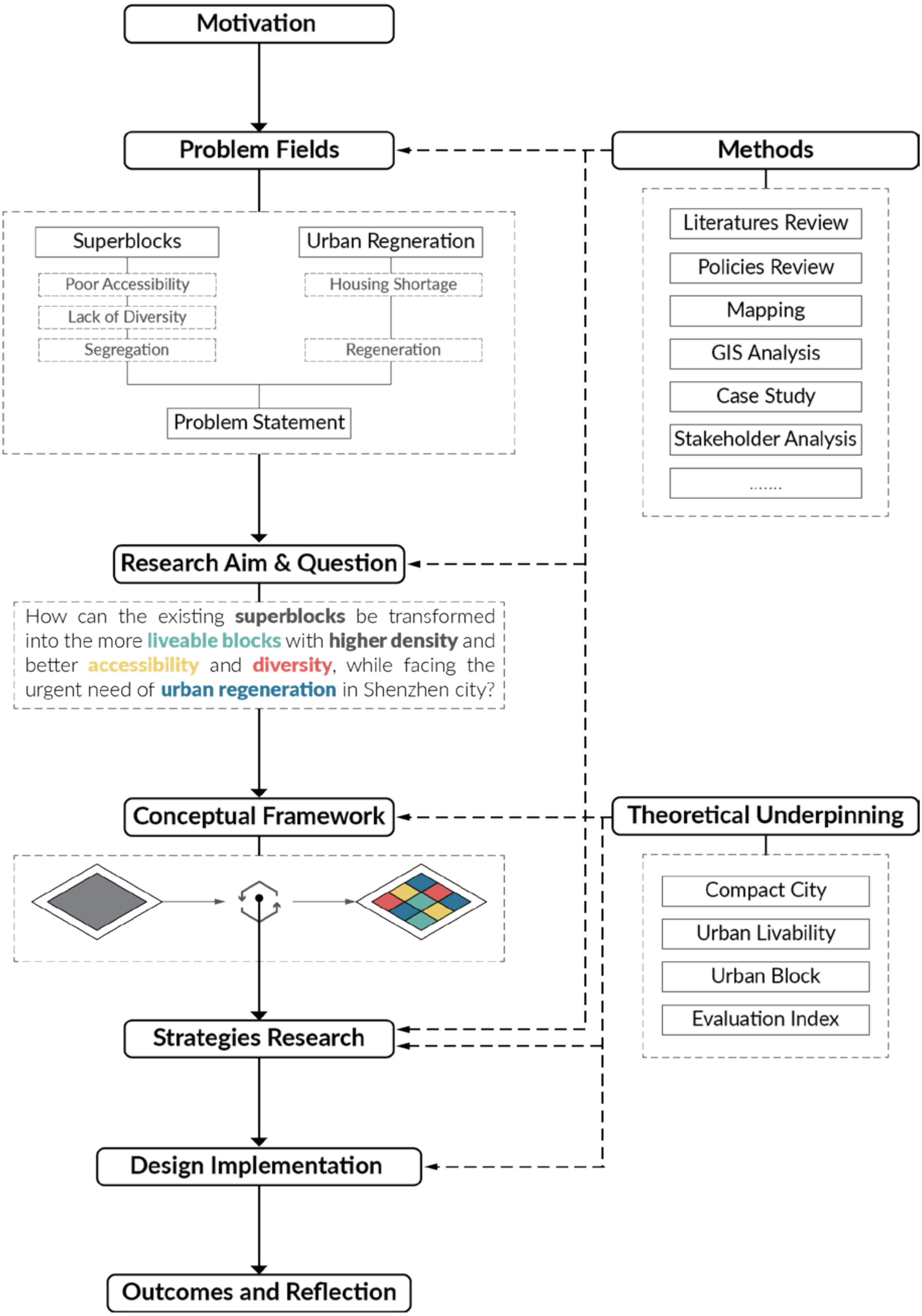
This chapter will make a clear outline of this project, including the goals, methods, theoretical underpinning and the final outcome, to show the step of getting the design result of the research.

3.1 Introduction

The superblock almost dominates the urban structure of most Chinese cities and have been criticized by many scholars for its problems. In Shenzhen city, the conflict between superblock and livability is further amplified by the urgent need for urban renewal. In order to deeply study the transformation of superblocks in Shenzhen, especially in the Special Economic Zones (SEZs), relevant theories, concepts, and case studies that can be used for reference need to be reflected and summarized in order to propose a reasonable vision and design scheme for solving this problem. In this chapter, I will explain project-related concepts and connect them to actions to create a structure for the research. I will create different frameworks related to theory, concepts and methods and systematically elaborate on the meanings and logical connections in each framework diagram, to achieve a proposal that integrates social, spatial and technological aspect for the transformation of the superblock.

The problem statement will first be revised with a research framework, followed by the research questions and research aim of this project. I will then address the implications of these fundamental components and clarify the steps to be taken and to achieve the final design proposal. After that, the conceptual framework will show the links between the core variables of the project and explain the relevant sub-concepts of each variable. Hereafter, I continue explaining the methods that may be used in the research, which will serve different purposes at each stage, ranging from problem analysis to scheme design. Afterwards, the main design process and the corresponding theoretical underpinnings will be expounded. Finally, I will reveal how these steps and variables will be organized in two semesters to achieve the goals related to the transformation of the superblock. Evaluation and reflection on current methodologies will be the end of this chapter.

3.2 Research Framework



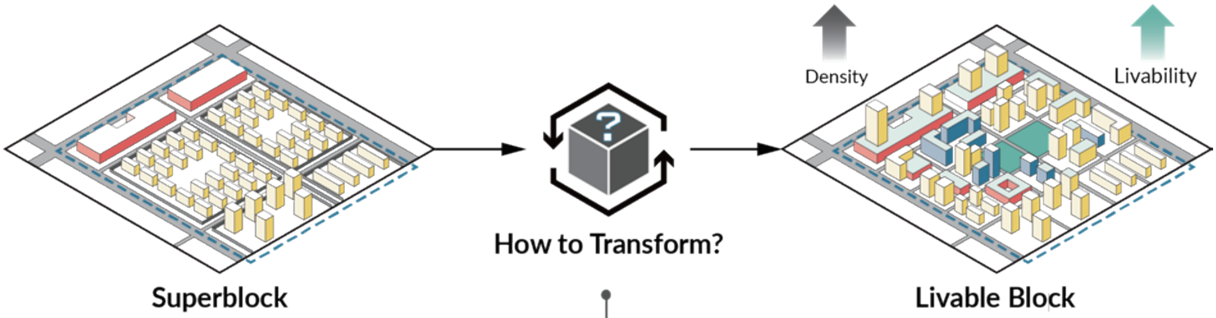
3.3 Research Aims and Questions

My experience of living in both Chinese and European cities made me realize that the common superblock in China has a significant impact on the quality of urban life, and led me to consider what causes the proliferation of superblocks in China and how they can be transformed in the future. As indicated in the analysis in the previous section, as a first step I divided the problem area into two main parts: the main problems caused by superblock (poor accessibility and lack of diversity) and the need for urban regeneration in Shenzhen. I argue that China's urban development model, which has been dominated by speed and economic efficiency for the past 40 years, should be changed. This is both a return to human values and a need for urban densification. We need to find an approach to make superblocks more livable while increasing urban density at the same time.

Therefore, I raise the main research question of how can the existing superblocks be transformed into the more livable blocks with higher density and better accessibility and diversity, while facing the urgent need of urban regeneration in Shenzhen city. To answer this question, four aspects need to be clarified. Firstly, the mechanism behind the misuse of superblocks in China needs to be clarified, otherwise any subsequent work could be fail to get to the heart of a matter. Then, the definition of livability and its relationship with urban block should be explained, which provides the foundational context and criterion for the following research. Thirdly, potential areas of transition and subsequent social impacts need to be identified and predicted from multiple-scale perspective. The last but not least, the improvement of accessibility and diversity should be translated into spatial strategy so that it can be used in the design implementation. Each question will be answered through the following research and some outcomes would be concluded to help to reach the research aims, which is:

-A sample design to transform the spatial and functional structure of a superblock in the context of urban densification, creating a vibrant, livable environment at the local scale.

-A decision-making strategy that reorganizes the development and building codes of the block to control the overall density configuration, the mobility network and public spaces, with an assessment of the synergies required by different stakeholders.



Main Research Quesition:
How can the existing **superblocks** be transformed into the more **liveable blocks** with **higher density** and better **accessibility** and **diversity**, while facing the urgent need of **urban regeneration** in Shenzhen city?

Sub-Q1:
What is the mechanism behind the formation of superblocks in China?

Forming Reason

Sub-Q2:
What does a livable block mean in the context of Shenzhen and what is the correlation between livability and the attribute of the block?

Livability Indicators
×
Key Parameters of Block

Sub-Q3:
Where is the potential area for this transformation in Shenzhen and how to meet the density needs?

Potential Location
+
Regeneration Policy
+
Density Forcast

Sub-Q4:
How can accessibility and diver-sity be improved in the existing superblock while increasing the urban density?

Design Strategies

AIMS:

A sample of superblock transformations
+
General design guidelines

3.4 Research Methods

Main Reseach Question

How can the existing **superblocks** be transformed into the more **liveable blocks** with **higher density** and better **accessibility** and **diversity**, while facing the urgent need of **urban regeneration** in Shenzhen city?

Sub Research Question:	Methods:
Sub-Q1: What is the mechanism behind the formation of superblocks in China?	**Literature Review** Reviewing the history of urban development and scholars's critical perspectives on superblocks **Morphological Mapping** Comparing the urban tissue of different cities to better understand the scale of the superblock
Sub-Q2: What does a livable block mean in the context of Shenzhen and what is the correlation between livability and the attribute of the block?	**Literature Review** Comparing and integrating perspectives on urban livability and urban block studies. **Case Study** Analyzing the block's characteristics of livability cases
Sub-Q3: Where is the potential area for this transformation in Shenzhen and how to meet the density needs?	**GIS Analysis** Analysing the density, program composition, connectivity, accessibility, etc. of superblocks **Morphological Mapping** Defining superblocks in Shenzhen and finding out their hierachy **Policy Analysis** Analysing the future density needs of the potential area and comparing with the current density.
Sub-Q4: How can accessibility and diversity be improved in the existing superblock while increasing the urban density?	**Literature Review** Reviewing scholars' opinions on accessibility and diversity **Case Study** Analyzing the design principles of cases with good accessibility and diversity **Policy Analysis** Analysing the rules in local urban regeneration policies and urban design guidelines **Site Analysis** Collect site specific information and data to concretize previous research

The research method is in a deductive way, which will base on the previous studies and conclusions of urban block form and livability, then explores the transform approach of superblock by categorizing, assembling, and reconstructing. The research methods are mainly divided into two parts: Design Research and Research by Design.

Outcomes

Multiple Factors
Contributing to forming the superblocks

Typical Model
showing the characteristics of superblocks

Livebility Indicators
in the context of Shenzhen

Key Parameters of Block
that are closely related to livability

Potential Location
that need to be densified and improved

Density Forecast
to meet future needs without overloading

Design principle
that are helpful to shape a accessible and diverse superblock

Urban Design Scheme
using the design principle and fitting with the regeneration mechanism in Shenzhen

Design Research

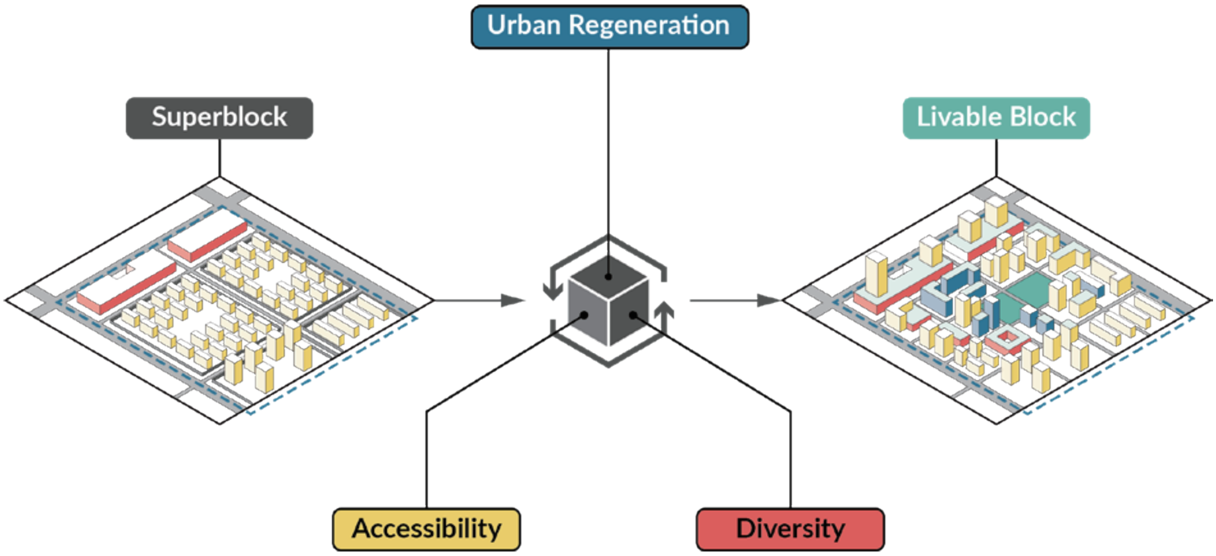
In the early stages of this research project the main focus was on design research. Design research is research for design, not only to gain knowledge, but also to apply knowledge to support design, which includes relevant theoretical concepts, reference tools, and evaluation criteria that meet the goals. It is an indispensable step of research-by-design.

Research-by- Design

Research-by-Design is to generate desirable, maybe unexpected urban perpectives in place of probable, but less desirable urban developments. (Rosemann, 2008) It use design as a tool to generate additional knowledge. This project use research-by-design to propose a possible solution for Chinese superblock development.

Research-by-design is a product of design research. They are iterrelated and inseparable during working and thinking in this project.

3.5 Conceptual Framework



In terms of the superblock, one of the focuses of this research is the urban form of the superblock, including buildings and their related open spaces, plots or lots, and their streets (moudon, 1997). The other focuses on the functional composition and distribution within the superblock. Finally, Livable blocks are expressed in the form of urban design scheme. In the transformation of superblock to a more livable block, according to the previous problem statement, there are three important aspects that need to be understood:

Urban Regeneration:
Roberts (2000) defines "urban regeneration" as "an integrated, holistic approach to solving a wide range of urban problems; it should aim to make long-term, sustainable improvements and enhancements to changing urban areas in all aspects of the economic, social, and physical environment."According to Zhai and Wu (2008), in China, urban renewal has evolved from a chaotic development in the last century to legalization and diversification of decision making; the government and developers are the main players in urban regeneration, and they often seek to maximize economic benefits.

Many superblocks are the products of China's rapid urbanization in the past decades, and the spatial quality and density of some superblocks can no longer meet the requirements of the urban future, so they need to be transformed or rebuilt at a reasonable scale, at a reasonable speed, and in a reasonable way in the process of urban regeneration.

In this process, it is necessary to balance the economic interests of the government and developers while enhancing environmental quality and public interest.

Accessibility:

In the review by Bhat and her colleagues (2000), accessibility is a measure of the ease of an individual to pursue an activity of a desired type, at a desired location, by a desired mode, and at a desired time. Accessibility can be disaggregated into three components: benefits at the end of a trip, the cost in reaching that benefit, and the individual gaining that benefit. Sevtsuk (2016) rely on Hansen s concept (1959) of gravity index in estimating accessibility on foot, and suggest that the most walkable grids are those that maximize the number of plots one can reach within a given walking radius while minimizing the travel distance required to reach them. Improving the experience of mobility and reducing time spent, increasing the number and attractiveness of destinations, and the openness to each individual will effectively improve the poor accessibility of the superblock.

Diversity:

The importance of diversity of urban forms has been emphasized by many scholars like Jacobs (1961), Montgomery (1998),Ghel (2011), etc. The concept of diversity includes the diversity of urban forms, types of activities and social groups. Panerai and his colleagues (2004) defended the relations between buildings, blocks and streets as the basic generators of diversity. The diversity of physical form can to some extend leads to other sorts of diversity. A research by SEMAPA (2010) on Masséna, Paris shows that the diversity of urban form can successfully accommodate of the mix-use of different program and permit a considerable degree of the mix of social groups.

3.6 Theoretical Underpinning

This section will review the theoretical literature relevant to this research in order to understand the relationship between urban block space and urban livability, and to explore how the physical form of the urban fabric affects the functional use of space, providing a theoretical basis for subsequent analysis and design.

Compact City:
The compact city model is initially concerned with reducing the negative spatial impacts typically associated with urban sprawl. According to Wu and other scholars, there are many features of the compact city concept that Chinese cities should pay attention to and learn from (Wu et al., 2012), such as: high-density land use; mixed-function land use; TOD-oriented development patterns; ecological environmental protection; concern for social justice; and the creation of human-scale urban spaces. Although Shenzhen already has high urban densities, there are still a significant number of areas that are not compact enough. Superblocks have a low degree of mixed use due to their large areas of single-function land and modular development approach, and lack the flexibility to adjust density strategies as transit stations are built. The compact city approach provides an important guidance for the transformation of superblocks.

It is worth noting that the compact city approach may lead to a paradoxical reduction in open space and green space (Neuman, 2005), thus requiring an integrated consideration to address urban density and quality.

Urban livability:
Urban livability, a term widely discussed and used by urbanists and city managers, is a multidimensional concept. Generally speaking, most definitions align the core of livability with local community wellbeing, which includes not only the environmental characteristics, but also social-economic dimension, concerning how people interact with local urban environments (Lowe et al., 2013).

The definition of livability can vary from country to country and region to region due to differences in economic levels and cultural backgrounds. In China, building livable cities has become an important goal for most cities. A study (Zhan et al., 2018) investigated residents' satisfaction with urban livability and its determinants in 40 major Chinese cities through a large-scale questionnaire survey. The study summarized the determinants of livability into the following aspects (figure 3.6.1): A-Urban security, B-Convenience of public facilities,

Dimensions of urban livability	Assessment indicators
A. Urban security	A1 Social security
	A2 Transport security
	A3 Emergency shelters
	A4 Disaster response capacity
B. Convenience of public facilities	B1 Shopping facilities
	B2 Education facilities
	B3 Healthcare facilities
	B4 Dining facilities
	B5 Recreational facilities
	B6 Cultural facilities
	B7 Aged facilities
C. Natural environment	C1 Favorable climate
	C2 Access to water area
	C3 Access to urban parks
	C4 Urban green coverage rate
	C5 Cleanliness of city
D. Sociocultural environment	D1 High-quality citizens
	D2 Social inclusion
	D3 Urban identity
	D4 Protection of historical culture
	D5 Sense of belonging
E. Convenient transportation	E1 Urban road conditions
	E2 Access to public transit
	E3 Availability of parking lots
	E4 Traffic congestion
F. Environmental health	F1 Water pollution
	F2 Solid waste pollution
	F3 Air pollution
	F4 Noise pollution

figure 3.6.1 Assessment indicators of satisfaction with urban livability in China

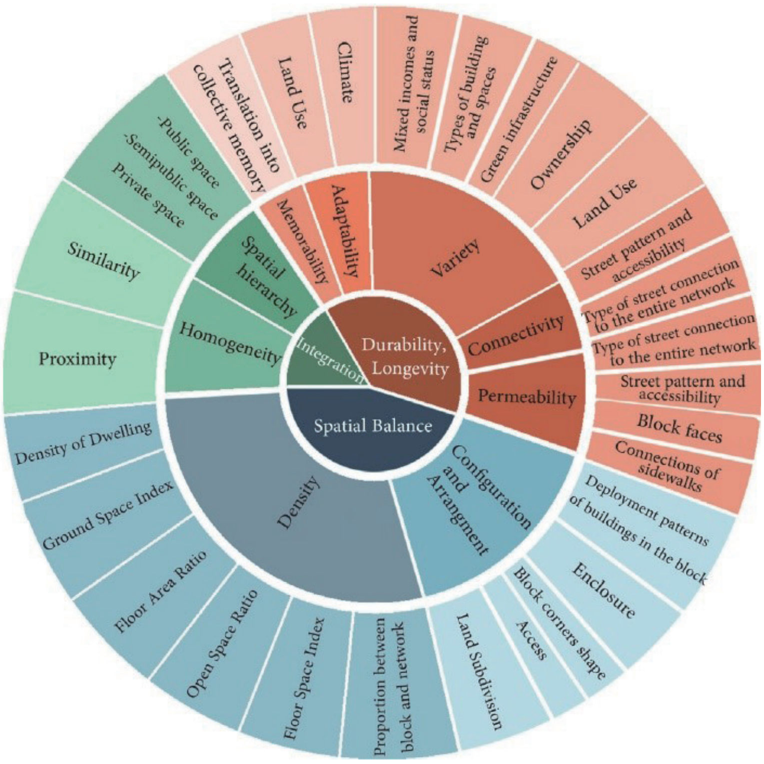


figure 3.6.2 Three ctegories of the factors about urban block

C-Natural environment, D-Sociocultural environment, E-Convenient transportation, F-Environmental health. Among them, C-Natural environment, E-Convenient transportation, and F-environmental health are the most contributing factors to urban livability.

Urban Block:

The urban block is one of the main elements of the urban fabric and is of great importance in urban design. The pattern of streets and squares become the result of positioning of the blocks. Also, the size and shape of urban blocks contribute effectively to the formation of the character of the environment (Carmona, 2010). Existing discourses on urban blocks focus on the following three aspects (Shakibamanesh and Ebrahimi, 2020): size, dimensions, and shape; position; and function and meaning. Shakibamanesh and ebrahimi grouped fverious factors related to urban blocks, from concepts to indices, into a checklist to allow urban designers to understand urban blocks more effectively. (figure 3.6.2)

The relationship between urban livability and urban form:

Berghauser Pont & Haupt (2009) ated that the performance of urban form could be used to clarify different consequences for the quality of urban environments. This means urban form is tightly linked to urban livability. Optimizing urban blocks, one of the core elements of urban form, will help improve the livability of the city. In this project, accessibility and diversity of superblock is the research focus, and they are most closely associated with the following indicators of livability: B-Convenience of public facilities; E-Convenient transportation; D-Socialcultural environment; C-Natural environment. And according to the checklist, the folowing factors of block should be noticed: Configuration and Arrangement; Spatial Hierarchy; Density; Variety; and Connectivity and Permeability. For instance, configuration and arrangement deal with the dimension of block and the way the blocks are arranged next to each other. This has a direct impact on the diversity of urban space and the experience of direct citizen movement through the blocks.

Theory of Interconnection:

Many modernist planning ideas of the last century advocated the isolation of urban form and function, with the result that the socio-economic functions of cities suffered from the compartmentalization of structure, movement and activities and the inability to create urban synergies (Hillier 1996). Since the 1960s, a number of scholars, including Jacobs, Alexander, Hillier, Gehl, etc. criticized such modernist understanding and concerned with the interrelationship between built form (building and space) and function (movement and activity) in

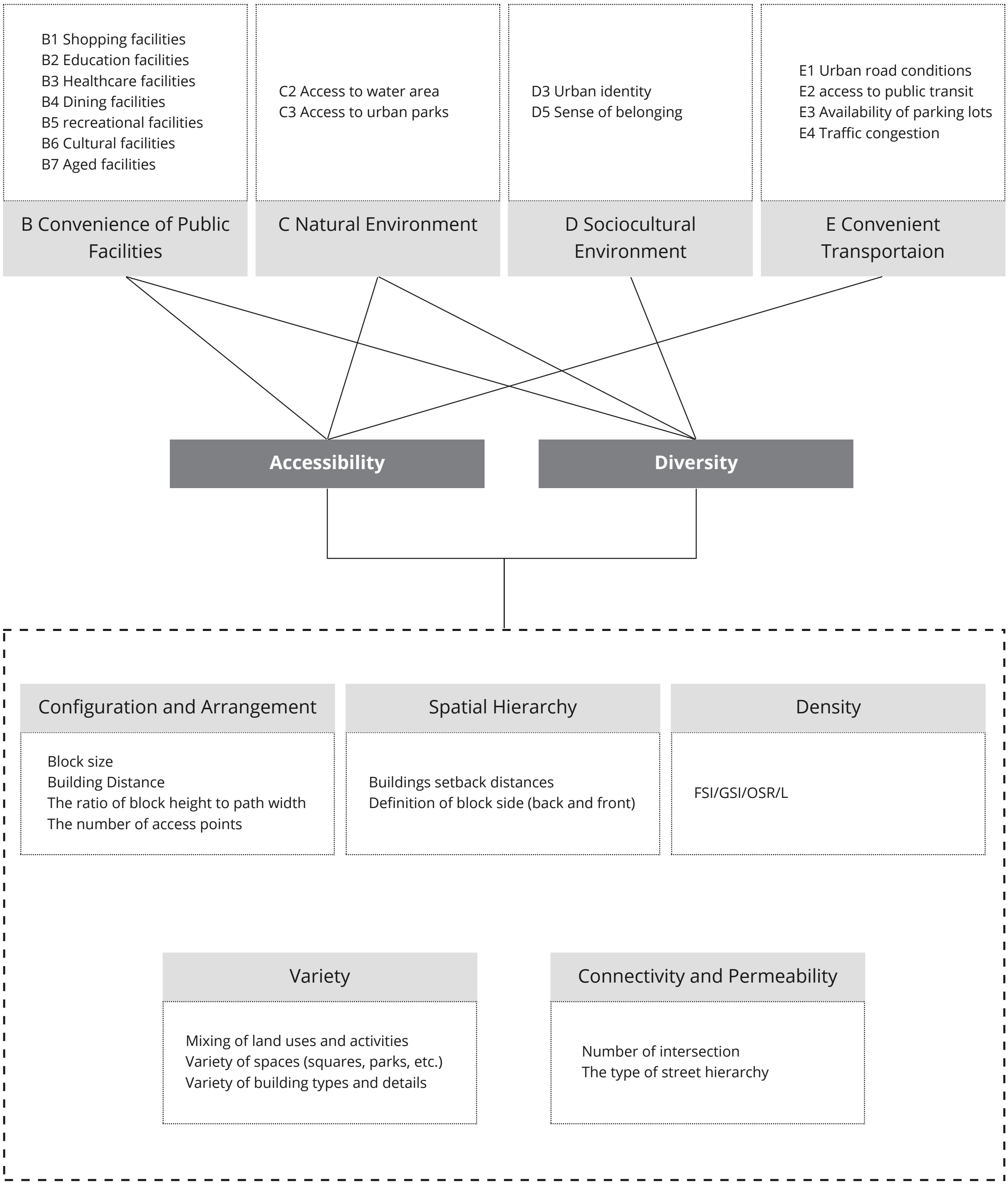


figure 3.6.3 Three ctegories of the factors about urban block

cities. These studies note that an effective urban structure is needed to support the operation of a modern city and they are framed collectively as Interconnection Theory (Chen, 2017).

The theory of interconnection holds that, cities are organized and complex systems that are mainly composed of a number of interrelated systems. The interplay between street structure, movement and activities are the nuclei of the interconnection between form and function (Chen, 2017). Jacobs (1961), for example, noted that urban forms such as short blocks, frequent streets, and active street fronts can have a synergistic effect with the mix of primary functions, building types, and even people groups, making cities more vibrant, more accessible, and safer. Lastly, integration, connection and interaction are three basic principles for maintaining good interconnectivity of the form and function system (Chen, 2017). Integration means that the local system maintains a close relationship with the overall system; connection requires a high degree of network permeability and accessibility; Interaction requires a high mix of social interactions and a combination of various types of physical structure to support the functional mix (Chen,2017).

Other notions:

Mixed-use Index

In the thesis The MXI (Mixed-use Index) as Tool for Urban Planning and Analysis, J. Hoek(2008) defined all building typologies as "Unmixable Non-housing," "mixable Non-housing," and housing. By giving values to urban blocks according to their degree of mixing program, we can gain an index figure of mix-use neighborhoods. For example, the 0-20 scores blocks are maybe factories or offices, 40-60 scores could be city center, 80-100 scores blocks are obviously, residential neighborhoods. This index can provide a quantitative reference of the diversity of superblock's program.

Space syntax

Space syntax is a set of techniques for analysing spatial layouts and human activity patterns in buildings and urban areas. It is also a set of theories linking space and society. Space syntax addresses where people are, how they move, how they adapt, how they develop and how they talk about it (Overview Space Syntax – Online Training Platform, 2021). This tool will be use in the folowing analysis

Space Matrix

The Spacemate/SpaceMatrix theory was initially developed by M. B. Pont and P. Haupt (Pont and Haupt, 2005). They introduced a scatter chart to include various density variables like FSI, GSI, OSR, L. This Index correlates density with urban morphology and is useful for assessing the density profile of a superblock and its morphological diversity.

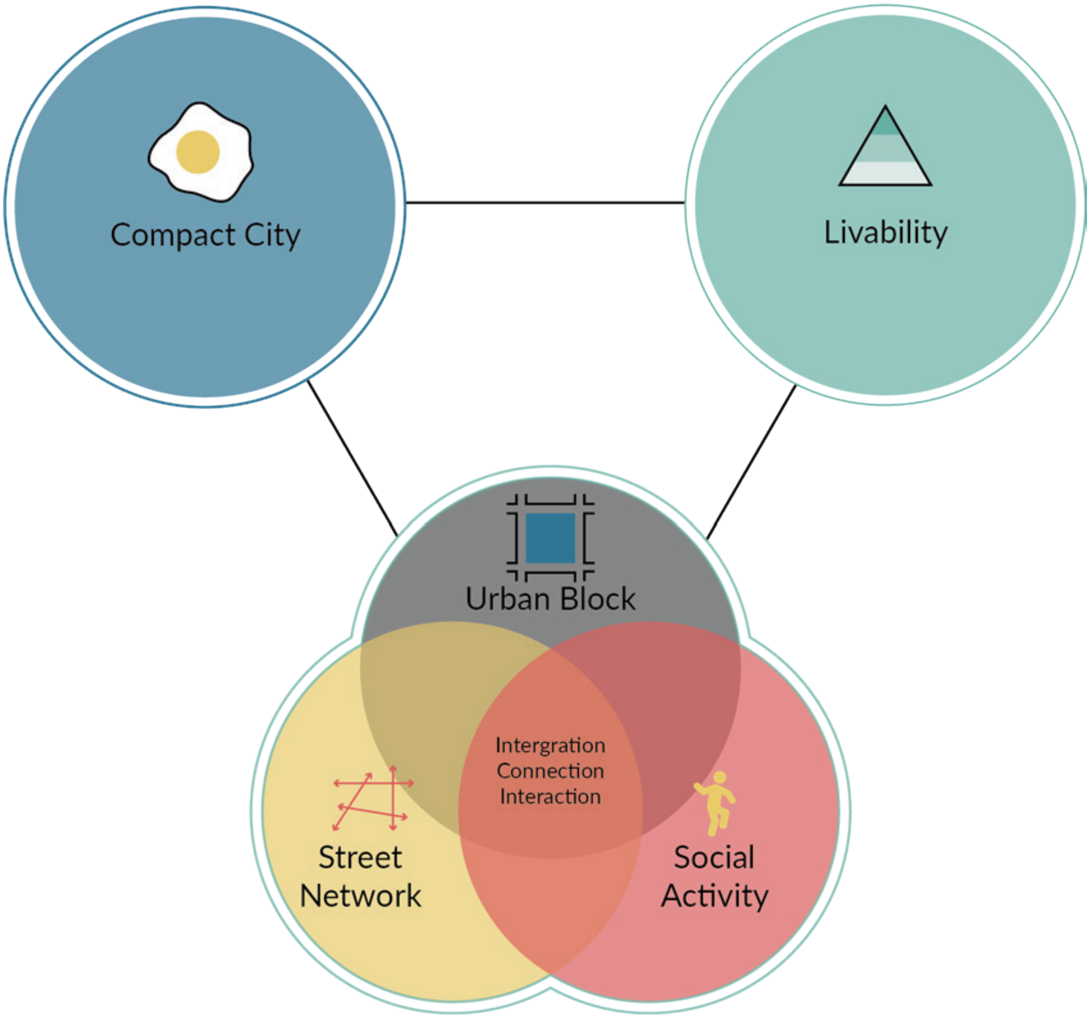
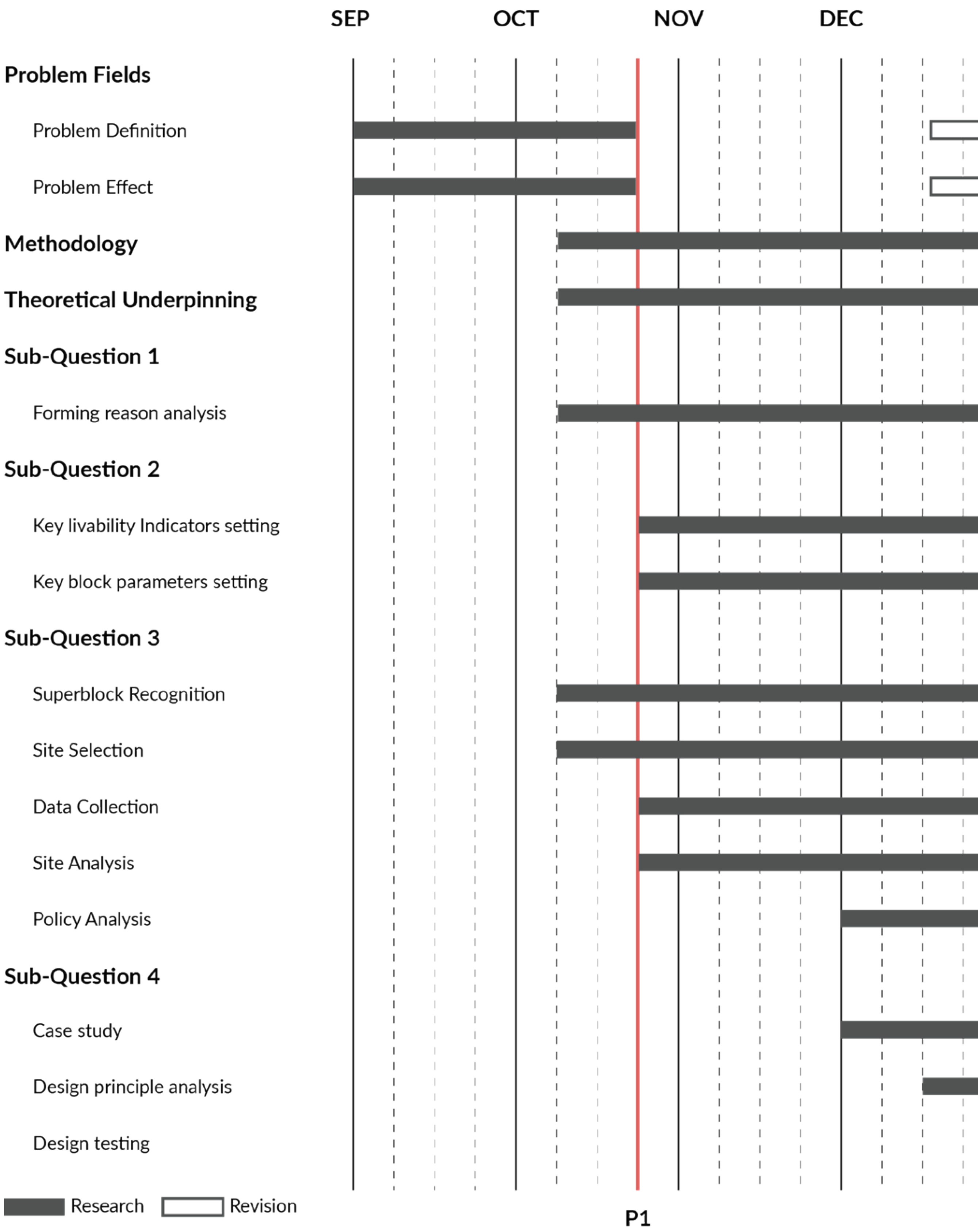


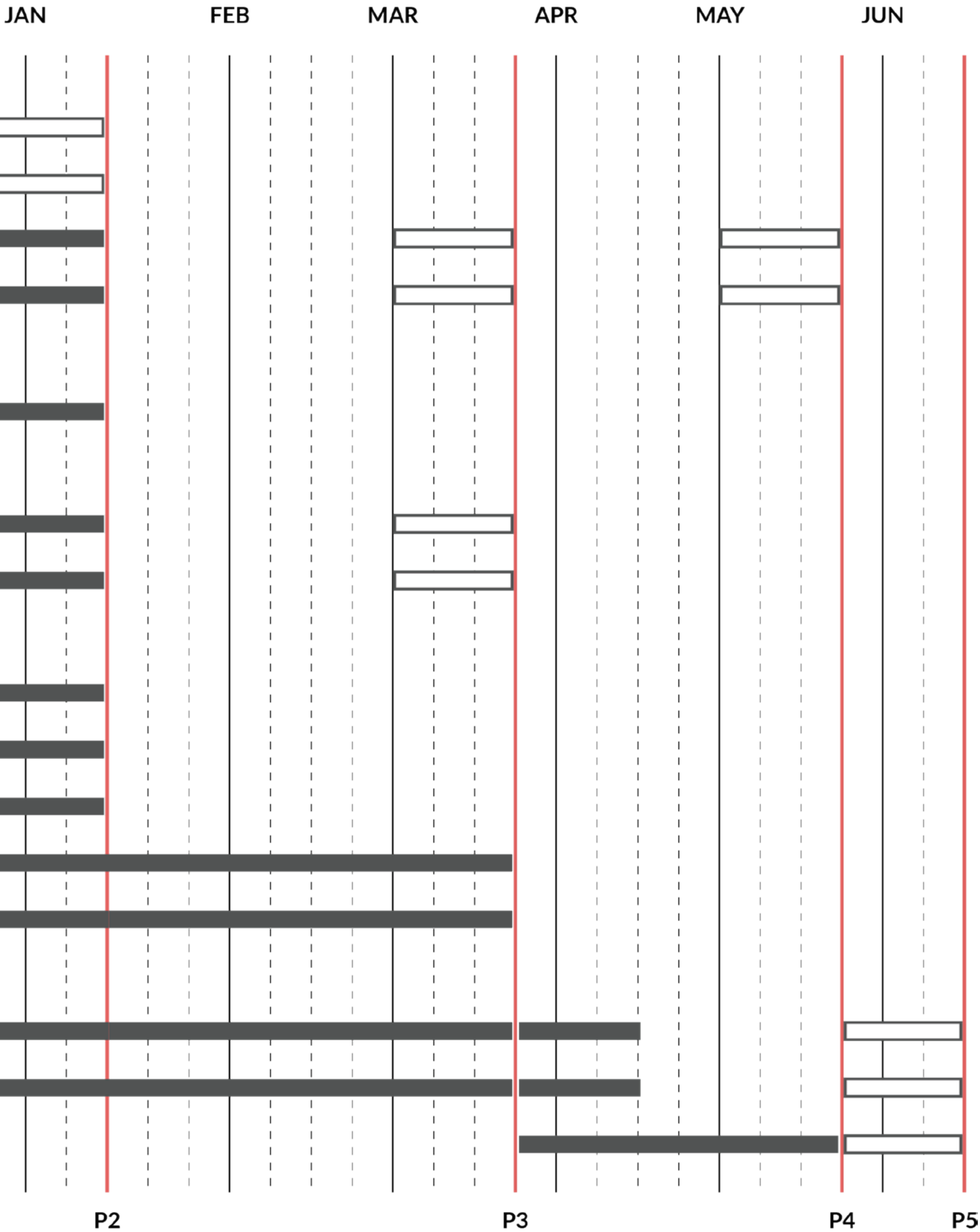
figure 3.6.4 Theoretical Framework

Theoretical Framework

The theoretical framework demonstrates the theories reviewed in this research and their interrelationships, and serves as the theoretical underpinning for this project. The compact city as a widely accepted urban development concept can be used as the basic principle of this project. A set of indicators of urban livability can be used as the criteria for this project. Both together serve as the basic theoretical background and the overall vision of the design. Interconnection theory emphasizes the integration of urban forms, networks and activities, and provides methodological support for specific analysis and design.

3.7 Research Schedule




JAN
FEB
MAR
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MAY
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P3
P4
P5

04 SITE SELECTION

This chapter will introduce how a representative site for further analysis and designing is selected and it’s basic information.

4.1 Superblock Recognition

As the first region to experiment with land leasing policies, a large sample of superblock exists in the Shenzhen Special Economic Zone (Nanshan, Futian, Luohu, Yantian), especially the earliest superblocks in China. The early superblocks were unable to meet the needs of Shenzhen, the most densely populated city in South China, in terms of both density and environmental quality. Since Nanshan, Futian and Luohu are the most central areas of Shenzhen, concentrating most of the population living and working in Shenzhen, it is a major challenge to balance the density and quality of the city. This project will use Nanshan, Futian, and Luohu as the scope of the study sample selection. (figure 4.1.1)

According to the definition of a superblock, the boundary elements need to be defined.(figure 4.1.2) The first is a separate area such as a large green space, water body, etc. Secondly, large urban infrastructures such as railroads. They are physical barriers that are difficult to cross due to their large scale and thus can be used as superblock boundaries.

figure 4.1.1 Special economic zone of Shenzhen (base on the 1980 master plan)

Another major boundary element of superblocks is urban arterial roads. In China's urban road classification, highways or expressways, as well as main arterial roads are usually dominated by automobile traffic with design speeds faster than 40km/h. However, not all roads at the secondary arterial level form a significant sense of boundary. By measuring the width of the secondary roads, and their continuity in the urban network, as well as investigating the slow traffic conditions on both sides of them on Baidu Street View, the parts that can obstruct the continuity of the neighborhood are selected out as the boundaries of the superblock . Ultimately, the superblock delineation of the core area of Shenzhen can be obtained (figure4.1.3) .

The data for this study include the 2010 shapfile provided by the Shenzhen Urban Planning Institute, online data from open street map, and related land use documents and road planning documents. Acceptable errors are inevitable due to the timeliness of the data and the limitations of manual mapping.

