Livability in a growing Shenzhen

How to make Shenzhen a more
migrant-friendly city to
young graduates?

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Master thesis:

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Keywords:

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Studio Complex cities

This research project, based on the hot issues of escaping from mega cities in China, focuses on young graduates and intends to improve their livability and make Shenzhen a more migrant-friendly city to them. Livability, including affordability and good accessibility to services and jobs, is the main topic and final goal of this thesis. To reach this goal, urban form study, which is the study of urban environments through the physical form, is put forward. Through the understanding of the context of livability, urban form and the relationship between livability and urban form, this thesis explores the current urban forms in Shenzhen and the possible ways to transform it by the change of function and density to improve livability and get to jobs-housing balance.

TABLE OF CONTENT

Problem Field

1.1 | The location and rapid urbanization process of Shenzhen

Located in Guangdong Province in south of China and in the north of Hongkong, Shenzhen is one of the four mega cities in China and holds sub-provincial administrative status. As the first economic zone and test land, Shenzhen has become a miracle due to its fast urbanization speed since 1978. Started from a small fishing village, Shenzhen now covers over 1,997 square kilometers with about 11.37 million population (Shenzhen statistical yearbook,2016).

In 1978, the Third Plenary Session of the CPC 11th Central Committee, led by Xiaoping Deng, the Chinese government put forward the Reform and Opening-up policy, which is seen as a great turing point of significant importance in the history of China (China Daily, 2011). Towards a market-oriented economy, this policy intended to encourage foreign capital and adopt the former planned economy, aiming to modernize industries and boost economy in China. According to this policy, the city of Shenzhen was set up next year. Together with Zhuhai and Shantou, speical economic zone was created to attract foreign direct investment, which is mainly "focus on low-value-added and labor-intensive manufacturing" (McKinsey Global Institute, 2009: 260). In 1980, the population of Shenzhen was only about 314 thousand and the GDP per capita was 835 yuan (around €107)(Shenzhen statistic yearbook, 2016). While with the influx of foreign capital, more and more factories settled down in Shenzhen. The increasing job opportunities made more internal migrants flooded into the city. To boost its financial sector, Shenzhen Stock Exchange was established in 1991, offering opportunities for intensive stock exchanging.

After over 30 years' development, more than 10 million people migrated from hinterland to Shenzhen, which led to rapid city expansion as well. Population of Shenzhen in 2015 grew up to over 11 million people and the GDP per capita reached 157,985 yuan (around €20,254). Four pillars of modern economy developed quickly: cultural and creative industry, high-tech services and manufacturing, modern logistics and financial services(Shenzhen government Online, 2017). Companies like Huawei, Zhongxin, Shunfeng, Ping'an have already been famous in China, even worldwide. With these pillars and other industries, Shenzhen ranks 20 out of 92 cities in Global Financial Centers Index 22 (Z/yen, 2017).

Figure 1-1: Shenzhen before Reform and Opening-up policy
Source: Shenzhen(n.d.)

Figure 1-2: Shenzhen in 2017
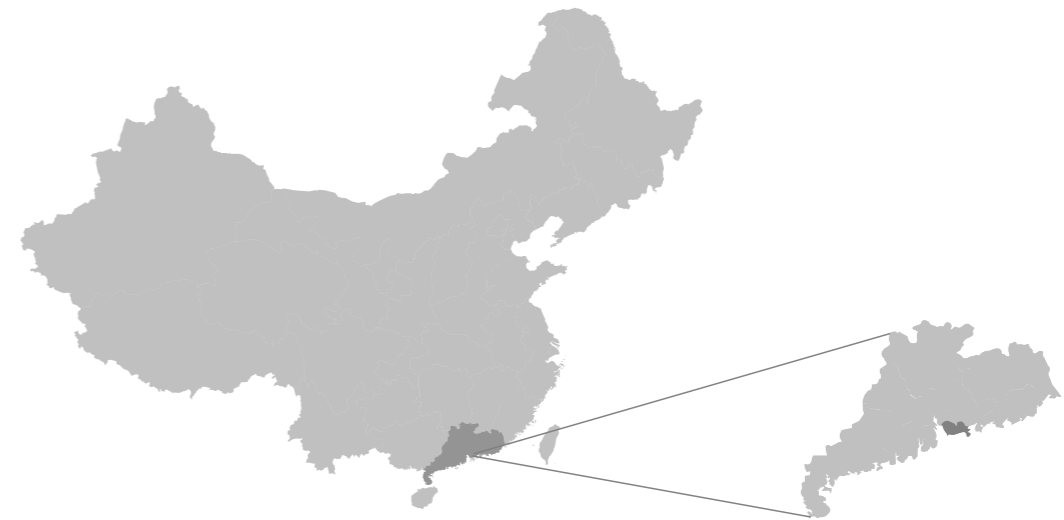*Source: Shenzhen(n.d.)*

Figure 1-3: Location of Shenzhenw
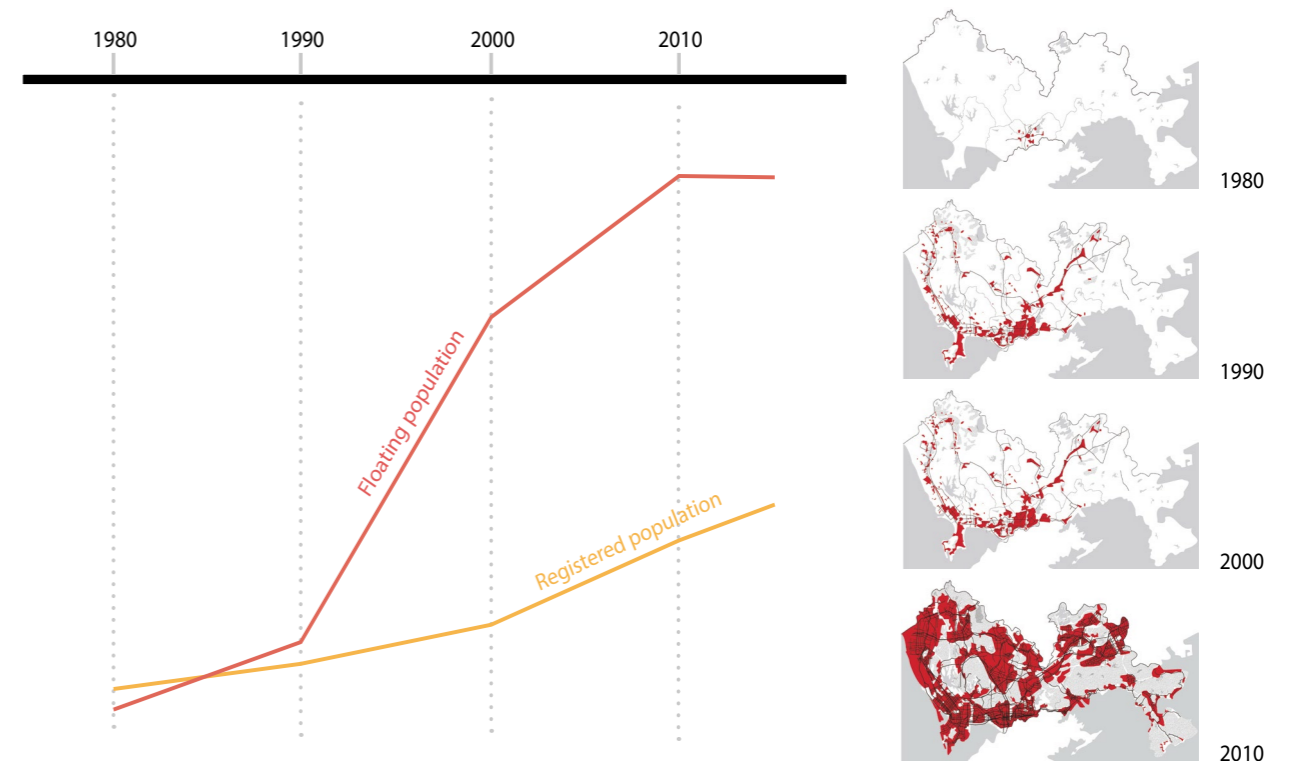*Source: author*

Figure 1-4: Population growth and City expansion in Shenzhen
Source: Zhou, H., Shi, P., Wang, J., Yu, D. AND Gao, L., 2011

1.2 | Unbalance development in Shenzhen

At the beginning of Reform and Opening-up policy, only four districts were in the specific economic zone, which were Nanshan District, Futian District, Luohu District and Yantian District. In order to insure safety and social development of these four districts, boarders were created to control the passing in and out, so these four districts were called "guannei", and Bao'an district and Longgang district were called "guanwai". Other original residents in Bao'an district and Longgang district entered these three districts was called "ruguan" and conversely was called "chuguan". While with the urban expansion, this policy was cancelled in 2005, the specific economic zone was expanded to the whole city in 2010 and these boarders disappeared as well. But out of habit, Nanshan District, Futian District, Luohu district and Yantian District are stilled called "guannei" and other districts are still "guanwai", even though there are no relevance

with boarders anymore. As the first specific economic zone, "guannei" is the most developed area in Shenzhen. Covering 21.0% land with over 34.5% population, the GDP of four three districts is 52.5% of the whole city(Shenzhen statistic yearbook,2016), which makes a big gap between "guannei" and "guanwai".

Figure 1-5: Buji boarder in the past
Source: Buji boarder(n.d.)

17.3%

Land

32.6%

population

49.7%

economy

Figure 1-6: administration distrcits in Shenzhen and the percentage of land, population and economy in "guannei"
Source: author

1.3 | The industrial upgrading in Shenzhen

Known as world factory, Shenzhen emphasized more on intensive low-value added manufacturing in the past. Custom manufacturing with materials, designs or samples supplied and compensation trade is the main trade form in Shenzhen since the reform and opening up policy. Due to lower land cost and cheaper labor forces, the majority of investors in Shenzhen were from Hongkong. Even though innovation was the keyword of mission for Shenzhen since its industrialization, it did not become the focus. Shanzhai culture in manufacturing even became the symbol of this city. However, with the land prices increasingly rising, some factories are moving out from Shenzhen to its adjacent cities or hinterland. One of the biggest Apple product manufacturing factories- Foxconn decided not to employ new employers in Shenzhen since 2016 and also proposed to move its manufacturing sector to hinterland, such as Yantai, Chongqing and Langfang (Shan,2015). Another big company- Huawei, which is seemed as one of the icons of Shenzhen and covers 47% industrial output of Longhua District, has already moved its manufacturing sector to Dongguan, the Shenzhen's adjacent city(Lima,2016). Other companies like Zhongxing, Guangqi, Biyadi and so on moved their manufacturing sector to other city as well. According to Shenzhen's mayor Xu Le, 15,000 enterprises moved out Shenzhen in

2016 (Li&Wang, 2016).

However, the government set forth a new image of National Innovation city in Shenzhen since 1994. With this image, local enterprises became the leading players in government's strategy of facilitating R&D development. Shenzhen spent over 4% of its GDP on R&D, which is almost double the mainland average. Especially in Nanshan district, the share of R&D is over 6% and most of the money comes from private enterprises. The patent application in China increases dramatically from 173,327 in 2005 to 1,101,864 in 2014, among them Shenzhen is the dominant player (WIPO, 2016). According to Forbes China, Shenzhen ranks first in relation to innovation(Forbes China, 2016). The companies in Shenzhen, which account for a big chunk of China's innovation, are moving up to the value chain. Used to harness its brawn, foreign firms are deriving benefit from its brains as well.

Originally started its business from telecoms-equipment vendor, Huawei now has become one of significant enterprises not only in smartphones, but also in cloud computing and 5G. Impressive 15% of its revenue and 82,000 of its 180,000 employees is invested into its 24 R&D centers and numerous collaborative hubs with leading universities all over the world (The economist, 2017). Another successful recent

Foxcoon

Figure 1-7: manufacturing sector movement of Foxcoon
Source: author
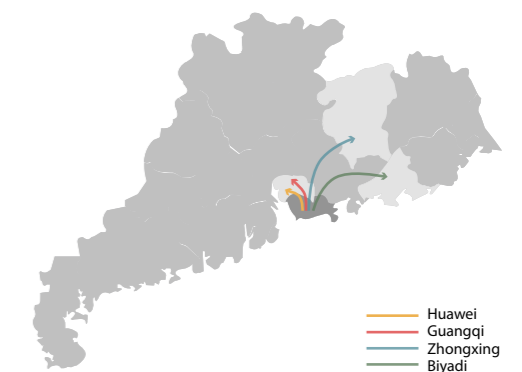

Huawei
Guangqi
Zhongxing
Biyadi

Figure 1-8: manufacturing sector movement of different companies
Source: author

startup in Shenzhen is Da-Jiang Innovations. With more than 1,500 employees in R&D sector, this company occupies over half of the global market of small drones and its business clients ranges from agriculture to public security, which would continuing increase in other fields as well. This company is a new icon of innovation in Shenzhen.

Because of these industrial upgrading, the industrial structure is experiencing an ongoing change at the same time. According to 2016 Shenzhen Statistic yearbook, the primary industry has already vanished since 2013. From 2005 to 2015, the secondary industry decreases from 53.4% to 41.2%, however, the tertiary industry rises from 46.4% to 58.8%.
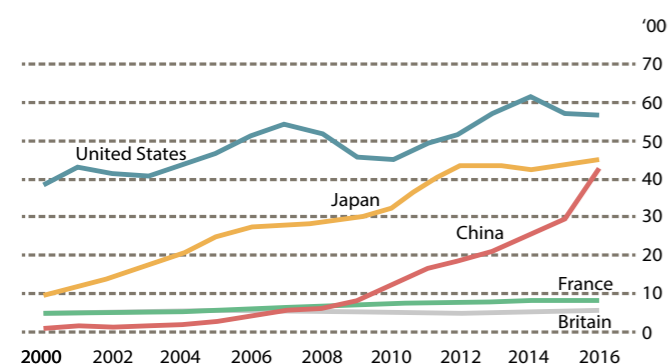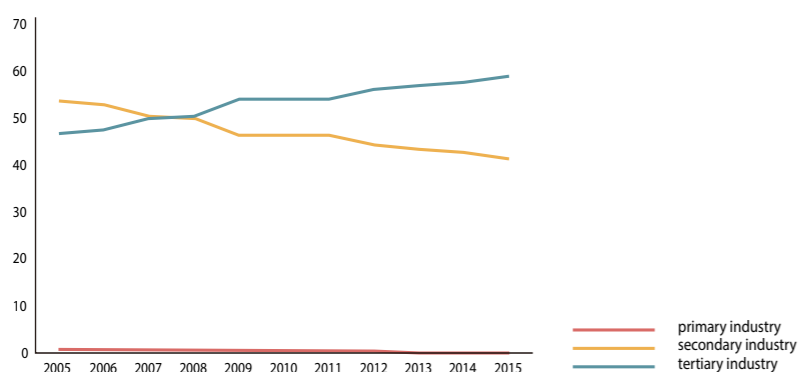
Besides, according to the urban planning for 2020, the government wishes to strengthen its four pillar industries and boom more burgeoning industries, such as energy-saving and environmentally friendly industry, modern material industry, Internet industry, wearable devices industry, robot industry, aerospace industry, biology industry, and healthy industry(Shenzhen government Online,2017). The data from Bureau of Statistics shows in 2016, these burgeoning industries rise 10.6% than last year and contribute 40.3% in the whole city's GDP (Bureau of Statistics,2016).

All these datum show that the ongoing industrial upgrading intends to change Shenzhen from labor-intensive city to high-tech-intensive city, which means the need of young graduates.

According to the sixth national census in Shenzhen, the dominant group is people aged 20-39 with secondary school degree, and this group covers over 60% of the population in Shenzhen (Bureau of Statistics,2010).

Compared with the fifth national census in 2000, population with bachelor degree has increased significantly over 1.21 million. Besides, 71,013 university graduates are attracted to Shenzhen, increasing 16.99% than last year. Among these graduates, population with master and post-master degree covers 20.08% (Liu,2016).

From this data, the attraction for young graduates rose in last ten years and this could contribute to the industrial upgrading. But the proportion of population with bachelor degree is still quite low, and the population with secondary school degree is still dominant, which does not help to the innovation city image. In order to attract more young graduates, the government of Shenzhen put forward some policies to attract these group of people.
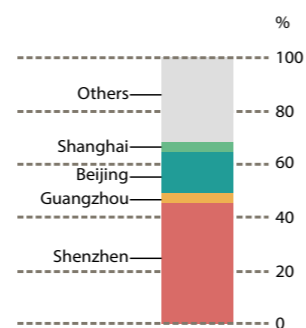

*Figure 1-9: International patent applications
Source: WIPO&SIPO,2016*

*Figure 1-12: Composition of GDP by three industries
Source: Shenzhen Statistics Yearbook,2016*

*Figure 1-10: China's international patent application by cities
Source: WIPO&SIPO,2016*
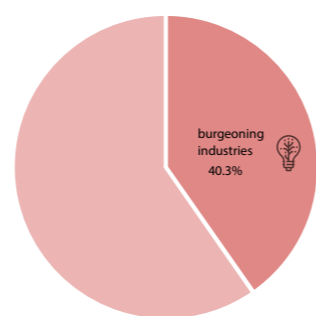
*Figure 1-11: The proportion of burgeoning industries output in GDP
Source: Bureau of Statistics,2016*

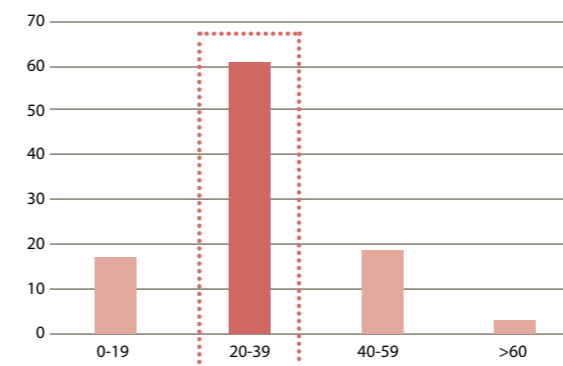*Figure 1-13: The proportion of different age in Shenzhen
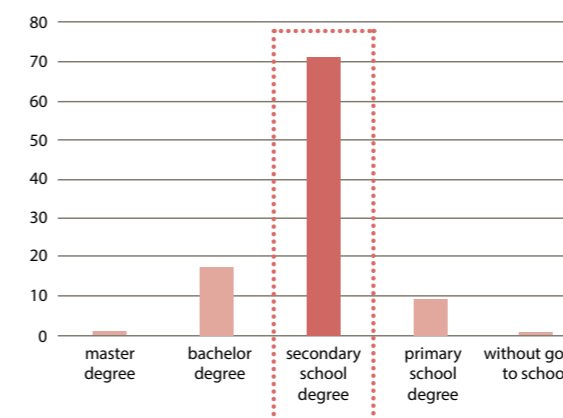Source: The sixth national census in Shenzhen, 2010*

*Figure 1-14: The proportion of different education degree in Shenzhen
Source: The sixth national census in Shenzhen, 2010*

*Figure 1-15: Workers prepare to depart for a factory in Shenzhen
Source: China Photos, 2009*

*Figure 1-16: Factory workers in Shenzhen
Source: Liam Young, 2015*

1.5 | The current policies to attract young graduates in Shenzhen

In order to attract more high-educated people, the government put forward several policies. University graduates could easily get Hukou in Shenzhen, which means they could easily get and enjoy social resources. Furthermore, graduates with bachelor degree could get 15,000 yuan (around €1,923) rent allowance; with master degree could get 25,000 yuan (around €3,205); with doctor degree could get 30,000 yuan (around €3846); and with post PhD would get 0.12 million (around €15,385) allowance per year, especially those who get post PhD in Shenzhen would get 0.3 million (around €38,461) funding. For those who have outstanding contribution, they would get at least 0.32 million yuan (around €41,025) subsidy and at least 2560 yuan (around €328) rent allowance per month. Students studying abroad can also get from 0.3 million yuan to 5 million yuan (around €38,462 to €641,026) subsidy. The companies or institutions that hire these high-educated migrants would also get monetary reward.

Figure 1-17: Policies to attract high-educated migrants in Shenzhen
Source: Wang,2017

1.6 | The escaping from Shenzhen of young graduates

Even though the government has already put forward attractive financial subsidy to this group of people, escaping from mega cities become a hot issue in China nowadays. According to China Daily, The Social Survey Center of China Youth Daily has surveyed 2,000 people who were either currently or had ever worked or studied in the mega cities. The data shows that about 23% had already left these mega cities and about 48% were planning to leave. When it comes to the reason for leaving, 64% people named high house prices as their main reason for leaving ("Young Chinese leave big expensive cities due to soaring housing prices", 2017). Another survey conducted by one of the biggest Internet company in China- NetEase, Inc. showed that 85% young people believed buying a property was necessary and 80% wished to make the deal under 35 years old but 65% thought it was impossible to achieve this goal without the help of their parents. Having surveyed 5,000 young people, this survey also revealed that among the four mega cities in China, the pressure of soaring housing price in Shenzhen is the highest. The proportion of buying the first house under 30 years old is the lowest and the proportion of intending not to buy a house in Shenzhen is the highest among these four cities. Besides, Shenzhen also ranked the last in terms of city loyalty, and the high housing price is named as the dominant reason. The world's largest human resources consulting firm Mercer reported that Shenzhen ranks 12 among 209 cities in the cost of living city worldwide, while Amsterdam only ranks 85. The average income in 2015 is 81,034 yuan(around €10,389) per year in Shenzhen (Shenzhen statistic yearbook,2016), but the average price of newly-built houses is 54,382 yuan (around €6,972) per square meter (Shenzhen statistic yearbook,2016) ,which means a person with average income can only buy no more than 2 square meters per year. Taking 100 square meter as the average area of a house, the average price of the property is around 5.44 million yuan (around €697,205). Amsterdam, where the housing price is already very high in Netherlands,
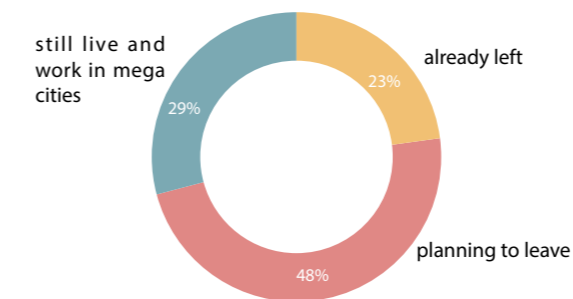

Figure 1-18: Percentage of young people's choice of staying or leaving metropolitan cities
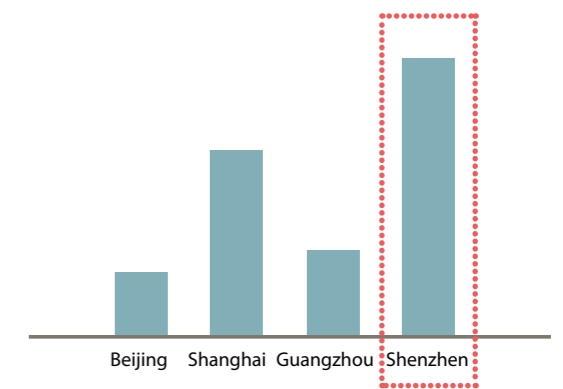*Source: China Daily, 2017*

Figure 1-19: Population density of four mega cities in China
Source: ASKCI Consulting Co., Ltd ,2016

however, the average price of existing houses is €394,931 (Delmendo, 2017) , which is just half of Shenzhen. But the average income in Netherlands is over €40,000 (PayScale Inc, 2017). With just a quarter of income, people living in Shenzhen have to afford double on prosperity compared with living in Amsterdam. The report from Numbeo also shows that Shenzhen ranks first among 267 cities in relation to price to income ratio, and Amsterdam only ranks 120th (Numbeo, 2017). Meanwhile as the densest city in China mainland, the density of population in Shenzhen is 5,689.45 people/km^2, which is 1.5 times of Shanghai and 4.3 times of Beijing (ASKCI Consulting Co., Ltd ,2016). With very high housing price, high density but low income, living environment in Shenzhen for young migrants, who just start their own career, are unlivable.

Figure 1-20: Reports about high housing price in China
Source: China Daily, 2016; The American Interest, 2017; The Atlantic, 2013

Figure 1-21: Ages when people buy the first property in different cities
Source: NetEase, Inc., 2017

Figure 1-22: Time of planning to buy a property after working in different cities
Source: NetEase, Inc., 2017

Property Prices Index 2017 Mid-Year

Rank	City	Price To Income Ratio	Gross Rental Yield City Centre	Gross Rental Yield Outside of Centre	Price To Rent Ratio City Centre	Price To Rent Ratio Outside Of City Centre	Mortgage As A Percentage Of Income	Affordability Index
1	Shenzhen, China	39.76	1.26	1.29	79.35	77.44	318.97	0.31
2	Hong Kong, Hong Kong	38.61	2.06	2.08	48.52	48.14	239.67	0.42
3	Beijing, China	37.80	1.59	1.91	62.81	52.32	299.14	0.33
4	Shanghai, China	36.91	2.00	1.91	50.05	52.31	290.04	0.34
5	Mumbai, India	31.58	2.18	2.85	45.78	35.03	365.99	0.27
6	Algiers, Algeria	27.13	2.68	3.33	37.35	30.07	227.45	0.44
7	London, United Kingdom	24.16	2.62	3.50	38.24	28.57	163.54	0.61
8	Lviv, Ukraine	23.33	4.74	6.91	21.07	14.46	545.37	0.18
9	Belgrade, Serbia	22.25	3.07	3.53	32.53	28.32	160.83	0.62
10	Singapore, Singapore	22.18	2.45	3.19	40.87	31.39	138.67	0.72
11	Bangkok, Thailand	21.58	4.10	3.86	24.42	25.89	176.71	0.57
12	Thane, India	21.26	2.25	2.37	44.37	42.21	257.80	0.39
13	Rio De Janeiro, Brazil	20.81	4.95	4.32	20.21	23.15	268.32	0.37
14	Baku, Azerbaijan	20.69	5.43	5.49	18.41	18.22	245.13	0.41
15	Moscow, Russia	20.47	4.10	5.05	24.38	19.81	283.85	0.35
16	Rome, Italy	20.30	2.93	4.08	34.16	24.49	133.13	0.75
17	Guangzhou, China	20.12	2.29	2.85	43.68	35.10	168.27	0.59
18	Tel Aviv-Yafo, Israel	19.97	2.16	2.53	46.39	39.55	135.56	0.74
19	Bogota, Colombia	19.96	4.93	4.66	20.27	21.45	290.33	0.34
20	Kiev, Ukraine	19.69	6.18	7.17	16.19	13.95	419.34	0.24
110	Madrid, Spain	10.17	4.39	5.42	22.76	18.46	62.15	1.61
111	Mexico City, Mexico	10.14	5.98	7.09	16.73	14.11	127.89	0.78
112	Wroclaw, Poland	10.13	5.64	6.01	17.74	16.64	70.88	1.41
113	Timisoara, Romania	10.11	5.07	4.15	19.73	24.10	76.21	1.31
114	Riga, Latvia	10.03	5.44	5.43	18.39	18.42	66.87	1.50
115	Sevilla, Spain	9.97	3.68	5.56	27.15	17.99	58.68	1.70
116	Lucknow (Lakhnau), India	9.93	2.82	3.21	35.48	31.19	113.38	0.88
117	Visakhapatnam, India	9.92	3.70	3.37	27.06	29.63	122.08	0.82
118	Genoa, Italy	9.89	3.85	5.17	25.94	19.33	64.34	1.55
119	Kuala Lumpur, Malaysia	9.87	4.89	4.75	20.44	21.07	75.17	1.33
120	Amsterdam, Netherlands	9.69	5.16	6.01	19.39	16.63	60.66	1.65
121	Gdansk, Poland	9.67	4.21	5.30	23.73	18.88	69.74	1.43
122	Porto, Portugal	9.65	5.39	5.30	18.57	18.88	63.71	1.57

Figure 1-23: Property Prices Index of 2017 Mid-Year
Source: Numbeo, 2017

Figure 1-24: Housing price distribution in Shenzhen
Source: Lianjia Marketing research center,2016

Legend
>80,000 yuan/m²
60,000-80,000 yuan/m²
50,000-60,000 yuan/m²
40,000-50,000 yuan/m²
<40,000 yuan/m²
no data

Figure 1-26: Housing price distribution in Shenzhen
Source: author

Legend
administration
finance and business
high-tech industry
high-tech industry under construction
logistics and business under construction
factory

Zooming into Shenzhen, housing price gap between different districts is quite huge. A report from one of the biggest property agency- Lianjia revealed top 55 expensive areas in Shenzhen and Figure 1-24 shows their location. From the report, the housing prices of most areas in "guannei" are over 40,000 yuan/m², especially Nanshan district and the western part of Futian district. Considering the initial downpayment of 30% in Shenzhen, people with average income need at least 14 years to pay for the downpayment of houses which are close to their jobs. So if young migrants want to buy a house under 35 years old, it is only possible in very suburban areas in "guanwai" (see in Figure 1-25).

Figure 1-25: Affordability for young migrants in Shenzhen
Source: author

Legend
affordable area
unaffordable area
no data

While at the same time, agglomerating most high-tech industries, finance and administration, "guannei" is the most possible job locations for young graduates (see in Figure 1-26). Nanshan District, as the technology center, collects a large number of universities, research institutions and high-tech companies. Futian District is the administrative center of Shenzhen. And there are a lot of financial and economic companies located in Luohu District. With the major job opportunities for young migrants located, these three districts are the areas that most young graduates would work in. However, combined with the housing price map in Figure 1-24, the housing price in these three distrcits are nearly all unaffordable.

Figure 1-27: Science Park in Nanshan District
Source: Liu, 2017

But how about the rental market in Shenzhen? From Figure 1-28, "guannei" is still the hot spot for renting and the price is relatively high as well, especially Nanshan district and Futian district. However, the living conditions between different places are quite diverse. Zoom into "guannei", with a lot of green space and better housing quality, living conditions in Nanshan district and western part of Futian district are generally better, except for urban villages. While the renting prices are higher correspondingly. Luohu district and eastern part of Futian district are the areas that are developed at the beginning of Reform and Opening-up policy. Setting Hong Kong as the example, these two areas are the most dense areas in Shenzhen with low housing quality. Poor housing quality and lack of public space make there not livable. But the prices in these areas are relatively lower than other parts inside "guannei", which makes some migrants choose to rent there due to the proximity to jobs (see in Figure 1-29). While areas located in "guanwai" but close to "guannei" are attractive as well. Most of dwellings in these areas are newly built in recent years. Lots of public space and good housing quality make living environment in "guanwai" livable and affordable as well.

Minzhi 66.9 yuan/m²
Hongshan 73.4 yuan/m²
Longhua 50.3 yuan/m²

Baishilong 67.8 yuan/m²
Shenzhen North 68.6 yuan/m²
Minle 68.5 yuan/m²

Fuyong 34.3 yuan/m²
Airport 50.9 yuan/m²

Bantian 53.3 yuan/m²
Wuhe 57.9 yuan/m²

Shangmeilin 93.9 yuan/m²
Xiameilin 77.9 yuan/m²
Xiangmei North 91.0 yuan/m²
Jingtian 83.1 yuan/m²

Mumianwan 49.4 yuan/m²
Buji 60.8 yuan/m²
Dafen 44.9 yuan/m²

Xili 67.0 yuan/m²
Taoyuan village 75.4 yuan/m²
Chaguan 81.4 yuan/m²

Xixiang 37.6 yuan/m²
Pingzhou 62.6 yuan/m²

Fanshen 55.9 yuan/m²
Xin'an 73.4 yuan/m²
Baoan Center 79.5 yuan/m²
Bao'an Staidum 62.8 yuan/m²

Buxin 71.5 yuan/m²
Baigelong 56.0 yuan/m²

Baishizhou
66.6 yuan/m²

Grant Theater 84.4 yuan/m²
Old Street 80.4 yuan/m²

Shixia 83.4 yuan/m²
Huanggang Village 87.7 yuan/m²
Yitian 102.7 yuan/m²

High-tech center 90.8 yuan/m²
Taoyuan 84.7 yuan/m²
Daxin 84.2 yuan/m²
Shenzhen University 97.9 yuan/m²

Shangsha 76.9 yuan/m²
Chegongmiao 117.4 yuan/m²
Xiasha 89.3 yuan/m²

Legend
Main renting area
Guannei
Guanwai
>80 yuan/m²
60—80 yuan/m²
<60 yuan/m²

N

0   4   10   20km

renting conditions

Fanshen 55.9 yuan/m²

Bao'an Center 79.5 yuan/m²

Xili 67.0 yuan/m²

Minle 68.5 yuan/m²

Buji 60.8 yuan/m²

Pingzhou 62.6 yuan/m²

Buxin 71.5 yuan/m²

Shixia 83.4 yuan/m²

High-tech center 90.8 yuan/m²

Baishizhou 66.6 yuan/m²

Chegongmiao 117.4 yuan/m²

Shangsha 76.9 yuan/m²

Legend

● Main renting area
● Guannei
● Guanwai

● >80 yuan/m²
● 60—80 yuan/m²
● <60 yuan/m²

0 2 5 10km

N

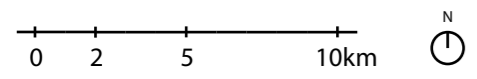*Figure 1-29: Housing quality of hot renting areas*
Source: Baidu Maps, 2017
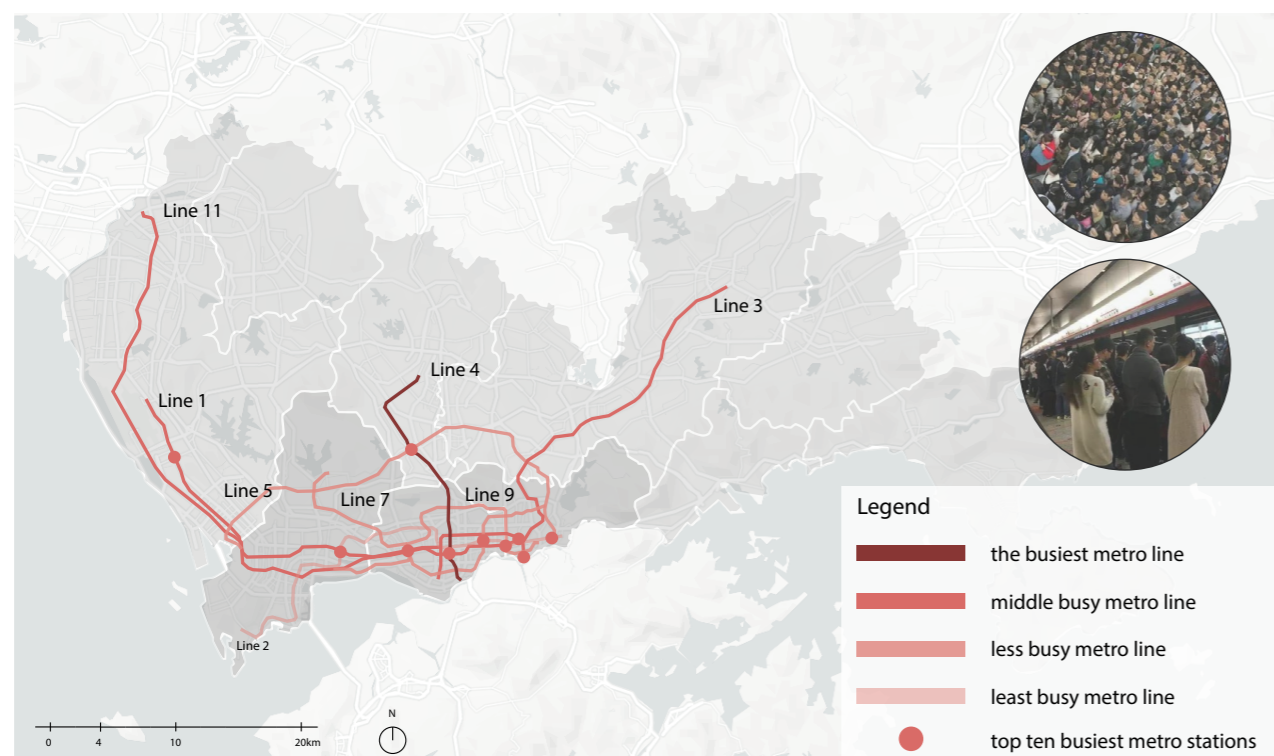
Figure 1-30: Renting price distribution in Shenzhen
Source: Jiajiashun agency, 2016

Figure 1-31: Conclusion map
Source: author

Unlike "guannei", most houses in "guanwai" are newly built in these years. With better housing quality, more public space and lower renting fees, these areas attract a lot of migrants to live in. Nevertheless, from the survey of metro congestion, Line 4, Line 1, Line 11 and Line 3, which connect "guannei" and "guanwai", are quite crowded (see in Figure 1-30). Line 4, as the direct link between Longhua district and Futian district, became the most crowded metro line in Shenzhen. Carrying over 75,000 people during rush hours on workdays, double population takes Line 4 when commuting than Line 2, which is the least crowded metro line. Shenzhen North Station and Bao'an center, two of the top 10 crowded metro stations in Shenzhen, are located at the quite beginning of Line 4 and Line 1, which could also clearly show the congestion in these two metro lines. Besides, the report of Didi (a company that is similar to Uber) showed that the average commuting time in Shenzhen was 43.5 minutes. This long-time commuting and crowded experience make the accessibility of "guanwai" low.

To sum up, there is a huge jobs-housing unbalance in Shenzhen. Either too unaffordable or too shabby and dense, the living quality in "guannei" is low, even though there cluster most of job opportunities for high-educated young migrants. Without job opportunities, people have to put up with long-time commuting though the living conditions and affordability are quite good in "guanwai" (see in Figure 1-31).

Figure 1-32: Living in Luohu District
Source: Hailuo Creativity, 2017

1.7 | The dilemma of lack of social resources in Shenzhen

Even though the "hukou" system in Shenzhen is not very strict and university graduates could easily get "hukou" in Shenzhen, it is still very difficult for tenants to enjoy same social resources as owners due to the lack of social resouces, especially good education resources.

Government of Shenzhen carry out a policy of entering schools by integrals during compulsory education period. Among these elements, census register and property are all in the first category in every district. Futian district and Nanshan district, where the prices of property are the highest and have most of good schools, put forward a very stringent requirement. Having properties in these two districts could get the highest score in integrals, while in other districts it is not necessary. Besides, "guannei" also has a severe demand of the length of renting. Parents should rent in these three districts at least 1 year and the longer the parents rent, the higher score students get (Chen, 2017). In a conclusion, it is quite difficult for students from tenants to share the same education resources as owners, which also push the parents to buy a property.

Figure 1-33: Reports about lack of educational resources in Shenzhen
Source: Beijing Today, 2016; Xinhua Insight, 2016

1.8 | Opportunities

In July, Ministry of Housing and Urban-Rural Development put forward a policy that "Tenants enjoy the same rights as home buyers" after applying for living permit as owners, even though this policy does not specify what definite kind of resources the tenants could enjoy. Corresponding to this policy, Guangzhou proposed another policy to highlight that tenants' children could enjoy the same rights to go to nearby schools with better education resources as owners without properties and Bureau of Education is directly responsible for the implementation. Being tested in 10 cities, this policy has the potential to be extended to whole China, which may boom the rental market and bring the possibility to solve the soaring housing price gradually. With this policy, rather than have to buy a property, young migrants could choose to rent. In addition, Shenzhen government also proposed a project to construct housing that only for rent not for sale, aiming at promoting the development of rental market. Shenzhen is experiencing an on-going urban regeneration at the same time, especially in "guannei". So it is the time for planners to improve livability for tenants at this moment.

With lower cost on housing and better living conditions, these high-educated young migrants would probably choose to settle down in Shenzhen and contribute to its economic growth and social development.

Figure 1-34: A report about new policy of "tenants enjoy the same rights as home buyers"
Source: China Daily, 2017

Problem Statement
research question
methodology & relevance

2.1 | Problem statement and aim

Problem statement:

With the constantly increasing of land price, a lot of manufacture sectors are moving out from Shenzhen, especially some big factories which contribute a lot to economic growth in the past. Corresponding to this dilemma, the government put forward a new image of innovation city and try to transform from "wold factory" to "world city". This new image requires continuous industrial upgrading, which is on-going in Shenzhen. Besides, with policies and plannings to retain headquarters and invest more on R&D, the government wished to strengthen its pillar industries and boom burgeoning high-tech industries, which all lead to the demand of young graduates.

While nowadays in Shenzhen, the dominant population is young people with secondary education degree. Even though the government proposed a lot of policies to attract these high-educated migrants, the soaring housing price , job and housing unbalance and the dilemma of lack of social resources are driving out this group of people.

Aim:

Improve the livability and get jobs-housing balance in Shenzhen through urban regeneration and new policies to help the city attract and retain young graduates and contribute to its economic growth in the rapid urban development context.

2.2 | Research question

How to get jobs-housing balance and improve livability of young graduates in Shenzhen through urban regeneration and new policies?

Sub research question:

-What is jobs-housing balance? What is the benefit of it?

-What is the character of young graduates? Why the city should attract and retain these group of people? What is their demand of livability?

-How could urban form be adaptive to improve living quality with more affordable accommodation?

-What kind of typology in terms of density and function could contribute to jobs-housing balance? What are the existing typologies in Shenzhen?

-What are the existing urban regeneration models/principals/strategies?

-How can the possible alternative strategies contribute to jobs-housing balance? What are involved stakeholders? What new policies could help to promote the implementation of the project strategies?

2.3 | Methodology

Main research question	Sub research question	Methods	Expected outcomes
How to get jobs-housing balance and improve livability of young graduates in Shenzhen through urban regeneration and new policies?	What is jobs-housing balance? What is the benefit of it?	Literature review about urban morphology study	A set of parameters to measure the job-housing balance, the ideal urban form which could get the balance and the benefit of job-housing balance
	What is the character of young graduates? Why the city should attract and retain these group of people? What is their demand of livability?	Literature review about creative class and migrants, interview with high-educated young migrants	The identification of high-educated young migrants, conclusive demands of creative class and migrants for livability as design principals and the possible economic growth and social development they may bring
	How could urban form be adaptive to improve living quality with more affordable accommodation?	Literature review about livability, the relationship between livability and urban form and comparative study of housing improvement cases and house sharing projects worldwide	A clear linkage between urban form and livability, knowledge about affordable housing with good living quality projects worldwide and the possible reflection on projects in China.
	What kind of typology in terms of density and function could contribute to job-housing balance? What are the existing typologies in Shenzhen?	Exploration through design, typomorphology study, use of GIS software to map the current exising typologies in Shenzhen, site visit	Density and function maps and a selection of representative areas according to similar urban forms.
	What are the existing urban regeneration models/principals/strategies?	Case study and literature review	Conclusive urban regeneration principals and the application of these principals to the projects.
	How can the possible alternative strategies contribute to job-housing balance? What are involved stakeholders? What new policies could help to promote the implementation of the project strategies?	Exploration of the necessary strategies and policies, interview with related stakeholders and re-evaluation of the livability in the representative areas once the design interventions are applied through the parameters defined from literature reivew	An affordable and good living quality vision for high-educated young migrants in Shenzhen, which includes: -a set of design principals that, tested in representative areas, can be extended to the rest of the city, -a strategic vision for the application of these interventions

2.4 | Social relevance

High prices of housing have reduced the attraction of mega cities.

The high prices of housing, which have already driven out a lot of young graduates, has already become a hot issue in China. Even though having a good salary, these young graduates still cannot afford the prices of housing in these mega cities. Space in Shenzhen is mainly for production and economic purpose instead of living quality. Either tolerant with bad living conditions or put up with long-time commuting, the pressure of buying houses makes them suffocating. By the way, the lack of social resources also pushes them to buy properties. Due to these elements, these young graduates are escaping to their hometown or hinterland and the attraction of Shenzhen is reducing. As a migrant city, losing this kind of attraction would be very difficult for Shenzhen to keep its economic growth and social development.

Policies concerning about high prices of housing is being tested

Last year central government put forward policies to encourage the development of rental market in big and middle cities. Shenzhen, Guangzhou and other big cities are chosen as the tested cities. Corresponding to these policies, in July, Guangzhou implemented a policy that tenants enjoy the same rights as home buyers, which may cause a huge change in housing market and policy making. As is known to all, nowadays urban planning is the main driver of social economic development and should also respond to these policies, which is a good opportunity to improve the liveability of tenants as well, especially these young graduates in Shenzhen at the same time.

2.5 | Scientific relevance

Livability is a "hot topic". The references to the role of cities considering about achieving a more livable city are numerous, and there is a clear link between density, function and livability. In Chinese context, urban regeneration is also an ongoing approach to improve the living conditions. Furthermore, there are not many researches in relations to retaining young graduates, since the conflicts among jobs-housing balance, affordability and living condition are not that obvious in other countries. So the core topic of the thesis is to explore how the changes of morphology in terms of density and function could improve the livability in Shenzhen. Different morphology needs different kind of transformation. Thus this is a people-oriented approach, which related to modernization, urban regeneration, livability and gentrification.

Theoretical framework

3.1 | Young graduates

Defining the group of young graduates

Young graduates are highly linked to creative class through literatrue. The term "creative class" was first identified by Richard Florida in his book *The Rise of the Creative Class*. Florida described the core of creative class includes "people in science and engineering, architecture and design, education, arts, music and entertainment whose economic function is to create new ideas, new technology and/or new creative content" (R.Florida, 2008). The broader group of creative class "contains creative professionals in business and finance, law, health care and related fields who engage in complex problem solving that involves a great deal of independent judgement and requires high levels of education or human capital (R.Florida, 2008)". This means the objective of the thesis plan- young graduates could be seen as creative class.

What creative class value in locations

Richard Florida described what matters when they choose places to live, which included thick labor markets, lifestyle (variety of scenes: music, art, technology, outdoor spaces, nightlife, etc), social interactions, diversity (tolerance for people of different ethnic groups, races and ages), identity, authenticity and the quality of place.

These elements could be translated into several spatial qualities as job opportunities, necessary amenities, accessibility to public space, accessibility to public facilities, mixed- use, multi functions and unique characters of a place. These spatial qualities are the basic demand of creative class.

3.2 | Livability

Definition of livability

As the increasing degree of urbanization and globalization, livability has become an increasingly popular and widely discussed term among urbanists. Livable city, as the quality of 'fit to live in' (van Dorst, 2013, p. 224), is an ideal image of the city and is often used to describe the long range goals of governments. Despite the wide usage of this term, the concept of livability is still implicit.

The term of livability first appeared in the 1950s as a powerful linguistic tool in Vancouver with *The Electors Action Movement* (TEAM) (Ley, 1990 & Kaal, 2011). The book Livable Streets from Donald Appleyard that published in 1981 also mentioned livability and its relationship with streetscapes and transportation. The AARP developed the guidance on livability in 2000 and continued to provided definition of livability through the description of a livable community as "one that has affordable and appropriate housing, supportive community features and services, and adequate mobility options, which together facilitate personal independence and the engagement of residents in civic and social life" (AARP, 2005). At this time, the definition of livability was mainly depicted through a diverse range of meanings. The essay that published from Peter Evans (2012), however, started to use indicators to reveal the definition of livability. The coin of livability was divided into two indicators, which are livelihood and ecological sustainability. Livelihood means "jobs close enough to decent housing with wages commensurate with rents and access to the services that make for a healthful habitat" (Evans (Ed.), 2002). Livelihoods must be environmentally sustainable as well. "To be livable, a city must put both sides of the coin together, providing livelihoods for its citizens,

ordinary as well as affluent, in ways that preserve the quality of the environment" (Evans (Ed.), 2002). Livelihoods must be environmentally sustainable as well. "To be livable, a city must put both sides of the coin together, providing livelihoods for its citizens, ordinary as well as affluent, in ways that preserve the quality of the environment" (Evans (Ed.), 2002). What's more, The Victorian Competition and Efficiency Commission (2008) defined livability as "a statement of desires related to the contentment with life in a particular location..." (Competition, V., & Efficiency Commission, 2008, 24, p. 587), and "a behavior-related function of the interaction between environmental characteristics and personal characteristics" (Competition, V., & Efficiency Commission, 2008, 26, pp. 1-2). Adopting this definition, *Place, health and livability research program* (2013) defined the livability indicators in Melbourne, including crime and safety, housing, education, employment and income, health and social services, transport, public open space, community cohesion and local democracy, leisure and culture, food and other local goods, natural environment (Lowe et al., 2013). In 2009 the new *Partnership for Sustainable Communities* (PSC) developed six livability principles, which were providing more transportation choices, promoting equitable and affordable housing, enhancing economic competitiveness, supporting existing communities, coordinating and leveraging federal policies and investment and valuing communities and neighborhoods (PSC & Gough, 2015). Machiel van Dorst (2013) also made a definition as "the quality of the match between people and their living environment". Health, safety, social interaction in the neighborhood, controlling the environment and sustainable green were the basic needs that make up livability in relation to spatial context. (van Dorst, 2013, p. 230-233).

Name of literature	Author	Indicators / context
Livable cities?: Urban struggles for livelihood and sustainability	Peter Evans, 2002	•Livelihood: jobs close enough to decent housing with wages commensurate with rents and access to the services that make for a healthful habitat; •Ecological Sustainability
Livable Communities: An Evaluation Guide	AARP, 2005	•Affordable and appropriate housing; •Supportive community features and services; •Adequate mobility options; •Facilitating personal independence and the engagement of residents in civic and social life
Reconciling Livability and Sustainability: Conceptual and Practical Implications for Planning	Partnership for Sustainable Communities, 2005	•Providing more transportation choices; •Promoting equitable and affordable housing; •Enhancing economic competitiveness; •Supporting existing communities; •Coordinating and leverage federal policies and investment; •Valuing communities and neighbourhoods
Livability-Sustainable urban environments : an ecosystem approach.	Machiel van Dorst, 2013	•Health •Safety, •Social interaction in the neighborhood •Controlling the environment •Sustainable green
Liveable, healthy, sustainable: What are the key indicators for Melbourne neighbour-hoods?	Place, Health and Liveability Research Program, 2013	•Crime and safety; •Housing; •Education; •Employment and income; •Health and social services; •Transport; •Public open space; •Community cohesion and local democracy; •Leisure and culture; •Food and other local goods; •Natural environment

Table 3-1: The context or indicators of livability through time
Source: author

These definitions and indicators suggest that livability has a number of key dimensions. Generally speaking, most definitions align the core of livability with local community well-being, which includes not only the environmental characteristics, but also social-economic dimension, concerning how people interact with local urban environments (Lowe et al., 2013).

In Chinese context, Beijing Masterplan 2004-2020 firstly set "livable city" as the aim of city development. Li and Guo defined that livability includes two aspects, which is physical environment and social environment. Continuing economic prosperity, social harmony, cultural richness, convinent lifestyle, pleasant view and public safety are the dominant elements (Li& Guo, 2006). Besides, Zhang pointed out livable city is the city that are safe, healthy, convenient, accessible and have a good living environment (Zhang, 2007).

Considering the demand of creative class mentioned above, the livability indicators could be divided into two aspects- environmental aspect and socio-economic aspect.

In the environmental aspect, the core of livability would be ecological sustainability, which consists characteristics that make for a sustainable physical living conditions. Combined with the indicators that put forward by Place, Health and Liveability Research Program in Melbourne, the indicators consist good air quality, good water quality, low level of noise, low energy consumption, use of renewable energy, comfortable micro-climate, efficient use of resources, high capacity of surfaces to absorb rainfall water, natural habitats preservation, biodiversity and quality of ecosystem. Indicators in this aspect are mainly objective indicators.

In the socio-economic aspect, the core of livability is the quality of social-economic environment. Characteristics that are related to safety, transport, job, housing, public facilities, places for social interaction, entertainment and identity would have a strong relationship with livability and indicators in this aspect are mainly objective. So the indicators would be safe living space, convenient public transport, less traffic congestion and parking problems, good walking and cycling environment, more employment opportunities, jobs-housing balance, access to public open space, access to green space, more public facilities, more amenities, more housing type choices, more affordable housing, mixed-use, social equity, less social segregation and exclusion and unique characters of places preservation.

While in the thesis, since the main research question is about the socio-economic aspect, the following analysis would mainly focus on socio-economic dimension. Combined with Maslow's hierarchy of needs, safe living space, more employment opportunities and more affordable housing could be seen as the basic level since these are safety demand. Convenient public transport, less traffic congestion and parking problems and good walking and cycling environment would be the second level. Jobs-housing balance, access to public open space, access to green space, more amenities, more public facilities and diverse housing types should be the third level, and social equity, less social segregation and exclusion and unique characters of places preservation should be the top level (see in Figure 3-1). The first two level and jobs-housing balance would be further analyzed in both district scale and site scale, other indicators would be analyzed in site scale.

Aspect	Indicators
Environmental	•Good air quality •Good water quality •Low level of noise •Low energy consumption •Use of renewable energy •Comfortable micro-climate •Efficient use of resources •High capacity of surfaces to absorb rainfall water •Natural habitats preservation •Biodiversity •Quality of ecosystem
Socio-economic	•Safe living space •Convenient public transport •Less traffic congestion and parking problems •Good walking and cycling environment •More employment opportunities •Job-housing balance •Access to public open space •Access to green space •More public facilities •More amenities •Diverse housing types •More affordable housing •Social equity •Less social segregation and exclusion •Unique characters of places preservation.

Table 3-2: The indicators of livability
Source: author
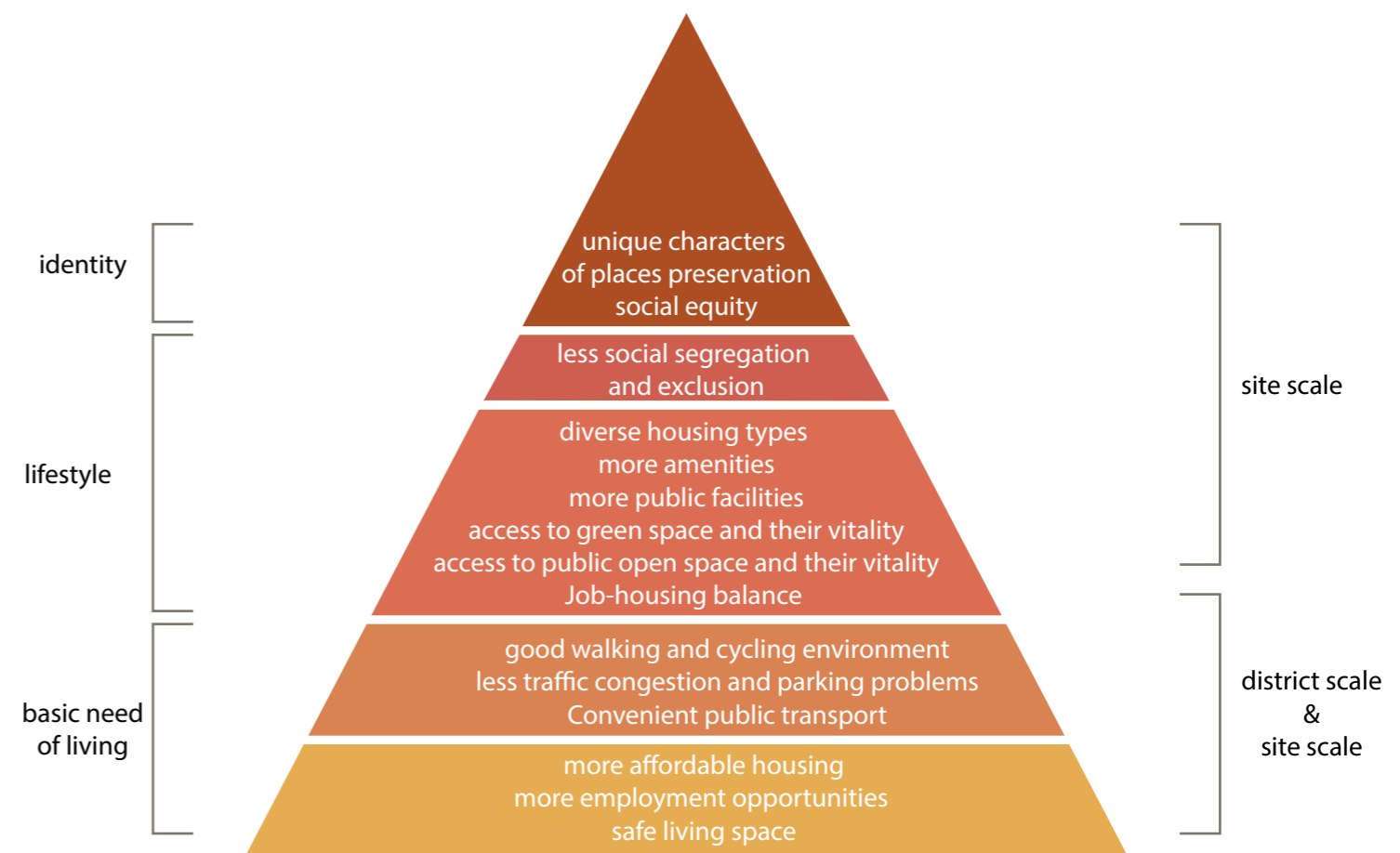
Figure 3-1: The hierarchy of livability indicators
Source: author

3.3 | Density

When it comes to the spatial elements that have a great impact on livability, urban form comes out. Density, as an important element of urban form, naturally have a strong relationship with livability.
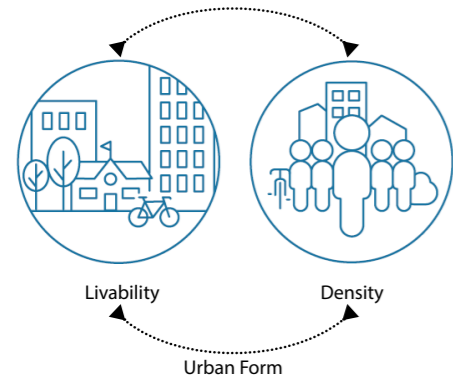
Figure 3-2: The relationship between density and livability
Source: author

Definition of density

Density, as one of the key concepts in urban planning and urban design (Rapoport, 1975), helps to describe, predict and control the use of land (Berghauser Pont & Haupt, 2007; DETR, 1998). The concept of density has varied largely with the development of the cities. Before the 20th century, density was barely a result of the complex and natural development of cities and it started to work as a concept in urban planning existed only after the second industrial revolution. During that period, the extremely dense and congested urban environments led to disease and social disorder (Churchman, 1999). As a result, maximum urban densities were put forward in order to improve the living environment. Since then, density has been used as a normative tool, setting the maximum or minimum levels. Nowadays, the concept of density in urban planning and urban design is generally used to describe "the relationship

between a given area and the number of certain entities in that area" (Berghauser Pont & Haupt, 2009, p.14). Commonly, density could be referred as the number of inhabitants or dwellings per surface unit (Berghauser Pont & Haupt, 2009, p.14). As an objective, quantitative and neutral term for measurement, density provides certain limitation and "reflects the spatial properties of an urban area" (Berghauser Pont and Haupt, 2010, p. 12). Density, however, is not a unitary concept and the entities could be "people, services, dwellings or floor space" (Berghauser Pont & Haupt, 2009, p.17), which means it also contains social dimension, such as "schools per surface unit", "hospitals per surface unit".

The measurement method of density

As an objective and quantitative term, the measurement of density should be easy, which turns out not(Hitchcock 1994; Alexander 1993). "There is no one accepted measure of density between or within countries or even within metropolitan regions" (Churchman, 1999). Different measurement methods are used due to different places and situations. Besides, even though density offers a certain limitation, a speific density could still occur several urban fabrics with different spatial qualities.

Corresponding to this problem, five of the most conventional methods of measuring density were identified by Berghauser and Haupt (2009), consisting population and dwelling density, land use intensity (FSI or FAR), coverage (GSI), building height (L) and spaciousness(OSR) (Berghauser Pont & Haupt, 2009, p.72). Among these methods, three fundamental indicators were suggested enough to define urban types, which were

land use intensity (FSI or FAR), coverage (GSI) and network density (N) (Berghauser Pont &Haupt, 2009, p.88). Other measurement methods could be calculated through these three fundamental indicators.

Furthermore, four variables were needed to calculate the three indicators- Base land area (A), Network length (l), Gross floor area(F) and Built up area, or footprint(B) (Berghauser Pont & Haupt, 2009, p.89).
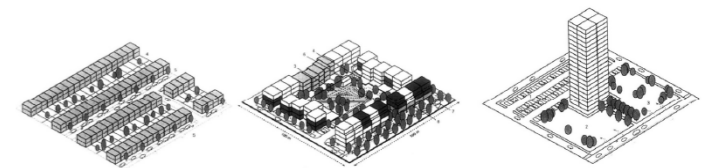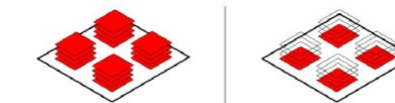

Figure 3-3: The imprecision of the quantitative approach to density: three areas with 75 dwellings per hectare. With an equal number of dwellings, these three examples offer very different qualities

Populatio and dwelling density

Px/Ax or Hx/Ax
Px = number of people
Hx = number of household
Ax = area of aggregation x (m^2)
x = aggregation

Building intensity (FSI)

FSIx=Fx/Ax
Fx = gross floor area (m^2)
Ax = area of aggregation x (m^2)
x = aggregation

Coverage (GSI)

GSIx=Bx/Ax
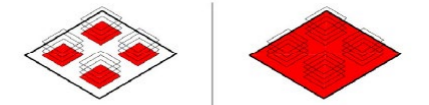Bx = footprint of (m^2)
Ax = area of aggregation x (m^2)
x = aggregation

Building height (L)

L=Fx/Bx
Fx = gross floor area (m2)
Bx = footprint of (m2)
x = aggregation
L=FSIx/GSIx

Spaciousness (OSR)

OSR=(1−Bx)/Fx
Fx = gross floor area (m^2)
Bx = footprint of (m^2)
x = aggregation
OSR=(1−GSIx)/FSIx

Figure 3-4: The most conventional measurement methods of density
Source: Berghauser Pont & Haupt, 2009, p.88

The relationship between density and livability

The relation between density and livability has been a topic of discussion in last decades, and the relation should be depicted firstly through the connection between urban form and livability. Berghauser Pont & Haupt (2009) stated that the performance of urban form could be used to "clarify different consequences for the quality of urban environments" (Berghauser Pont & Haupt, 2009, p.212), and the good quality of urban environments is, as defined before, livability. This means urban form is tightly linked to livability. Furthermore, De Sola-Morales (1978) formulated that the measurements of the urban form were defined by the relationship between general form (street pattern) and built content, which could be translated into network type and building type according to the definition of the two terms from Berghauser Pont & Haupt (Berghauser Pont & Haupt, 2009, p.132). A network type is decisive for N, b and T and building type is characterized by FSI, GSI, OSR and L, which are all indicators of density. Urban density, as a result, decided the performance of urban form (Berghauser Pont & Haupt, 2009, p.212). So urban density has a strong connection with livability. And the advisors of the City of Vancouver's (2008) also stated that an approach to density which is well-designed and strategic can "foster more holistic communities, which include improved transportation, affordable housing, a strong economy and energy efficiency" (cf. the Location Efficiency Calculator, created by The Prince's Foundation, 2009).

In general, the relation between density and livability tends to be negative and a high level of density tend to result in lower levels of livability. Howley et al. (2008) stated that "there is a perception among many that high-

density development poses too great a cost on individuals' quality of life". And inhabitants tended to view high-density space as unattractive, due to noise, pollution, lack of public spaces, traffic congestion, etcetera (Howley et al., 2008). High density also had a negative impact on psychological aspect and could lead to environmental stress (Gillis, 1987, as cited in Boyko and Cooper, 2011). On the other hand, the low density could result in the issue of unsafe and less vibrant, which does not contribute to livability as well. So the relationship between density and livability deserves a further study. One thing needs to be emphasized is that the investigation into relation would focus on the conditional character of density. Every situation needs to take complexity into account, rather than apply the relation as directly applicable values. But the study is still important since it could be used to support explorative design processes.

Combined with the study of Bokyo and Cooper (2011)and Berghauser Pont and Haupt (2009) the relationship between high density and livability could be generally described as in Table 3. It needs to be clarified that the advantages and disadvantages may not be the direct and only result since some references are more theoretical and the surrounding density is perceived diversely through different people.

Since density has a strong relationship with livability, the following analysis would be carried out in two aspects of livability and density.

Indicators		Relationship [1]	Reference [2]
Environmental	Good air quality	-	Dave, 2010
	Good water quality	-	Ham et al., 2009
	Low level of noise	-	Oyedepo and Saadu, 2010
	Low energy consumption	-	Steemers, 2003
	Use of renewable energy	- (in terms of solar power)	Steemers, 2003
	Comfortable micro-climate	-	Coutts et al., 2007; Tratalos et al., 2007
	Efficient use of resources	+	Alexander and Tomalty, 2002
	High capacity of surfaces to absorb rainfall water	-	Tratalos et al., 2007
	Natural habitats preservation	+	Haughey, 2005
	Biodiversity	+	Haughey, 2005
	Quality of ecosystem	-	Tratalos et al., 2007
Socio-economic	Safe living space	+	Cadman and Payne, 1989; Churchman, 1993
	Convenient public transport	+	Masnavi, 2000
	Less traffic congestion and parking problems	-	Evans and Cohen, 1987
	Good walking and cycling environment	+	Bannister and Woodhull, 1992
	More employment opportunities	+	Dave, 2010
	Job-housing balance	+	Alexander and Tomalty ,2002; Mayor of London, 2008; Stenhouse, 1992
	Access to green space	-	Masnavi, 2000; Alexander and Tomalty, 2002
	More public facilities	+	Jenks et al., 1996
	More amenities	+	Jenks et al., 1996
	Diverse housing types	+	NHPAU, 2010
	More affordable housing	+	NHPAU, 2010
	Social equity	-	Churchman, 1999
	Less social segregation and exclusion	+	Burton, 2000b
	Unique characters of places preservation	-	Mullins, 1995; Rapoport, 1977

1 A "+" indicates the relation between the indicator and density could be valued as positive (more sustainable/more livable) and a (-) indicates a negative evaluation.
2 as cited in Boyko and Cooper, 2011.

Table 3-3: The relationship between high density and livability
Source: author

Site analysis - livability

4.1 | Basic information

The choice of location

As the most possible job locations for young graduates, "guannei" agglomerates most of the this group of people. The population density in "guannei" is overall higher than it in "guanwai", especially Futian District and Luohu District, which have the highest population density in Shenzhen (see in Figure 4-1). Besides, data from the sixth national census in Shenzhen showed that the major group of people in "guanwai" is still people with junior high school degree, while in "guannei", young graduates, became the majority (see in Figure 4-2). So "guannei" become the main focus of the thesis.

Zoom in "guannei", the population growth in Futian District and Nanshan District is higher than Luohu district (see in Figure 4-3), even though the population density in Futian District is the highest. The population with bachelor degree in Luohu District is the lowest as well (see in Figure 4-2). As mentioned before, Luohu District is the typical district of areas with low living quality, low price but close to employment locations. Lack of available land, Luohu District became the last choice of young graduatess. Considering these elements, the need of imporving livabiltiy to attract this group of people through urban regeneration in Luohu District is the most urgent in "guannei", so Luohu District is chosen as the main focus of the thesis .

Figure 4-1: Density of population in Shenzhen
Source: Shenzhen Municipal Bureau of Statistics, 2016
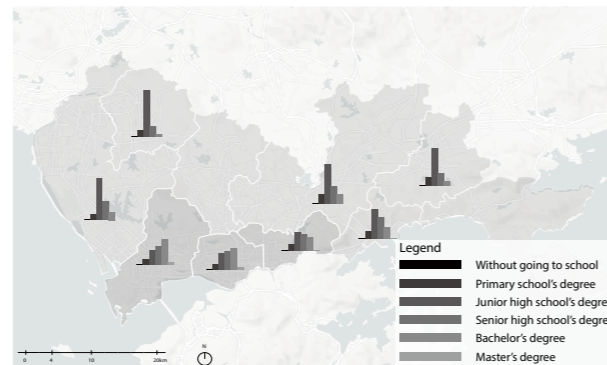
Figure 4-2: Education level of districts in Shenzhen
Source: The sixth national census, 2010

Figure 4-3: Population growth in "guannei"
Source: Shenzhen Municipal Bureau of Statistics, 2016
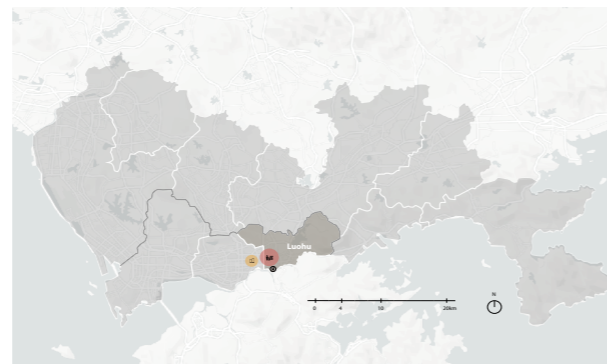
Figure 4-4: Location of Luohu District
Source: author

Basic information of Luohu District

-Population (2015): 0.976 million
         0.573 million registered
         0.403 million non-registered
-Coverage (2015): 78.36 km^2
         33.72 km^2 built up area
         44.64 km^2 non-built up area
-GDP (2016): 197.41 billion yuan (about €25.31 billion)

Located in the south of Shenzhen, Luohu District is one of the earliest developed areas in Shenzhen. As the business and economic center of Shenzhen, Shenzhen Railway Station in located in the south of Luohu District. Besides, the biggest electronic devices wholesale in China- Huaqiangbei, which is partly transforming into maker space, is located in the west of Luohu District and has a big influence on Luohu District due to the job opportunities there (see in Figure 4-4).

With only 43% built up area and setting Hong Kong as the example when built, the density in Luohu District is quite high. Moreover, according to the urban regeneration plan of this district, nearly 1/4 of the built up area in Luohu District needs to be regenerated in the following five years (see in Figure 4-5), and in 2015 Luohu District was put forward as the test land of urban regeneration in Shenzhen. In order to improve the livability and keep the economic and social growth of Luohu District, the government devided this district into ten areas with different industries and goals (see in Figure 4-8). Qingshuihe, Sungang and Caiwuwei would become the high-tech and high-end business and economic areas, Shuibei-Buxin and Liantang would become the main industrial areas, Hubei and Eastern Shennan would become retail and
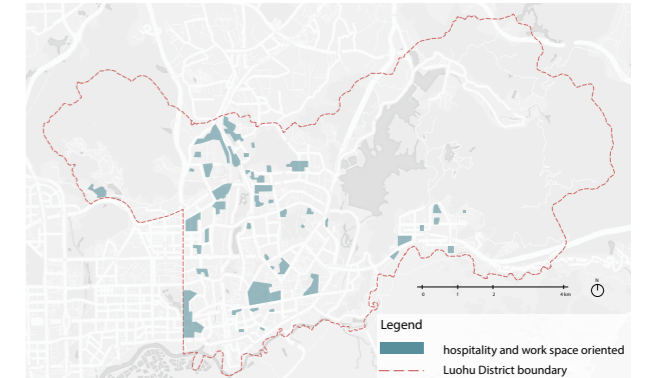

Figure 4-5: Density of population in Shenzhen
Source: Shenzhen Municipal Bureau of Statistics, 2016

Figure 4-6: Luohu District
Source: Luohu, n.d.

Figure 4-7: Image of pilot project "Zhaoshangzhonghuan" in Luuohu District from Luohu government
Source: Luohu, n.d.

business areas, Chahuadi would be transformed into the demonstration area of urban village regeneration and Wutong Mountain and Buji River would become areas for lesiure and nature.

Sungang area as the site of the thesis

There are several industrial plots scattered inside "guannei" besides the vast industry land in "guanwai". These plots are mainly located along major expressway and railways. The one located in Sungang was used to be a regional logitstic center, linked with the railway to Hong Kong. While in recent years, the area has declined to a local warehouses area. Even though lots of warehouses have already been transformed into commercial functions, the housing quality in this area is still very bad. With bad building quality, lower density and more unitary property right, this area would be firstly regenerated in Luohu District through urban planning of the governmen, which means a lot of capital would flood into this area. Besides, as one of the ten areas in Luohu District, the regeneration of Sungang area could largely improve the livability of the area, even of the whole district. This area is quite mixed-use and has nearly all urban fabrics in Shenzhen as well. The urban regeneration of different urban fabrics in the site is possible to be transferred into similar fabrics in other districts. What's more, this area is quite close to the current economic and business center of Shenzhen, making it a possible living place for young graduates. So Sungang area would be the site of the thesis.
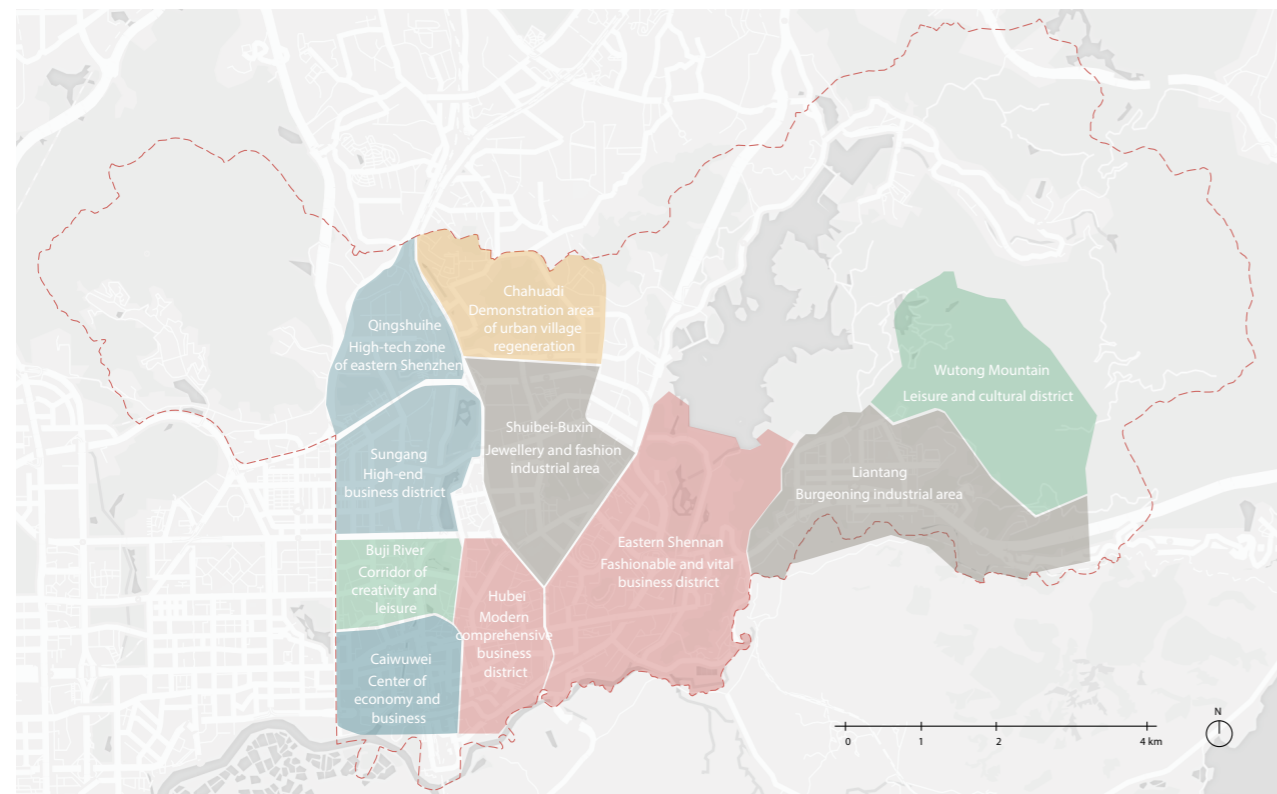
Figure 4-8: Urban regeneration vision of Luohu Government
Source: Bureau of Urban Regeneration in Luohu District, 2015

Basic information of Sungang

-Population（2010）: 60,732
  - 0.72% never go to school
  - 9.46% primary school degree
  - 27.35% junior high school
  - 32.88% senior high school
  - 28.59% bachelor degree
  - 1.00% master degree

-Coverage: 4.03 km^2

Sungang area is located in the west of Luohu District. This area was developed in 1980s with the construction of Shenzhen Railway Station and Shenzhen East Railway Station and it was the earliest and biggest public warehouse area in Shenzhen. Nowadays this area is transformed from storage, transportation and industry into retail, service and demonstration. Keeping the urban fabric of industry, the old industrial buildings are transformed into car, furniture, building material and craftwork markets, which are quite famous in Shenzhen and even in Guangdong Province. In space, Sungang area is surrounded by business and economic area, industrial and storage area, retail area and large green area (see in FIgure 4-9). It is bordered with main infrastructures on 4 sides. To zoom in, the livability would be further analyzed according to the indicators mentioned above and it would be analyzed through district scale and local scale.
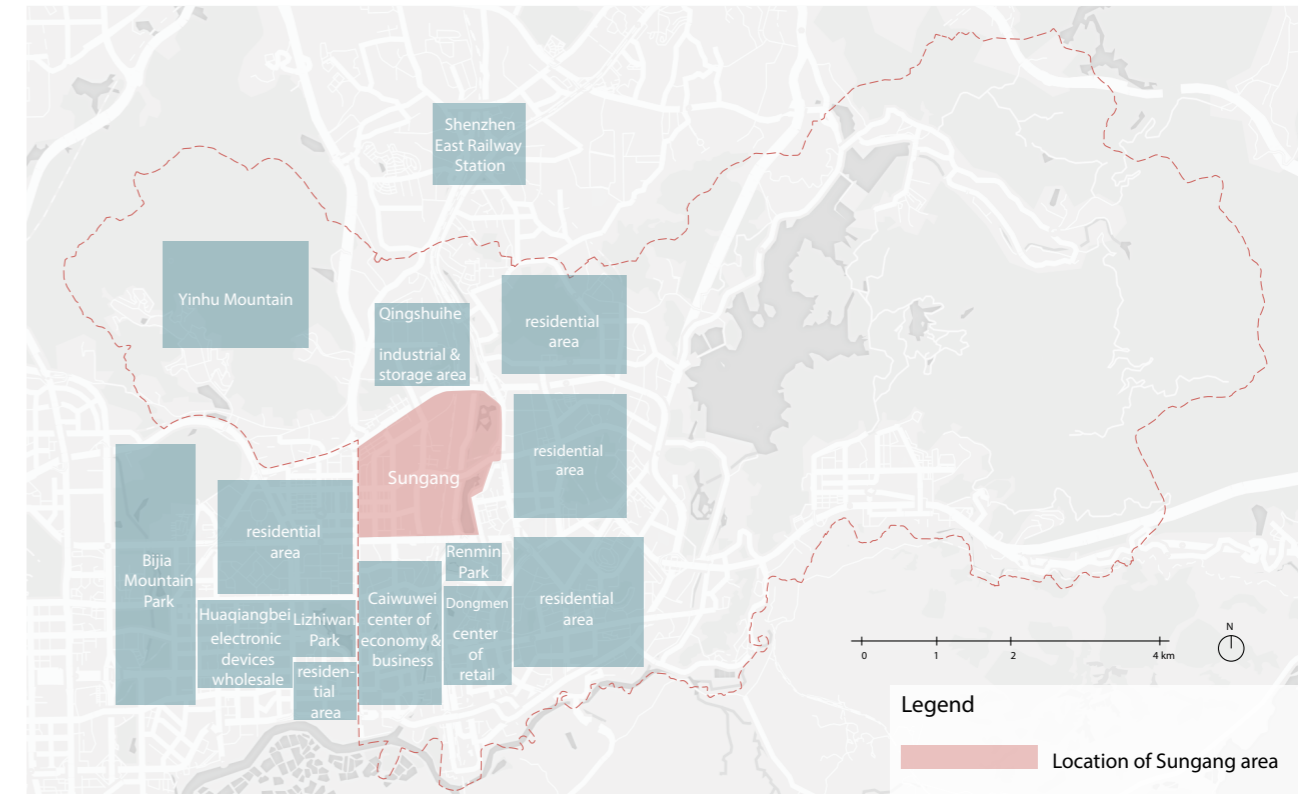

Figure 4-9: Location of Sungang
*Source: author*

4.2 | Safety

4.2.1 | District scale

Safety, as the basic demand of Maslow's hierarchy of needs, is the first element to attract people. According to the weibo(similar with twitter) from Shenzhen Police, Luohu is generally very safe. This weibo divided the safety indicator into crime, transportation and firefight and made a conclusion (see in Table 4-1 and Figure 4-10). The outcome showed that the degree of safety is highly linked with the function of places.

Figure 4-11 shows the function of places in Luohu District according to the mapping of Urban Planning, Land& Resources Commission of Shenzhen Municipality. There are several existing functional centers in Luohu district, which are Renminan-Caiwuwei-Dongmen, the commercial and retail center, Sungang-Qingshuihe, the logistic and warehouse center, and Shuibei-Tianbei, the jewellery trading and residential center. Even though Huaqiangbei is not located in Luohu District, it still has a strong relationship with Luohu considering the very close distance. These centers accumulate most of economic activities and are the most possible job locations in Luohu District.
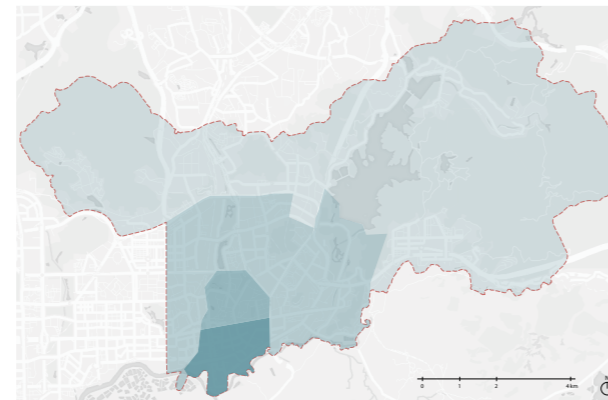
Safety indicator- Crime
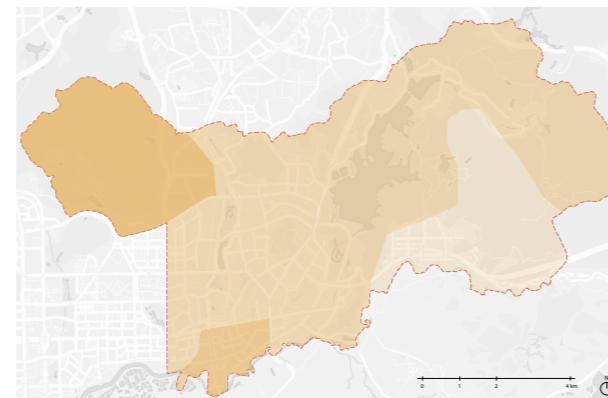
Safety indicator- Transport
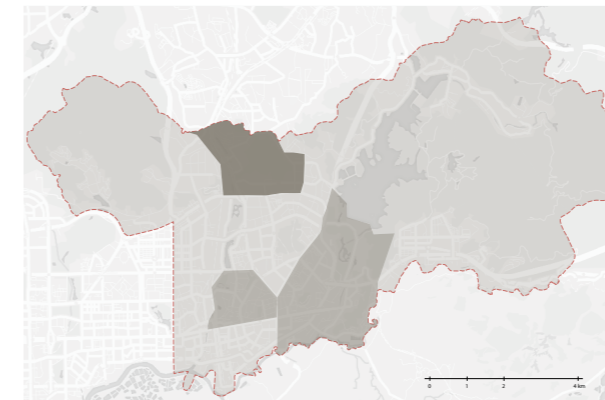
Safety indicator- Firefighting
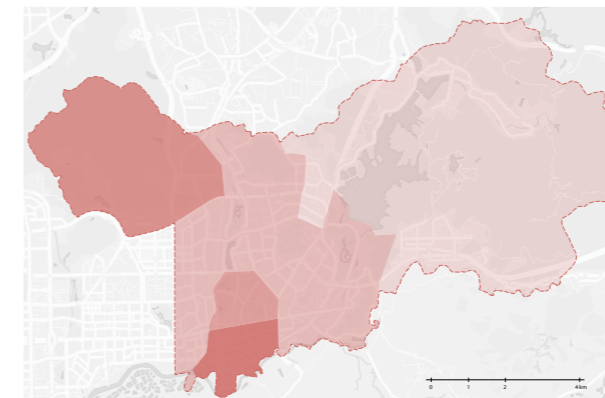
Safety indicator- Conclusion

Legend

safe ▭▭▭▭ not safe

Figure 4-10: spatial implication of Shenzhen public afety indicator
Source: weibo of Shenzhen Police, 2017

Different function centrality can accumulate flows of people, goods and capitals and lead to different spatial qualities. When it comes to crime, Renminnan-Caiwuwei-Dongmen area is the most unsafe due to the its commercial and retail centrality. The large and quick flow of personnel makes it easier for crime to happen. Qingshuihe area is very unsafe in relation to transportation since it is the warehouse and logistic center. The most unsafe places in sie related to firefighting are mainly in residential areas that locate a lot of urban villages. The distance between buildings are very small in urban village, which makes the possibility of catching fire very high.

The conclusion from weibo showed that in Luohu District, Renminnan-Caiwuwei-Dongmen and Qingshuihe area are not so safe due to the large people and car flow. Sungang area is relatively safe.

From the above data, it can be concluded that density and function plays a very important role in relation to safety. Renminnan-Caiwuwei-Dongmei center, which has the highest center and mainly for working and retail, is relatively not safe when it comes to crime, since the huge flow of people and car brings a larger possibility of theft and car accident. Areas that are less dense mainly used as warehouse are easily to catch fire and commit crimes. So density and function are closely linked with safety.

Shenzhen public safety indicator

Area	Crime	Transport	Firefighting	Conclusion
Nanhu	83	93	95	86
Dongmen	91	95	94	92
Guiyuan	93	95	95	94
Huangbei	93	94	95	93
Cuizhu	94	94	89	93
Sungang	94	94	95	94
Donghu	94	94	95	94
Liantang	94	94	95	94
Dongxiao	95	94	89	94
Qingshuihe	87	94	95	89

Table 4-1: Shenzhen public safety indicator
Source: weibo of Shenzhen Police, 2017

Legend

▨ commerical housing		▨ factory & warehouse	
▨ working space		▨ urban village	
▨ retail		▨ danwei housing	
▨ school		▨ station	
- - - boundary			

Figure 4-11: Function of different areas in Luohu District
Source: author

4.2 | Safety

4.2.2| Site scale

The level of safety in site scale is mainly concluded from the interview with local residents (see in Figure 4-12), and the outcome also has a strong connection with density and function (see in Figure 4-15).

During the interview, most of the interviewers have bad impressions upon areas that are segeregated by railway tracks in the east. The warehouse area in the northeast are areas people feel most unsafe in the site since seldom people would go there, especially in the evening. Areas in the northwest are also unsafe because these areas are still under construction. While areas in the southwest are places mainly for car and furniture retail, where would be energetic during the day but seldom people in the evening, so some interviewers think it is safe during the day but unsafe in the evening. Other residential areas, since a lot of "street eyes" in these areas during the day and night, are quite safe.

Figure 4-13: Photo of street in Sungang Custom Living area
Source: author

Figure 4-14: Photo of street in Sungang Village
Source: author

Figure 4-12: Level of safety in Sungang
Source: author
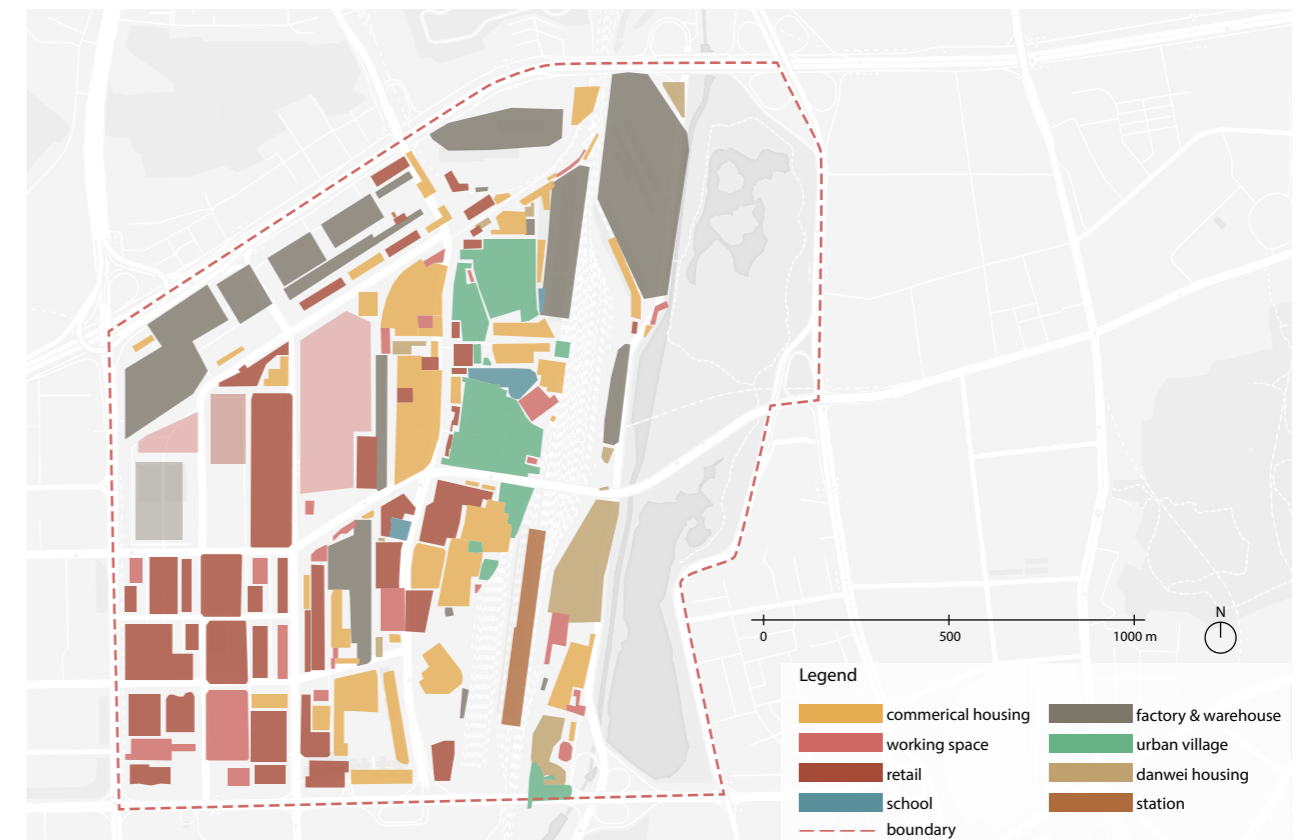
Figure 4-15: Function of different areas in Sungang
Source: author

4.3 | More employment opportunities

4.3.1| District scale

Employment opportunities are highly related to the functions in these places, and centrality is one of the key influential features of the context. In Luohu District, jobs are mainly agglomerated in the centers mentioned above (see in Figure 4-16). For young graduates, Renminnan-Caiwuwei area, which is the financial and economic center of Shenzhen, and Huaqiangbei area, where is partly transforming into maker space, would be the employment locations. Areas like Sungang and Dongmen, since the main function is retail, are probable places for them to spend their money rather than get a job.

4.3 | More employment opportunities

4.3.2| Site scale

Jobs in the site scale are also agglomerated in the west of the site (See in Figure 4-17). Nowadays jobs in the site are mainly for car and furniture retail, especially low-end value commodities. Except for retail, some interrelated jobs like auto repair, hardware retail, auto cleaning also exist ubiquitously in the site even inside the residential areas because people with only senior high school degree are the majority in the site. These jobs may not attract young graduates, which means the need of industrial upgrading in the site.

While with the urban regeneration planning of the government, several projects related to economic and logistic are already under construction in the middle and northwest of the site, which may become the employment opportunities for young graduates.
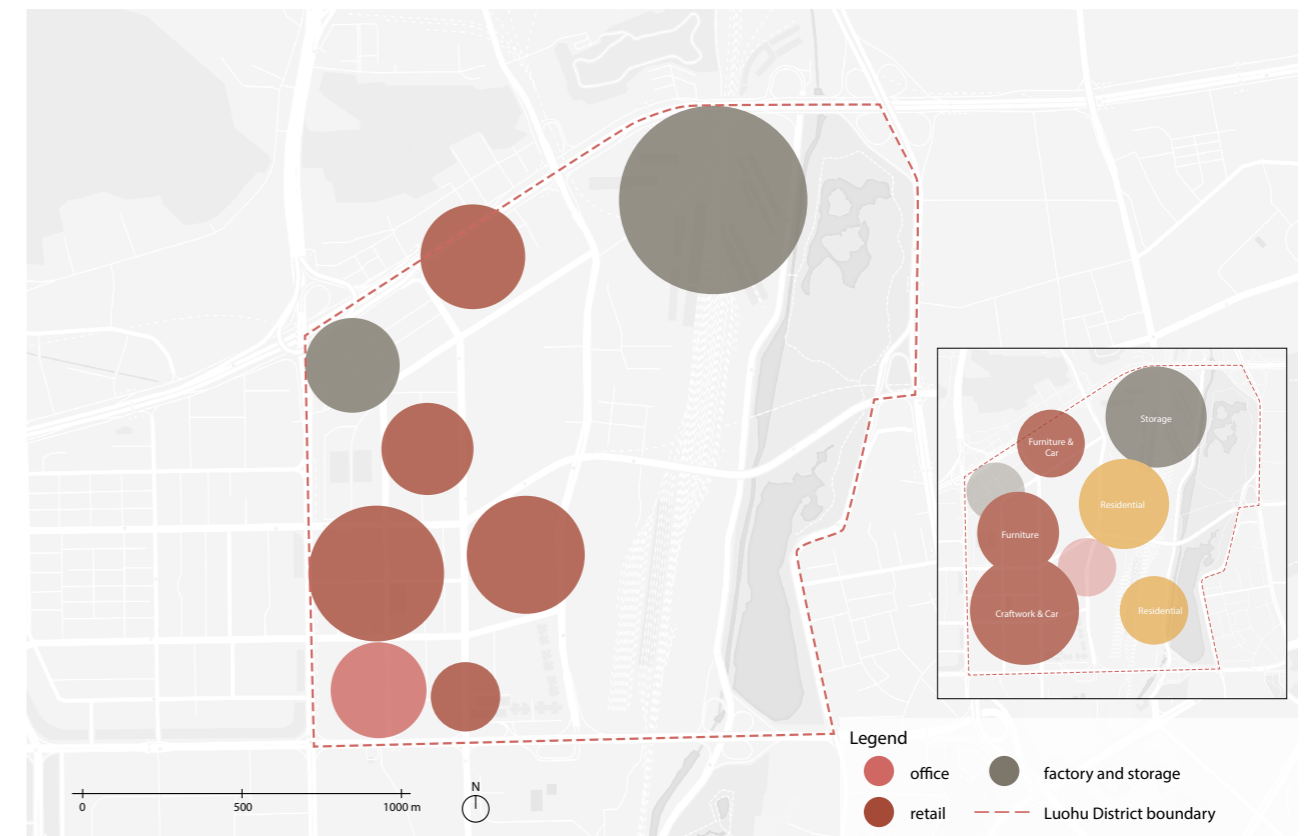

Figure 4-16: Job opportunities in Luohu District
Source: author

Figure 4-17: Job opportunities in Sungang
Source: author

4.4 | More affordable housing

4.4.1| District scale

Housing price in Luohu District, which is mentioned before, is relatively low in "guannei". According to one of the biggest real estate agencies, the housing price in Luohu District varies between 38,000 yuan/m^2 and 66,000 yuan/m^2. The housing price in Qingshuihe area is the lowest, since the heavy logistics and poor building quality. One of the biggest urban villages in Luohu District is also located in this area. The price in Renminnan area is quite low as well because this area was developed at the very beginning of the development of Shenzhen. The housing quality in the area is relatively poor and the density is relatively high, which makes this area not livable. On the other hand, housing price near nature, including parks and natural

mountains, and the economic and business center is quite high, which are all over 55,000 yuan/m^2. Houses near Cuizhu Park and Shenzhen Reservoir is the most expensive in Luohu District, and houses near Yinhu Mountain, Honghu Park and Caiwuwei are higher as well. The good environment and location make the housing price higher spontaneously. While, compared with other areas in Luohu District, the housing price in Sungang area is not so high, which is around 44,000 yuan/m^2. This area is one of the typical areas that the housing price is affordable, but the housing quality and living environment is bad. This is quite common in "guannei", which needs to be improved urgently.

Legend

low ———— high

- - - Luohu District boundary
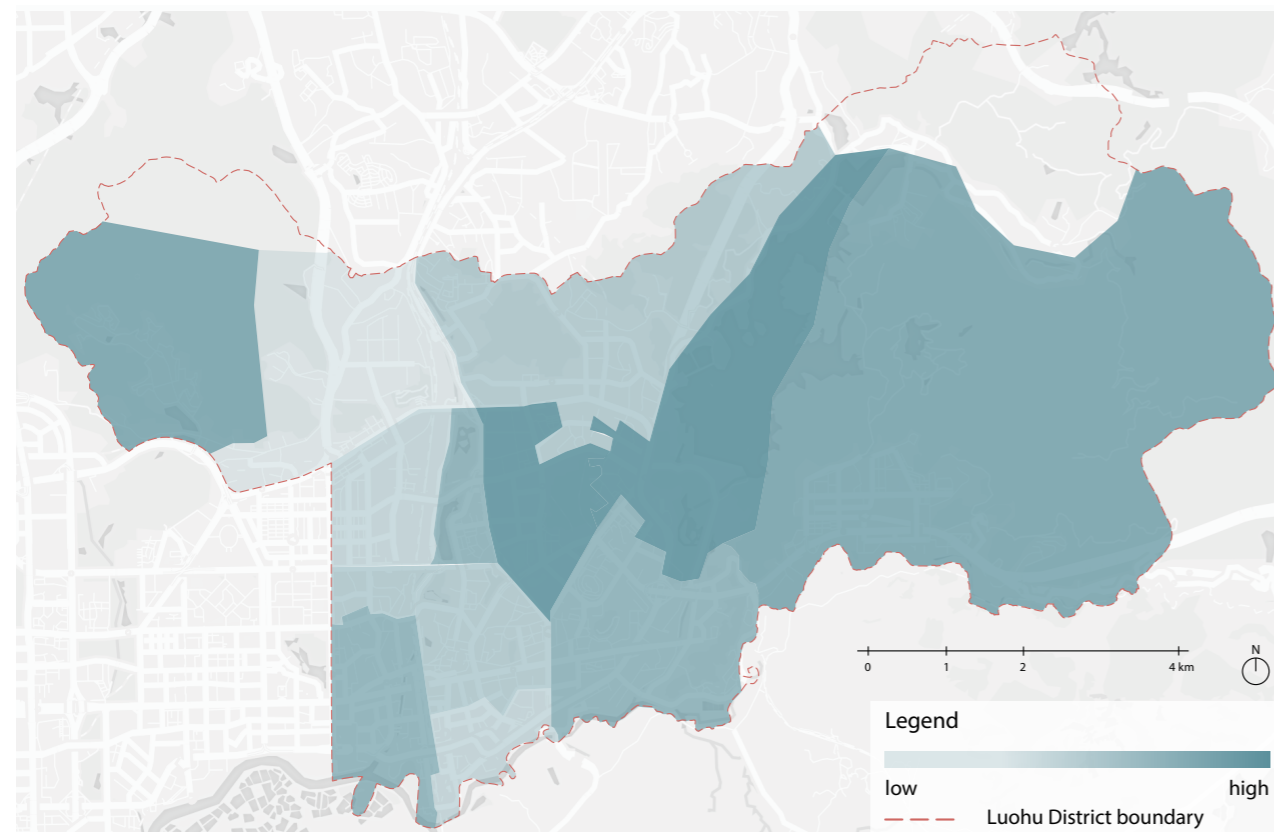
Figure 4-18: Housing price in Luohu District
Source: http://esf.sz.fang.com/map-a086/

4.4 | More affordable housing

4.4.2| Site scale

Residential areas are mianly in the middle of the site. Housing price in the site is highly linked with the housing quality and housing type. In general, housing quality in the site is not very good (see in Figure 4-19). With seldom good quality housing, the housing price is lower naturally. The housing types in site are diverse. There exists danwei housing, urban village and commercial housing in the site (see in Figure 4-19). Urban village are mainly in the northeast, which are Tianxin Village and Sungang Village. Danwei housing are mainly located in areas that are close to the railway tracks, which are mainly for Sungang Customs. Even though there are also commercial housing in the site, while most of them were built in 1980s and are in bad quality nowadays.

The report from the real estate agency showed that the highest price in the site, which is over 60,000 yuan/m^2, located all in the south, where the housing quality is better and the housing types are all commercial housing. Areas in the north and middle where housing quality is better and housing types are commercial housing, are more expensive as well. The housing price in these areas are between 40,000 yuan/m^2 to 60,000 yuan/m^2. The rest areas are mainly less than 40,000 yuan/m^2 and housing types are mainly urban village and danwei housing, most of which are in bad quality.
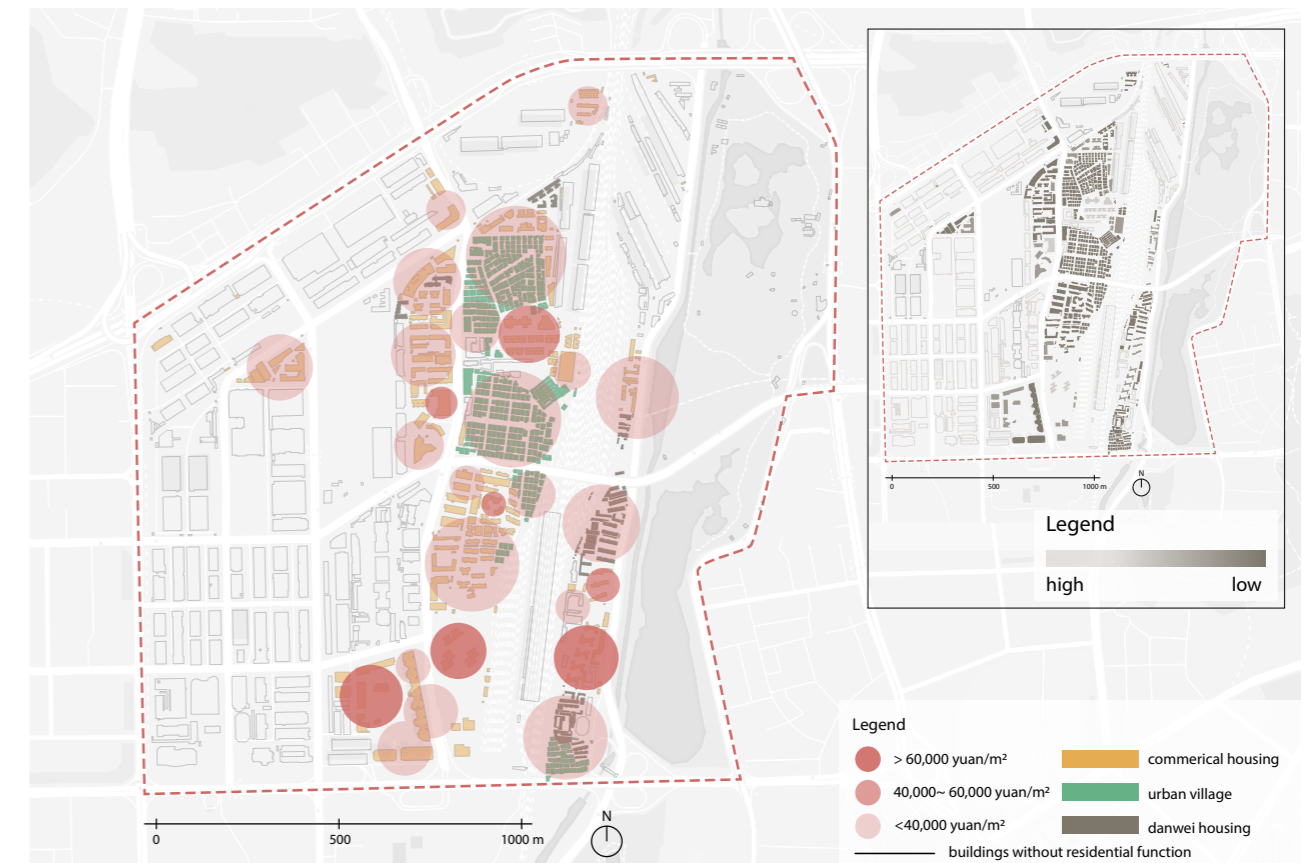

Legend

high ———— low

Legend

- ● > 60,000 yuan/m²
- ● 40,000~ 60,000 yuan/m²
- ● <40,000 yuan/m²

- commerical housing
- urban village
- danwei housing
- buildings without residential function

Figure 4-19: Housing price in Sungang
Source: http://esf.sz.fang.com/map-a086/

4.5 | Convenient public transport

4.5.1| District scale

Public transportation in district scale is mainly focus on metro, since this is the most convenient and cheapest way to travel for not only young graduates, but also all citizens in Shenzhen. In Luohu District, there are several metro stations are listed in the top 10 crowded metro station, which are pointed out in Figure 4-20 in red. According to the analysis of serivce area from Arcgis, the metro service area is mainly in the west part of the district because there is no metro line in Liantang area in the current situation. Generally speaking, most of the areas in the district are within 1,500 meters service area of metro, which means people could get to a close metro station within 1,500 meters in most cases. The south centrality of Caiwuwei-Renminnan-

Dongmen has the best metro connection in the district, which is also place where most of employment opportunities located for high-educated young migrants. While Qingshuihe area, which is the current warehouse area, has the lowest metro service level.

4.5 | Convenient public transport

4.5.2| Site scale

Public transportation in site scale includes metro and bus. In relation to metro, there are four metro stations in site, which is Hongling North, Yuanling, Sungang and Honghu. Most area in the site are in the 1,000 service area. While the residential area, which should have the best metro connection, is located within 500-1,000 meters service area. Besides, most of retail areas in eastsouth are also located within 500-1,000 meters service area.

Figure 4-22: Sungang Metro Station
Source: Baidu Map, 2016

Figure 4-20: Metro service area in Luohu District
Source: author
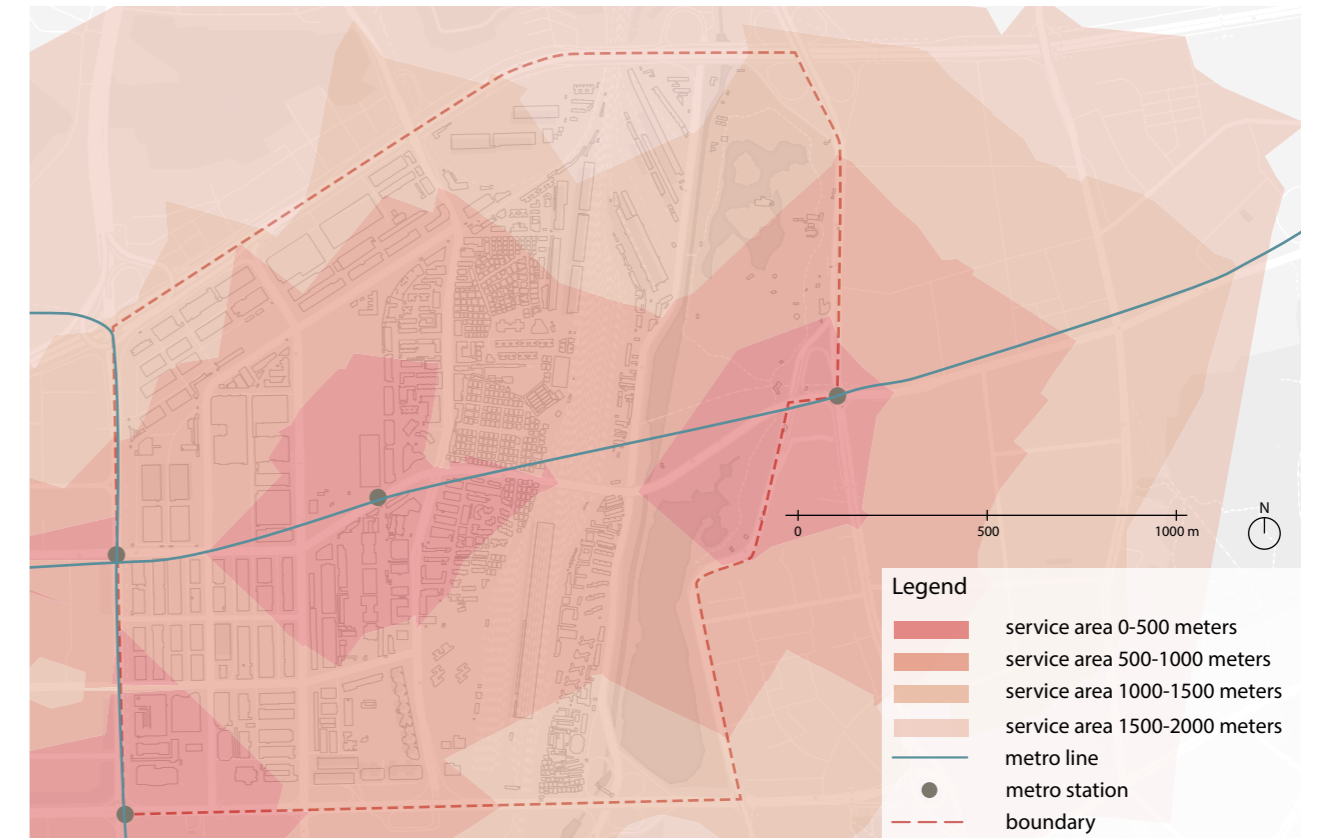
Figure 4-21: Metro service area in Sungang
Source: author

4.5 | Convenient public transport

4.5.2| Site scale

Bus is a way to replenish the public transport. Bus stations in the site is mainly in the east part of the site, where the retail is located, especially on the Sungang East Road. Compared with other areas, the amount of bus station in residential areas are relatively lower.