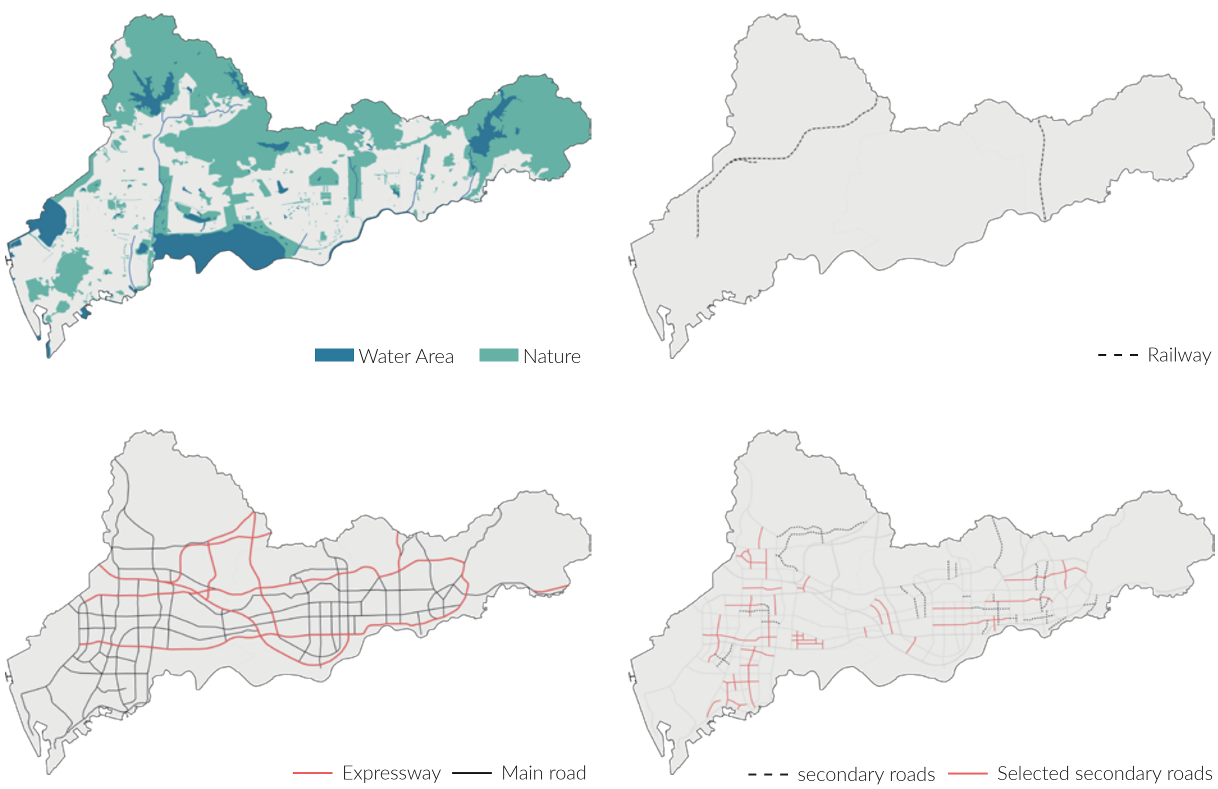


figure 4.1.2 Boundaries of superblocks

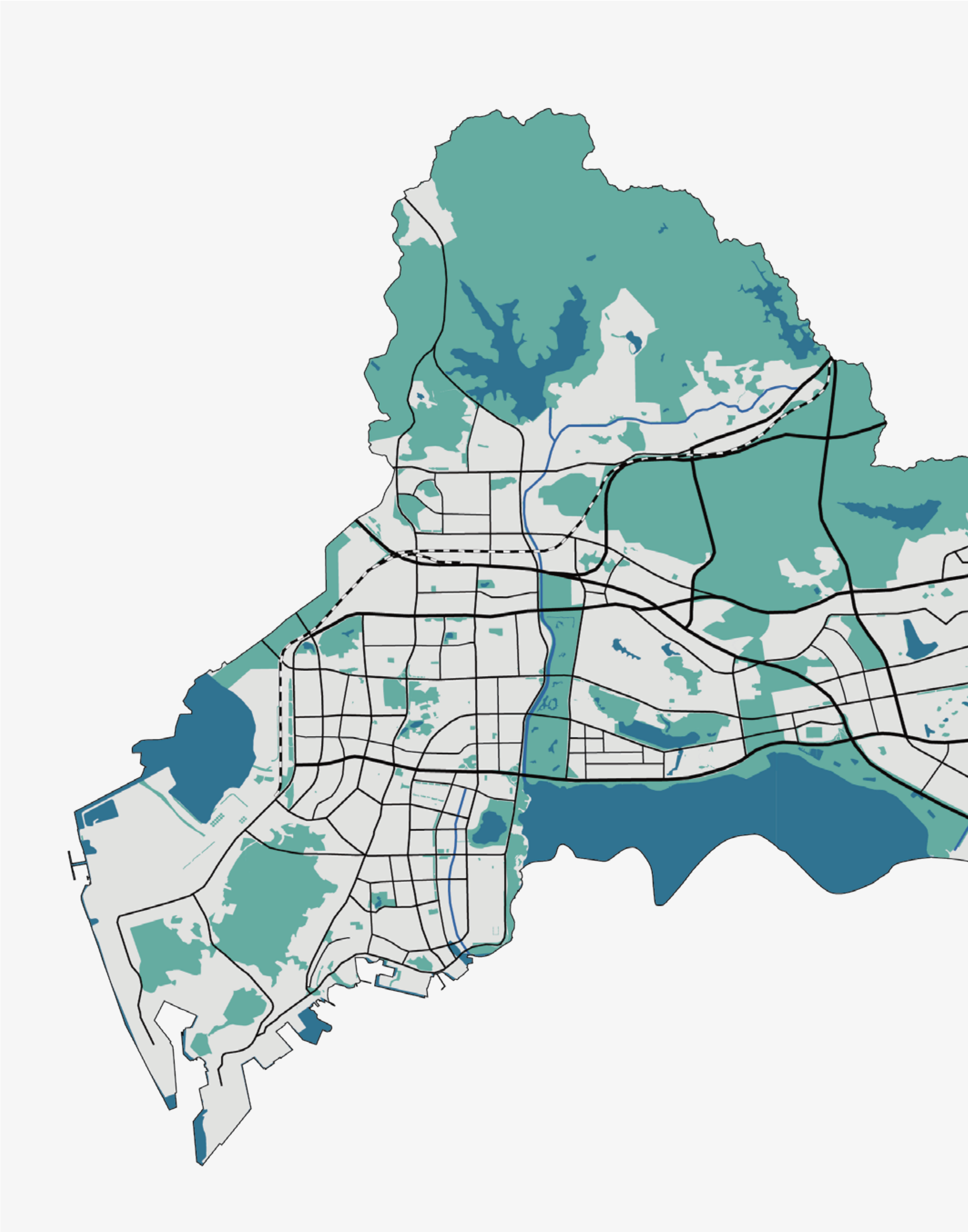
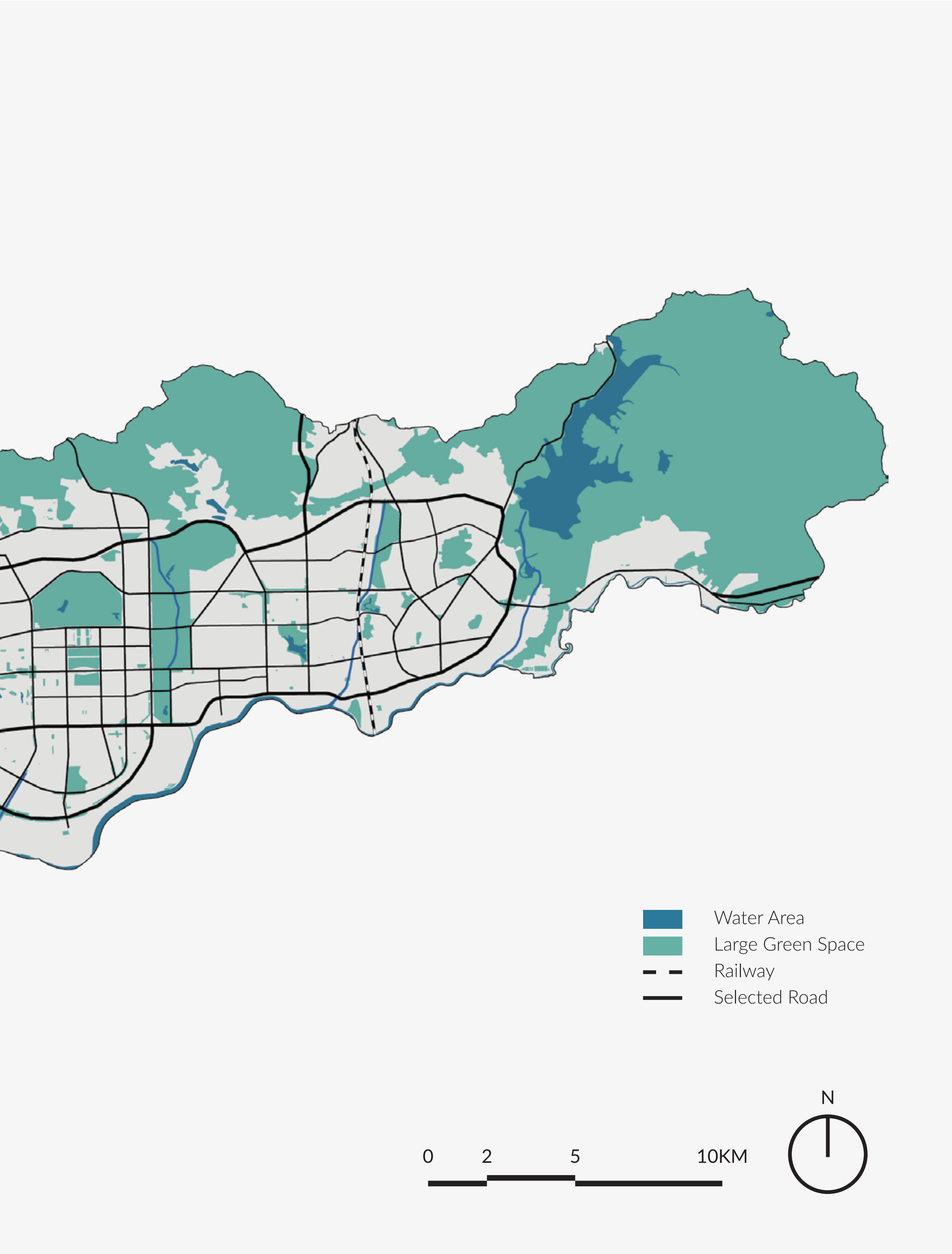


figure 4.1.3 superblock delineation of the core area of Shenzhen


Water Area
Large Green Space
Railway
Selected Road
0
2
5
10KM
N

4.2 Site Selection

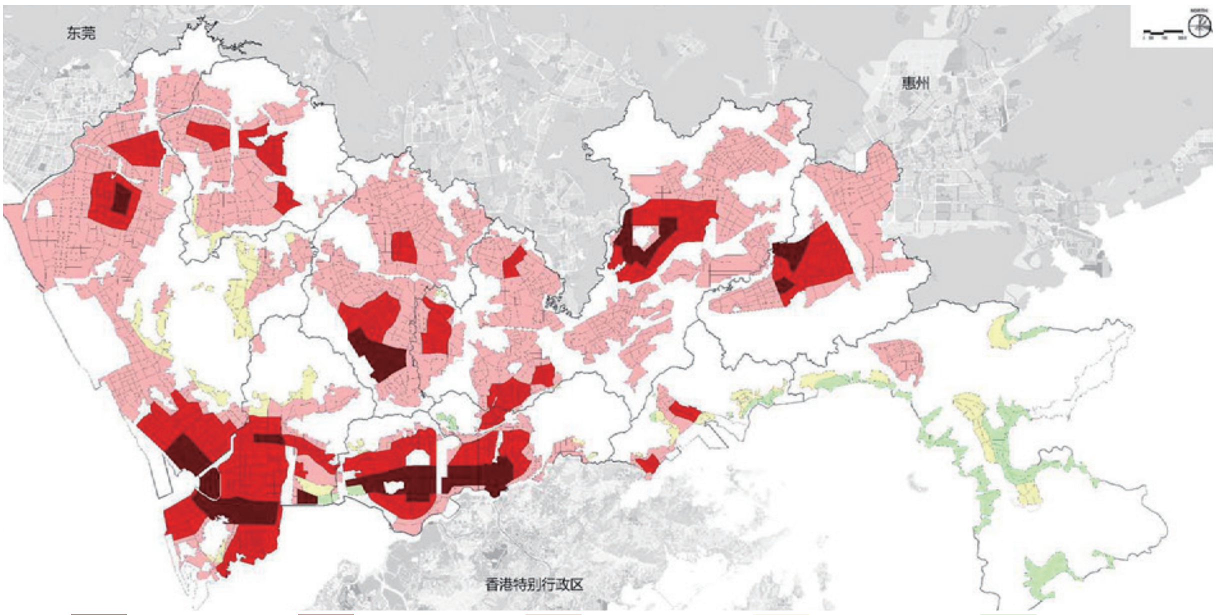
Density zoning

In order to allocate urban resources more rationally and balance urban development and ecological environment, Shenzhen has formulated strict density control regulations based on functional zoning, ecological environment, urban landscape and other factors (Shenzhen Municipal Government, 2019). There are 5 density classes for urban construction land, each class corresponds to a different FSI baseline (figure 4.2.1). For example, residential sites in Density Zone 1 need to have an FSI higher than 3.2 and no more than 6.0, while commercial sites need to be at least 5.4. In addition, depending on the location of the site and its contribution to the urban public space, there are some regulations related to FSI bonus and compensation.

The final FSI of the plot is composed of three parts: foundation FSI, transfer FSI and bonus FSI. The foundation FSI is the result of correction based on the FSI baseline specified by the density zoning, according to the scale of the plot, the number of surrounding roads and the metro stations. The transfer FSI and bonus FSI are very related to the specific project development and change dynamically, so they are ignored in this research. The research will only use the foundation FSI as the density goal for the design. Thus, the density goal for each plot:

FA=FSI baseline x (1-A1) x (1+A2) x (1+A3) x S

(A1=plot scale correction factor; A2=surrounding road correction factor; A3= metro station correction factor; S=plot area)



Zone 1 — High density development
Zone 2 — Medium and high density development
Zone 3 — Medium density development
Zone 4 — Medium and low density development
Zone 5 — low density development

figure 4.2.1 Density Zoning of Shenzhen

Plot scale correction factor

In general, the size of residential land parcel is 2ha and the size of commercial service land parcel is 1ha. When the parcel size exceeds this standard, the correction factor A1 is calculated as 0.005 per 0.1 hectare in excess. The maximum value is ≤ 0.3

Surrounding road correction factor

The correction factor is divided into four categories: one side, two sides, three sides and perimeter adjacent to the road.

catogories	one side	two side	three side	perimeter
A2	0	0.1	0.2	0.3

metro station correction factor

catogories	Distance	multi-line station	single line station
A3	0-200m	0.7	0.5
	200-500m	0.5	0.3

FSI guidelines for residential land plots

Grading	Zone	Baseline FSI	Maximum FSI
1	Zone 1&2	3.2	6.0
2	Zone 3	3.0	5.5
3	Zone 4	2.5	4.0
4	Zone 5	1.5	2.5

FSI guidelines for commercial and services land plots

Grading	Zone	Baseline FSI
1	Zone 1	5.4
2	Zone 2	4.5
3	Zone 3	4.0
4	Zone 4	2.5
5	Zone 5	2.0

figure 4.2.2 Density baseline

Residential Superblock

Most of Nanshan District, Futian District, and Luohu District are in density zones one and two (figure 4.2.3), especially in the central east-west urban axis, which is the highest density area in Shenzhen. In the north and south area near the sea and mountains, there are density zone 3 and a small number of density zones 4 and 5. Since this project focuses on the transformation of a superblock with mainly residential functions, it can be a candidate superblock sample (figure 4.2.4) when more than 70 percent of the land in a superblock is residential. Once these superblocks are located in Density Zone 1 and Density Zone 2, it means they have the most convenient infrastructure, the most active public space and the most complex urban functions. These superblocks would need to be densified in the future urban renewal process to ensure that the urban resources they occupy can be used by a larger number of citizens (figure 4.2.5) .

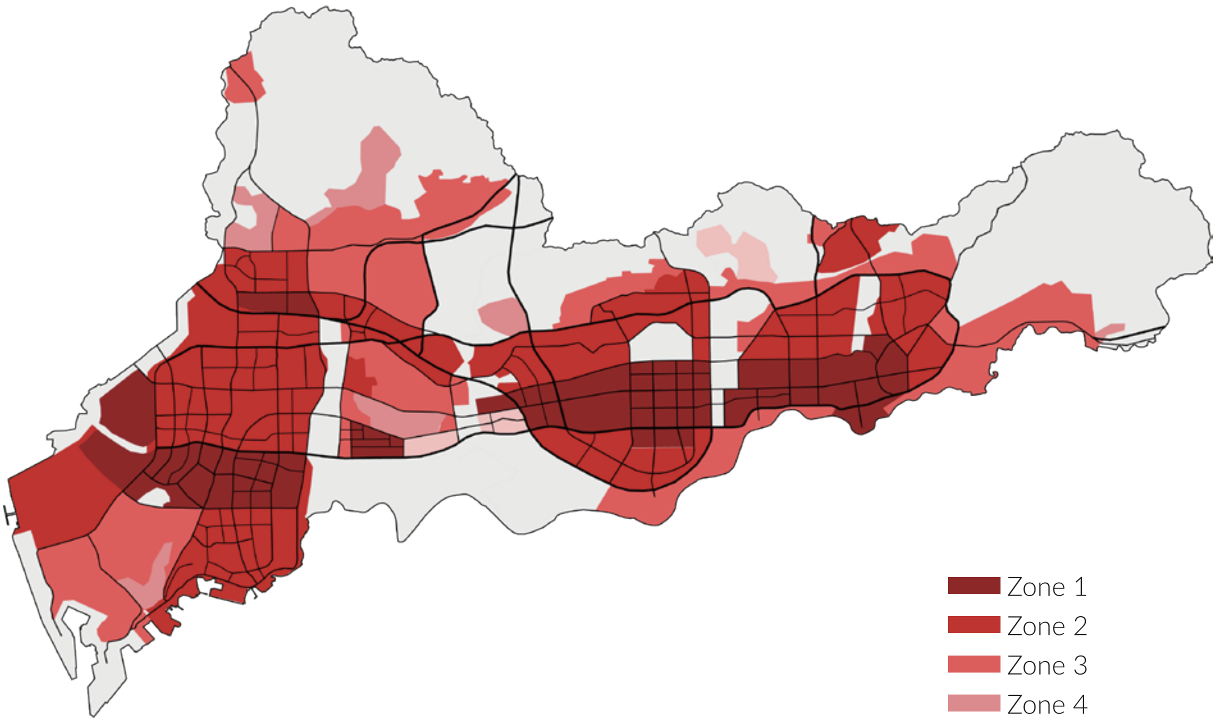


figure 4.2.3 Density zoning of core urban area

figure 4.2.4 residential superblocks

figure 4.2.5 residential superblock in density zone1 and 2

Density Gap

By calculating the current density status of these superblocks (figure4.2.6) and comparing it to the density baseline of the density zoning, the difference between the current density and the target density can be derived (figure4.2.7). The redder the color, the larger the difference, and the greater the densification needs. At the same time, a new rail station can often serve as a powerful opportunity for urban renewal. In China, the construction of a new metro interchange station implies significant government and real estate developer investment as well as large-scale commercial and residential development. Figure 4.2.8 shows the metro rail lines and interchange stations under construction in Shenzhen.

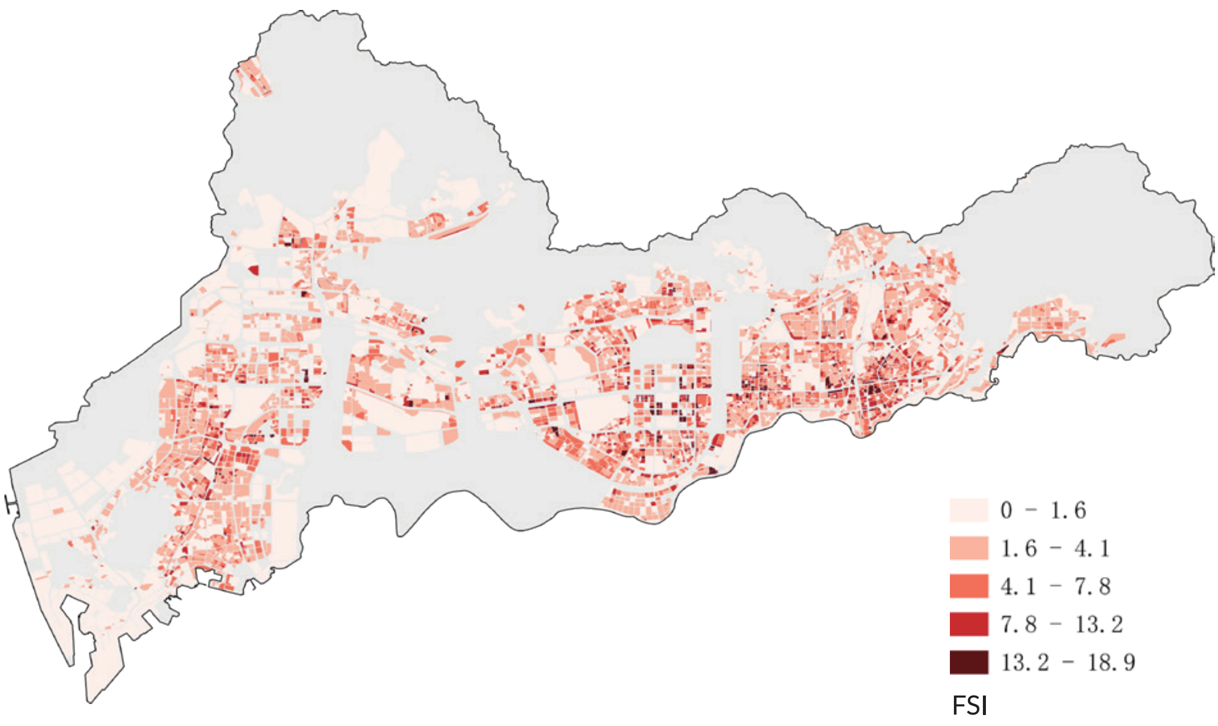


figure 4.2.6 Current FSI of each plot

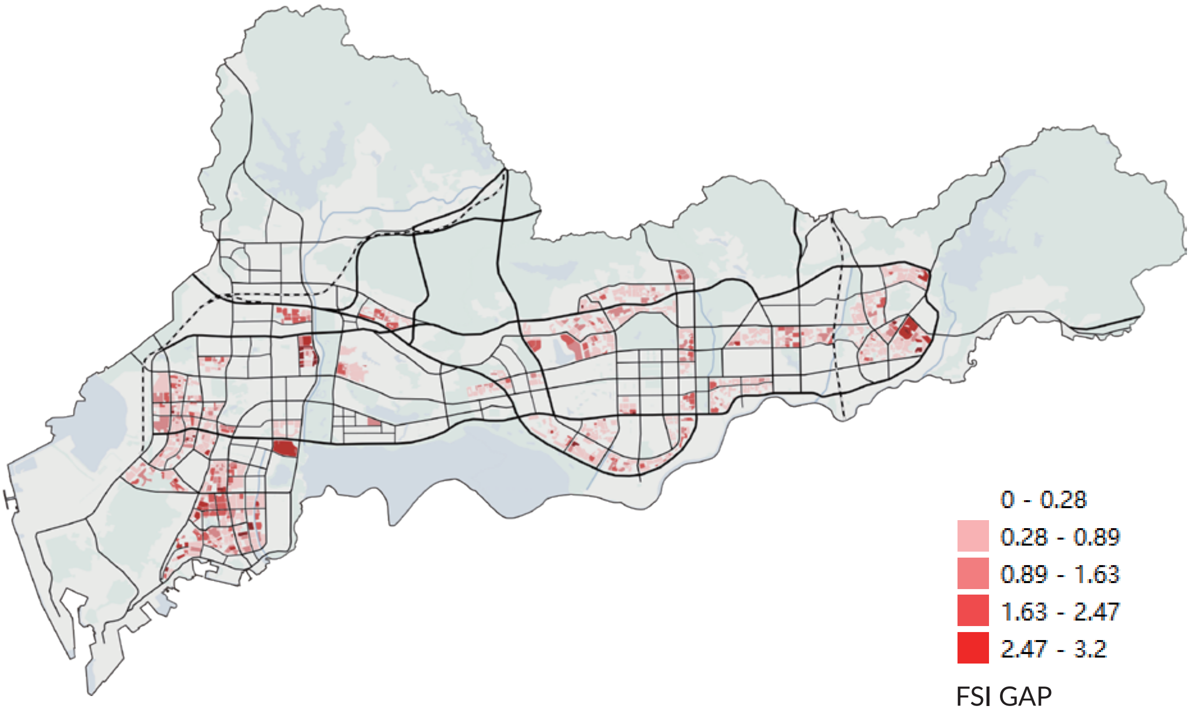


figure 4.2.7 Density gap between current and the goal

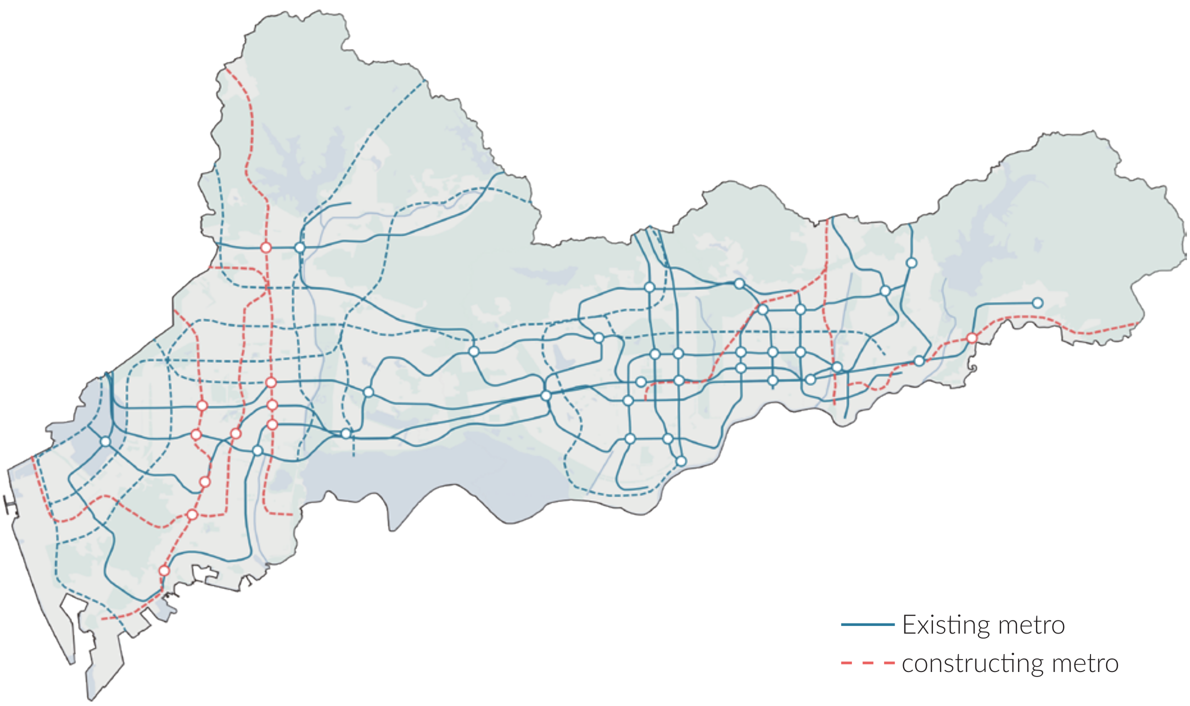


figure 4.2.8 metro line in core urban area

Based on these two conditions, I chose two superblocks located in Nanshan as the subjects of this project (Figure 4.2.9). The superblock to the north (Superblock A) is located in Density Zone 1 while the other (superblock B) is in Density Zone 2. Both superblock A and B are at low density levels and great potential for densification. At the same time, two metro interchange stations will be built on their boundaries, which means that these two superblocks have ample opportunities for large-scale transformation.

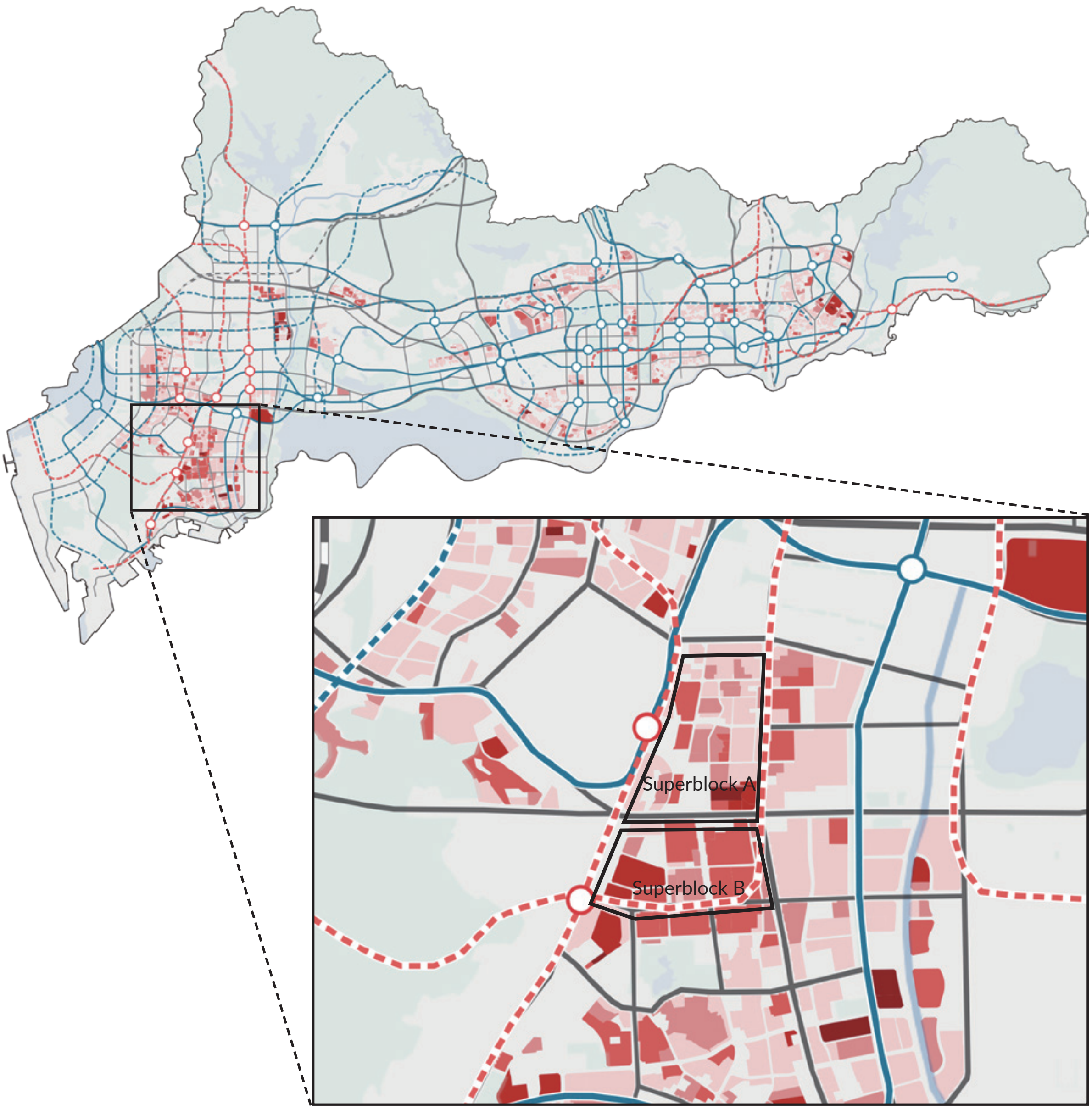


figure 4.2.9 Site location

4.3 Site Information

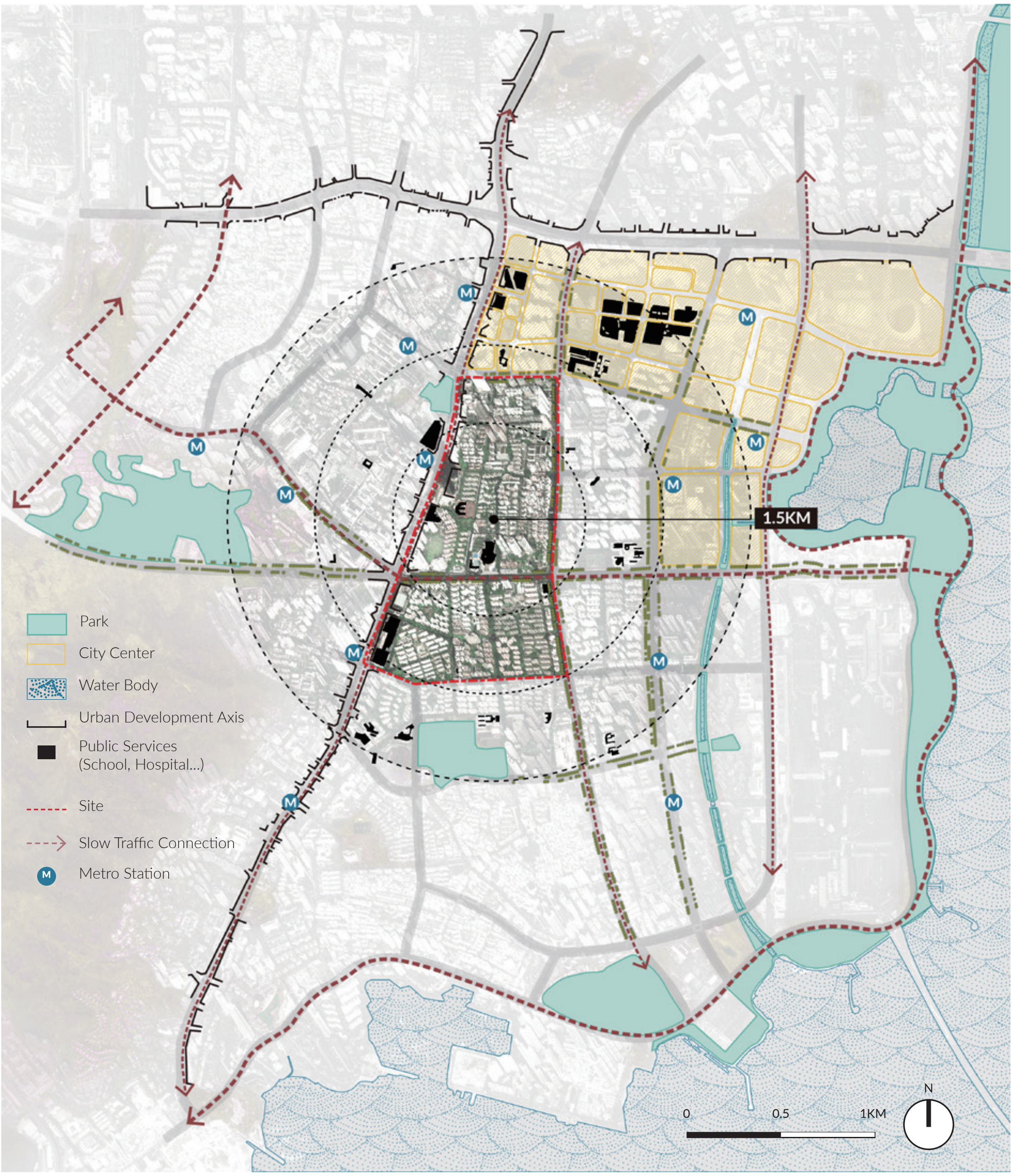


figure 4.3.1 Site mapping

These two super blocks are in the sub-core area of Nanshan. The north side is adjacent to the city's core business district, and the west side is the city's main artery, Nanhai Avenue, which is also one of the city's development axes (figure 4.3.1).

The size of the superblock A is about 800m wide and about 1000m from north to south, giving an area of about $0.7km^2$. The total building footprint is about $0.23km^2$ (33% building coverage), with a population density of approximately 737 people/ha. The size of the superblock B is about 950m wide and about 540m from north to south, with a total area of about $0.53km^2$. The built area is about $0.13km^2$ (25% building coverage), with a population density of around 463 people/ha. The population of this area is mixed with people of different ages and including local residents and migrant workers. It is mainly a residential area without industrial uses .

Superblock B consists mainly of 6 enclosed residential areas. Each closed residential area is approximately 5 ha in size and is dominated by 5-9 story slab buildings. The FSI of each enclosed residential area ranges from 1.15 to 2.29, the GSI is between 0.2-0.3, and the OSR is between 0.4 and 0.5. Fewer enclosed blocks are located in superblock A, and the area of each is smaller than in superblock B. Also, superblock A presents a richer edge-interior diversity. There are super tall buildings with FSI above 6 and dense urban villages with GSI close to 0.1 at the edge of superblock A, while the interior is a mid-rise residential slab close to superblock B.

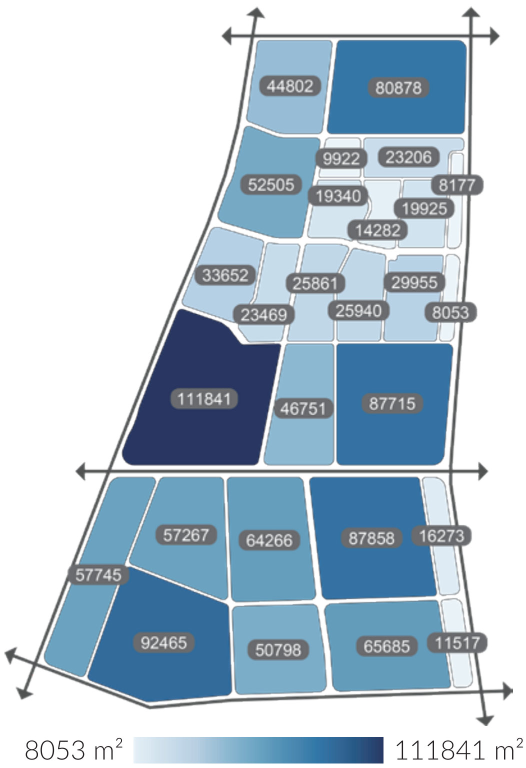


figure 4.3.2 Block area

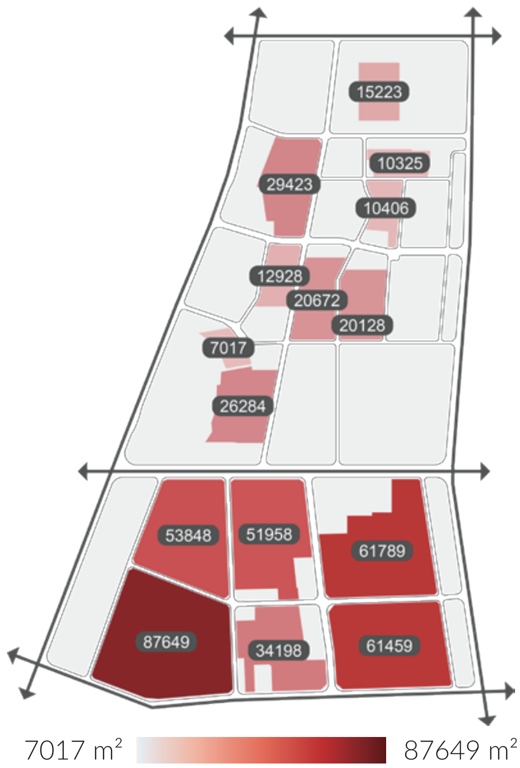


figure 4.3.3 Walled area

figure 4.3.4 Site status axonometry

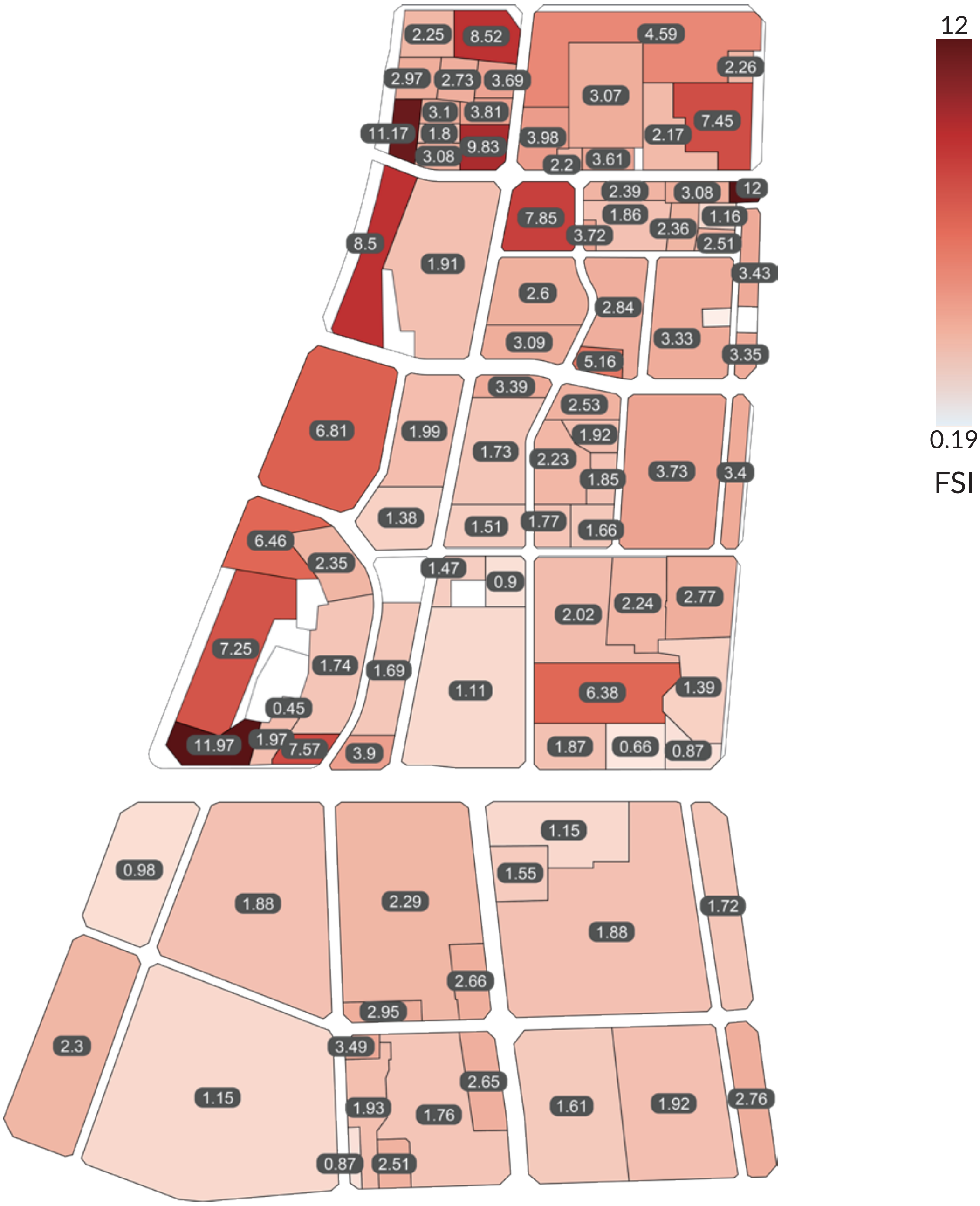


figure 4.3.5 Current FSI of each plot

The average FSI of the parcels in the site is 2.63, with Superblock A having an average FSI of 2.77 and Superblock B having an average FSI of 2. The overall density of Superblock A is higher, with a greater difference in FSI between plots and a higher degree of dispersion, with the high-density plots mainly concentrated on the west side of Nanhai Avenue. Superblock B has evenly divided parcels and less variation in density.

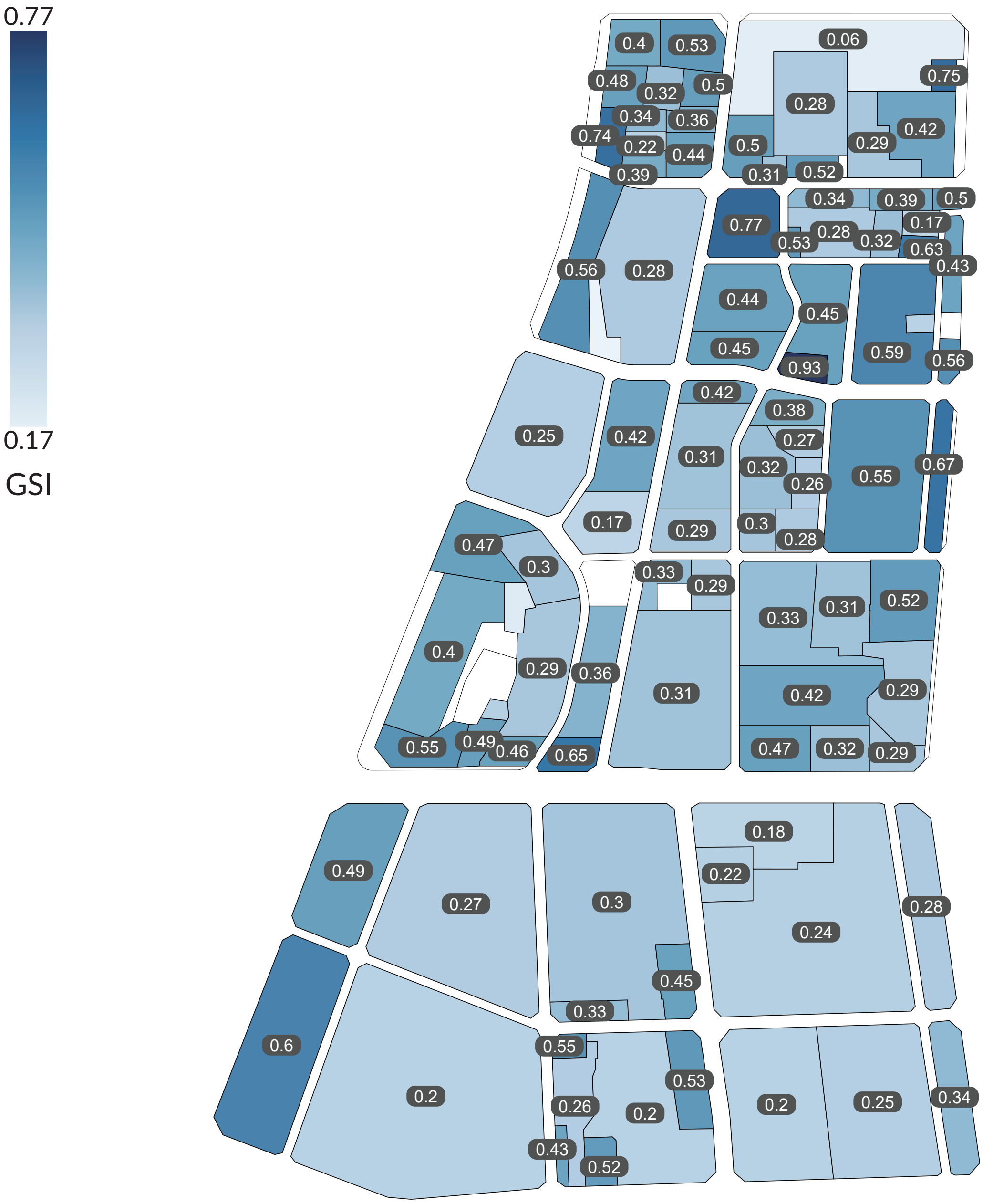


figure 4.3.6 Current GSI of each plot

The average GSI of the plots in the site is 0.33, with an average GSI of 0.32 for Superblock A and 0.34 for Superblock B. The building footprints of the two Superblocks are not significantly different. For Superblock A, the parcels with high GSI are mainly located at the edges of the superblocks. For Superblock B, the two mixed commercial and residential buildings in the middle and the large shopping mall plot on the west side have higher GSI.

figure 4.3.7 Current OSR of each plot

The average OSR of the plots in the site is 0.31, with an average OSR of 0.28 in Superblock A and 0.39 in Superblock B. Open space pressure is slightly greater in Superblock A than in Superblock B. The central and southern plots of Superblock A are relatively rich in open space. The open space in a closed block to the south of Superblock B is relatively abundant.

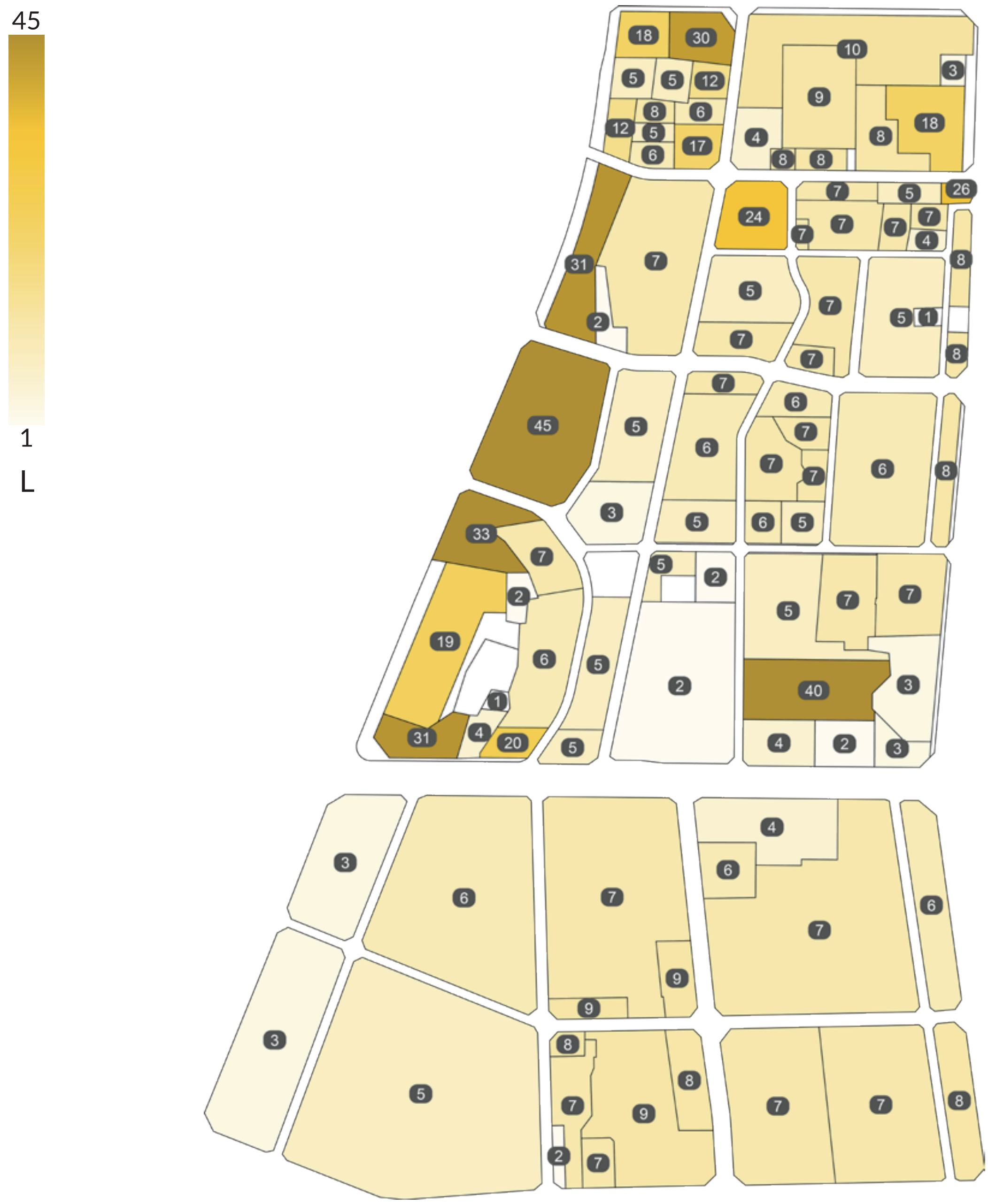


figure 4.3.8 Current average floors of each plot

It can be noticed that most of the buildings in these two superblocks are 6-7 story buildings, especially Superblock B, where the highest floor is only 9 stories. In contrast, Superblock A has high-rise buildings of up to 30 to 40 stories at the edges, while mid-rise buildings of 18-24 stories exist on the north and west sides.

05 ANALYSIS

This chapter will analyze the network structure and activity distribution, and study the interrelationship between them, so as to find out the spatial logic behind the problem of superblock, and provide principles for the design

5.1 Network Analysis

Network Classification
To explore how to increase the accessibility and diversity of superblocks, it is first necessary to understand the distribution of the current road network and activity types within the superblocks. Inspired by Chen's research (2017) on Chinese superblocks, the road network is classified into five major types: Global Road, Glocal Road, Local Road, Internal Road and Private Road, which represent different levels of connection structure in the urban network (figure).

Global Road: Mainly refer to urban arterials that form superblock boundaries and form a super grid of the city. They are usually more than 30m wide and 6-lane dual carriageway. They often overlap with subway lines, elevated highways, bridges, underground tunnels and other multi-level connections.

Glocal Road: Mainly refers to roads that connect adjacent superblocks. This means that Glocal Roads have intersections with Global Roads, where both automobile and pedestrian can move from one superblock to the neighboring superblock through Glocal Roads. They are usually less than 24m width.

Local Road: Mainly refers to the roads within a superblock that link to Global Road directly, but do not provide access to cross the Global Road to the neighboring superblocks. They are normally less than 15m in width

Internal Road: Mainly refers to the roads within a superblock that do not directly connect to the Global Roads but just providing internal link. They are typically less than 10m in width.

Private Road: Mainly refers to the roads in gated communities that provide access only to residents living in the community. Most of them are cul-de-sac.