The distribution of the metro station and bus station shows that people could easeily get to the retail areas by both metro and bus, and bus is even easier than metro. While for people getting to the residential areas, metro would be the most possible choice. While the metro station is a little bit far away from residential areas, which could be improved.

Figure 4-24: Hongling North Metro Station and Bus Station
Source: Baidu Map, 2016
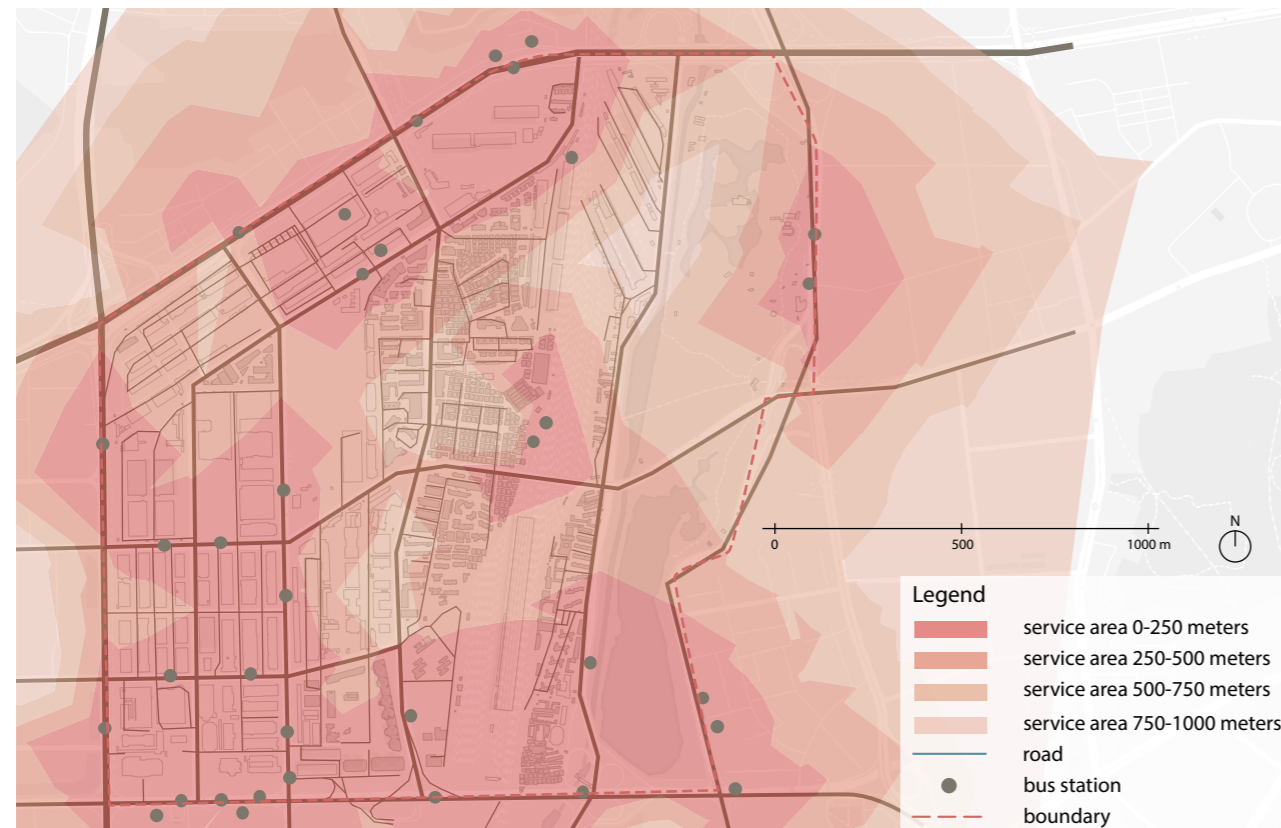
Figure 4-23: Bus servie area in Sungang
Source: author

4.6 | Less traffic congestion and parking problems

4.6.1| District scale

Luohu District consists of 3 regional roads that connects Futian District, Longgang District and Yantian District. Besides, 6 metro lines travel through this district (see in Figure 4-25). According to AMap (similar with Google Map), the main traffic congestion in Luohu District is the regional road which not only connects Futian District, but also a main corridor connecting to Longhua District and Longgang district (see in Figure 4-27). On workdays, the regional roads are nearly all in very heavy congestion, especially in rush hours. While Caiwuwei-Renminnan- Dongmen centrality is always in a traffic congestion during workdays no matter if it is in rush hours due to its high accessibility in local scale (see in Figure 4-26). On weekends,

Caiuwei- Renminnan- Dongmen area is still very crowded, especially in the afternoon and in the evening. This area agglomerated a large amount of retail, entertainment, restaurants, which is very active on weekends. In district scale, the traffic in Sungang area is good in a whole.
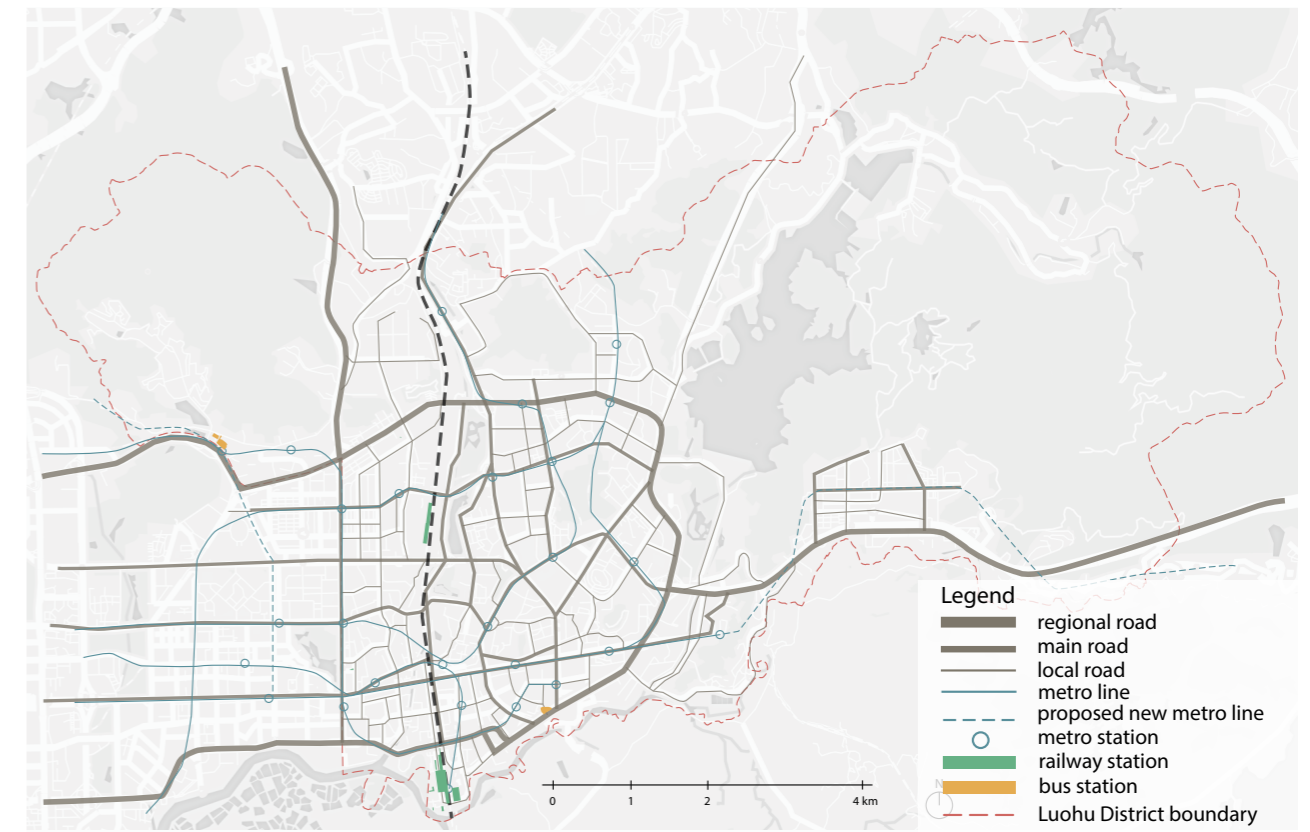

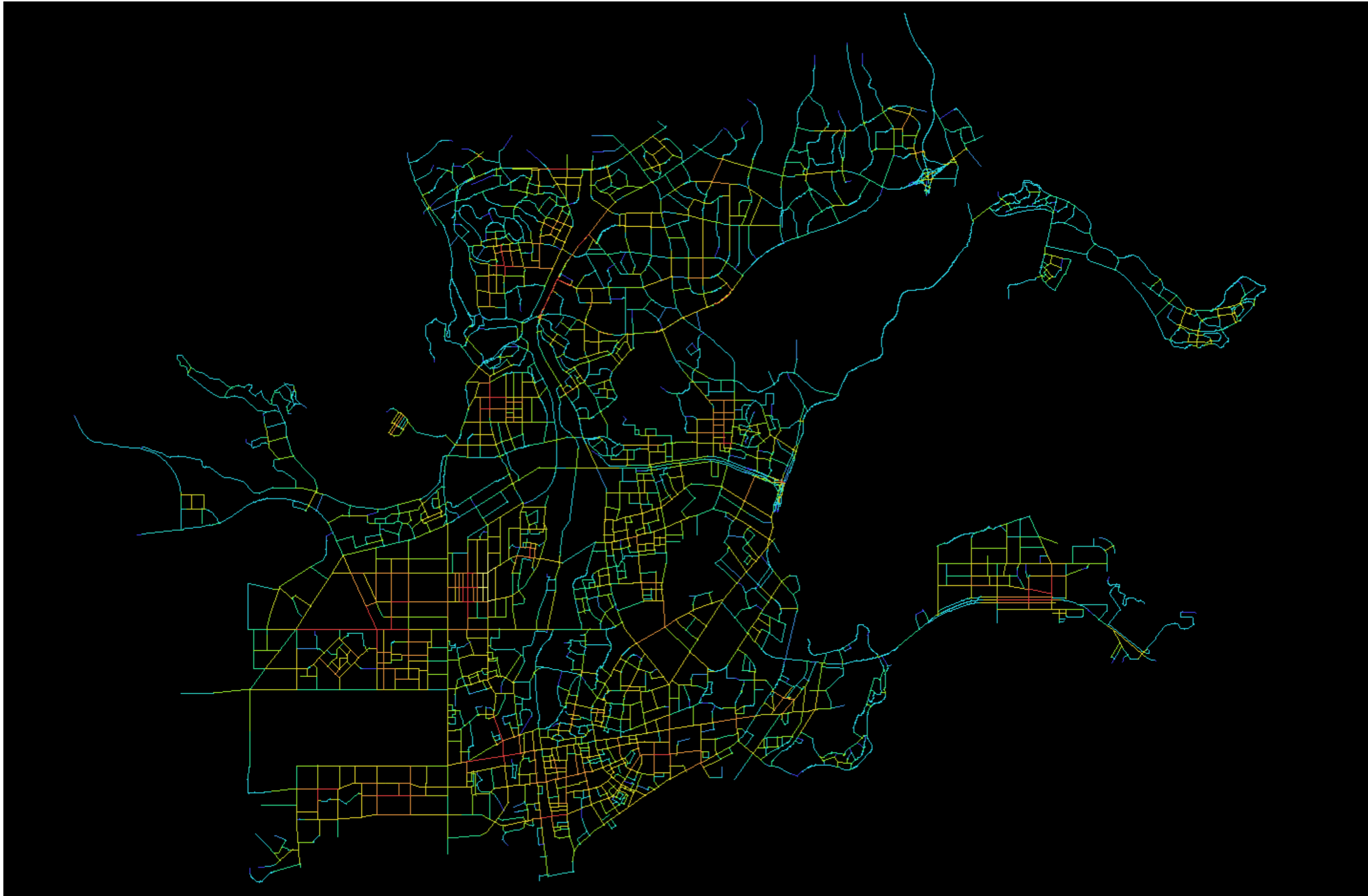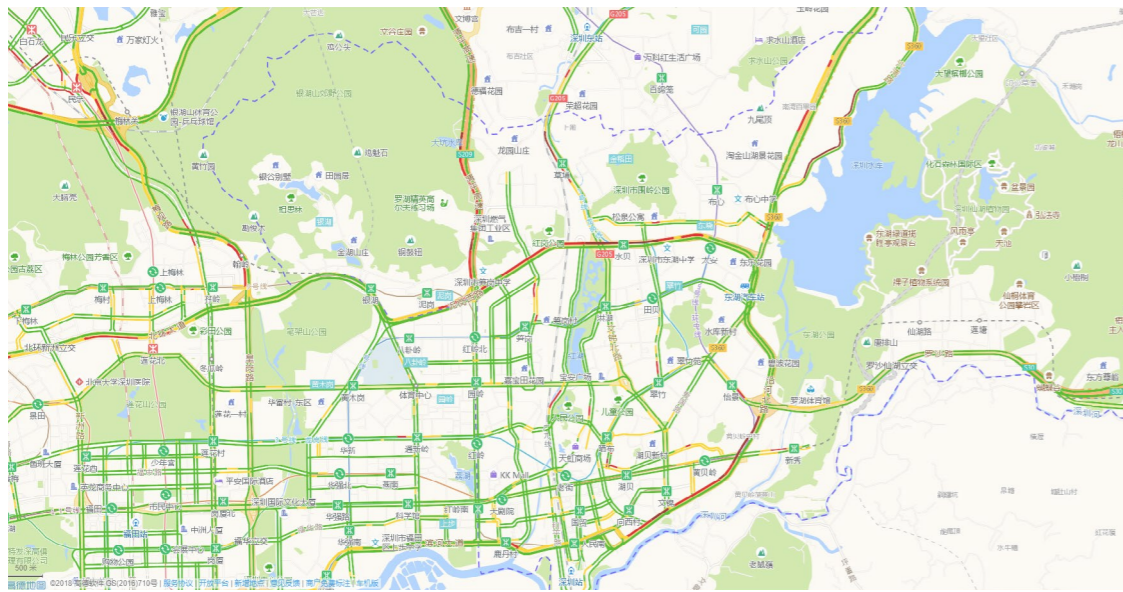*Figure 4-25: Infrastructure in Luohu District*
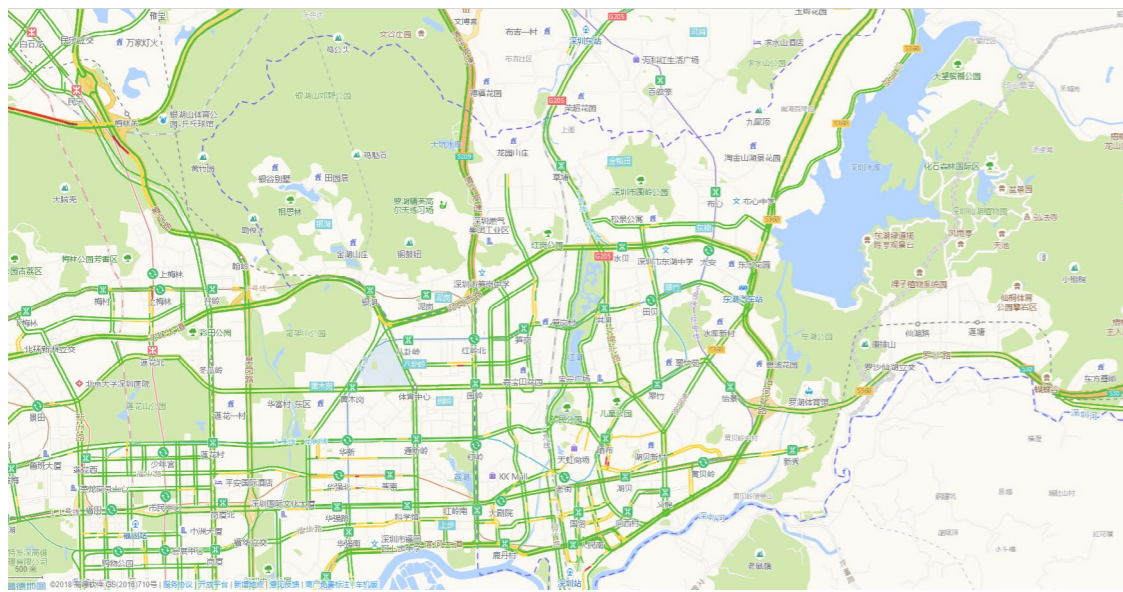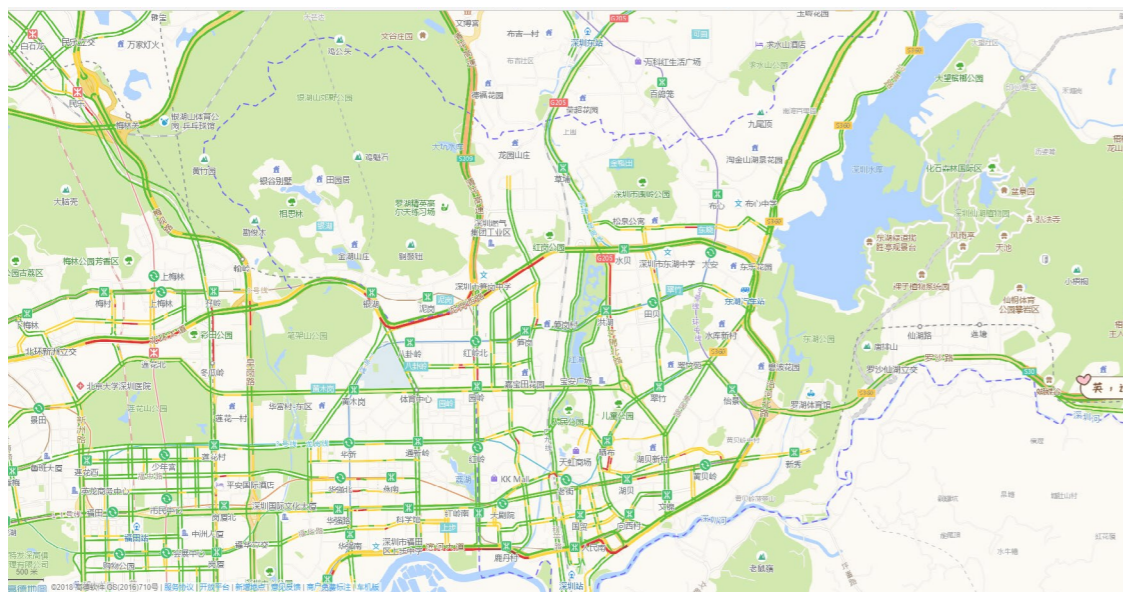*Source: author*

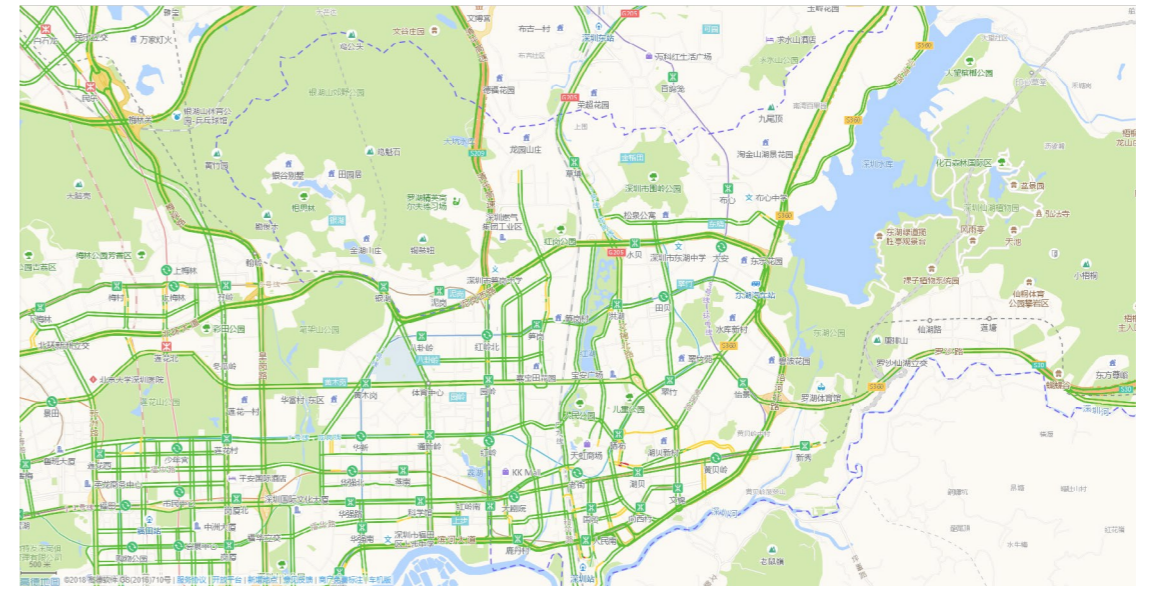*Figure 4-26: Space syntax of Luohu District in local scale (n=5)*
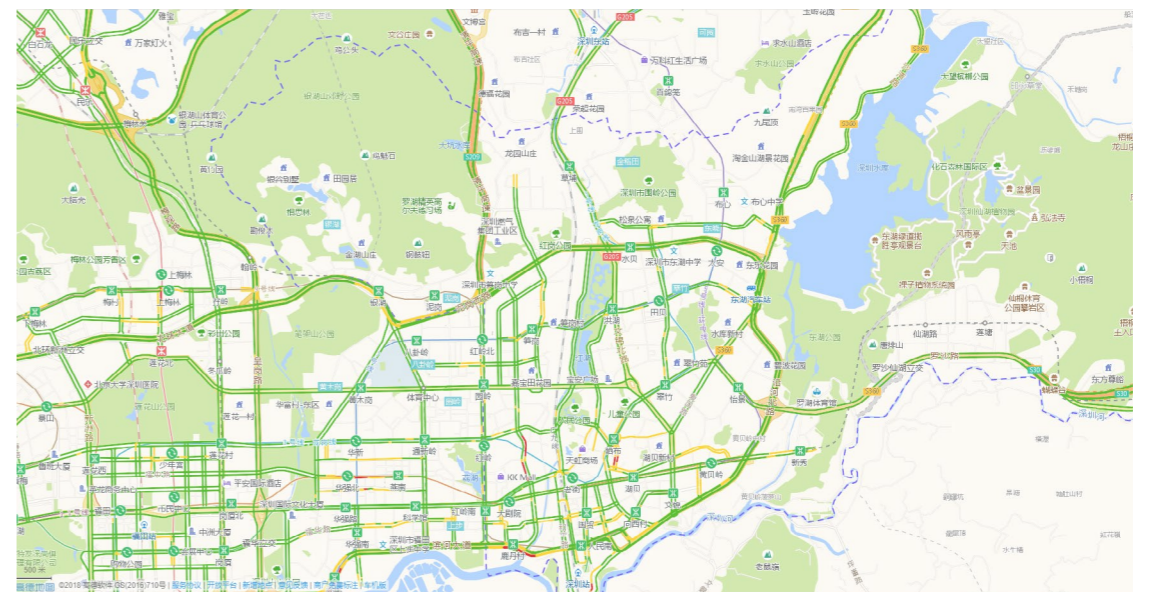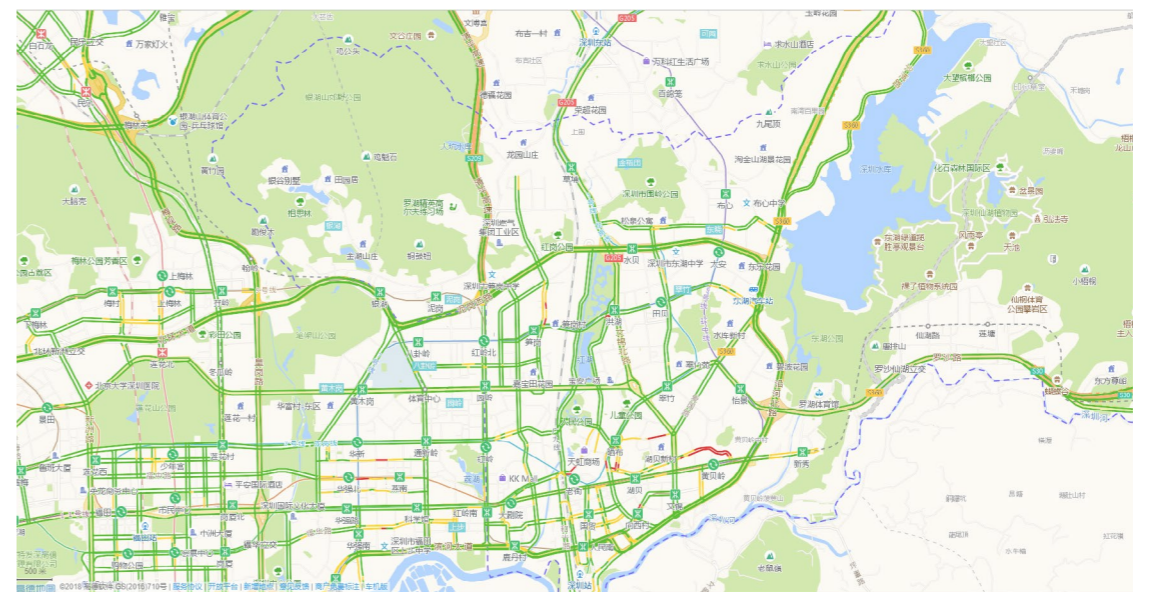*Source: author*

Workday 08:00

Weekend 08:00

Workday 14:00

Weekend 14:00

Workday 19:00

Weekend 20:00

Figure 4-27: Traffic congestion in Luohu District during workdays and weekends
Source: Amap, 2017

6.6 | Less traffic congestion and parking problems

6.6.2| Site scale

In district scale, local accessibility on regional roads and the retail area is very high, which leads to the traffic congestion. Traffic congestion in the site mainly happenes on regional roads and roads in the retail area (see ini FIgure 4-31). Besides, the Baogang Road, as the only main connection from the north to south in regional areas, accessibility is also very high and would be very crowded especially during rush hours. On weekends, the traffic condition in regional roads is better, but on Baogang road is the worst. Local people usually choose this road to get to Caiwuwei- Renminnan-Dongmen area for entertainment on weekends. While on the other hand, accessibility in the warehouse area and areas near the Honghu Park is very bad, so the connection of these areas needs to be improved.

Figure 4-28: Space syntax of Sungang in local scale (n=5)
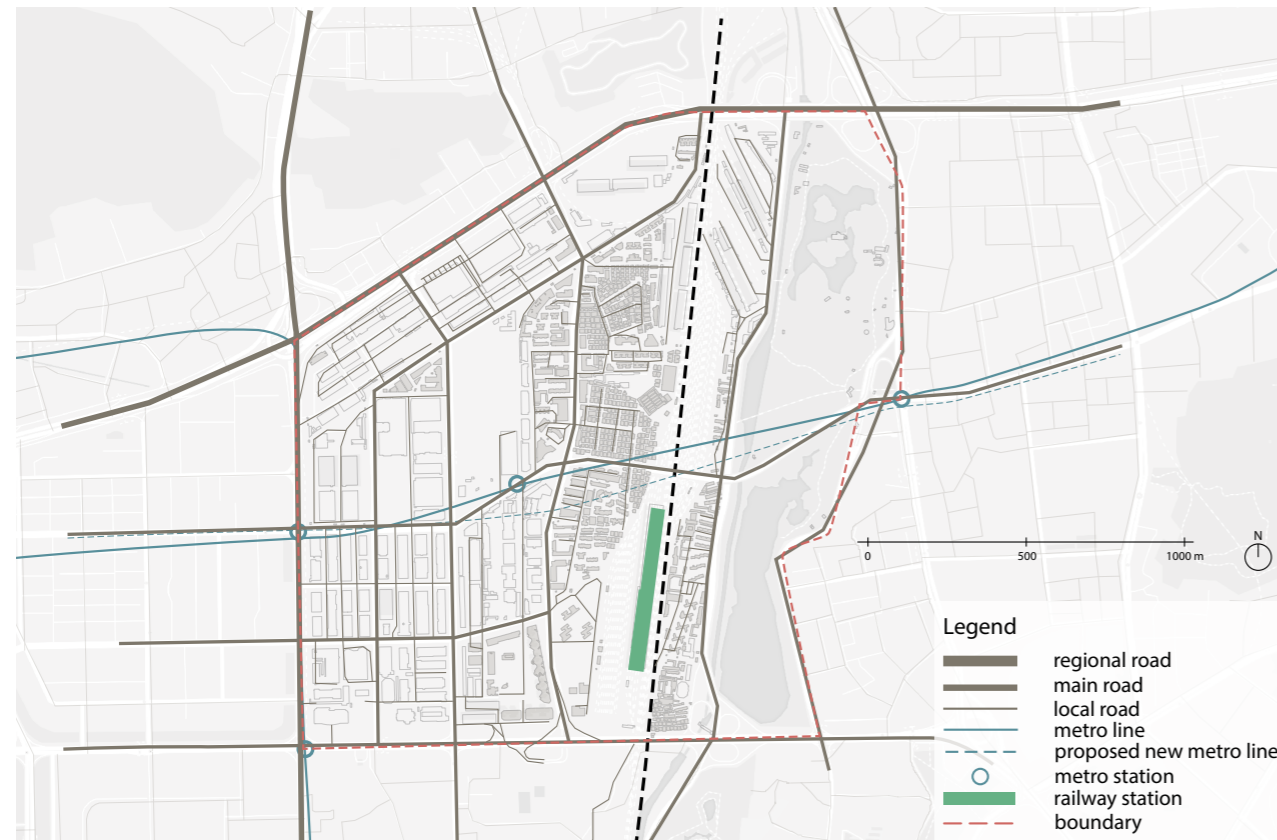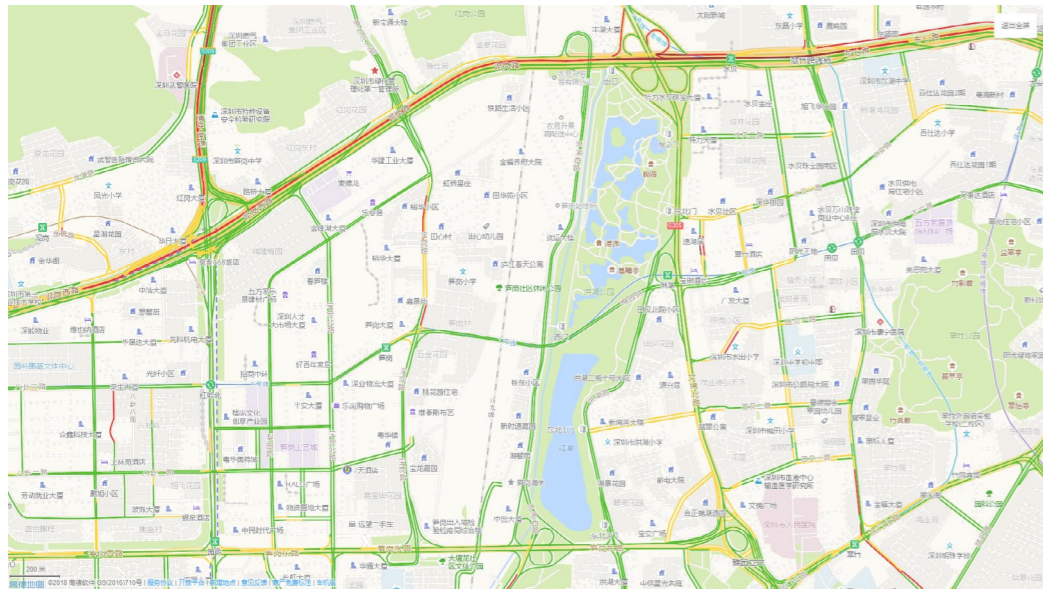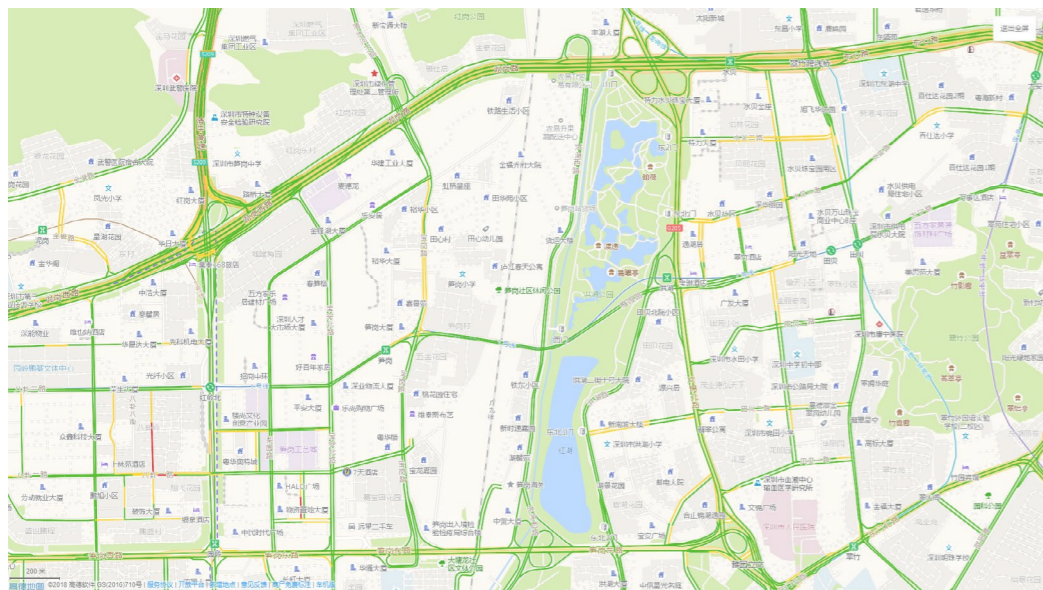*Source: author*

Legend

▬▬	regional road
▬▬	main road
──	local road
──	metro line
- - -	proposed new metro line
○	metro station
▬	railway station
- - -	boundary

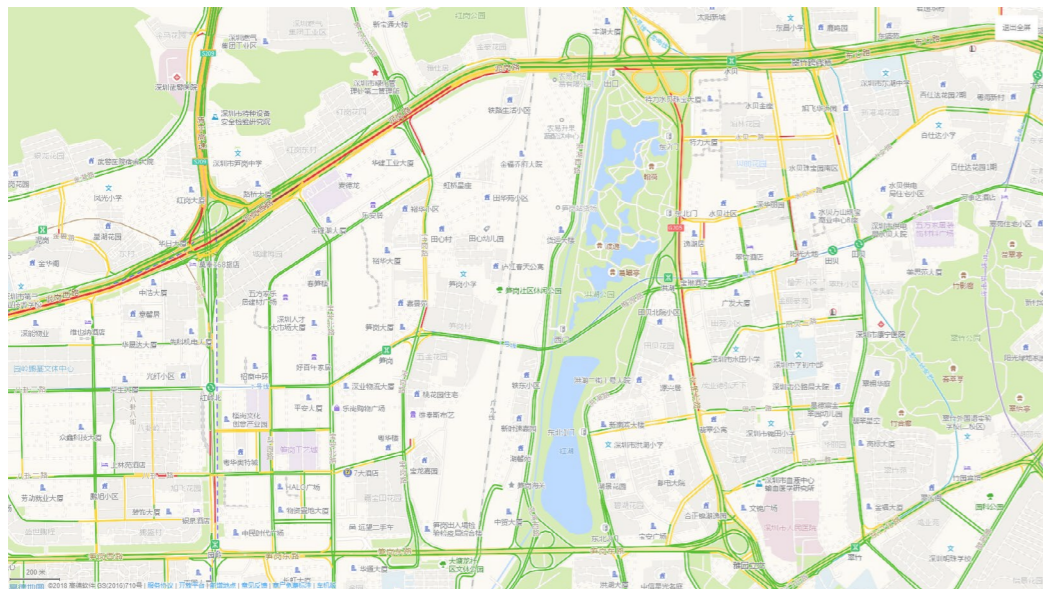*Figure 4-29: Infrastructure in Sungang*
Source: author

Figure 4-30: Traffic condition in Sungang Road
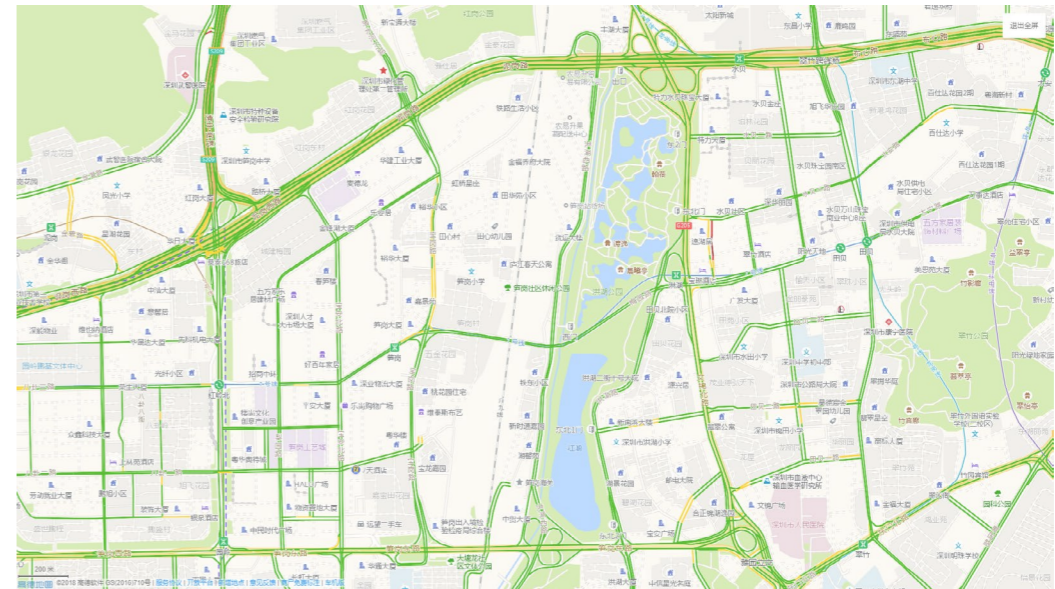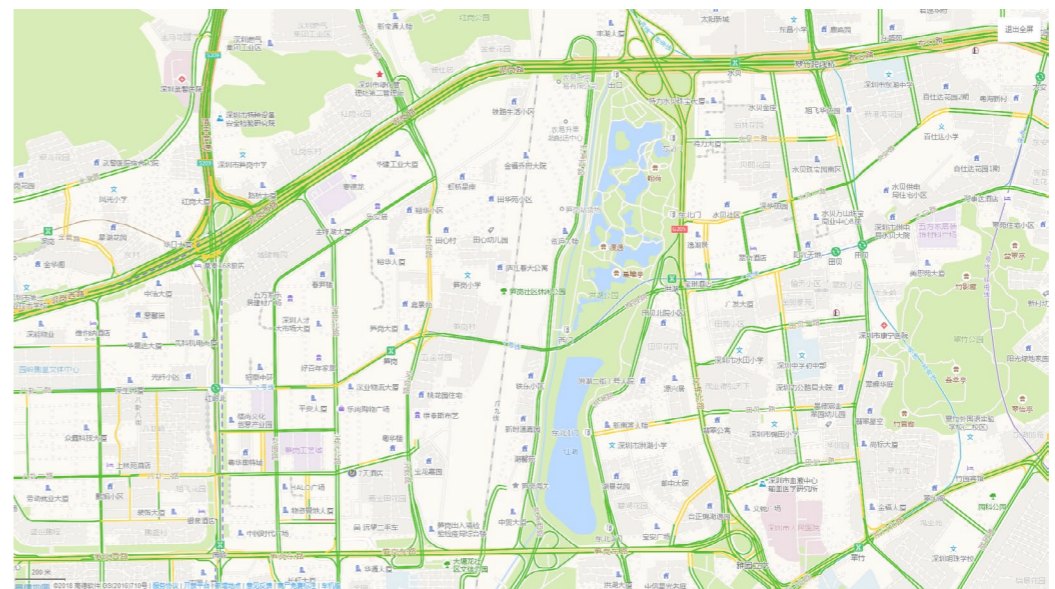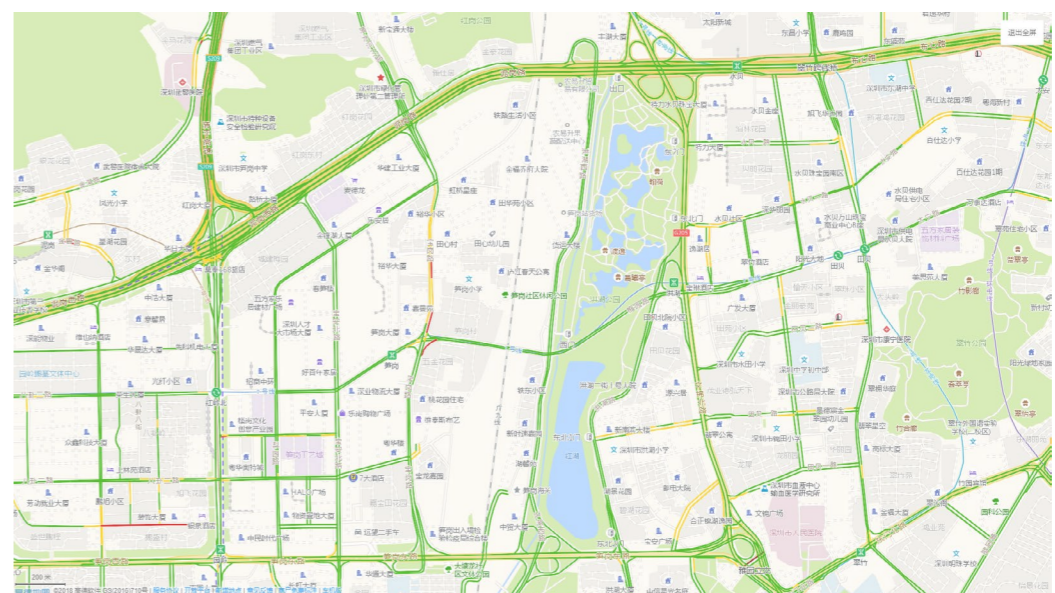*Source: Shenzhen Evening News, 2014*

Workday 08:00

Weekend 08:00

Workday 14:00

Weekend 14:00

Workday 19:00

Weekend 20:00

Figure 4-31: Traffic congestion in Sungang during workdays and weekends
Source: Amap, 2017

4.7 | Good walking and cycling environment

4.7.1 | Site scale

The cycling environment in Shenzhen is very bad since there is no specific lane for cycling. Cyclists have to struggle either in the rush of cars or among the huge amount of pedestrian, which also makes the walking environment unsafe and crowded.

The walking environment in the site could be devided into 12 types (see in Figure 4-32). From the sections, most of streets in the site are quite active. The majority of streets are dominated by commerce, and commerce is spread in different streets. Moreover, from the distribution of these sections, most of the main streets around the retail area have large space and high active level in the same time. Streets around and in the urban village, which are mainly commercial and market streets, have high active but small space. Streets near the storage area in the northeast and less active retail area has large space but low active level. The other streets insides the building clusters and warehouse areas have small space and low active level (see in Figure 4-33).

residential area

commerce

Figure 4-32: Section of streets
Source: author

pedestrian

pedestrian-oriented
street is lacking

commerce is spread
in different streets
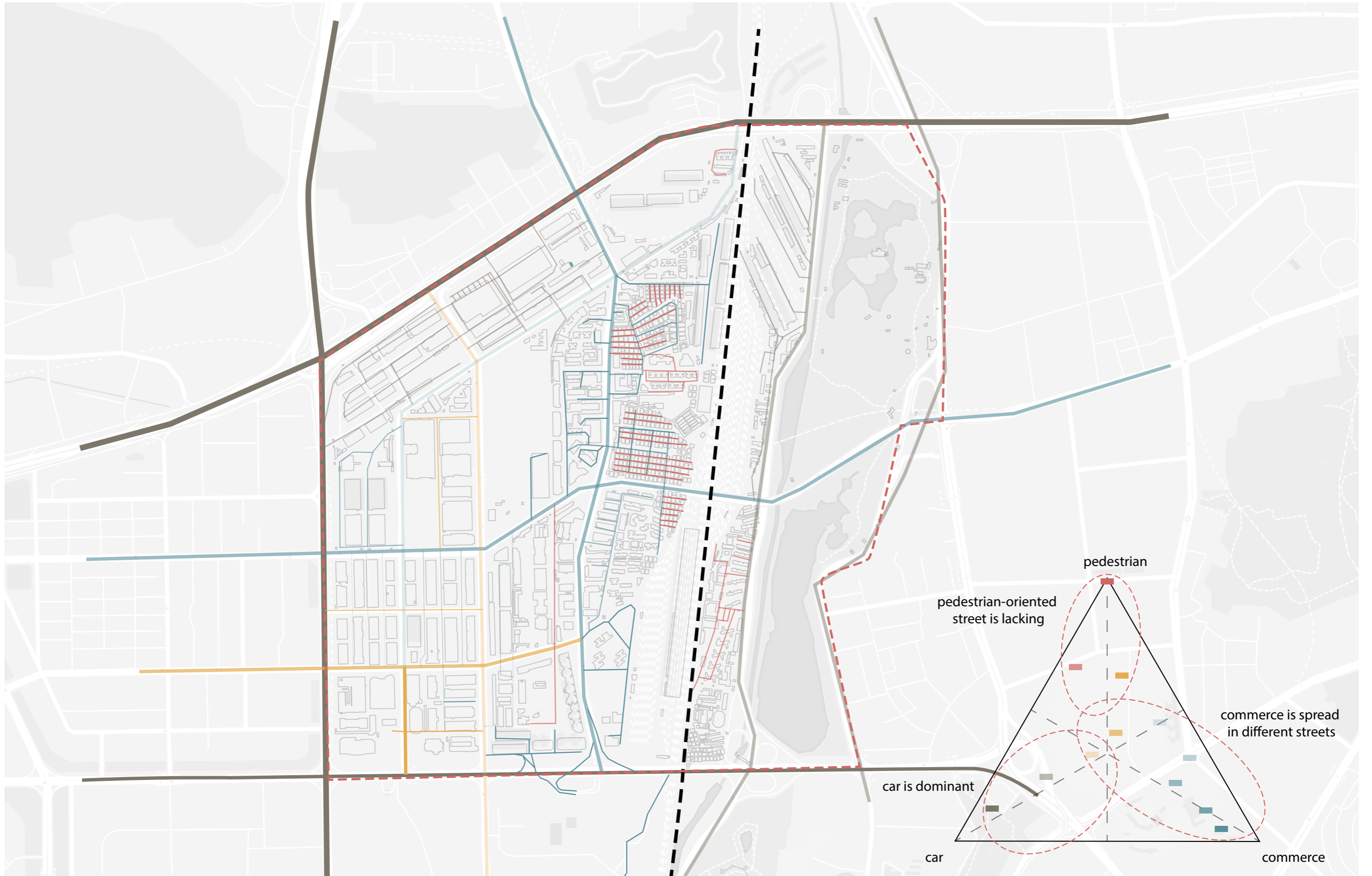
car is dominant

car

commerce

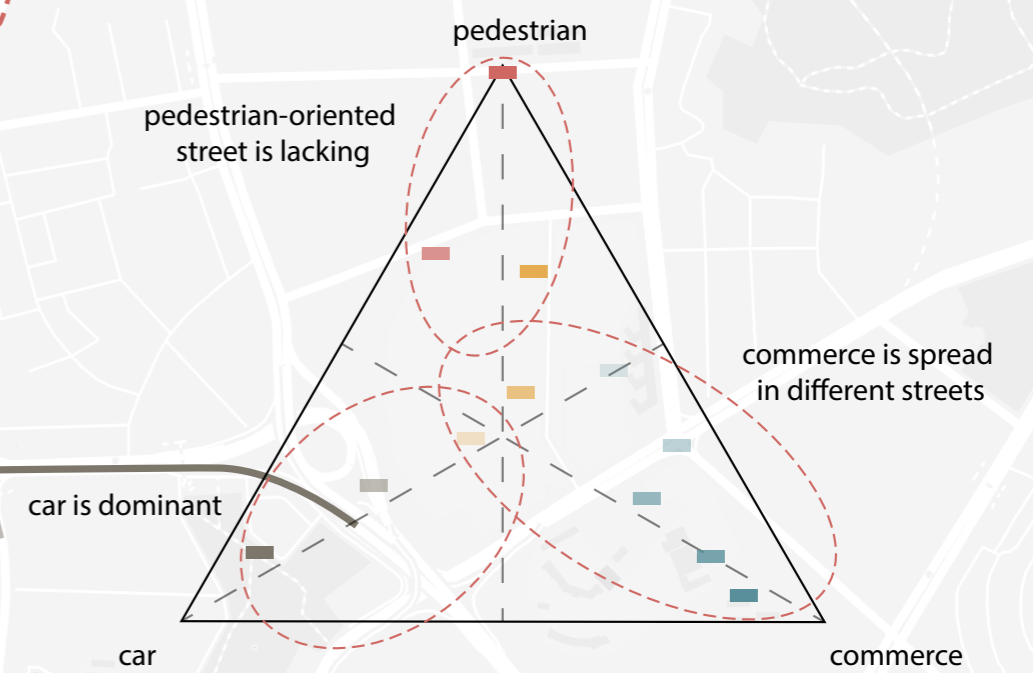Figure 4-33: Spatial distribution of 12 section types
Source: author

Figure 4-34: Triangle grid about the portion of activities
Source: author

4.8 | Jobs-housing balance

4.8.1| District scale

Jobs in Luohu districts could mainly be separated into working in offices, retail, and factory and storage. The most possible working place for high-educated young migrants is in Caiwuwei-Renminnan- Dongmen area, which is the economic and business center of Shenzhen. The maker space in Huaqiangbei may also be an ideal place for them to work in. While jobs in Dongmen, Huangbeiling and Sungang are mainly for retail. Dongmen is mainly for commodities such as clothing. Sungang, however, is famous for the furniture, small craftwork and cars. Factories and storage areas are mainly in Qingshuihe, Liantang and Wutongshan area. Qingshuihe area is still one of the biggest warehouse area in "guannei". Factories in Wutongshan and Liantang

where are less connected when compared with other areas in the distrit, are mainly traditional low-value added manufacture.