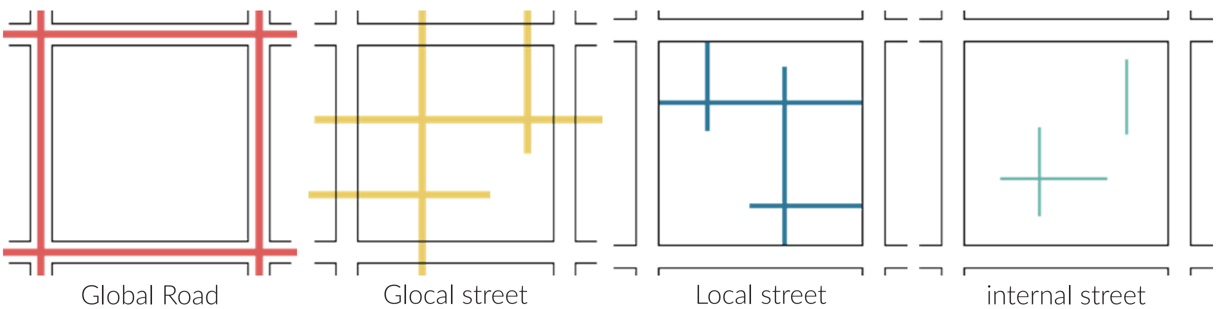


figure 5.1.1 Current OSR of each plot

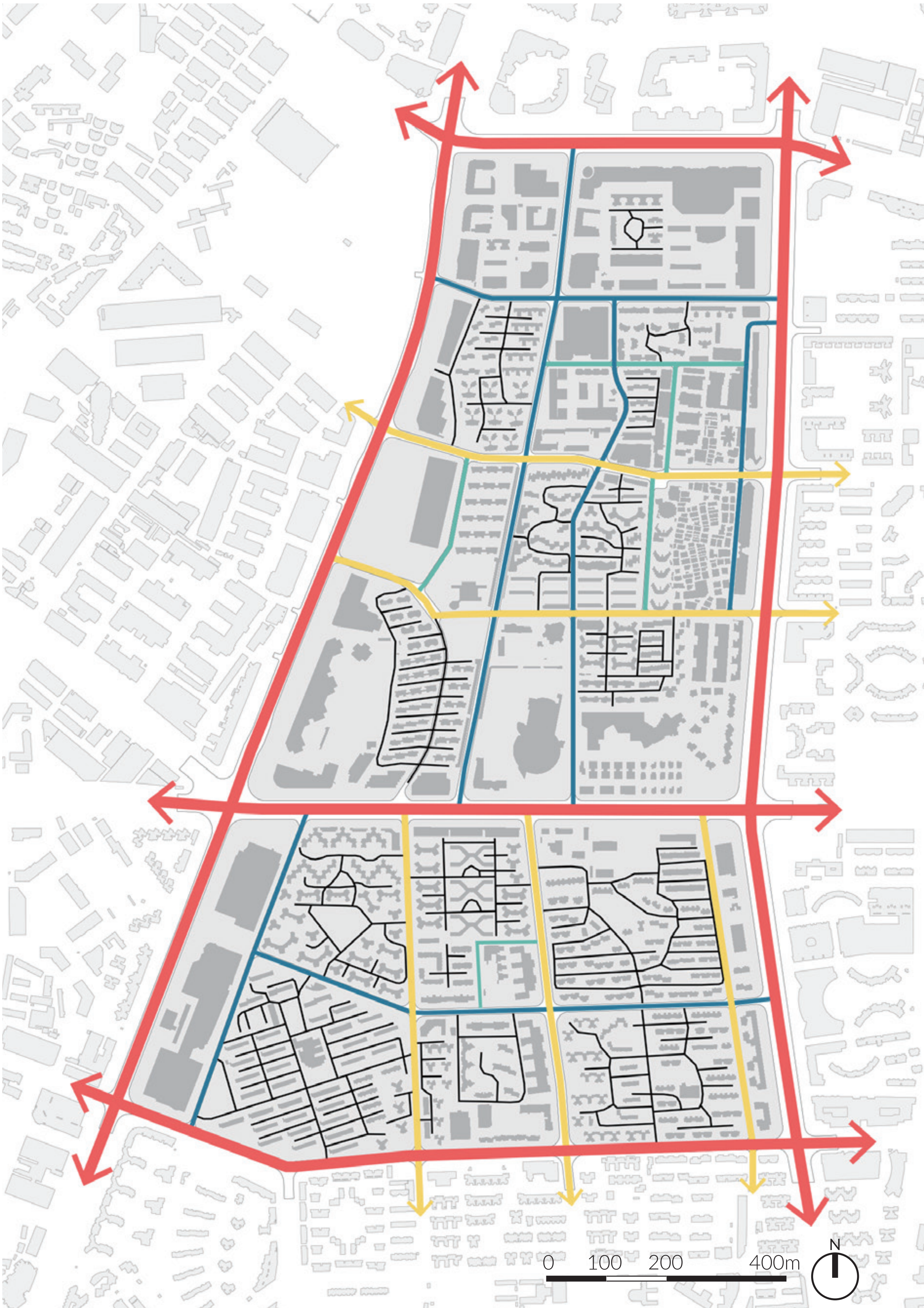
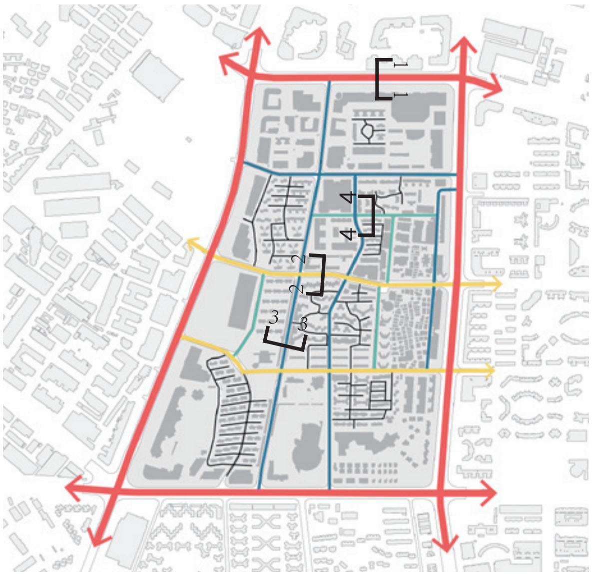
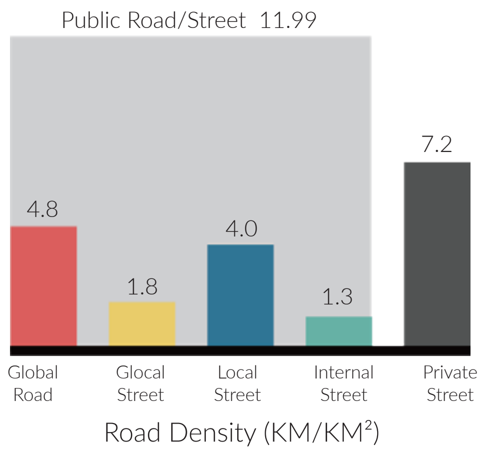
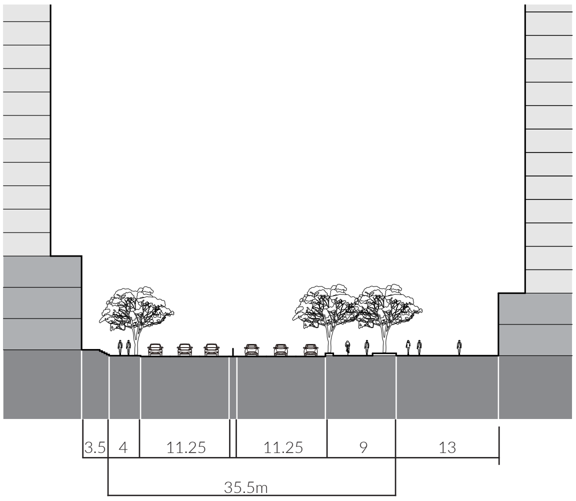


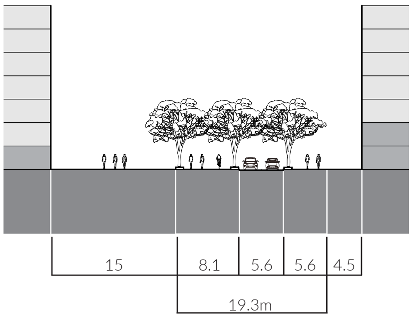
figure 5.1.1 Current OSR of each plot







Global Road 1-1

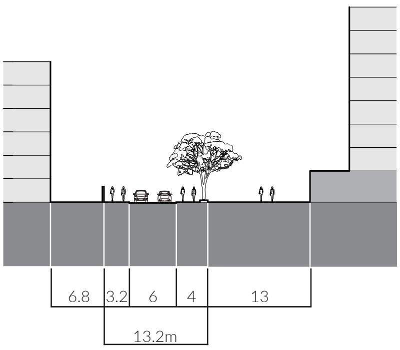


Glocal Street 2-2

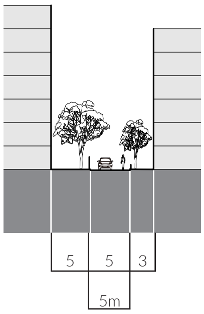
Network in superblock A

The densities of the four street types are able to provide a quantitative interpretation of the street network. As can be seen from the figure, among the four road types in Superblock A, Global Road and Local Street have higher road densities of 4.8 km/km² and 4.0 km/km², respectively. This indicates that this superblock has a good global-local connection, but the lower glocal road density shows that this superblock is not well connected to the neighboring superblocks.

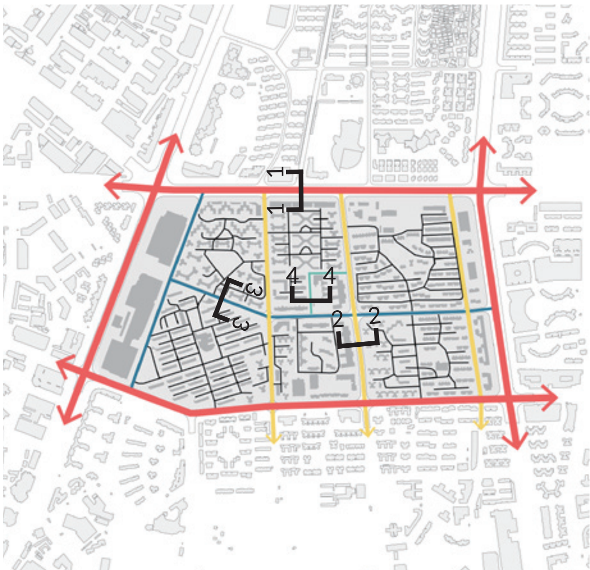
The street profiles reflect the hierarchical differences between the four street types. Global Road in Superblock A is approximately 35m wide and includes three lanes in each direction and more than 4m of pedestrian space on one side, but lacks bike lanes. Glocal Road is approximately 20 m wide and includes two lanes in each direction and more than 5m of pedestrian space on one side, again without bike lanes. Local Street is approximately 13m wide, with narrower lanes and sidewalks, and the buildings on either side are less functional than the previous two. Internal Street does not make a distinction between pedestrian and vehicular traffic.

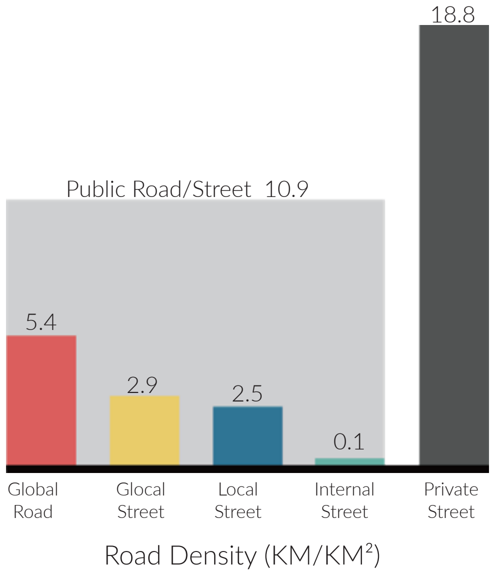


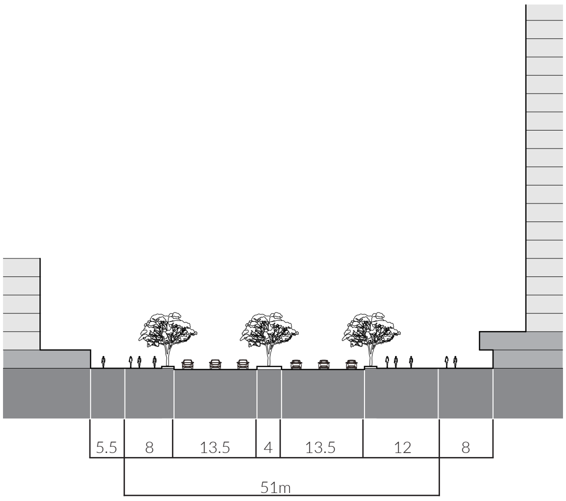
Local Street 3-3



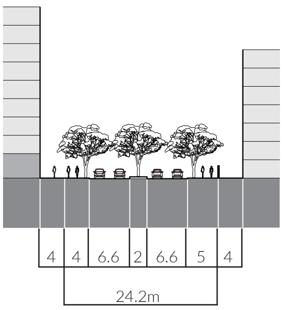
Internal Street 4-4







Global Road 5-5

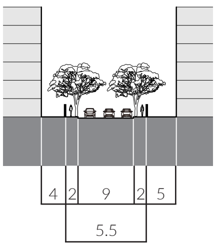


Glocal Street 6-6

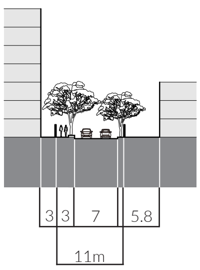
Network in superblock B

In Superblock B, Global Road still has the highest road density, while Glocal Road has the second highest density, indicating that Superblock B has better connectivity to adjacent superblocks. However, the lower Local Street density and the absence of Internal Street result in a non-site density of public roads in Superblock B. This is replaced by an extremely high Private Street density due to the closed blocks that occupy almost the entire Superblock B.

The roads in Superblock B are wider than those in Superblock A. Global Roald and Glocal Road add green space in the center of the road and wider pedestrian space compared to the Superblock A sample, but the functional richness of the first floors of the buildings on either side is reduced. local Street adds temporary motor vehicle parking space, but the pedestrian area is narrower. Internal Street adds separate vehicular and pedestrian distinctions.



Local Street 7-7



Internal Street 8-8

5.2 Activity Analysis

Activity Classification
Most daily activities can be divided into four functions: consumption, production, service, and residence, each of which includes a number of corresponding architectural functions. The following are the definitions of these four activities:

Consumption Activity: Consumption activities is the purchase of good and services by individuals or households. It is one of the most basic social activities in the city, which includes various types of retail, catering and entertainment, etc.

Production Activity: Production activities are the organized conversion of resources into goods or services (both physical and intellectual) and include a variety of companies, factories, manufacturing industries, etc.

Service Activity: It mainly refers to non-profit social services that assist production, consumption, and residential activities, including various governing, educational, medical, and logistics functions.

Residence Activity: This refers mainly to all long-term and short-term residential activities, including all kinds of apartments, houses, and hotels.

CONSUMPTION	Entertainment	KTV, Gym, Opera, Cinema
	Retail	Supermarkets, All kinds of Shop
	Catering	Restaurants, Food Stores
SERVICE	Governing	Government
	Education	All kinds of School
	Medical	Hospital, Nursing Home
	Parking	Parking lot, parking building
	Logistics	Post office, Express
PRODUCTION	Working	All kinds of Offices
	Manufacturing	All kinds of factories
RESIDENCE	Short term	Hotel, Airbnb
	Long term	House, Apartment

figure 5.2.1 Activities Classification

figure 5.2.2 The distribution of activities in the building

Activity Distribution

The distribution of activities within the superblock is complex, as there is often a mix of different functions in the same building. In the process of mapping the distribution of activities in the superblock, the main criteria is based on the type of site in the plan and the main use of the building podiums and towers. As seen in the figure 5.2.2, the whole site is dominated by residential activities, followed by consumer activities. Consumption and production activities tend to cluster at the edges of the superblock and sub-block, but the distribution of consumption activities is usually more continuous, while production activities are more dispersed. Service activities, on the other hand, are relatively more present in the interior of the superblock.

To get a more careful understanding of the various activities within the superblock, I obtained publicly available POI (point of interest) data from Baidu Maps, a type of geographic information point that records names, categories, coordinates, and classifications, in order to obtain a more detailed view of activity locations as well as aggregation (figure 5.2.3) The edge aggregation effect of non-residential activities can be seen more clearly, especially for Superblock A, where it can be clearly seen that consumer and service activities are distributed almost all along Global Road, as well as concentrated along Glocal Road and at the Global-Glocal and Glocal-Local intersections. For Superblock B, the activity points are not linearly distributed along the road, but are instead concentrated at a Glocal-Local intersection in the middle and at a mall off Global Road on the west side.

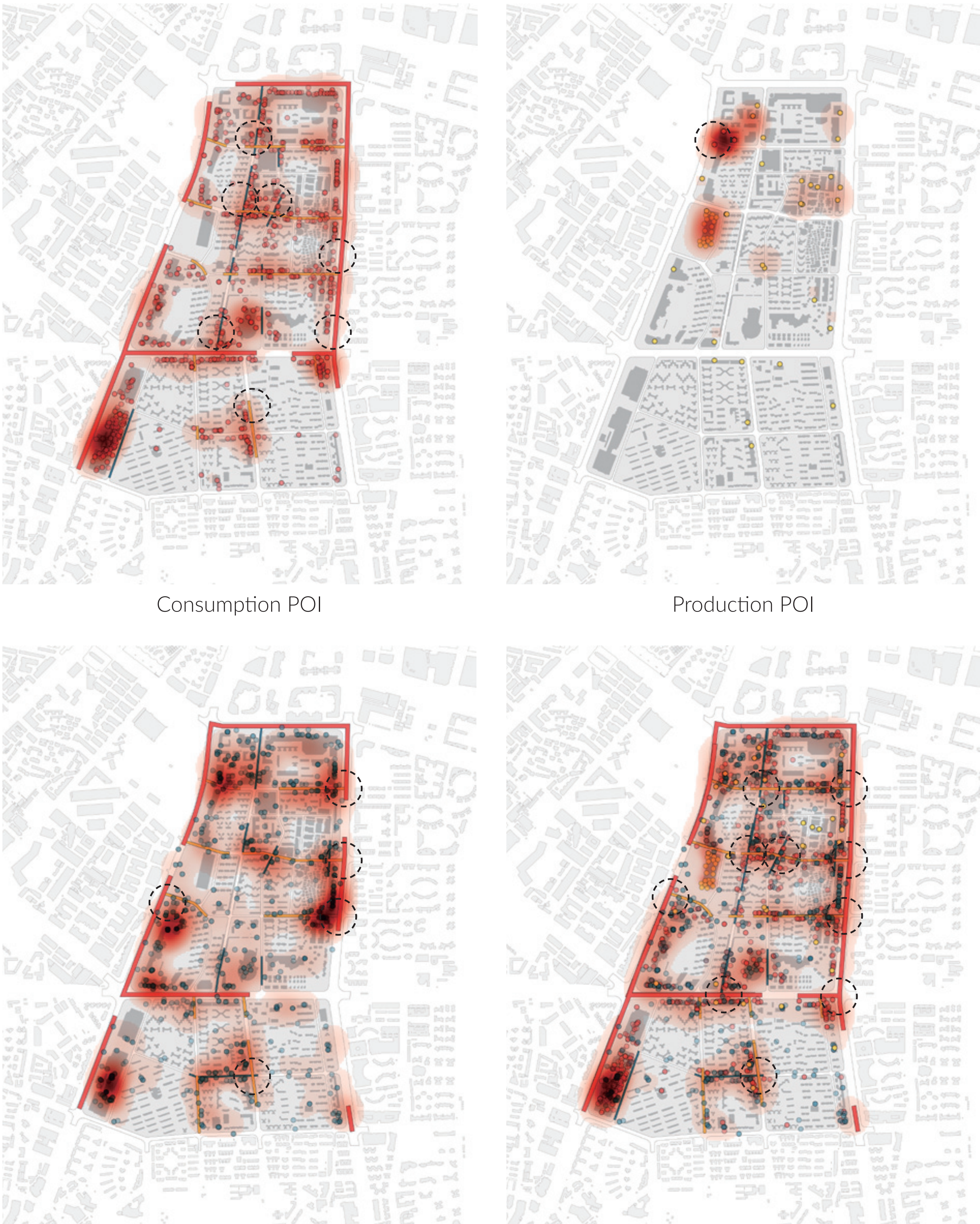


figure 5.2.3 Activities points distribution

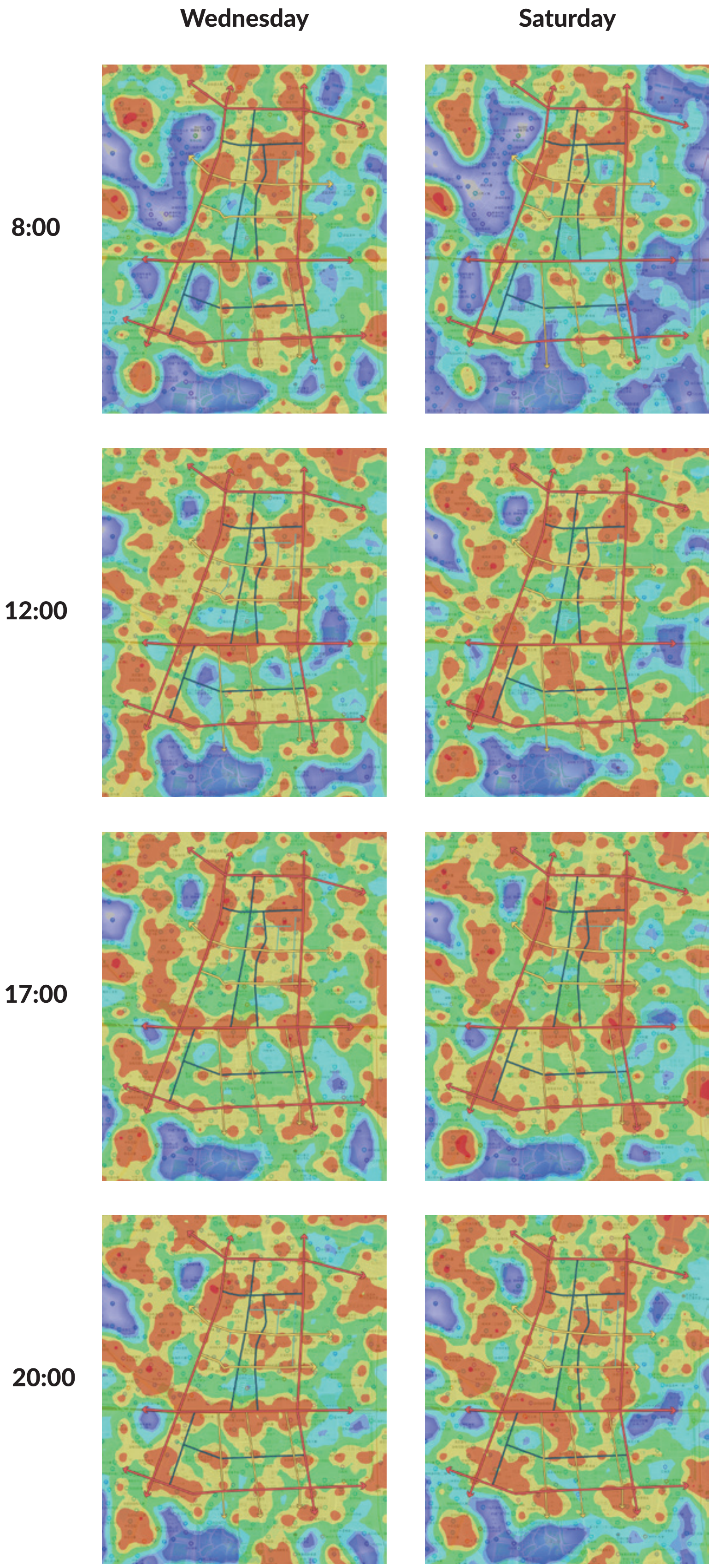


figure 5.2.3 Heat map of people flow in different time periods

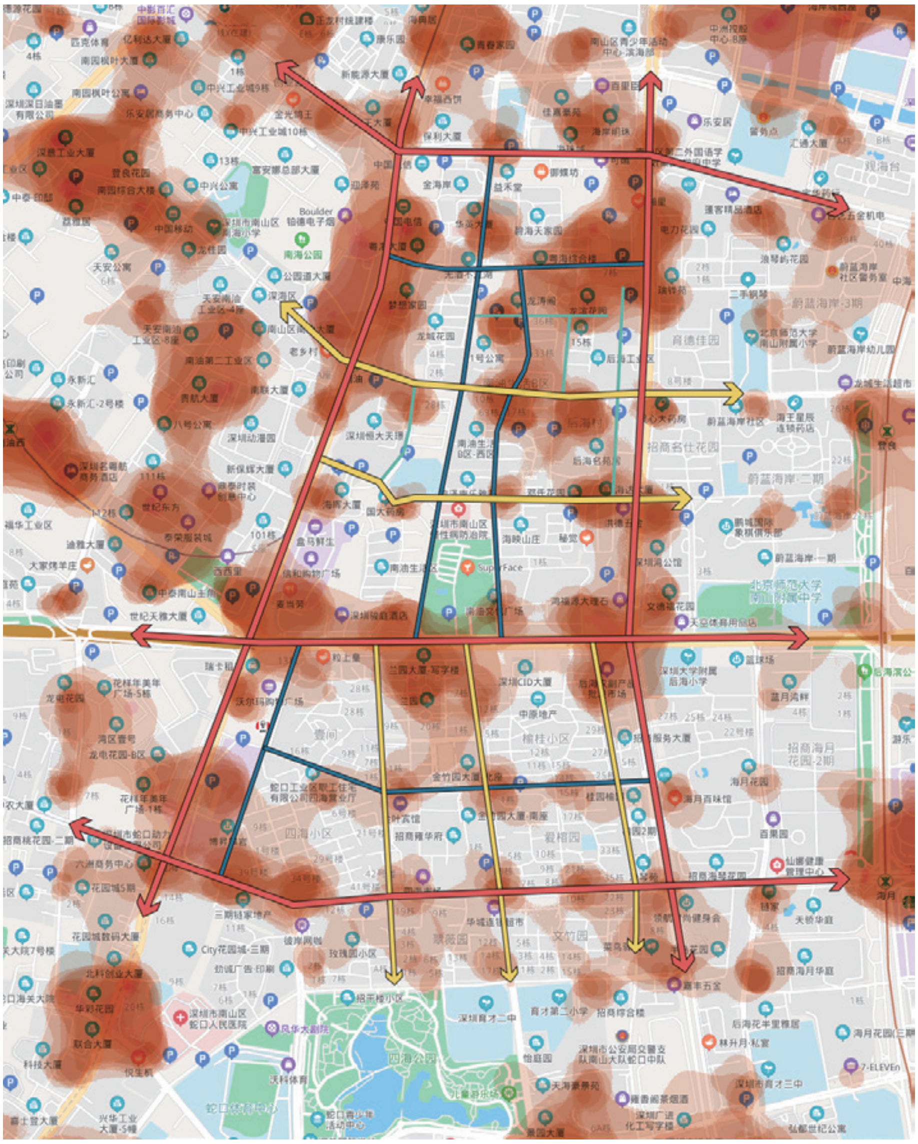


figure 5.2.4 Heat map of people gathering

Heat map of people gathering

By obtaining the heat map of the crowd from the big data of Baidu Map, we can observe the distribution, density and trend of the crowd in the city at different time periods to a certain extent. I took the heat map of a Wednesday weekday and a Saturday rest day at 8:00, 12:00, 17:00, and 20:00 for the site and the surrounding area (Figure). The redder the color in the graph, the more people are gathered. The above diagram reflects the most important areas where people gather in and around the site. Comparing with the distribution of activity points, it can be found that the gathering of activity points shows a high overlap with the gathering of people, and the places with high gathering of people tend to have high gathering of activity points, although the reverse is not necessarily true.

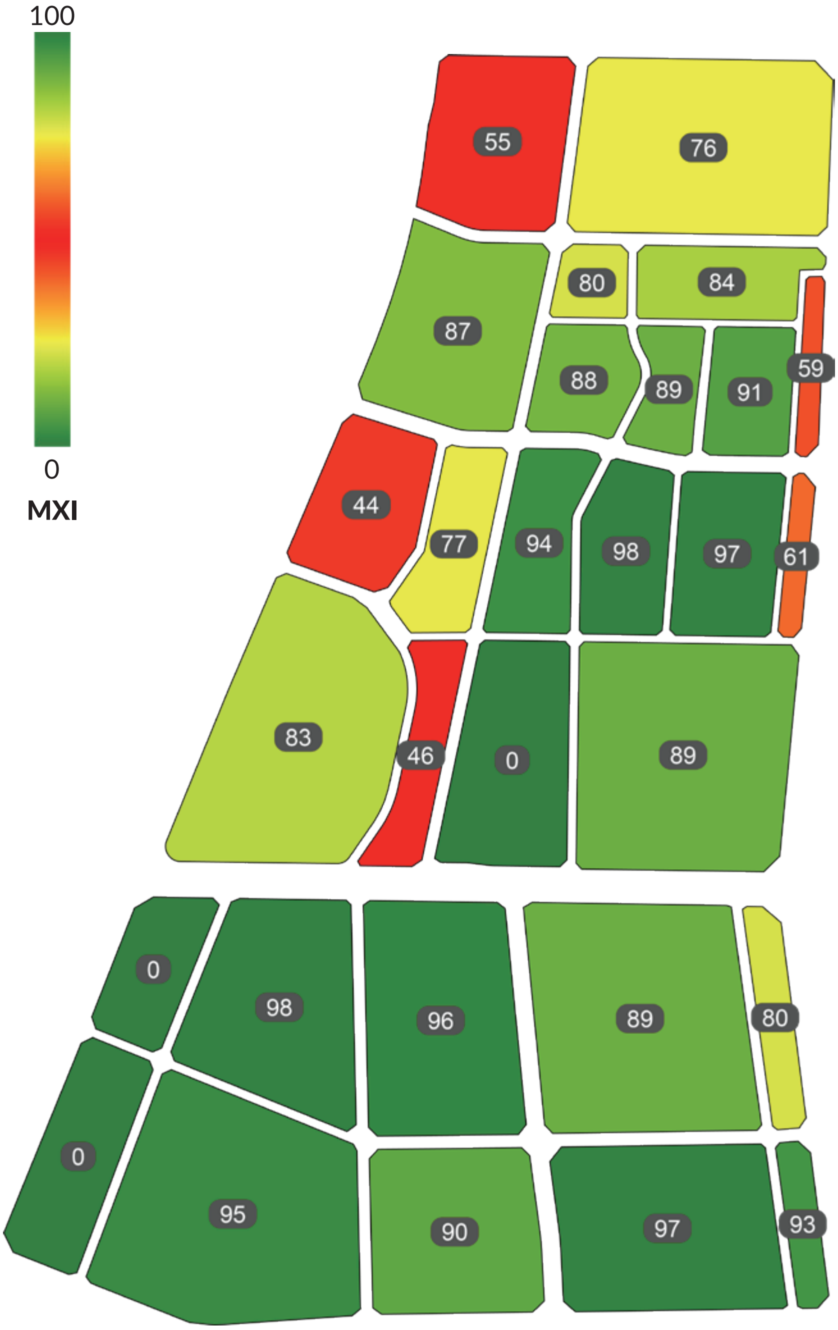


figure 5.2.5 Current MXI of each block

Mixed use of superblock

By calculating the MXI for each sub-block, the degree of mixed utilization of the super-block can be understood. The figure above shows that Superblock A has a significantly higher degree of mixed use than Superblock B, especially in the marginal subblocks. Superblock B, on the other hand, has a more absolute distinction between residential and non-residential.

5.3 Interrelationship of Network & Activities

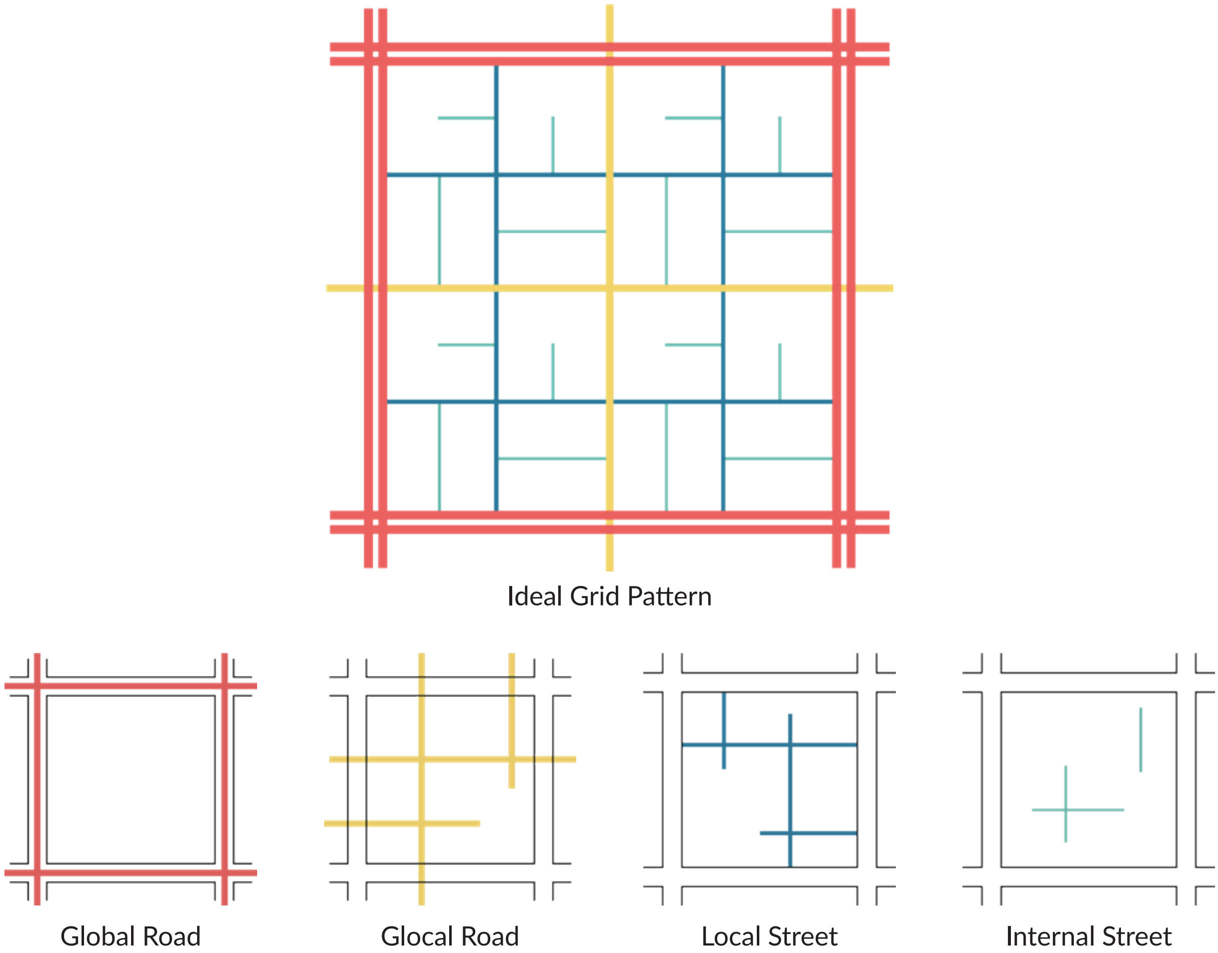
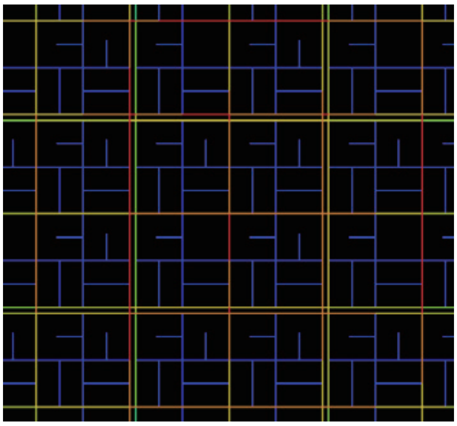


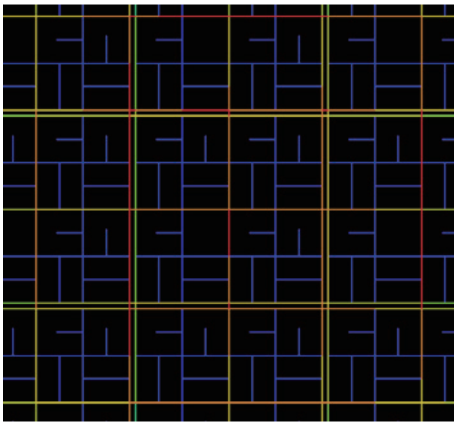
figure 5.3.1 Ideal superblock grid pattern

Ideal grid pattern

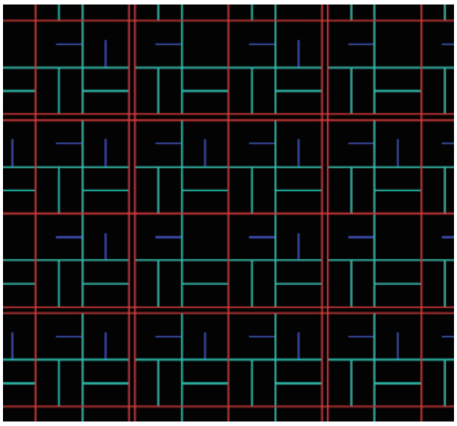
Based on the definitions of Global Road, Glocal Road, Local Street, and Internal Street, we can obtain an ideal superblock network model to analyze the roles played by different road hierarchies in the overall network structure. It is particularly important to note that since Glocal road is difficult to cross for both pedestrian and vehicular traffic, except for specific intersections, and has strong directional distinctions, it is represented here using double lines. Next I will analyze the performance of this network using spatial syntax and later compare it with an actual superblock network.



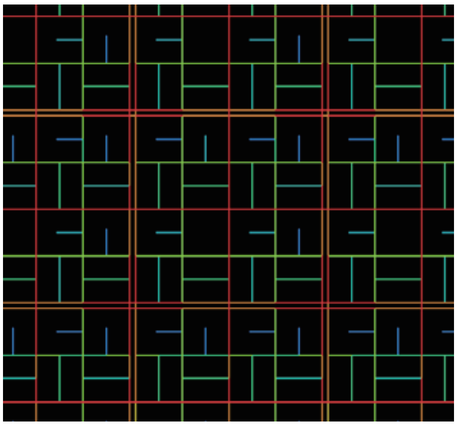
Choice R=n



Choice R=1000m



Integration R=n



Integration R=1000m

figure 5.3.2 Space syntax analysis of ideal grid

Global Scale (R=n)
Choice indicates the likelihood of a path being passed through from all spaces. The degree of integration indicates the proximity of the path to the overall space, and networks with a high degree of integration tend to have a higher potential for activity aggregation. Global Road and Glocal Road have high choice and integration degrees, and they both play the role of skeleton in the overall network. Local Road and Internal Road are less choice and less integrated and can be considered to have a limited impact on the overall network.

Glocal Scale (R=1000m)
Since the size of superblock tends to be 500m-1000m, 1000m is chosen as the study radius for the analysis of the network. At the same time, 1000m is also the limit of human walking comfort range. Global Road and Glocal Road still have the best choice and integration, but Glocal Road has a better integration. This suggests that, at the walking scale, Glocal Road can has a higher degree of integration and the potential to attract activity aggregation. It might because Glocal road as an intermediary, connecting Global network and local network, can provides medium distance movement between superblocks.

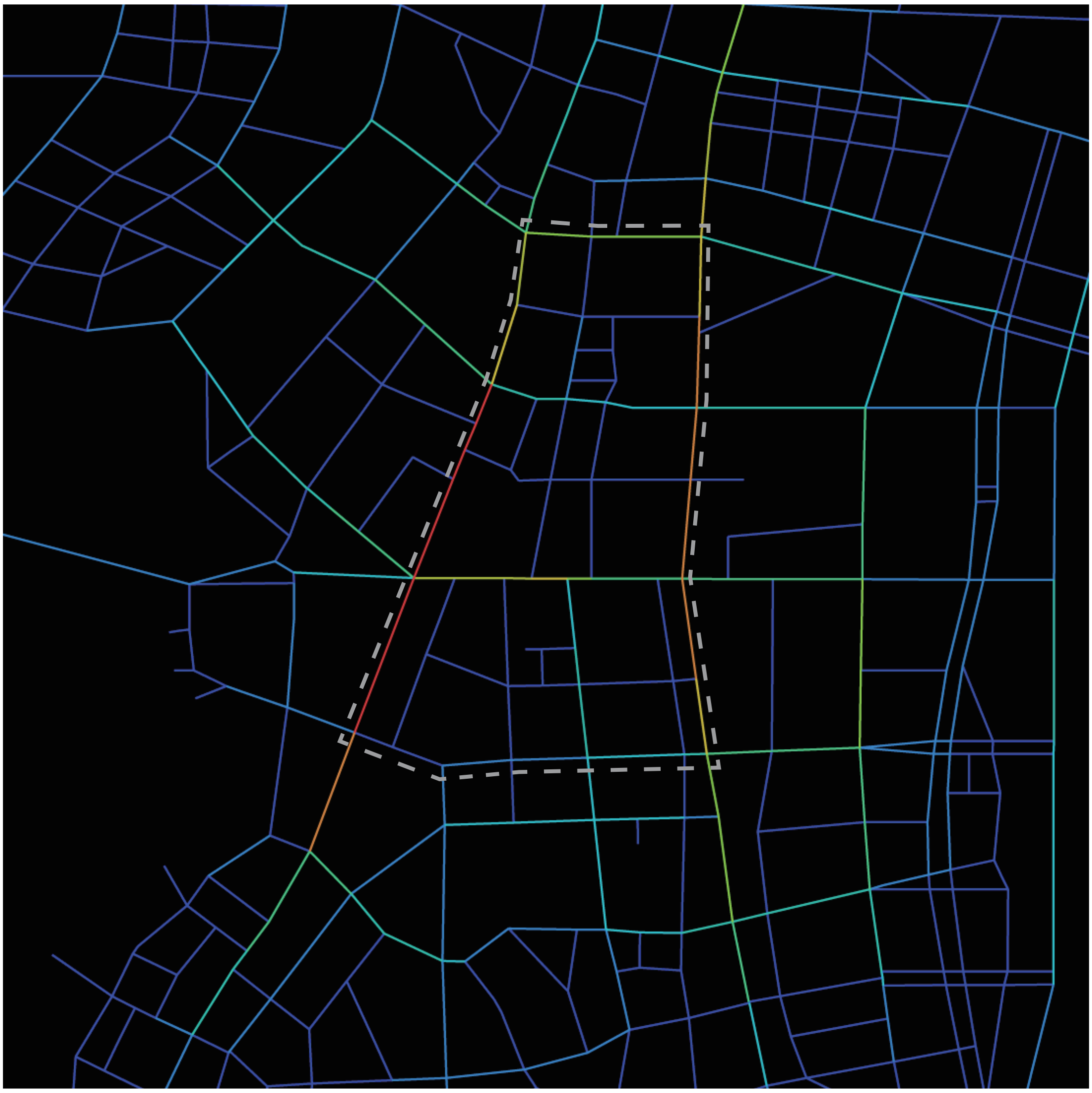


figure 5.3.3 Space sytax analysis of Choice index (R=n)

Global Scale Analysis:

Choice R=n

All public roads in the site and its surrounding superblocks were selected as a network to analyze the selectivity and integration at the cross-superblock scale (R=n). From the choice degree analysis, it can be found that Local Street and Internal Street in the study area are dominated by blue color, Global Road is dominated by orange and red color, while Glocal Road is partly blue and partly light blue and yellow color. This suggests that Global Road is better at aggregating traffic flows across superblocks, while Local Street and Internal Street contribute little to the global network. This is in line with the expectation of the Ideal Gird Pattern analysis. However, Glocal Road does not share the pressure of GLobal Road. Too much traffic is concentrated on Glocal Road, which explains why Chinese superblocks often have traffic congestion problems.

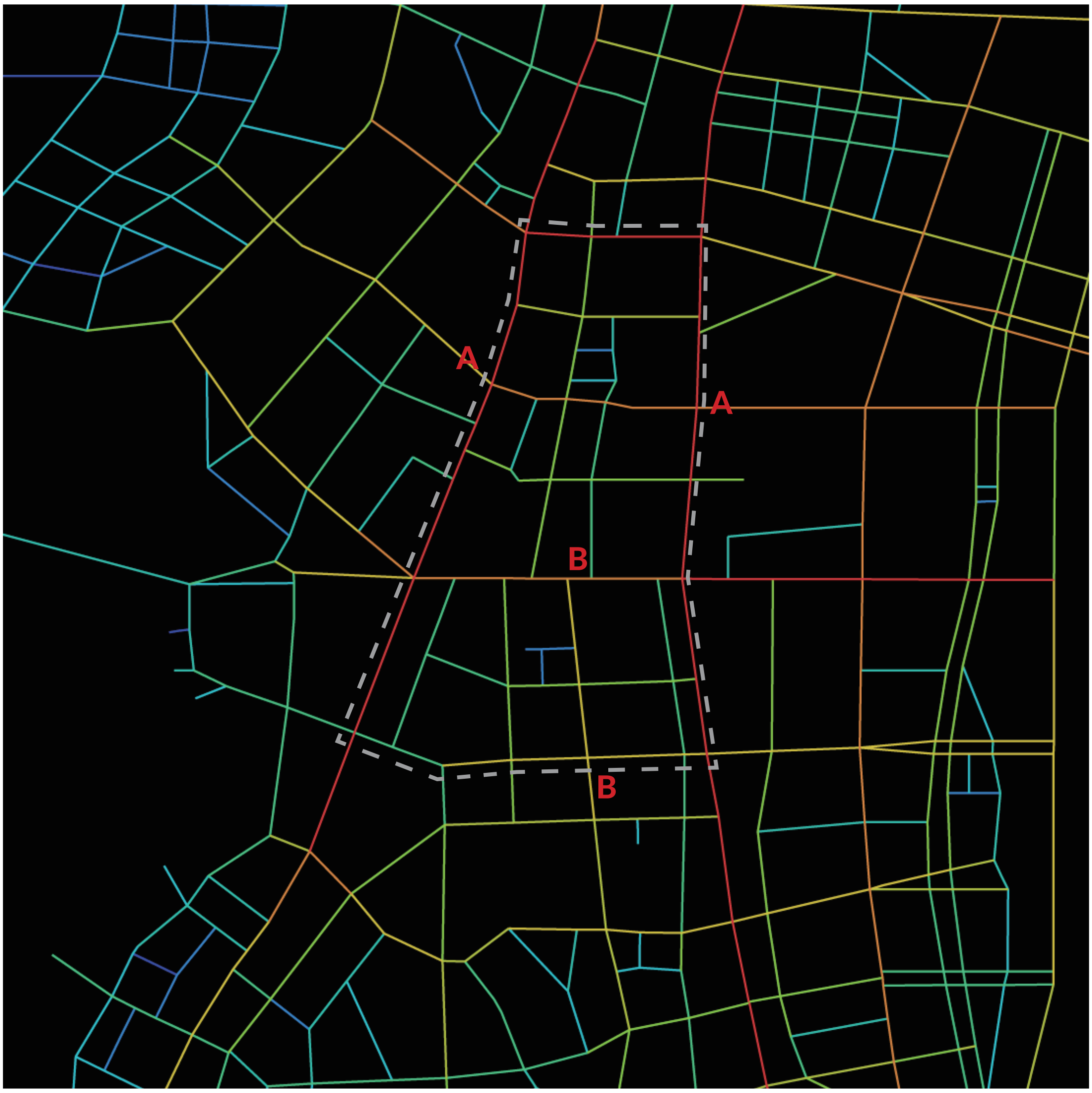


figure 5.3.4 Space sytax analysis of Integration index (R=n)

Integration R=n
Similar differences can be seen in the integration analysis. Global Road in the study area is predominantly red and orange in color, while Glocal Road has a medium level of integration. The Glocal Roads A-A and B-B are relatively well integrated, while the others are not well integrated into the network. Their depth of connection to the overall network is limited; on the one hand, these poorly integrated Glocal Roads only establish connections between two superblocks and are not linking through multiple superblocks; on the other hand, their connections to Local Street and Internal Street are also limited.

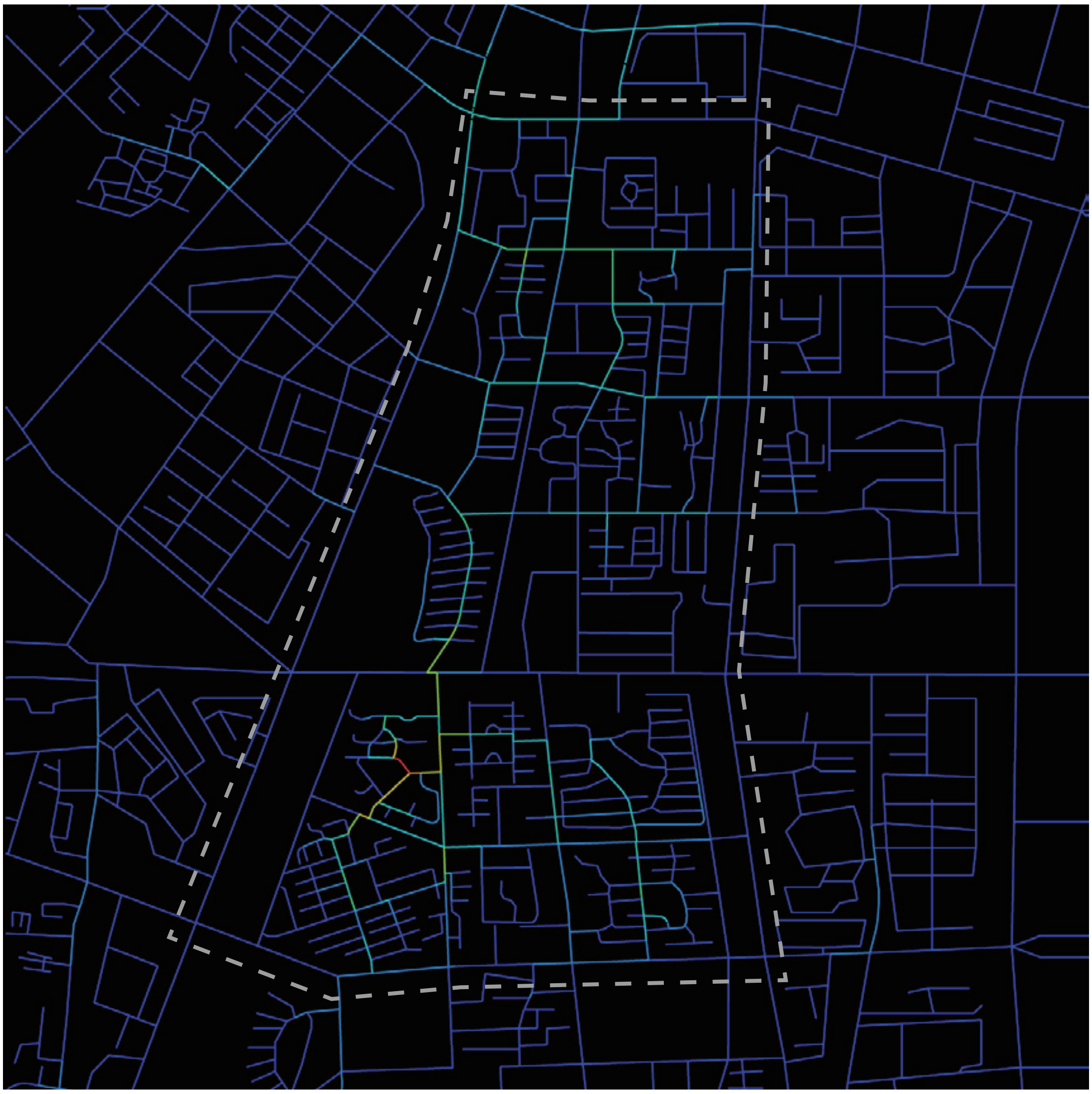


figure 5.3.5 Space sytax analysis of Choice index (R=500m)

Glocal Scale Analysis:

Choice R=500m

The network of sites (including Private Street) is analyzed at a radius of 500m to study the movement within superblocks at the pedestrian scale. The choice degree analysis shows that Private Street is significantly more chosen than others, which indicates that Private Street within closed settlements occupies the most important position in the residents' walking circle, but these roads are also the most lacking in non-residential activities. The overabundance of Private Streets also confines residents' walking activities to superblocks, and they often rely on other modes of transportation for movement across superblocks.

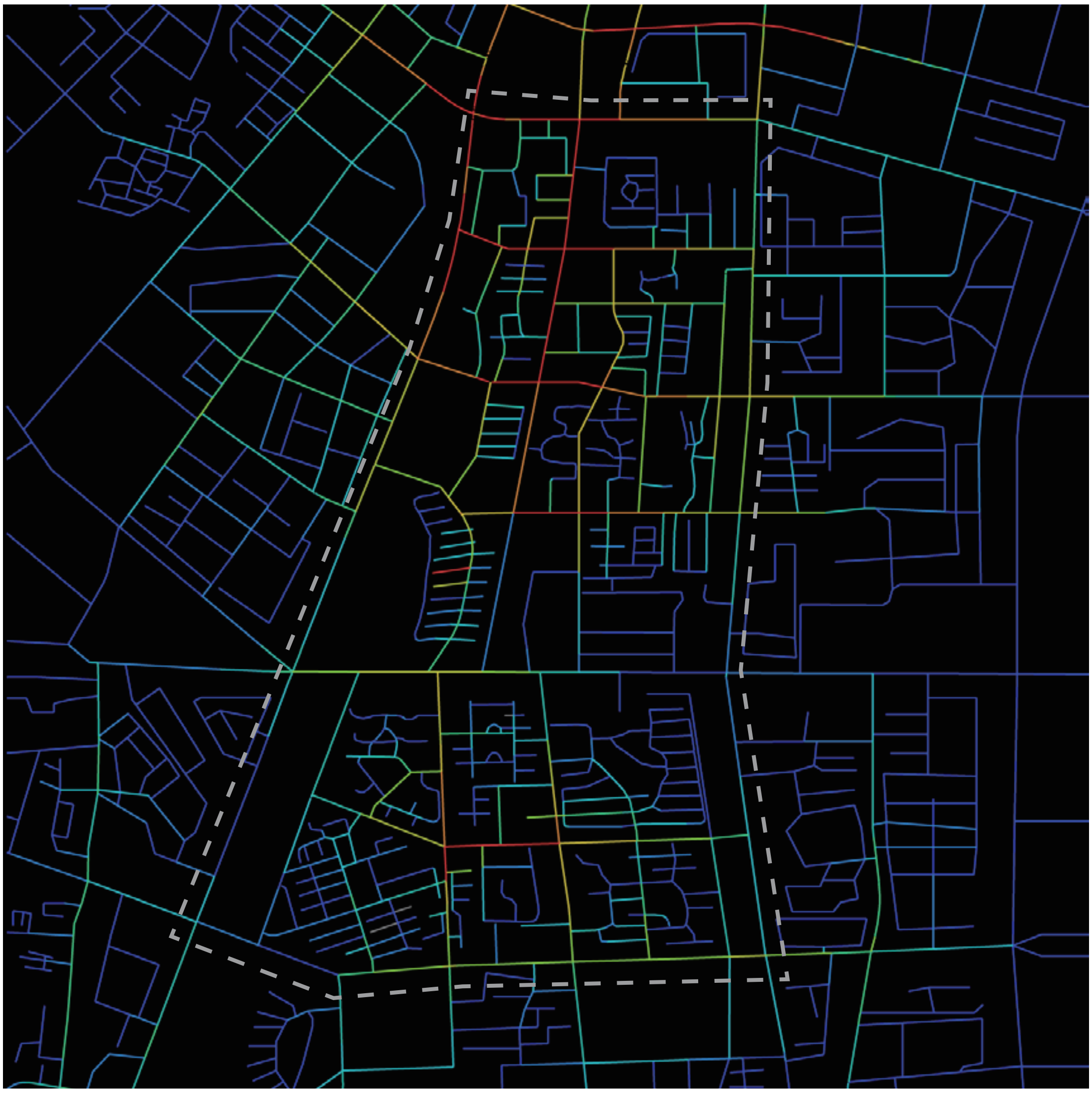


figure 5.3.6 Space sytax analysis of Integration index (R=500m)

Integration R=500m

The integration analysis shows that the integration around the Glocal-Local/Internal intersections is higher in the superblocks, which means that these areas have higher activity and movement intensity. These areas also tend to have higher clustering of activity points, especially for Superblock A. However, the previous activity point analysis and crowd heat map analysis shows that more activity points and crowds tend to congregate along Global Road. The problem here is that the activity and crowd clusters are not very walkable for the residents of the superblock, and they are more for car trips.

figure 5.3.7 Origins

UNA Toolbox Analysis:
The UNA (Urban Network Analysis) Toolbox provides a more refined approach to network analysis by setting the starting and destination points and the study radius, which allows you to count the number of times any line segment is passed through the network from any origin point to any destination point, i.e. Betweeness.

In this analysis, I choose all buildings with residential function as the starting point (Figure 5.3.7);

figure 5.3.8 Destination

then all consumption, service, and production activity points are potential destinations (Figure 5.3.8).

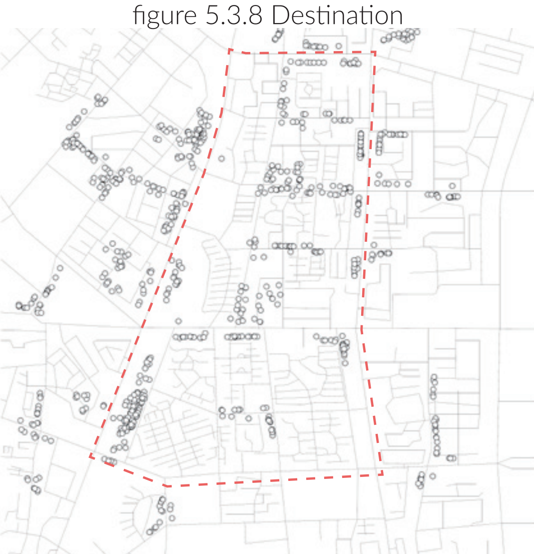


figure 5.3.9 Most attractive destination

With 50m as the radius and 10 points as the minimum cluster size, the clusters with high concentration of these activity points can be filtered out as the most attractive destinations (Figure 5.3.9).

figure 5.3.10 Space sytax analysis of Choice index (R=n)

Betweeness R=1000m

The results of the analysis again demonstrate (Figure 5.3.10) that Glocal Road and Local Road take on a more important position at the pedestrian scale, especially Glocal Road to the north of Superblock A. Public spaces and activity points along these roads will be able to gain higher exposure and usage.

Conclusion of the analysis

The analysis of the above study reveals some spatial patterns of the selected sites, which may be a snapshot of the superblock problem in China. The different hierarchy of network structures in superblocks take on their respective roles. The global road behaves as the backbone of a city-scale network, while Local Street and Internal Street operate more within the superblocks and have limited integration with the overall urban network. Glocal Road acts as a link between the urban network and the Local Network, it is logical that Glocal Road should provide medium-distance mobility paths between superblocks and superblocks and relieve the pressure on Global Road. At the pedestrian scale, Glocal Road should have a high level of integration and the potential to attract clusters of activity. In reality, however, Glocal Road is failing in superblocks, and its performance in terms of quantity and connectivity is unsatisfactory. Glocal Road is not well integrated in the urban network, partly due to the limited depth of Glocal Road connections across superblocks, and partly due to the limited connections to Local Street and Internal Street are limited in number.

The distribution of activities within superblocks has the following distinctive features: consumption and service activities tend to be concentrated along Global Road and at the intersections of Global-Glocal and Glocal-Local. For superblocks in residential areas, there is generally a very low level of mixed use of the block, especially a lack of workplaces, because it is difficult to allow non-residential functions to exist in gated communities.This has led to sub-blocks within superblocks being either gated communities with purely residential functions or large shopping malls with purely commercial functions. Because commercial service activities are concentrated at the edges of the superblocks, pedestrian activity is also concentrated at these large activity points, rather than on the streets.

In the spatial syntactic analysis of the network, Global Road is best integrated with the overall network at the regional scale. In contrast, Global Road and Local Street are better at the pedestrian scale. Combined with the distribution of activity points within superblocks, the current activity point setting in superblocks is still automobile-oriented rather than pedestrian-oriented. Therefore, the essence of improving the current dilemma of superblocks is to optimize the network structure and to make activities more evenly distributed within superblocks rather than overly concentrated at the edges.

06 URBAN REGENERATION

This chapter will introduce the existing superblock design paradigm and the urban regeneration system in Shenzhen with a critical view to explore the necessary policy support and the possibility of improvement.

6.1 Design Changes in Residential Areas

As mentioned earlier, the design of residential areas in Chinese cities was heavily influenced by the Westward Neighborhood Unit paradigm as well as the Soviet Worker's Unit paradigm, which tended to have a predominantly north-south orientation with strip slab buildings as the dominant building type and the use of walls and gates to manage the community. The design of residential areas has evolved over the past forty years as economic standards have improved and the demands on the living environment have increased. As products circulating in the market, these residential areas are the product of developers' trade-offs between the needs of residents and their own interests. Therefore, studying the changes in the design of residential areas in Shenzhen over the past forty years can provide a better understanding of the real constraints that are difficult to reverse and the potential opportunities for improvement, so that alternative strategies with high feasibility can be offered in response to the transformation of superblocks.

Using a ten-year interval, I have selected five representative real estate projects from different periods, from the first commercial residential project in Shenzhen, Dong Hu Li Yuan (1981), to the more recent Hua Run Cheng (2020), which has attracted a lot of attention from buyers. The graph shows a clear difference between Wei Lan Hai an, built in 2002, and Dong Hua Liyuan, built in 1981. On the one hand, the buildings are significantly taller and have larger facade widths in order to obtain a higher number of houses and sufficient ventilation and light, while the site area of the whole area is significantly increased, which allows more open space for luxurious internal gardens. This reflects the increased quality of living required by residents. Real estate in this period often used luxurious interior views as a selling point, and buildings were oriented to face south while facing as much of the landscape as possible. These large open spaces were not open to the city and exacerbated the closeness of the superblock.

Hua Run Cheng, which will be completed in 2020, has changed once again. First, it has been transformed from a strip building to a more compact tower, and at the same time the height has been increased again, almost 200m, while the footprint has been significantly reduced. This reflects the reality that Shenzhen's available land is becoming increasingly limited, yet there is still a huge housing gap. In addition, open space that was originally at ground level has been shifted to the second floor in exchange for commercial space and infrastructure at ground level. The development of public space from ground to upper floors may be an opportunity to increase public space in a high-density environment.

figure 6.1.1 Dong Hu Li Yuan, Built in 1981

figure 6.1.2 Wei Lan Hai An, Built in 2002

figure 6.1.3 Hua Run Cheng, Built in 2020

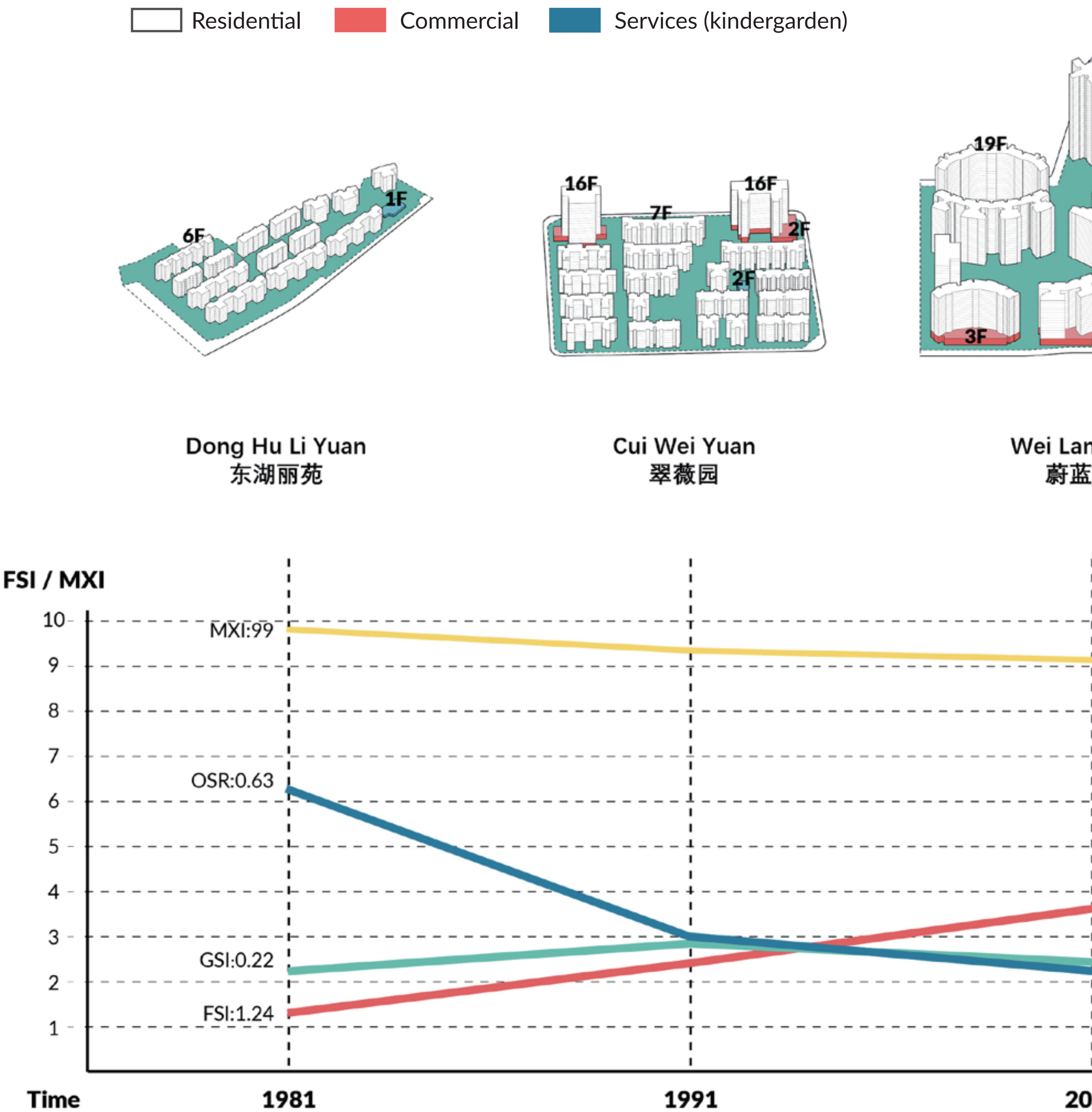
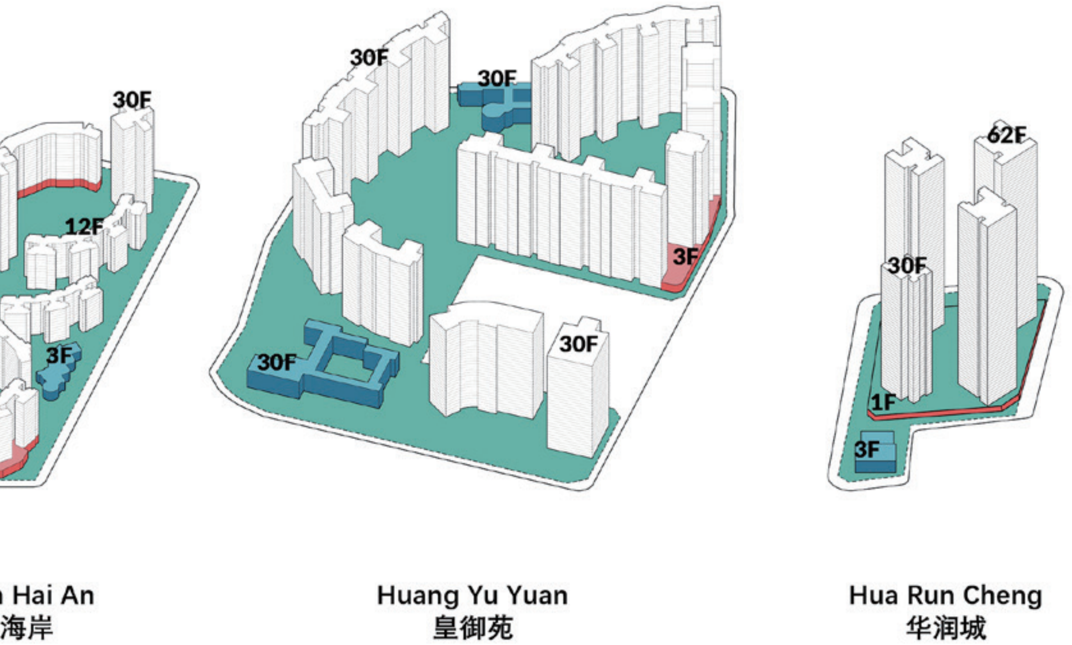
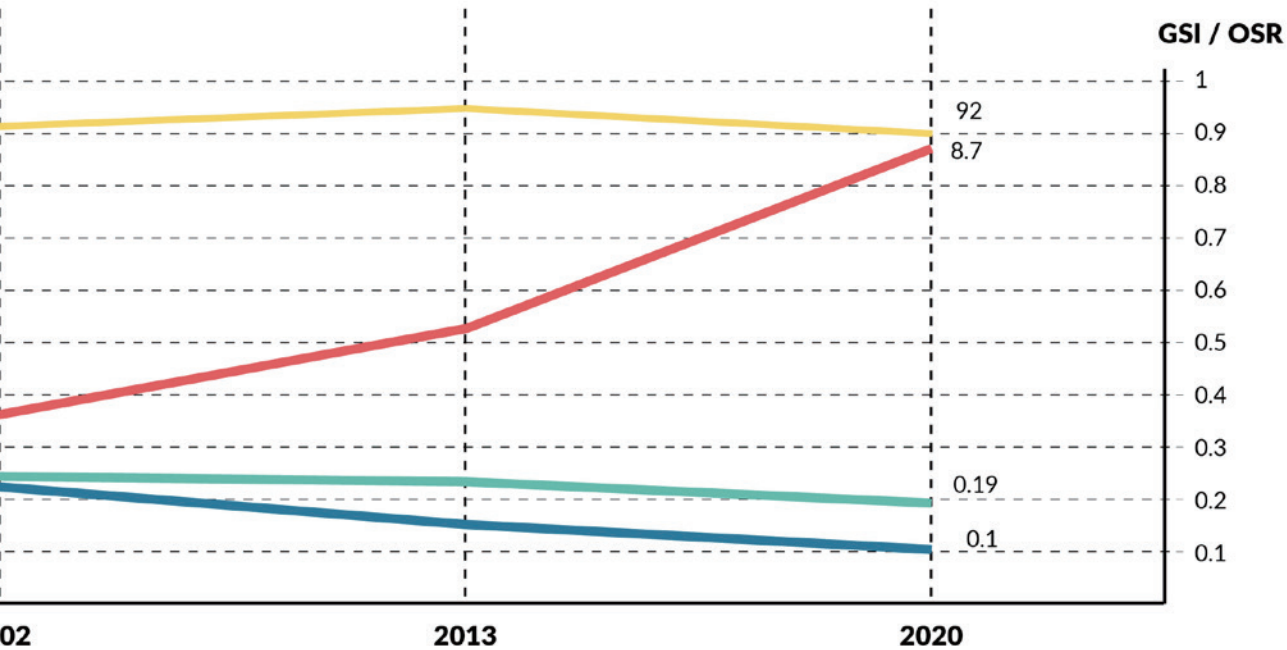


figure 6.1.4 Change of residential area design in the last 40 years

Throughout the last four decades of residential design in Shenzhen, the FSI has increased from 1.24 in 1981 to a high of 8.7 in 2020 to meet the needs of a large population and to maximize the interests of developers, while the GSI has remained around 0.2 to ensure sufficient open space for private gardens within closed settlements. However, due to the yearly increase in FSI, the OSR has been decreasing year by year, which indicates that these open spaces are under increasing





pressure. At the same time, the contribution of these open spaces to the city is very low. This is something that needs to be improved in the process of superblock transformation. On the other hand, the level of mixed use in these settlements has been low, with MXI consistently above 90. These settlements provide only the most basic community services and a small amount of ground floor retail, which makes it very difficult to constitute a diverse and vibrant community.

6.2 Existing Regeneration Mode

There are two main models of urban regeneration in Shenzhen in the demolition and redevelopment category, Renovation of Shanty Area and Renovation of Old Buildings. The general term urban regeneration mainly refers to the Renovation of Old Buildings. The types of projects involved in superblock transformation are in line with the framework of these two models. These two models are separate policy systems with different targets, compensation standards, implementation modes and end products (Figure).

The Renovation of Shanty Area is mainly led by the government, state-owned enterprises to implement and for the existence of safety risks of the old residential, the final product is mainly affordable housing. At present, there are about 700 old residential areas in Shenzhen that are eligible for shanty area renovation, but only 6 have officially started construction and 7 are included in the record (2020). The core problem faced by shantytown renovation is that the projects are often difficult to achieve break-even and sustainable development, because none of the affordable housing is allowed to be sold and the capital recovery period is long.

The Renovation of Old Buildings model has a broader scope of application, including old residential areas, old industrial areas, old commercial areas, etc. This model is mainly directed by the developer, and after meeting certain public facilities and housing construction, all of them are used as commercial housing. The compensation for the original residents are often the key to this type of project, as it requires 100% consent from the residents to carry out the project. For this reason, developers need to maximize the amount of development to balance compensation and revenue. The government needs to better guide developers, especially in balancing development density with the urban environment.

TYPE	Renovation of Shanty Area	Renovation of Old Buildings
Targets	- The **old housings** with quality and safety risks, incomplete functions, imperfect infrastructure and other problems, and the construction age is more than 20 years.	- **Housings** with a building age greater than 20 years; **- Commercial and industrial buildings** with an age greater than 15-20 years.
Enforceability	- If the resident consent rate reaches **95%**, it can be levied administratively	- It can only be implemented when **100%** of the owners agree
Compensation	- Monetary compensation according to the market price. - Replacement of property rights in accordance with 1:1-1:1.2 of the original area. - Allowing the purchase of an additional area of no more than 10m2 at a lower than market price	- Need to negotiate on a case-by-case basis
Operation	**- led by the government** **- implemented by state-owned enterprises**	- Guided by the government **- led by the market** **- implemented by enterprises**
Product	**- Replacement Housing** **- Affordable Housing**	**- Commodity Housing** **- Affordable Housing** (Depending on the location, the area accounts for 12% to 20% of the new residential area) **- Commercial Building**

figure 6.2.1 Existing regeration model in Shenzhen

6.3 Shenzhen Urban Regeneration System

In 2009, Shenzhen published the first urban regeneration law in China, which sets out policies around "urban regeneration units". The urban renewal law matches and complements existing urban planning laws and regulations, resulting in a statutory plan that regulates land use, development volume, infrastructure planning, and service facility layout.

Regeneration unit planning is the core of urban regeneration in Shenzhen, responsible for determining development boundaries, land ownership, development density and other rules. It is the result of a game between the government, land rights holders and developers, and provide disciplined and effective management for urban redevelopment. However, with the increase of urban regeneration projects in recent years, the core control system of regeneration unit has revealed some drawbacks, such as: the planning of regeneration unit only considers its own development, unable to foresee the impact of the project on the district and the city; the fragmented regeneration projects cause difficulties in implementing public facilities, increasing the burden of schools and hospitals; the lack of effective management of the rising FSI in urban regeneration. The regeneration unit only controls the development status within the unit, while the integration of the network of superblocks needs to be coordinated from a higher scale.

Therefore, in recent years, Shenzhen is introducing Sub-District Urban Regeneration Integration Planning, which is between District Urban Regeneration Sectoral Planning and Urban Regeneration Unit Planning. Integration Planning, as an intermediary scale, plays the role of carrying on the top and leading the bottom. On the one hand, it can refine and deepen the District Urban Regeneration Sectoral Planning; on the other hand, it can supplement and update the statutory plan in time to make up for the shortage of its timeliness and implementation; most importantly, it can make up for the shortage of public space, public facilities and urban design in the regeneration unit.

On the other hand, density is the core of developers' interests, and although the regeneration unit sets a density cap, it is insufficient to control the quality of the neighborhood, and developers tend to use a one-size-fits-all approach to maximize the amount of development within the site, causing the neighborhood to lose its diversity.

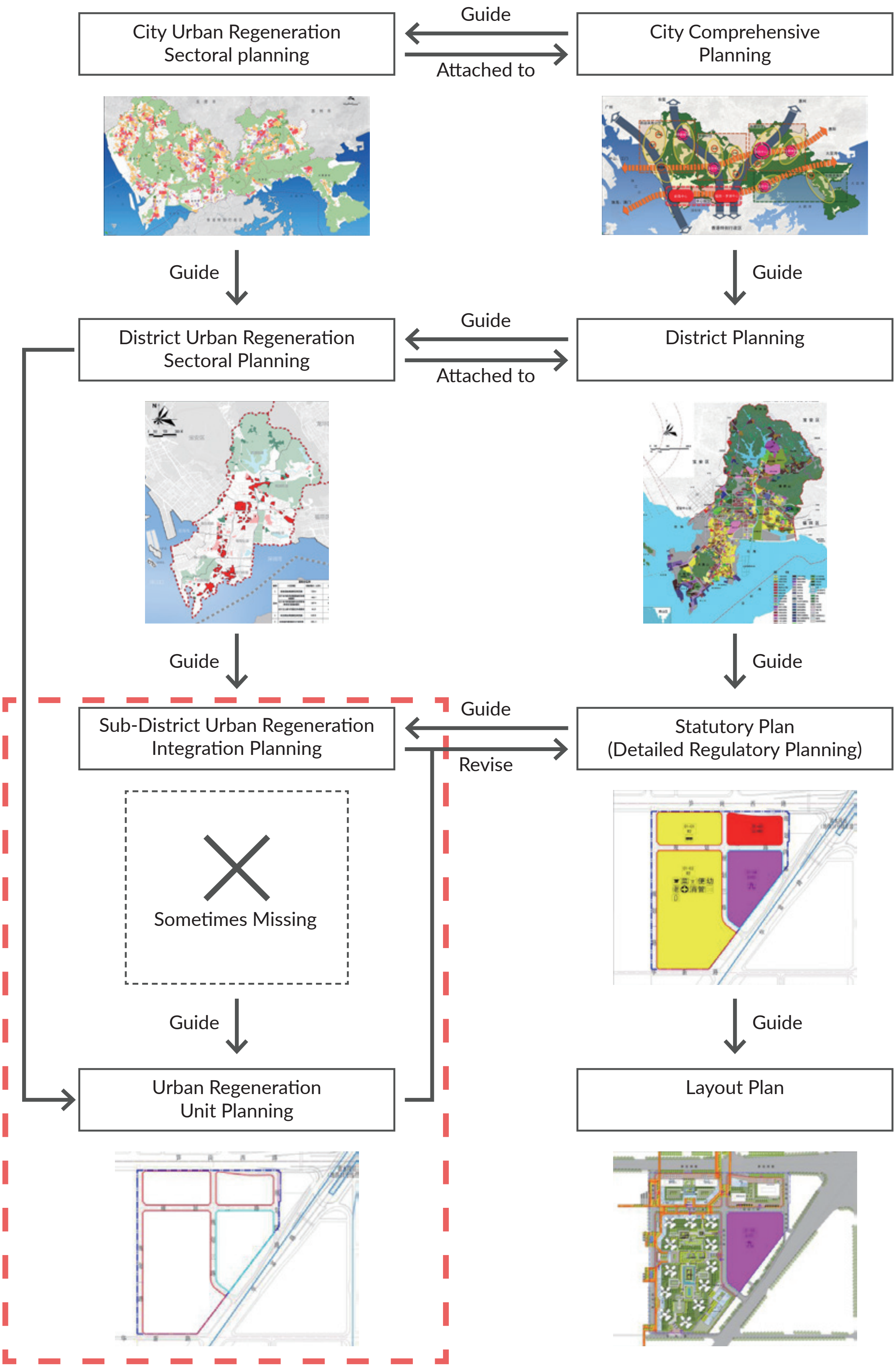


figure 6.3.1 Shenzhen Urban Regeneration System

6.4 Potential Future

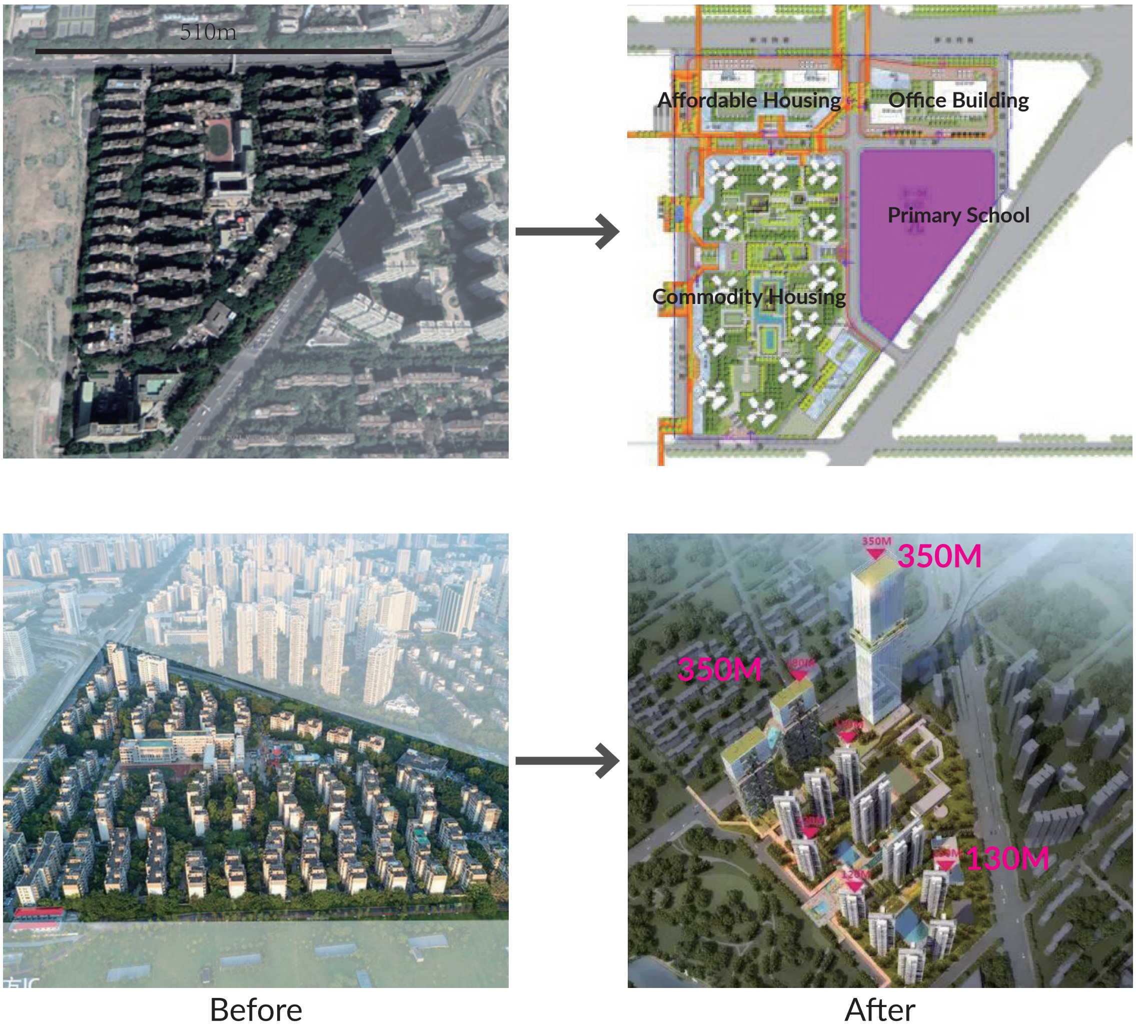
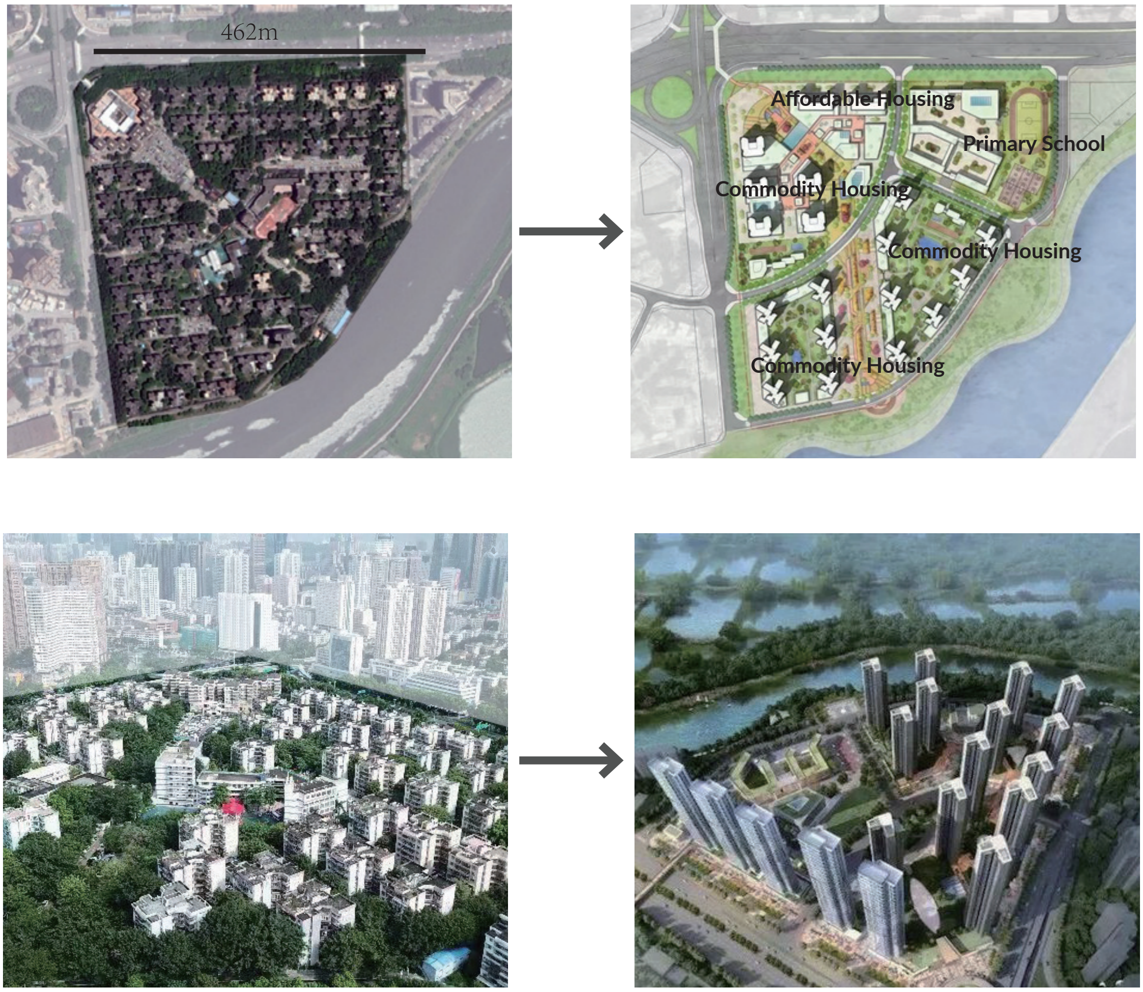


figure 6.4.1 Hua Fu Village urban regeneration project

Case 1: Hua Fu Village urban regeneration project:

Hua Fu Village urban regeneration plan was approved in 2019. According to the plan, the site area to be implemented for demolition is 139,625.07m², and the demolished construction area is about 250,000 m². In the future, the total new construction area will reach 640,000 m², including 433,200 m² residential houses, 135,200 m² subsidized housing, 185,200 m² office buildings and hotels, and 23,100 m² kindergartens, fire stations and other public service facilities.



Before After

figure 6.4.2 Nan Hua Village urban regeneration project

Case 2: Nan Hua Village urban regeneration project

Nan Hua Village urban regeneration plan was launched in 2020. According to the plan, the land area of the transformation area is 170,259.1 m^2, and the demolition construction area is 235,000 m^2. After that, 550,780 m^2 of new housing, 50,140 m^2 of affordable housing, 126,130 m^2 of offices and 35,015 m^2 of public service facilities will be built, with a planned FSI of 6.8.

From these two recent demolition and redevelopment projects, some patterns can be identified to predict the future appearance of the superblock selected for the site. As mentioned earlier, Shenzhen has developed a density zoning for the city and corresponding density calculation rules. This rule will set the upper limit of development density for regeneration units based on the size of the site, the distance to the metro station, and the level of the surrounding roads, while giving development incentives beyond the upper limit to developers who build public service facilities or public spaces. Generally, only when the ratio of demolition to redevelopment is above 1:2 can developers have enough incentive to invest in the regeneration project. Thus, high density is an inevitable result of urban regeneration and a given condition that superblocks must face for future transformation. In the subsequent design, a close development volume must be guaranteed in order to ensure the feasibility of the superblock transformation proposal.

Based on the comparison of the two cases above, some similar patterns can be summarized. The site to be redeveloped will be divided into commercial, residential, and school (or kindergarten) areas of different functions, with residential occupying the largest part. Office and commercial are often clustered in the form of office towers and large shopping malls next to the main road. The residential areas are high-rise in the same form to maximize the number of saleable residences. A small number of two-story retail stores are built as residential enclosures at the edge of the residential areas. Overall, the block's building density and quality of construction have increased substantially following the regeneration, but it has not produced better public spaces or more vibrant streets. If this design pattern continues, the future of the superblock will turn out to be as predicted in the figure.

I believe that residential areas should be divided into multiple zones to release a certain amount of publicly accessible open space and to avoid developers using the same architectural template on a large scale, creating a single urban look. In addition, commercial and office should not be overly concentrated in one area, but should be dispersed in streets in order to create more vibrant neighborhoods. Finally, it is not necessary for affordable housing to adopt the same building types as commodity housing, and the overly stringent daylight and ventilation regulations can be appropriately relaxed to obtain more flexible building forms to enrich the building types within superblocks.

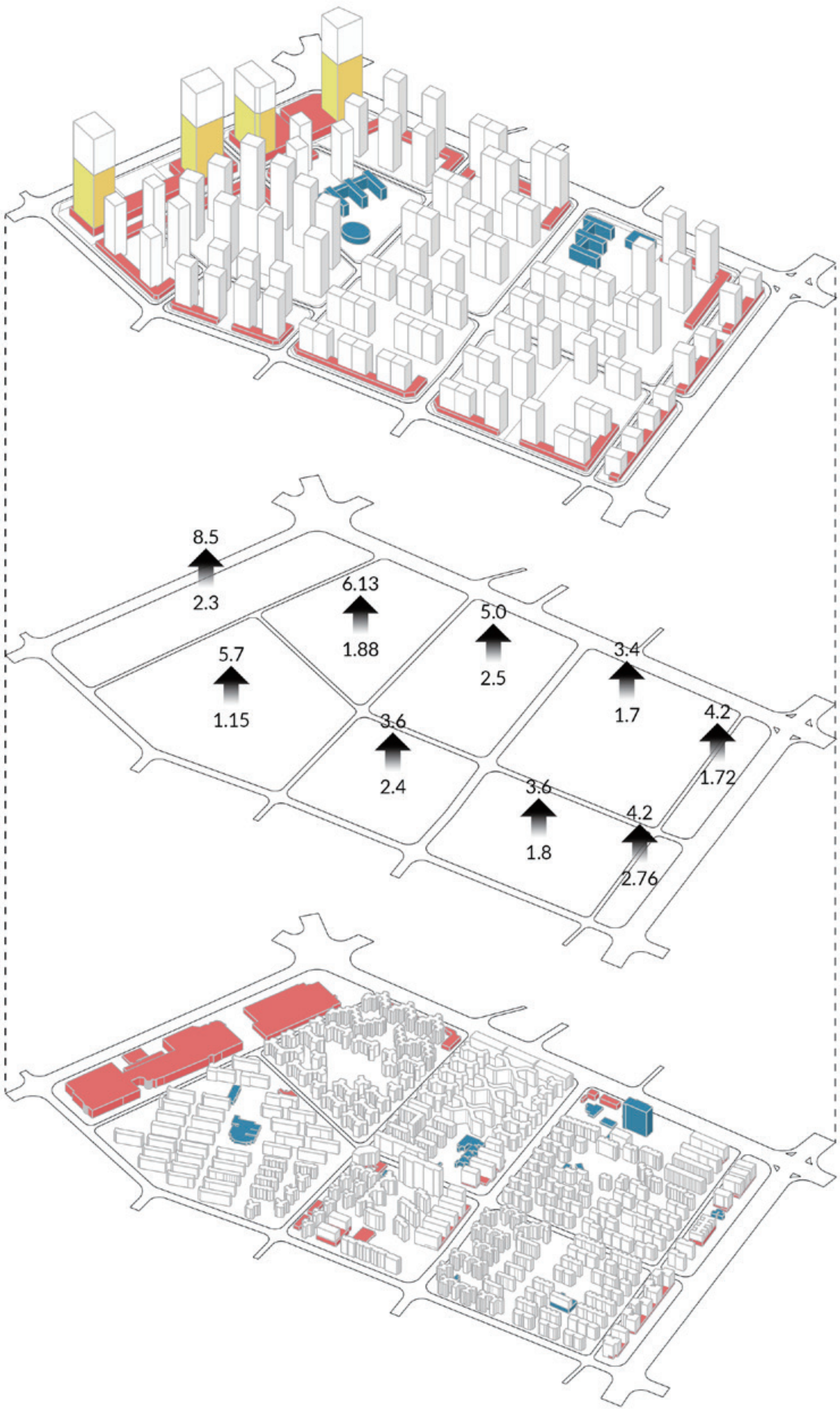


figure 6.4.3 A potential future of superblock B

07 DESIGN TRATEGIES

AND APPLICATION

This chapter presents a list of design strategies to improve the problem of super blocks, and demonstrates the application of the strategies using the selected site as an example.

7.1 Strategy1 - Intermediate Scale Integration

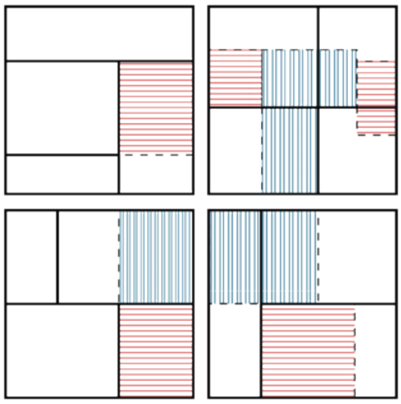


figure 7.1.1

Step1:Regeneration Potential Assessment
The existing fragmented regeneration unit plan is first identified, and the regeneration potential of the area around the regeneration unit is evaluated based on future density needs, distance from transportation hubs, the quality of the current built environment, and the complexity of the land ownership, to form a regeneration plan across the superblock scale.