Housing is nearly distributed everywhere in the district except for the natural habitats. When making interviews with young graduates in Shenzhen, most of them believed the maximum commuting time is 30 minutes and an ideal commuting time is between 10 minutes and 20 minutes' walking or 2 or 3 metro stations. In general, housing is not that far away from jobs in Luohu District and the commuting time is nearly all acceptable for people living in this district.
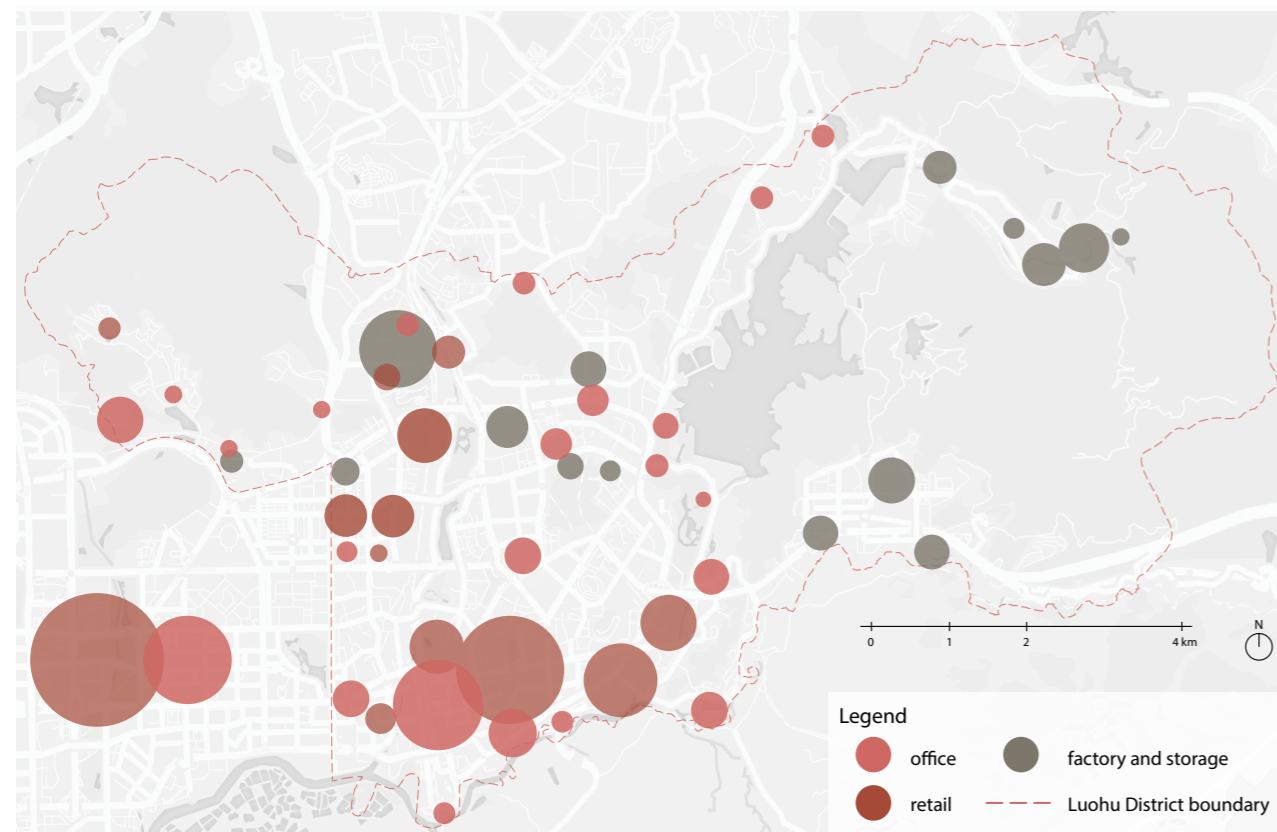

Figure 4-16: Job opportunities in Luohu District
Source: author

4.8 | Jobs-housing balance

4.8.2| Site scale

As mentioned before, employment in the site are mostly located in the west. The majority of jobs are in the retail and warehouse areas, which may not be the jobs for high-educated young migrants. In order to attract this group of people, on one hand, the industries in the site need to be upgraded. On the other hand, the close physical distance between Sungang, Caiwuwei and Huaqiangbei makes the site a possbile location for this group of people choosing to live. However, traveling by metro to get to Caiwuwei-Renminnan-Dongmen,the business and economic center, and Huaqiangbei, the maker space, would be very tough. Even though Sungang metro station is not far away from metro stations in these areas, people have to transfer at least two times and walk to the destination after

getting off the metro, which relatively reduce the accessibility of the site. As estimated in Amap, driving from Grant Theater Station to Sungang Station only spends no more than 10 minutes, while taking public transport would spend more than 20 minutes, which is still acceptable while could be improved.
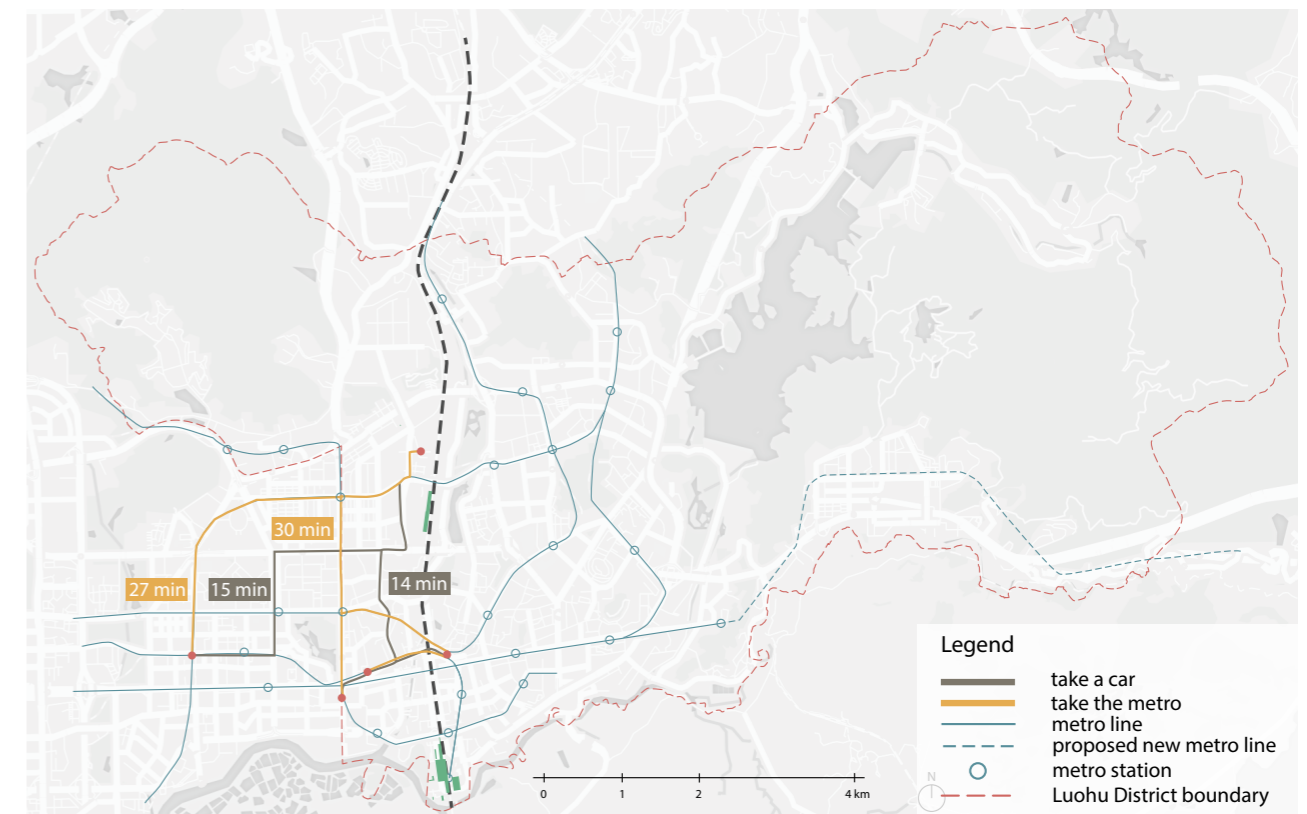

Figure 4-35: Commuting time of different ways from Sungang metro station to Caiwuwei-Renminnan-Dongmen centrality
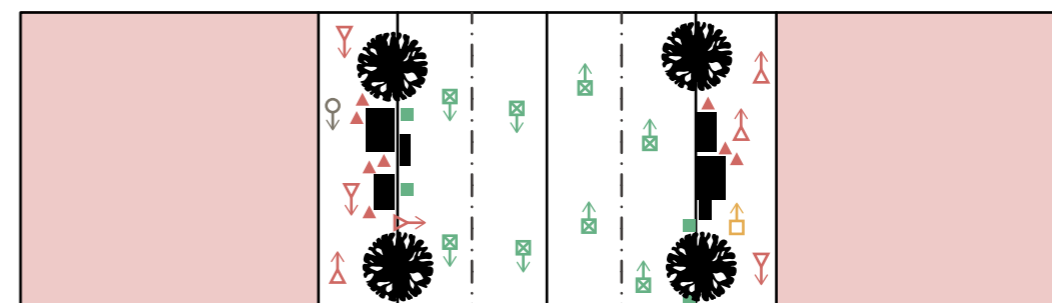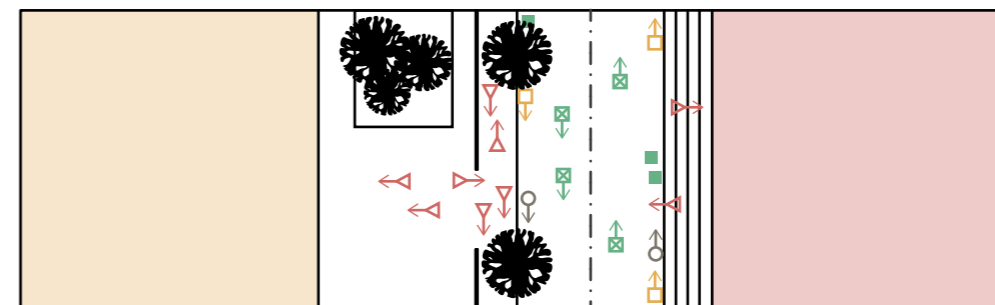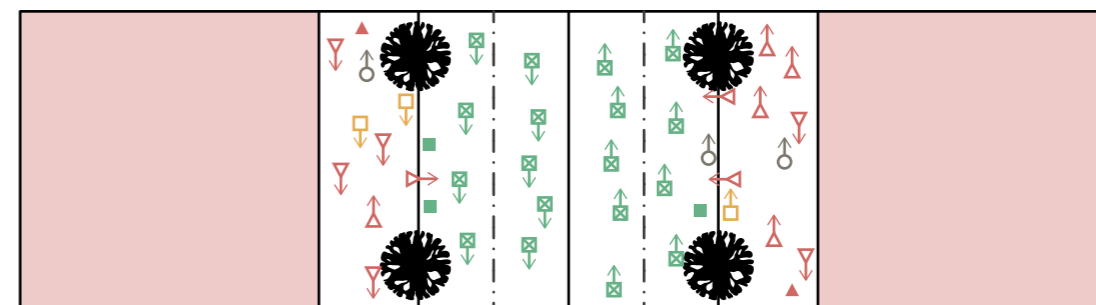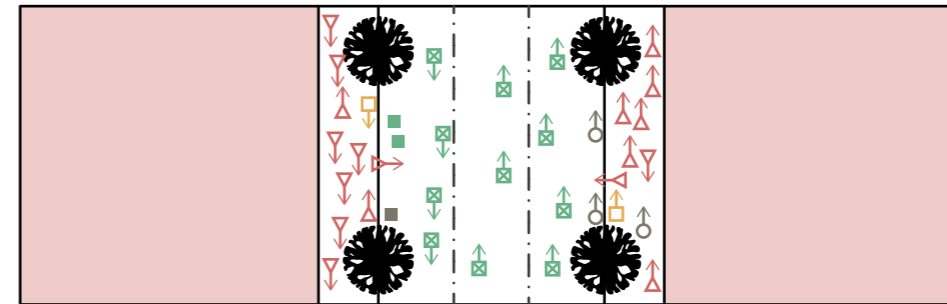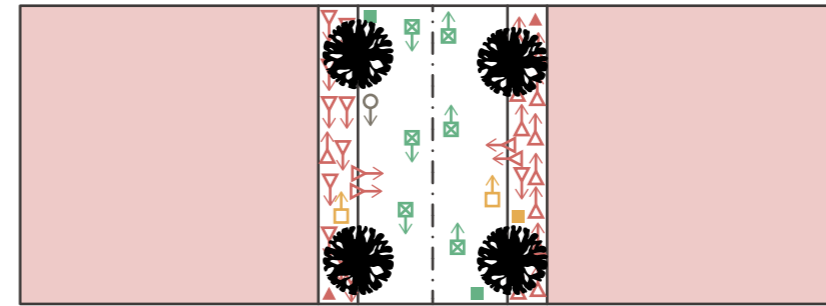*Source: author*

4.9 | Access to public open space and green space and their vitality

| Site scale

Public space Is the space that can be publicly used, and mostly publicly owned, which includes streets and open space. As mentioned before, the majority of streets (which are pointed out in blue) in the site are commerce-dominant and filled with people. Besides, with the development of sharing bicycles in China, a lot of bikes are put on these roads, covering a lot of space. Activities on these streets are mainly passing by and go shopping. When people finished the acitivities of shopping, they would leave the streets and seldom of them would choose to stay on these streets. The more commerce dominates, the larger flow of people and less people staying in the streets. Even though there are seldom people staying on the streets, the large flow of people still makes these streets attractive. Among these streets, streets in the retail area which are covered with goods, have the highest amount of people staying, while the mono-function makes the activites in the streets are mainly picking up goods, which are not attractive for other inhabitants. The car-dominant streets (which are pointed out in grey) are less active. The flow of cars makes it difficult for people to make activities. This kind of streets are the least attractive in the site. Streets with wide pavement (which are pointed out in yellow) are active. The more pedestrain dominates, the more activities of staying it would have. However, the wide pavement is not naturally linked with activities of staying in pavement. The staying activities is highly linked with the type of retail on the streets. The retail in the first type is mainly cafe, which makes it attractive. The retail in the second type is mainly small craftwork, so the flow of people is large, but seldom people stay in the streets. The huge amount of sharing bicycles in the streets also make it very crowded. The retail in the third type is mainly cars and funiture, which are less attractive, and the flow of people and stay activities are the least as expected. The

pedestrian-dominant streets (which are pointed out in red) are surprisely the least attractive. Even though these streets are streets are mainly for pedestrain, the small distance and the building height make this place unattractive to pedestrain.

⇡ walk
⇡ cycle
⇡ moto-cycle
⇡ drive
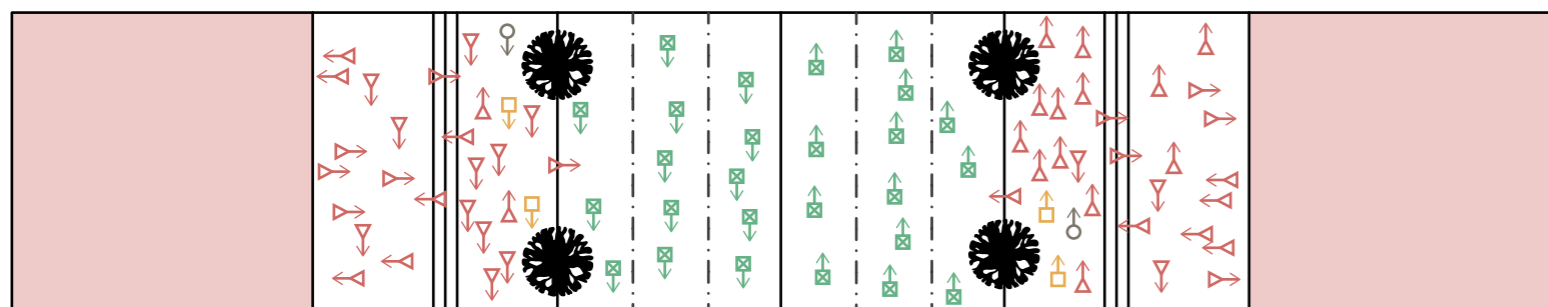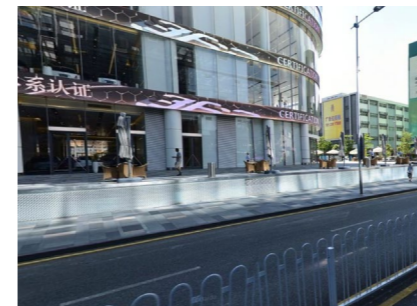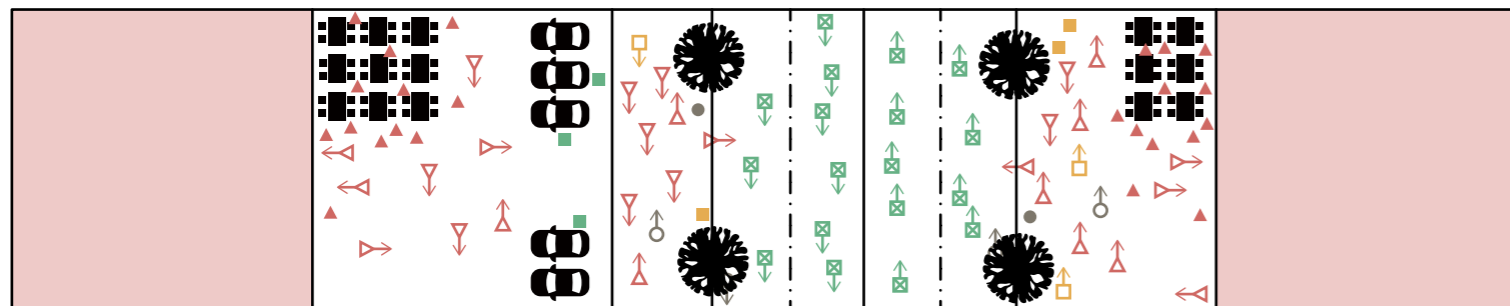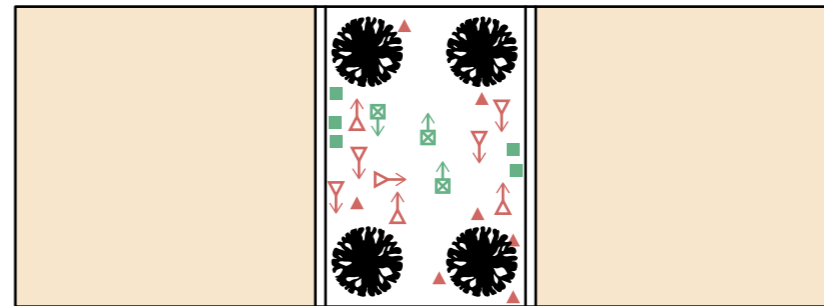▲ stand / sit
■ stay on bike
● stay on moto-cycle
■ stay on car
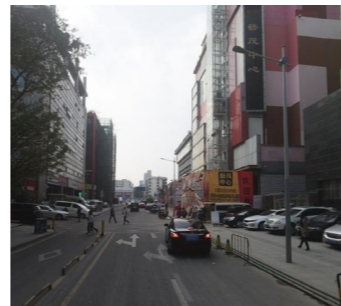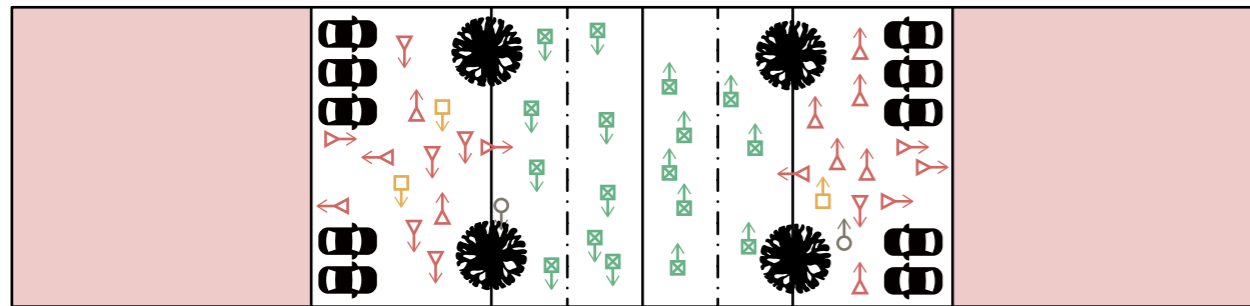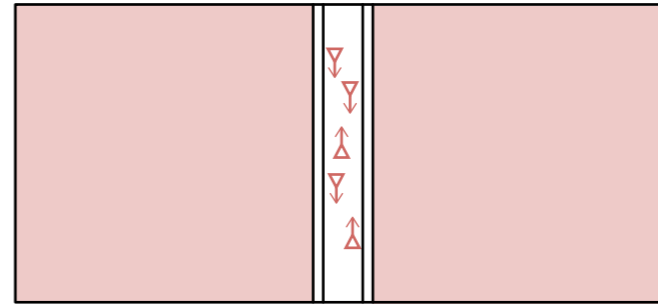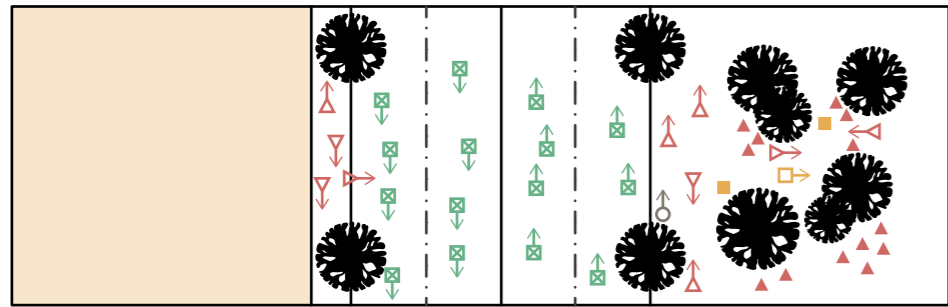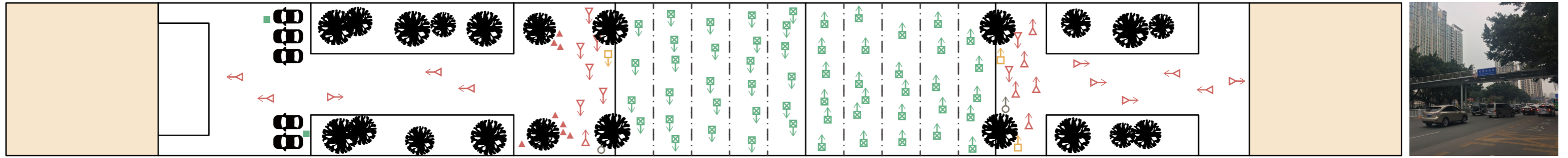
Figure 4-36: Activities on the streets
Source: author

When it come to public open space, there are only three public space in the site (see in Figure 4-37). The first and second public open space are located in urban village, and the third one is located in the commercial housing. The first public open space is a small junction in the center of urban village. It is accessible nearly to all inhabitants. With chairs and a big tree for shading, this place is a good place for inhabitants to make social activities, such as playing card games, chatting, and taking a rest. It is still very active even at night. Routes to the second public space is longer, which reduce its accessibility. Without chairs and facilities to attract people to stay and poor lightning, this place is less active. The third public open space in commercial

of building cluster. However, this place is gated and only for inhabitants in this small community. The segregation makes the accessibility low. Besides, the public space is mainly for children and provides some facilities for children and their parents to stay. This space is highly active after school, while less active at school.

Figure 4-37 Locations of public open space and public green space
Source: author
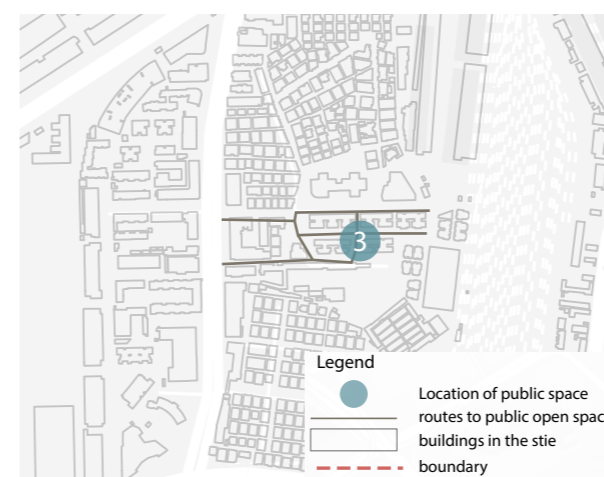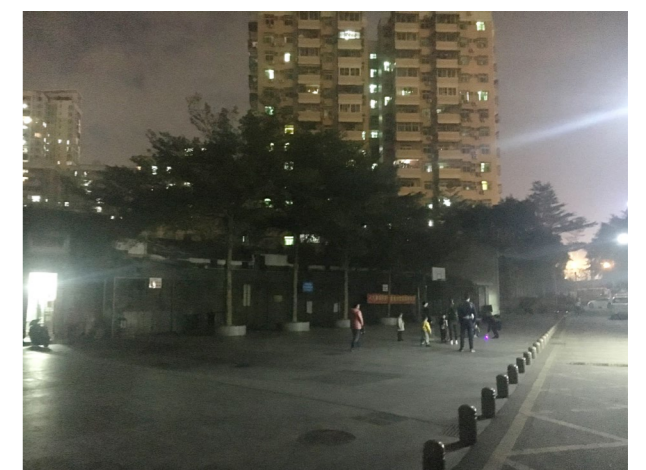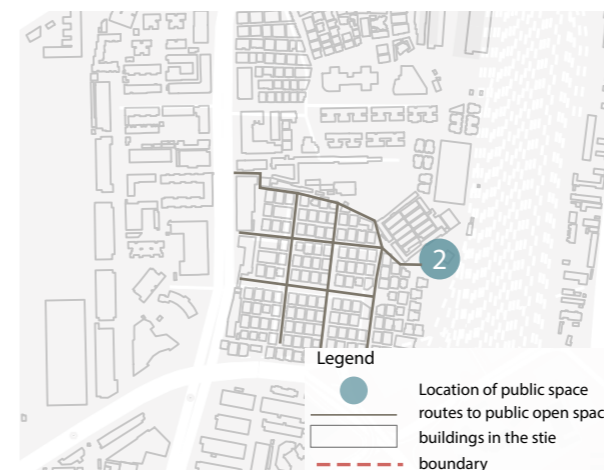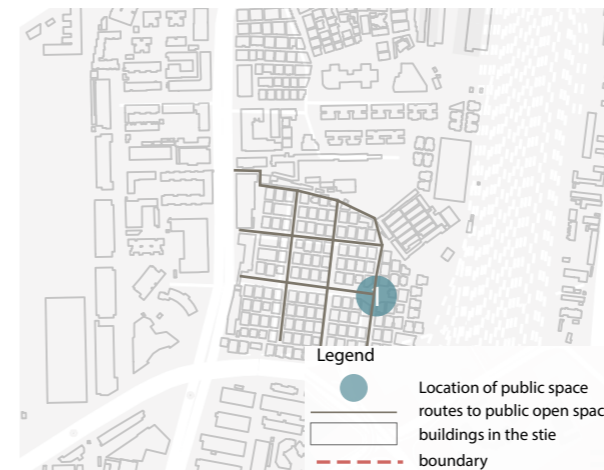
Figure 4-38: Accessibility to public open space and the photo of public space
Source: author

One of the biggest open space in the site is Honghu Park, which is also the biggest in the site. Honghu Park is very active during the weekends, people gather here to go fishing, chat or do some sports. Even though the park is quite close to the residential area, while the accessibility is low. The railway tracks become a huge boundary. People have to get through a narrow urban village street, then under a bridge, through an overpass and across a street to get to the park (see in Figure 4-40). From the interviews in the residential area, elderly people usually walk to the park every day to do exercises. While young people without kids seldom go to the park, or only go there for running. Young parents would choose to go there once a week or two weeks to enjoy their family time in the park. Interviews in the park also shows that the majority are people living in the east of the park rather than in the site.

Another green space in the site is on Sungang East Road (see in Figure 4-39). The green segeregations between streets and buildings are designed as a place for people to stay. Even though it is accessible for people on both sides of the streets, while lack of privacy, the noise, and large flow of cars make this place unttractive. Only people passing by would choose to stay to have a rest for a while from the interviews.

Legend
● Location of public space
routes to public open space
☐ buildings in the stie
- - - boundary
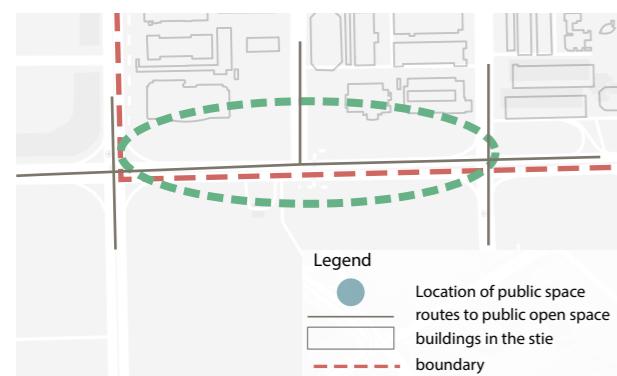
Figure 4-39: Accessibility to green space on Sungang East Road
Source: author

Legend
● Location of public space
routes to public open space
☐ buildings in the stie
- - - boundary

Figure 4-40: Accessibility to Honghu Park
Source: author

Figure 4-41: Activities in Honghu Park
Source: author

4.10 | More public facilities, amenities and entertainment
| Site scale

Public facilities in the thesis are mainly referred to schools and hospitals which are the most concerned issues in Shenzhen. There is only one primary school, four kindergartens and two clinics in the site. Lack of high school and hospitals, people have to go to other places to enjoy these public facilities.

Amenities in the site are mainly restaurants, and supermarket. Restaurants nearly distributes in all main roads and streets in urban village.There is one supermarket in the site, while interviews show that the supermarket is in a relatively low level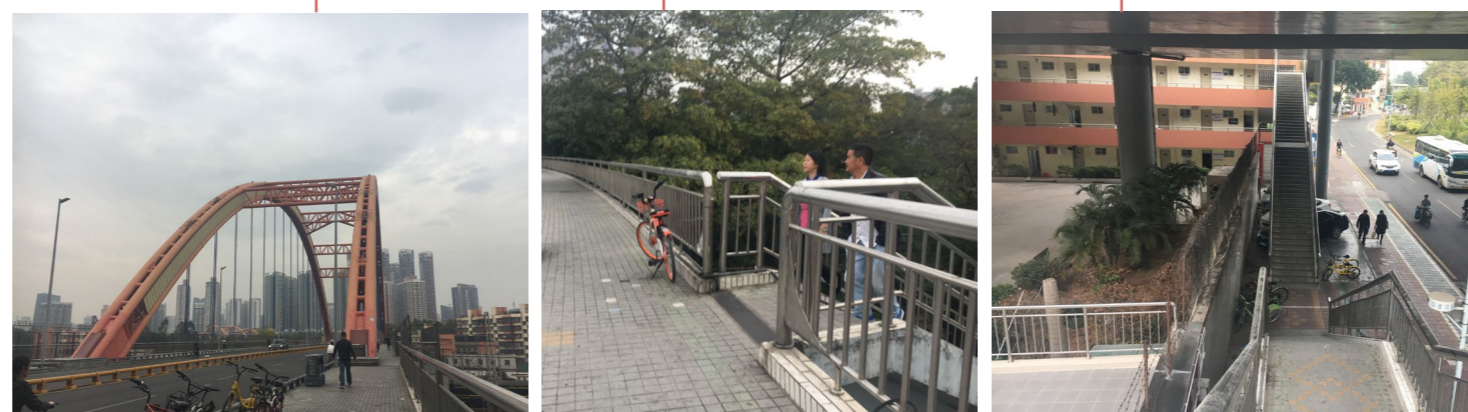 and the Wal-Marts near the site is not that accessible without cars. Besides, there is no city complex in the site and people would like to go to Caiwuwei- Renminnan- Dongmen area to go

shopping, watching movies and having dinner at weekends. When it comes to lifestyle, there is no clubs, no cinemas, only one accessible karaoke and gym in residential area. Other gyms, karaokes and cafe are located in the west,which is far away from the dwelling area, mainly serves for people living in the residential area out of the site. When making interviews with young migrants in the site, most of them expressed the idea of moving out to other places because there is no enough amenities and places for entertainment in the site.
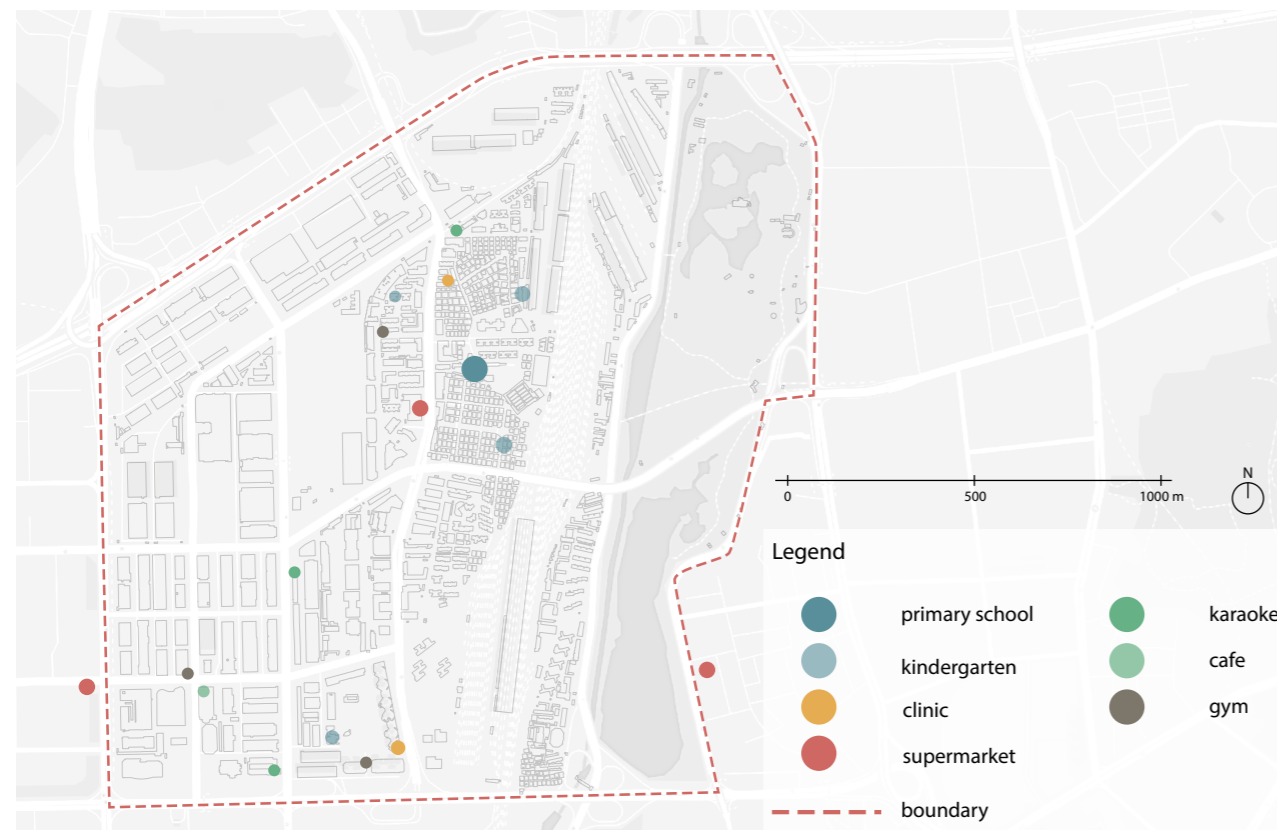
Figure 4-42: Public facilities, amenities and entertainment in Sungang
Source: author

4.11 | Diverse housing types
| Site scale

There are four kinds of housing types in Shenzhen generally speaking, which are also the four basic urban fabrics in Shenzhen: danwei housing, commerical housing, urban village and factory compound.

Danwei housing

After the Second World War, it had been a global trend to build massive housing as a tool to relieve housing shortage. Most of the post-war housing around the world was designed following the principle of functionality and standardization, and fit economic feasibility and affordability. Danwei housing was built under this condition. Before the housing reform in 1998, all the housing were built under the idea of collectivism and social equality and owned by the state of work unit. These buildings were normally built by the work unit close to the workplace in the form of "a walled compound organized around a state-owned enterprise or other institution (educational, research, or administrative)" (Friedmann, 2005: 102). A danwei housing also "provided employment, housing, education, health care, welfareservices and recreation for workers and their families" (Bray, 2012: 3) and was by doing so the "organizer of the daily life of its employees" (Hui, 2012: 66).

Spatial form of danwei housing - Due to the principle of functionality and standardization, most of danwei housing were gated in unified form with public facilities like canteen, medical carel, recreation in the center. Most of danwei housing is low rise with 7 or 8 floors. The housing quality of danwei housing is normally not good due to the lack of maintenance.

Governnance- According to Bray (2006) the danwei housing has been a long time the basic

unit of governance in urban China. Large scale danwei housing were almost always top-down planned and invested by the central government. Some danwei housing may also be invested by work unit itself. After the housing reform in 1998, most of danwei housing was privatized by selling to the employees.

Figure 4-43: Basic morphology of danwei housing
Source: author

Commercial housing

Commercial housing appeared after the housing reform. From the 1998 onwards, state owned enterprises were forbiddedn to provide housing for employees (Bray, 2012). New commercial private housing replaced danwei housing provided by 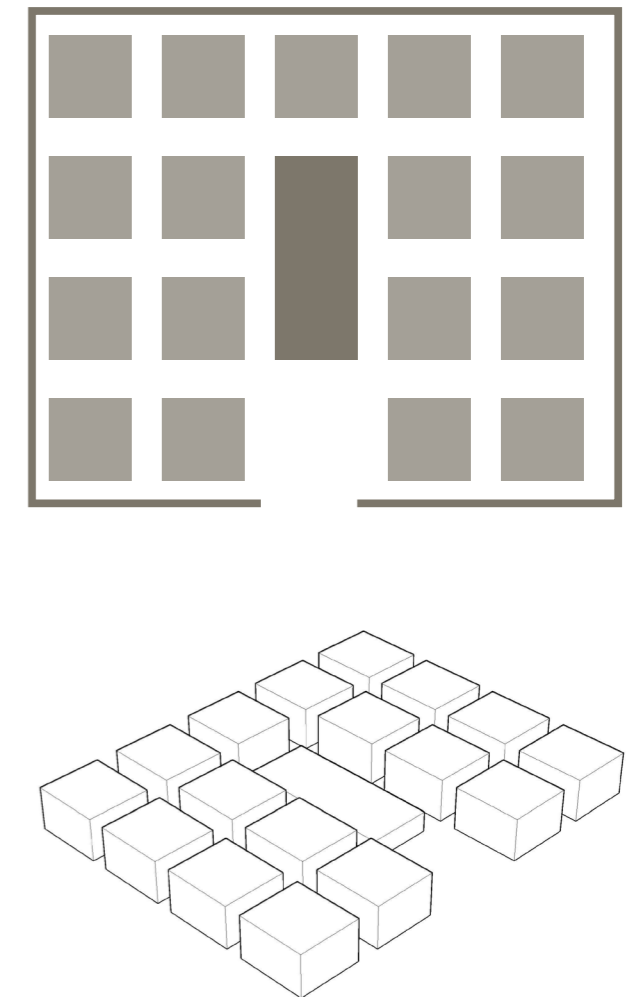work units. Commercial housing usually has two types. One is individual building, the other is a gated community which is "an area based community in which its members share interests and resources" (Benewick et al., 2004: 17). In the thesis plan, the commercial housing is mainly refered to the second type.

Spatial form of commercial housing - The living environments in different commercial housing are diverse, while the basic spatial form is similar. The commercial housing is mainly walled compounds with designs based on social and economic ideas. Social cohesion, neighbourliness and feelings of security and belonging are elements that are very important in relation to commercial housing. Besides, buildings in commercial housing "is integrated with communal facilities like kindergartens, clinics, restaurants, convenience shops, sports facilities and communications infrastructure" (Bray, 2006b: 9) and these facilities are normally located in the center. Most of the commercial housing in China combines high-rise and low-rise, while commercial housing in Shenzhen are mainly high-rise, due to the pressure of land use. Commercial housing are mainly private areas and prevent other people who are not living in this compound, of using the space.

Governance- The commercial housing are nearly all developed by developers, the government would control their living environment through density, especially through FSR. The commercial housing is mostly managed by the property management company in combination with its residents, which means the self-organization in commerical housing.
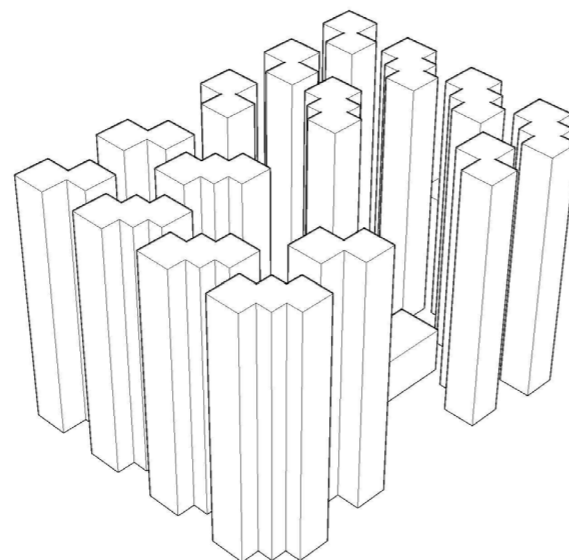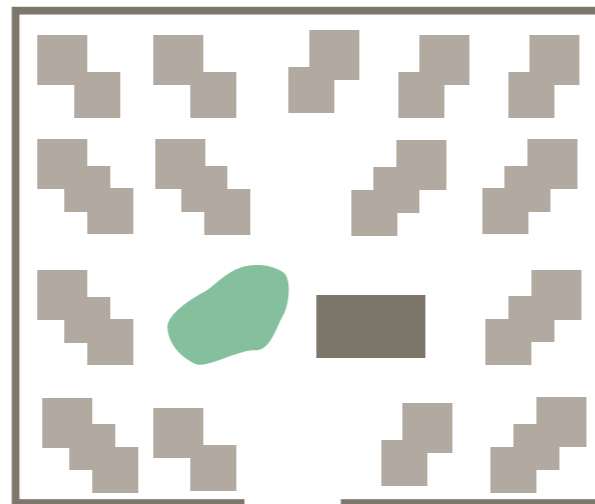

Figure 4-44: Basic morphology of commercial housing
Source: author

Urban village

Urban village first became prevalent in Shenzhen and Guangzhou (Hao et al., 2011). In China, urban land is owned by the government while rural land is collectively owned by the rural communities (Hao et al., 2011). When urban extends to the village, the farmland is often transferred from rural to urban. Then most villagers starts to replace their traditional houses for concrete houses with more ground stores to rent extra rooms to migrant workers. In 1982, the government passed a policy to define and control the construction of these new villages. "The maximum residential land area for each household was stipulated at 150 m^2, and the house footprint for each household should be no more than 80 m^{2}" (Hao et al., 2011: 217). This policy led to the morpohology of urban villages with very rigid grid structures. The urban village is not only an area to live in for the villagers, but also a place that villagers can make profit out of.

Spatial form of urban village - The urban village is a very common urban form in Shenzhen. Urban villages are high dense neighbourhoods, and are characterized overall by narrow roads, face-to-face buildings, a thin strip of sky, and inner streets packed with shops, grocery stores and service outlets" (Liu et al., 2010: 136). The areas are unplanned, which lack public goods making them very different from other neighbourhoods in Chinese cities (Wu et al., 2012). Most urban villages are not walled with high accessibility. Urban villages are one of the most acive places in Shenzhen, which have mixed function areas with commercial and recreational functions. Besides, the form of urban villages in Shenzhen has two typical types. One is quite uniform with same height, while the other one has different height. The inhabitants in urban villages are mainly villagers and migrants with low-income and low-educated and have low-income jobs. However, in Shenzhen, a lot of white-collars also live in urban villages, since most of urban villages are located quite close to job agglomeration areas.

Governance- In Shenzhen, the urban village is mainly planned and built by the villagers themselves and managed by the residents' committe and Joint-Stock Company.

Figure4-45: Basic morphology of urban village
Source: author

Factory compound

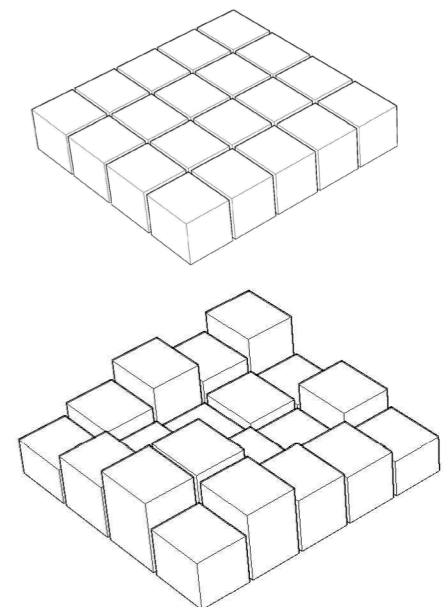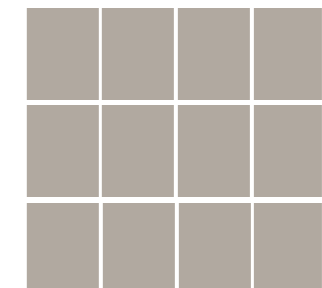Since the housing reform, danwei system fall, and a new form of factory compound appeared. To house their workers, factories built dormitories in a missive scale (Siu, 2007). "Foreign-invested firms are building their own dorms to suit their own particular needs; typically, these facilities are within compounds flanking the factory. In these settings, the spatial integration between working and non-working life is tighter, and companies, rather than the state, play a more commanding role in controlling workers' lives" (Ngai, 2004: 33). The factory compounds is built to make the most of profit based on the idea of production and efficiency.

Spatial form of Factory compound - Factories in Shenzhen can also mainly be divded into two types. The first one is invested by capital from Hong Kong or foresign international enterprises. The urban form of this kind of factorm is usually uniform with low-rise in a big scale. The second one is invested by villagers which focus on low-value added manufacture. These two types of factories are all gated and workers live and work within the walls of the factory compound. Most of these compounds also have facilities like sports fields, common living rooms. However, since the main idea of factory compound is production, this means that no excrescent expenses are invested in the public space or spatial quality of these compounds. Domitories are often included out of the idea of effective production in these two types of factories. "Such dormitories are communal multi-storey buildings, housing several hundred workers. Rooms are shared, with between eight and 20 workers per room. Washing and toilet facilities are communal between rooms, floors or whole units, such that living space is intensely collective, with no area,

except within the closed curtains of the worker's bunk, for private space" (Ngai and Smith, 2007: 32).

Governance - The factory compound is uaully planned by the government and built or developed by the enterprises or villagers. Workers are completely controlled by their management staff in the factory compounds (Ngai and Smith, 2007, Pun, 2005).
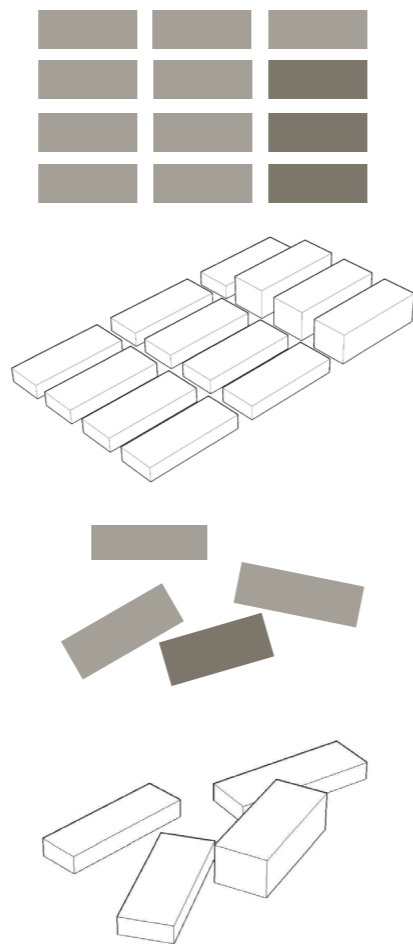
Figure 4-46: Basic morphology of factory compound
Source: author

These four basic morphology all exist in the site as showed in FIgure 4-47. Danwei housing are mainly located in the east. With uniform morphology and building height, the function of danwei housing is mainly for dwelling. Cars are only accessible to the periphery streets and main streets, other areas are mainly connected by pavements. The housing price of danwei housing is relatively low and main residents in it are employees in particular enterprises or work units. Commercial housing are mainly in the middle of the site. As mentioned before, commercial housing in Shenzhen are mainly high rise with green space and public facilities in the center. Compared with danwei housing, cars are more accessible inside commercial housing. The ground floor of commercial housing is normally retail, especially buildings near the streets. The housing price of commercial housing is the

highest among 4 types. Urban villages are mainly located in the north and covers the largest area in the site. With rigid grid strctures, the density in urban villages is very high. Cars can only get through main roads in urban villages, while other streets are pedestrian-oriented. The ground floor of urban villages are mostly grocery stores and restaurants. The housing price in urban villages is the lowest, and tha main residents are migrants with low-income as expected. Unlike factory compounds in other areas, lots of factory compounds in the site have already transformed into commerce while kept the basic morphology of factory compound. Without living space, factory compounds in the site are quite mono-function, which leads to the unsafety in the evening and less activities on the streets as mentioned.
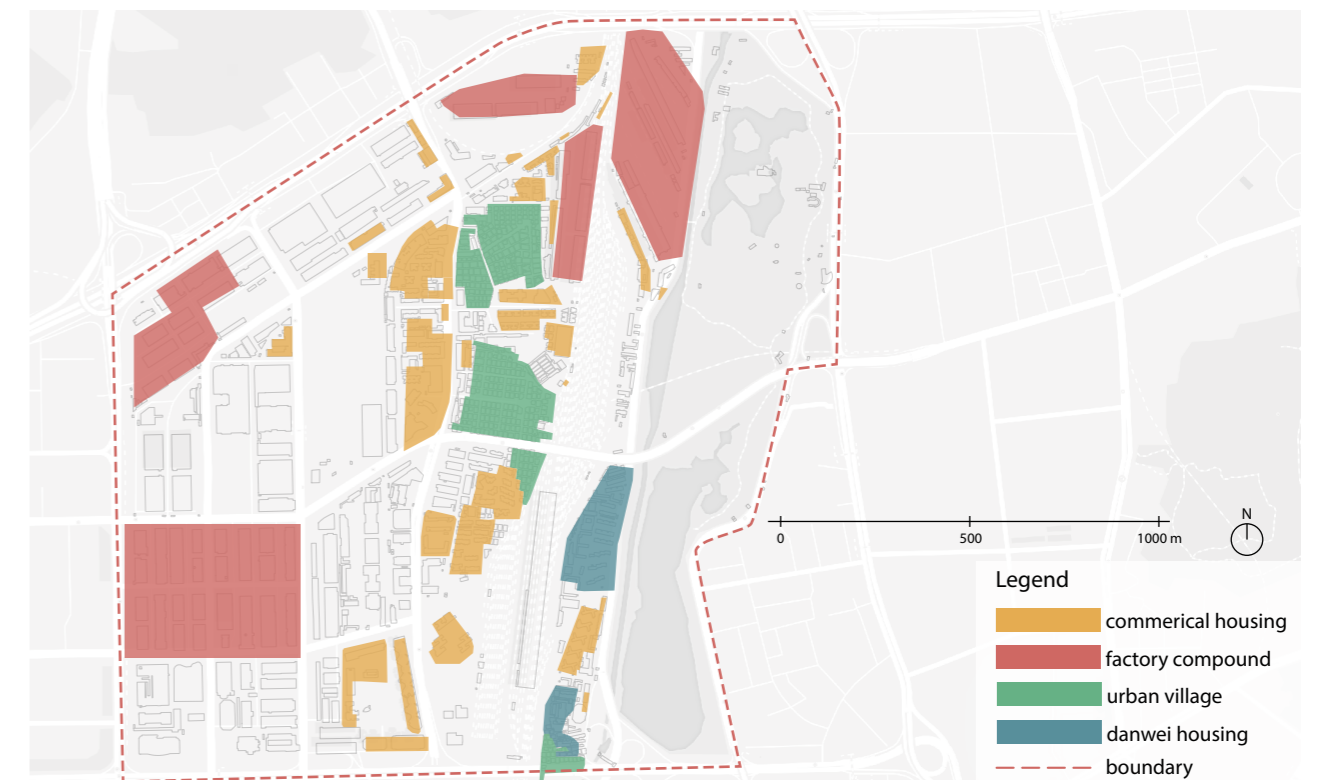
Figure 4-47: Morphology distribution in Sungang
Source: author

	Danwei housing	commercial housing
Location		
Morphology		
Density		
Access	car / pedestrian	
Function		
Price	41,000 yuan/m² / affordable	61,000 yuan/m² / unaffordable
Main residents	Employees in particular enterprises or work unit	People with higher income

	Urban village	Factory compound
Location		
Morphology		
Density		
Access		
Function		
Price	7,000 yuan/m² / affordable	/
Main residents	Migrants with low income	/

Figure 4-48: Morphology of different housing types in Sungang
Sourcea: author

4.12 | Social equity, less social segregation and exclusion
| Site scale

Segregation and exclusion is mainly happens between people in the urban village and living in the commercial housing. The housing price spontaneously divided these two groups of people. Even though they are quite close to each other, the gated commercial housing makes it impossible for people living in the urban village to interact with people living in commercial housing. Only people with permit card could get into the commercial housing. The open space, public facilities and amenities in the commerical housing cannot be enjoyed by people living in the urban village. While inhabitants in the commercial housing can still enjoy the same public facilities and amenities as residents in the urban village.

Figure 4-49: Photo of danwei housing in Sungang
Source: author

Figure 4-50: Photo of commercial housing in Sungang
Source: author

Figure 4-52: Photo of factory compound in Sungang
Source: author

Figure 4-53: Photo of urban village in Sungang
Source: author

Figure 4-54: Photo of gated commercial housing in Sungang
Source: author

4.13 | Unique characters of places preservation

| Site scale

Sungang area is famous for the small craftwork, furniture, car and clothing nowadays. Keeping the urban fabric of traditional factory compound makes it unique as well in "guannei". Only Qingshuihe area, Sungang area and Liantang area keep the urban fabric of traditional manufacture. And among the three areas, and only Sungang areas have made the transformation of function but kept the morpholoy.

Besides, the railway track is also quite unique in the site, but without design, parts of the tracks have already been left. Some inhabitants transformed it into places for urban farm, which means the potential of transforming some abandoned railway tracks into public space for interaction.

Figure 4-55: Photo of transformed factory compound in Sungang
Source: author

Figure 4-56: Photo of railway tracks in Sungang
Source: author

Figure 4-57: Sungang
Source: Sungang, n.d.

4.14 | Conclusion

Sungang area, as an area close to the economic and business center, is one of the typical areas where affordable, close but low building quality. Employment in the site may not be the choice for young graduates. But the close distance makes the jobs-housing balance in the site. However, when it comes to other elements of livability, the site are in a relativley low level. The mono-function makes retail areas and warehouse areas unsafe. Only one direct south and north connecting street in residential areas, this street always congests no matter on workdays or weekends. Cyclists have to struggle among the flow of people on the pavement due to lack of cycling lanes, which also make the pavement very crowded and unsafe. Besides, the commerce

spread in different streets in the site, leading to the main activities on the streets are passing by. When it comes to public space and green space, without accessible large scale of public open space, social interaction in urban village mainly happens in a small area under a tree. Outdoor activities in commercial housing also mainly happens in the frontage among building clusters. Honghu Park is a large green space in the site. However, the accessibility of residents in the site is low. Even though it is quite active during weekends, the main visitors are people living in the east. Besides, there is also a shortage of public facilities, amenities and entertainment in the site. In relation to affordable housing, the main housing types in the site are urban village

and danwei, which are affordable but poor living quality. The commerical housing is built in 1980s as well. The housing quality is also poor. But the gated commercial housing, segregating people in urban village with residents in commercial housing, increases social segregation and exclusion. For the unique characters, the site keeps the urban fabric of factory compound, while leave away the tracks, which could also be transformed into the identity of the site.