Existing Planning Potential Areas

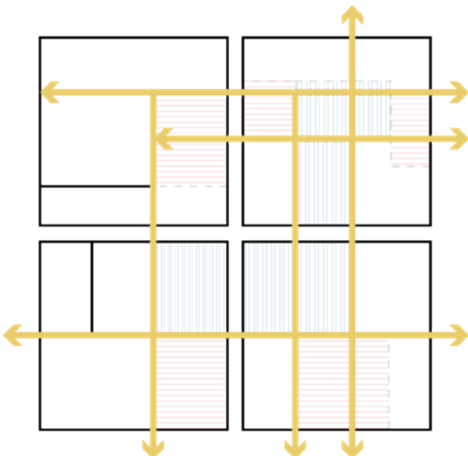


figure 7.1.2

Step2: Superblock Interconnection
Based on the existing road network, Glocal Road connections between superblocks are increased as much as possible to improve the integration of the overall network while avoiding massive infrastructure reconstruction.

Glocal Connection

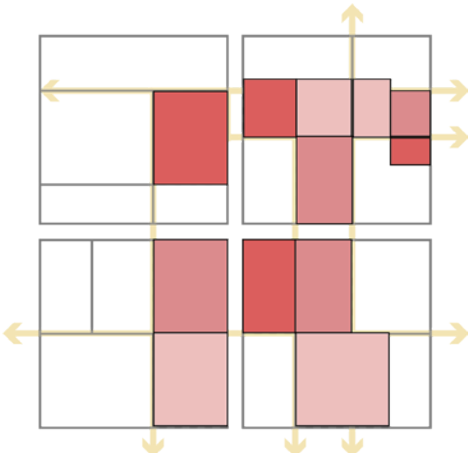


figure 7.1.3

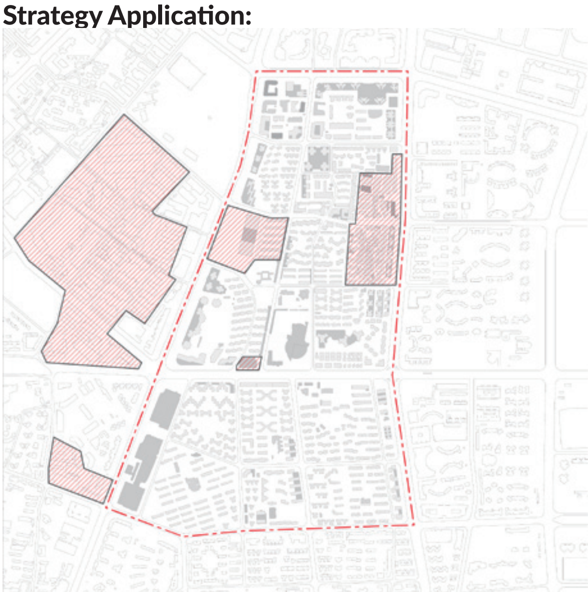
Step3: Regeneration Unit Setting
Define the scope of the regeneration unit and set the development time sequence. The upper density limit measured by the existing density rules for each regeneration unit boundary is used as the density goal for subsequent design

High Density

Low Density

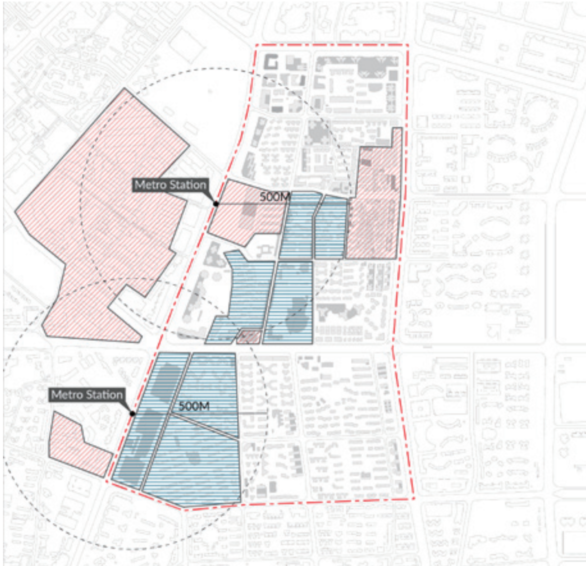
Regeneration Units

Strategy Application:



The existing regeneration planning

According to the government's plan (Nanshan District Urban Renewal Bureau, 2018), there are four urban regeneration sites being planned in and around these two superblocks use.



Potential regeration area identification

Develop potential regeneration plans based on proximity to transportation hubs, density, current environmental quality, and complexity of land ownership

Existing Network

The existing road network lacks connectivity across superblocks, and the GLocal Road in particular is poorly integrated.

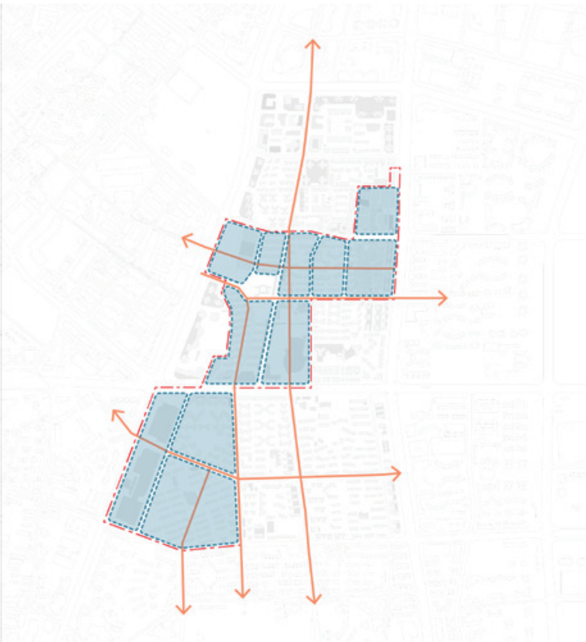
Potential New Glocal Connection

Identify potential new connections based on the current status of the road network in the area to be updated.

New Glocal Connection

New Glocal Connection

Six new connections between superblocks are added while rebuilding as little infrastructure as possible and improving the integration of the existing Glocal Road with the overall urban network. It is important to note that the intersection of GLocal Road and Global Road is proposed to be spaced no less than 100m apart, otherwise it has the potential to increase traffic congestion on the main road.



New Glocal Connection

Regeneration Unit Setting

The regeneration units will be developed based on the existing plots, road boundaries and other conditions, their density limits will be measured, and the development timeline will be planned. The approved regeneration units in Superblock A will be implemented in the first phase, the parcels located in Superblock B, adjacent to the subway station, and with lower current density will be implemented in the second phase, and the rest of the area will be implemented in the third phase. Taking ‘regeneration unit a’ (figure) as an example, the density is calculated as follows: 'regeneration unit a' is located in density zone 2, with a total area of 5.7 hectares, surrounded by roads on all sides, and within a 200m radius of the subway station. Therefore, its upper density limit is equal to 3.2×0.86×1.3×1.5≈5.4.

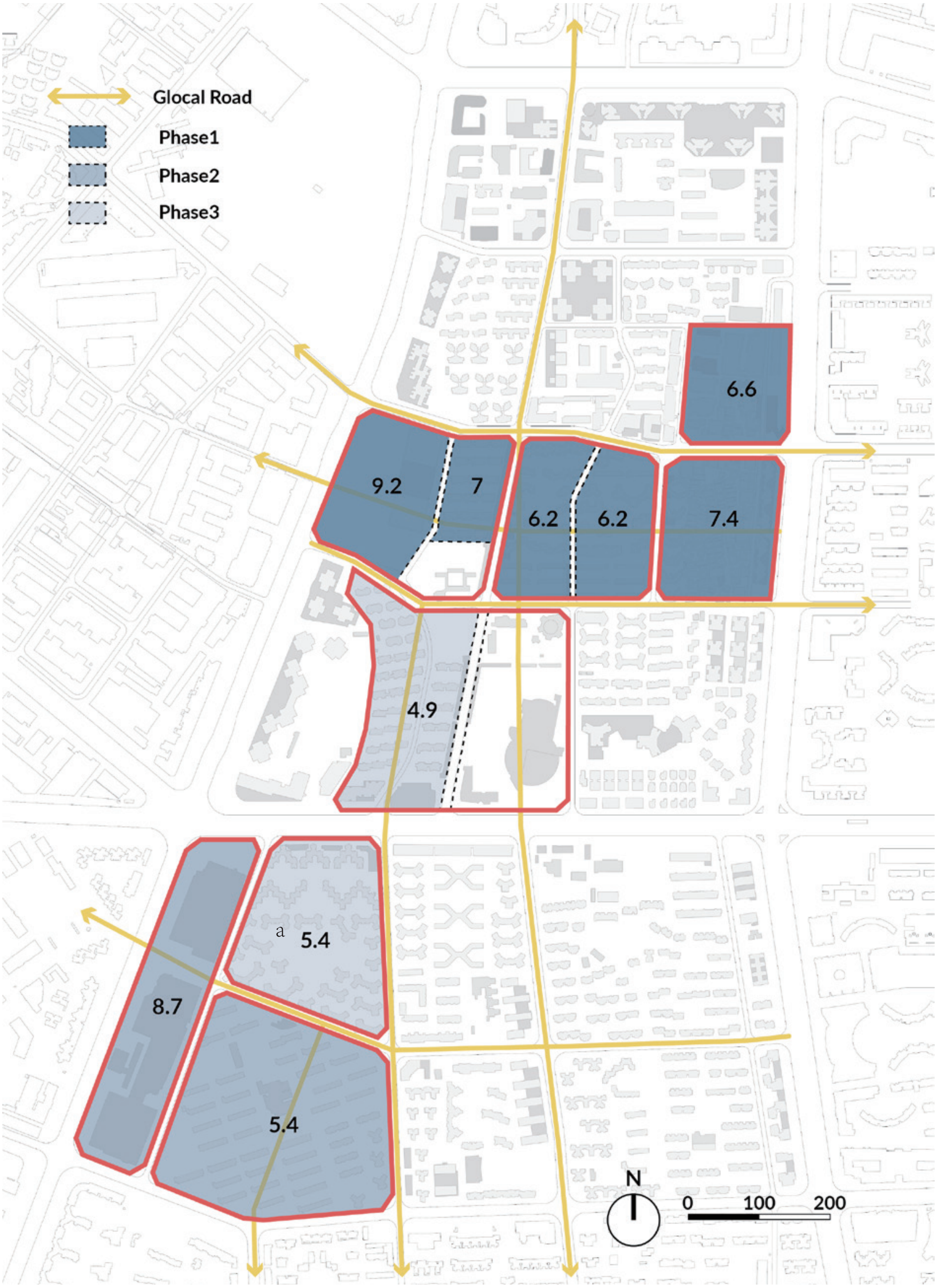
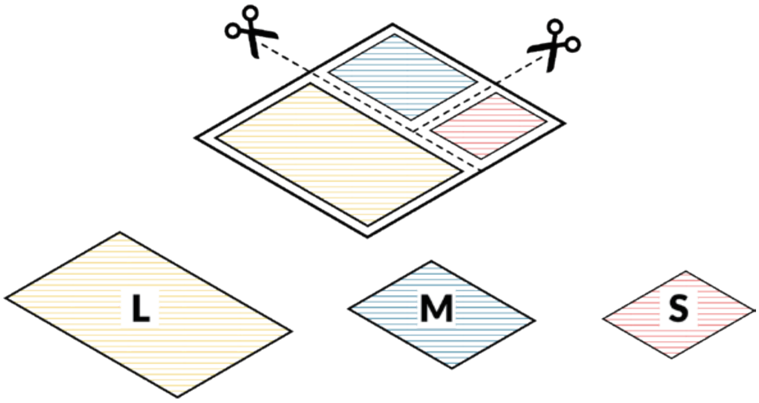


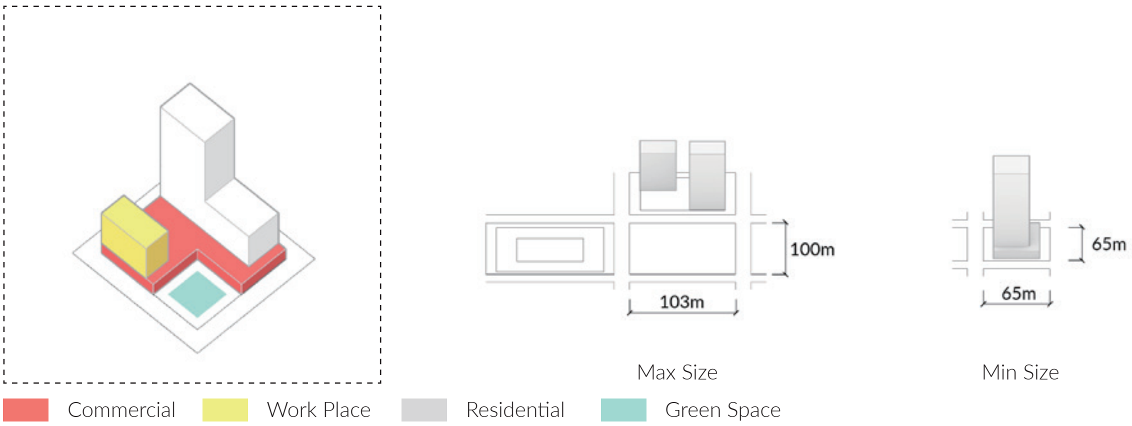
figure 7.1.1 Regeneration unit proposal

7.2 Strategy2 - Finer-grained Block Division



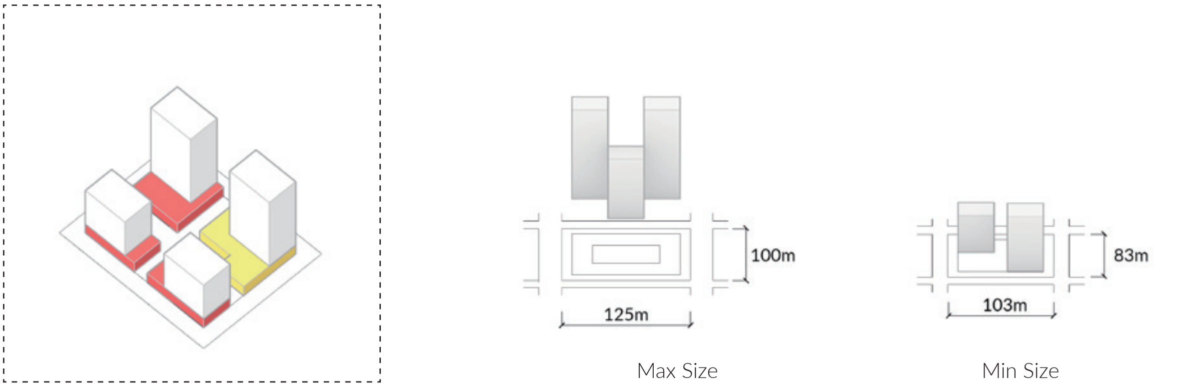
Small block typology

This strategy aims to increase roadway density on local and internal streets to improve the overall network integration. A higher density street network implies more fine-grained block divisions, requiring the design of different block types than the current large enclosed blocks to accommodate the coexistence of high density and high permeability.At the same time, blocks of different sizes force developers to make customized designs, thus increasing the diversity of built forms.Based on the block size and openness, this project proposes the following three basic block types that can meet the common building sizes and regulations in China.



S: Mixed-Use Complex:

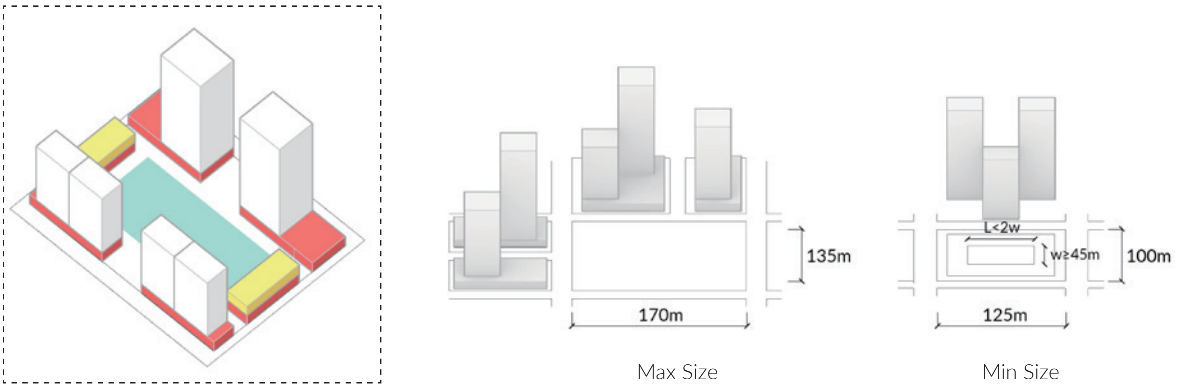
The small block type is the most compact and mixed-use type, consisting of a single podium and tower. It ranges in size from 65m X 65m to 103m X 100m and can accommodate one conventional office tower or no more than two residential towers. This block type is highly mixed-use, with both podium and towers available for non-residential functions. As for the residential function, it is more suitable for residential products like single or double apartments, hotels, or soho.However, this block type has limited open public space and can utilize the podium setback to form a front plaza.



Commercial Work Place Residential

M: Open Block:

The medium-sized block type is similar to the open block proposed by Christian de Portzamparc. This block type has at least one pair of diagonal buildings, retains sufficiently wide entrances on all four edges, and has semi-public streets within the block. This block type creates a strong community atmosphere while also having a high degree of permeability. They range in size from 83m x 103m to 100m x 125m and can accommodate up to three residential towers. Such blocks can have a rich and varied podium space to accommodate community commercial, small office and other functions.



Commercial Work Place Residential Green Space

L: Garden Community

The larger block type is similar to the enclosed settlements now popular in China, but significantly smaller in size. These blocks range in size from 100m x 125m to 135m x 170m, with a length to width ratio of ≤ 2. This ensures that there is enough space within the block for the enclosed gardens favored by the middle class, while avoiding the oversizing of such private gardens. Once it exceeds 135m x 170m, the block can be split into small and medium-sized blocks. Such blocks are dominated by large family apartments, with limited podium space to accommodate small commercial and community service functions, and the potential for office space on the east and west podiums.

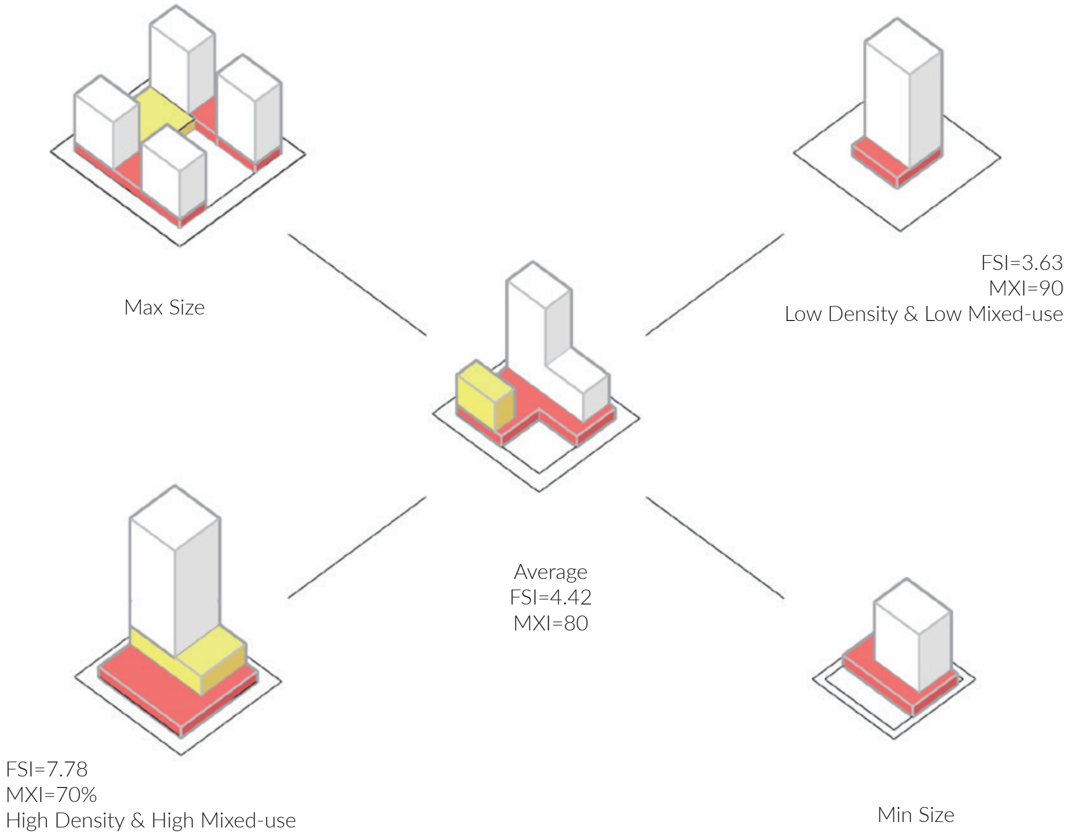


figure 7.2.1 Adaptability of Type S

'Blocks Type S' have the flexibility to adjust the form and ratio of podiums and towers to accommodate different density and functional mix requirements (figure 7.2.1). Podiums should have abundant public spaces on the terrace and first floor, providing a rich street frontage along the urban street (figure 7.2.2 - 7.2.3). The examples on the right show a block design with a front plaza and two residential towers (figure 7.2.4), as well as a block design with a single residential tower (figure 7.2.5).

figure 7.2.2 A Community in Canada

figure 7.2.3 A Hotel in Singapore

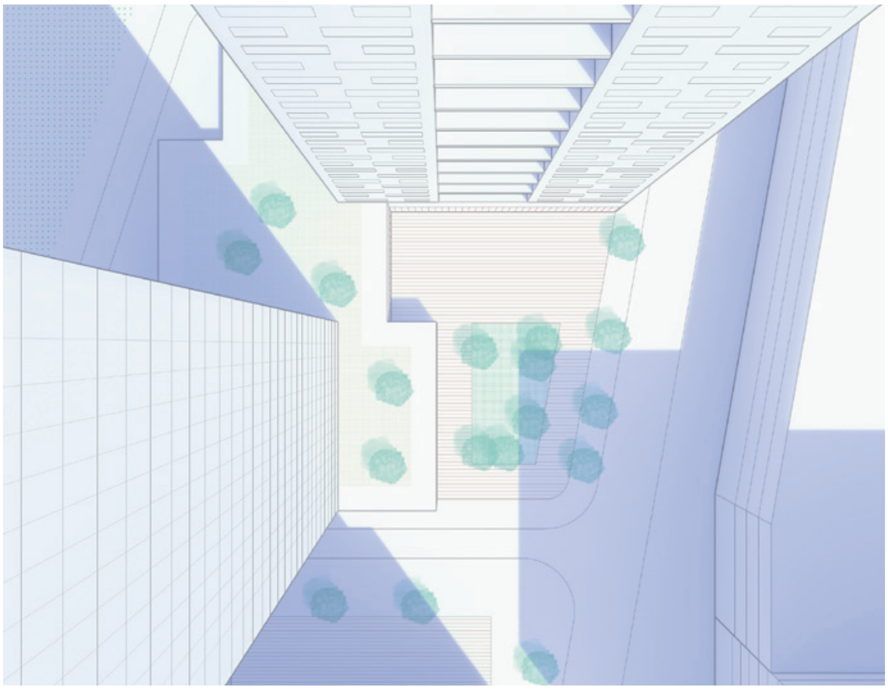


figure 7.2.4 Type S sample A

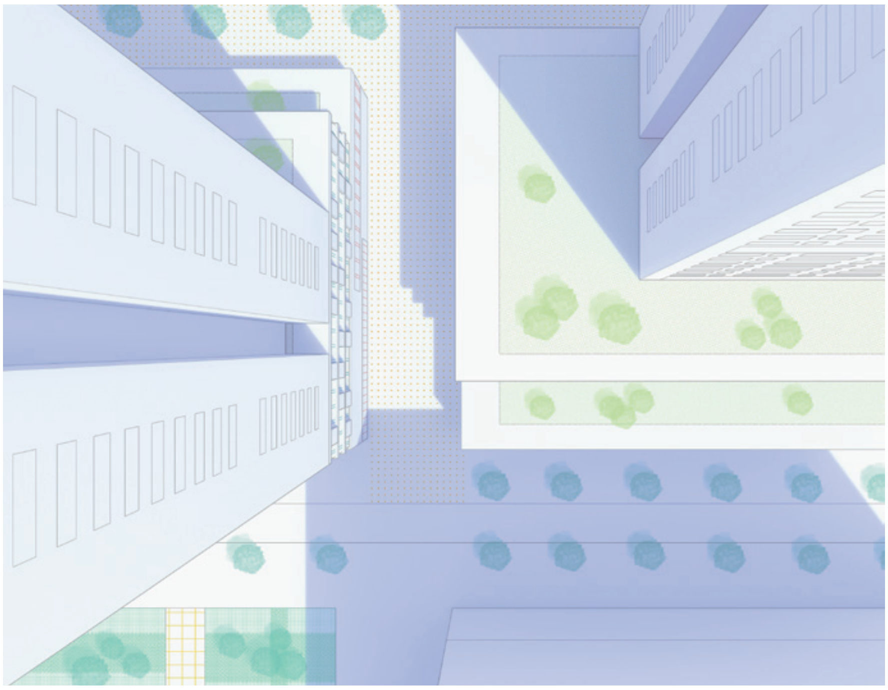


figure 7.2.5 Type S sample B

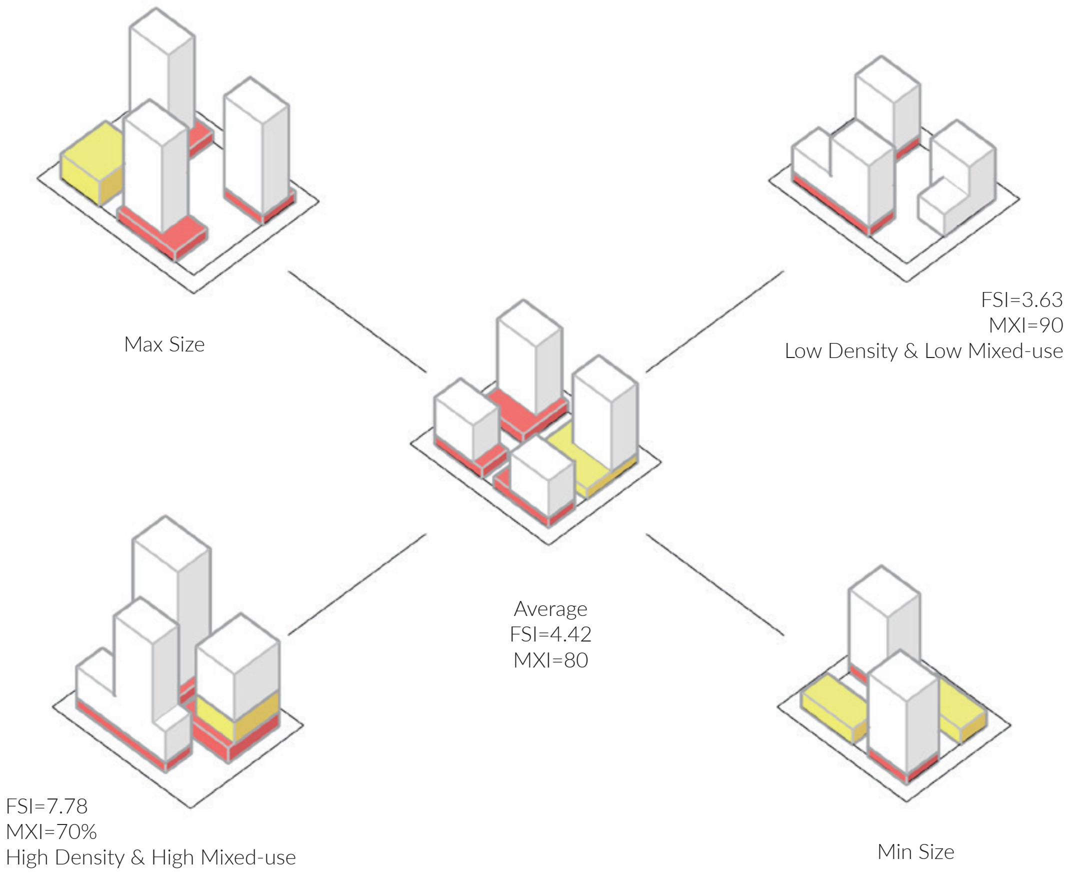


figure 7.2.6 Adaptability of Type M

'Block Type M' also allows for flexible adjustment of podium and tower forms and ratios to accommodate different density and functional mix requirements (figure 7.2.6). The semi-public streets within the block are predominantly hard-paved with plantings or canopies providing moderately shaded social open spaces (figure 7.2.7- 7.2.8). The diagram on the right shows a block design formed by two residential towers and one office tower (figure 7.2.9), as well as a block design consisting of several low- and mid-rise residential towers(figure 7.2.9).

figure 7.2.7 A Community in Shenzhen

figure 7.2.8 A campus in Singapore

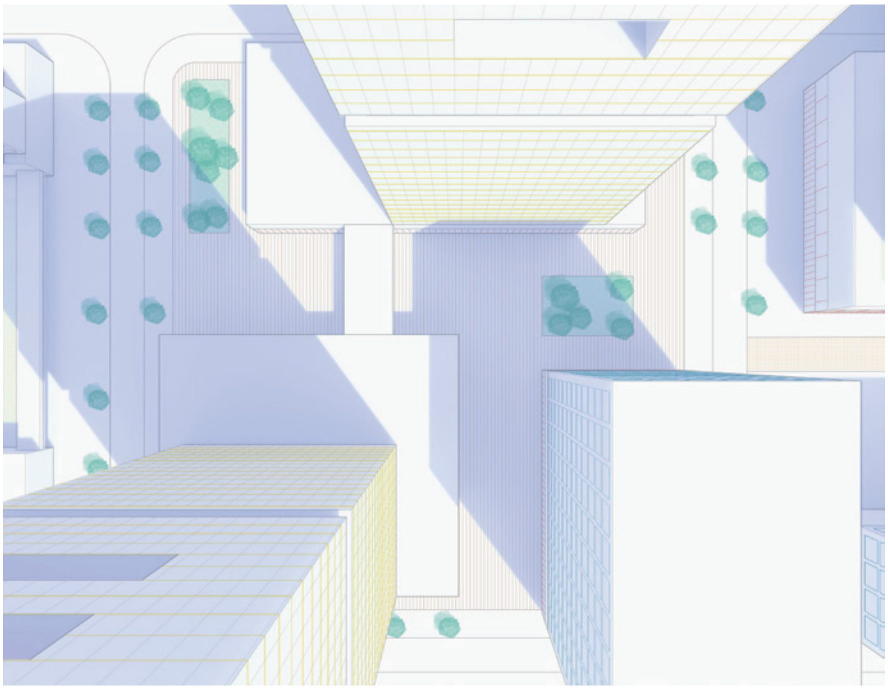


figure 7.2.9 Type M sample A

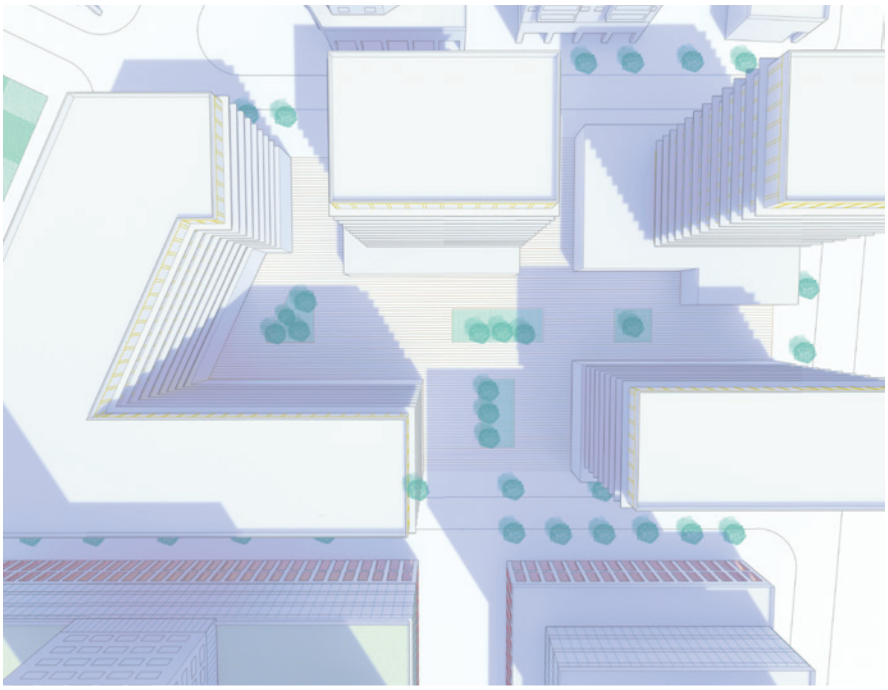


figure 7.2.10 Type M sample B

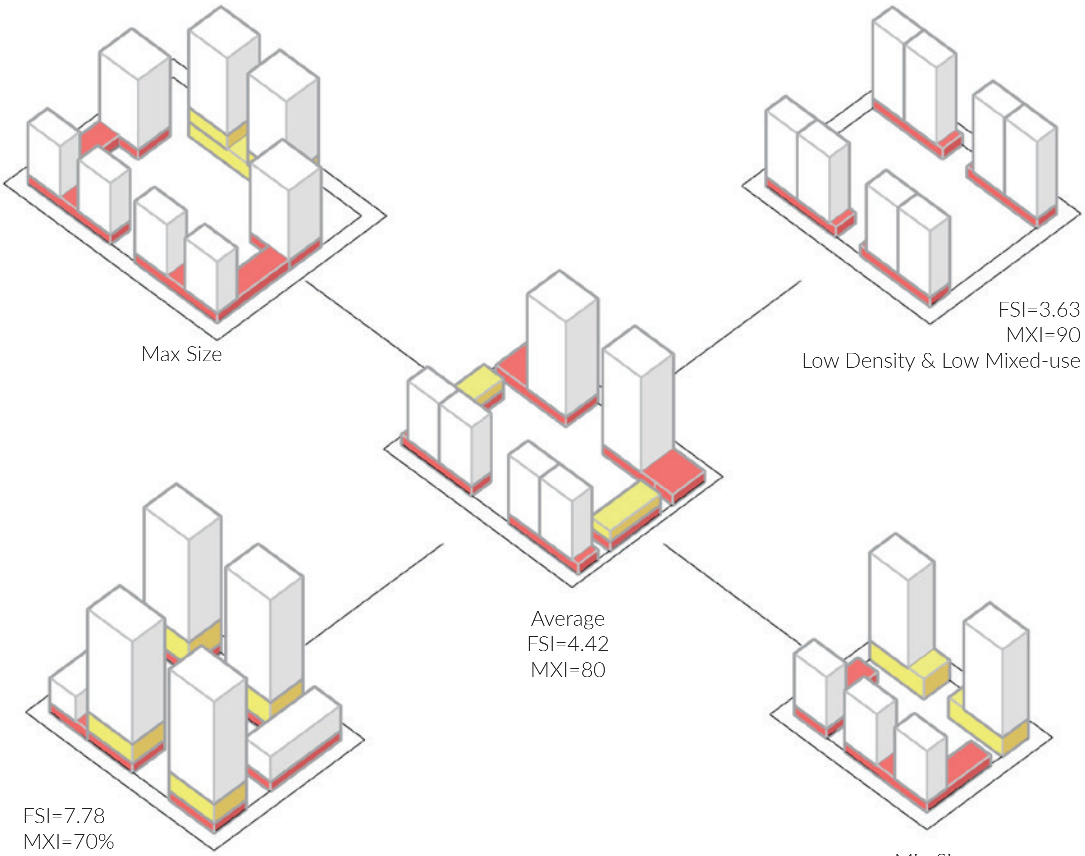


figure 7.2.11 daptability of Type L

'Block Type L' relies heavily on adjusting the height of residential buildings to regulate density; it is possible to improve mixed use by modestly increasing the height of buildings on the east and west sides (figure 7.2.11). Enclosed gardens within the block provide carefully designed plant and water landscapes, as well as a variety of facilities for playing (figure 7.2.12 - 7.2.13). The diagram on the right shows the common design of this type (figure 7.2.14), as well as the design of a sky garden in the context of high density requirements (figure 7.2.15).

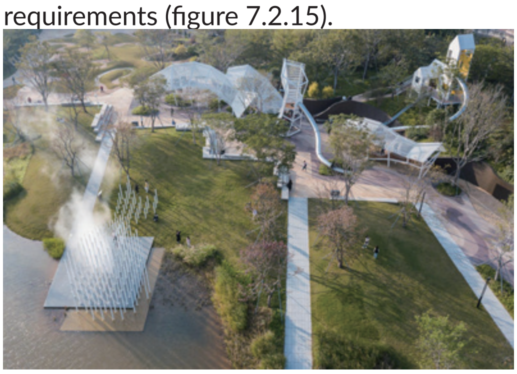


figure 7.2.12 A community in Guangzhou

figure 7.2.13 A community in Shenzhen

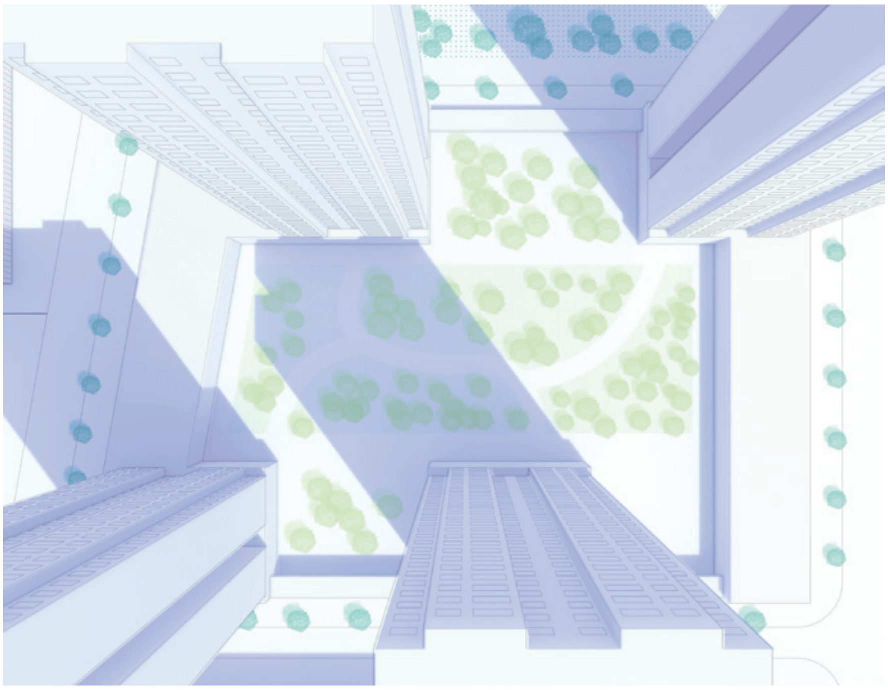


figure 7.2.14 TypeL sample A

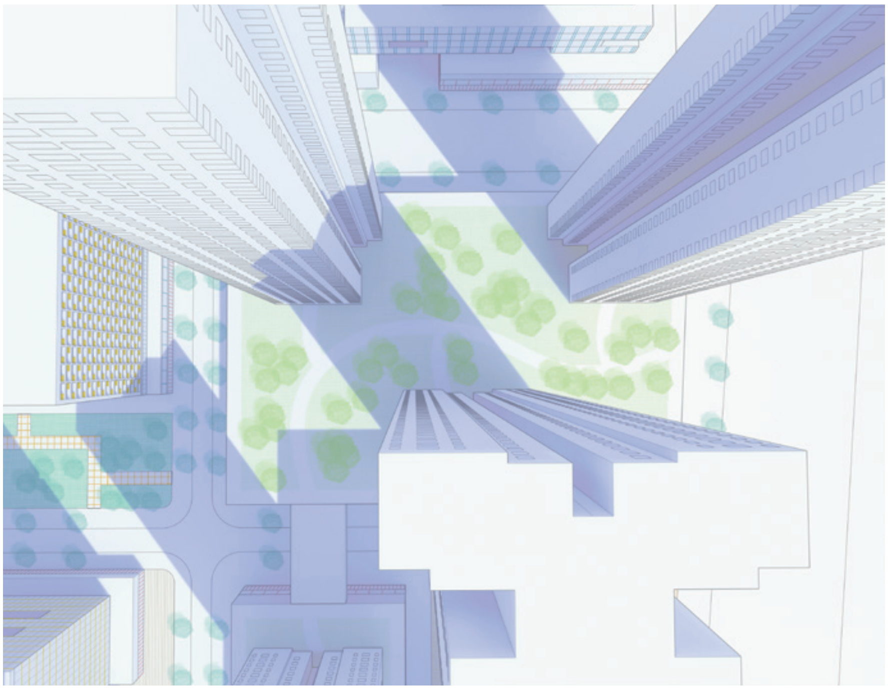


figure 7.2.15 Type L sample B

Block for public function

In addition to residential functions, the regeneration of superblocks requires the addition of public service functions necessary to provide essential urban services to a larger population. Schools, hospitals and open spaces are the three most essential types of urban services that require separate sites. The figure below shows sample designs for schools, hospitals, and public spaces.

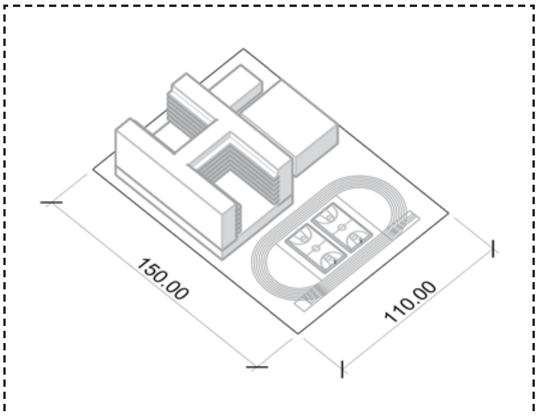


figure 7.2.16 The school Plot

P - School Plot:

In the case of primary schools, for example, the school site needs to provide a minimum of 4 classrooms per grade in the school building, a multi-purpose building, and a sports field.

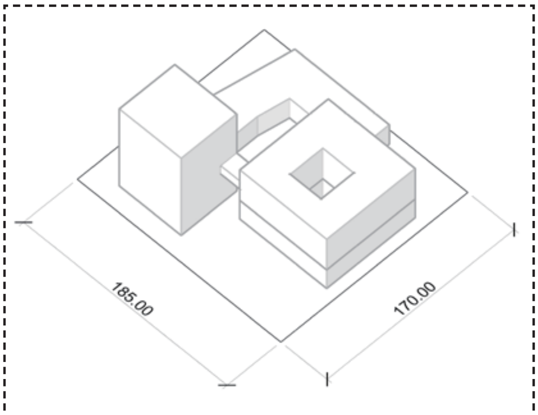


figure 7.2.17 The hospital plot

P - Hospital Plot:

The site of the municipal hospital needs to accommodate the construction of buildings such as outpatient and inpatient buildings and provide space for services such as parking areas.

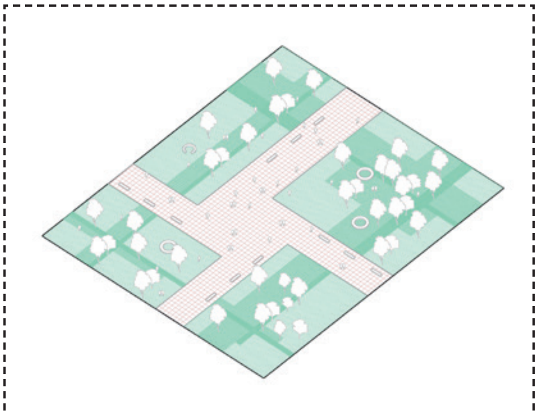


figure 7.2.18 The open space plot

P - Open Space Plot:

The open space can be used by neighborhood residents for walking, exercise, and as a sponge facility within the block. The green landscape is dominated by native plants that are easy to maintain.

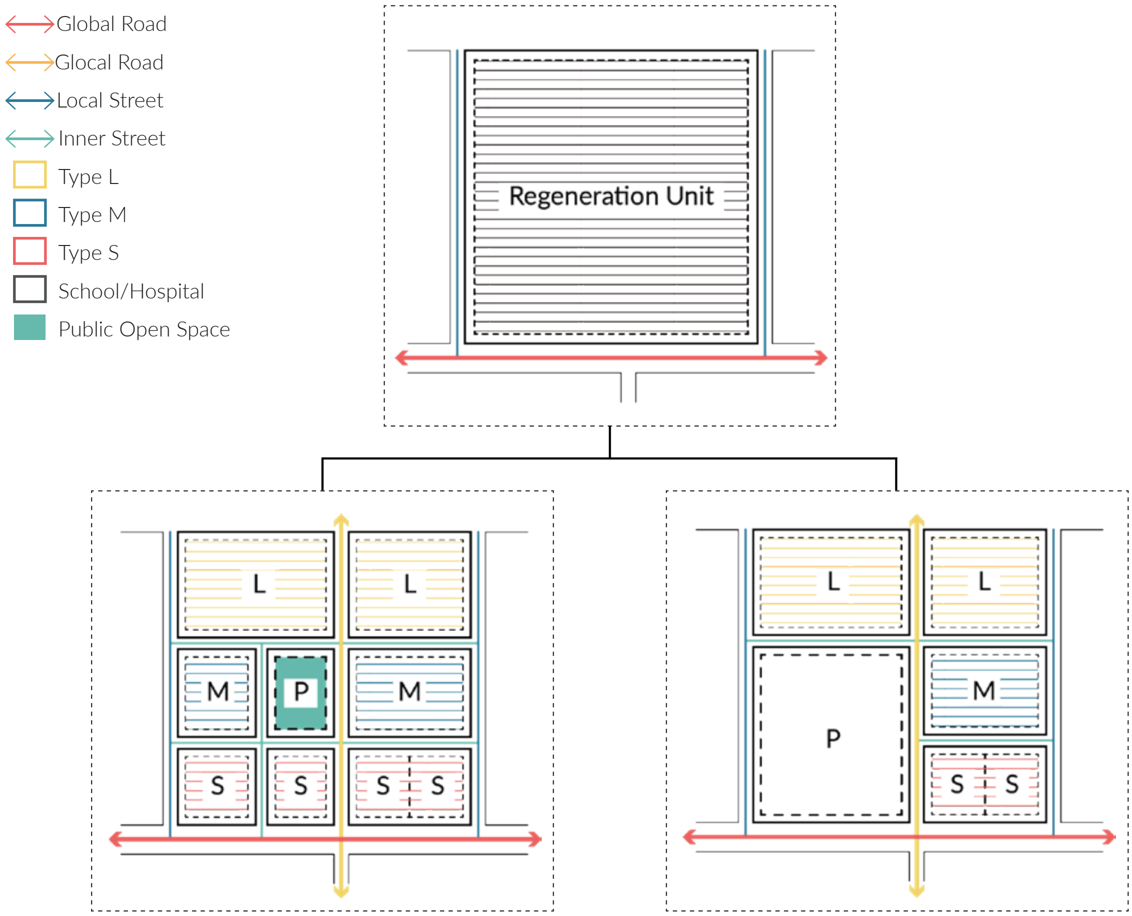


figure 7.2.19 Suggested pattern

Suggested Division Pattern:
The above-mentioned block types should be applied in different locations of the superblock according to the degree of mixed-use and accessibility in order to accomplish the task of deconstructing the superblock more effectively. Along the Global Road, high-density Mixed-use Complex (Block Type S) should be prioritized to increase access to the Superblock at the Superblock boundary. At the same time, since the width of Global Road is usually 30m or even 50m or more, the high-density buildings on both sides will not be oppressive to human perception. In addition, city-level public facilities such as schools and hospitals should be located along the Global Road to better serve the entire area.

The Open Block (Block Type M) should be located in the middle as an intermediary, acting as a transition from open to relatively closed areas. Public open space should also be located in the center to provide equal accessibility to the surrounding neighborhood. Both are relatively low density areas that can help mitigate the negative effects of overly high density buildings.

Lastly, Garden Community (Block Type L) can be located in the center of the superblock for a relatively quiet living environment.

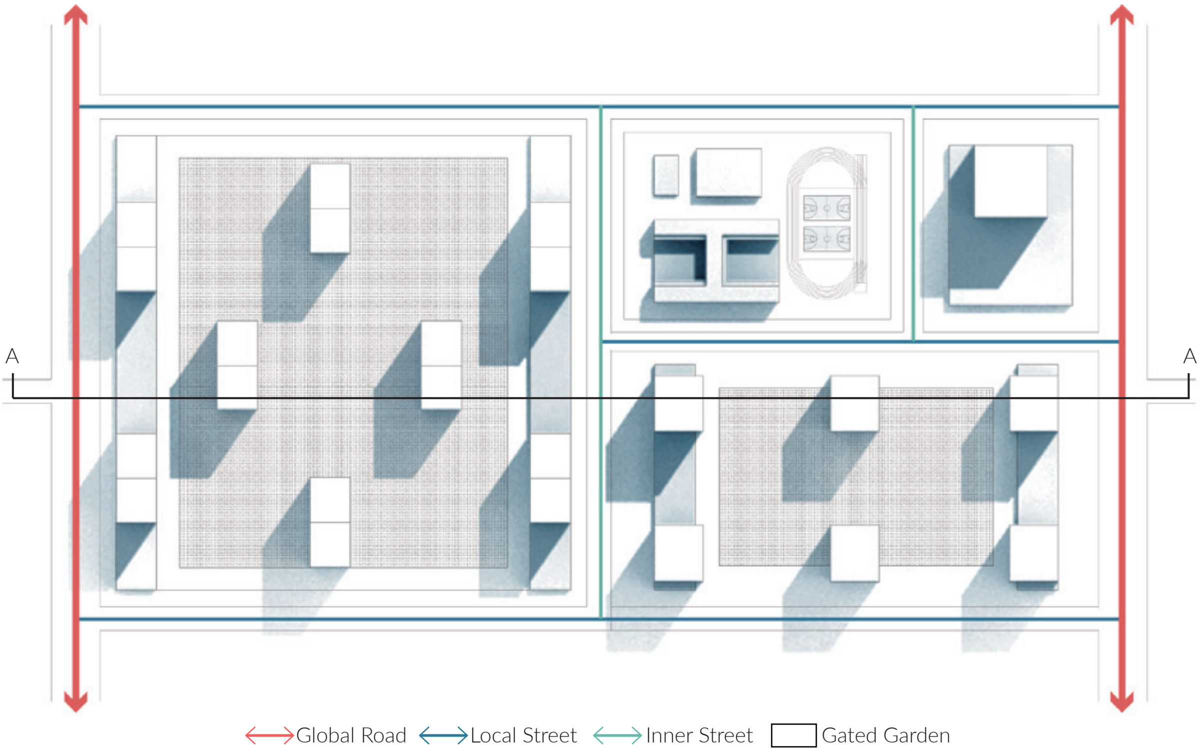


figure 7.2.20 Possible masterplan in the existing regeneration mode

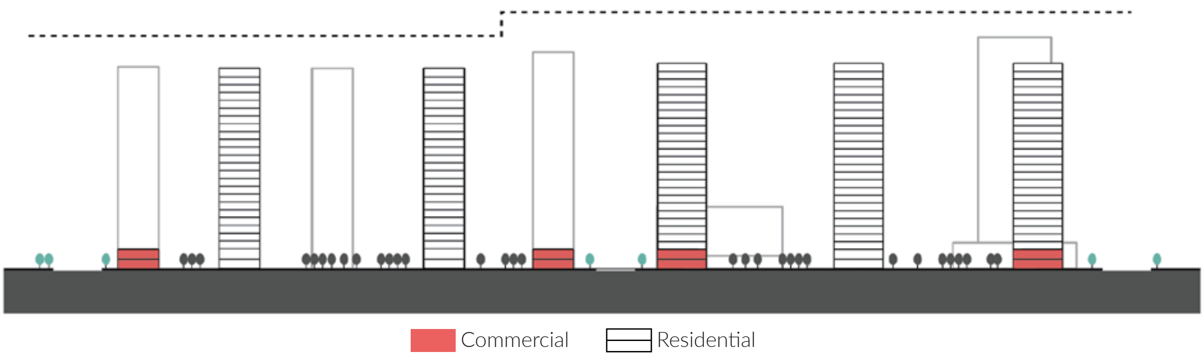


figure 7.2.21 Section A-A

Existing regeneration model:
The existing development model simply divides the regeneration unit into residential, commercial and public service plots, each of which is relatively independent and has a low degree of mixed use. In particular, residential plots are often built as large enclosed settlements with standardized buildings spread over the whole site at once. Therefore, the whole urban space is very homogeneous and monotonous (figure 7.2.21).

figure 7.2.22 Possible masterplan in the new regeneration mode

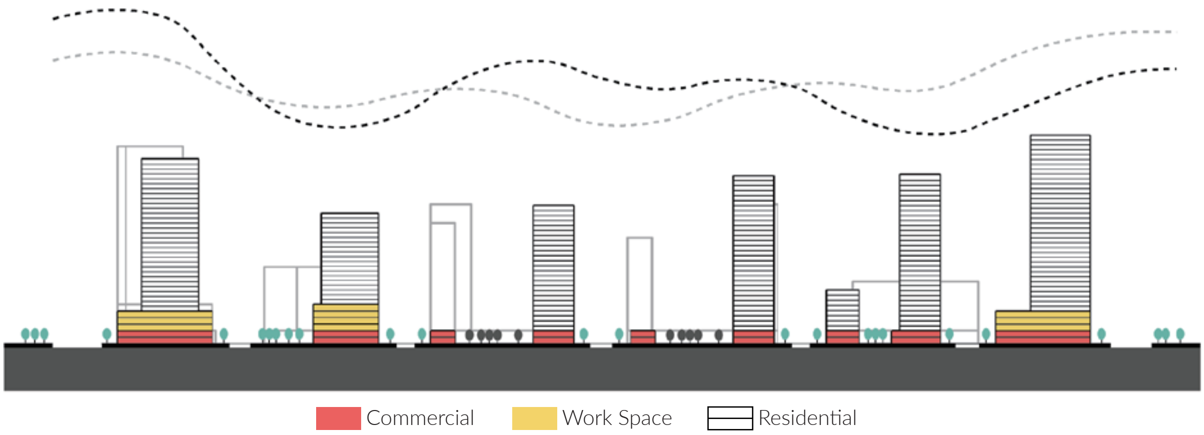


figure 7.2.23 Section B-B

Proposed regeneration model:
If the block division is regenerated in the way proposed above, it can significantly increase the street density and public open space area of the superblock. Also developers can no longer develop in a one-size-fits-all manner, resulting in a richer variety of building types and spatial variations (figure 7.2.23).

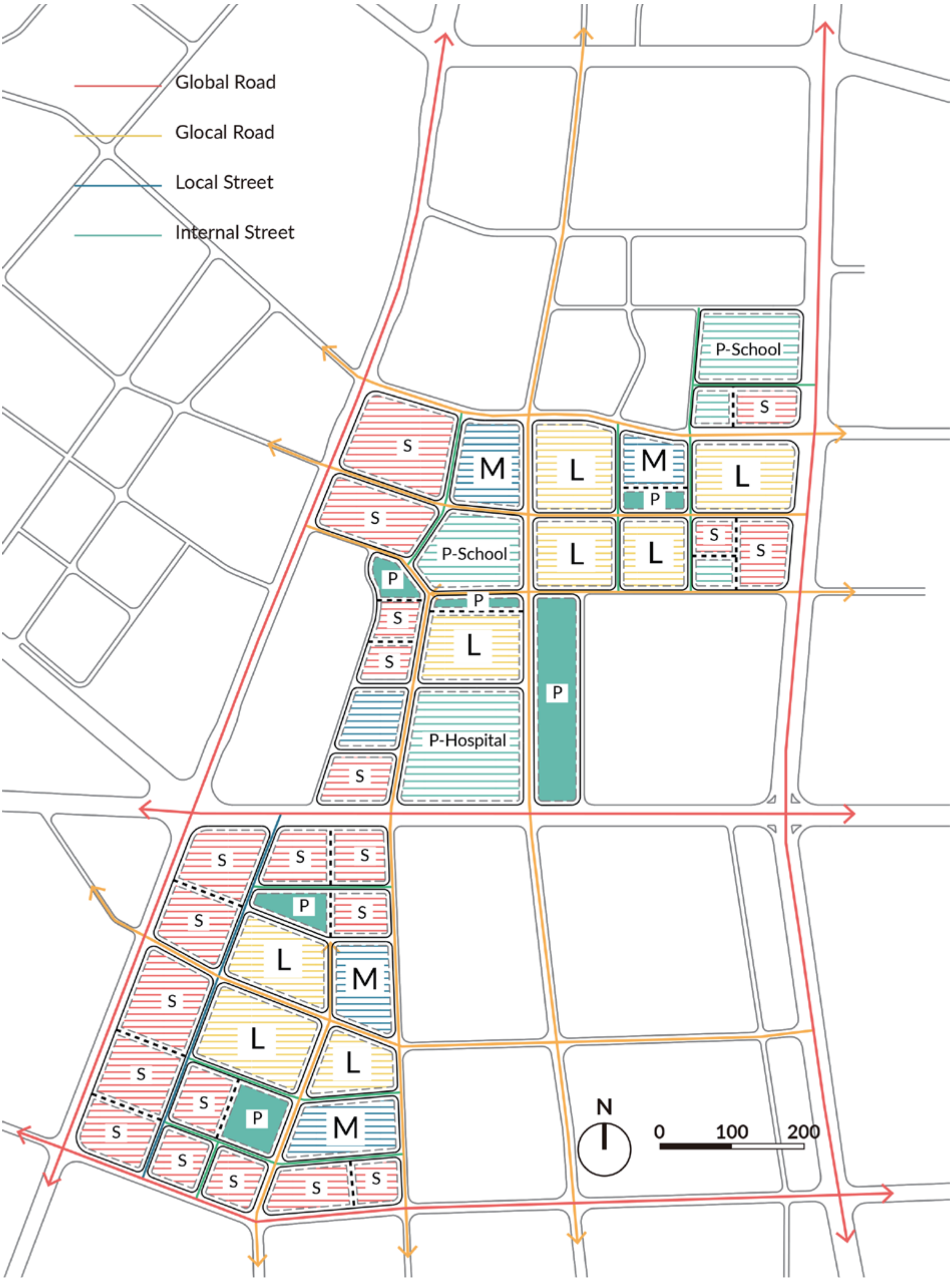


figure 7.2.24 Block sub-division proposal

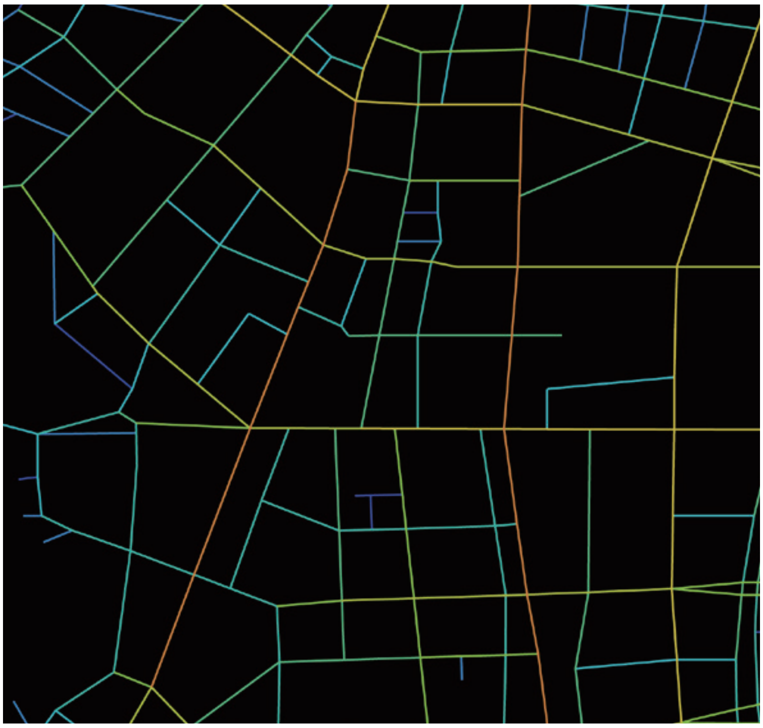
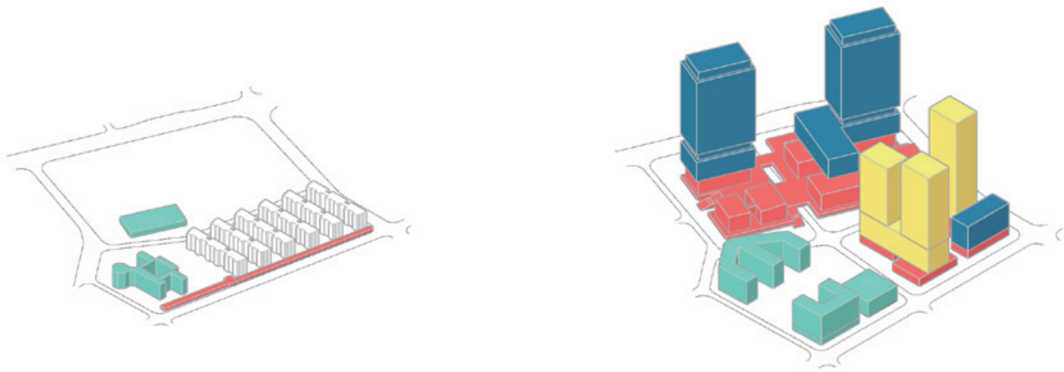


figure 7.2.25 Integration of existing network


figure 7.2.26 Integration of proposed network

Applying strategies one and two within the sample superblocks (figure 7.2.24), a significant increase in the integration of the road network is seen (figure 7.2.25 - 7.2.26).

Regeneration Unit 1:



Commercial | Affordable Housing | Work Space | Public Service | Residential

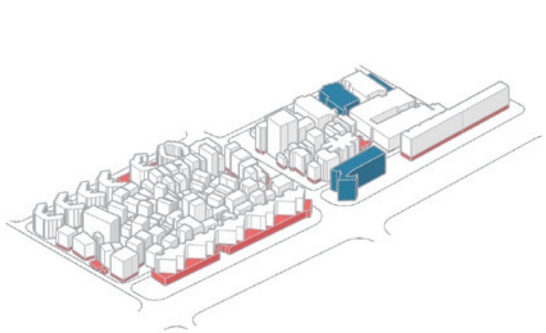
FSI 0.39 3.55

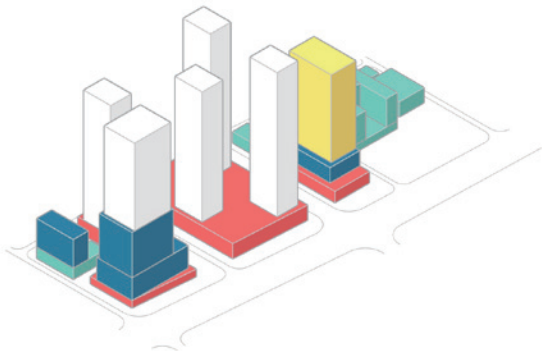
MXI 60% 25.6%

Road Density: 19.4 km/km² 22.5 km/km²

figure 7.2.27 Unit 1 Axonometric Drawing

Regeneration Unit 2:



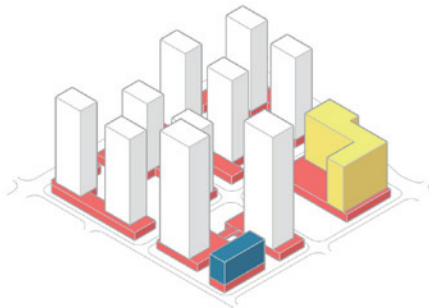


Commercial | Affordable Housing | Work Space | Public Service | Residential

FSI	2.42	4.48
MXI	88%	58%
Road Density:	22.8 km/km²	23.3 km/km²

figure 7.2.28 Unit 2 Axonometric Drawing

Regeneration Unit 3:

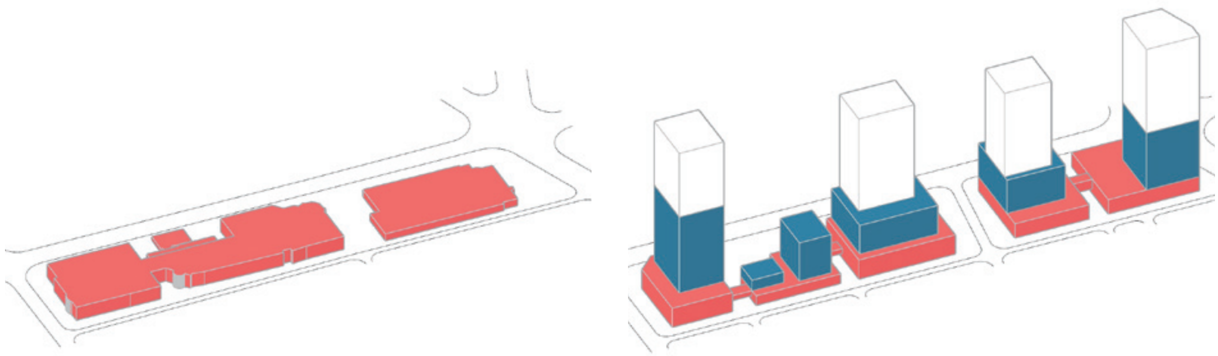


Commercial | Affordable Housing | Work Space | Residential

FSI	1.62	4.9
MXI	96%	81%
Road Density:	20.9 km/km²	24.5 km/km²

figure 7.2.29 Unit 3 Axonometric Drawing

Regeneration Unit 4:



Commercial   Work Space   Residential

FSI 1.32 5.03

MXI 0 47%

Road Density: 19.7 km/km² 21.5 km/km²

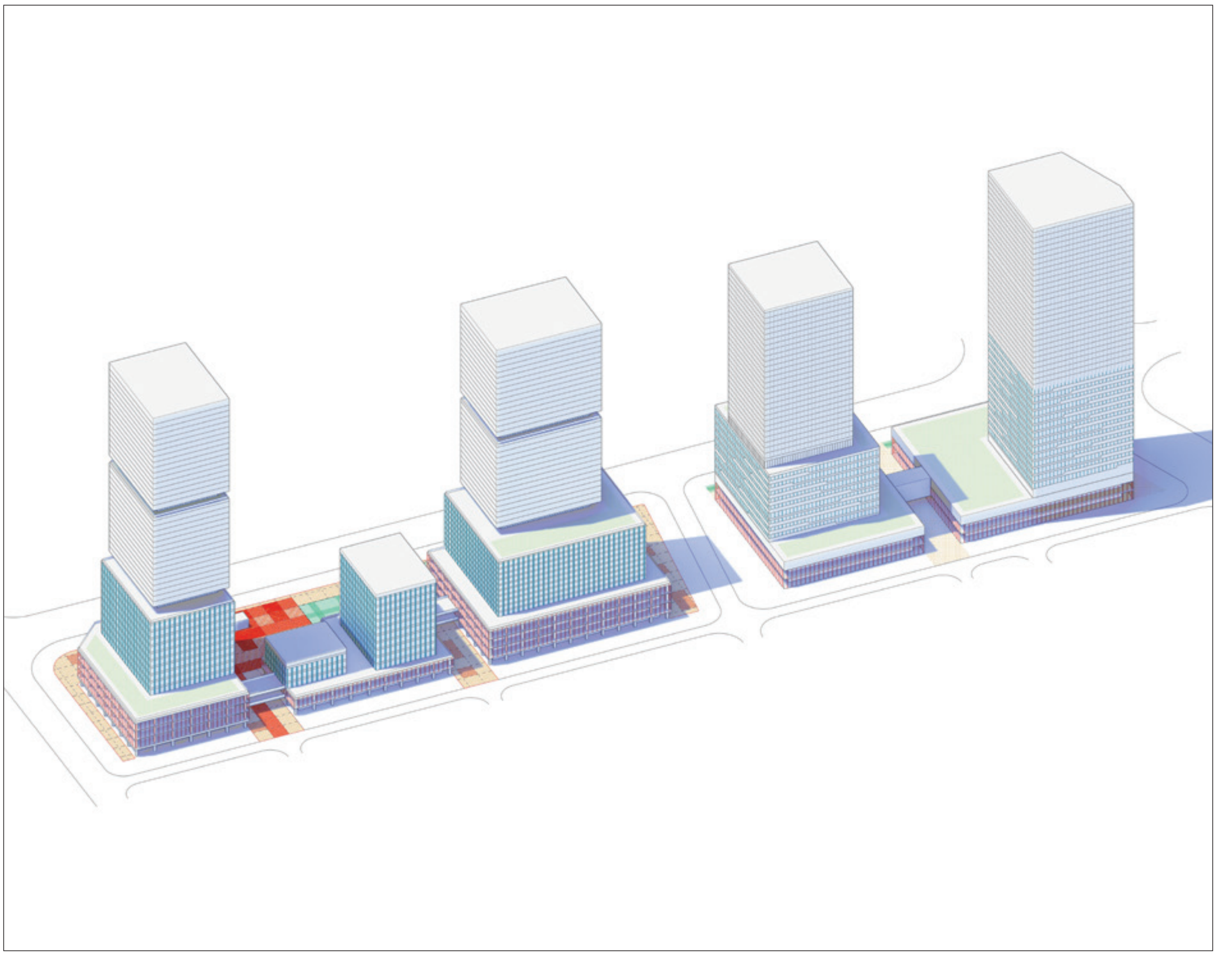
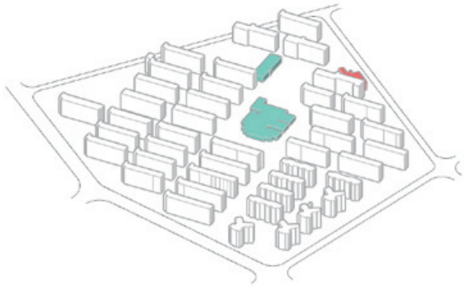
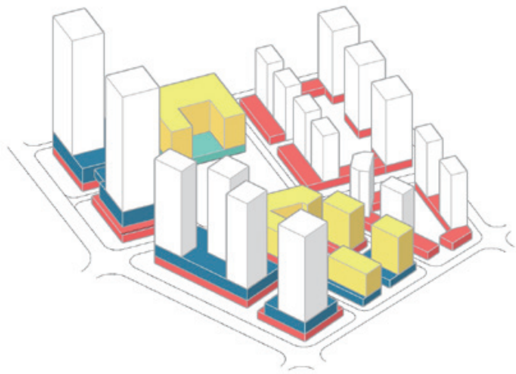


figure 7.2.30 Unit 4 Axonometric Drawing

Regeneration Unit 5:





Commercial Affordable Housing Work Space Public Service Residential

FSI 1.62 | 4.9

MXI 94% | 76%

Road Density: 12.5 km/km^2 | 22.7 km/km^2

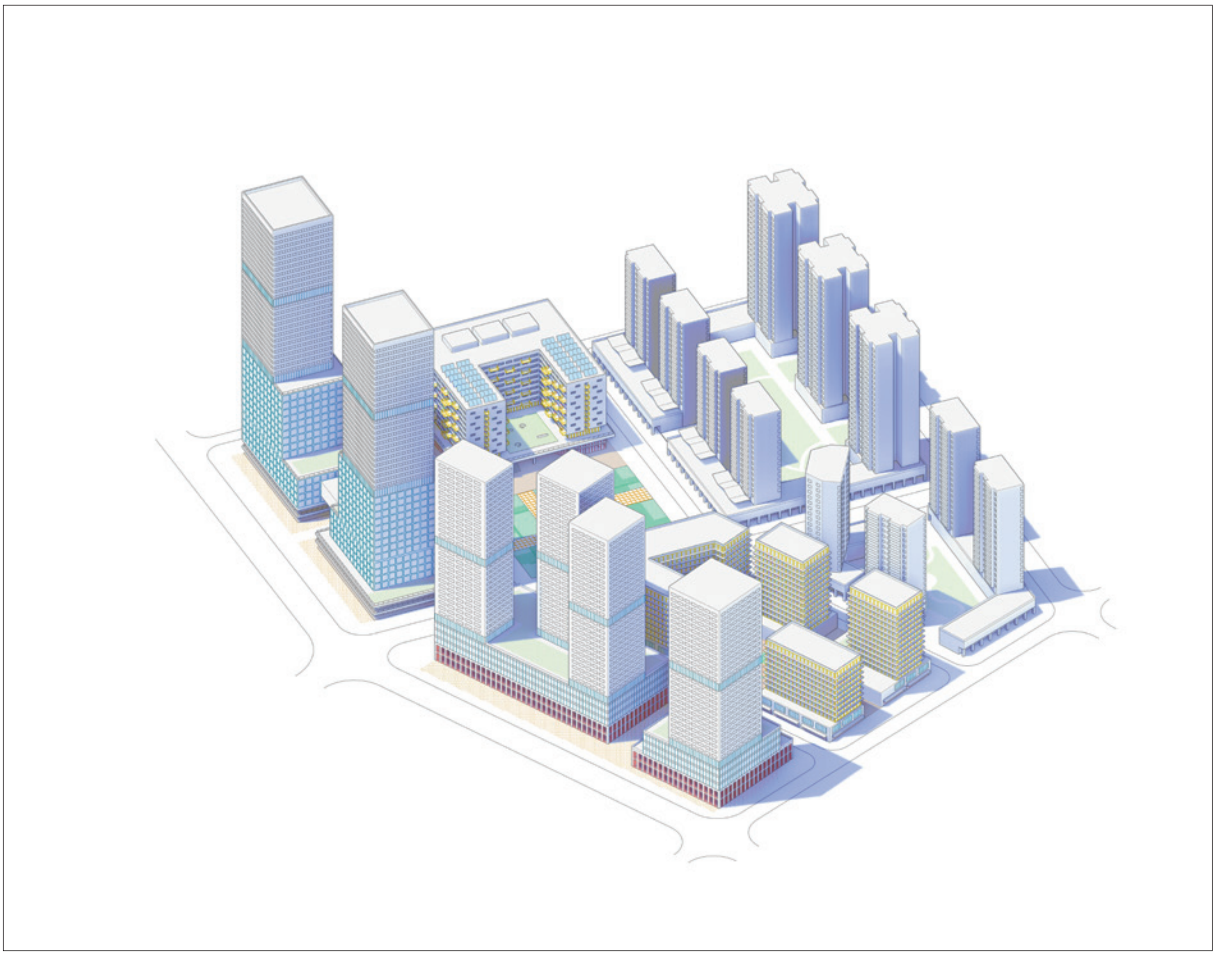
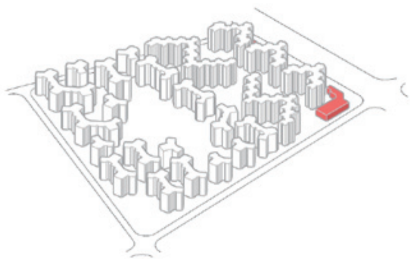
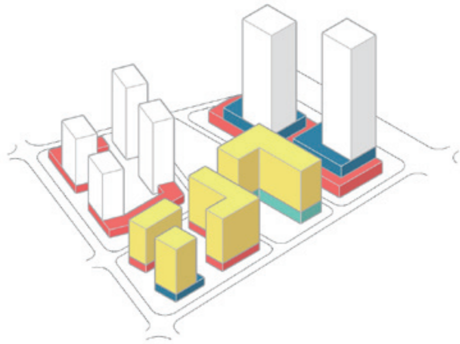


figure 7.2.31 Unit 5 Axonometric Drawing

Regeneration Unit 6:





Commercial Affordable Housing Work Space Public Service Residential

FSI 1.32 5.03

MXI 98% 73%

Road Density: 16.4 km/km² 25.1 km/km²

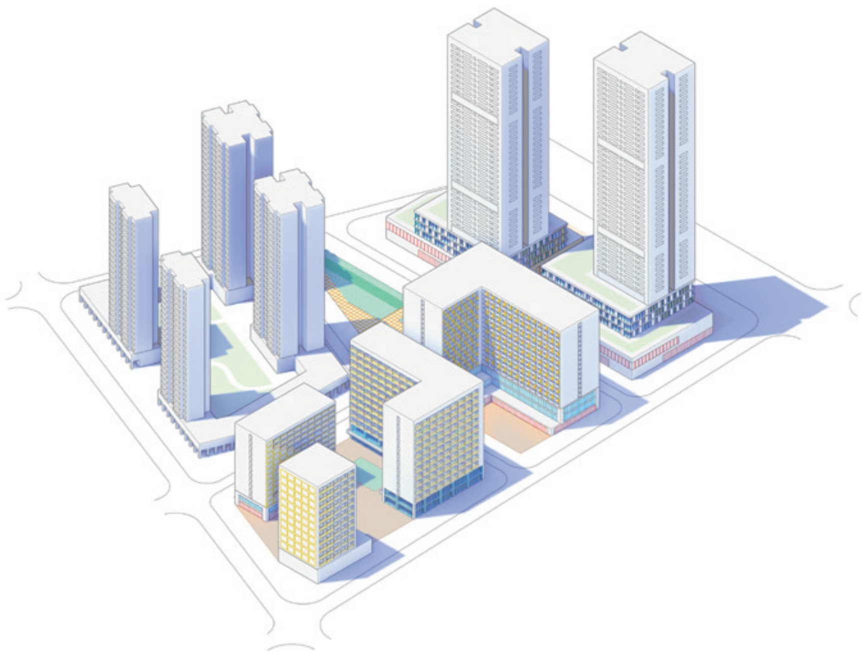
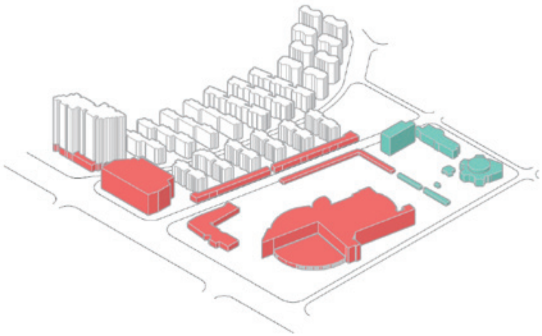
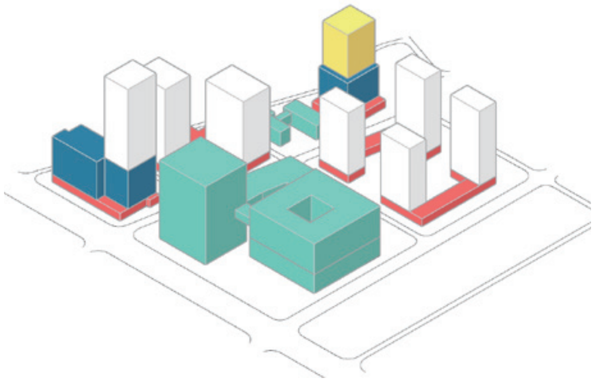


figure 7.2.32 Unit 6 Axonometric Drawing

Regeneration Unit 7:



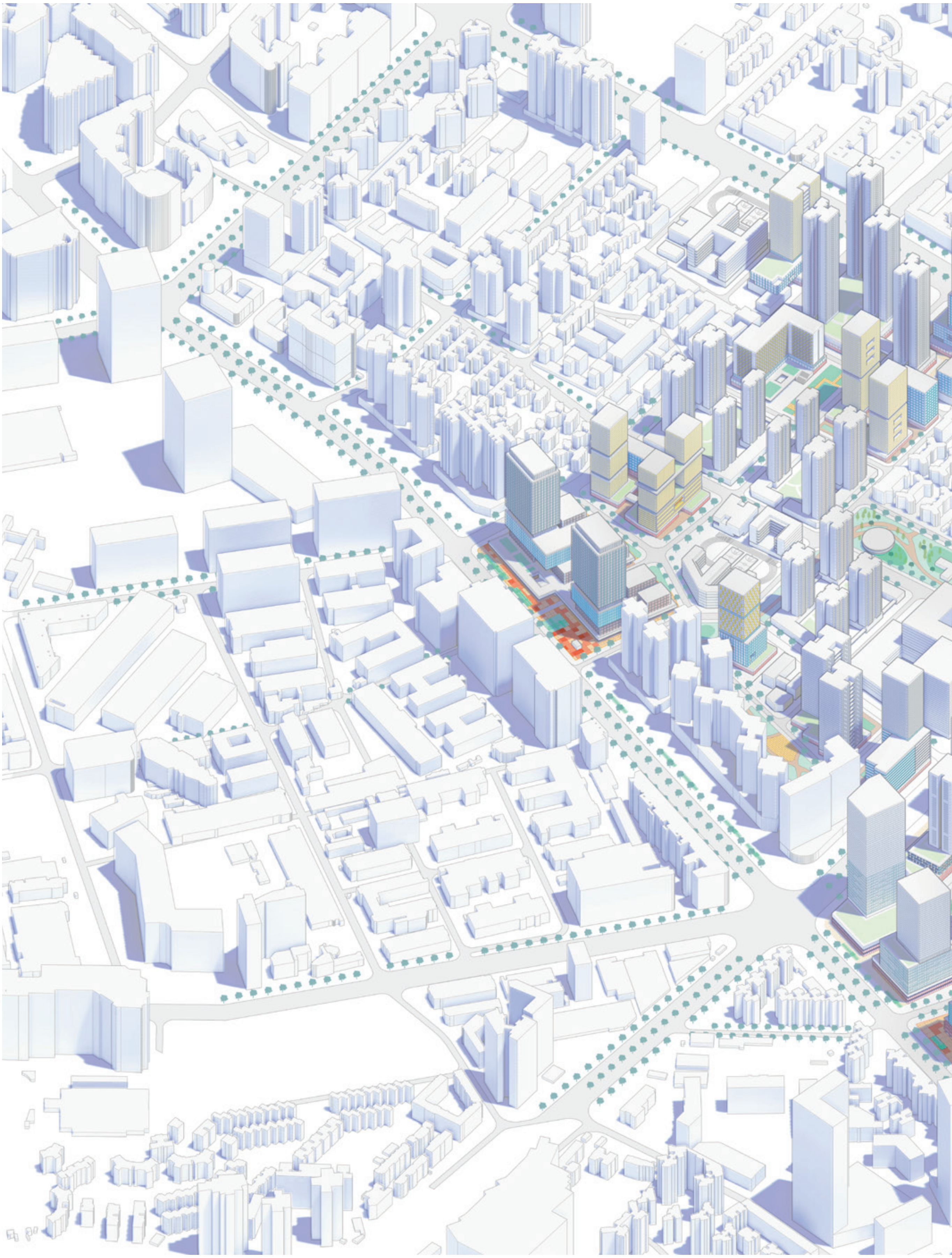


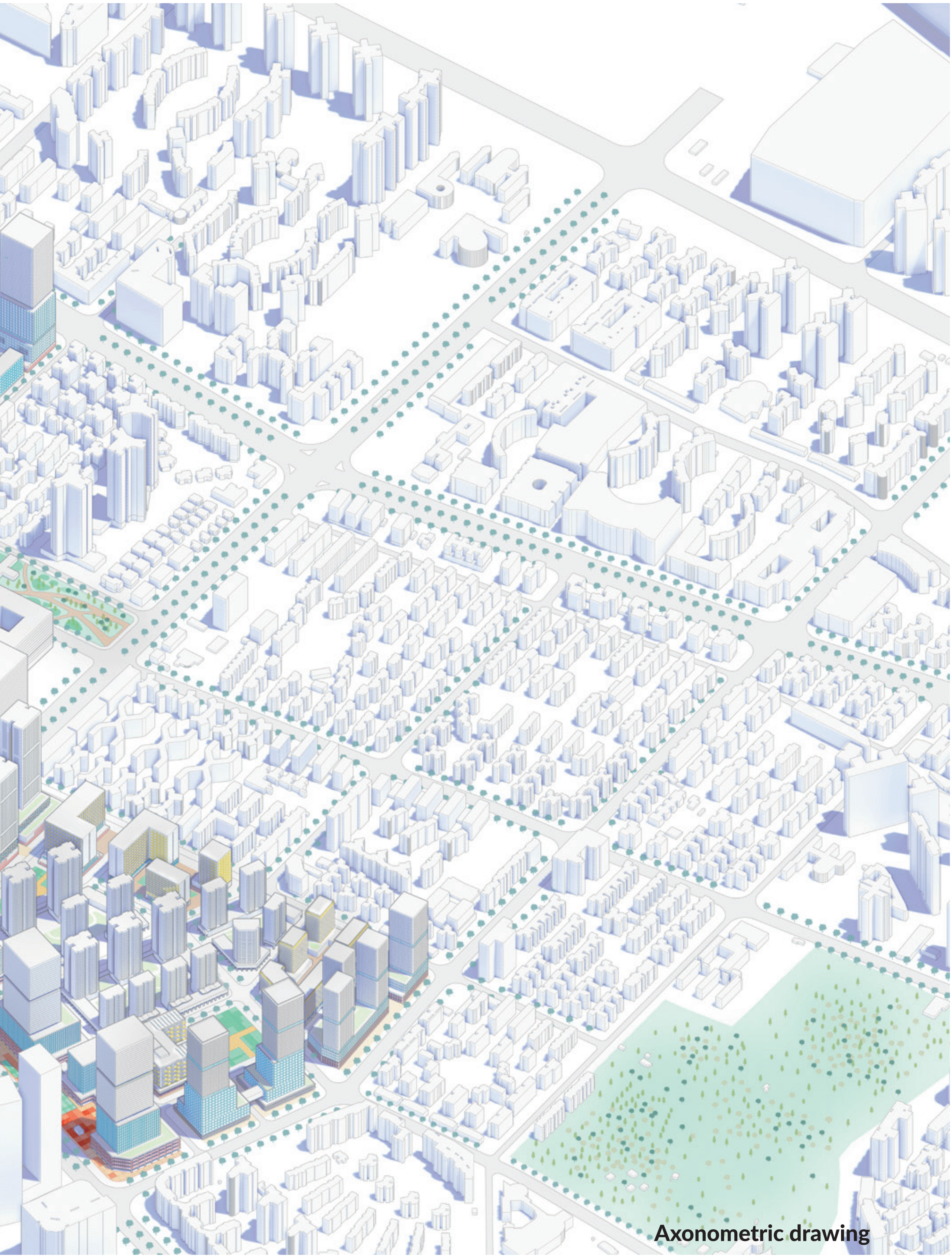
Commercial | Affordable Housing | Work Space | Public Service | Residential

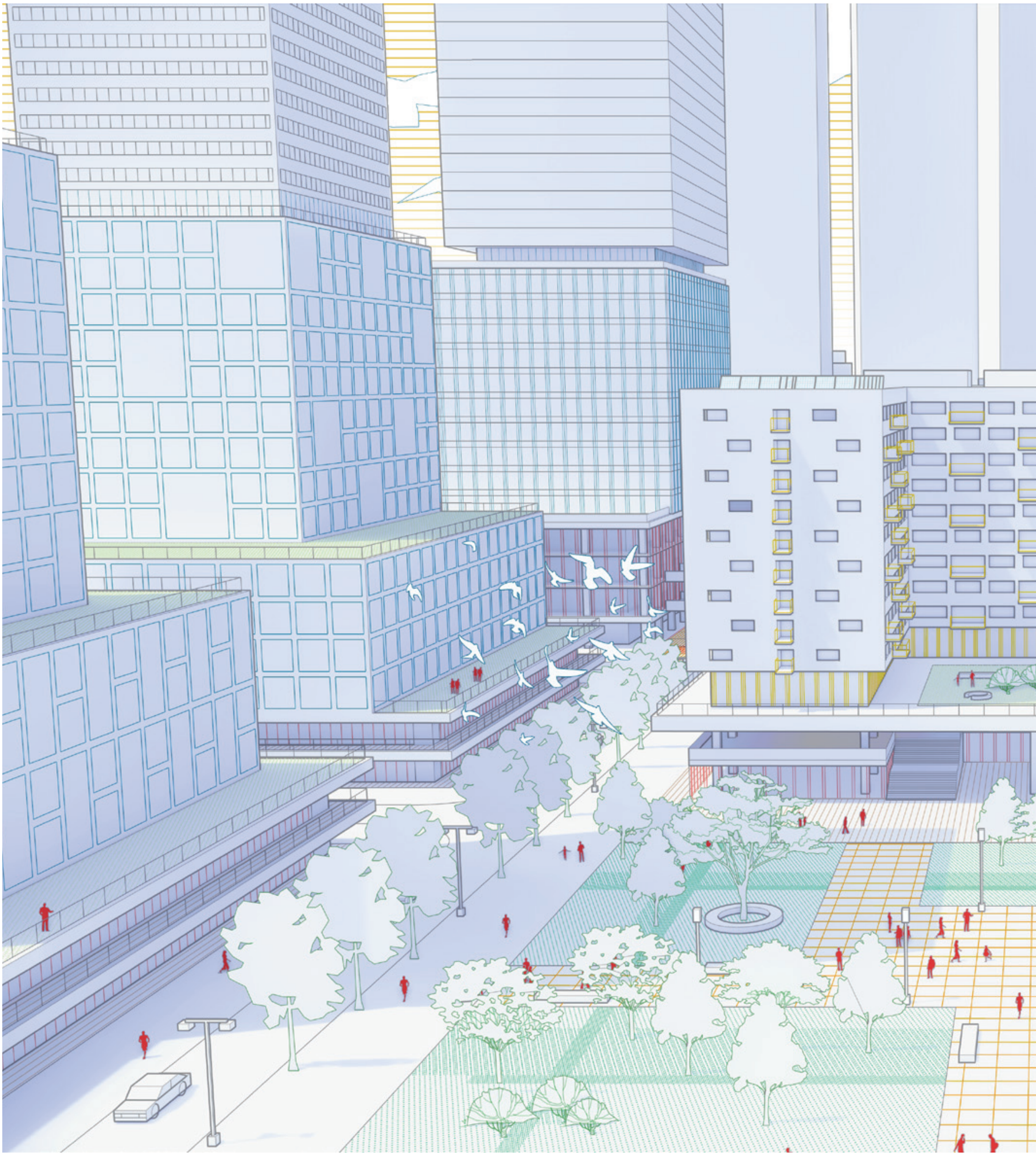
FSI	1.62	4.9
MXI	53%	35%
Road Density:	19.3 km/km²	21.3 km/km²

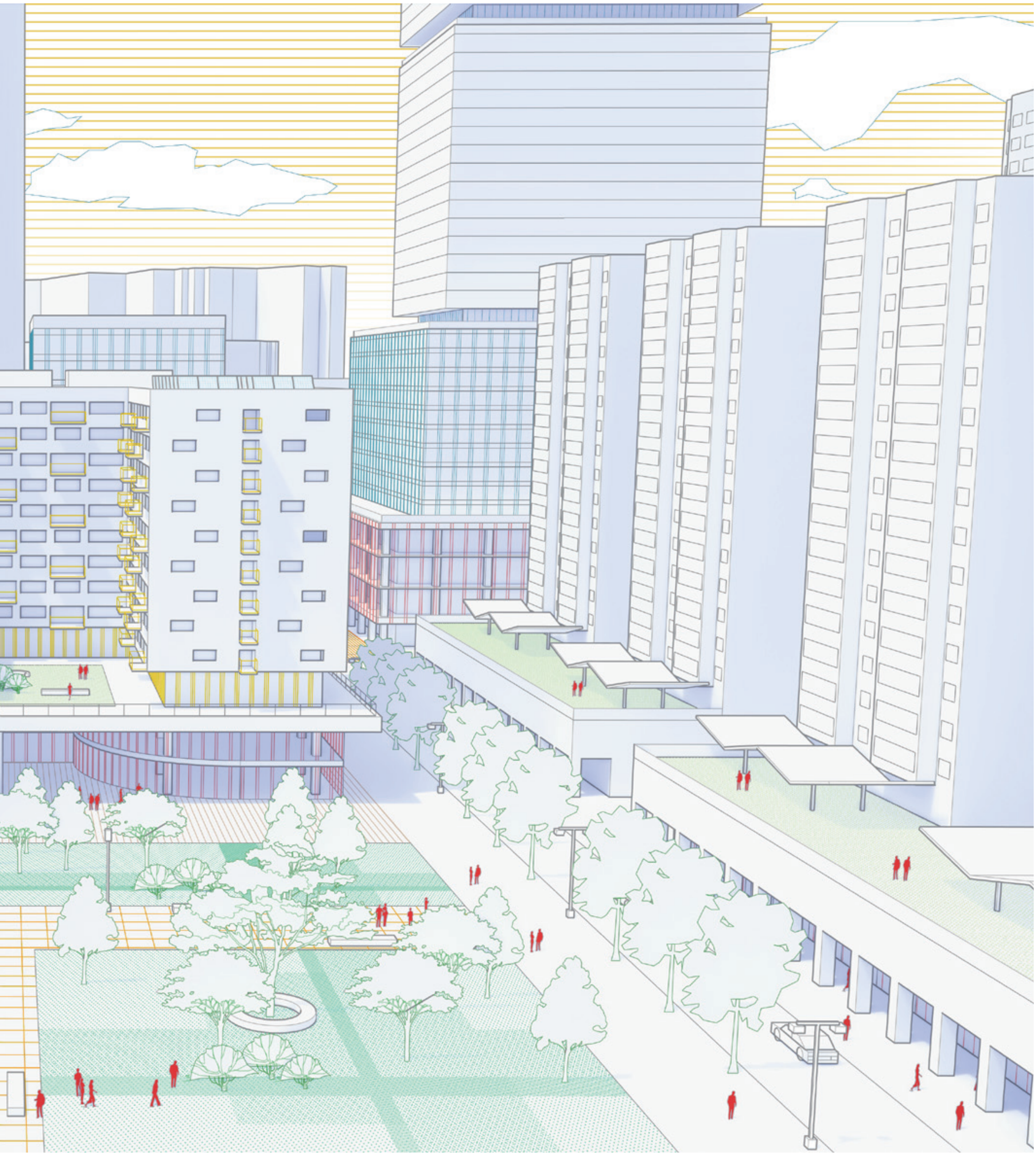
figure 7.2.33 Unit 7 Axonometric Drawing


0
100
200
300M
N
Masterplan



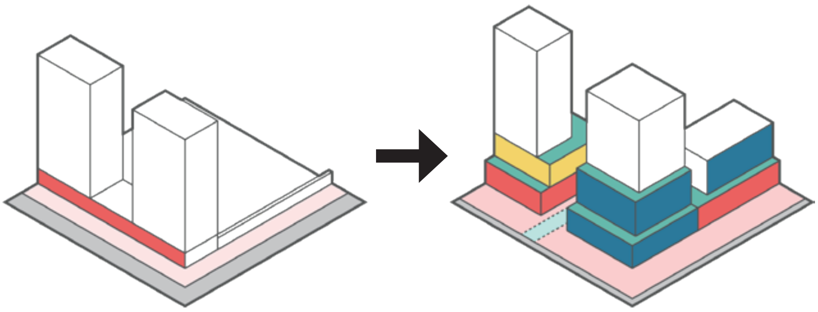

Axonometric drawing





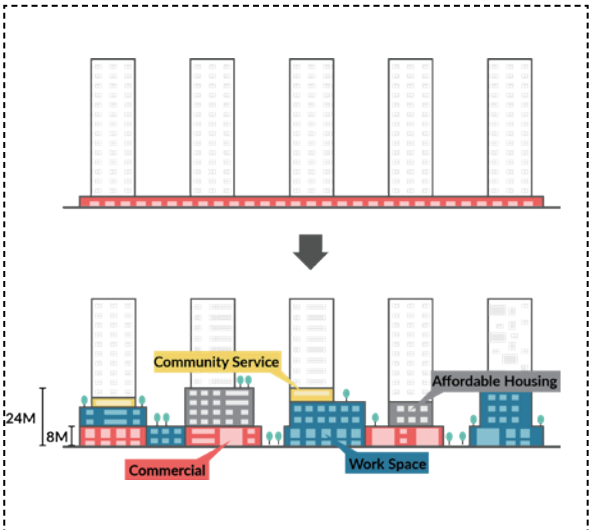
view to the public space in the middle of superblock

7.3 Strategy3 - Network & Activity Integration



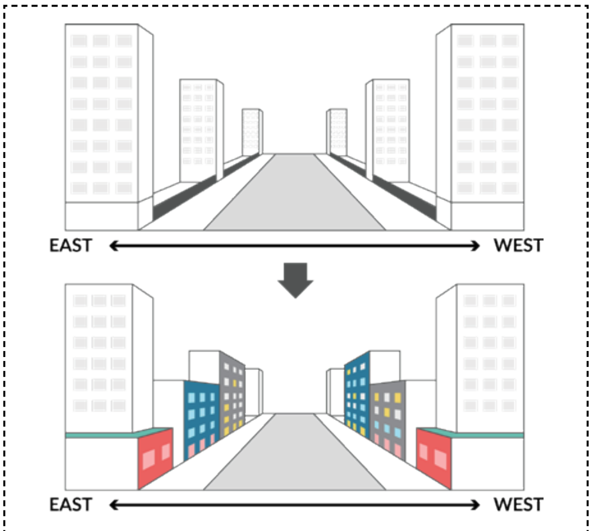
1. Thickened Podium

Most residential areas in Chinese superblocks have a low level of mixed use, and the edges of them are mostly fenced and hedged to meet the requirements of closed management. Even if commercial activities exist on some edges, they do not create a vibrant street frontage because of the limited space and single type. A thickend podium means to creating a greater number and variety of first floor spaces that provide places for a mix of different functional uses.