In a conclusion, even though close to job agglomeration areas, livability in the site is relatively in a low level, making the lack of young graduates in the site.
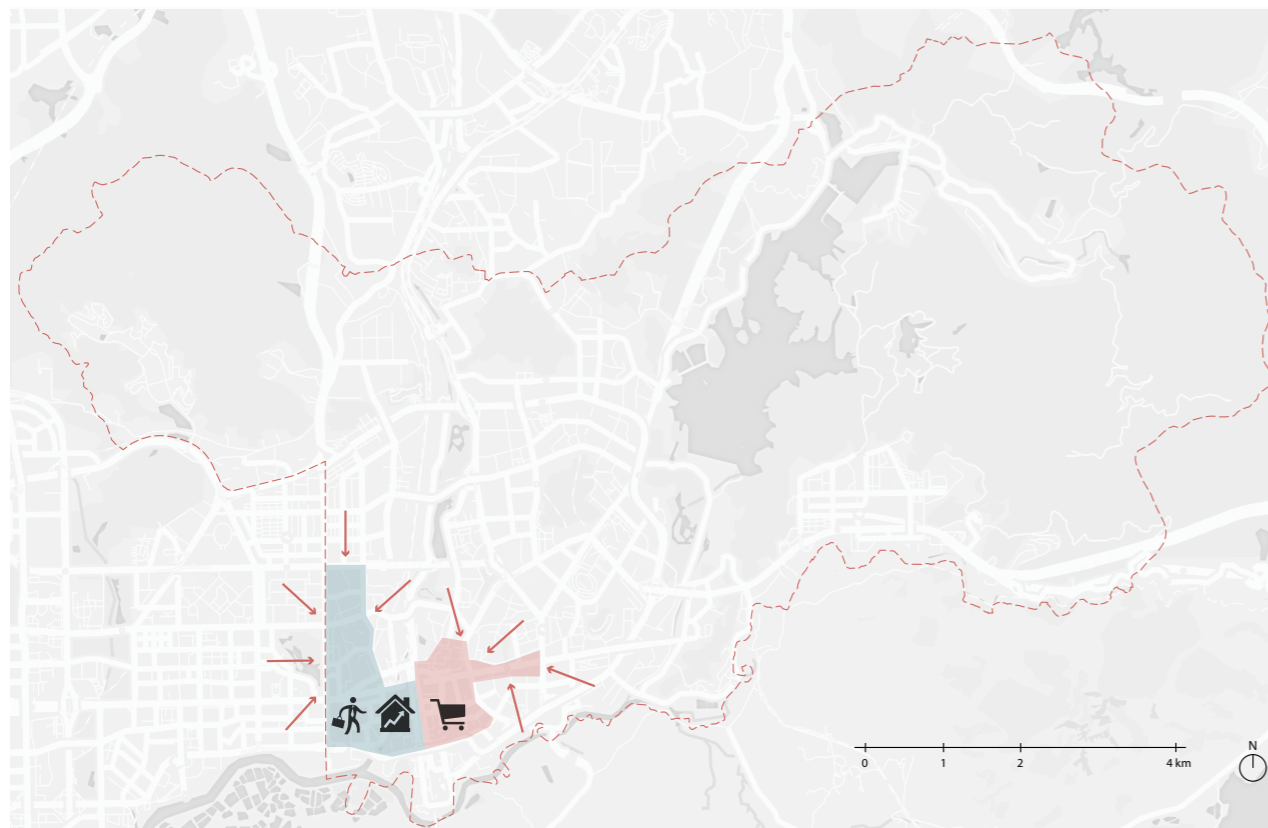

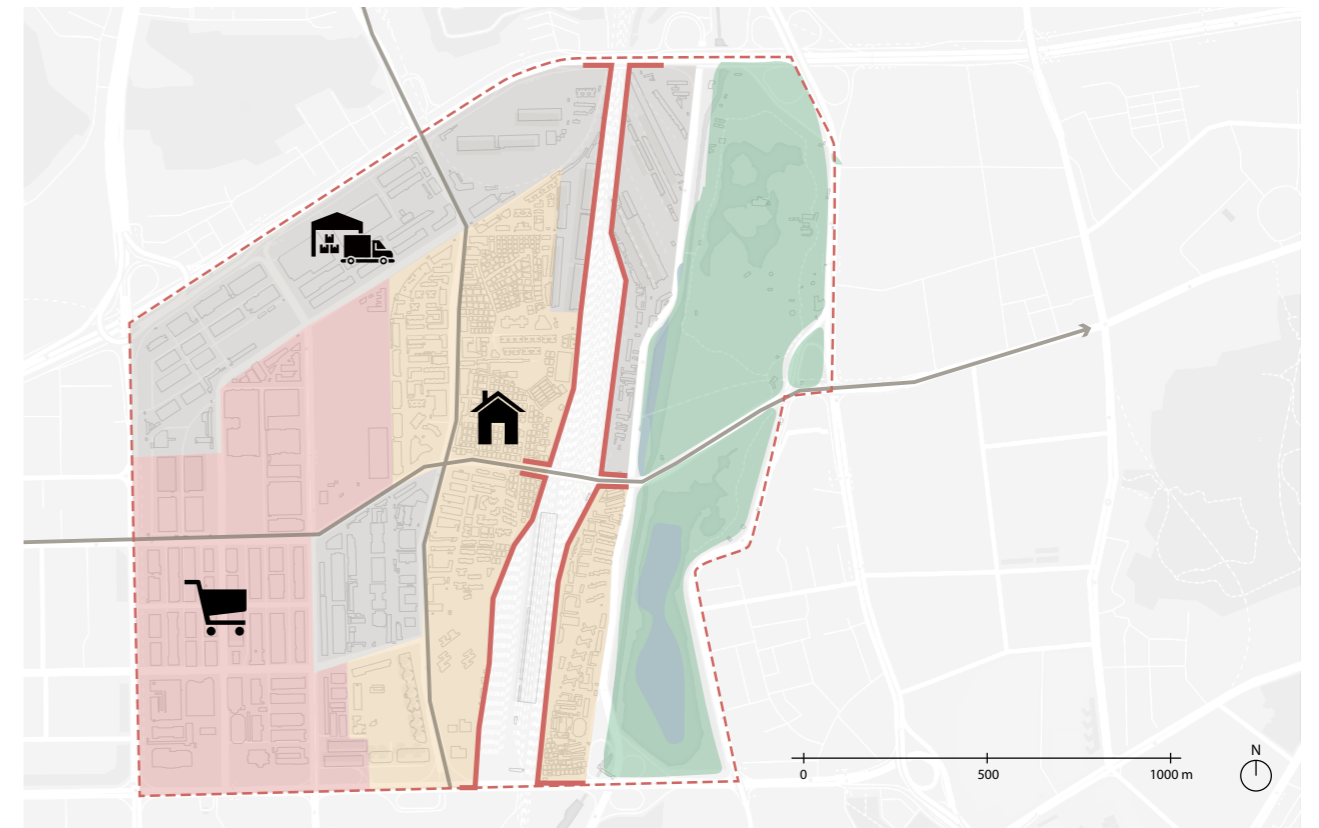*Figure 4-58: Analysis conclusion in district scale*
Source: author

Figure 4-59: Analysis conclusion in site scale
Source: author

4.15 | Potential

Due to the agglomeration of current economic and retail sector, the job opportunities would mainly in the current center and the huge land pressure on this area makes the dwelling would be mainly in the adjacent areas, such as Sungang, Shuibei and Hubei. And the site could be the dwelling area for people working in the current economic and financial sector. Besides, in july 2017, Bureau of Investment Promotion in Luohu put forward a new image of a new financial and economic strip- Hongling creative financial and economic strip (see in Figure 4-60).This 3.5 kilometer strip would become another economic growth pole and the current financial and economic center could be expanded through this strip. The main industries in this street would be

be banks, security, insurance, affiance, fund and so on. As an area in the strip, the site could be the place for economic expansion. So in district scale, the site could not only become the dwelling area for the current employees in economic and financial sector, but also could become their new working place.

When zoom in to local scale, considering the current function and the economic strip, the economic expansion would happen in the current retail area. Some functions which are not the choices of young graudates, would be moved out as well. This area makes it possible to introduce other new functions, such as dwelling and public facilities and amenities into this area. Besides, the

current mono-function in the site is one of the most urgent issues in the site, the site would be transformed into mixed-use. Meanwhile, the big barrier of the railway tracks is also a a big issue, and new connections between these two sides would be added.
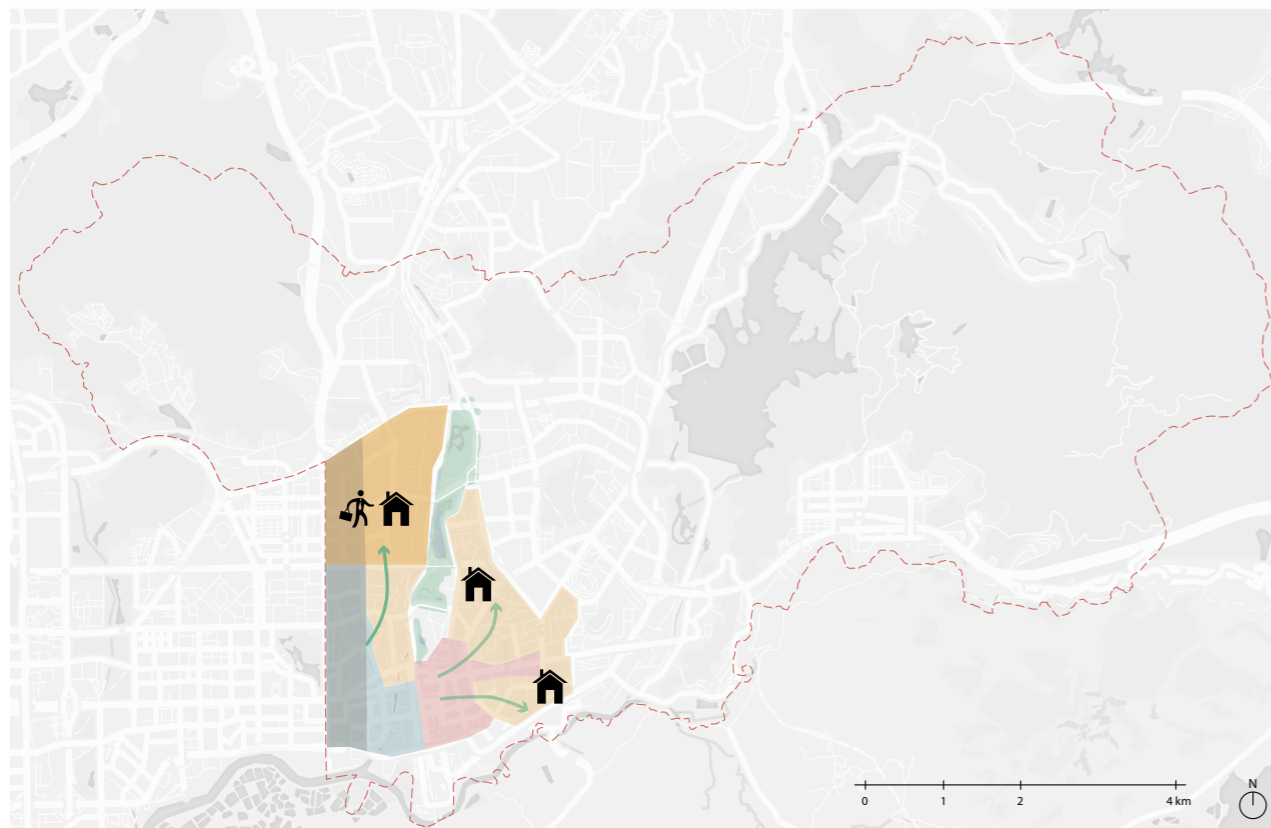

Figure 4-60: Potential map in district scale
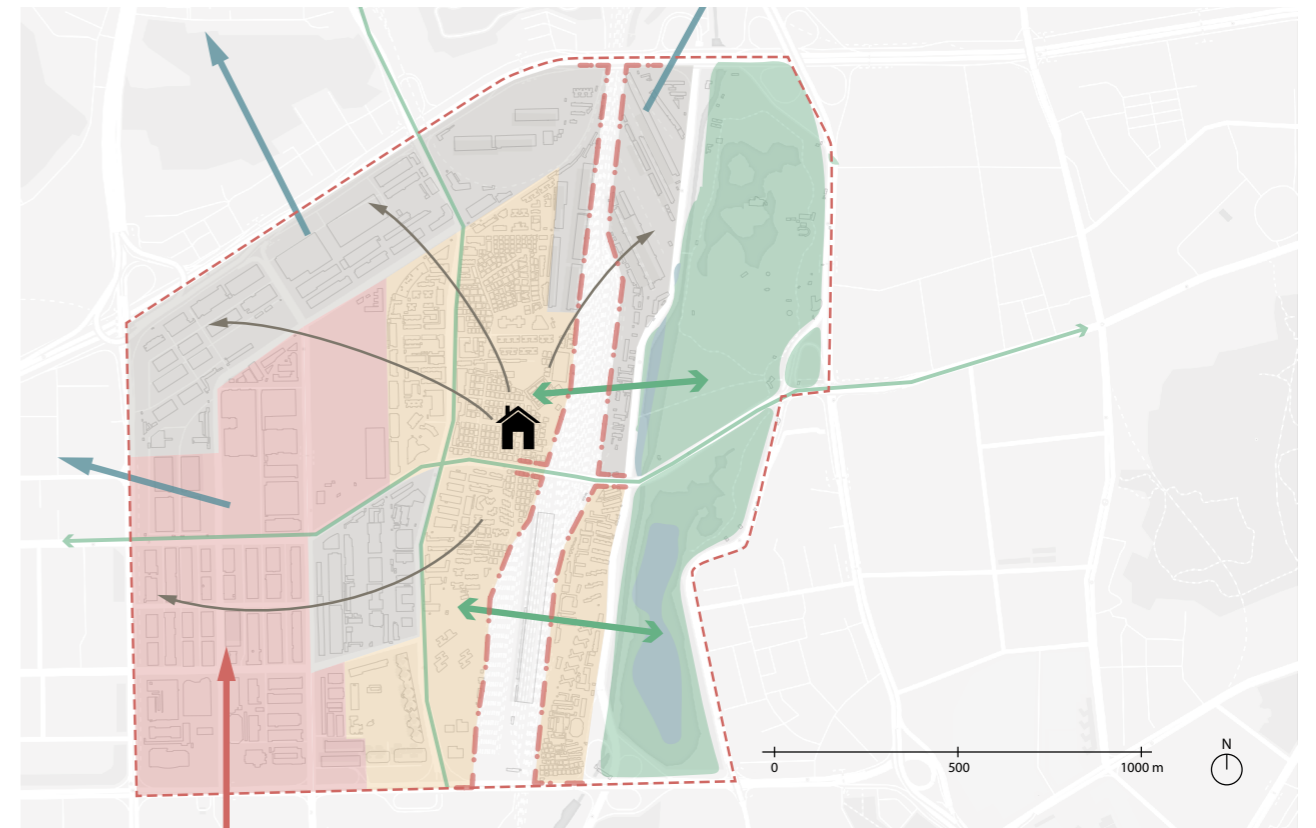*Source: author*

Figure 4-61: Potential map in site scale
Source: author

Site analysis - density

Legend

Type 1
Type 2
Type 3
Type 4
Type 5
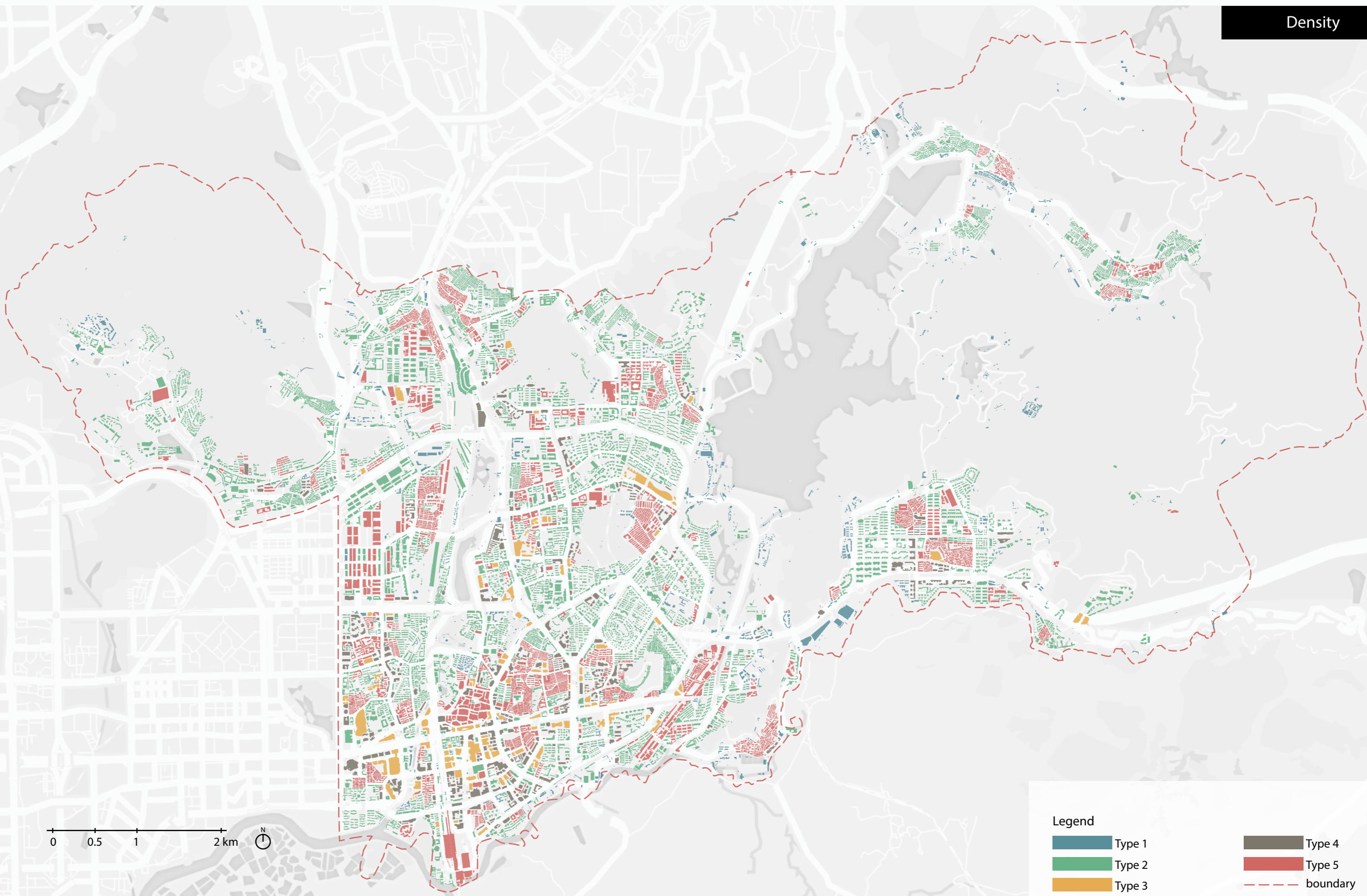boundary

0   0.5   1   2 km   N

Figure 5-1: Density map in district scale
Source: author

5.1 | Definition of the boundary and the outcome of density analysis

Define the boundary of the block
'A Planners Dictionary' which is edited by American Planning Association (Davidson & Dolnick, 2004) lists different definitions of block in several cities in the United States. These definitions could be divided into two categories. One defines a block as 'an area of land entirely bounded by streets' and another adds more elements that act as 'physical barriers to the continuity of development' including water bodies, public open spaces, railroads and cemeteries. Based on these definitions, the block is defined with streets and physical barriers. Combined with the current situation in the site, the physical barrier also includes walls, which are very common as a barrier in the site.

**Identify urban form types through Spacematrix and statistical classification**
The urban form of the study are is diverse and the traditional methods of classifying urban form types, which is mainly based on manual work, is limited and inefficient in dealing with such complex and a large number of data. So the Spacematrix model published by Berghauser Pont and Haupt is adopted as the main method for type classification study.

Spacematrix is a uantitative research tool that builds up the relation between urban morphological types and density which is understood as a multivariable phenomenon (Ge & Hausleitner, 2018). The basic data for this calculations includes gross floor area, footprint area and plot area. All these data is imported into SPSS Statistics. The principle of cluster analysis in SPSS is to identify groups of objects that are similar to each other but different from objects in other groups based on the level of statistical similarity (Ge & Hausleitner, 2018). Among three clustering methods, the two-step Clustering

method is adopted for its capability to handle large datasets.

Outcome of density analysis
In SPSS Statstics, different cluster numbers are tested in order to get optimal results with minimum cluster numbers and clear classification of urban form types and 5 types are tested as the optimal result.
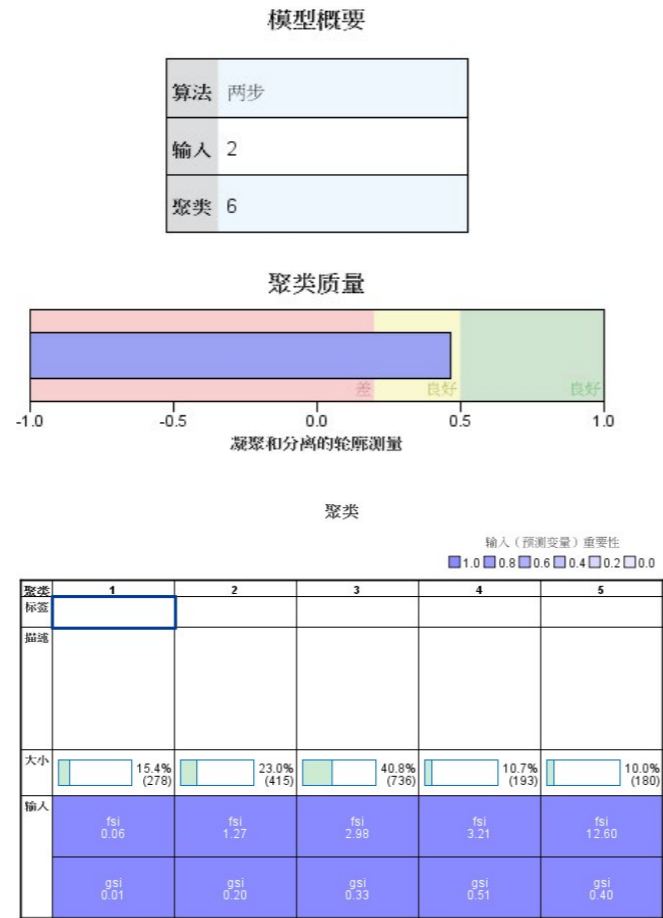
The result shows in general FSI is more important than GSI during classification. But when it comes to within-cluster importance, for Type 3 and Type 4, GSI is more important than FSI.
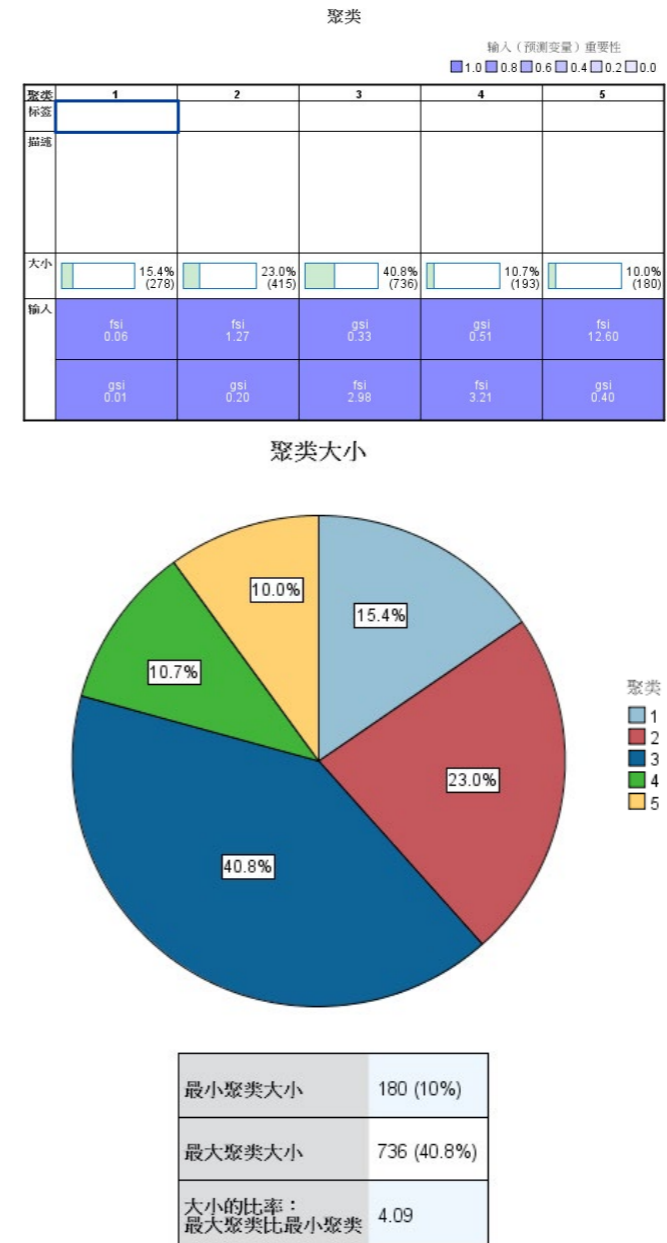
Figure 5-2: Outcome of density analysis
Source: author

The data is reimported into ArcGIS again, and a density map is created to show the density of each building in Luohu District. Combined with

sthe urban form, the five types are: 1) low-rise pacious type with low GSI and FSI, and this type is mainly located in natural habitats; 2) mid-rise spacious type with with medium FSI and low GSI, and this type is usually in residential areas; 3) high-rise tower combined with its low podium buildings type with medium FSI and GSI, and this type is usually located in financial and economic center; 4)high-rise compact type with high FSI and GSI, and this type is also usually in financial and economic center; 5) mid-rise super compact type with high FSI and GSI, and this type is mainly located in urban village and retail center of the district.

Zoom in to the site, the retail area in the west is mainly Type 5, which is similar with financial and economic center. For financial sectors, high accessibility and high density are important elements, which means the retail area is an ideal place for economic expansion.

Vision

Vision 1:
Diverse and adaptable economy for more job opportunities close to diverse and affordable housign with rich and accessible public facilities and amenities

Figure 6-1: Image of vision 1
Source: author

Vision 2:
Good walking environment and cycling environment to accessbile, inclusive and rich public life, making use the characteristics of places

Figure 6-2: Image of vision 2
Source: author

Strategy

7 | Strategy

The conclusion and potential of the previous analysis and vision form the starting point for strategies. Based on conclusion and vision, the strategy would be divided into 5 layers, including job opportunities, affordable housing, public facilities and amenities, public space and infrastructure. The strategy would be explained through these 5 layers.
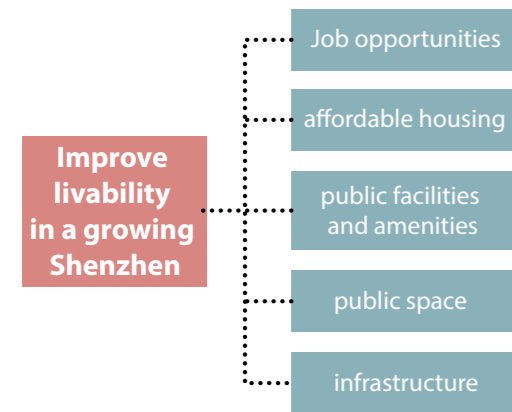

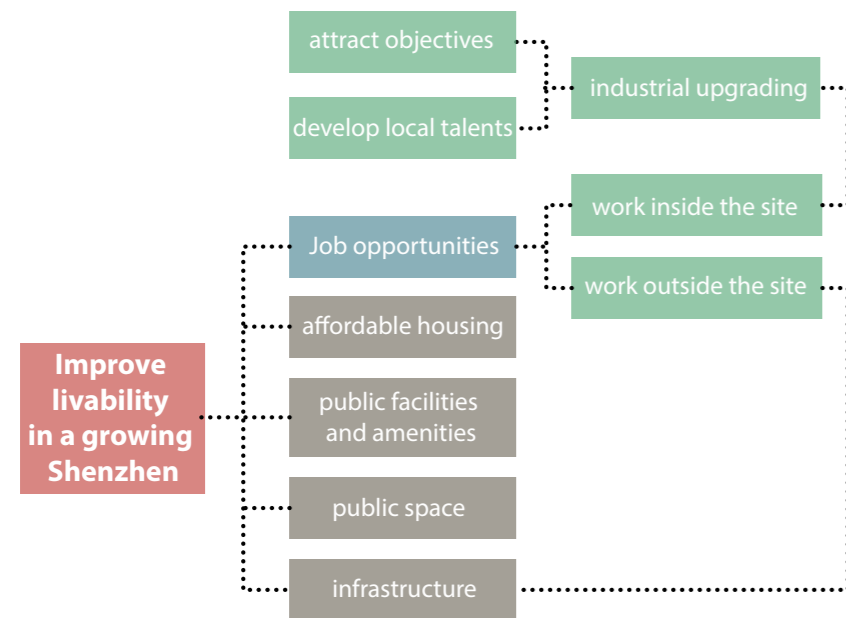*Figure 7-1: Layers of strategy*
Source: author

Figure 7-2: Strategy of job opportunities
Source: author

Job opportunities

This layer would focus on providing job opportunities for not only young graduates, but also local residents.Through the analysis, the jobs in current site are not for young graduates. To provide job opportunities, industrial upgrading is needed. Besides, the site is close to economic and financial center in Caiwuwei-Renminnan-Dongmen area, it is also possible for young graduates working in the financial center and living in the site, so good public transport, which is linked to infrastructure layer, is very important. To make a conclusion, job opportunieis for young graduates could be located both inside and outside the site. Since working outside the site is highly linked with infrastructure, it will be explained in the layer of infrastructure.

7.1 | Strategy- job opportunities

Work inside the site- attract objectives

The current jobs inside the site are mainly retail, which may not be the choice for young graduates. In order to create job opportunities for this group of people in the site, two strategies are put forward. The first strategy is to introduce new industries into the site to create job opportunieis, and the second is to upgrade the current industries in the site.
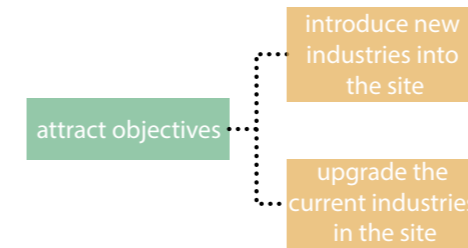

Figure 7-3: Structure of strategies to introduce new industries
Source: author

As mentioned before, with the vision of government, a economic belt would be created from the current financial center to the site and the current retail area is an ideal place for this expansion. So economy industries could be introduced into the site. Besides, a project for a big investment company is under construction in the site, which would become a branch of this company focusing on investment. In order to transform these areas into a good place for economy industrial and improve livability, several transforming principles should be followed:

Transforming principle:

1. The current typical factory urban fabric in this area should be kept to create the identity of the place.

The current urban fabric in this area is typical factory urban fabric and now is quite rare in

"guannei". So this unique fabric should be kept to create identity of this place.

2. Considering land use efficiency and good working and living quality, transit-oriented development is adopted.

2.1 According to the definition of TOD, 400- 800 meters radius (5-10 minutes walking) around the transport node should be the most dense and diverse area. So 400-800 meters circles around metro station in the site are the areas that needs to be densified.

2.2 However, due to the demand for sunlight access and good walking environment, the distance between buildings should be guaranteed. Take the regulation of building distance in China as example, in the south-north direction, distance between buildings should no less than the height of the southern building; in the east-west direction, distance between buildings should no less than 0.9*the height of the higher building. Besides, considering the urban fabric of the current buildings, buildings in the Figure 7-6 are chosen to be densified.
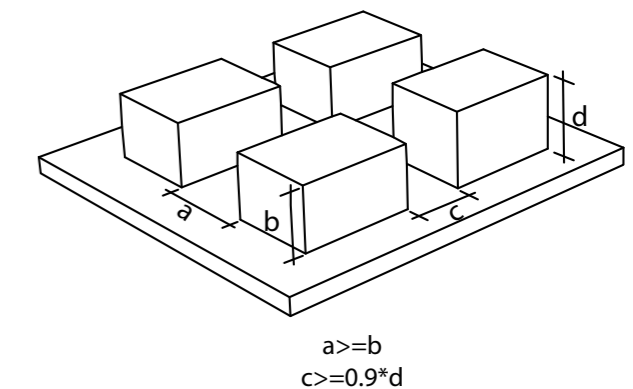

a>=b
c>=0.9*d

Figure 7-4: Strategy of densification
Source: author

2.3 Different and flexible functions should also be

added into this area, such as commercial, public service facilities, dwellings, entertainment since mono-function in the current area is one of the biggest issue of this area.

3. In order to improve walkability in this area, some current commerce-oriented roads would be transformed into pedestrian-oriented, especially roads that are now mainly for parking.

4. To provide good and livable working and living space for residents, pubilc space is needed in this area.

There is no public space for people to social interacting in the current situation, so a good public space should be added in this area. This public space should be accessible for all people inside this area, so it is better to locate in the center of the area. To create a public space inside the area which now is totally covered by buildings, a building in a bad quality would be torn down. Considering these elements, the public space would be located in the center of the area which is shown in Figure 7-6.

5. For those does not have sunlight access in current situation, celosia model could be adopted.

Celosia building is a project of MVRDV which is located in PAU de Sanchinarro, a new neighbourhood situated on the northeast edge of Madrid. To provide enough light and ventilation, communal public space inside the building is created which also offer views towards the city and the mountains.

The daylight access in some current buildings is very bad due to the small distance between buildings. In order to provide enough daylight

access and ventilation, the celosia model could be adopted. Buildings that would adopt this model are showned in Figure 7-6.

Stakeholder:

In the strategy of introduce new industries, the main stakeholder is the government since this strategy is based on the vision of government. So the government should firstly provide other accessible and cheap areas for the current owners, helping them to move out to other areas. Besides, incentives for enterprises and employees should be provided to attract the expansion of economic sector, which can include flexible land use and function policies, low-interest loan policies, and personnel policies. To create good livable environment, the government should not only create regulations to control the living quality, like regulations about density and daylight access, but also provide incentives to keep the currecnt urban fabric of factory, for example, the more current buildings preserved, the higher FSI or lower tax is allowed.
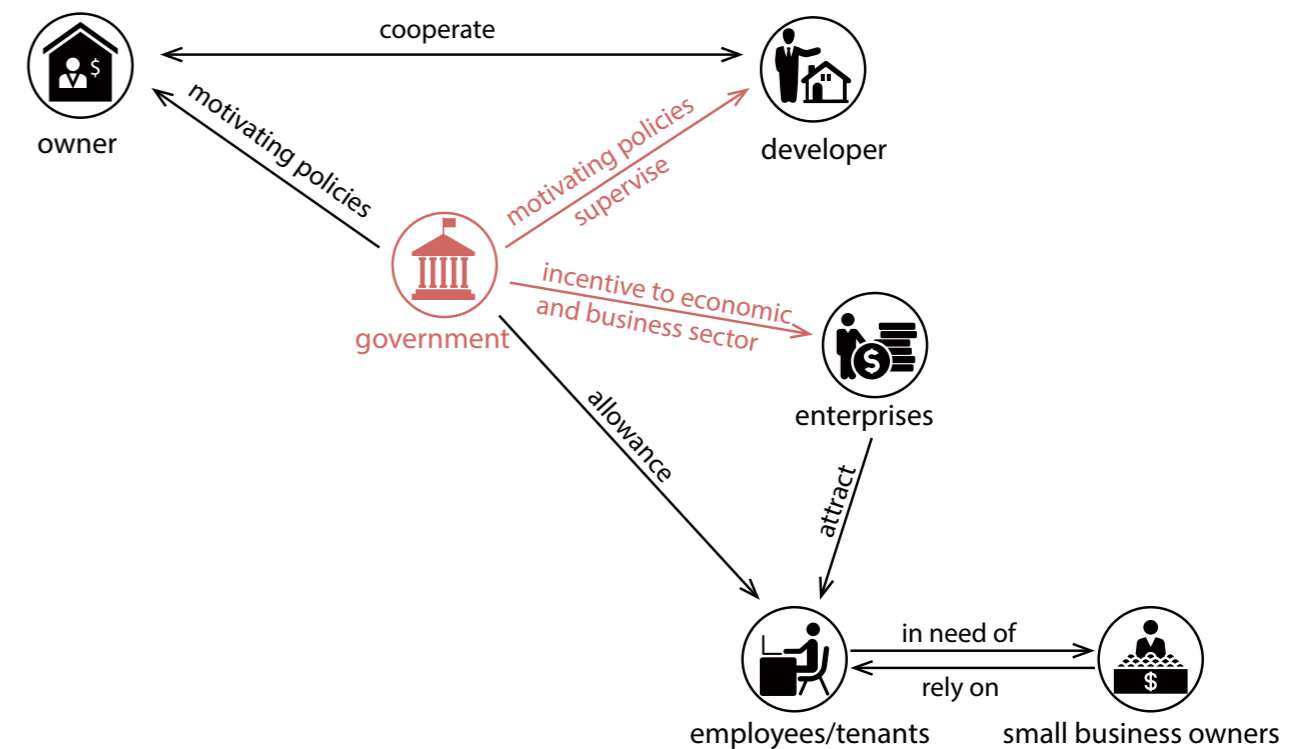
Figure 7-5: Stakeholders of introducing new industries
Source: author

1 Keep the current typical warehouse urban fabric

Identity
Lifestyle
Basic needs for living

2 TOD densification and mixed-use

Identity
Lifestyle
Basic needs for living

3 Transform some roads into pedestrian-oriented

Identity
Lifestyle
Basic needs for living

4 Add pubilc space to create good working and living space

Identity
Lifestyle
Basic needs for living

5 Adopt celosia model for current buildings without sunlight access

Identity
Lifestyle
Basic needs for living

Shenzhen BAONENG Investment Group Ltd

financial and economic sector

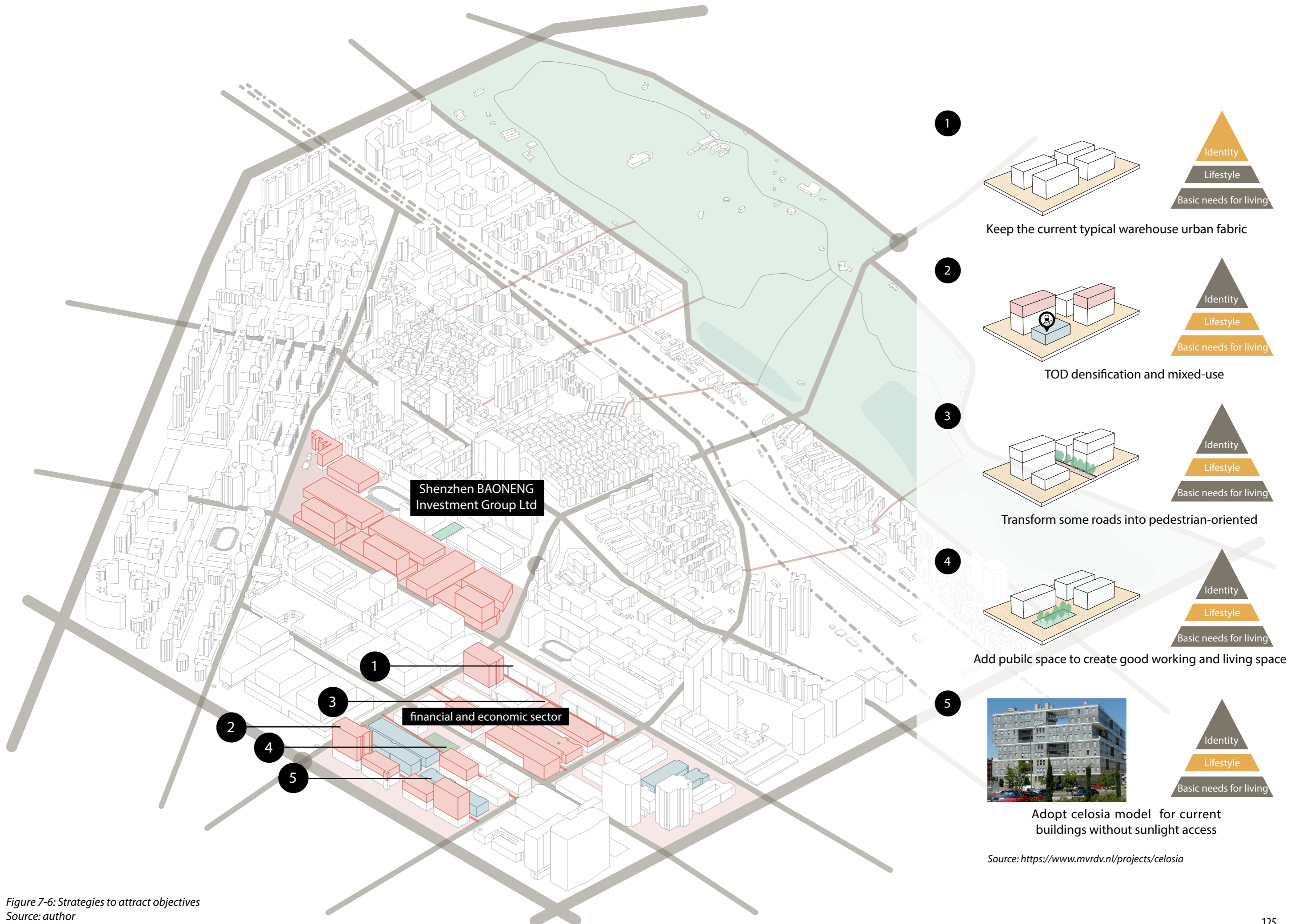*Source: https://www.mvrdv.nl/projects/celosia*

Figure 7-6: Strategies to attract objectives
Source: author

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Work inside the site- attract objectives

The second strategy of attracting objectives is to upgrade the current industries inside the site, which includes smallware retail, auto and auto parts retail, auto clean, warehouse, costume retail, handicraft and jewellery retail and furniture retail. These industries could be divided into two categories. The first category is retail or warehouse that rely on logistics and has a big and bad impact on living environment and should be moved out to areas which are closer to highway

or railway station, including smallware retail, auto and auto parts retail, auto clean and warehouse. The second category contains costume retail, handicraft and jewellery retail and furniture retail that have a less impact on living environment. These retails have the potential to be transformed into retail combined with design and manufacture. Besides, the manufacture of these items, especially handicraft and jewellery, has the potential to cooperate with local community and local residents, which is already existed in communities in Shanghai. Based on the current functions in the site, northern retail area would be transformed into areas focusing on interior design/ furniture design/ industrial design retail and manufacture and the southern retail area would be transformed into areas for fashion and jewellery design retail and manufacture. To create

good working and living environment, the spatial intervention principals should be followed:

1. The current typical factory urban fabric in this area should be kept to create the identity of the place.

2. These two areas are all located in the 800 meters circle of metro station, so TOD model would also be adopted and the criteria for densifying is the same as mentioned before.

3. To provide good and livable working and living space for residents, pubilc space is needed in this area.

To realize this strategy, government should be the main stakeholder since a lot of incentives needs to be provided by the government to facilitate industrial upgrading. The government

should firstly provide other accessible and cheap areas for the current owners, making it possible for industries in the first category to move out. What's more, incentives for industrial upgrading, especially for design sector should be provided, which can include flexible land use and function policies, low-interest loan policies, and personnel policies. And similar regulations should be put forward to supervise developers as mentioned before.

Figure 7-7: Structure of strategies to
Source: author
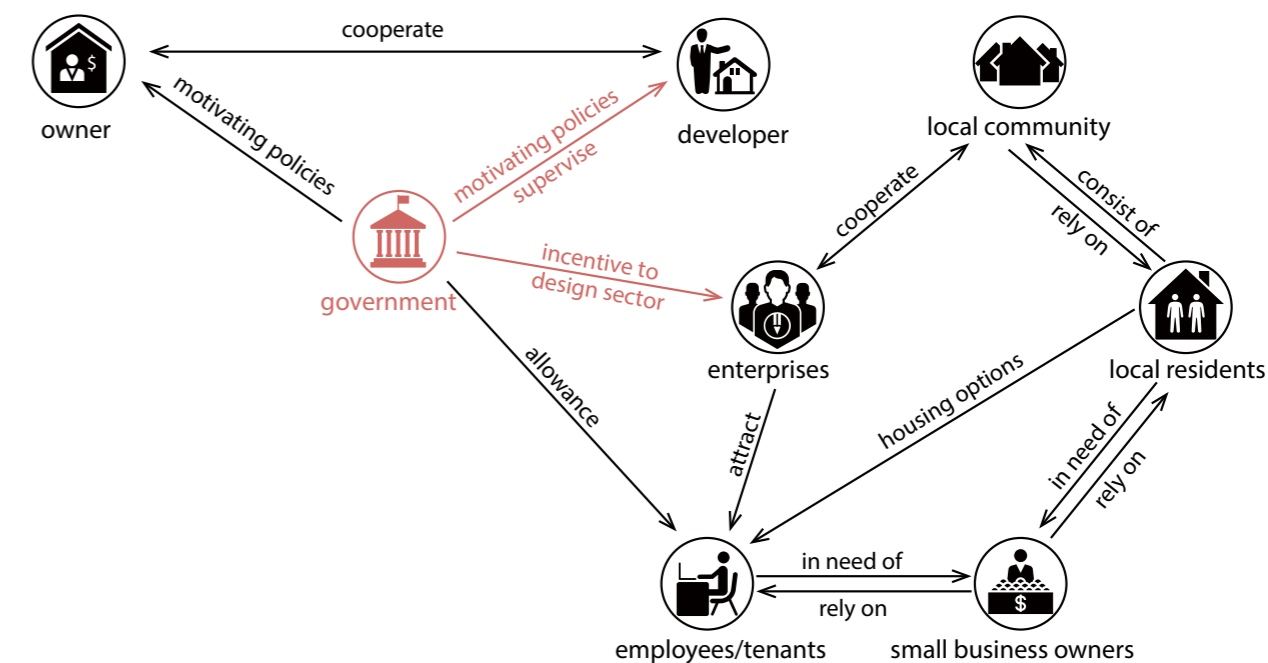
Figure 7-8: Stakeholders of industrial upgrading
Source: author

interior design/ furniture design/ industrial design
retail and manufacture

fashion and jewellery design
retail and manufacture

1 Keep the current typical warehouse urban fabric

Identity
Lifestyle
Basic needs for living

2 TOD densification and mixed-use

Identity
Lifestyle
Basic needs for living

4 Add pubilc space to create good working and living space

Identity
Lifestyle
Basic needs for living

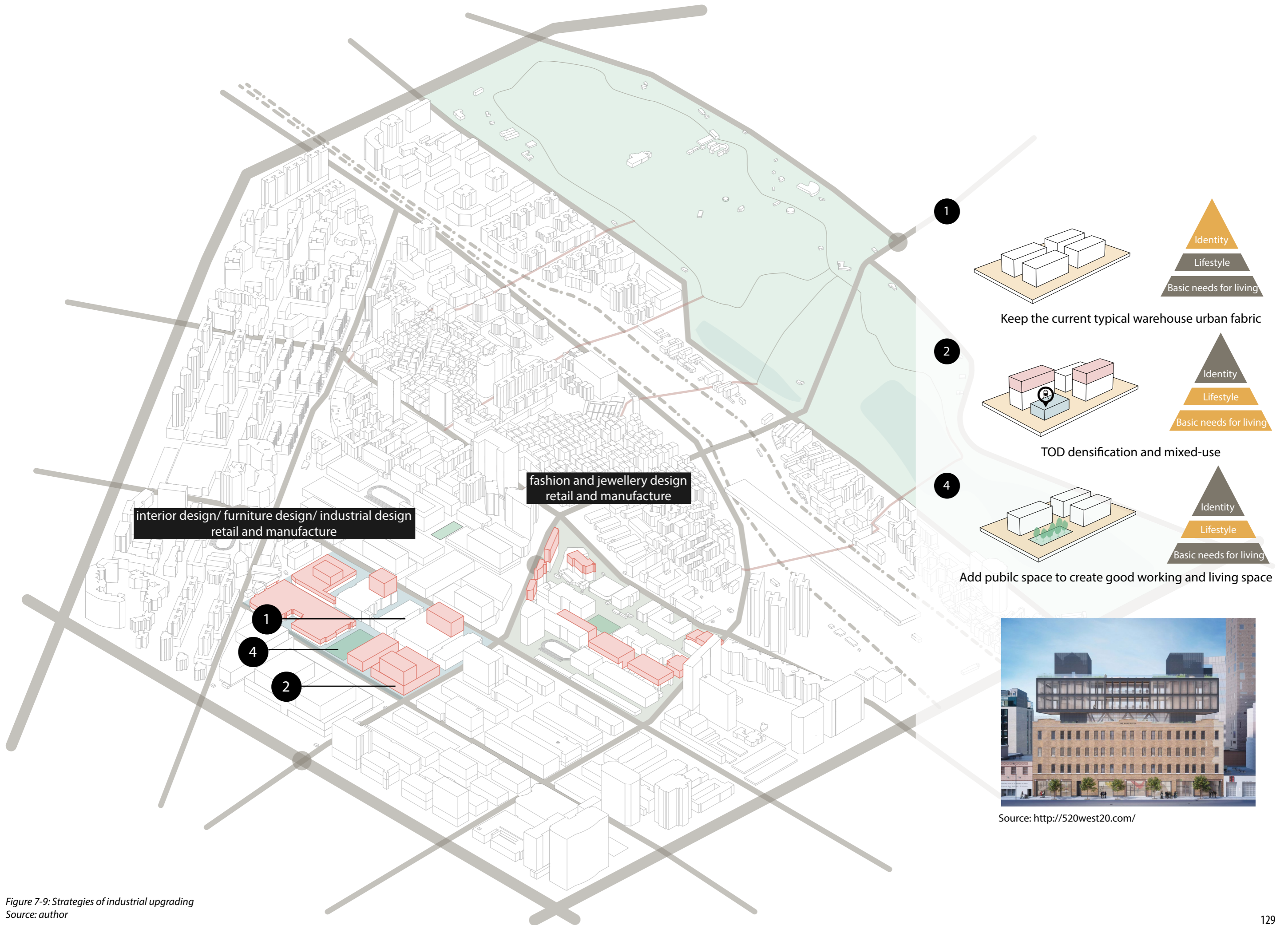Source: http://520west20.com/

Figure 7-9: Strategies of industrial upgrading
Source: author

129

Work inside the site- develop local talents

According to Richard Florida (2002), each person is creative, so also the residents of the site. But the majority of current local residents do not have the possibility to develop their talent. Lack of education and training, internship places, orientation and podiums, development of 'soft skills', social networks, and language proficiency are prime causes for the lack of opportunities among the population. Visible and strong connections and contributions with and by local entrepreneurs, the creative industry, schools and multifunctional neighborhood centers that aim at specialised talent development, can make up these deficits.

Consider the current function and the demand of attractive and visible places for these schools, neighborhood centers and business space, the current warehouse buildings in Figure 7-11 are chosen to be transformed into this function,. Physical interventions are defined as:

1. The current typical factory urban fabric in this area should be kept to create the identity of the place.

2. This area is located near metro station, so TOD model would also be adopted and the criteria for densifying is the same as mentioned before.

In this strategy, enterprises or schools that want to contribute to the development of local talents. With this wish and contribution, it is possible for them to negotiate with government for a visible and attractive business space, which also could benefit their business. And these enterprises or schools would take the responsibility to develop local talents, contributing to industrial upgrading.

Figure 7-11: Locations of areas to develop local talents
Source: author

Figure 7-10: Structure of strategies to develop local talents
Source: author
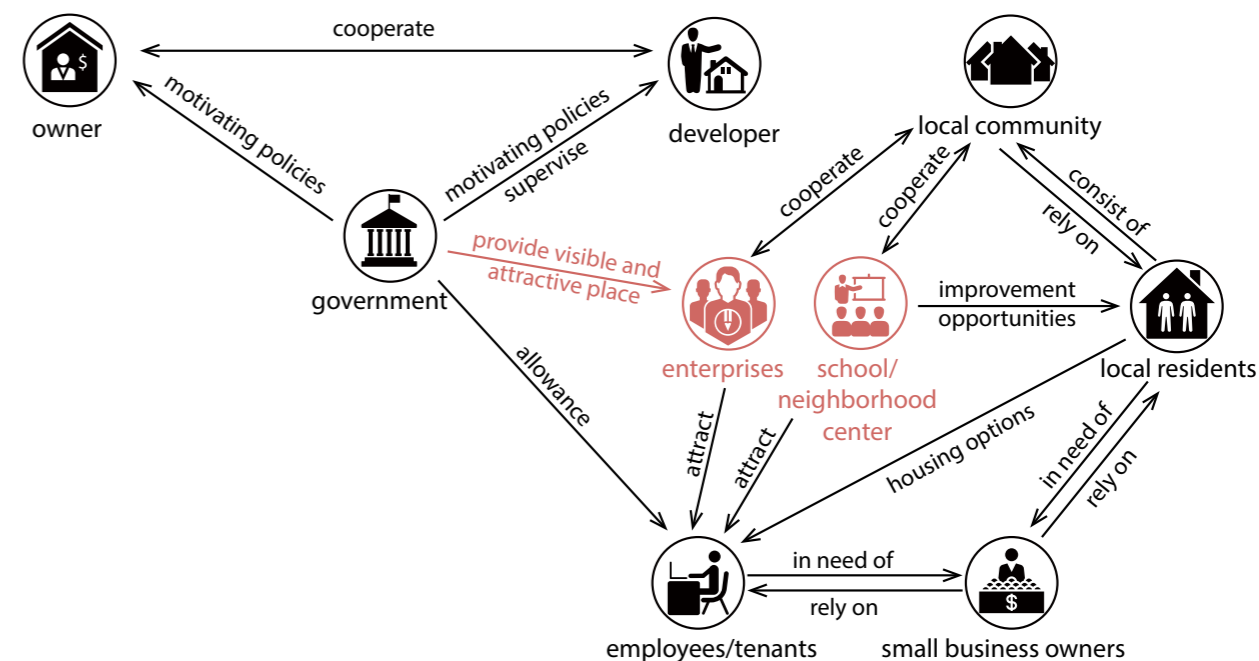
Figure 7-12: Stakeholders of developing local talents
Source: author

enterprises which contribute to local community

neighborhood center/ schools

1

2

1

Identity

Lifestyle

Basic needs for living

Keep the current typical warehouse urban fabric

2

TOD densification and mixed-use

Figure 7-13: Strategies to develop local talents
Source: author

133

7.2 | Strategy- affordable housing

The layer of affordable housing mainly concentrate on providing affordable housing not only to young graduates, but also other citizens, such as middle-income families and low-income migrants. As one of the most important reasons that drive people escaping from mega cities, affordable housing is a very essential indicator of livability. This layer contains three strategies, which are providing new residential areas, trasnforming current residential areas and advocate long-time renting.
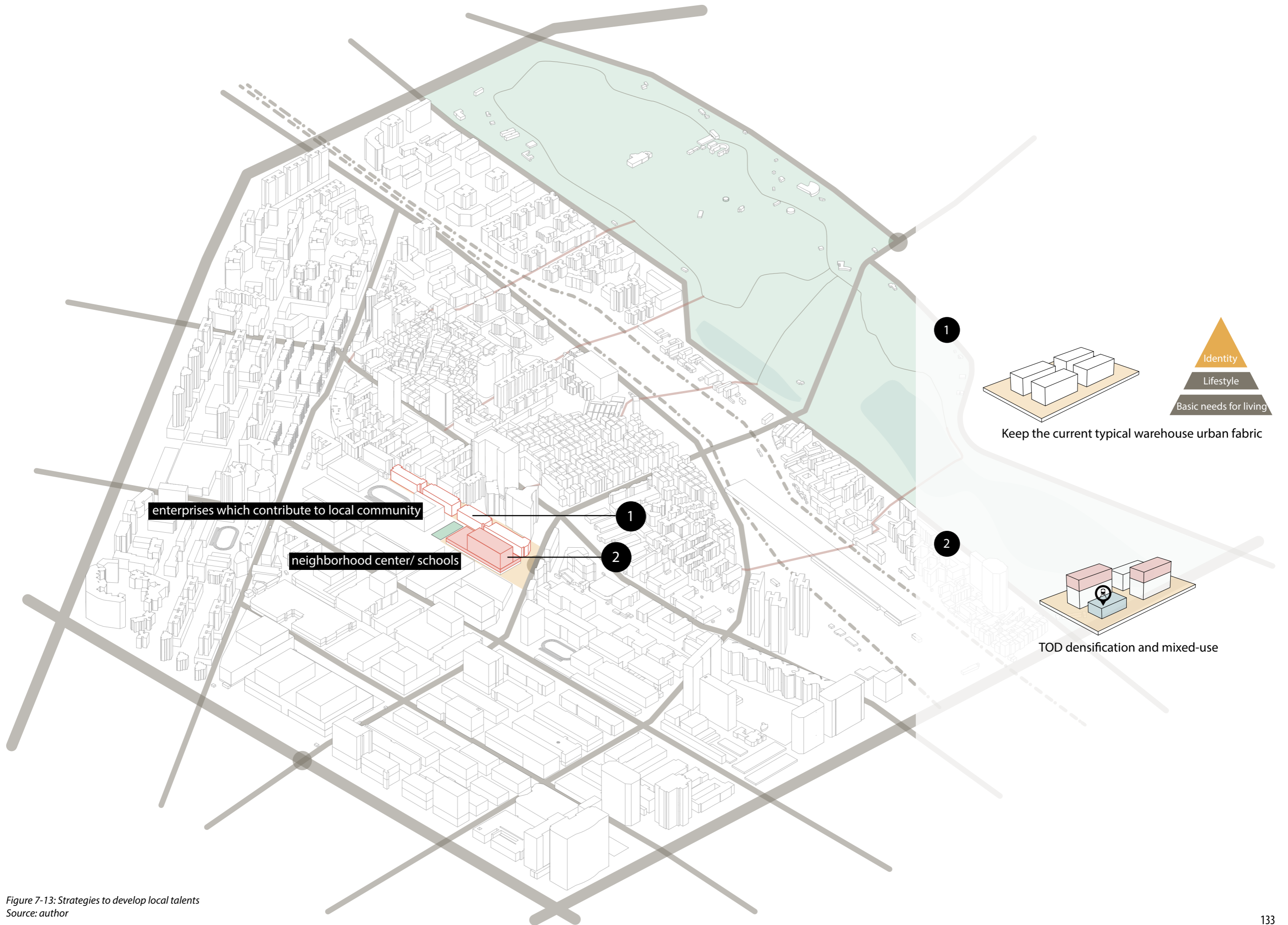
Affordable housing- provide new residential areas

After attracting new industries and employees into the site, the living requirement would increase largely, so new residential buildings should be provided. New residential buildings will be located in two areas. The first area is the moving-out warehouse area. After moving out from the site, large space would be remained for dwelling. The second area is area that would be turned into mixed-use, which has mentioned in the layer of job opportunities.
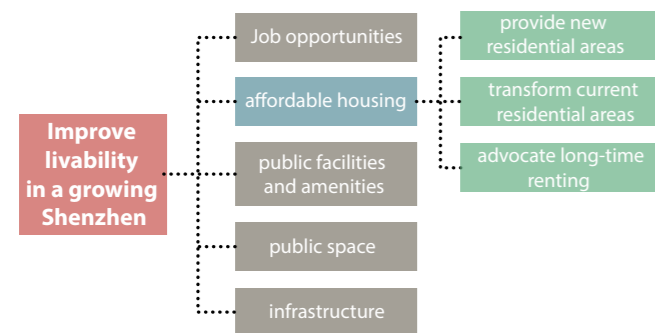

Figure 7-15: Location of new residential areas
Source: author

Figure 7-14: Strategies to provide affordable housing
Source: author

To create livable living environment for both young graduates and other residents, following design principles should be adopted:

1. New residential areas would be a livable place for a diverse group of individuals ranging from young graduates, low-income migrants and other local residents. Besides, gated community is not allowed during construction to reduce social segregation in the area. So a super block should be devided in small plots to accommodate this dynamic mix of people and lifestyles and create open communities.

2. In order to accommodate low-income migrants, social housing is needed in this area. The mix of different types of housing could contribute to reduce the social exclusion and segregation. Taking the regulation of mixed housing type in Netherlands, social housing should cover at least 30% of the whole newly built housing. To motivate the developed to build social housing, FSI compensation would be provided. State-owned developers could also involve in these social-housing built projects.

3. Consideing the efficient use of land, transit-orinted development is adopted. But in this area, bus station would be the center for TOD model.

4. In order to create convenient and good living environment, functions such as entertainment, amenities, commercial should be located in the area.

5. Even though gated community is not allowed to build, collective outdoor space should also be provided for the idea of safety. So this new designed area should have a mix of collective outdoor space and public space for different residents to social interact. These outdoor space

could help to contribute to a mix of attractiveness and liveliness for future residents.

6. Soft barriers would be created as a noise-proecting landscape between the new design areas and the railway tracks. This could, on one hand, create areas which might serve as a park or play zones for the future residents; and on the other hand, be linked with the surrouding big green space- Honghu Park.
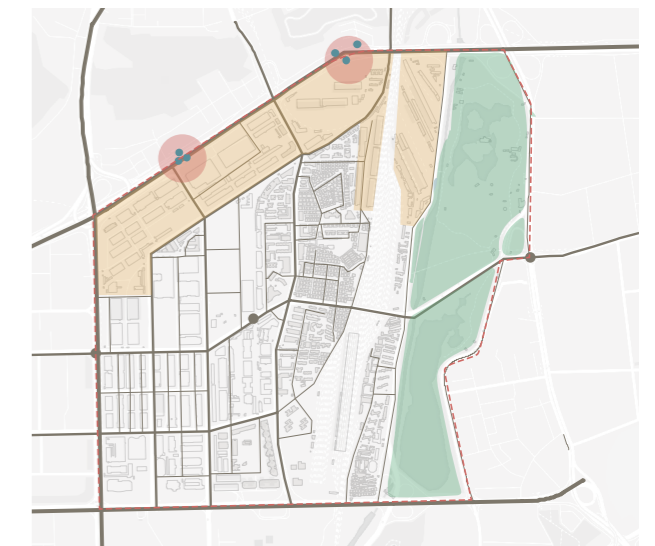
Figure 7-16: Location of new residential areas in current warehouse area
Source: author

6 Divide a superblock into small plots, focusing on different groups of people for social inclusiveness and social housing should cover 30% of the whole newly built housing

Identity
Lifestyle
Basic needs for living

2 TOD densification and mixed-use

Identity
Lifestyle
Basic needs for living

7 Mix collective public space and community space

Identity
Lifestyle
Basic needs for living

8 Create soft barriers as a noise-proecting landscape

Identity
Lifestyle
Basic needs for living

Figure 7-17: Strategies of new housing
Source: author

Affordable housing- transform current residential areas

There are four typical urban fabrics of residential areas, which are Danwei housing, urban village, factory compound and commercial housing. Four key interventions of transforming would be adopted, including mixing different groups of people, mixed use, mixing private and public space and adapting housing fabric.

Figure 7-18: Structure of strateiges to transform current residential areas
Source: author

Danwei housing

As mentioned in the analysis, the current issues of Danwei housing are mono-function and only for dwelling, gated and homogenized public space, lacking different housing fabric and mainly for families, and lack of maintenance. Facing these problems, spatial interventions are defined as:
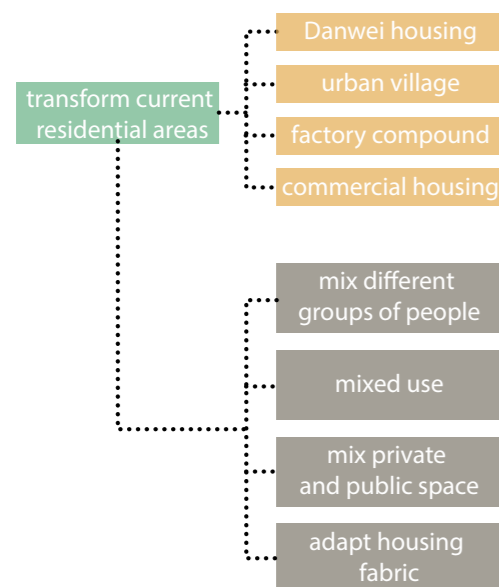
1. The current Danwei housing should not only accommodate employees, but also other groups of people. So in order to satisfy the demands of different groups of people, the super block should be divided into different plots. Proportion of target groups should be bases on the current situation.

2. Mixed-use should be adopted in the area. Commercial activities tends to accumulate along big infrastructure. The transformation of buildings along main streets can integrate parking, storage, public space and shop. However, residential buildings which are not located on main streets should not involve too much commerce. Design of the main street needs to consider space for local business and parking.

3. The current gated and homogenized public space prevent people living outside interacting with residents inside Danwei housing. So a mix of public space and collective outdoor space should be provided. The government should proivde allowance for current residents for their payment of management.

4. Danwei housing was originally designed for families, so the current urban fabric does not meet the demand of other groups of people. The current slab apartment building can no longer suit the increasing diverse expectations of future residents. Transforming the current housing types would be very important. For young graduates, single rooms are the better choice. Middle income families have a higher expectation on living quality, so housing with private garden or duplex apartment, may become their choice.

Urban village

From the analysis, density of urban village is very high and public space is very rare inside urban village. Housing fabric is also unitary and housing quality is usually not good. Facing these problems, spatial interventions are:

1. In order to get enough sunlight access, the whole urban village should be divided into small plots according to the main roads, and the center buildings within the enclosure of other buildings should be demolished. Residents in these demolished buildings could be accommodated into the newly built social housing in the site.

2. Public space for social interaction should be added. The public space should not only inside the urban village, but also outside urban village for residents interacting with other people. These public space should be accessible for both residents in the urban village and people outside the urban village. Besides public space inside the buildings could also be added through adding balcony and stairs.

3.Transorm the current housing types for different groups of people. Some buildings with better quality could be chosen to transform for young graduates.

Factory compound

As analyzed before, mono-function is one of the biggest issues of factory compound and now the current main function is manufacture. Public space lacks due to the idea of efficiency and housing typology is mainly for groups of people. So in order to improve livability of this urban fabric, spatial interventions are:

1. The transformation of factory compound is mainly aimed at those have already deteriorated and the former manufacture function has nearly disappeared. So this area has the potential to be transformed into mixed-use. Residential, commercial and work activities could be added in this area. Commercial and working activities tend to accumulate along big infrastructure and main roads in the factory compound. Ground floor, which has a higher commercial value, could be transformed into commercial and working space.

2. Residential activities usually would happen in upper floors. The fabric of factory compound could be preserved through transforming the ground floor into commercial and collectively used and other floors could be trasnfromed into residential areas. Different housing typologies are put forward in the case. The urban fabric of factory compound also has the potential to be densified through adding tower building on top of the current building.

3. Public space is very essential for people to interact while there is a lack of public space in current factory compound based on the idea of efficiency. So a mix of public space and collective outdoor space would be added inside the area. Except for public open space like square and park, streets and public-used ground floors are also very important public space for people to interact. Some functions like library, sharing kitchen and gym could be added on the ground floor.

6

Identity
Lifestyle
Basic needs for living

Mix different groups of people

2

Identity
Lifestyle
Basic needs for living

mixed-use

7

Identity
Lifestyle
Basic needs for living

Mix collective and public space

9

Single room

Apartment with garden

Identity
Lifestyle
Basic needs for living

Adapt housing typology

6

7
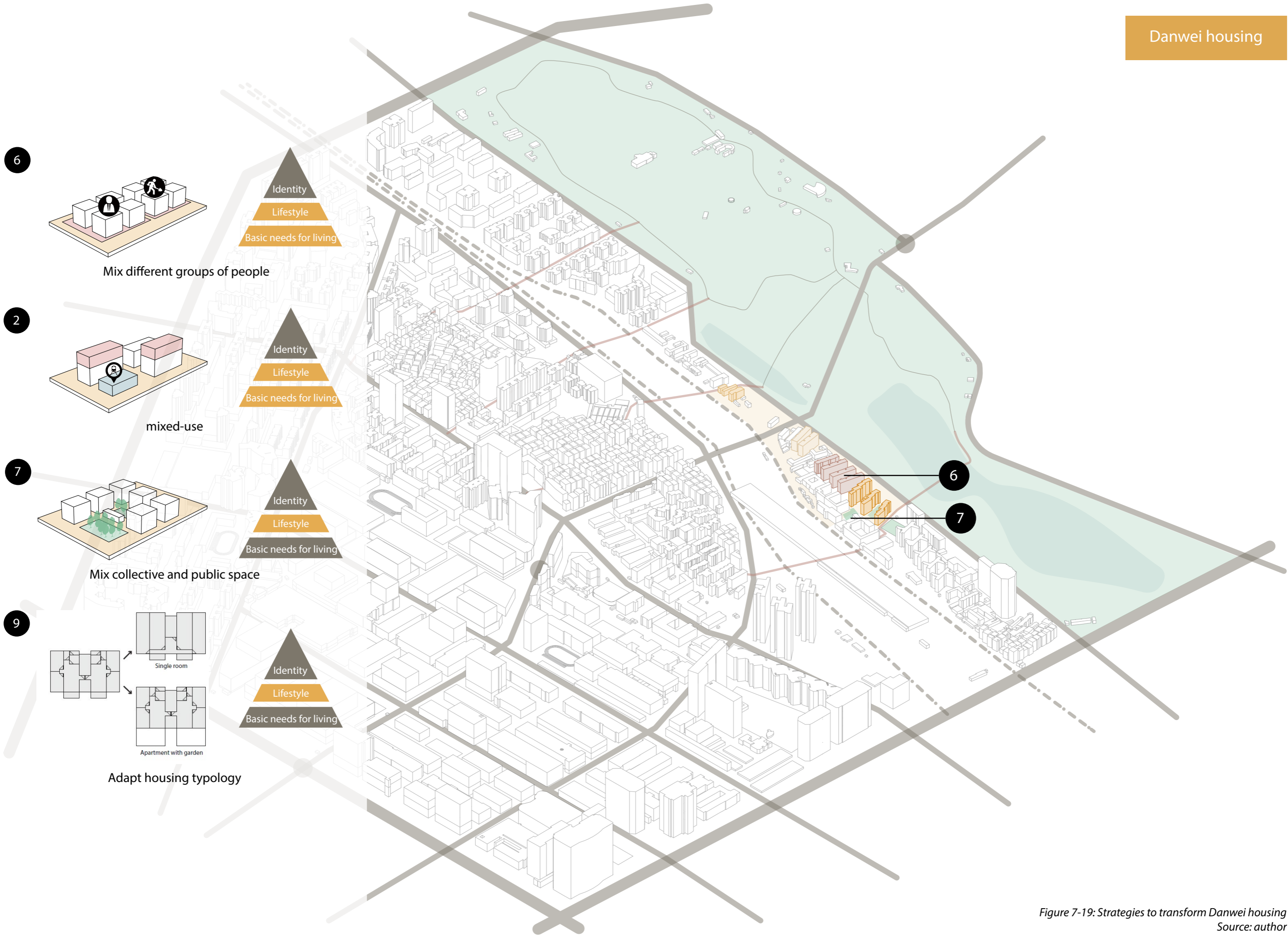
Figure 7-19: Strategies to transform Danwei housing
Source: author

10
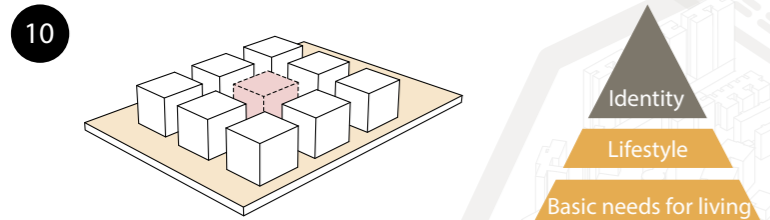
reduce the density of urban village
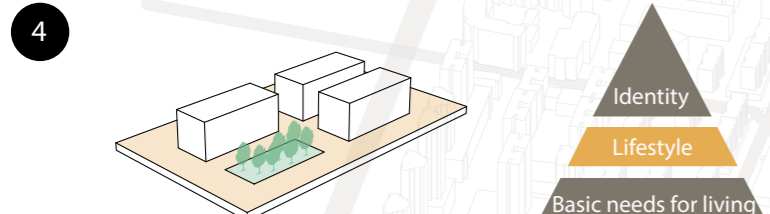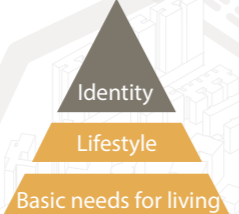
Identity
Lifestyle
Basic needs for living

4

Add more public space for social interaction

Identity
Lifestyle
Basic needs for living

9

Single room

Apartment with garden

Adapt housing typology

Identity
Lifestyle
Basic needs for living

Source: http://www.gooood.hk/lm-youth-community-china-by-doffice.htm
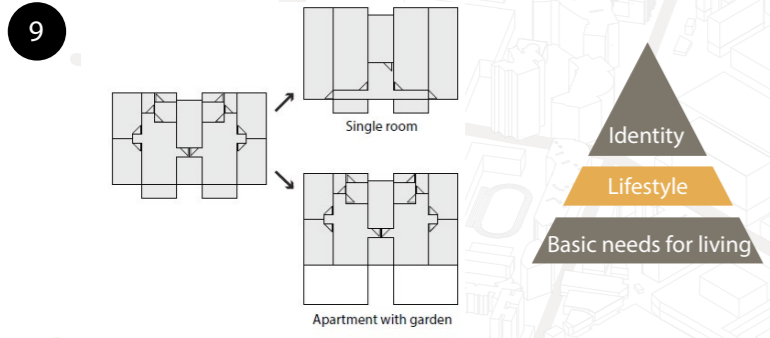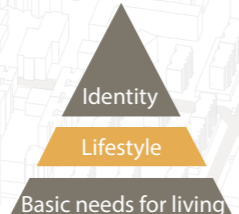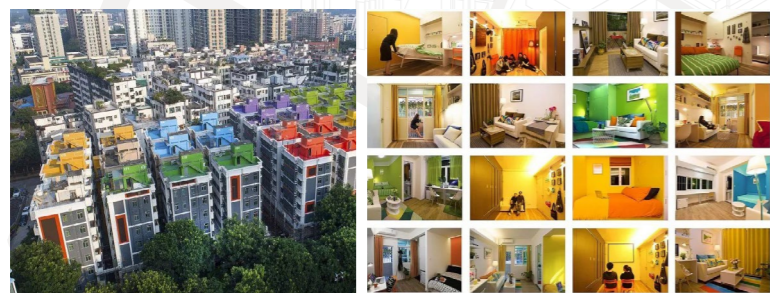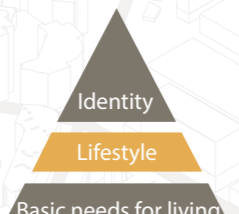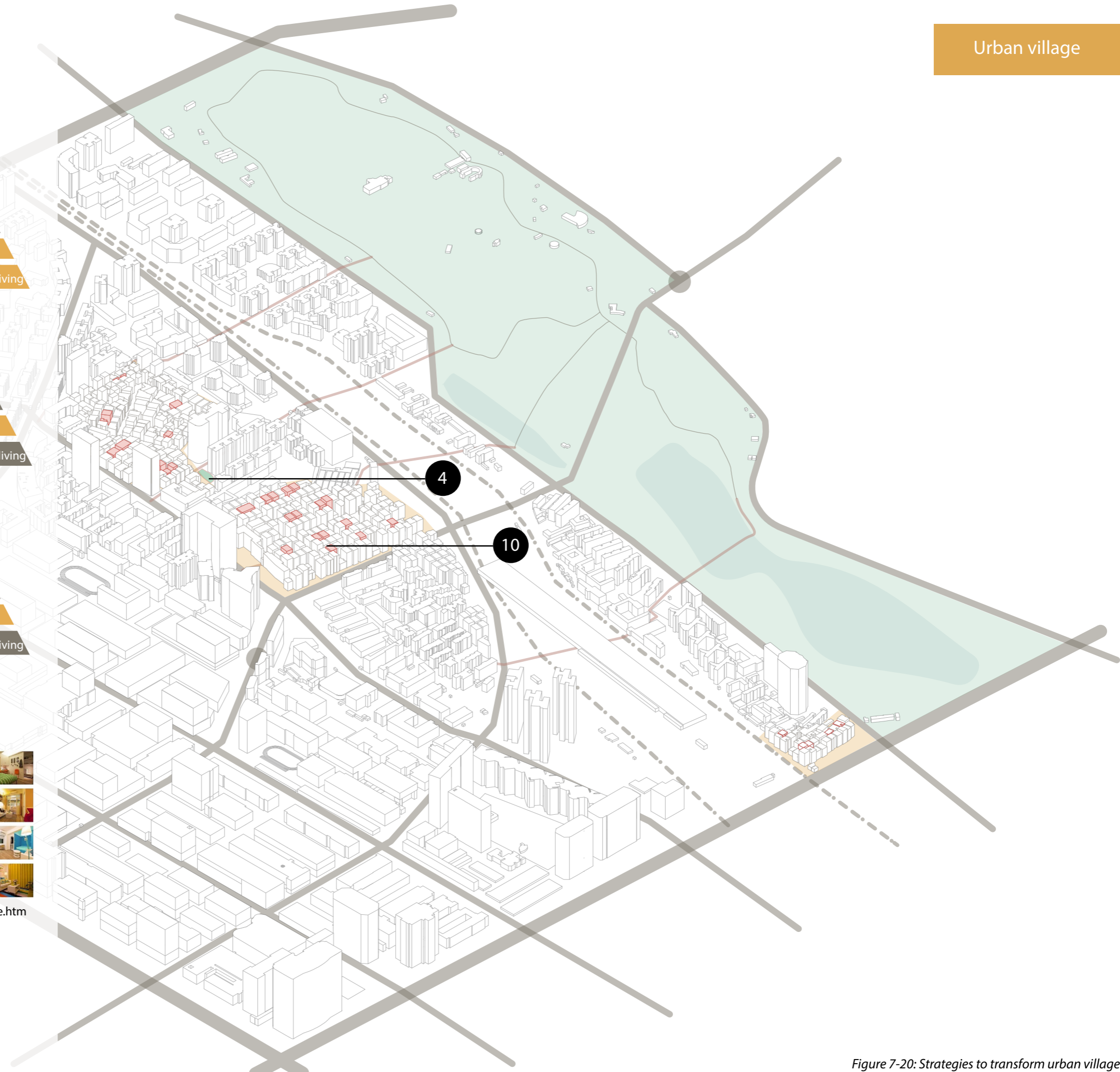
Figure 7-20: Strategies to transform urban village
Source: author

1
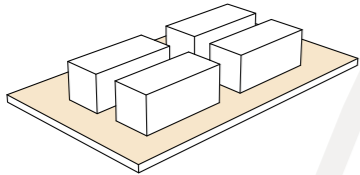
Identity
Lifestyle
Basic needs for living

Keep the current typical warehouse urban fabric

2

Identity
Lifestyle
Basic needs for living

TOD densification and mixed-use

4

Identity
Lifestyle
Basic needs for living
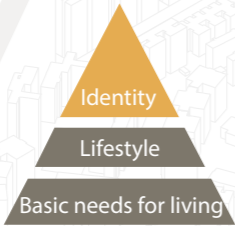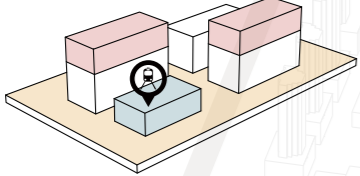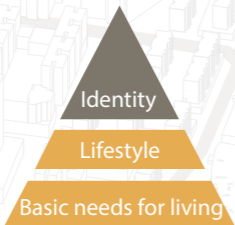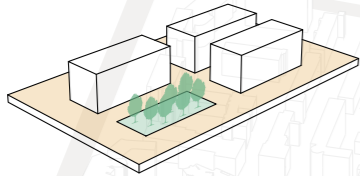
Add pubilc space to create good living space
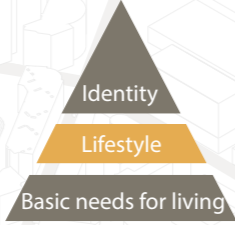
Source: http://www.sohu.com/a/157809240_448680
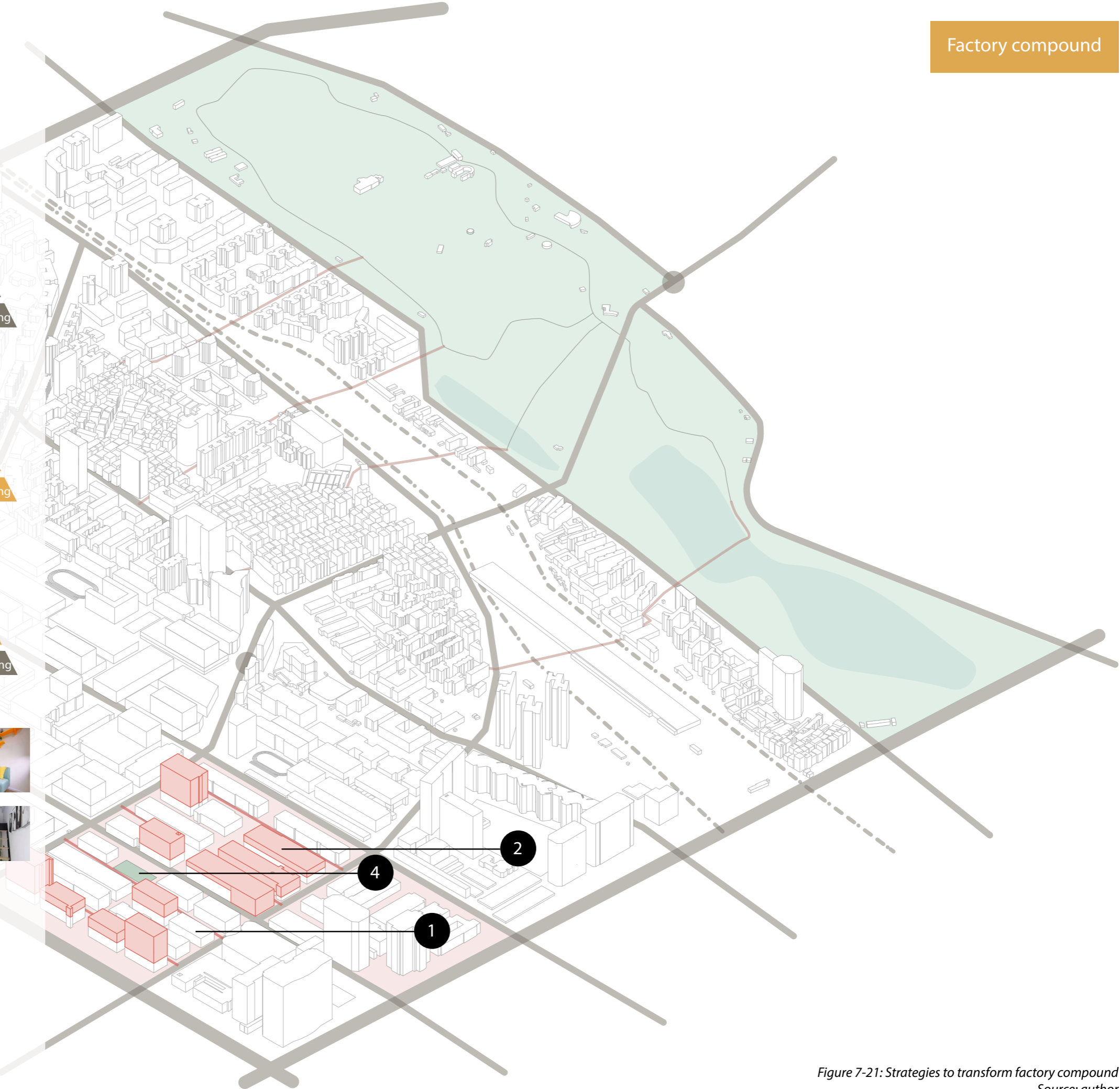
Figure 7-21: Strategies to transform factory compound
Source: author

7

Identity
Lifestyle
Basic needs for living

Mix collective and public space
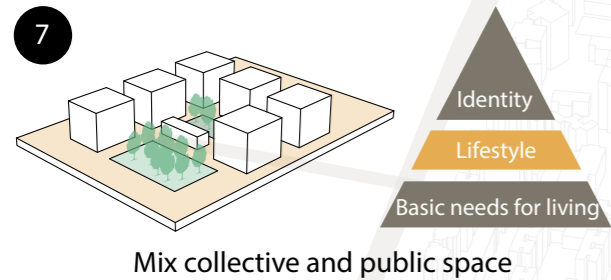
Commercial housing

Commercial housing has the best building quality with good outdoor space. While as a gated community, most of facilities inside, especially outdoor space, cannot be enjoyed by people living outside. So the physical interventions would be:

For the gated community, the most important invention should be how to "open" the gate, and make all residents enjoy the good facilities inside. Even though there are already some debates on how to open these gated community in China, while it is still very difficult to realize it. The most important public facility in commercial housing that people living outside cannot share is the outdoor space. In order to make all people enjoy the outdoor space inside commercial housing, a mixture of public space and collective space should be provided. The government should also proivde allowance for current residents for their payment for management.

7
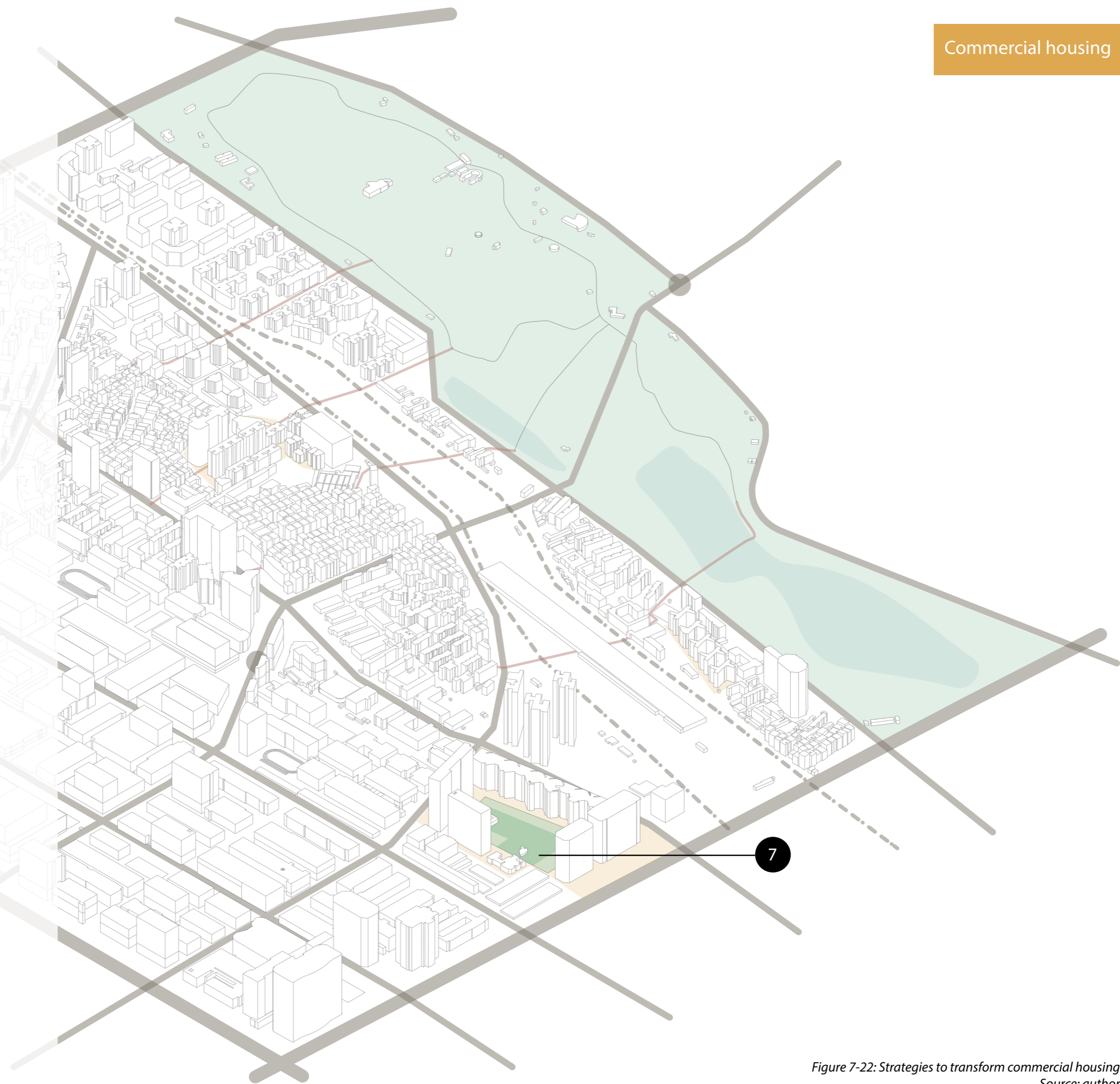
Figure 7-22: Strategies to transform commercial housing
Source: author

Affordable housing- advocate long-time renting

My interviews with the young graduates in Shenzhen showed that the instability is one of the main reasons they do not choose to rent. Any little change of the owners could influence their living in the renting house. Even though long-time renting is already very common in Europe, short-term renting is still the main way of renting in China. However, the short-term renting does not only very inconvenient for tenants, the frequent moving in and out does not contribute to create the sense of community. So it is very important to adovate long-time renting rather than short-term.

Nowadays there are mainly two ways of long-time renting in Shenzhen. The first one is dominated by state-owned developers and supported by government. The state-owned developers first develop or regenerate an unlivable area, and the housing inside the site is mainly for employees in enterprises that contribute a lot to the district or
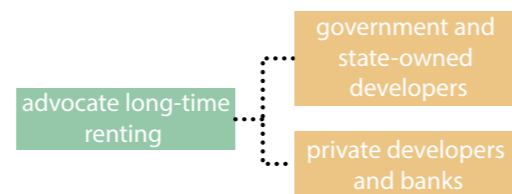
Figure 7-23: Strategies to advocate long-time renting
Source: author

young graduates. The government would provide rent allowance at the same time. In this way, the owner of the housing is the developer and the tenants could directly sign agreements with developers, which means it is possible for them to sign long-time agreements. This way of developing and management has already been put forward in Shenzhen. Shenye Enterprise, a state-owned enterprise, transformed 35 buildings inside an urban village into 504 houses with over 15 housing typologies for high-educated young migrants. Cooperating with Futian District government, the majority of tenants are employees of big companies which contribute the most to the financial growth of Futian District.

All employees in these big companies could apply for the housing. At the same time, the government would provide 40% rent allowance at the market. Shenye Enterprise is not only the developer, but also the management. The tenants would sign agreements with Shenye Enterprise, making long-time renting possible.

The second way of long-time renting is private-developer-dominant and is supported by the bank. In 2017, one of the four biggest banks in China-China Construction Bank Corporation carried out a project and cooperated with 11 developers to start long-time renting business. The developer would be responsible for developing and management. And the bank would offer different products, like different interests, years and discount. The longer time the tenants rent, the less rental. The tenants also sign renting agreements with developers. Tenants can easily find a place to rent through the app or official website of the bank or the developer.

Figure 7-25: A screenshot of an app for long-term renting from a bank
Source: author

Figure 7-24: Stakeholders of advocating long-time renting which is dominated by state-owned developers and supported by government
Source: author

Figure 7-26: Stakeholders of advocating long-time renting which is dominated by private developers and supported by banks
Source: author

7.3 | Strategy- public facilities and amenities

When it comes to public facilities and amenities, the site is now lacking most of these elements which can improve the living quality. So it is vital to add the facilities and a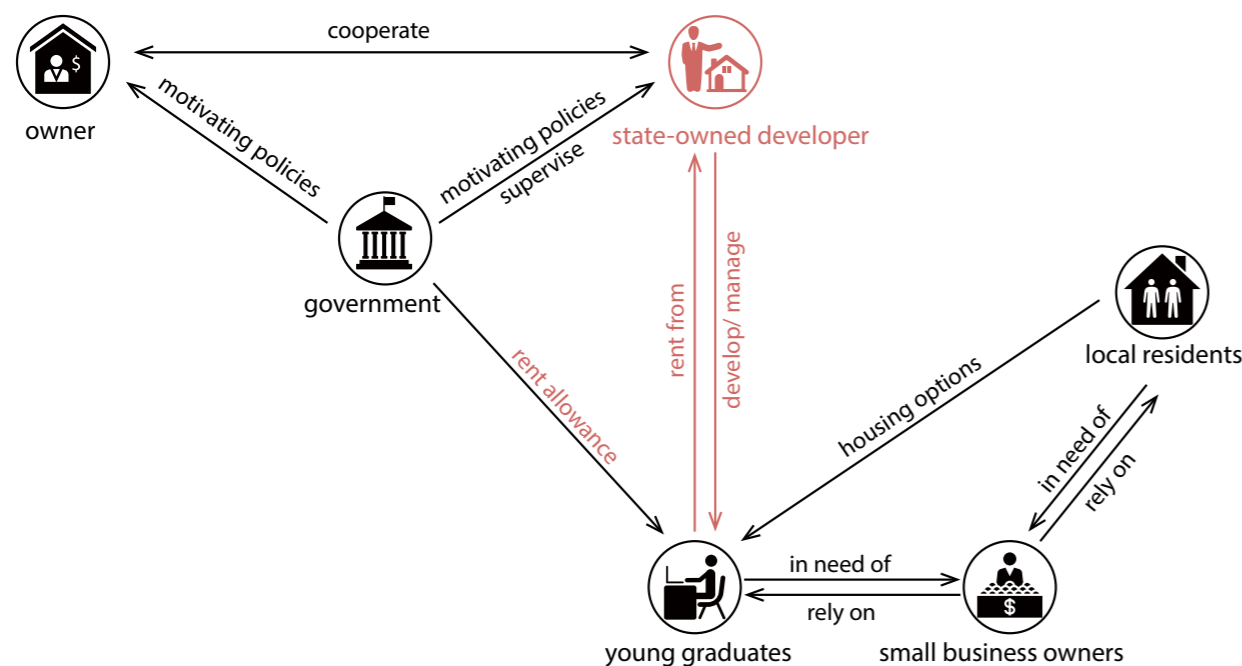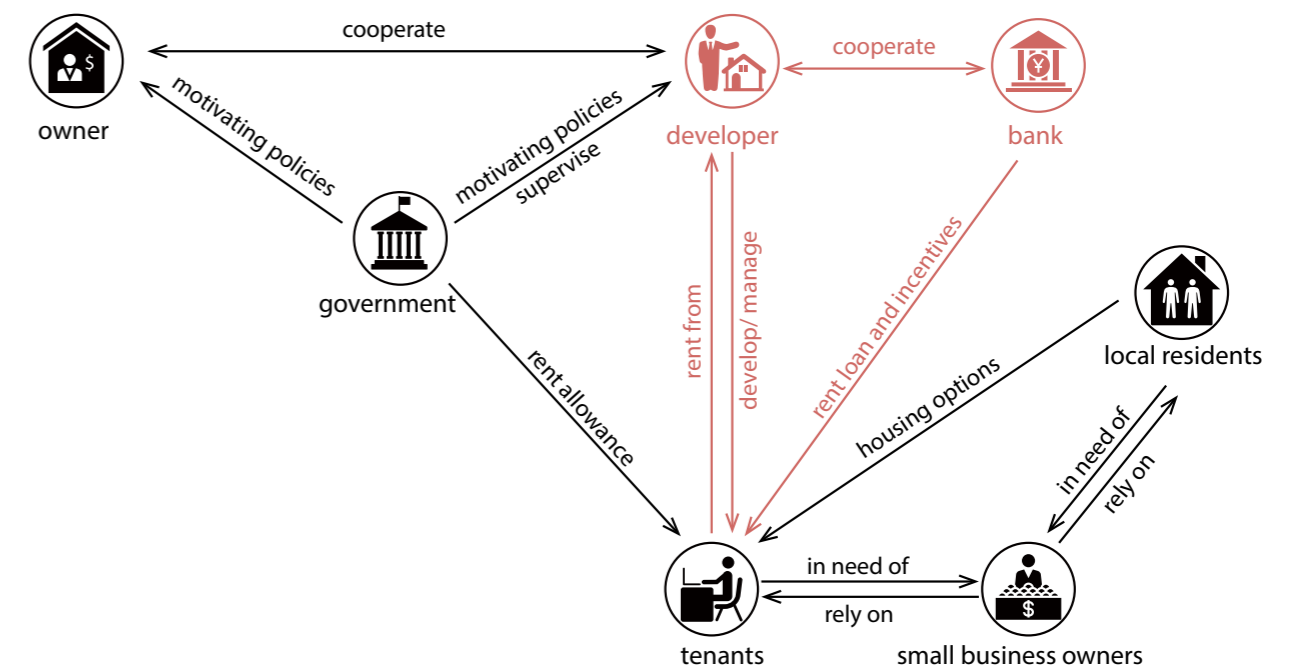menities that local residents need for a more convenient and livable life and the location of facilities and amenities should follow transit-oriented development. Through the analysis before, the public facilities that local residents lack most are big supermarket and city complex. The city complex, which combines entertainment with shopping, parking and working, is a place that people can work and also get relaxed. In Chinese context, a city complex is usually one of the biggest attraction in a region, and that means a large amount of people flow is very essential and the service area of city complex is quite big. As estimated, the service area of a city complex is usually 3-5 kilometer radius. So the city complex should not only serve the residents inside the site, but also people nearby. Due to this reason, the new city complex could be located near the metro station in the west (see in picture 7-28). And the current buildings should be densified.

The current only easily-accessible big supermarket is in a good location while the service quality is bad. Upgrading the current big supermarket could solve this problem.

Figure 7-27: Reference of the new city complex
Source: LE GRAND MAGASIN, MVRDV, 2014
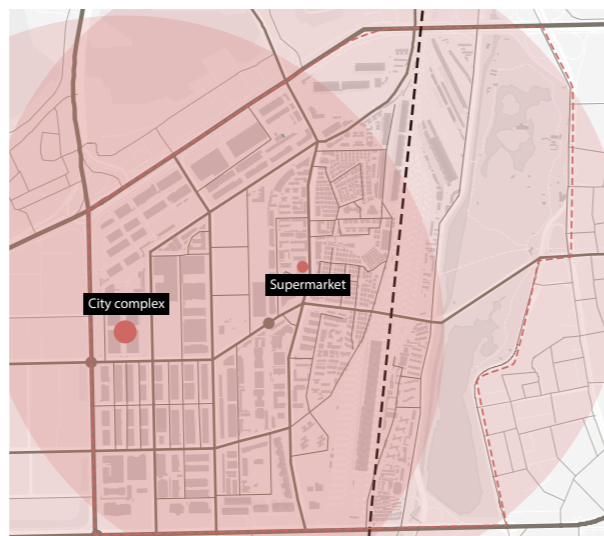
Figure 7-28: Location of the current supermarket and new city complex and their serivce area
Source: author
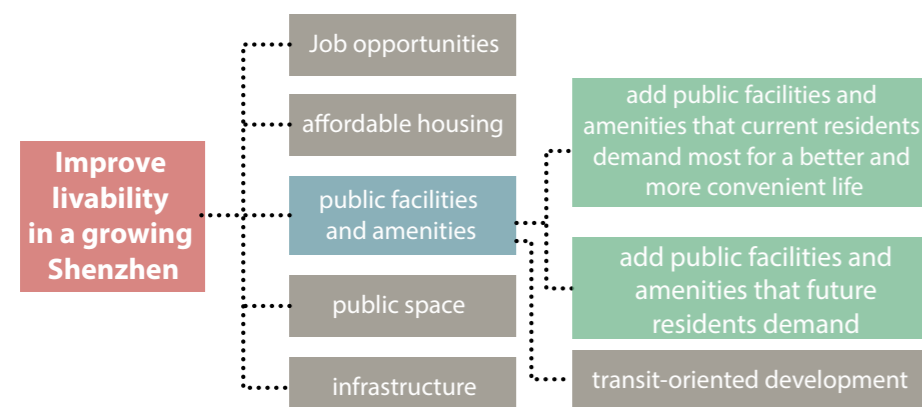
Figure 7-29: Strategies of public facilities and amenities
Source: author

Considering the service area of big supermarket as 1~1.2 kilometer radius, this supermarket could serve most of the residents living in the east. For people living in the west , the supermarket could be combined with the city complex. Even though these two big supermarket could cover most of the areas in the site, there are still some areas in the southeast cannot enjoy these big supermarkets, so some small supermarkets could be added as supplement.

For public facilities, hospitals and schools are the most important facilities that need to be added in the site. There is only one primary school currently in the site, which is located in the urban village. As analyzed before, only students in the northeast can easily enjoy this facility. So more primary schools should be superinduced. Even though new residential would be developed in the west, the main tenants would still be young graduates, who may not have children at first, so new primary school should be firstly built in the current southeast residential area. The service area of primary school is 500 meters radius, which means students living in the 500 meters radius could easily enjoy this facility. What's more, good environment is quite important for schools. It should have enough sunlight access and be away from noise making, such as railway tracks and the large flow of cars. While accessibility is still very vital for the students, so schools would be located in areas with low density and near the local roads rather than main roads. Following these principals, two new primary schools will be added in the south (see in Picture 7-31). And when other new residential areas are built, new primary school should be added following the same principals. Except for primary school, middle school is also needed as analyzed before. The service area of middle school is 1000 meters, but other principals are quite similar with primary

school. Since it is possible for students in middle school to take metro to school, so metro station is very important for middle school. Following these principals, the middle school would be located near the metro station (see in Figure 7-31). When other new residential areas are built, new middle school should be added following the same principals.

Figure 7-30: Strategies related to location of new schools
Source: author

Figure 7-31: Location of new schools and their service area
Source: author

7.4 | Strategy- public space
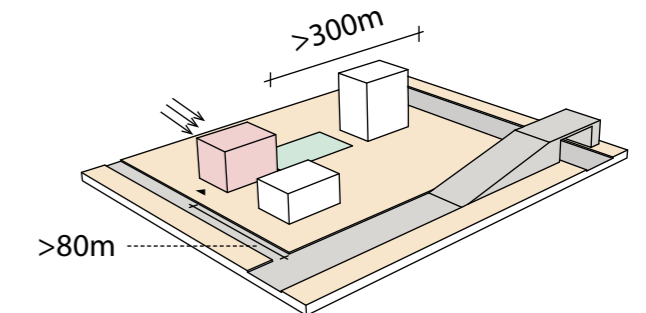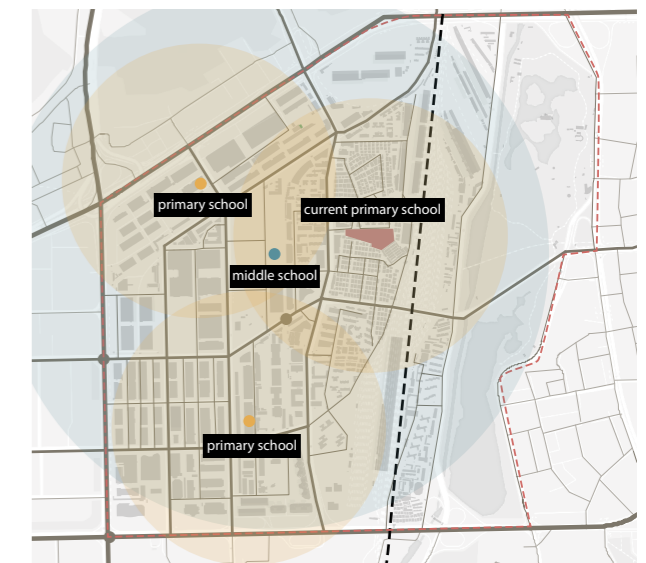
The other public facilitiy that lack most is the hospital. The nearby hospitals are nearly all over 1 kilometer away from the current residential area, as mentioned before. So hospitals needs to be added in the area. High accessibility is very important for hospitals and it should close to main roads so that people can easily get to the hospitals. And it is better to near two city roads due to the idea of convenient dispersal. Besides, since there may be some source of infect in the hospitals, schools and food production should be away from the hospitals. Considering the nearby hospitals service area, the above principals and the morphology of buildings in the site, the new hospital would be added near the metro station (see in Picture 7-33). Some clinics would be added in the south as supplement.
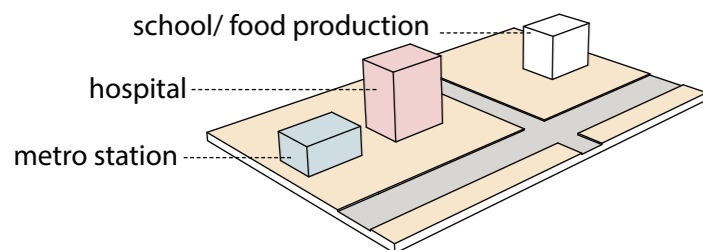

Figure 7-32: Strategies related to location of new hospital
Source: author
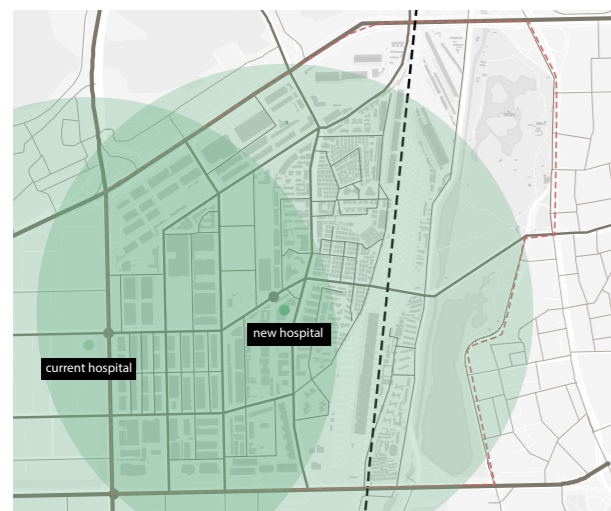
Figure 7-33: Location of the new hospital and its service area
Source: author

Except for the public facilities that current local residents lack should be added, the public facilities for future residents and employees should also be taken into consideration. Since the industries in the site would be upgraded into design, and combined with the morphology of factory compound in site, a place for exhibition or a industrial and furniture design museum could be transformed from the current retail building in the northwest (see in picture 7-34). This area and city complex could become the economic and entertainment center of the site.
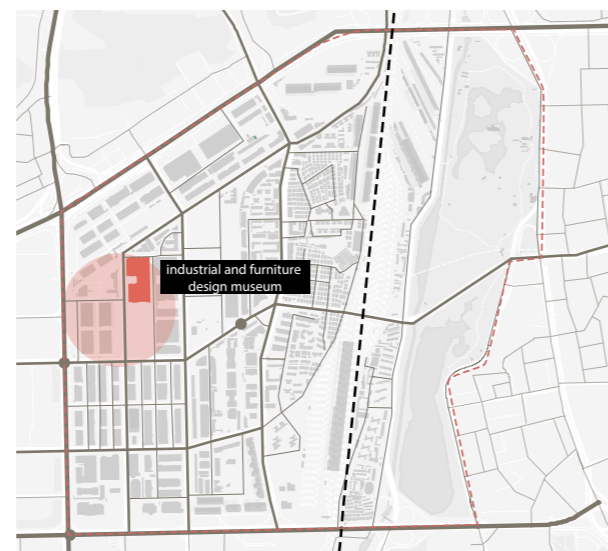
Figure 7-34: Location of the new museum
Source: author

Public space- redesign the current public space in the site for inclusive and rich pubilc life

Most of current public space lack of enough facilities for people to stay and interact and some even don't have enough necessary facilities like enough lighting. So the main principle of transformation the current public space is adding facilities according to its location. Public space inside the residential area would be the main space for people to social interact, do exercise and get relaxed, so it is very important for creating the sense of community. Facilities that help people to stay and interact should be added, like enough lighting, seat and facilities for children playing. Besides, as mentioned before, some current gated public space would be open to other citizens, so people outside the commercial housing would also enjoy these facilities. The playground of schools could also be opened after school.

Public space- add more pocket parks and open space in the site

Spatial interventions for public space can be defined as:

1. Public space is very vital for a good living environment and it is also contribute to creating a sense of place for a community. But big infrastructure may become a big barrier for people coming to enjoy the public space and naturally devide different communities, so the site could be devided into several parts according to the main roads and each part would be provided at least one public space with pleasant and welcoming environment for creating the sense of belonging.

2. Taking the United States national guidelines for quantities of park and recreation facilities related to population and regulation of public space in China, pocket park and urban plaza which is small than 3 acres, the service area is around 400 meters radius and the walking distance should around 500 meters. So local residents should can easily get to a public park within 500 meters walking.
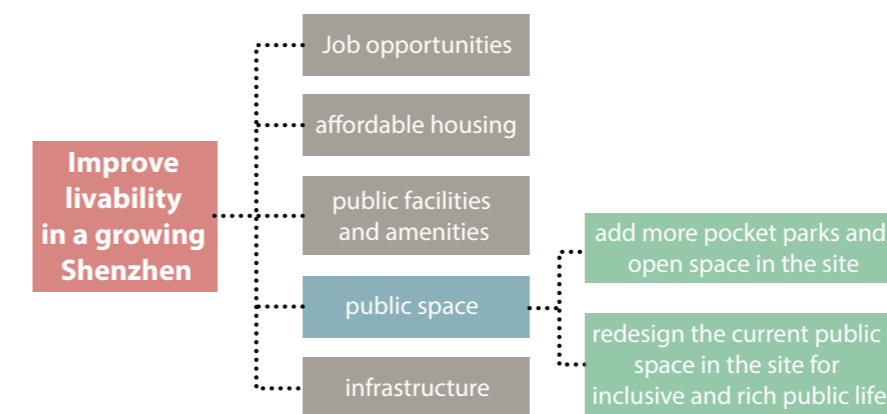
Figure 7-35: Strategies of public space
Source: author
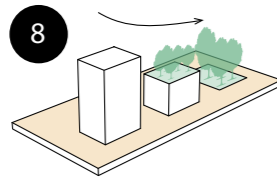
3. The public space could be combined with the biggest attraction in each part, especially open space like square, making it a good place for people to meet and social interact.

4. Buildings with very bad quality or with seldom sunligh access could be torn down to transform into public space. Some vacant space wihere some buildings now already with enough sunlight could also be transformed into public space.

5. For some open space like square, it is better to get close to urban main roads for huge amount of people flow, high accessibility and safety. But for green space or open space inside residential area, privacy should be provided for people to interact. While on the other hand, accessibility and safety are still very important, so this kind of public space could be close to main roads inside the part or near urban secondary road.

6. Each public space should provide facilities for recreation, social interaction, physical exercises and staying (such as seats and enough lighting). And different facilities and environment should be provided and created considering the functions of nearby buildings and the demands of residents and main users in nearby neighborhoods.

7. The historic site and the railway track could be transformed into a history center to create the identity of the site.

8. Some buildings also could be transformed into roof garden. Especially areas in the current retail area, wihere some buildings now already have roof gardens. And a continuous green space could be created through the change of height.