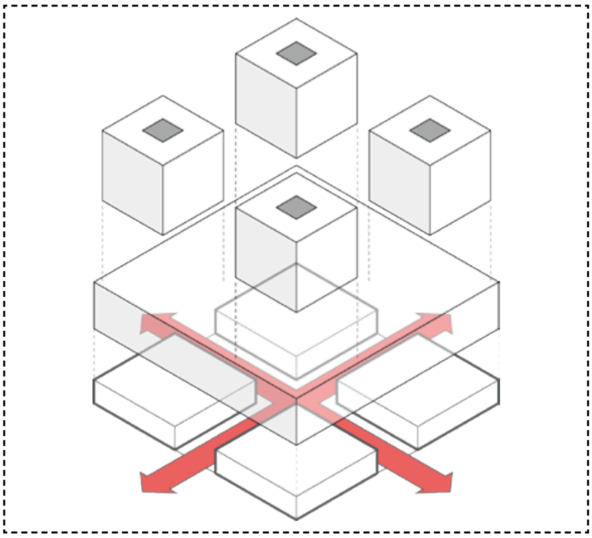
1.1 Mixed-use Podium

The standard one-story small commercial podiums that are popular in Chinese settlements today should be changed. Developers need to provide at least 8m of first floor to provide sufficient space for different functions and to generate more diverse spatial possibilities. It is also recommended that floors of 8-24m can be used for offices, affordable housing, or high-rise residential buildings to provide community space.

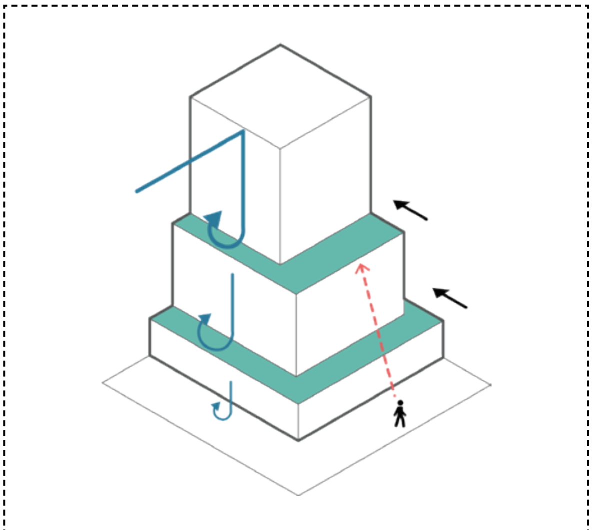


1.2 The east-west 'street front':

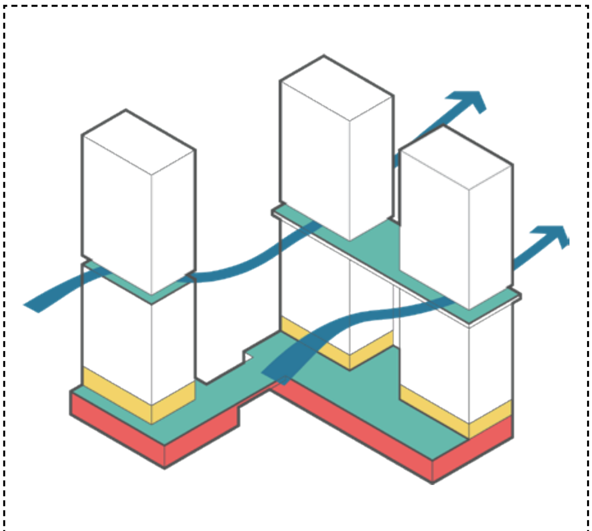
According to the sunlight and climate conditions in South China, the best ventilation and sunlight can be obtained from a north-south orientation, so the long faces of almost all residential towers are oriented north-south. This also results in street fronts that are often discontinuous in the east-west direction, and the dramatic changes in height of the buildings even give a sense of cut-off. Perhaps the spatial gap between east and west could be bridged with offices, social housing rather than monotonous fences



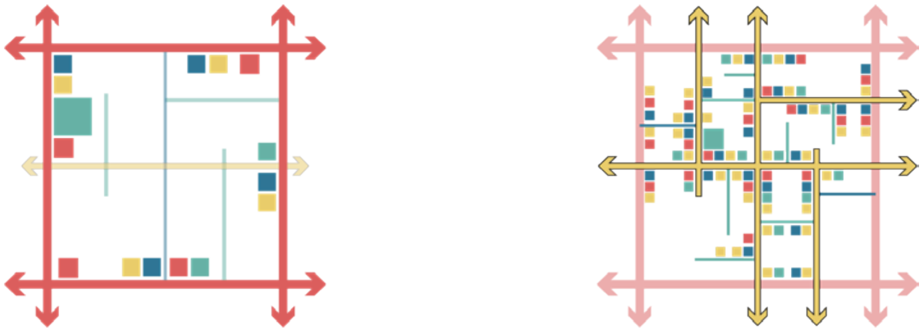
1.3 Transferable ground floor:
For building complexes with larger footprints, pedestrian access and courtyards should be integrated into such buildings. As such, the ground floor should be porous, encourage interaction, networking, and a vibrant public realm. The government can provide a certain amount of FSI bonus to encourage developers to build first floor public spaces that are open to the city.



1.4 Smart Setback:
Many studies have concluded that the ideal ratio of street connected-layer to street width should be between 1:1 and 1:2. Therefore, when the height of the plinth increases, a reasonable setback should be incorporated according to the building structure to reduce the pressure caused by too tall buildings along the street to pedestrians. At the same time, the platform created by the setback can abate the vortex effect caused by the tall building and reduce the strong wind rushing to the street.



1.5 Multiple layers of open space:
Open space is rare in China's high-density urban spaces. The platforms created by the thickened podium can be interconnected to form a second layer of open public space. Also, for high-rise buildings, refuge floors can be designed together with public spaces and act as windows for wind flow to improve urban ventilation in high-density environments.



2. Decentralize activities to the streets

The various types of social activity should be more evenly distributed throughout the streets of the Superblock, rather than being overly concentrated along Global Road. In addition, Global Road, Glocal Road, Local and Internal Street should differ in their main street-level activities due to their different levels of integration in the urban network.

2.1 Suggested profile and plan of Global Road

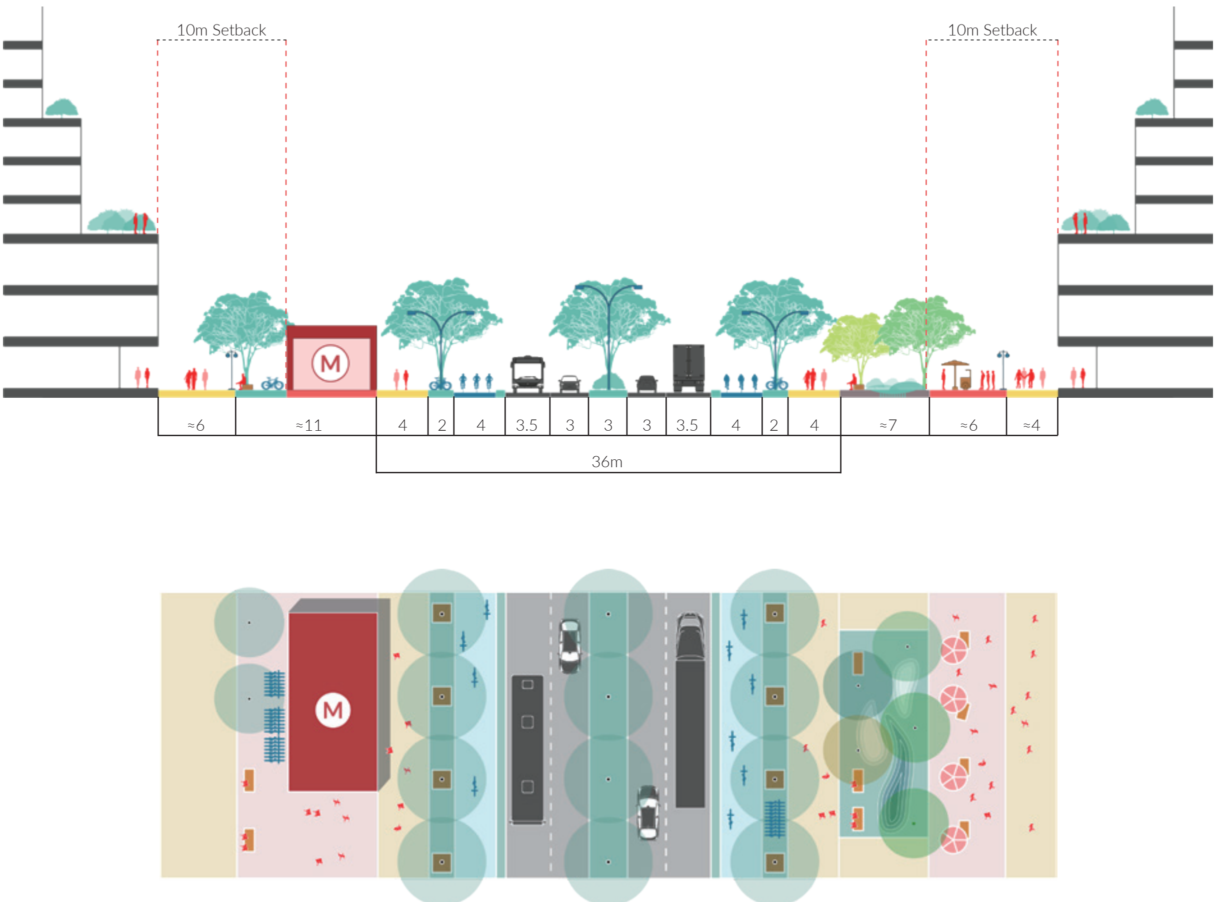
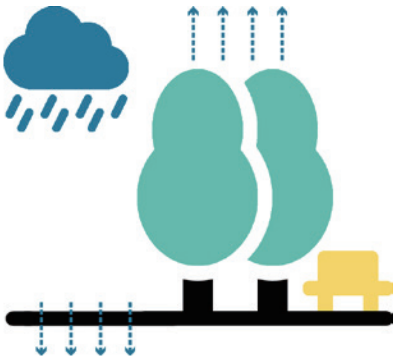


figure 7.2.34 Suggested profile and plan of Global Road

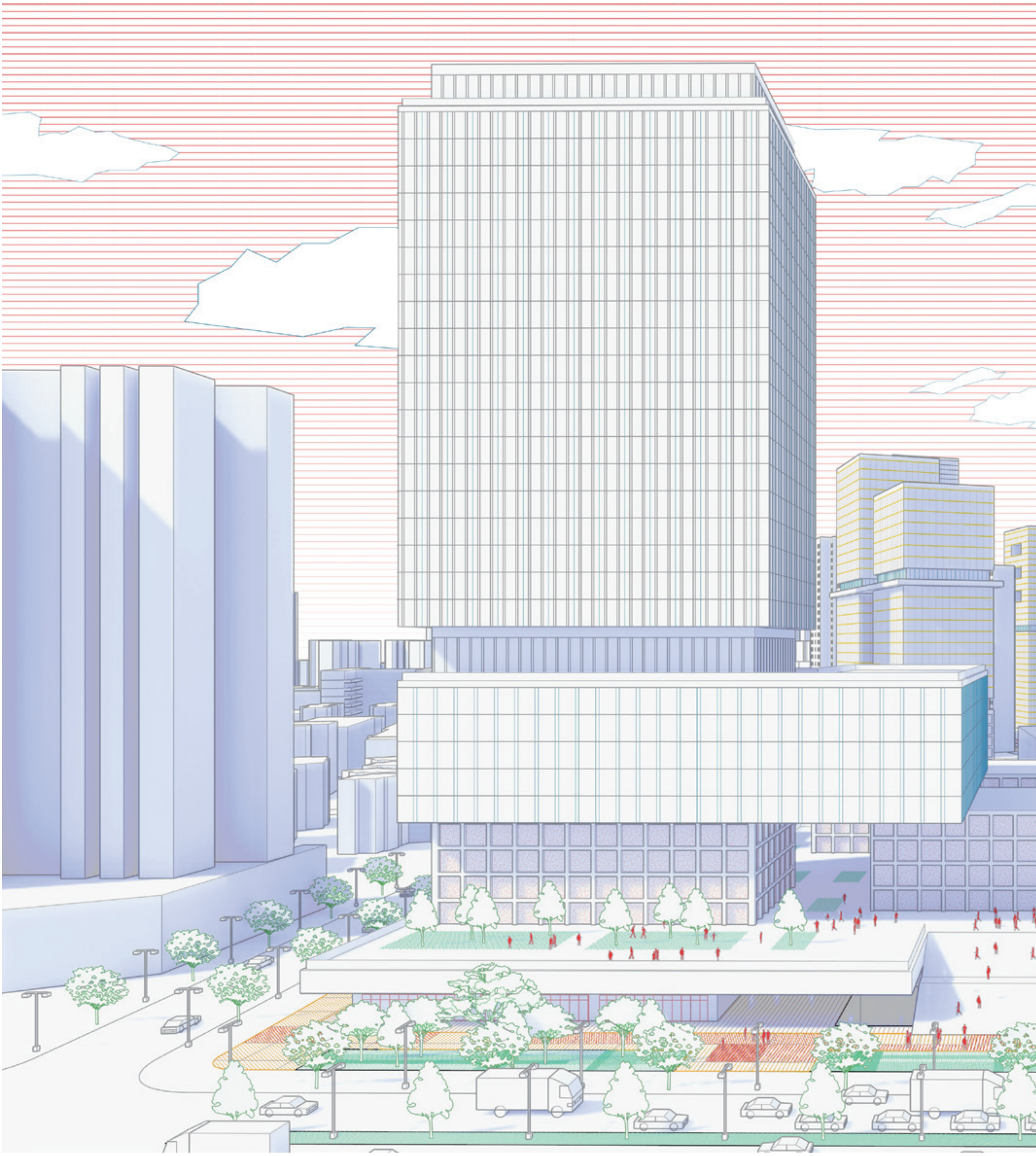
Design suggestions for activities along Global Road

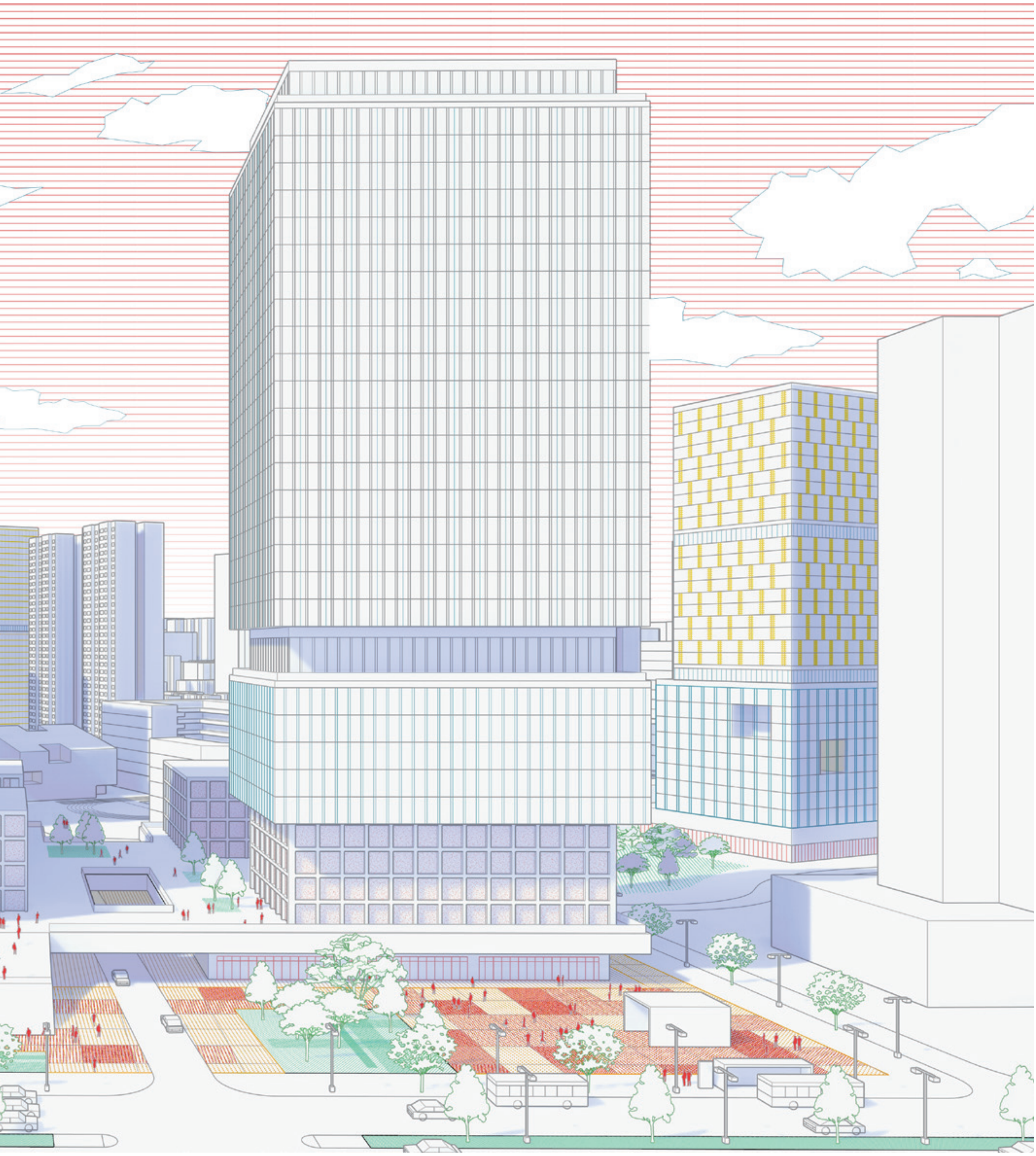
District-level functions:
Global Road serves as the backbone of the road network and is the corridor that concentrates most of the district-level traffic. At the same time, both sides of Global Road have relatively generous space to accommodate functions that require more land area. Therefore, large urban services such as government, schools, and hospitals can be located along Global Road, as well as urban complexes such as shopping malls plus office towers.

Transportation hub:
In addition to being a major transportation artery, Glocal Road is often integrated with urban rail transit such as the Metro. Convenient transit connections should be provided near rail stations to provide easy access to bus stops and public bicycle connections.



Green space along the road:
The sidewalks on both sides of Glocal Road have more than enough space. A pocket park can be built along Glocal Road without affecting pedestrian traffic, providing shade and resting places for pedestrians and serving as a sponge infrastructure for the city.





view to the complex along the global road

2.1 Suggested profile and plan of Glocal Road

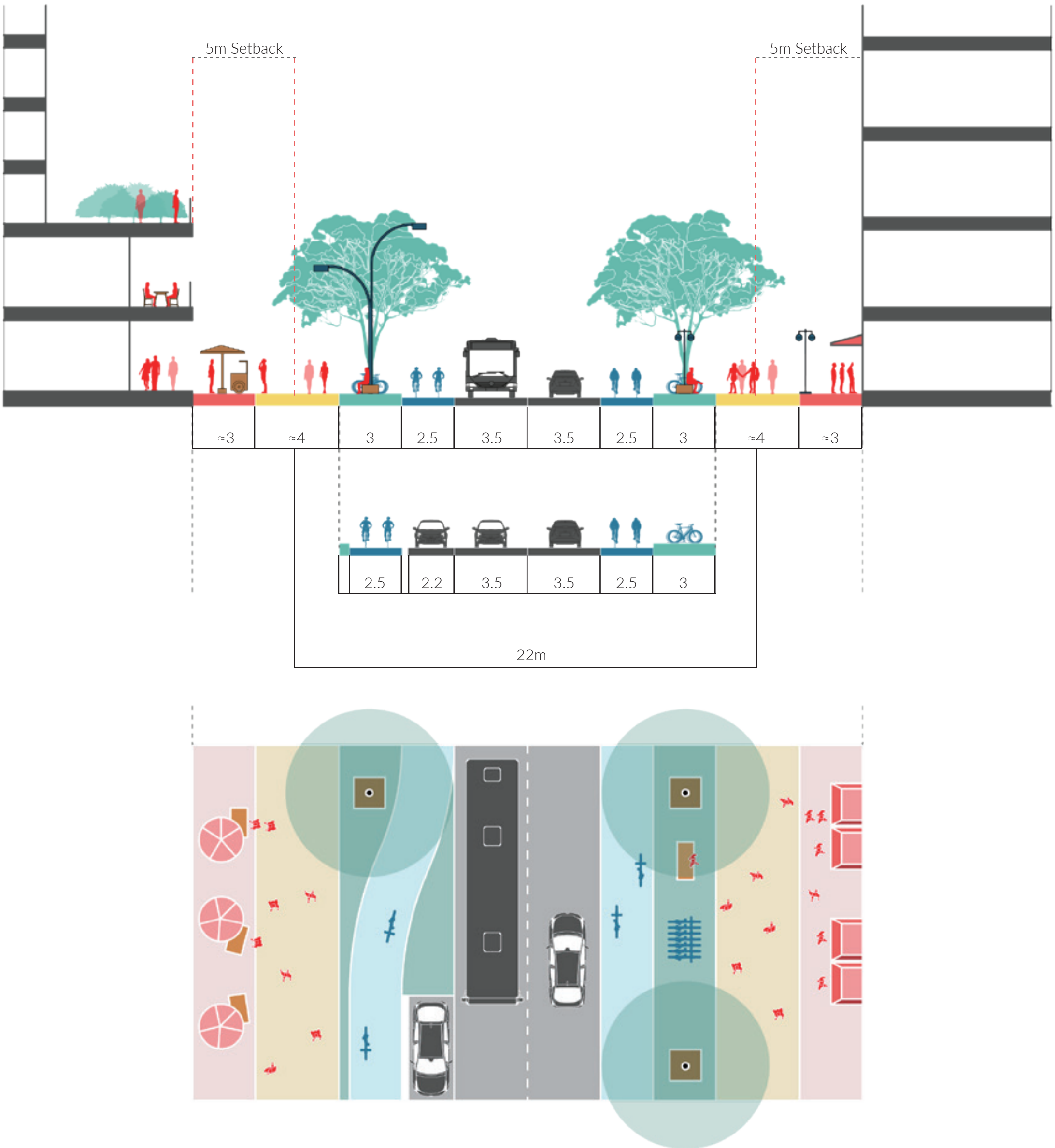
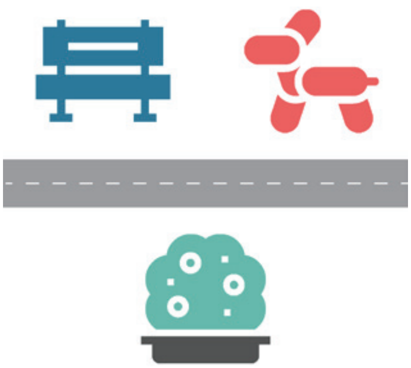


figure 7.2.35 Suggested profile and plan of Glocal Road

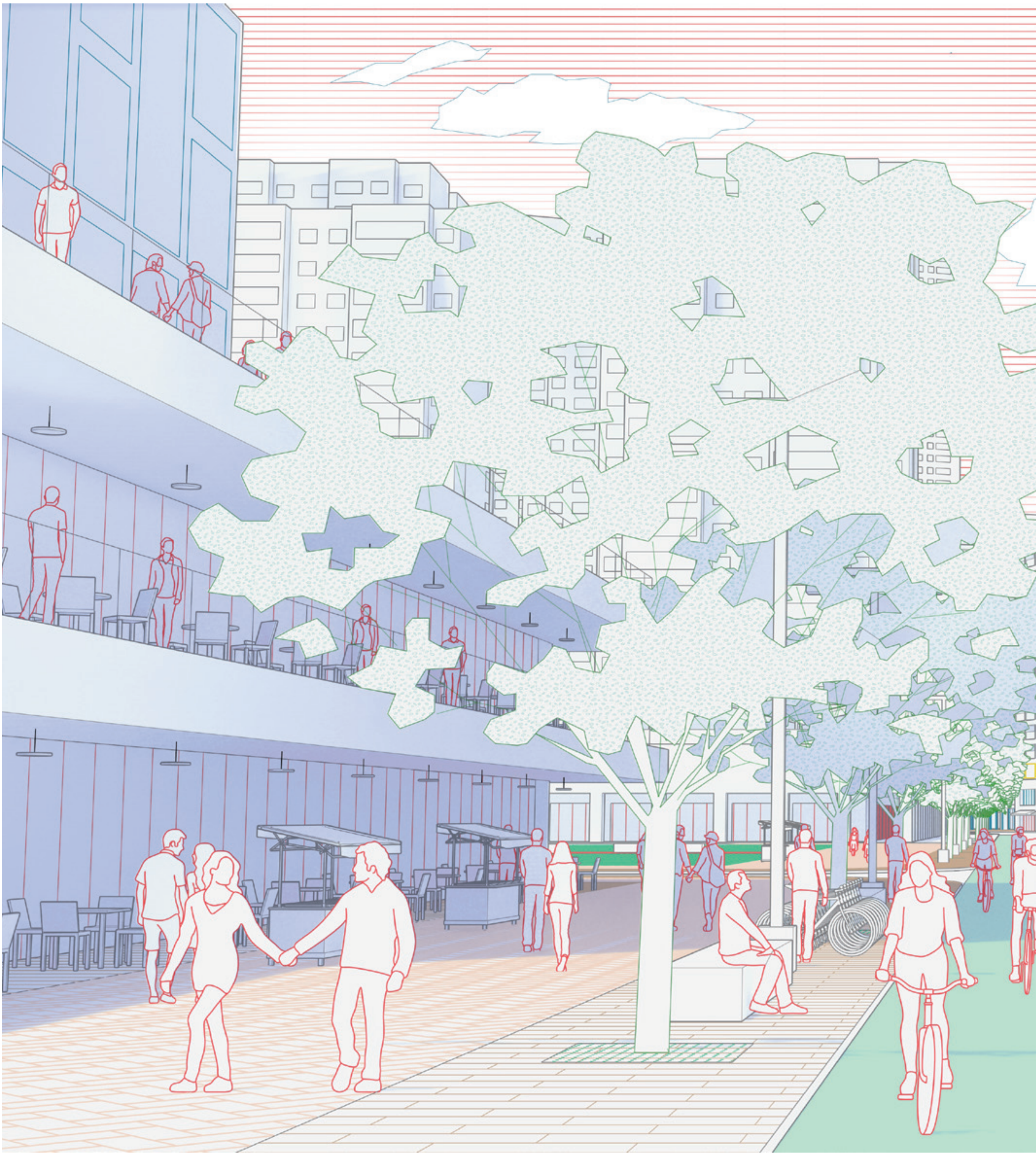
Design suggestions for activities along Global Road

Daily consumption:
Glocal Road is an important link between superblocks and superblocks, which can attract people from different superblocks to gather and provide a continuous walking experience. Therefore both sides of Glocal Road should focus on more activities that provide daily consumption for pedestrians, such as clothing stores, restaurants, and small supermarkets. Outdoor retail spaces and mobile vendors should also be allowed to create a more active street atmosphere.

Flexible office space:
In addition to commercial functions, the building plinth can also be used as office space, especially the space that is more flexible compared to large office buildings, such as shared offices that attract young entrepreneurs, artists, and craftspeople.



Street furniture:
Provide street furniture such as seating for pedestrians, small bonsai or sculptures on the sidewalk to make the pedestrian space more diverse and attractive.



view to a glocal road

2.1 Suggested profile and plan of Local Street, Internal Street

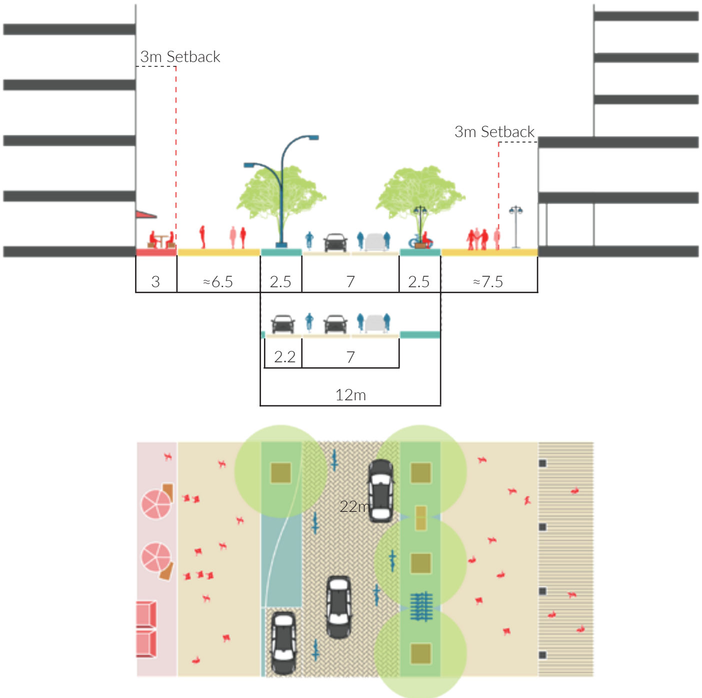


figure 7.2.35 Suggested profile and plan of Local Street

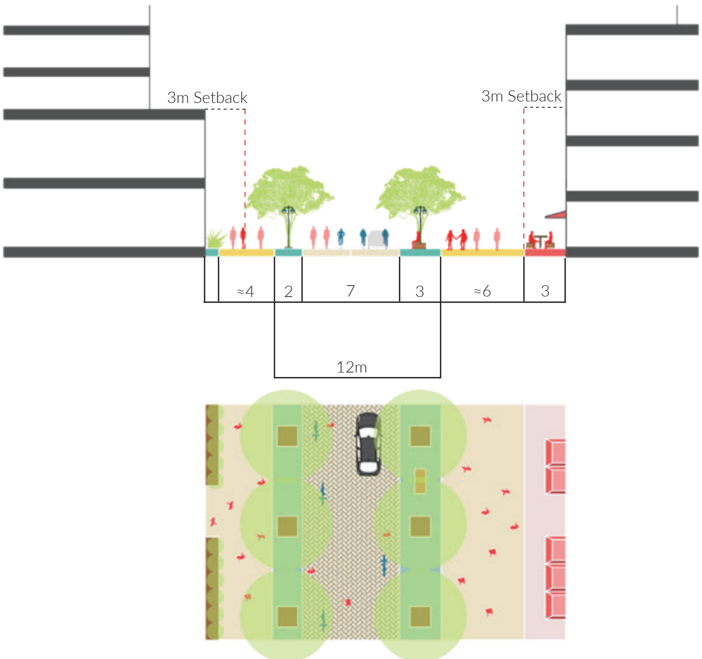
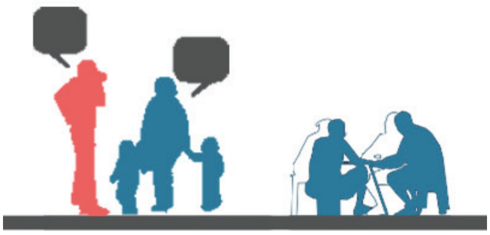


figure 7.2.35 Suggested profile and plan of Internal Street

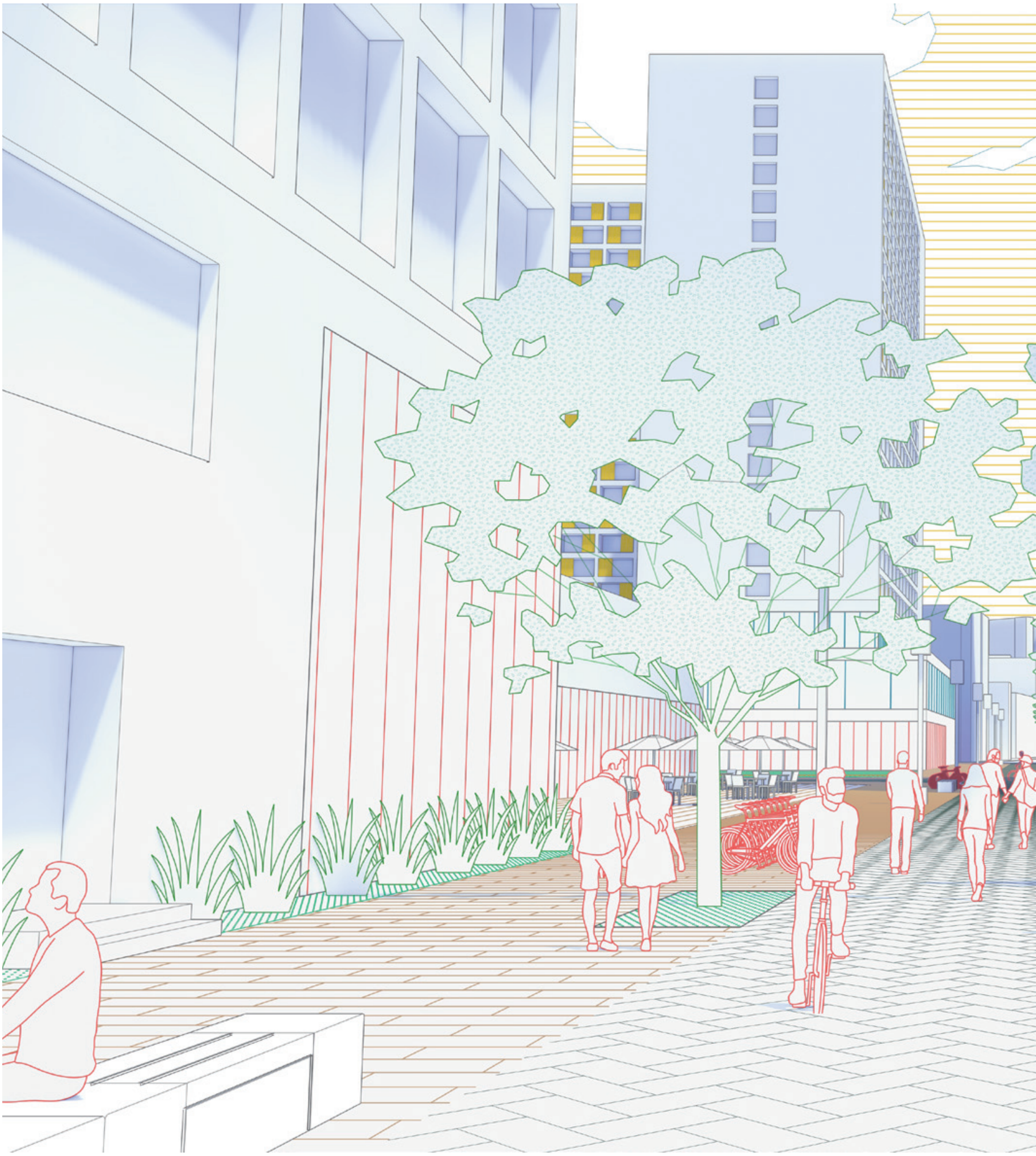
Design suggestions for activities along Local Street or Internal Street:

Place for children and the elderly:
Both Local Street and Internal Street mainly serve the residents within the Superblock. The streets serve both as transportation infrastructure and as community public spaces. The streets can be lined with pocket parks and playgrounds to provide activity areas for children and the elderly in the community.



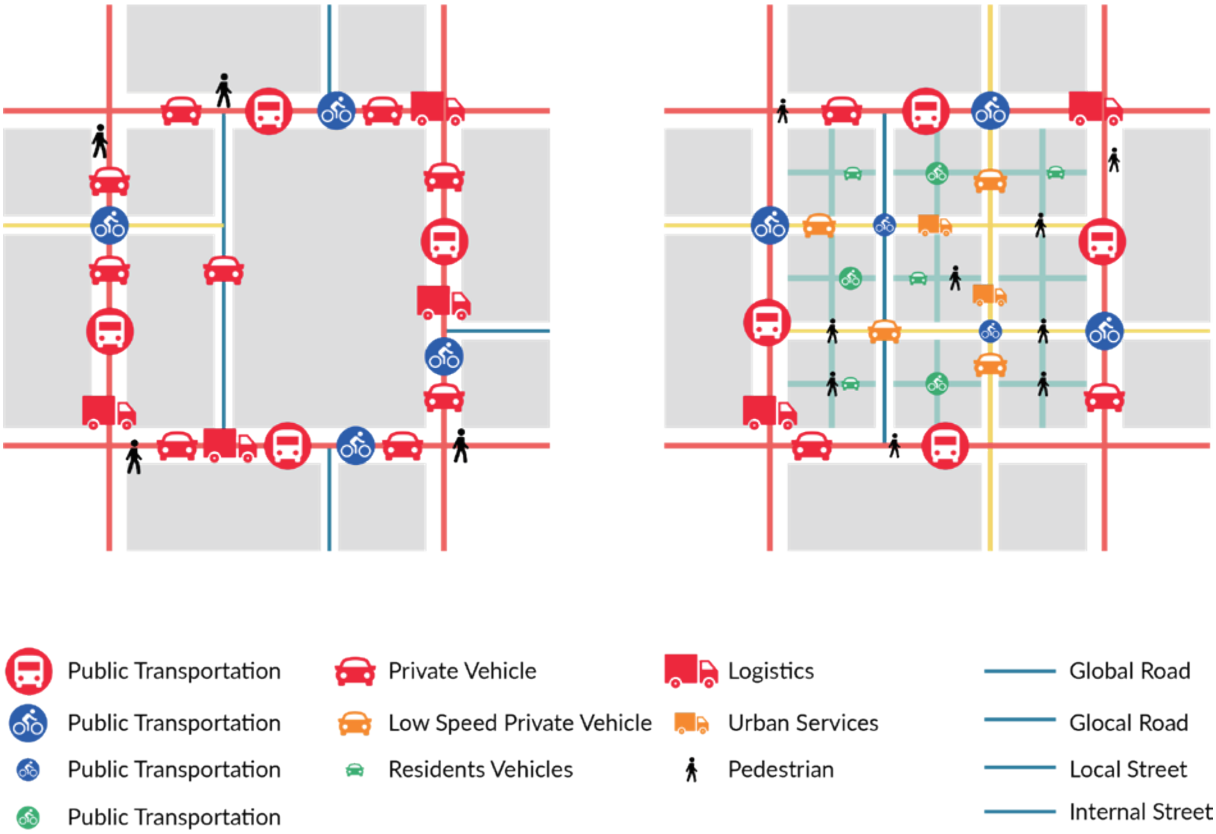
Place for communities:
Streets and open spaces on both sides of the street can facilitate interaction between people from different communities within the superblock. Providing flexible furniture and spaces where people can stay and talk promotes more self-motivated activities in public spaces and increases interaction between communities.

Place for activities:
During certain holidays or celebrations, the street can be restricted from motorized traffic, making it a completely public space for residents to move around.



view to an internal street

7.4 Strategy 4 - Flow Control



Smart control of the traffic flow

Currently, Global Road in the Superblock concentrates too much traffic, causing problems such as congestion, noise and a bad walking experience. With the upgrading of the Superblock's road network, motorists and pedestrians have more options for paths of travel. A smarter approach to traffic flow management is therefore needed to better ensure the pedestrian travel experience and mitigate the negative impacts of crossing traffic on the community.

Speed Control

Limit the speed of motor vehicles, especially on Local and Internal Streets, to ensure pedestrian safety.

Walking Only Zone

Certain less connected streets or areas with a high concentration of activity can be turned into pedestrian streets at certain times of the day.

Reversible lanes

Some of the driveways are only open for use during the morning and evening rush hours.

Distrubution Management

To allow the distribution of goods only in certain time slots.

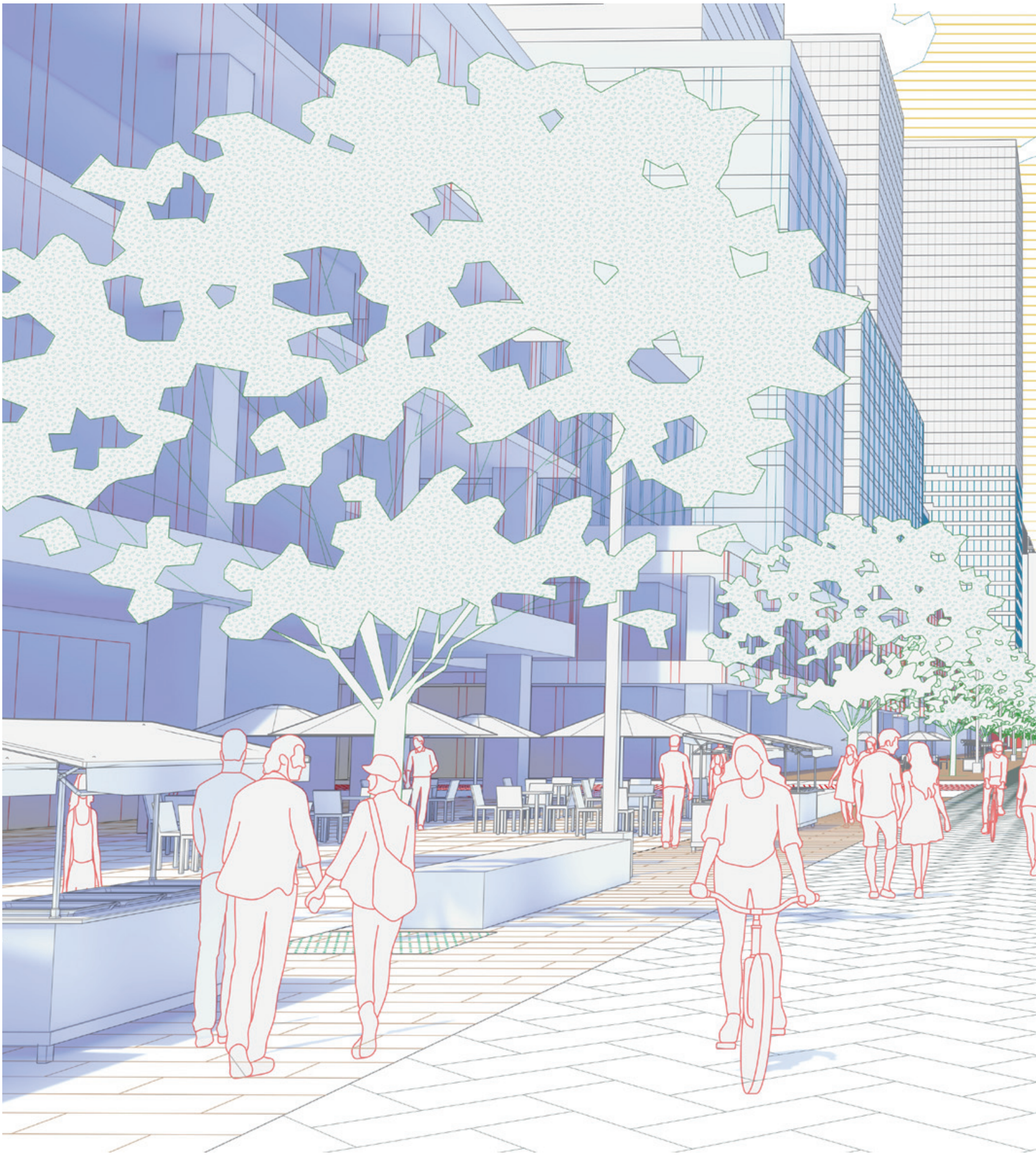
No honking

All motor vehicles are banned from honking when driving on roads within the Superblock

Intersection Management

Avoid congestion at intersections by planning vehicle routes, such as setting up one-way streets.

view to a local street



view to a local street in pedestrian-only time

08 CONCLUSION AND REFLECTION

This chapter will make a clear outline of this project, including the goals, methods, theoretical underpinning and the final outcome, to show the step of getting the design result of the research.

8.1 Conclusion

This graduation project attempts to find a balance between high density and street life in the Chinese urban environment. During my preliminary literature reading, I was introduced to the concept of superblock and found that this urban form exists in most cities in China and is closely related to the loss of street life. By studying the history of superblocks and the spatial characteristics of this urban form, it can be argued that the construction of large closed settlements, the reliance on car traffic, and the mismatch between activity distribution and road hierarchy are the main reasons for the loss of street life in superblocks. This project proposes a series of strategies to improve the problems of superblocks, and uses two superblocks in Shenzhen that need to be regenerated in the future as sites to apply the strategies to urban design solutions to verify the effectiveness of the strategies and ultimately answer the research questions of this project: 'How can the existing superblocks be transformed into the more liveable blocks with higher density and better accessibility and diversity, while facing the urgent need of urban regeneration in Shenzhen city?'

The following are the main conclusions of this project:

Reasons for the overuse of superblocks in China

Urban structures similar to superblocks have always existed in ancient Chinese planning paradigms, reflecting the absolute control of imperial power over the division of urban land during the feudal era. **The core of the contemporary Chinese superblock is still a top-down approach to managing urban development, but in a form that draws on many Western planning ideas and tools.** This urban planning paradigm is particularly easy to implement in China, where urban land is nationalized, especially since the Chinese government has been seeking to achieve rapid and larger-scale urbanization for the past several decades. By planning large infrastructures and forming superblocks, urban parcels can be quickly leased to developers in exchange for funds for urban development and urban management. **Due to local governments' reliance on land finance and their demand for efficient urban construction, the superblock urban planning paradigm has become the most convenient tool for them.**

The relationship between urban block space and urban livability

Livable cities always have convenient services, abundant life and a healthy environment. This requires urban neighborhoods that provide accessible streets, a variety of services within walking distance, and a diversity of urban spaces. Smaller neighborhoods, or increased public paths through neighborhoods, are considered by many scholars to enhance pedestrian friendliness and create more vibrant urban spaces; the density distribution of neighborhoods can influence the form of buildings within neighborhoods, resulting in more diverse architectural spaces; reasonable functional distribution and mixed use are generally considered to produce more diverse urban spaces and facilitate the interaction of different people, etc. In short, by controlling the spatial elements of the superblock and its sub-blocks, the superblock can be made more livable.

Urban regeneration is both an opportunity and a challenge for superblock issues

Shenzhen faces an urgent need for urban regeneration, and this is an opportunity to improve the superblock problem. In fact, in 2016, government departments proposed that closed settlements within superblocks should be gradually opened. However, there is a lack of motivation to implement this initiative, both officially and privately. Many residents also refuse to open the walls of closed blocks because of security and insistence on property ownership. The potential economic benefits of urban regeneration give the government, developers, and residents an incentive to implement superblock improvements. However, the economic benefits of urban renewal are based on double the existing urban density, which poses new challenges for superblocks.