Figure 7-36: Design principles about public space
Source: author
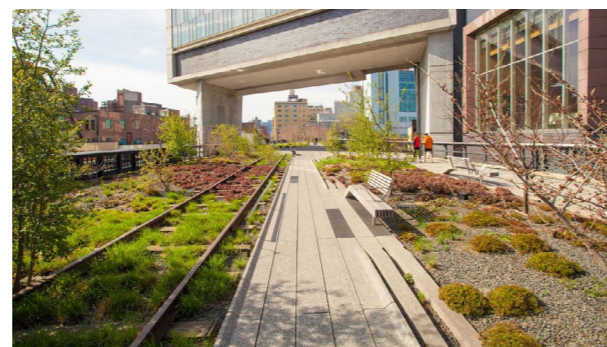
Figure 7-37: High line park, New York
Source: http://www.klatmagazine.com/en/architecture-en/storie-sulla-high-line-new-york-city-topics-006/38623

Legend
- ● square
- ● cureent public space redesign
- ● new public space
- ● attractions
- ● playground in schools
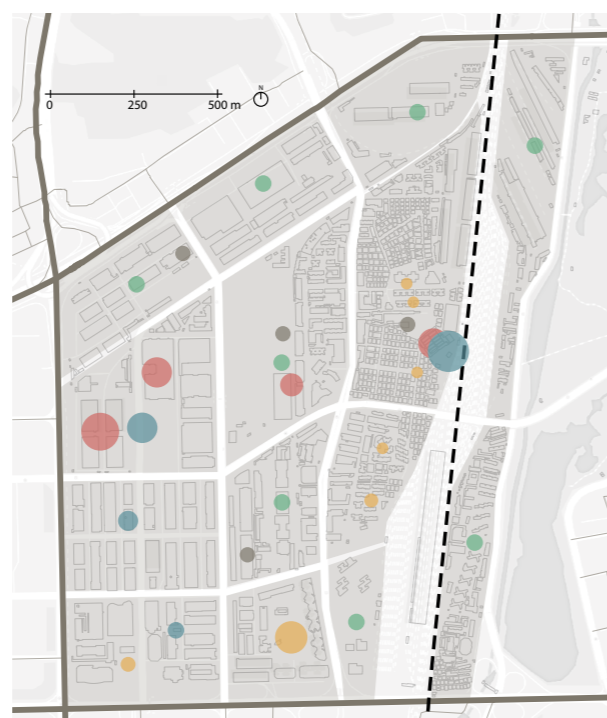
Figure 7-38: Location of public space
Source: author

7.5 | Strategy- infrastructure

Infrastructure- create good walking and cycling environment

The layer of infrastructure does not only focus on connection, but also create good walking and cycling environment. As mentioned in the job opportunities layer, working outside is highly linked with infrastructure. Even though physical distance to economic and financial center is not far away, but metro accessibility to economic and financial center is low. In order to improve accessibility, a slow-traffic system could be created which focus on walking and cycling. Streets that directly link to financial and economic center should be firstly transformed to pedestrian and cyclist oriented. Wider and less commercial covered pavement, cycling lanes and bicycle shelters should be provided. Bicycle shlters should not only along the pavement, but also should be provided near metro stations for a easier transfer. According to sections made before, the streets which is chosen as slow-traffic system would be transformed to pedestrian and cyclists oriented(see in Figure 7-40).

Infrastructure- create connection between areas that are still isolated

New connections are based on the space syntax analysis as mentioned before and would be maiinly added in the northern warehouse area after transforming this area into dwelling. Besides, the Honghu Park is another area that needes to be connected with other areas from the analysis. The connection to Honghu Park is based on the current infrastructure and areas that have the potential to be transformed as an attraction. The historic site in the north could be transformed into historic center together with some abandoned railway tracks, which could become a public space for people to social interact. The community square in the south which also have the potential to be transformed into the center of communities in the south, and could be linked with Honghu Park (see in Figure 7-41).
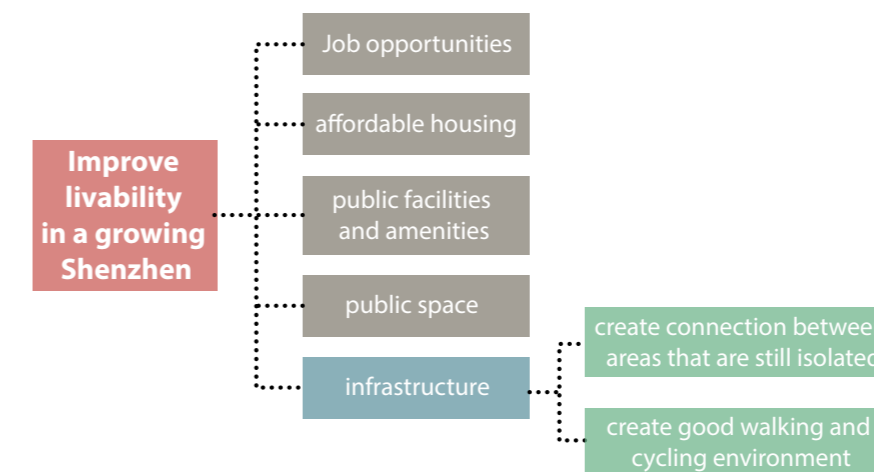
Figure 7-39: Structure of strategies about infrastructure
Source: author
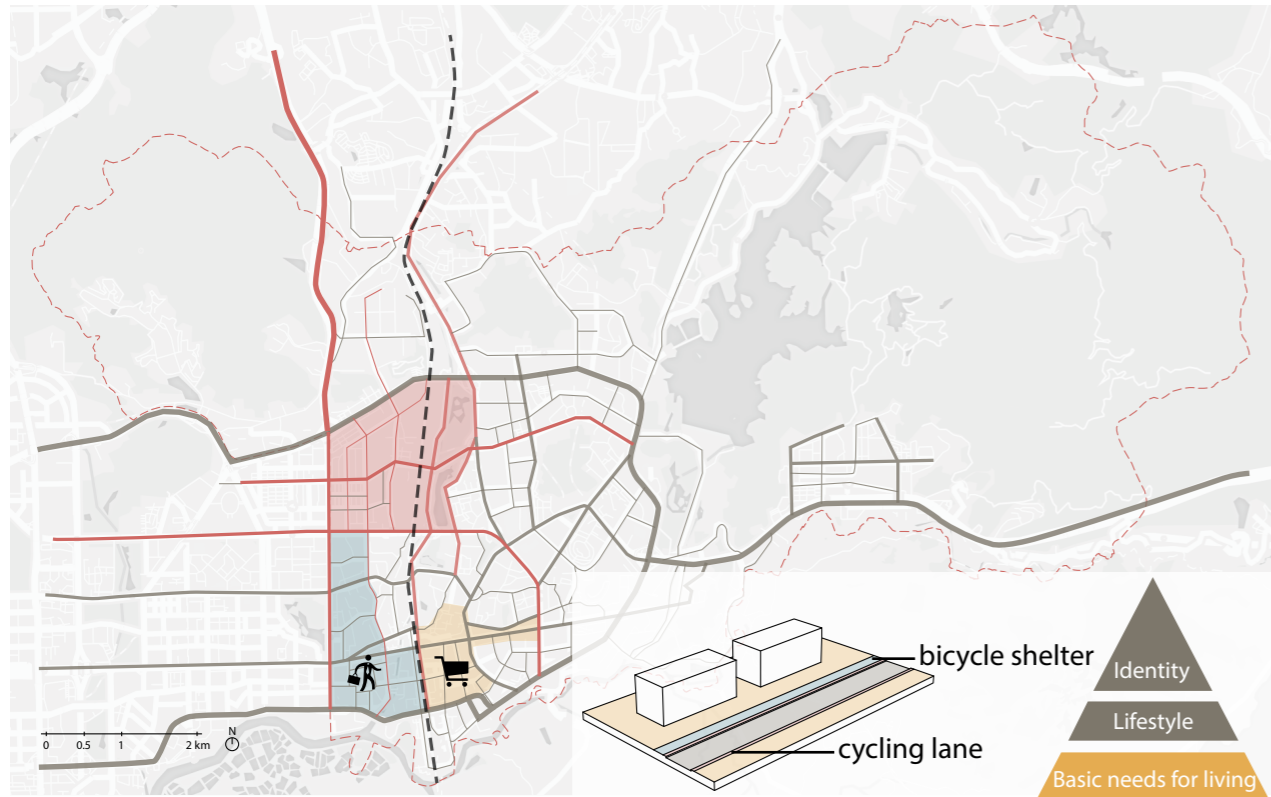
Figure 7-40: Strategies of creating good walking and cycling environment
Source: author

When it comes to create good walking and cycling environment, some types of roads are quite easy to transform due to the wide pedestrian except for three types. The first type is around Honghu Park. The pedestrian of this type is very narrow. However, located near a big public space, the flow of cars on this street is relatively small, which makes it possible to reduce the car lanes and transform the extra car lanes to cycle lanes. The second type is located around the residential area. Lack of space for parking, two lanes on the street are covered by parking. Since this street is the only street that cross the north and south in current situation, it would be the first street to be transformed. The parking would be moved to underground or nearby local streets and the two lanes would be transformed into cycle lanes. The third type is located in the current retail area, which now is covered by goods and parking. After function transformation, this street would become one of the important streets that connect north and south, which means the car flow would increase. So the car lanes which are covered by parking now would be covered by flowed car and the parking would be moved to underground or nearby local streets. And the buildings would be chamfered to create more space for cycling lanes and pavements.

Figure 7-41: Strategies of creating new connection
Source: author

1

widened pavement

cycling lane and green buffer

shortened car lanes

2

cycling lane and green buffer

shortened car lanes

3

widened pavement

cycling lane

increased car flow

retractive ground floor
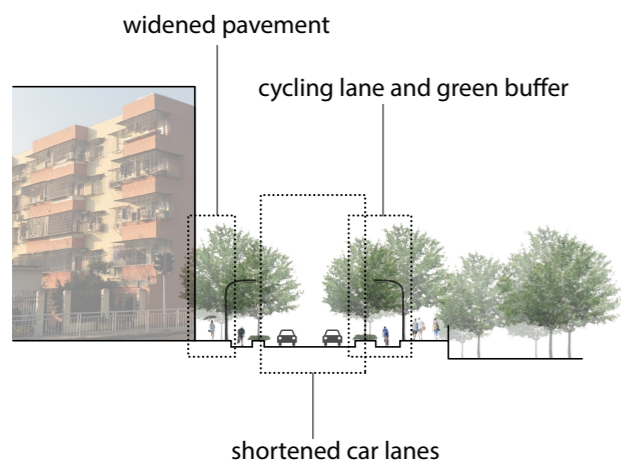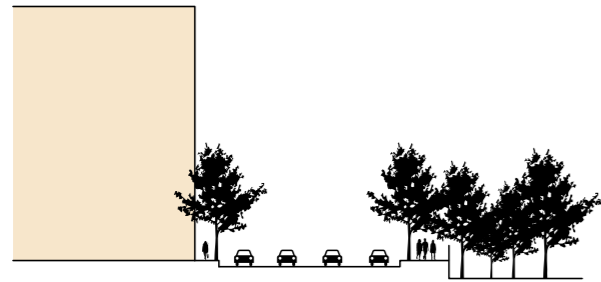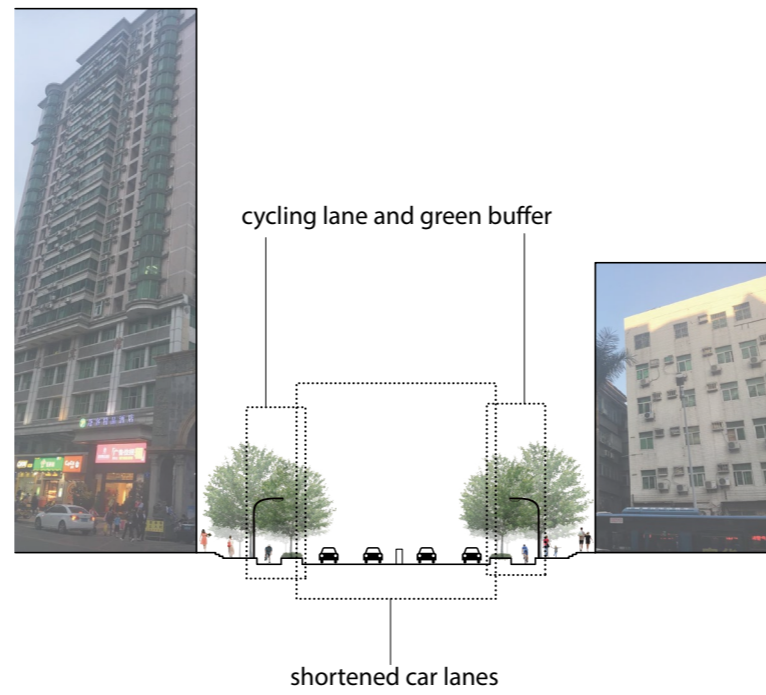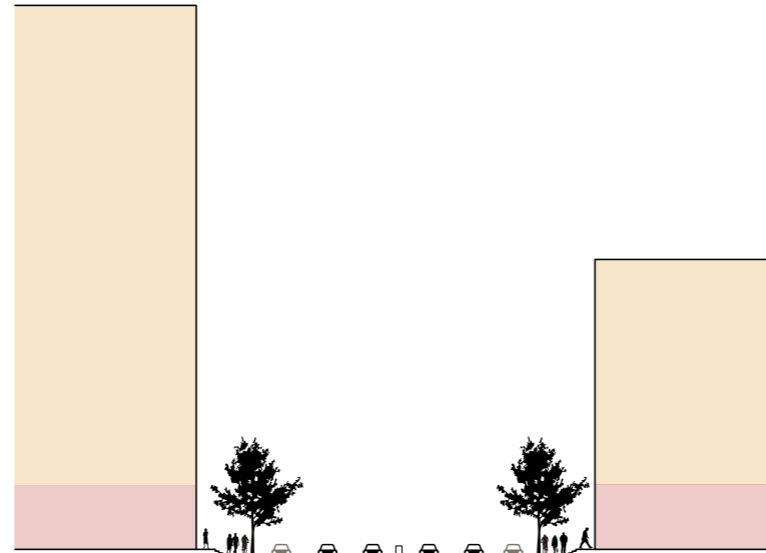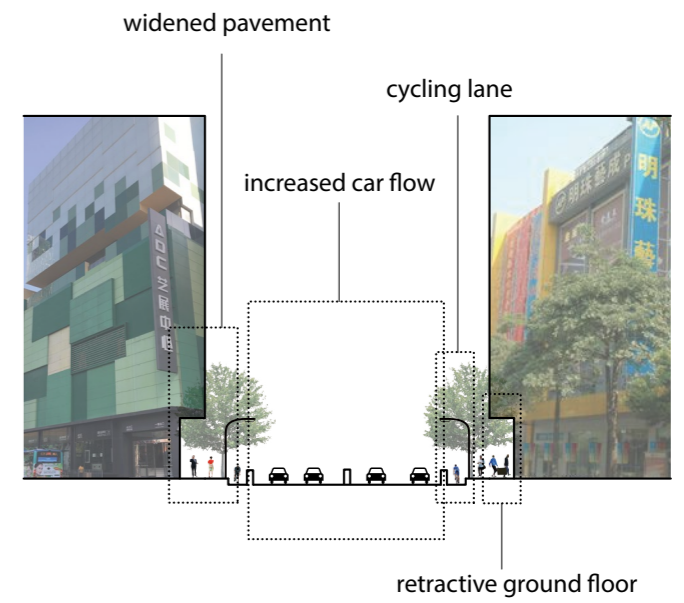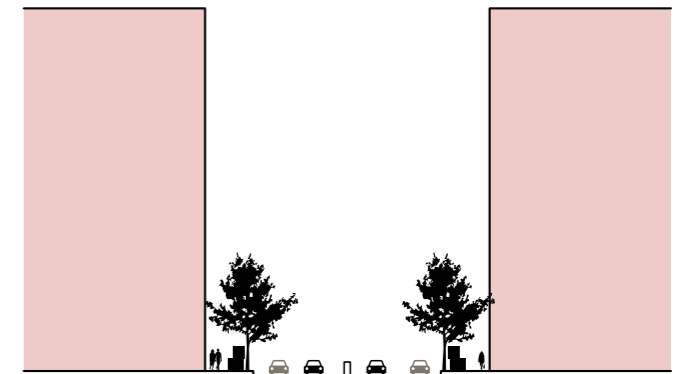
Figure 7-42: Sections of way to create a good walking and cycling environment
Source: author

7.6 | Phase

One important element of a strategy is time. How all these ideas could be placed according to time? In order, to make this strategy realize, a timeline is proposed. Since the base of this thesis is the image put forward by the government and new policy, considering the time of a urban planning in China, these interventions would mostly happen in the next ten years.

At the begnning of transformation, working would still largely happen in the economic and financial center in Renminnan-Caiwuwei-Dongwei, so a good walking and cycling environment would be very important. The transformation of cycle lanes would happen firstly and the street that is directly connected to the current residential area and working place would be transformed at first. Besides, the warehouse would start to move out and new dwelling would start to build. After the built of new dwelling, new economic and financial sector could start to move into the site and employees could choose to live in the new dwelling area. New connection between current residential and Honghu Park would also start to create and public facilities and amenities in current situation would start to add.

When the new financial and economic sector start to expand from south to north, the current jewellery retail and furniture retail would also start to upgrade. Current residential areas would be transformed to meet the demand of increasing employees. More public space and connection to public space would be created as well to improve the living quality of current dwelling. More public facilities and amenities would start to build to make it more convenient for residents to live in the site.

After completing industrial upgrading and new dwelling building, more employees would live in the site, so public facilities and amenities for future demand, like a city complex and a museum, should be added.

After all these interventions, the site would become a livable space for not only young graduates to work and live, but also for all residents.

Figure 7-43: Timeline
Source: author

Phase one: 0-1 year

move out industries
provide new residential areas
create new connections
transform current residential areas
create good walking and cycling environment

0   500   1000 m

N

Figure 7-44: Map of phase 1
Source: author

Phase three: 2-5 year

add more pocket parks
move out industries
provide new residential areas
create new connections
redesign current public space
transform current residential areas
create good walking and cycling environment
move out industries and trasnform current industries
transform current residential areas
create good walking and cycling environment
create new connections
move out industries and introduce economic industries
create new connections
add facilities for current demand
add more pocket parks
redesign current public space
transform current residential areas

0   500   1000 m

N

Figure 7-46: Map of phase 3
Source: author

Phase two: 1-2year

move out industries
provide new residential areas
add more pocket parks
create new connections
add facilities for current demand
create new connections
transform current residential areas
create good walking and cycling environment
add more pocket parks
move out industries and introduce economic industries

0   500   1000 m

N
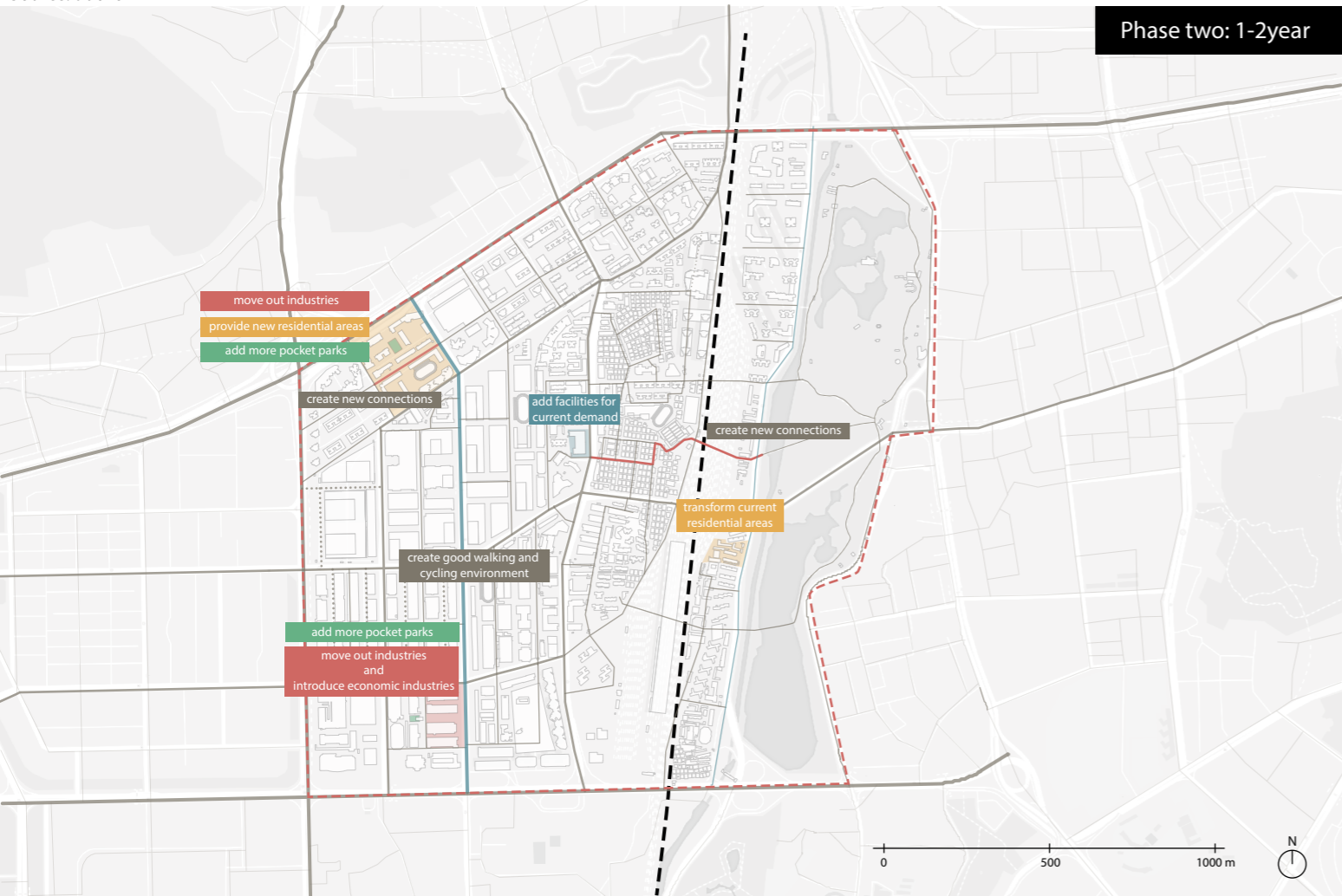
Figure 7-45: Map of phase 2
Source: author

Phase four: 5-10 year

move out industries
provide new residential areas
add more pocket parks
create new connections
create new connections
add facilities for future demand
add facilities for future demand
redesign current public space
transform current residential areas
transform current residential areas
move out industries and trasnform current industries
introduce economic industries
add facilities for current demand
create new connections
create good walking and cycling environment
move out industries and introduce economic industries
transform current residential areas

0   500   1000 m

N

Figure 7-47: Map of phase 4
Source: author

add more public space

New residential project

new connection to public space

historic center

Transform current dwelling

Transform current dwelling

new school

new school

Shenzhen BAONENG
Investment Group Ltd

neighborhood
center/ enterprises

new hospital

interior design/ furniture design/
industrial design retail and manufacture

fashion and jewellery design
retail and manufacture

add more public space

good walking and
cycling environment

museum

add more public space

new school

city complex

redesign public space

financial and economic sector

Figure 7-48: Strategy map
Source: author

CHAPTER 8

Pilot project

8.1 | The choice of pilot projects

The pilot project would be a comobination and a showcase for the strategies. So the two pilot projects are chosen. The first one is the transformation of retail area. The area is highly linked with all layers in the strategies. The second one is about new housing and show how to transform the warehouse area into dwelling. This area has a strong relationship with the layer of affordable housing, public amenities and facilities and public space. Even though it is needed to show how to transform the current urban fabrics into dwellings for high-educated young migrants, it is difficult to find a place that combines more than 3 kinds of urban fabric, so this kind of transformation would not be further explained in pilot projects.

new housing

retail transformation
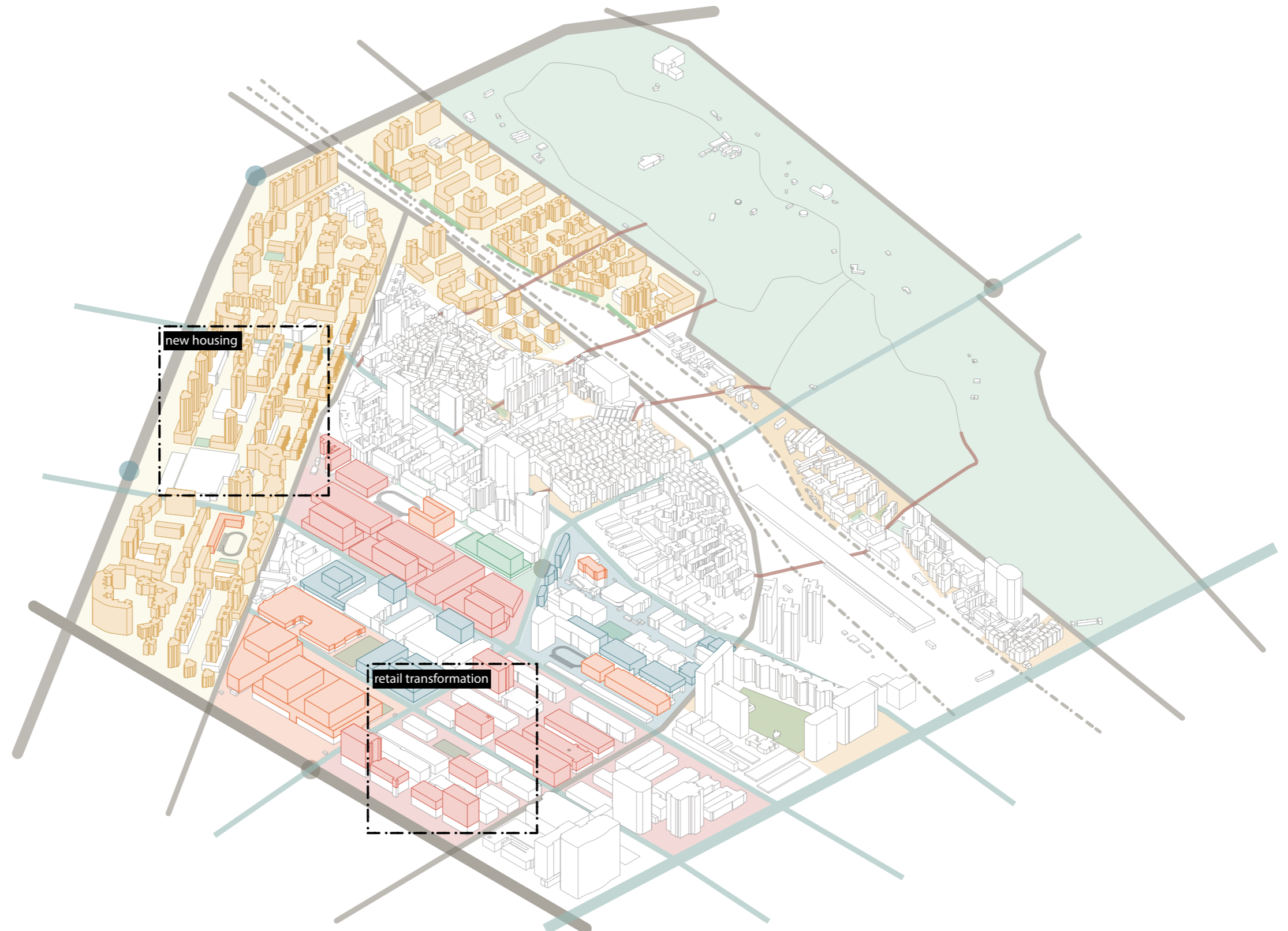
Figure 8-1: Location of pilot projects
Source: author

8.2 | Pilot project one- retail transformation
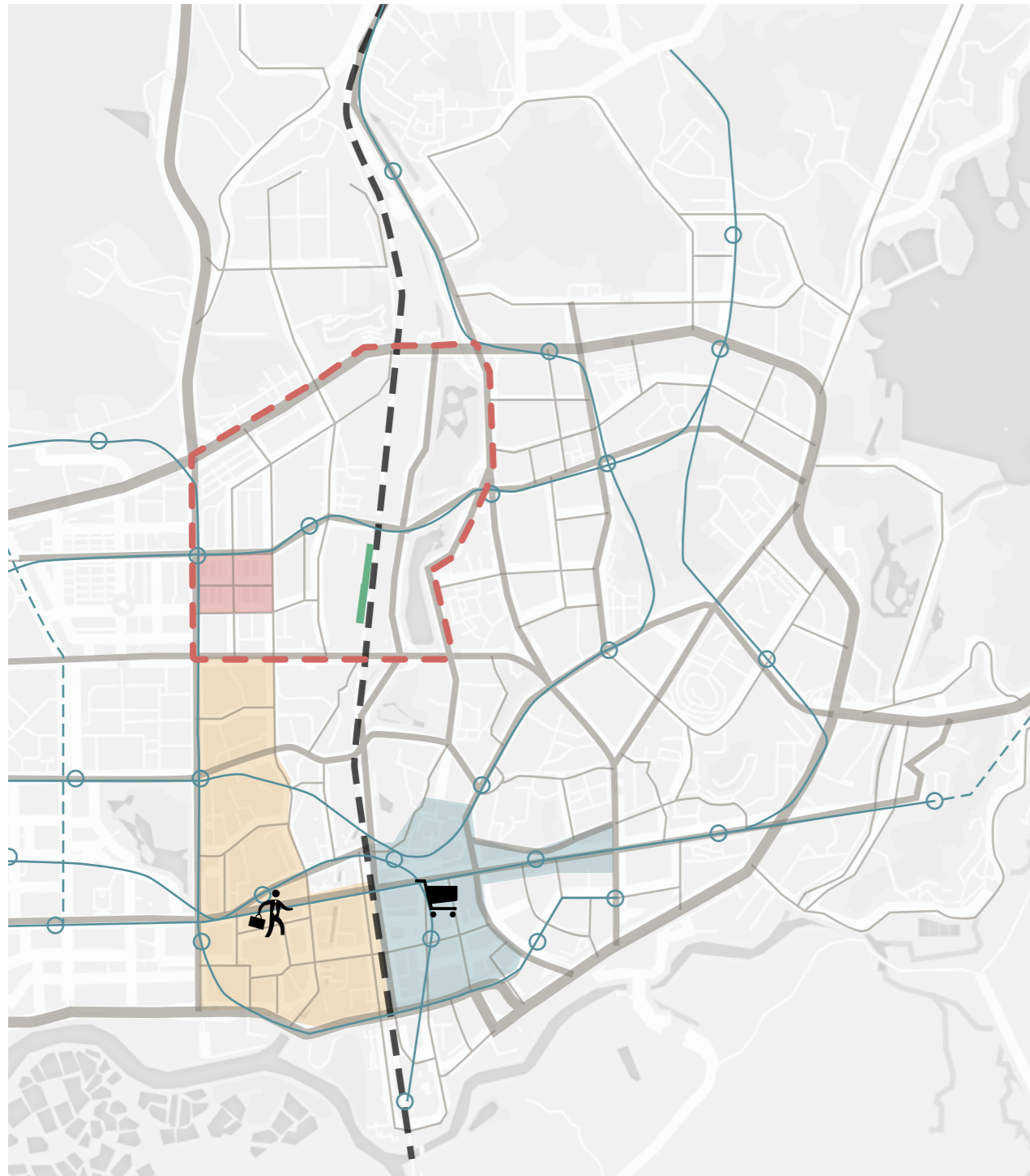
Figure 8-2: Location of pilot project 1
Source: author

The retail area of Sungang is located in the west of the site and in Figure 8-2, the location of the area is presented. As mentioned before, this area is quite close to the current economic and financial center and retail center of Shenzhen, which have the potential to transform the current retail into economic and financial sector. Based on this idea, this area would become one of the main working space for young graduates in the site.

In current situation, the typical urban fabric of factory is quite unique in "guannei", which have the potential to become the identity of this area. The transformation of this typical urban fabric of factory could also be trasnferred to other similar factory areas. So the urban fabric of this area should be kept as much as possible. While, the density of this area is classified into Type 5, which is the highest in the district and the function in the area is only retail, which makes it very active during the daytime but unsafe after working. Another big issue caused by mono-function of retail and high density is the absence of qualified public space and streets. There is no open space on the ground floor within this area for people to social interact and have fun. Only one green roof could be seen as an open space of a certain size, while it is rented for commercial use, which is only a semi-public space. What is more, absence of urban furniture, this green roof is very unfriendly for people to stay outside. The streets of the area are also lack of public activities. Covered by goods and parking, the only activity in the streets is passing by.

According to the current situation and transformation idea, the transformation includes function transformation, mixed-use, density reduction and creating public space. In order to create livable environment, some general

principles are put forward (see in Figure 8-4): (1)Transform the current retail function into financial and economic sector; (2) Create more public space on the ground floor for people to social interact and reduce density at the same time; (3) Densify buildings through TOD model and functions like dwelling and amenities would be introduced into densified areas; (4) Add more green roof for public use to create more public space; (5) Transform roads that are mainly covered by parking into pedestrian-oriented pavement to boost more street activities,meanwhile, reduce density; (6)Buildings with bad sunlight access in current situation would adopt "celosia" model to create semi-public space.

8.2 | Pilot project one- retail transformation

| current situation

Lack of public space

Nearly no public space, only one building has a green roof that rents for commercial use.

Unattractive street

Streets are mainly covered with goods and cars, lack of street activities

Source: Baidu Map, 2016
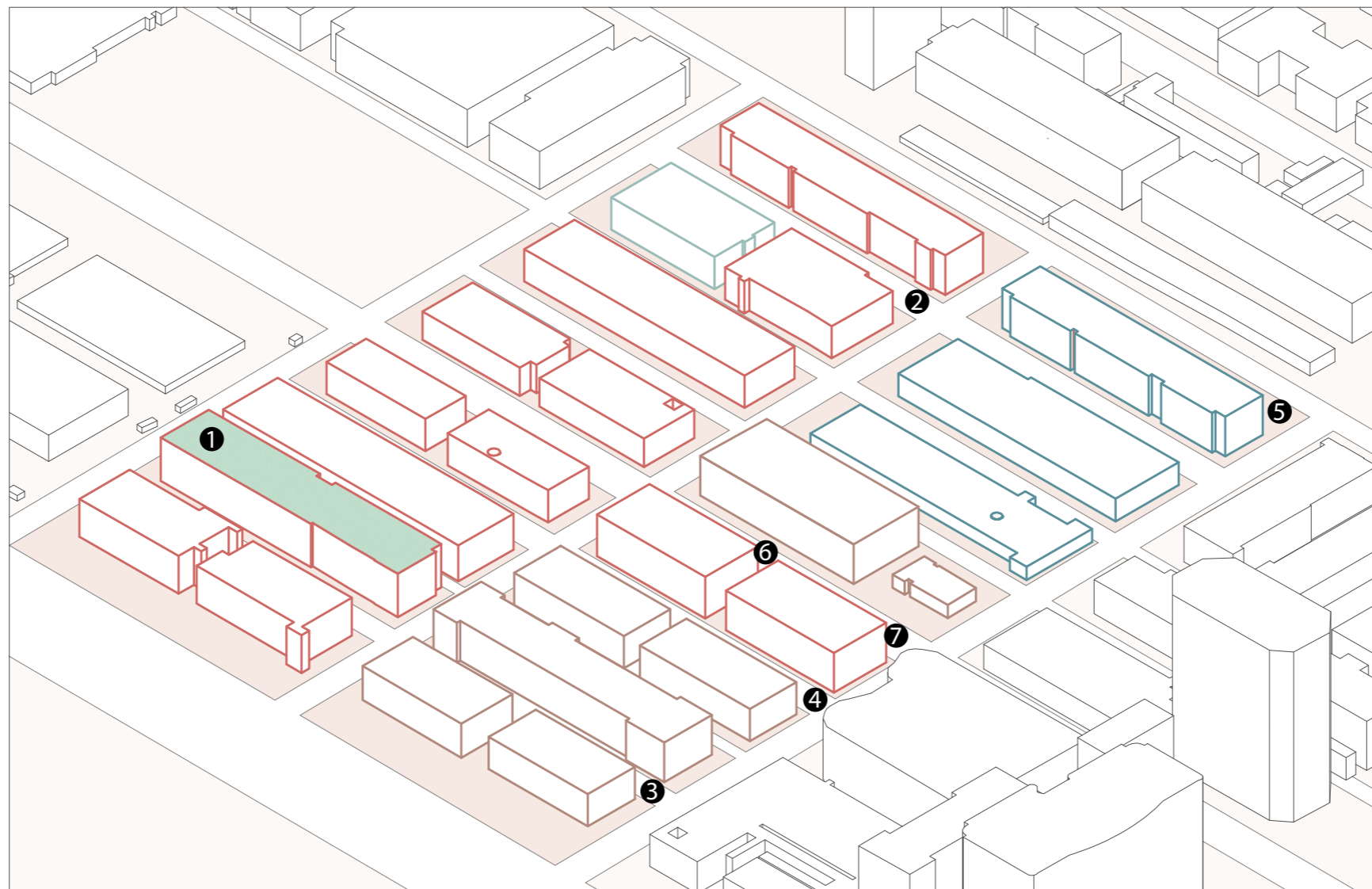
Figure 8-3: Current situation of retail area
Source: author

High density

Density of this area is one of the highest areas in the district

Mono-function

The mono-function of retail make this area be very crowded during daytime and deserted in the evening.

Unique urban fabric

Typical factory fabric of unitary cuboid, which is rare in "guannei" and should be preserved and transformed into identity of this area.
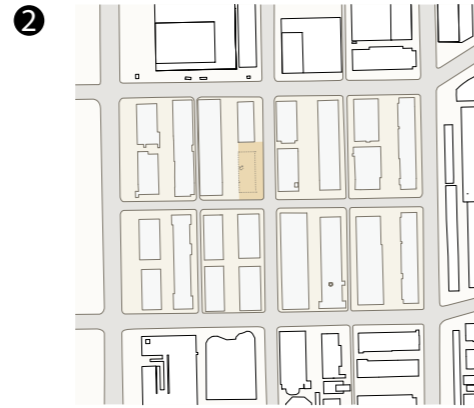

Source: Baidu Map, 2016

8.2 | Pilot project one- retail transformation

### | general principle

❶

Transform the current retail function into financial and economic sector

FInancial and economic sector like banks, investment funds, insurance companies, real estates, securities companies would be introduced into this area to replace the current retail function.

❷

Create more public space on the ground floor for people to social interact and reduce density at the same time

Tearing down buildings which qualities are very bad and are located in an accessible distance to the whole area to create more public space for people to social interact and reduce density.

❹
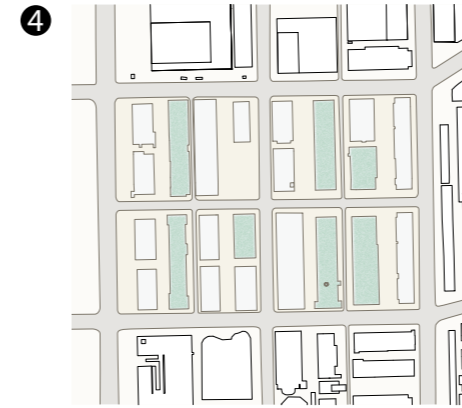
Add more green roof for public use to create more public space

Green roof for public use would be added in the site to provide more public space. The green roof would prefer lower buildings and buildings away from big infrasturcute since higher buildings could have a good visual image of green space.

❺

Transform roads that are mainly covered by parking into pedestrian-oriented pavement to boost more street activities,meanwhile, reduce density

Due to the large flow of retail, some roads in the area are mainly for parking, not for cars passing by. After function transformation, these roads would be transformed into pedestrian-oriented pavement.
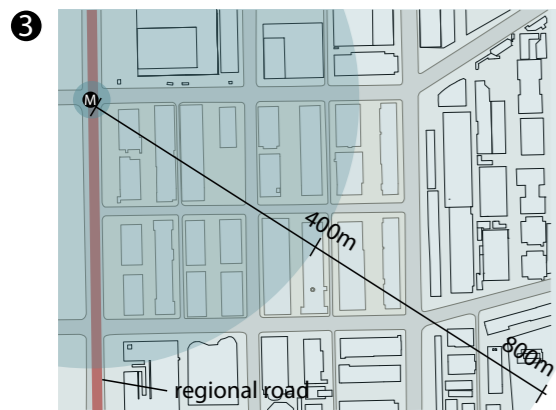
❸

Densify buildings through TOD model and functions like dwelling and amenities would be introduced into densified areas

According to TOD model, 400-800 meters circle of metro station would be densified, especially along big infrastructure. Daylight access would be ensured at the same time. As mentioned before, in the south-north direction, distance between buildings should no less than the height of the southern
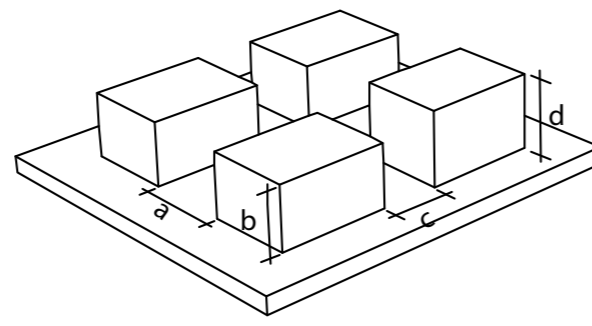
building; in the east-west direction, distance between buildings should no less than 0.9*the height of the higher building. Besides, functions like dwelling and amenities for living would be introduced to transform this area into mixed-use.

$$a>=b$$
$$c>=0.9*d$$

❻

Buildings with bad sunlight access in current situation would adopt "celosia" model to create semi-public space

More semi-public space would be created through "celosia" model to reduce the impact of lacking sunlight acess. The average coverage of public space, including public space on the ground floor, green roof, active pavement and semi-public space, should no less than 8 m^2/ person.
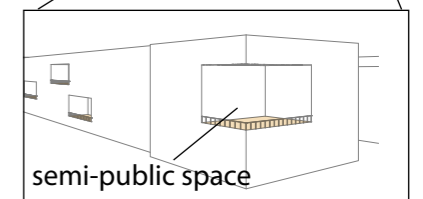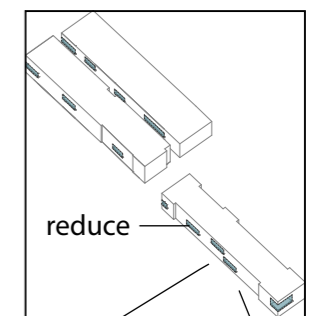
Figure 8-4: Design principles of transformation in retail area
Source: author

8.2 | Pilot project one- retail transformation
| option
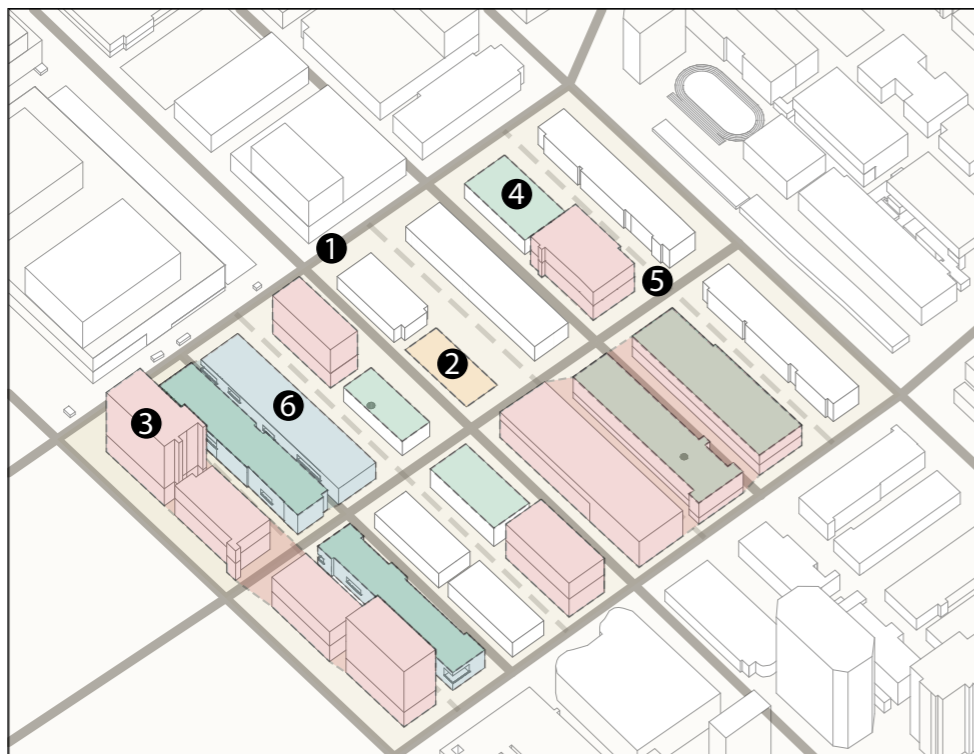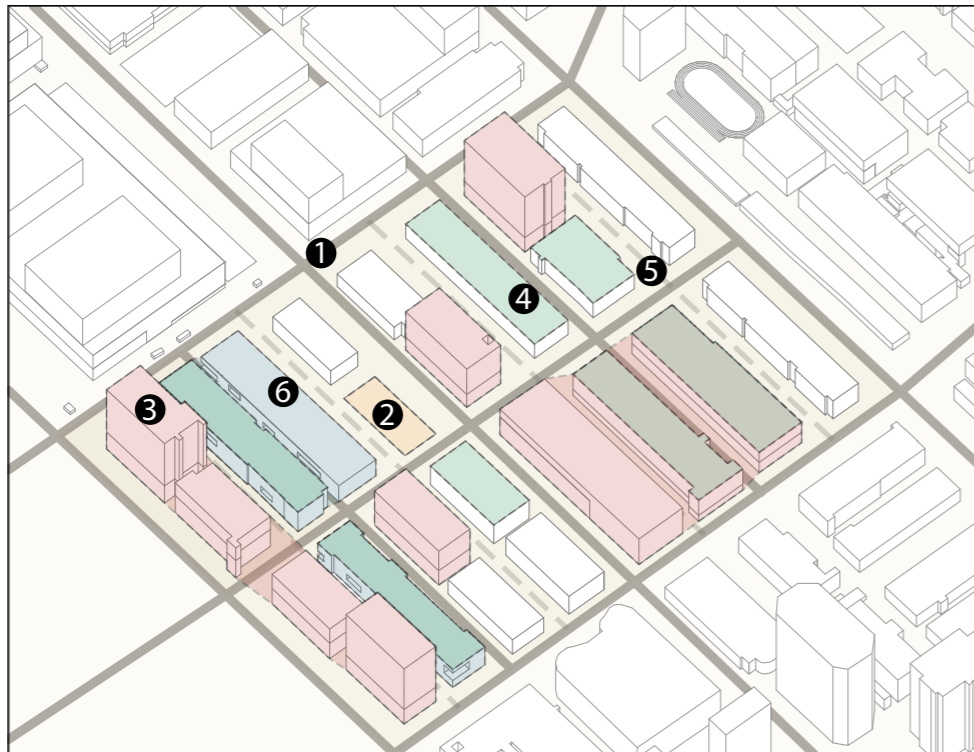
Figure 8-5: Two options of transformation
Source: author

10.2 | Pilot project one- retail transformation
| densification and "celosia" model of building
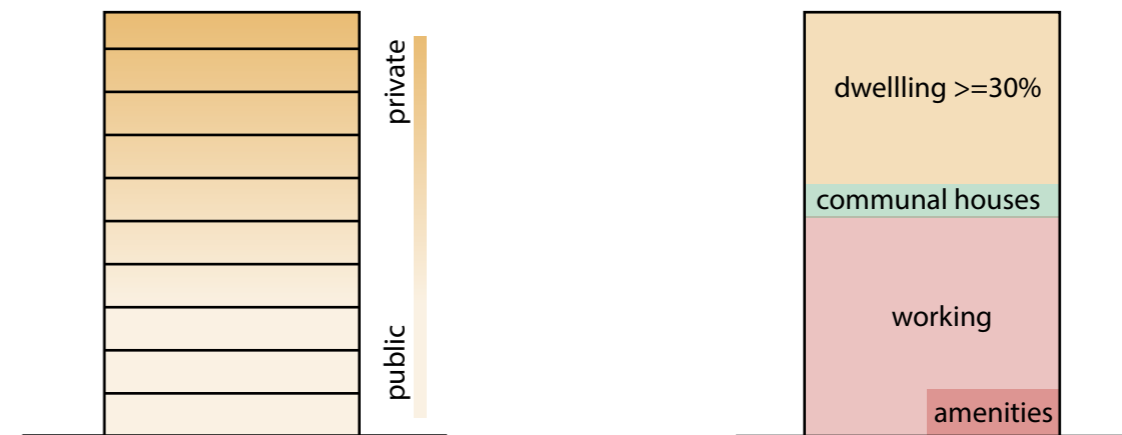
After densification, buildings would become mixed-use. The floors from low to high would have a transition from public to private. The lower floors would be more public and the upper floors would be more private.

Dwelling in the mixed-use buildings would mainly in the upper floors and should cover at least 30% of the whole floors. A floor for communal houses is needed for as a transition space, which contains sharing kitchen, sharing library, sharing laundry, communal living room, and communal game room. Working space would mainly in the lower floors. And the ground floor, especially on the pavement side, would mainly be space for amenities.
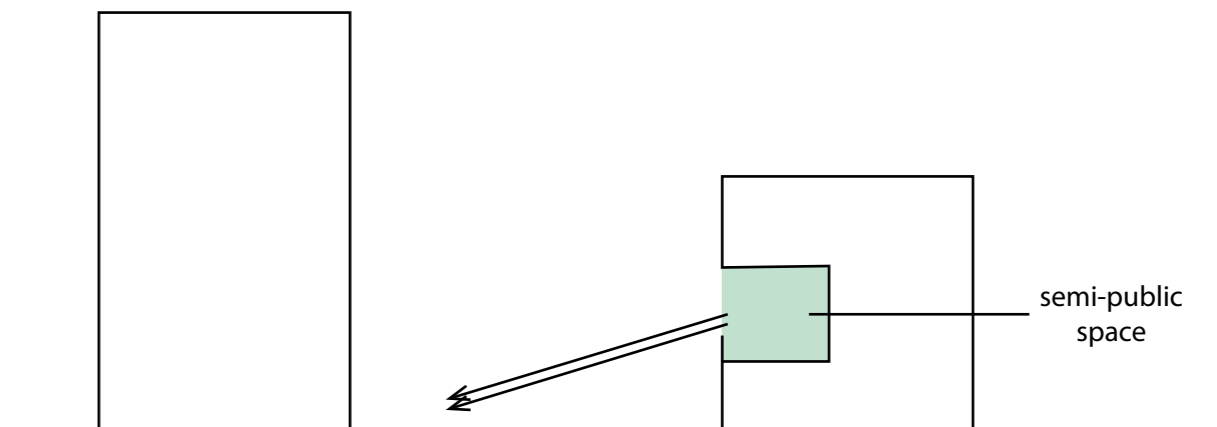
Buildings without good sunlight access would adopt "celosia" model to transform parts of space inside the buildings into semi-public space to reduce the impact of bad sunlight access. This semi-space should keep a good visual image to the ground floor, which means this space would mainly located in the lower floors, rather than the upper floors.

Figure 8-6: Details of densification and "celosia" model
Source: author

furniture, handicraft
and jewellery retail

covered by goods

current situation

densification

transform some
areas without
daylight access
into open space

densification and 'celosia' model

dwelling

communal
houses

working place
for financial and
economic sector

semi-public
space

amenities

car-free area

green roof as a
public space

function transformation
and car-free transformation
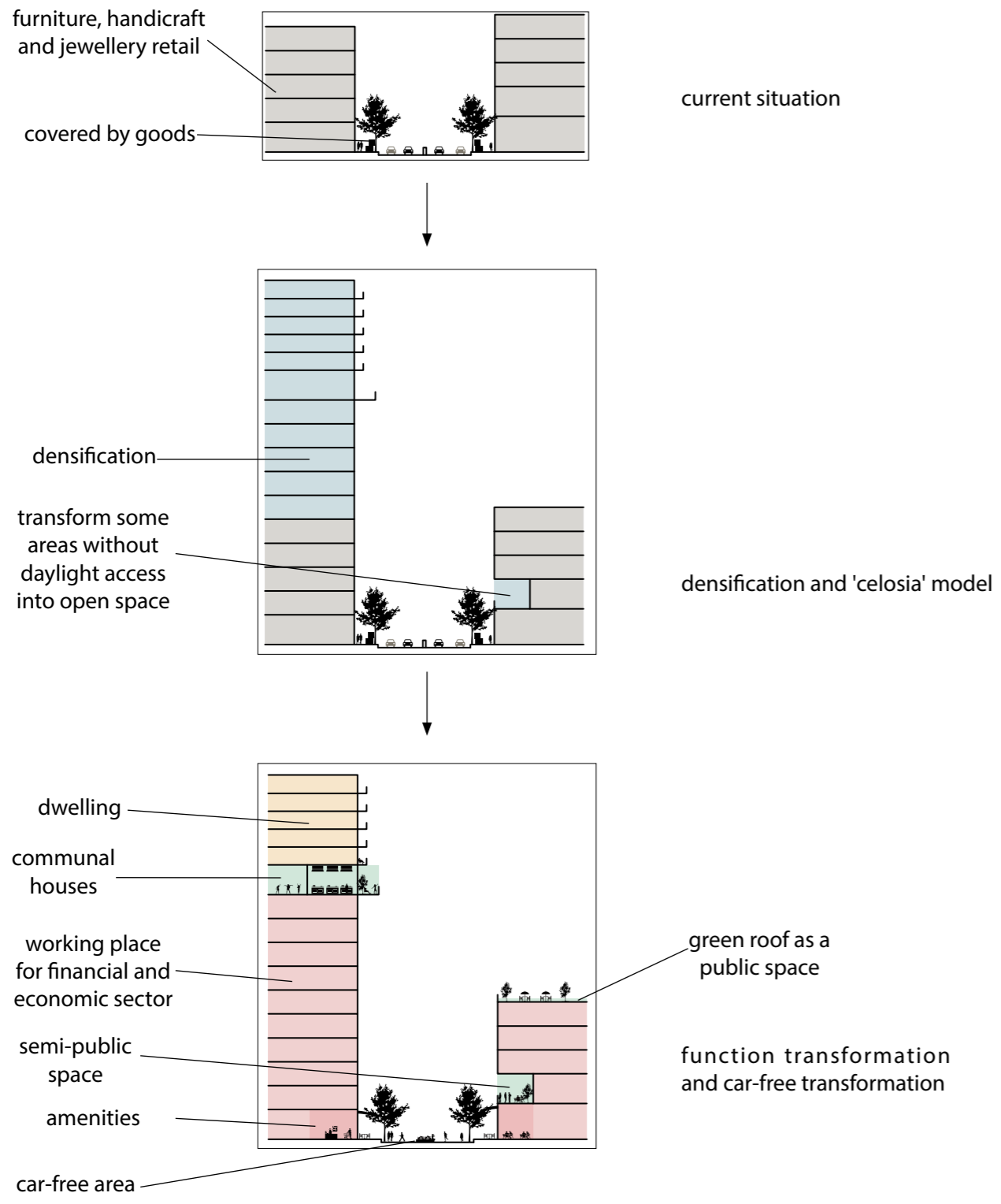
Figure 8-7: Option 1 of densification and "celosia" model
Source: author

furniture, handicraft
and jewellery retail

covered by goods

current situation

densification

transform some
areas without
daylight access
into open space

densification and 'celosia' model

dwelling

communal
houses

working place
for financial and
economic sector

semi-public
space

amenities

car-free area

green roof as a
public space

function transformation
and car-free transformation
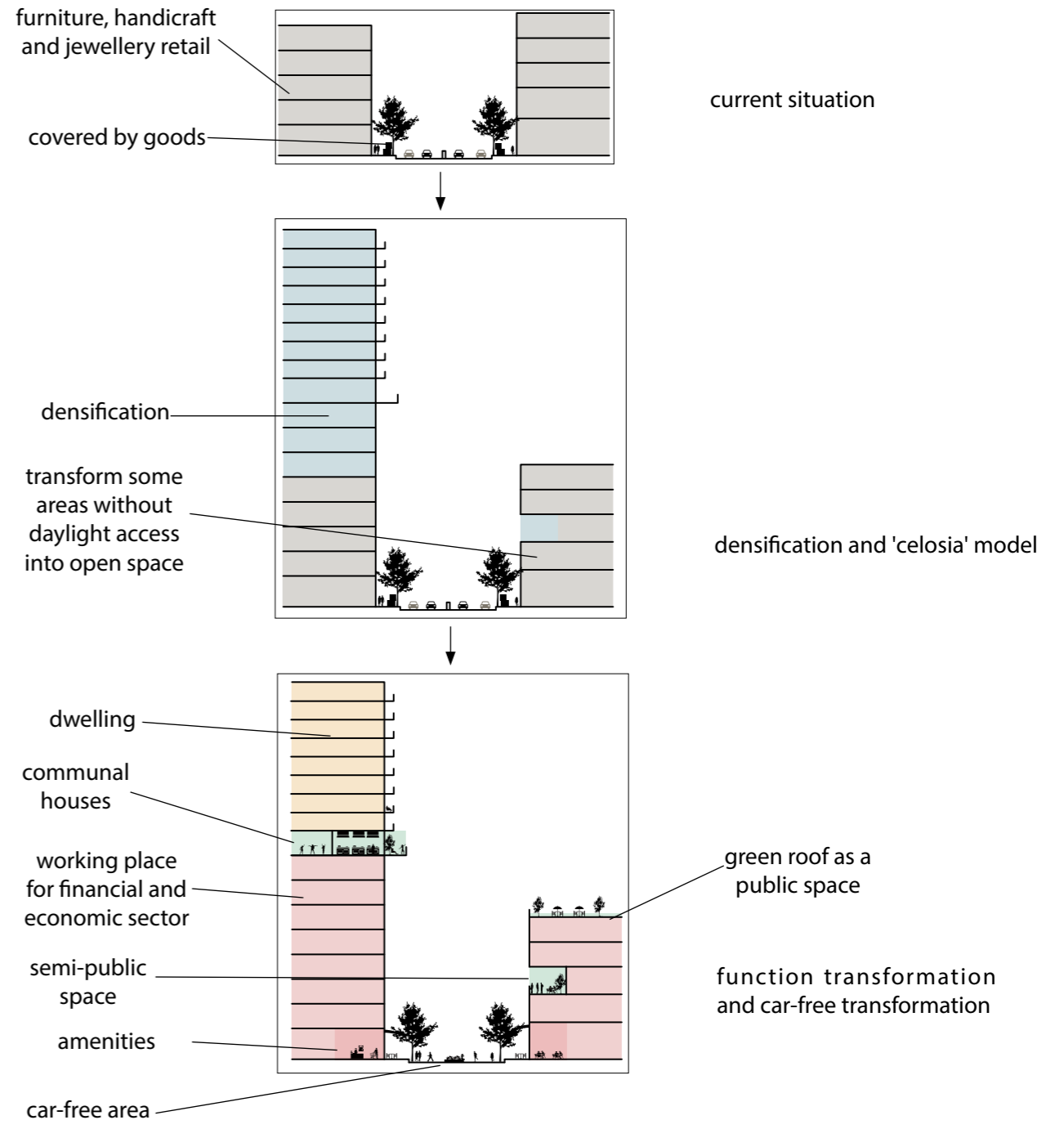
Figure 8-8: Option 2 of densification and "celosia" model
Source: author

Communal houses: This floor is a communal floor, which contains sharing kitchen, sharing library, sharing laundry, communal living room, and communal game room. This room could be shared by all residents in the building. The sharing kitchen could cooperate with nearby supermarket. The supermarket would supply vegetables and meat for the sharing kitchen, and residents could directly purchase in the kitchen. Sharing library could be a place for all residents sharing their favourite books. The living room and game room could be reserved in advance for residents to enjoy with their friends.