Key strategies for improving superblock accessibility and diversity in high-density urban environments
By analyzing the road network and functional distribution of the superblock, I believe that the construction of closed settlements should be reduced and the mixed use of the block should be increased. Through case studies and 3D modeling tests, I propose three new block types: mixed-use complex, open block and garden community, which can adapt to different density requirements and provide a variety of spaces to achieve a reasonable mix of functions. The combination of these block types is closely related to the road hierarchy of the superblock, which can increase public open space, increase the diversity of urban space and bring street life in a high-density urban environment while ensuring the daylight and ventilation conditions of the residential environment. To realize this new block model, it is necessary to build on the existing urban regeneration framework and enhance the integration of regeneration planning across superblocks. In addition, more refined and smarter road traffic control is the key to ensure that this new block model works well.

These strategies worked well in the two superblocks tested. However, in the real world, the problem of superblocks remains complex and involves many different stakeholders. This project does not provide a one-size-fits-all solution to the superblock problem in all Chinese cities. It simply offers a possibility to solve the problem of superblocks from an urban regeneration perspective, in the form of demolition and redevelopment. The problem of superblocks, which is widespread in most Chinese cities, still needs to be studied from a variety of perspectives, including economics, sociology, and ecology.

8.2 Reflection & Discussion

Living and traveling in Europe has given me a deeper understanding of so-called street life, and I have begun to reflect on why such spaces and lifestyles are gradually disappearing in many Chinese cities. I noticed that most European cities have continued their small-scale streets of historic neighborhoods very well. Residents can easily reach markets, stores, restaurants and parks by foot. However, after intense social upheavals, China has in recent decades adopted an aggressive urban expansion strategy in order to achieve its urbanization goals quickly. Superblocks have become the most effective tool. As a result, the fine-grained blocks of the old city were replaced by large scale blocks dominated by motorized traffic. Street life in the form of commercial streets and tourist attractions became rare objects captive in specific areas, becoming destinations that citizens needed to drive to rather than everyday life. The focus of my project is to explore a transformative approach to making China's superblocks more pedestrian-friendly, diverse, and livable. This topic aligns with Design of the Urban Fabric Studio's focus on urban transformation and the quality of density in the urban environment.

Relevance of the project

Societal relevance
This project addresses the common problems that appear in most cities in China, while also considering the urgency of Shenzhen as a typical city with special problems. During China's rapid urbanization process, the quality of the city was once neglected due to the technical conditions and development philosophy of the time, leaving behind many unlivable superblocks. They will need to be renovated or redeveloped to meet higher density and environmental needs in the future urban renewal process. This problem is particularly acute in Shenzhen, where after the rapid expansion of the past 40 years, there is little new land left to build on and the city needs to shift to intensification and compactness. The social relevance of this project is considered to be significant. It concerns whether city residents will be able to have a better urban life in the future. The results will have the potential to promote urban block changes at multiple scales, bringing street life back to the community and creating a more vibrant, livable urban environment that will have a positive impact on society as a whole.

Scientific relevance
The study of urban neighborhoods and street life has been one of the main focuses of research in the discipline of urbanism, while an increasing number of scholars have begun to focus on the issue of superblocks in contemporary China. However, these studies are more qualitative in their analysis of the problem, and the suggestions given tend to be principled, with limited guidance for specific designs. The results of this study have the potential to provide a more specific and generalizable design approach to the transformation of superblocks under high-density conditions.

Also in recent years, many architects have been trying to bring street life back to Chinese cities and trying to create their visions of the street in their architectural works. For example, the famous Chinese architect Yung Ho Chang designed an office park featuring a mini-block in Jiading, Shanghai (figure 8.2.1), and the architectural office URBANUS designed a commercial complex with open streets in Shenzhen. (figure 8.2.2). While these architectural works achieve nice These projects were destined to fail at the outset of urban planning. In the context of the city, they are like an island surrounded by motorways, with no connection to the surrounding neighborhoods. They become a closed superblock in their own right, a destination to be reached by motorized vehicle. The project believes that the problem of

figure 8.2.1 Jiading mini-block

figure 8.2.2 Shenye Shang Cheng

superblock cannot be solved from a single block or a single building, and tries to provide practical ideas for creating street life in Chinese cities from the perspective of urban regeneration as an urban designer.

Ethical considerations

This project is set in the context of urban regeneration in Shenzhen, which needs to meet the demand for urban housing supply while improving environmental quality. Since under current Chinese law, residents only have the right to use but not own the land they live on, and the current urban renewal model is more dominated by the will of the government and developers, demolition and redevelopment is often the most effective approach. This study is not a customized regeneration strategy for a specific site, and the selected sites are only used to test the strategy. Therefore, only the most basic considerations of residents' property interests (e.g. resettlement housing) were taken into account in this project, and the opinions of the real residents of the test site on urban regeneration had to be ignored in this project.

Advantages, limitations and problems of the chosen methodology

The project uses a research and design approach. By posing a main research question and its related sub-questions, relevant theoretical and social realities are analyzed and studied, from which a series of design strategies will be applied and tested. The relationship between research and design is cascading and mutually reinforcing. Superblocks exist in most cities in China, and it is crucial to identify the commonalities of their problems, both in terms of the specific spatial issues they present and the underlying socio-economic logic. From this, directions and visions for improving these problems can be summarized. Afterwards, these problems are further studied in the context of Shenzhen, leading to some more specific design principles and spatial prototypes. Finally, site-specific design tests using these principles as tools will complement and refine the research findings. Research and design are interrelated and mutually reinforcing throughout the process.

The chosen methods showed different advantages and limitations during the study. Due to the large population base of Chinese cities, urban density has to be a key consideration. High density represents the number of housing units for citizens as well as the investment interests of developers, therefore high density was taken as a given throughout the research and design process of the project, and the balance between density and neighborhood quality was studied on this basis. This makes the results of this project highly realistic and implementable. A series of spatial patterns are designed to achieve this balance while still offering diverse and flexible possibilities, avoiding becoming a copy-paste template. But it is also due to the pursuit of generality that this project is deficient in its consideration of the more inherent qualities of the city. The current approach lacks consideration of the city's specific cultural lineage and its identity, as well as inadequate consideration of the social relationships and lifestyles of its residents. On the other hand, this project is more about proposing an improved approach to a real dilemma, rather than proposing an alternative future pathway with a more revolutionary vision.

I encountered various problems during the data collection phase and design phase of this project. Due to covid-19, I was unable to go back to China to do the field research. In addition, many data of Chinese cities are not available to the public. Therefore, I could only conduct site studies by contacting local city planning departments to obtain some outdated information and combining it with the limited public information available on the internet.

In addition, this project initially hoped to find the optimal solution for the density-quality balance through parametric design. In recent year, Some residential planning tools that use artificial intelligence are becoming popular among real estate developers, such as xkool and Noah. Developers only need to input data about the residential product and these tools can quickly generate many options to achieve a balance of density, development cost, and environmental quality (ventilation and sunlight conditions, etc.). I think there are many quantifiable metrics for street life as well, such as reachness, density, open space area, etc. Once these metrics are effectively quantified and mathematically related to each other, computers can help us find the optimal balance. but due to the lack of relevant knowledge and the limitation of research time, the process could only be simulated manually in the end, which makes the final results lack a richer sample to discuss. This is a big regret of this project.

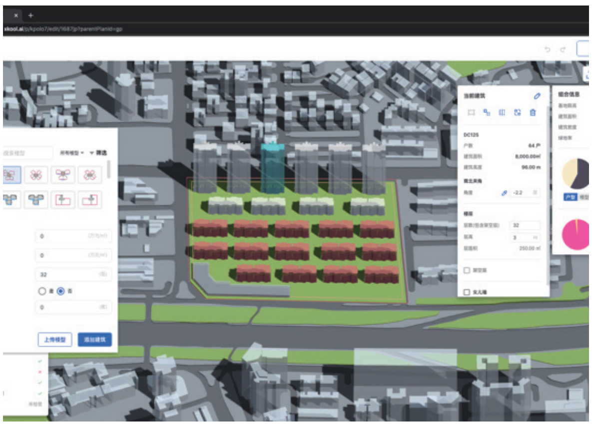


figure 8.2.1 Jiading mini-block

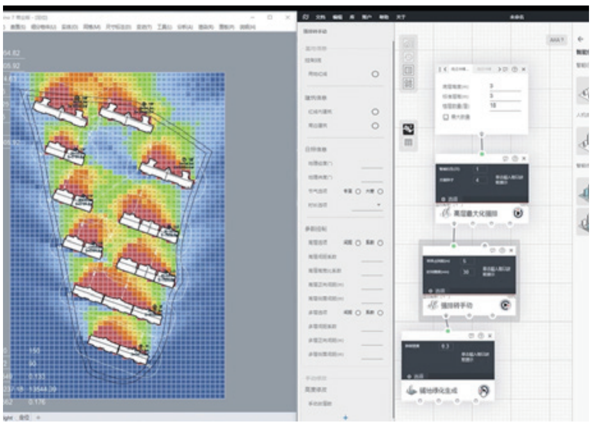


figure 8.2.2 Shenye Shang Cheng

Possibilities of generalization

The project has a high transferability value, as generalizability was one of the original intentions of the project. Though the final design of this study involves architectural patterns, spatial forms, and functional distributions that are specific to the chosen site and serve as an example of the future possibilities of the superblock, the principles and strategies applied in the design process are highly transferable to the transformation of other superblocks. Because the spatial strategies proposed in this project are consistent with the characteristics of most urban superblocks in China, and the transformation mechanism is improved on the basis of the existing building codes, planning policy and the demands of key stakeholders, so the project results have high potential for generalization.

However, in the process of application, the block characteristics, social relations and economic aspirations of the specific site still need to be further studied. At the same time, there is a need for the government and developers to pay attention to the public interest and sacrifice short-term economic benefits, as well as for urban residents to maintain a more tolerant mindset towards the negative impact of public life on privacy.

09 APPENDIX

This chapter will make a clear outline of this project, including the goals, methods, theoretical underpinning and the final outcome, to show the step of getting the design result of the research.

9.1 Thesis Review

What is the ideal size for a city block?
A review of the change and influence of block dimension
and its inspiration to Urban design in China

AR3U023 Theories of Urbanism

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Abstract:
As the basic unit of urban structure and urban life, the block's dimensions vary in different cities and at various historical stages. How does the urban development paradigm change the dimensions of blocks? What impact will the size of the block have on the lives of citizens? This paper tries to understand the factors influencing the block size and the impact of block size on urban environmental quality through the historical analysis of the evolution of urban blocks in China and abroad. By summarizing the current research on block size, a relatively ideal block size range can be concluded. However, some cases show that there is not a size fit all. In the end, it comes out with suggestions for determining the appropriateness of block size, which can be used as a reference for shaping a more human-scale and sustainable block in Chinese urban design.
Keywords: block size, urban form study, walkability

Introduction
The block and the street are two elements that coexist and influence each other. In terms of form and composition, the block is the basic organizing unit of the urban construction land and public space network defined by roads, streets, or natural boundary elements in a grid-like urban road pattern. At the same time, the block is also the basic organizing unit of urban activities. Different patterns of blocks and streets greatly influence the configuration of public spaces and the activities of public lives. It is an essential need and a fundamental goal of urban design to create urban blocks that are more responsive to spatial and social needs. Block dimension, expressed as a specific size, is one of the most fundamental attributes of a block. The perimeter and area of a block determine the scope of the buildable area and the organization of buildings and public spaces and influence the density of intersections and road networks within the area, thus influencing people's travel distance and experience. Block dimension represents the essential characteristics of the spatial form of the block and establishes a way of measurements concerning the human perception of urban space. Therefore, the study of the suitability of the block dimension is an important aspect of urban design.

During China's rapid urbanization, one of the defining features of modern Chinese cities is the use of large-scale blocks – superblocks to meet government and developers' quest for construction efficiency. Such large-scale blocks have caused a series of problems such as traffic congestion, poor accessibility, and even socioeconomic segregation, which have been studied and criticized by many scholars. In response, in February 2016, China's State Council issued a document calling for the concept of "narrow roads, dense road networks" for urban road layouts to create small-scale blocks with more fine-grained networks.

Small blocks are widely believed to be able to create more pedestrian-friendly and vibrant urban spaces. In particular, a series of critiques of functionalism after the 1960s, such as the works of Jane Jacobs (1961), Donald Appleyard (1981), Jan Gehl (1987), and others, argued that small blocks lead to highly connected networks that are more conducive to the creation of livable street spaces. However, is there an ideal block size? What is the size of the blocks that will fit the present and future needs of Chinese cities? This paper will review the existing literature to uncover the core values behind the block dimension and explore what block size better meets the modern city's needs. This paper will first review the modern urban design and urban planning paradigm and the corresponding theories shifts, and clarify the implications of these shifts for China's urban development. It then summarizes what factors influence the size of blocks and how the size of blocks affects the quality of the urban environment. In the end, by discussing recent research on the size of blocks and cases, suggestions are made for the urban design in China.

Historical evolution of the block size

whether the city is spontaneous or designed, the layout of the plan, the design of its streets especially, is not the result of chance, and some rules are followed (Buquets et al., 2019). When there is a regulation of a series of urban actions, it can design the city's layout and regulate the arrangement of buildings, roads, and public space, thus defining grids and city blocks. The city's layout varies dramatically from region to region, and the size of the blocks is constantly shifting as the city changes in size and function and as transportation advances.

Xiao (2006) concludes that the size of blocks in the ancient Greek and Roman periods was determined primarily by the modulus of residential lots to ensure that each home's entrances and exits faced the street. By the Middle Ages, Christianity had an important impact on block sizes. The size of the neighborhoods usually corresponded to the parish boundaries. Simultaneously, due to the frequent wars of the period, cities tended to confine themselves to the city walls, and the density and height of buildings within blocks increased. At this time, city blocks were often laid out in a checkerboard grid, with side lengths between 50 and 100 meters. In the Baroque period after the Renaissance, to reflect European monarchs' authority, streets turn into major axes of great length, and squares become nodal points and focal points of strong representative character. Meanwhile, to accommodate the passage of carriages and ease the congestion of the medieval inner city, the scale of the blocks was increased, often exceeding 100 meters on a side.

The industrialized cities of the 19th century grew at a tremendous rate. The city began to spread out. The blocks' size in the new city area was significantly larger than in the old city, with blocks of 200 meters and more massive (see Figure 1). The increase in size is due to the convenience of the horse-drawn vehicle and other new transportations and the emergence of factories and other large buildings that can dominate or even span the entire block. While in North America, most cities in the New World are divided by a grid of streets to increase the length of the road and obtain more frontage for rent. In Manhattan, for example (see Figure 2), the standard block size is about 80m×274m.

Figure 1: large scale blocks emerge on the edge of Florence

Figure 2: Planning of Manhattan

Around 1900, Cities are spreading rapidly outward. New housing, new factories are being built on the outskirts of the suburbs, and new transportation technologies (streetcars, electric commuter trains, subways, buses) are enabling this suburbanization to take place (Hall, 2014). Theorists began developing urban planning models to mitigate the consequences of the industrial age, by providing citizens, especially factory workers, with healthier environments. In the Ville Radieuse project that Le Corbusier had not realized, a block was defined as a grid of 400 yards (360m). In 1929, Clarence Perry proposed the neighborhood unit concept as a response to the crowded living conditions of large cities and the noise, pollution, and danger caused by cars (see Figure 3). This concept defines a block centered on community public services, with internal streets and green public spaces, surrounded by arterial roads, which is the beginning of a so-called superblock. Blocks based on this concept have an area of about 14-20 hectares and often have side lengths of 300-500m. Some of the traffic organization principles established by this concept, such as road hierarchy, main traffic roads as arterials, and cul-de-sac, have had a significant impact on modern urban space (Ren, 2008). Moreover, the form of China's blocks has been deeply influenced by them.

Figure 3: concept of neighborhood unit

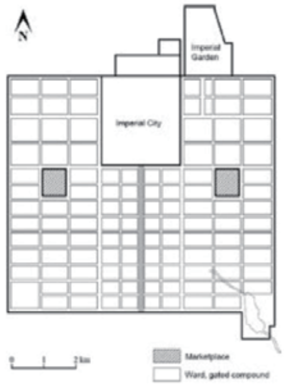

Figure 4: concept of Lifang

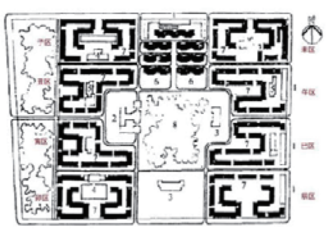

Figure 5: A danwei in Beijing

Much of the research on Chinese blocks inevitably review the paradigm of ancient China's cities. It can be traced back to thousands of years ago, a book called 'Kao Gong Ji (Artificers' Record)' proposed an ideal city model. In this book, the city is divided by the main road into several square blocks surrounded by walls. Each of the blocks corresponds to a different social class and urban function. This kind of urban block is called Lifang. This urban form reached its peak in practice in the Tang Dynasty (618-907) in Chang'an, which is now Xi'an City (see figure 4). There are four main sizes of Lifang: 520×520m and 650×520m on both sides of the city's central axis, and 1000×520m and 800×1100m on the further sides. Although there were cross-shaped streets within each block, the division of Lifang was entirely based on the grid and fence system of the main road to facilitate the Empire to manage people's lives. This block pattern continued until the Song Dynasty (960-1279). The commercial boom led to removing the walls of the blocks and creating more shops along the street. Although the concept of the Lifang was still used as an important basis for administrative zoning, the division of the blocks was made more flexible by the increased density of the street network. According to Zhang (2003), most blocks at this time were 100 x 600m, 120 x 700m, and 130 x 500m. The city became more street-oriented, with smaller streets connecting the main roads to the blocks of residents, like a fishbone structure, and continued to be so until modern times.

After the founding of New China, under the leadership of the Communist Party, cities were required to have industrial production as their primary function. Chen summarized that the block form in that time China was influenced by the concept of the neighborhood unit and the Soviet Union's company town and micro-district models. A block model called Danwei (work unit) was widely adopted in China and quickly became the dominant urban structure. Unlike the neighborhood unit, the wall system is once again in place to better manage the community's property and secure the interior. These superblocks, usually 300-500 meters wide and sometimes even 1000 meters, have become many huge islands in the city (see figure5). Even after the reform and opening up of the economy in 1980, this large block mode was still widely used because it was convenient for governments and developers to control costs and improve efficiency.

Factors influencing block size and their trends.

Through the historical review of block development, the scale of urban blocks in Western countries is a process from small to large, while that of China is from large to small, and then to large. The factors influencing this change can be summarized from three perspectives of politics, economy, and technology.

1. Politics

   Political factors mainly refer to how city governors manage people, including tools such as religion and regulations. Politics of Planning has had a decisive influence on the form of cities, which can be seen from the military cams in the ancient Roman Empire, the colonial cities in medieval Europe, the "ideal city" reflecting the political aspirations of the new bourgeoisie and its practice in the Renaissance (Wang, 2001). The size of the blocks is one of the outcomes. The influence of politics on Chinese blocks is even more obvious. In ancient China, the block had been a basic unit of political control. Until the founding of the people's Republic of China, the superblock reflected the transformation of urban land from private ownership to state ownership. Stokols (2016) believes that changes in the form of Chinese blocks are often closely related to the central government's control over commercial life.

With the increased democratization of society, the role of political factors in determining urban blocks has weakened. Completely top-down decisions are almost non-existent. Political interventions will have a more flexible approach to coordinating stakeholders and participate in urban construction by policies making that does not directly determine the specific spatial and dimensional design of neighborhoods.

2. Economy
   Xiao (2006) argues that commercial interests are one of the most fundamental and direct driving forces influencing modern urban blocks' size. Commercial interests are directly related to the length of street frontage. Cliff Moughtin (2005) argues that small-scale blocks represent a development that produces the largest number of streets and frontiers in a relatively small area and maximizes commercial interests. Manhattan is one example. On the other hand, small blocks can also lead to increased intersection density. A big-data-based study (Long and Huang, 2019) shows that, at least in the vast majority of Chinese cities, intersection density has a significant positive impact on economic vitality.

   However, the small block also results in higher development costs. On the one hand, regulations such as building setbacks reduce the amount of land that can be built on in the same amount of land, and on the other hand, they increase the amount of investment in urban infrastructures such as roads and pipelines. Negotiation is needed to strike a balance. For example, the core district in the city usually obtains more frontage in the form of small blocks while allowing the construction of higher towers in exchange for more building area. In general, the driving force of commercial interests is making blocks smaller and maximizing land-use efficiency.

3. Transportation
   Changes in transportation affect the structure, form, and scale of the entire city and are among the most fundamental and direct factors affecting the scale of blocks (Xiao, 2006). In cities where walking is the primary type of transportation, the scale of blocks is generally small. From ancient Greece to the Renaissance, blocks were smaller than 100m in size. When the horse-drawn vehicle became the main type of urban transportation, the size of roads and blocks increased. The widespread use of the automobile from the twentieth century onward led to the emergence of superblocks, especially in suburban areas or new cities. Therefore, the size of the superblock is determined by the distance between the city's artery and side roads, especially in China, where blocks of 400-500m are common.

   This motorized transportation-oriented urban space has posed a series of problems and has been criticized for years. Jane Jacobs (1961) calls for the importance of walking and believes that small blocks' high connectivity plays an important role in people's perception of urban space and social interaction. Allan Jacobs (1981), Kevin Lynch (1981) also emphasizes the importance of walking and thinks that the street should be one of the essential public spaces in the city. Besides, more sustainable public transportations and the use of automatic driving in the future will reduce the dependence on cars. The high connectivity and walkability brought by small-scale blocks and high-density road network, as well as the value of streets, are again advocated.

Discussion - what is the ideal size of an urban block

Based on the above review, does it mean that small city blocks are better? Is there an ideal block size? Jane Jacobs (1961) believes that a vibrant block's size should not be larger than 90m, and Cliff Moughtin (2005) believes that a reasonable range for a block is 70-100m. Arnis Siksna (1997) argued circulation meshes with a spacing of about 80-110m constitute an optimum network for pedestrian and vehicular needs, and finer-mesh networks, with a spacing of about 50-70m, are the optimum in areas of intensive pedestrian activity. David Green even suggests that the ideal block size of 240 feet by 360 feet (about 73 x 110 m) could accommodate almost any building type and provide a pleasant pedestrian environment. A statistical study (Huang and Sun, 2012) of block sizes in 90 large city centers shows that block sizes are predominantly concentrated in the 200m range. The 50-100m and 100-150m segments are significantly higher than other segments. To some extent, the result shows that smaller blocks do provide better quality than larger blocks, but it is not the smaller, the better.

Research by Sevtsuk (2016) reveals that the relationship between block size and walkability is not linear, and a smaller block does not equate to better walkability. Smaller blocks can only shorten distances for individual walks. However, from a collective perspective, this effect can be offset by an increase in the number of destinations made available by larger blocks in a given 'walkshed', producing an overall net increase in pedestrian accessibility. Also, smaller blocks mean more frequent cross-streets, which impose more travel costs. In this research, after a series of simulation-based on the Gravity index, which is proportional to the number of neighboring plots that can be reached within a given walking radius and inversely proportional to the travel costs involved, a few prototypical block sizes that maximize pedestrian accessibility are proposed, and they do not follow the block size described above (see table1, figure 6 and figure 7).

Plot Type	Block Size (Frontage×depths)	Plot Size (Frontage×depths)	Plots Number per Frontage	Street Width
Shop-house	120×32m	8×16m	15	12.5m
Walk-up structure	176×64m	16×32m	11	18m
Office building	288×128m	32×64m	9	21m
Office building	192×64m	64×32m	3	21m
Mixed-use development	192×256m	64×128m	3	36m

Table 1: prototypical block sizes

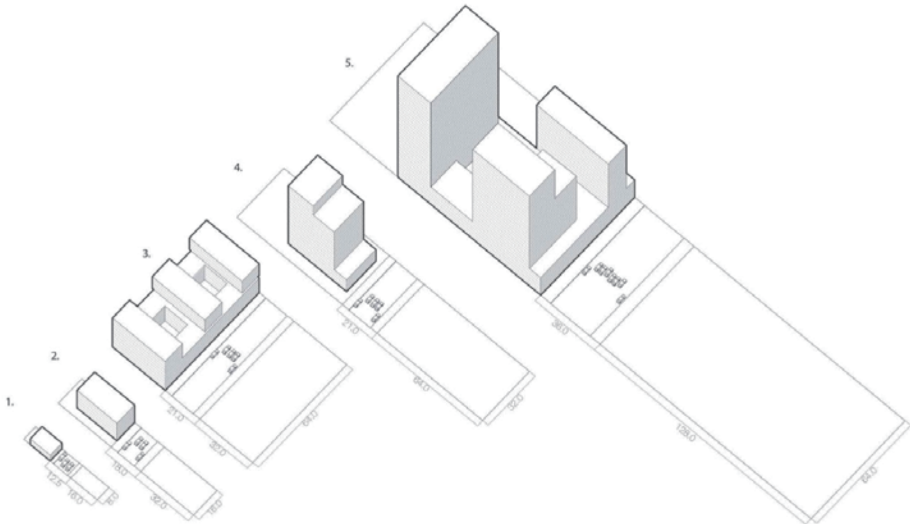

Figure 6: Sample plots with prototypical street

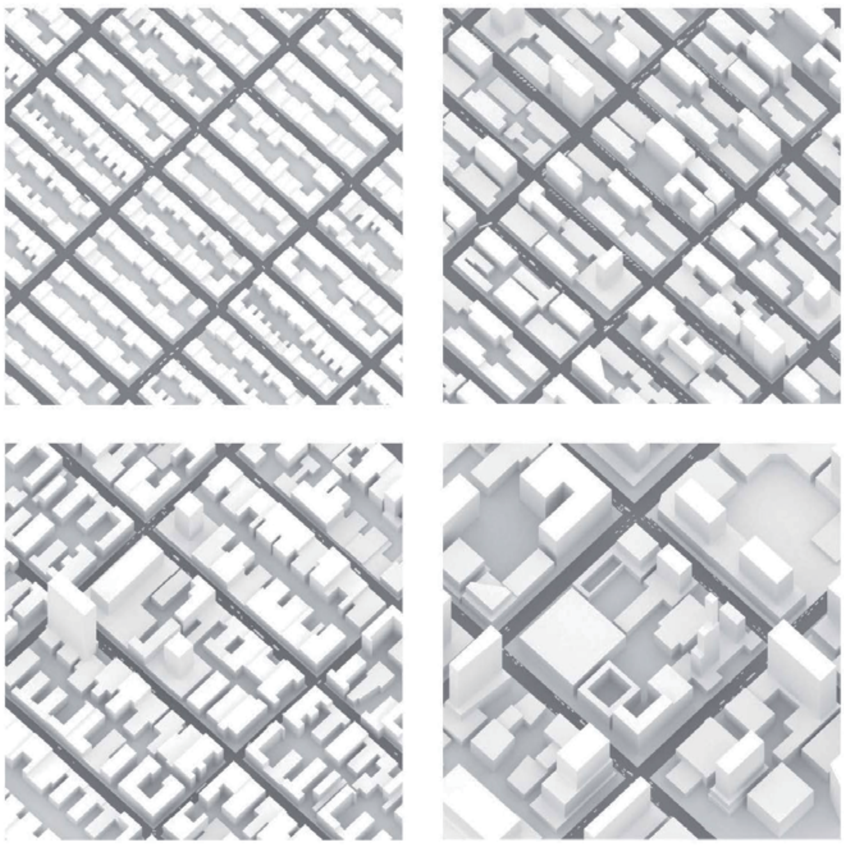

Figure 8: Example grids with optimal block lengths that maximize pedestrian accessibility. Top left: Plots – 16 × 32 m; Streets – 18 m; Optimal number of plots per block frontage for walking – 11. Top right: Plots – 64 × 32 m; Streets – 21 m; Optimal number of plots per block frontage for walking – 3. Bottom right: Plots – 64 × 128 m; treets – 36 m; Optimal number of plots in each block for 600 m walking – 3. Bottom left: Plots – 32 × 64 m; Streets – 21 m; Optimal number of plots per block frontage for walking – 9.

A further exception is worth noting, as it, in a sense, runs counter to the small neighborhoods described above, even if the qualities they seek overlap. A project to merge nine small blocks of about 100m x 100m into a superblock of 400m x 400m is being implemented in Barcelona to mitigate the adverse effects of car pollution and noise and improve the city's walkability (see figure 8). Within the superblocks, cars will be limited to ten kilometers per hour (6 mph) and restricted to one-way lanes (Bausells, 2016). This seems to be a 21st-century paradigm of the neighborhood unit, with the main difference being that the inner street remains highly connected to the city.

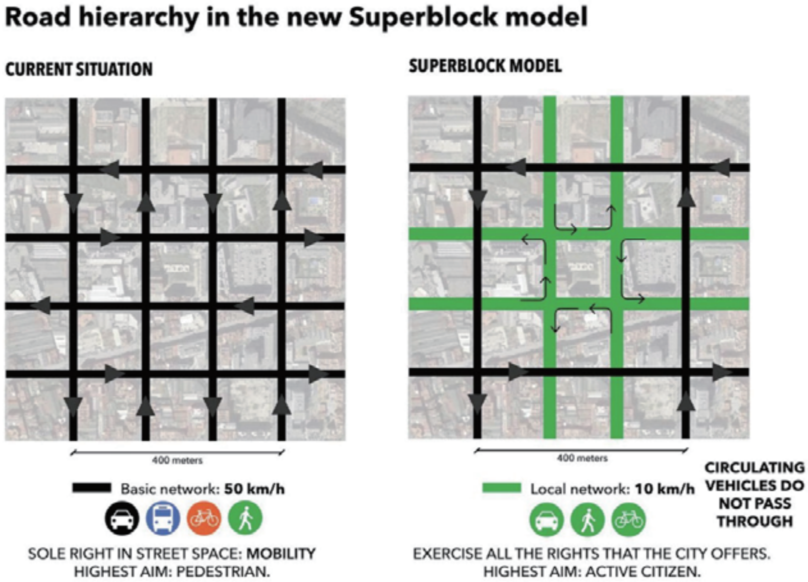

Figure 8: Concept of the superblock project

In summary, there may be a sweet spot in terms of block scale: sizes between 70 and 110 m are considered to be ideal block sizes for most buildings, with a right balance between pedestrian and automobile traffic, and with sufficient intersection density for commercial prosperity and social interaction. However, that does not mean it is a one-size-fits-all rule that necessarily leads to better street space and walkability. Moreover, hierarchy is another essential consideration. Obviously, the appropriate block size is not the same for cars and pedestrians. Thus, there can be a dual scale block pattern with block dimensions defined by arterials and sub-block dimensions defined by pedestrian paths or slow traffic roads within blocks. Besides, based on the above examples, increasing the number of plots within the main street area or increasing the number of entrances that connect the block to the external urban environment can increase the number of destinations within the block and effectively improve accessibility and walkability. This could be a beneficial suggestion for the large-scale blocks that are widespread in China.

Conclusion

Block is one of the core elements of the built environment. As one of the block's fundamental attributes, size can represent the value in the paradigm of urban planning and urban design during a particular stage. There is a close correlation between block size and urban environmental quality. Throughout history, the size of the block in many countries shows a trend from small to large due to transportation development. There are three main factors that influence a block's size: politics, the economy, and transport mode. Political was often the dominant factor in ancient times. Economic interests and the balance of different transportation modes are now the essential considerations in measuring block size appropriateness.

Due to the return of street values, small-scale blocks are widely admired. The more fine-grained road network resulting from smaller blocks is thought to be effective in reducing traffic congestion. Higher intersection density can also improve people's efficiency in reaching their destination and enhance their social interaction. A block size of 70-110m is considered the best size to create a vibrant neighborhood while also balancing both buildings and traffic needs. However, this is not an absolute guideline. Without effective control of the road hierarchy, small blocks may face pollution and dangers from frequent traffic intersections. Small blocks can also be unwalkable if there are not enough plots within. For Chinese large-sized blocks, subdividing them into more hierarchies and increasing the number of destinations can also lead to more vibrant and walkable neighborhoods.

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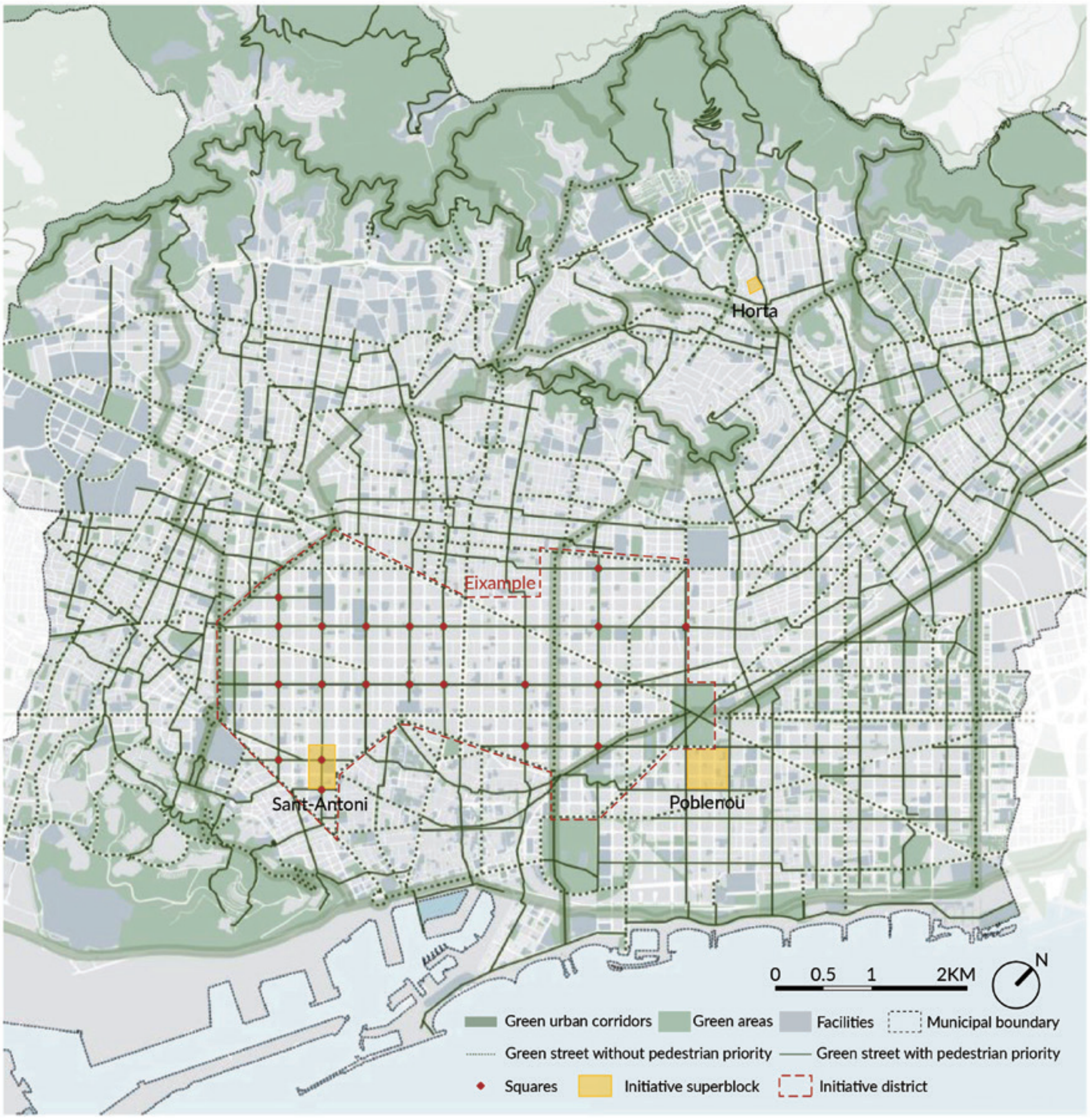
9.2 Case Study

Superilla (Super Block)

Kong Tao

Designer: Led by Barcelona City Council
Location: Barcelona
Year of construction/plan being published: 2015 - present



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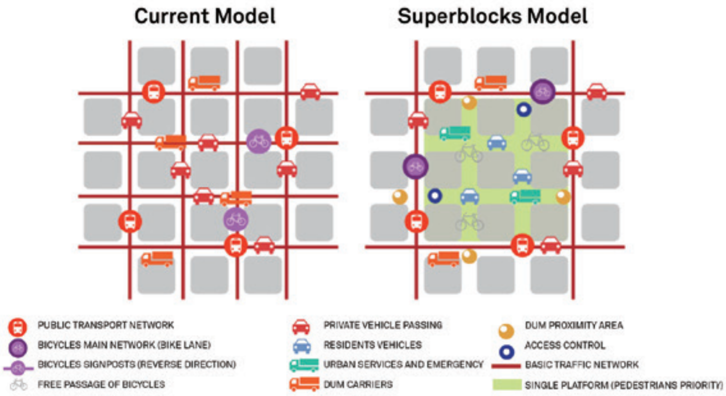
1. **Barcelona Superblock (City Scale)**
Source: https://ajuntament.barcelona.cat/superilles/en/superilla/eixample

The section of the city designed by Ildefons Cerdà, especially the Eixample, is an internationally recognised symbol of innovative urban planning. However, this area of Barcelona is subjected to the greatest pressure from motorised transport; it suffers the most pollution and noise, with everything that this implies for city residents. Furthermore, it is the district with the lowest number of green areas.

Applying the Superblock model in Cerda's part of the city makes it possible to define a new vision and project for the future, reorganising the city's general mobility in order to create new green streets and new squares at city crossroads. The aim is for Eixample residents to have a square or green street within 200 metres of their homes, with an especially significant increase in the number of meeting and relaxation areas available in the centre of the district.

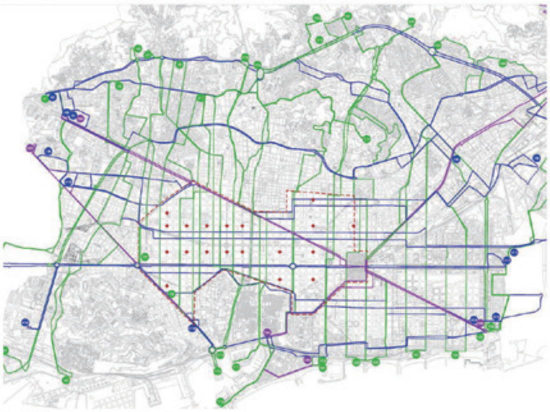
theme	movement
scale	block district city
system	place network
centrality	high medium low



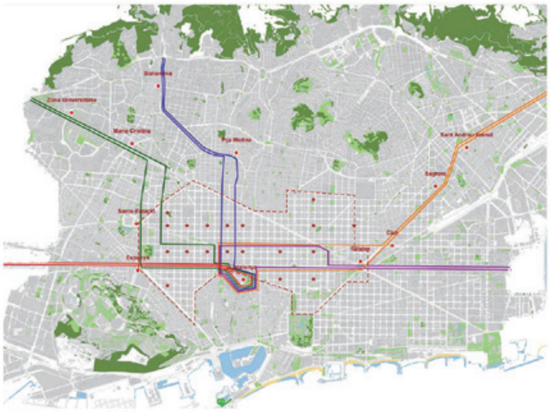
2. Superblock Model
Source: http://www.bcnecologia.es/en/projects/sustainable-urban-mobility-plan-barcelona-2013-2018

Concept of the superblocks model

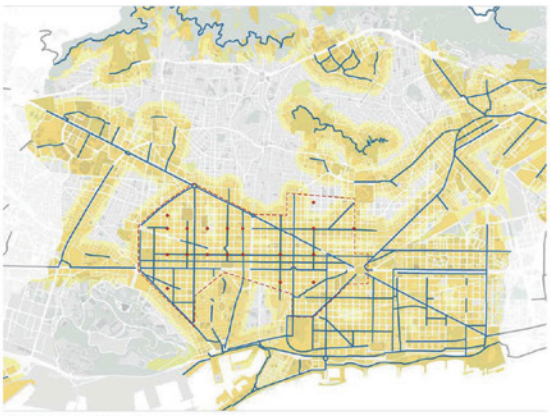
Superblock is to merge a block unit of 130x130m into a 3x3 grid to form a superblock of about 400x400m.Reorient traffic flow within the area only for residential traffic services, emergency vehicles and logistics vehicles within the block, and limit speed to 10 km/h to reduce crossing traffic.Turn the original driveway into a public space.Public transit stops are located outside.



3. Orthogonal Bus Network
Source: http://www.bcnecologia.es/en/projects/sustainable-urban-mobility-plan-barcelona-2013-2018

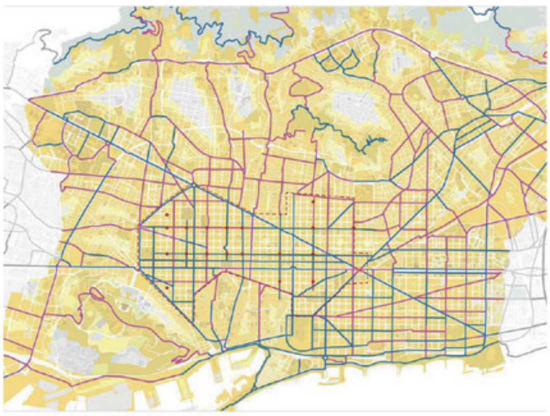


4. Interurban public transport
Source: http://www.bcnecologia.es/en/projects/sustainable-urban-mobility-plan-barcelona-2013-2018



5. Current Bicycle Network
Source: http://www.bcnecologia.es/en/projects/sustainable-urban-mobility-plan-barcelona-2013-2018

72% Population

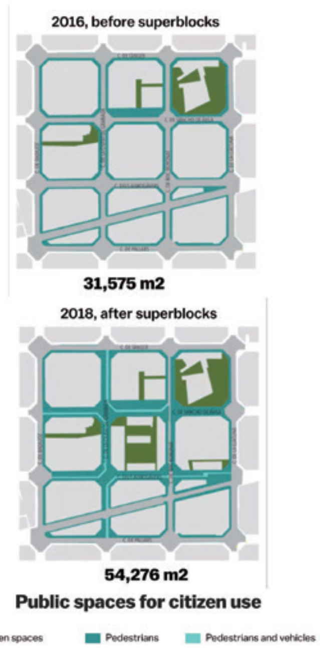


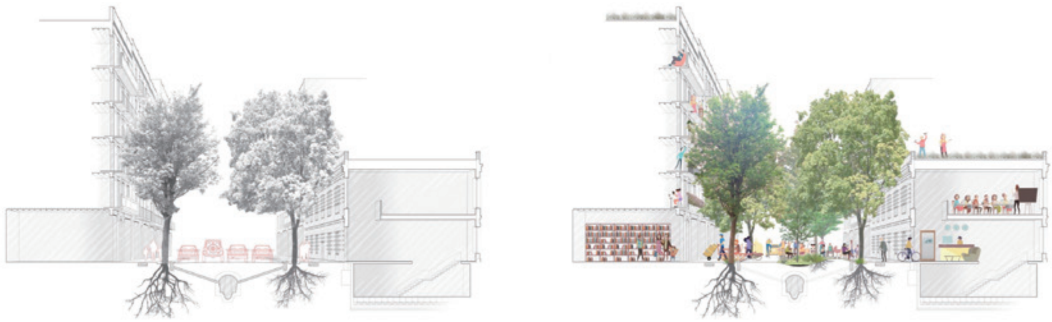
6. Proposed Bicycle Network
Source: http://www.bcnecologia.es/en/projects/sustainable-urban-mobility-plan-barcelona-2013-2018

95% Population

Poblenou

The Poblenou superblock is Barcelona's fourth. But it was the first built as part of the city's new urban plan — the first of what are intended to be dozens, eventually hundreds, in coming years.





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After the implementation of the Superblock, the public space available to citizens has increased significantly.

Roads that used to be dominated by cars have become quiet streets.Slow traffic becomes the preferred mode of travel.Various signage for pedestrians and bicycles, as well as various urban furniture, have been added on the road, making the street a place for residents to relax and play.

Intersections have also been transformed into city squares, where people gather through low-cost renovation, and more Spaces for children have been added.

In addition, the noise and pollution of the streets are greatly reduced due to the absence of motor vehicles.

Improve accessibility and comfort of sidewalks and pedestrian areas

Promote School roads (Cami Escolar) and the sustainable and safe mobility to schools

Develop more efficent and effective pacified areas

Expand and improve the network of bike lanes

Increase supply of bicycle parking in public road

Promote service points for the bicycle in public transport stations

5

Urban Mobility Plan of Barcelona 2013-2018

The Urban Travel Plan of Barcelona 2013-2018 seeks to develop guidelines for travel issues in the city of Barcelona over the next few years, with a clear focus on sustainability. The main goal of the plan is to implement the superblock with a similar level of saturation to the current traffic network.To this end, alternative transport will be better implemented (new orthogonal bus and bicycle networks, carpooling and pedestrian lanes, etc.)

The plan lists 66 action measures on walking, cycling, public transport, freight transport and private cars to improve the safety and convenience of walking, cycling and public transport and reduce the use of private cars.Some of the actions involved in walking and cycling are listed above.

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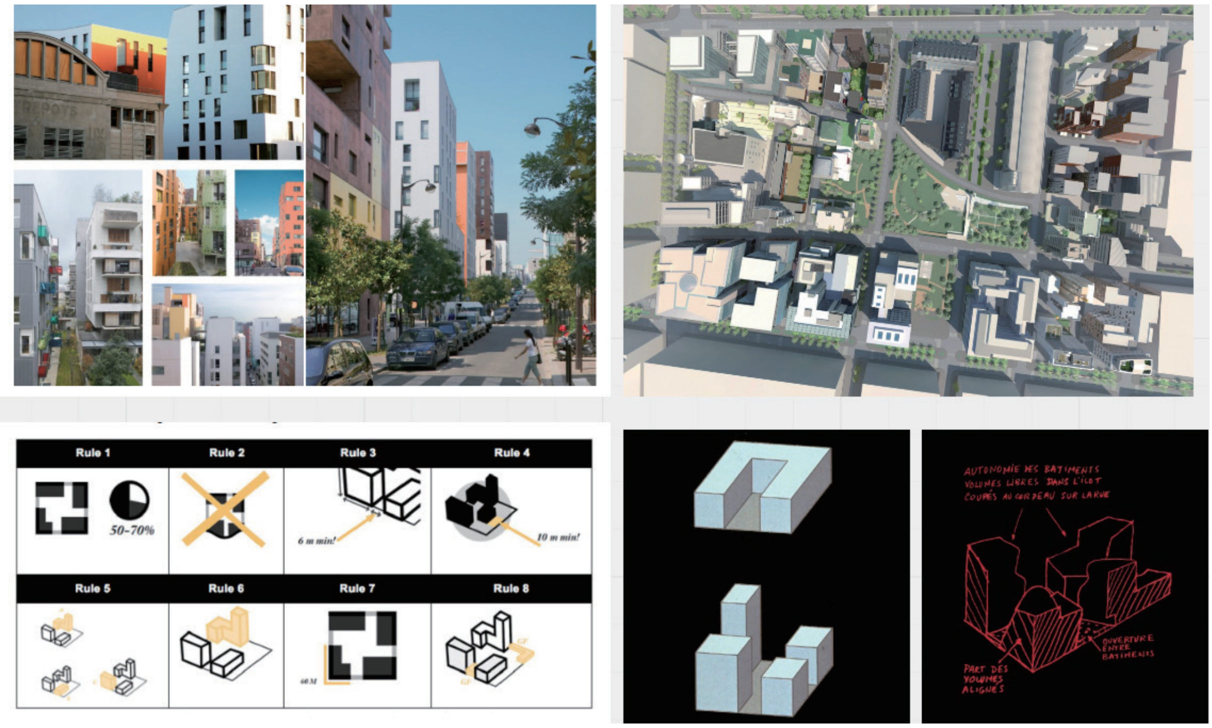
Traditional urban morphology in South China - Liwan District, Guangzhou

Urban Design Regulation Study - Hamerkwartier, Amsterdam

Urban Design of New City - Jurong Lake District, Singapore



Urban Desing Regulation study - Quartier Massena, Paris

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This chapter will make a clear outline of this project, including the goals, methods, theoretical underpinning and the final outcome, to show the step of getting the design result of the research.

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3.6.2 Shakibamanesh and Ebrahimi, 2020

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5.2.4 Baidu heat map

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