Figure 8-9: Photo of sharing kitchen in "Jiyue City"
Source: author
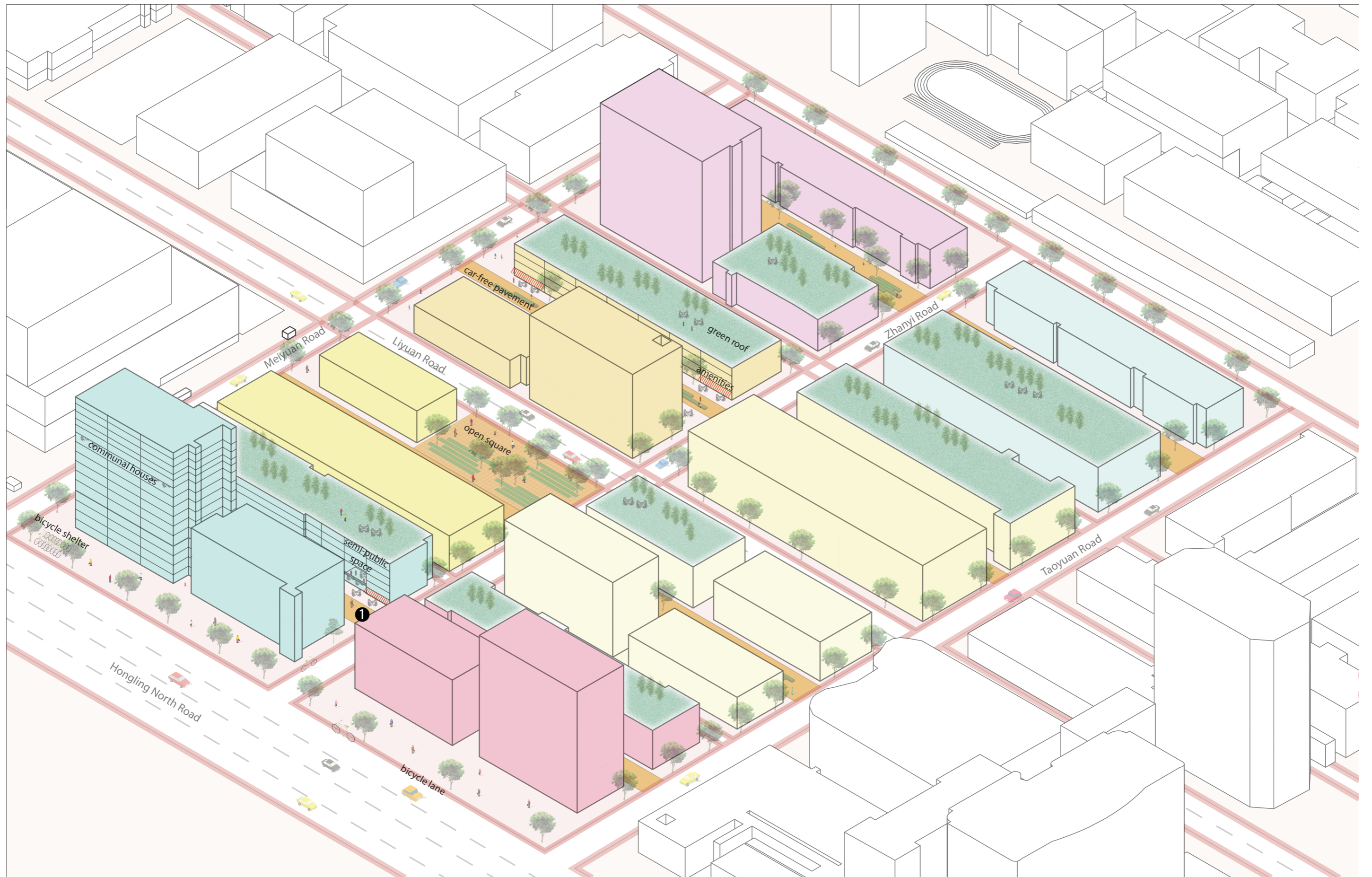
Figure 8-10: Whole image after transformation
Source: author

Figure 8-11: Image of street 1
Source: author

Figure 8-12: Interventions on street 1
Source: author

8.3 | Pilot project two- new housing
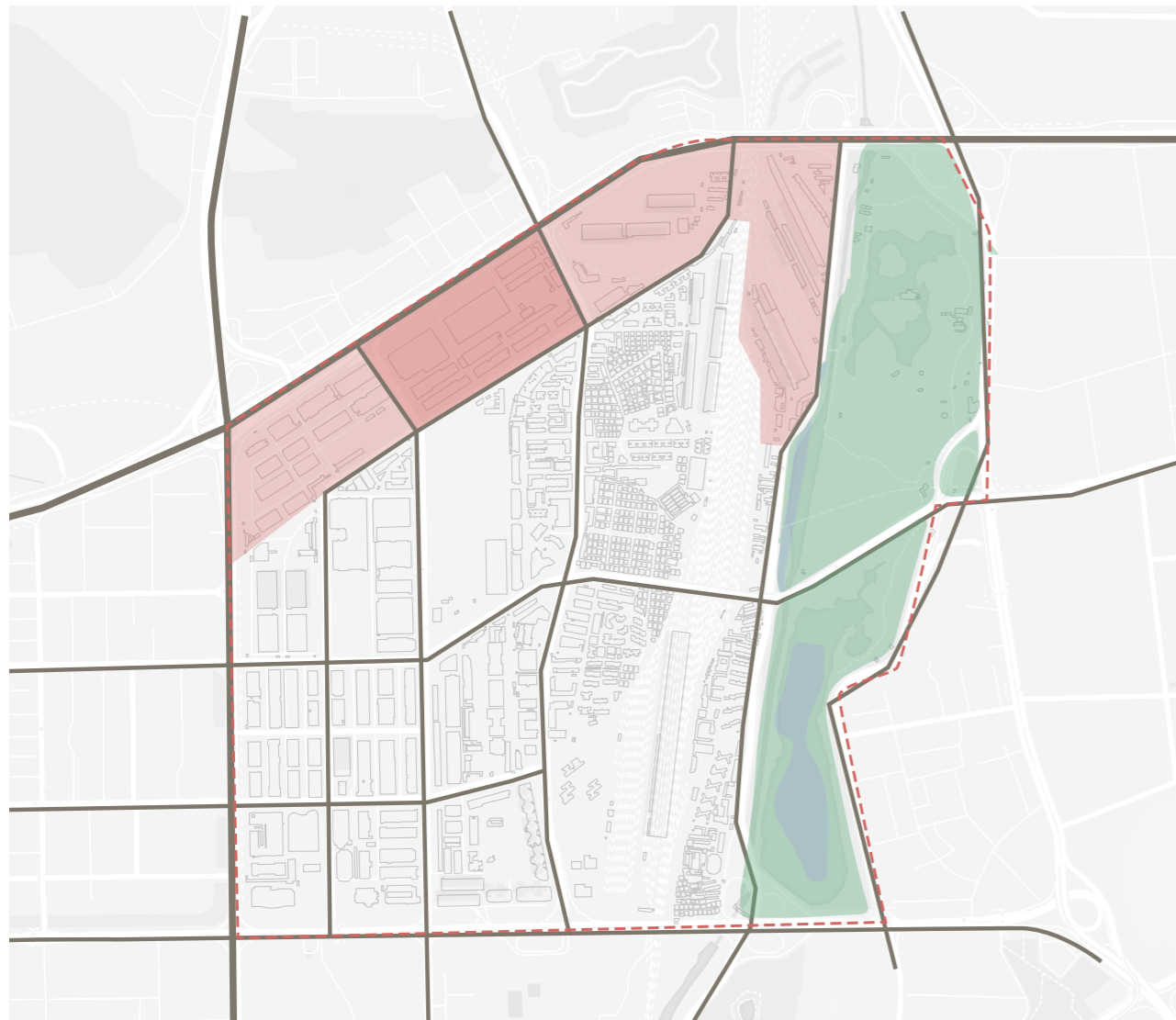
Figure 8-13: Location of pilot project two
Source: author

The new housing project is located in current warehouse area. After industrial upgrading, the current warehouse would be moved out to areas more close to railway station or highway, making it possible for this area to be transformed. Besides, more employees attracting to the site, more dwelling in the site should be provided. So the pilot project is chosen to show strategies about providing affordable housing.

In current situation, the main function of this area is for storage, which has low added value and brings a huge flow of cars, making the living quality very low. Besides, due to the main function, there is nearly no public space for people to social interact. Most of the public space inside the site is covered by parking. And some public space is even gated for bus parking. Besides, streets in the site are also very unattractive since they are mostly covered by parking as well and nearly no street activities would happen in the streets. The urban fabric of this area is not suitable for dwelling, which make it possible to be torn down or transformed into podium buildings or buildings for public use.

However, during transformation, this area should not only be living space for young graduates, it should also accommodate other residents, such as families and low-income migrants. The mix of different groups of people can not only make it possible for different groups of people to social interaction, but also would contribute to improve social inclusiveness and reduce social segregation. So in order to make a livable environment, seven design principles are put forward (see in Figure 8-15): (1)Buildings in the north should be more far away from the road than in the south; (2) Buildings which quality is good and urban fabric is suitable for function transformation could be kept to create identity;

(3) A superblock should be divided into small plots and TOD model should be adopted; (4) After transformation, density of this dwelling area should be categorized into Type 2, which is the category of dwelling in Luohu District; (5) A mix of public space and collective outdoor space should be provided; (6) Some roads which are mainly for parking in current situation could be transformed into pavement for more street activities; (7) Social housing should cover at least 30% of the whole newly built housing.

8.3 | Pilot project two- new housing

| current situation

Lack of public space

Nearly all public space is for parking, some public space is gated for bus parking.
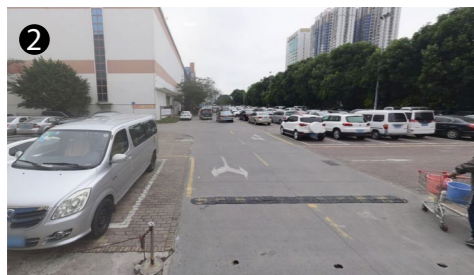
Mono-function

The main function of this area is warehouse, which has low added value and usually leads to low living environment. The warehouse function would be moved out during industrial upgrading.
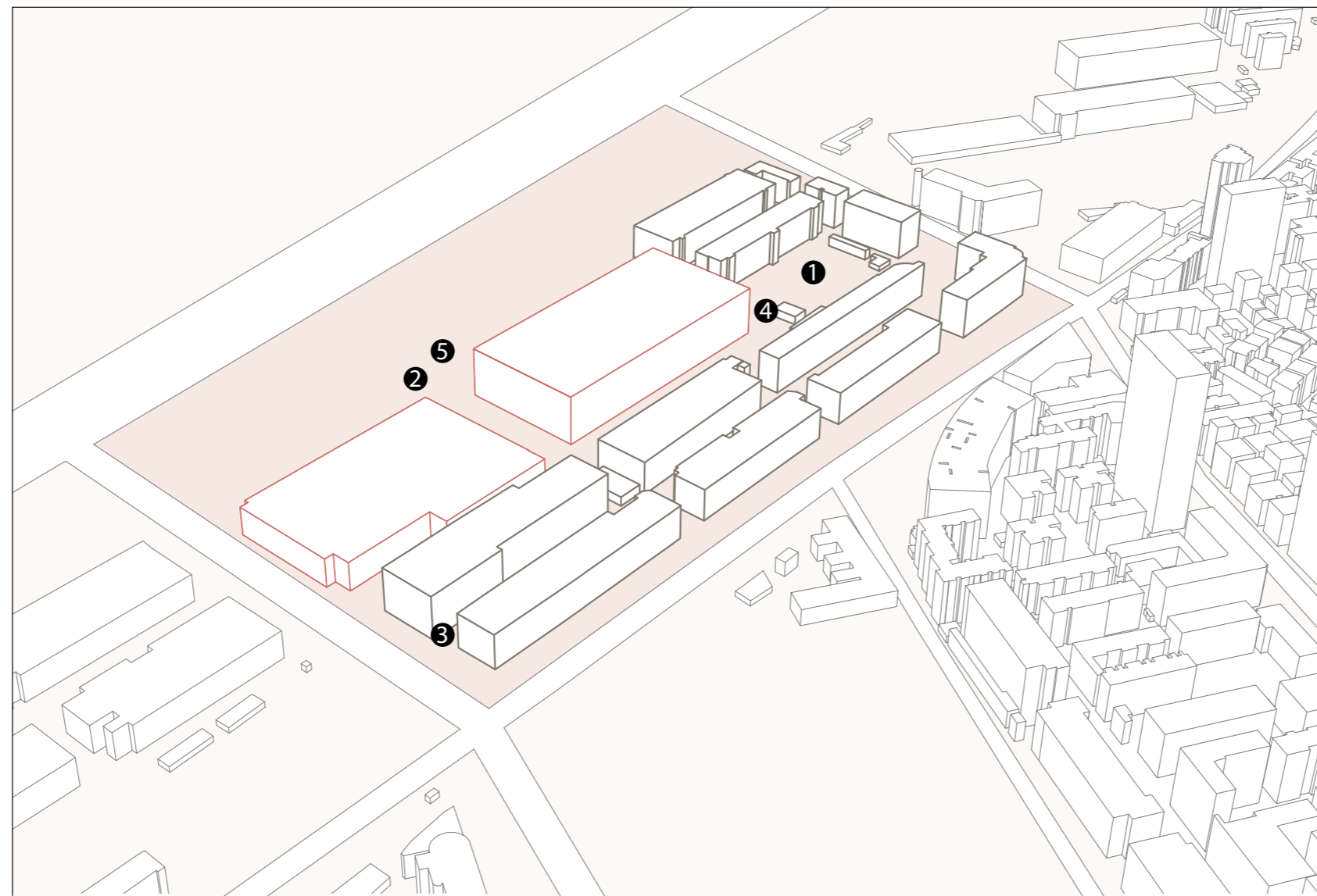
Figure 8-14: Current situation of warehouse area
Source: author

Unattractive street

Streets in this area are mainly covered by parking, nealy no any street activities in the streets.

Urban fabric is not suitable for dwelling

Urban fabrics of this area are mianly cuboid in different sizes, which is not suitable for dwelling. So some of the buildings would be torn down. But some could be transformed into podium buildings or buildings for public use, such as library and sports center, which is lacking in the whole site in current situation.

8.3 | Pilot project two- new housing

| general principle

❶

Buildings in the north should be more far away from the road than in the south

Due to the big noise of regional road in the north, the distance between buildings and roads in the north should be larger than in the south to reduce the noise of large car flow.

❷

Buildings which quality is good and urban fabric is suitable for function transformation could be kept to create identity

In order to keep the characteristic of this area, buildings which quality is still good and urban fabric is fit for function transformation would be kept. Some buildings could be transformed into podium buildings and some could be transformed into public buildings, such as library and sports center, which are amenities that lacks in current situation.

❸

A superblock should be divided into small plots to create open communities and TOD model should be adopted

To improve social inclusiveness, this area would accommodate different group of individuals, like young graduates, low-income migrants and other local residents. Besides, no new gated community is allowed to built. So a super block should be divided into a series of diverse plots to create open communities. Considering TOD model, plots near the bus station should have high density and be more compact , and areas away from bus

car lane
bus station
dense living space for single high-educated young migrants
less dense living space for families
social housing

station should be less dense and have larger plots. Besides, due to the demand for public transportation and efficiency, young graduates who are main single, are likely to live in denser areas that are near bus station. Families, with higher demand for public space and living quality, tend to live in areas that are less dense, and have more public space. Social housing, however, since this area is nearly all in walkable distance away from bus station, could be located a little bit far away.

❹

Type 2

After transformation, density of this dwelling area should be categorized into Type 2, which is mainly the category of dwelling in Luohu District

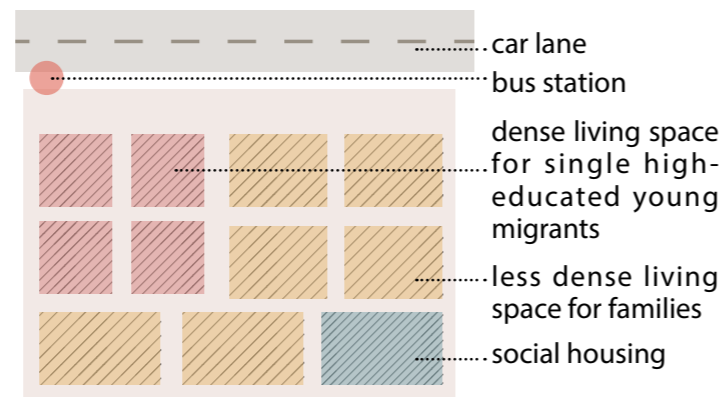As analyzed before, density of dwelling area in Luohu District could mainly be divided into Type 2. So after transformation, the density of this area should also be categorized in this type.

❺

public space
collective space
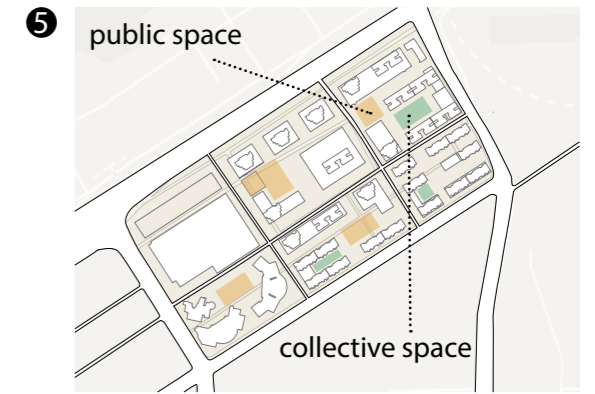
A mix of public space and collective space should be provided

This area should have a mix of public space for different residents to social interact and collective space, especially in plots for families. In order to make this mix realize, no gated community is allowed to build and only some buildings could be enclosed to create a collective space.

❻

Some roads which are mainly for parking in current situation could be transformed into pavement for more street activities

The large flow of cars in warehouse area in current situation leads that some roads in the area are nearly all covered for parking, and almost no street activites happen in these roads. After transformation, these roads could be transformed into pedestrian-oriented pavement.

❼

social housing

Social housing should cover at least 30% of the whole newly built housing

Taking the regulation of mixed housing type in Netherlands into account, social housing should cover at least 30% of the whole dwelling to reduce the social exclusion and segregation. FSI compensation could be provided to motivate developers. State-owned developers could also take the responsibility to build social housing, which means this project could be a cooperation between private developer and state-owned developer.

Figure 8-15: Design principles of transformation in warehouse area
Source: author

8.3 | Pilot project two- retail transformation
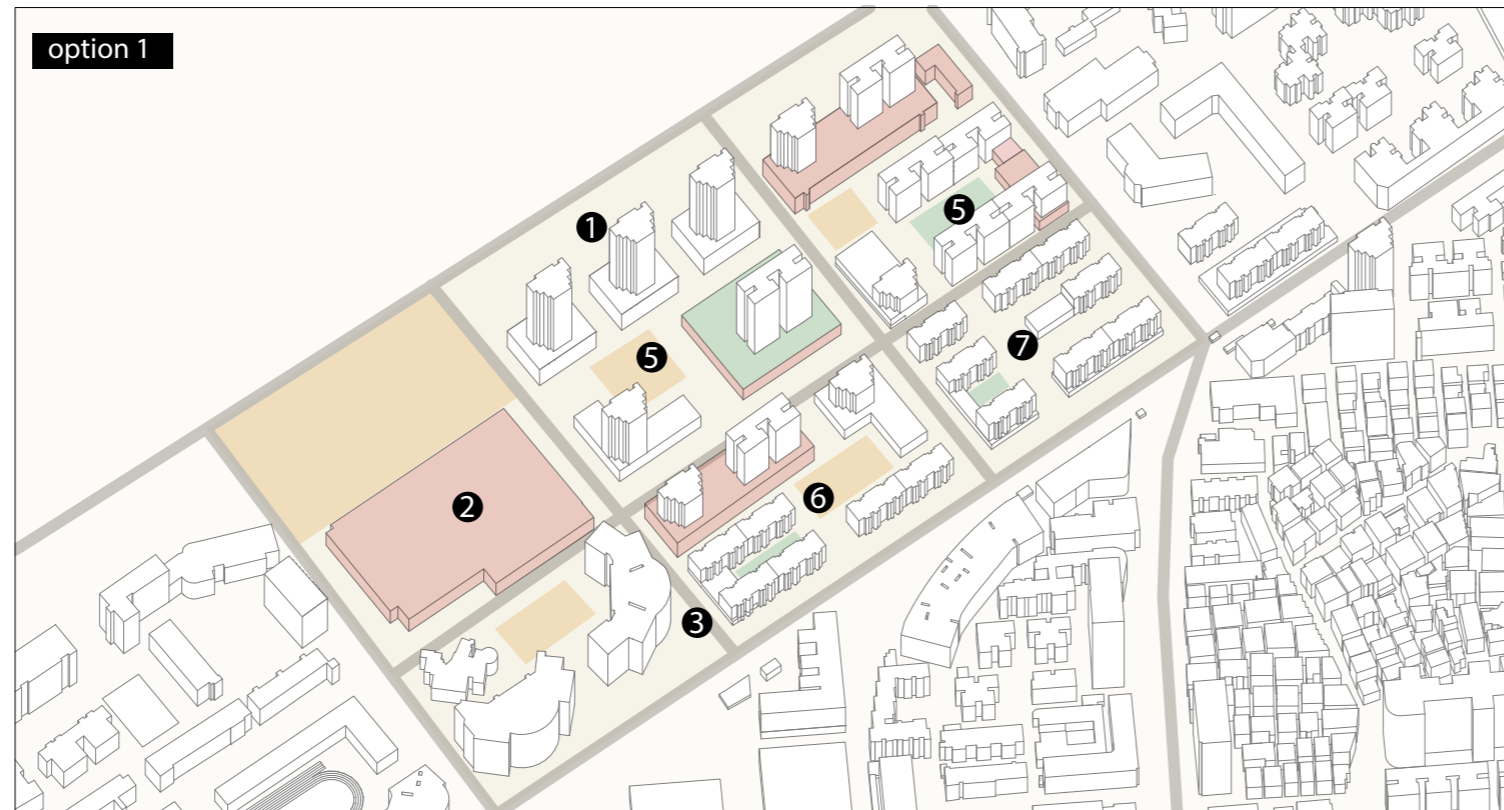
| option

For option 1, buildings which quality is good and urban fabric is suitable for transformation are preserved. The buildings which are located in the center of the area would be transformed into public facilities, such as sports center and library. Besides, the mix of public space and collective space is mainly created through the enclosure of buildings. In each block, several buildings are enclosed to make a collective space.

For option 2, same buildings would be preserved and transformed into same functions. But the mix of public space and collective space is different from option 1. The public space is mainly located on the ground floor, and the collective space would be located in the roof of podium buildings. This collective space would only be used by residents in this blocks. And residents could only get to this collective space through the gate on the ground floor of the building.
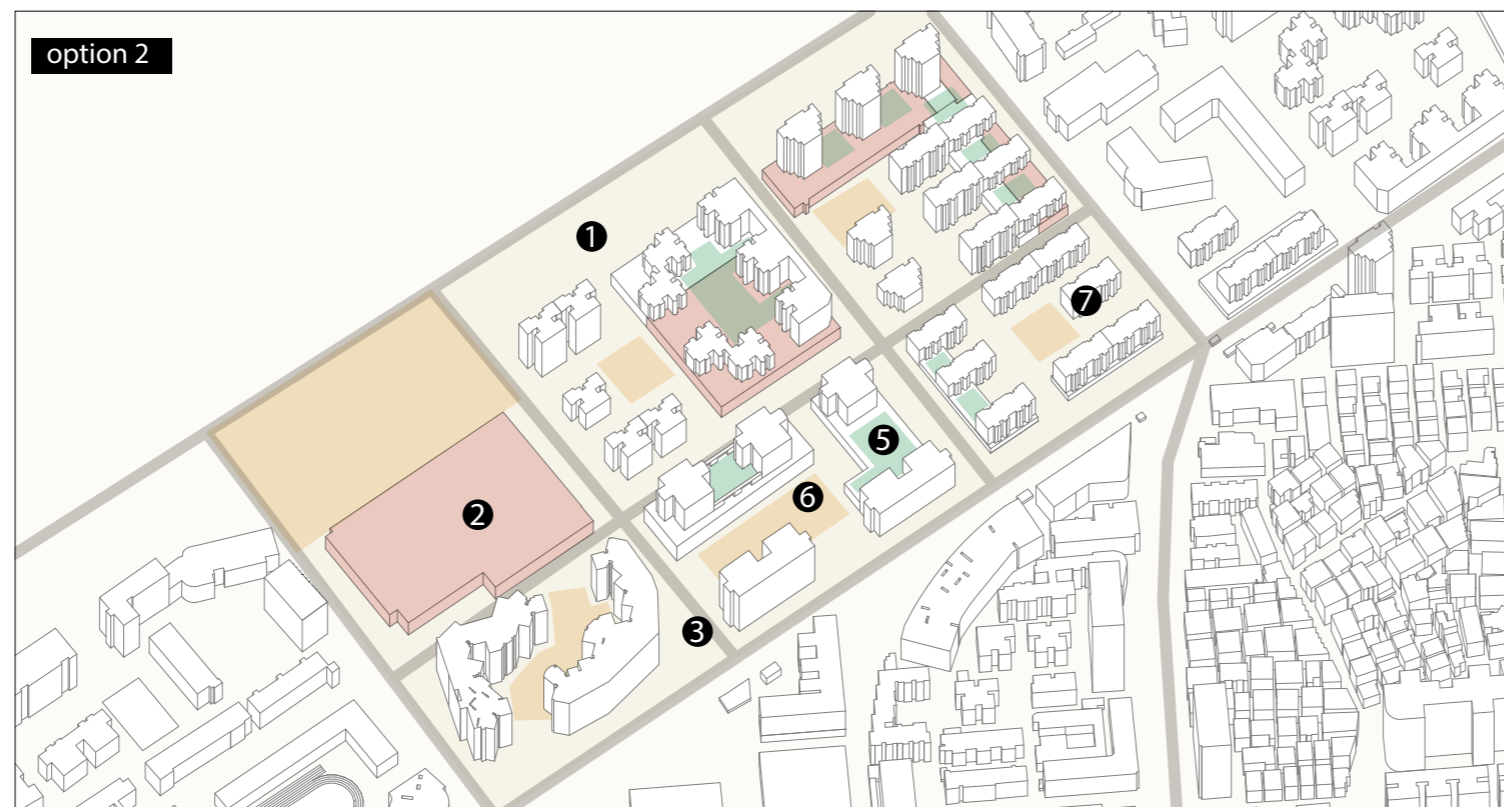
Figure 8-16: Two options of transformation
Source: author

Figure 8-17: new image after transformation
Source: author

SPORTS CENTER

Ground floor

Floor 1
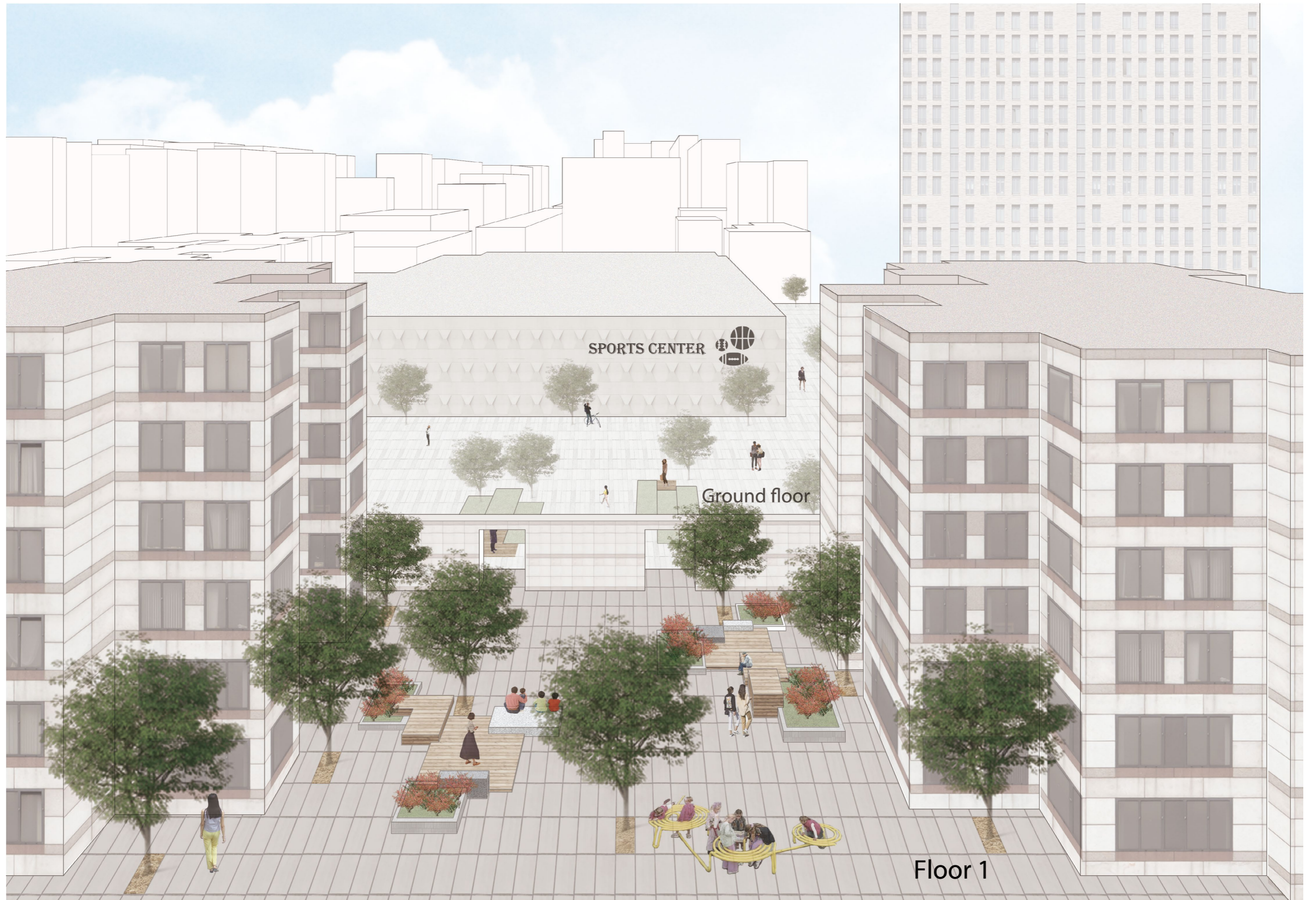
Figure 8-18: Image of collective space and public space
Source: author

long-time renting

long-time renting

public facilities

SPORTS CENTER

public space

public space

Ground floor

long-time renting

collective space

public facilities

Floor 1

Figure 8-19: Spatial intervention of collective space and public space
Source: author

9.1 | Conclusion

This thesis focuses on young graduates, who are the main backbone of future social and economic development of the city. Shenzhen has an intention to transform from "world factory" into "world city" and has already started industrial upgrading, which leads to the need of a large number of high-educated young migrants. However, unaffordable housing price and job-housing unbalance are driving out this group of people. To retain these high-educated young migrants, a livable living space should be created through urban regeneration. Besides, the new policy of "Tenants enjoy the same rights as home buyers" makes it possible to boom the renting market to solve the problem of soaring housing price. Therefore, the research question is defined as "**How to get jobs-housing balance and improve livability of high-educated young migrants in Shenzhen through urban regeneration and new policies?**" To answer this question, 6 sub-questions are put forward and answered in the thesis.

(1) What is job-housing balance? What is the benefit of it?

This sub-question is one of the main questions that ties problem statement and strategy together and could be seen as the basis of the thesis. This primary method of research here is interviews with local objectives. Since the transportation situation of different cities various, making it difficult to get the answer of this research question through literature. So during the field trip, a lot of young graduates from different fields are interviewed. From the interviews, the maximum transferring time that local young graduates in Shenzhen could accept is around 30 minutes, and most of them would choose to live in 2 or 3 metro stations away from working place. The main reason that they would

like to choose nearby area to live is because they think they could get more time for their own private lives after working, which would not only improve their living quality, but also working efficiency. Under this finding, the site is chosen as Sungang area, 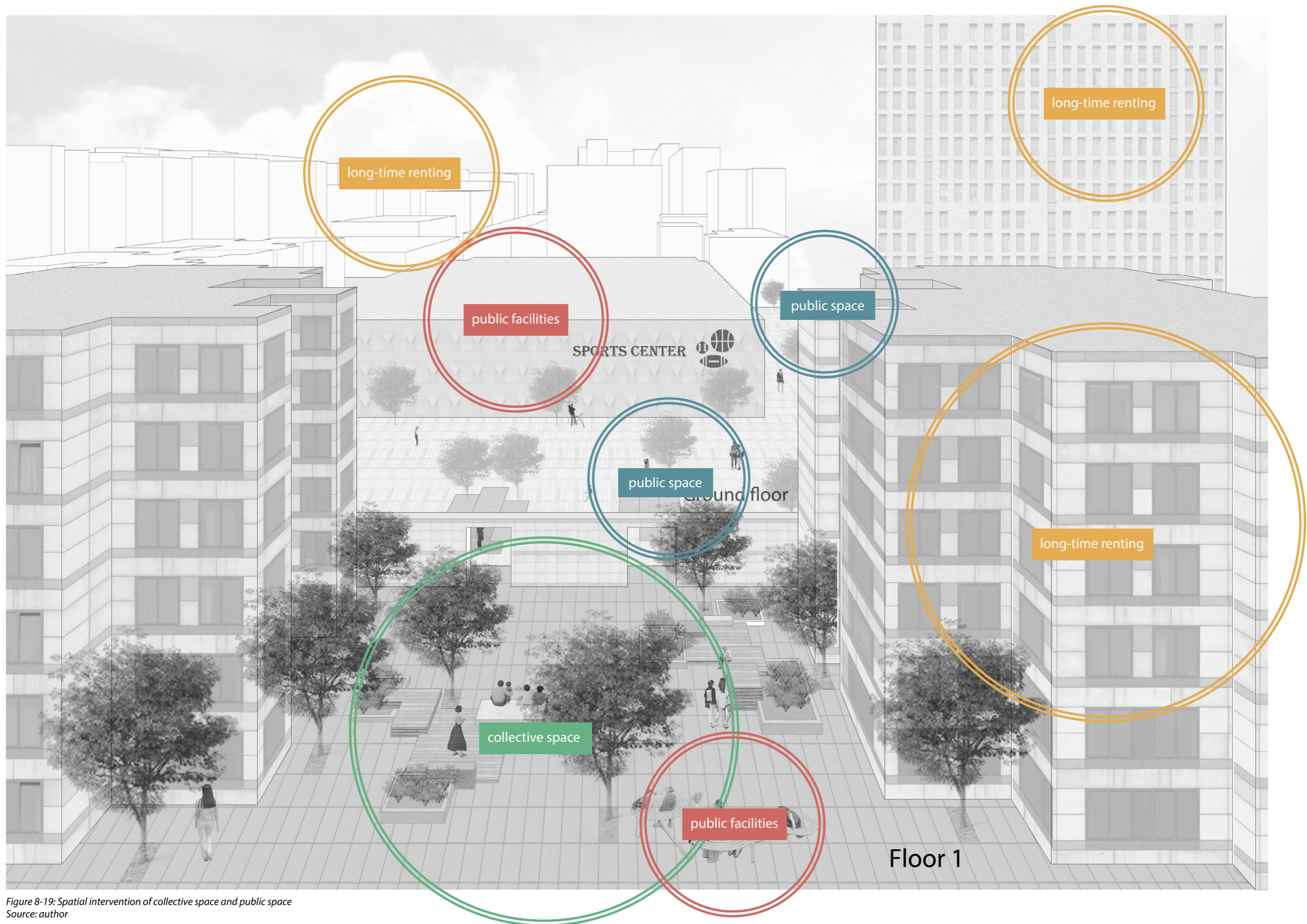which is around maximum acceptable distance. And the analysis shows that transferring by metro would cost a lot of time, even though the physical distance between these two areas are quite close. So according to the analysis, the strategies of creating new job opportunities in the site and creating good walking and cycling environment are put forward to reduce the time spending on transferring and get jobs-housing balance.

(2) What are the characters of young graduates? Why the city should attract and retain these group of people? What is their demand of livability?

This is the sub question that is investigated in the literature review. These young graduates, with professional skills and knowledge, are the main driven forces for future economic and social development. Besides, the government put forward a new image of "world city", and young graduates would also be the backbones of this transformation. According to literature review, the elements that creative class values most when choosing place to live are thick labor markets, lifestyle (variety of scenes: music, art, technology, outdoor spaces, nightlife, etc), social interactions, diversity (tolerance for people of different ethnic groups, races and ages), identity, authenticity and the quality of place. These elements could be translated into spatial qualities as job opportunities, public space, accessibility to public facilities, mixed- use, multi functions

and unique characters of a place. These spatial qualities are their demand of livability.

(3) How could urban form be adaptive to improve living quality with more affordable accommodation?

This sub question is studied through literature review. Density, as one of the most important elements of urban form, plays an important role concerning about living quality. The indicators of livability is first studied by literature review. Indicators of environmental and social aspect are concluded. While this thesis is mainly concerned about social aspect, so only indicators of social aspect are analyzed. Under this conclusion, the relationship between density, which is one of the most important elements of urban form, and livability, is studied. High density, generally, tends to lower level of livability, but it usually has a positive relationship concerning about affordable accommodation. So a TOD model would be adopted. A 400-800 circle around metro station and 200-400 circle around bus station would choose to be densified to create more space for affordable accommodation.

(4) What kind of typology in terms of density and function could contribute to job-housing balance? What are the existing typologies in Shenzhen?

This question is mainly answered by mapping. There are mostly 4 urban fabrics in Shenzhen, which are Danwei housing, commercial housing, urban village and factory. Danwei housing, commercial housing, urban village are the urban fabrics that mainly for residential, and factory is a combination of working and dwelling. These four typical urban fabrics all exist in the site. Danwei housing and urban villages in the site are the

fabrics that are affordable but living quality is low. Commercial housing has a better living quality, but the housing price is unaffordable. Factory fabric in the site is only for working. This mono-function in the site becomes one of the biggest issues. So mixed-use is one of the most important strategies and densification through TOD model make it possible to create working space and dwelling space as well. In site scale, to realize jobs-housing balance, jobs would happen not only outside the site, but also inside the site. To reduce transferring time to working space outside the site, a good walking and cycling environment is created. Moreover, factory compound is the main fabric that transformed into working space to create job opportunities inside the site. Densification and mixed use also happen in this area to create dwelling. The current dwelling areas are also transformed for a better living quality. The short distance between working space and dwelling space makes it easier for employees to transfer and contribute to jobs-housing balance.

(5) What are the existing urban regeneration models/principals/strategies?

This question is mainly studied through the analysis of government planning and vision. Accoring to government planning, Shenzhen would become a "world city" and Luohu District, as one of the three first developed districts, is experiencing an on-going urban regeneration to realize this new image. The vision of Luohu District government divides this district into 10 areas with different goals and the site would be a place for high-end business district. Besides, the government would expand the current economic and financial sector in the south to a 3.5 kilometer strip, and the site would become one part of this economic and financial strip. Based on this vision,

new job opportunities would be created and new economic and financial sector would be expanded to the current retail area, which is one of the most important layers of strategy.

(6)How can the possible alternative strategies contribute to job-housing balance? What are involved stakeholders? What new policies could help to promote the implementation of the project strategies?

This thesis is based on the new policy of "Tenants enjoy the same rights as home buyers". This new policy improve the possibility to boom the renting market and reduce housing price. And the strategies include 5 layers, which are related to job opportunities, affordable housing, public space, public facilities and amenities and infrastructure, could provide a mixed environment of working and dwelling. Commuting time to current economic and financial sector would be reduced and new job opportunities would be created inside the site. Moreover, new dwelling would be built and current residential areas would also be transformed to create more dwelling opportunities for employees. Public space, public amenities and amenities, new connection to current public space could improve the living quality as well. So this area would realize jobs-housing balance. A new policy of long-time renting would be put forward and government, private developers, state-owned developers and banks are the main stakeholders. State-owned developers could be one of the most important backbones of urban regeneration. Government would provide FSI compensation or beneficial polilcies to facilitate urban regeneration.

At this point, it should be underlined that such a future cannot be realized without efforts. Societal and technical advancements should be triggered. Whereas the achievements and possible risks or challenges is hard to measure and foresee. The thesis is one of the possible outcomes of on-going industrial upgrading and urban regeneration. One of the most challenging, but also discouraging parts of this thesis is the possible change and implementation of the policy. As mentioned, this project is based on the testing policy of "Tenants enjoy the same rights as home buyers". In a long-term, the implementation of this policy is highly linked with other supporting policies. Even though new schools are added in this project, the problem of lacking good educational resources is still severe in Shenzhen, which may lead the rental of school district housing become unaffordable as well. Besides, the strategy of introducing new industries in the site is also based on the vision of the government. The change of policies and vision may also cause the failure of economic expansion.

However, acknowledging the risks and challenges, this thesis still put forward a strategy characterized by flexibility and adaptability.

Job opportunities:
With the on-going trend of industrial upgrading in Shenzhen, industries in the site would be upgraded natrually. The warehouse function would be replaced either by retail or other functions spontaneously. This area may become a big wholesale center based on current large scale of retail in the site. However, spatial interventions in the thesis is still possbile to be adopted. The open structure inside the factory fabric makes it possible to be divided into small rooms of different size. Densification could still happen in
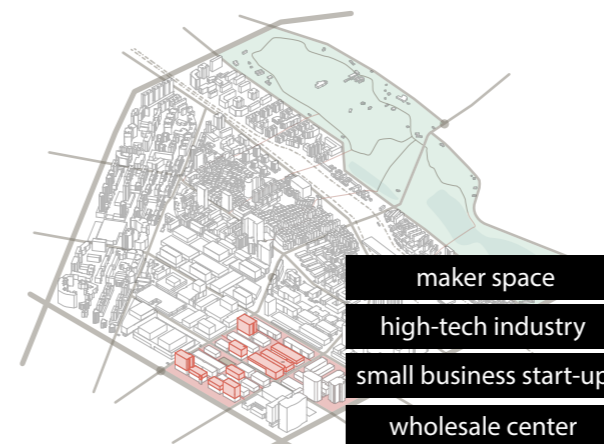

Figure 9-1: Other possible job opportunities in the retail area
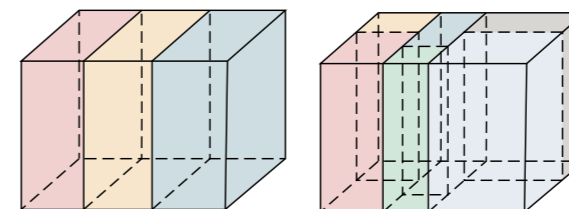Source: author

Figure 9-2: Flexible space inside factory fabric
Source: author

the buildings in the strategy and mixed-use could still be adopted. However, the urban fabric of factory should still be kept to create identity. Even though the jobs still may not be the choice of young graduates if this area become the wholesale center, it could contribute to improve livability of local residents and maybe other low-income migrants. And the strategy related to local talents development could also help to develop the local residents. Besides, this area have the possibility to transform as maker space, high-tech industry center and small business start-up center as well.

Affordable housing:
To provide more dwelling, new housing would still be built and current residential would be transformed. Spatial interventions in relation to

hese two aspects could still be adopted no matter the possible changes of location. And different options have already shown in the pilot project (see in Figure 9-3). However, the long-time renting policy may fail if the policy cannot be implemented. While on the other hand, supported by government, some projects related to affordable housing have already been carried out, including not only social housing for low-imcome migrants, but also rental rooms for young graudates. These rental rooms for young graduates could be a interim living place.

Public facilities and amenities, public space and infrastructure :
More public facilities, amenities and public space is very vital to improve living quality and create a sense of community. The strategy in the layer of public facilities, amenities and public space is already flexible. Warehouse could be transformed into public facilities and amenities, like museum, library and gym, and the large distribution of this fabric makes it possible to add more public facilities and amenities in the site.

In a nutshell, the thesis is not only related to livability of young graduates, but also other local residents, like low-iincome migrants. Providing job opportunities and affordable housing to young graduates and other groups of people, the site would get jobs-housing balance. Living quality would also be improved through adding public facilities, amenities and public space. Both talent development, young graduates attraction and living quality advancement will eventually contribute to improve livability and social-economic regeneration in Shenzhen.

dwelling

communal
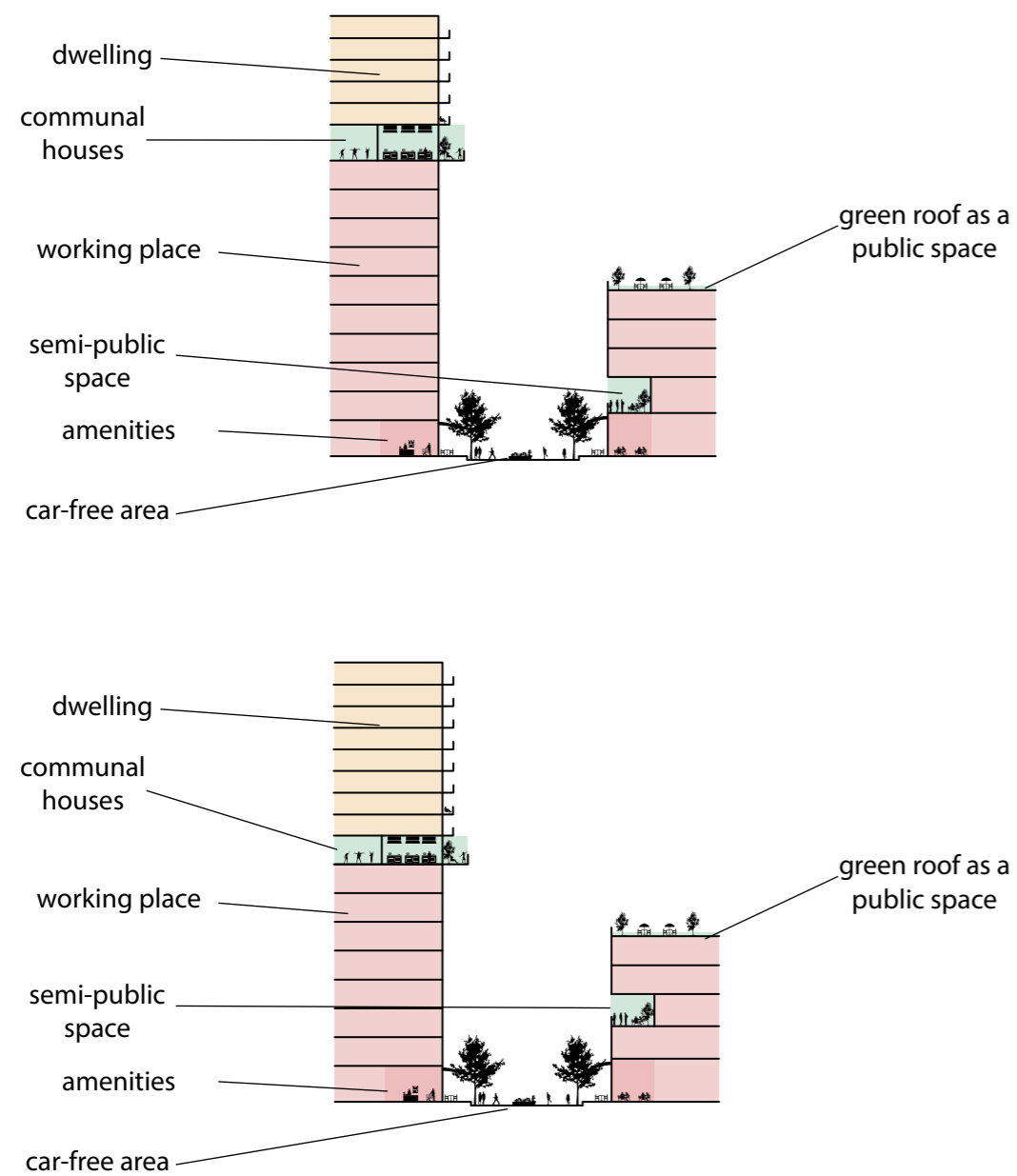houses

working place

green roof as a
public space

semi-public
space

amenities

car-free area

dwelling

communal
houses

working place

green roof as a
public space

semi-public
space

amenities

car-free area

Figure 9-3: Flexiblility in affordable housing
Source: author

9.2 | Reflection

Research group & thesis

This project of livable Shenzhen is carried out in complex cities research group under the graduation tope of "Transforming Chinese cities". The complex cities research group studies "the changing role of Urbanism that results from increasingly complex spatial and social circumstances and internationalization" (complex cities research group, 2018). And the "Transforming Chinese cities" graduation topic tries to "identify ways of planning to more effectively integrate the physical character of cities with social issues to create healthier, more livable, and more inclusive places - and provide new models of city development that promote 'people-centered urbanization'" (complex cities research group, 2018). This research group, from my perspective, is focusing on the development of cities under globalization, when cities are more complex than ever before. Stakeholders, history, policies, culture, social and economic geography are all the concerns of this research group. The "Transforming Chinese cities", meanwhile, pays more attention on urban regeneration in Chinese cities. This fits exactly in what the project of livable Shenzhen addresses in the thesis. The project is based on the new policy of "Tenants enjoy the same rights as home buyers" put forward by the government. This new policy makes it possible to boom the long-time renting in Shenzhen, which could be a solution for the current soaring high price in China. The impact of policy is always one of the study topics of this research group. Besides, the project is located in Shenzhen, which is an important city in the whole global system, and the objective of the project is high-educated young migrants, who are the main backbone of future social and economic development of the city. Although this thesis is not about low-income migrants and urban villages that this research group usually pays

attention to, they share the same idea of creating a health, livable and inclusive living environment. Moreover, this project tackles the complexity of transforming current residential areas and creating new job opportunities in the city. To create affordable housing and job opportunities, demand of objectives, different urban forms and stakeholders with different interests and powers are taken into consideration, and these are all the topics of complex cities research group.

Methodology & approach

Basically, this thesis follows the methodical line of complex cities research group, that is context and spatial analysis, vision, strategy and pilot projects. Systematical and logical thinking is involved in during the analysis. The thesis follows the approach of combining theoretical approach and the on-site analysis of complex cities research group, trying to localized the theory research on the local scale. The thesis the indicators of livability for high-educated young migrants and the relationship between density and livability. Through literature review, the framework of on-site analysis is defined and the representative case of Sungang is used to connect abstract theories and practice. Based on the analysis, strategies and pilot projects are proposed in the case of Sungang.

Besides, to approach the complexity, the strategies are divided into several layers. The way of categorizing could contribute to narrow down each strategy to the site and analyze different stakeholders and actions in each strategy.

Theory & deign

The thesis integrated design and research and each of these two plays an important role in the thesis. The research helps to answer the questions related to "why" and "what". In this thesis, the research clarifies the indicators of livability and

the relationship between density and livability, which not only becomes the framework of on-site analysis, but also shows the direction of design and provide the basis to form the solution in the design. Meanwhile, design process aims at solution, which means the questions related to "how". The design is integrated through the whole thesis. How density is connected with livability in the literature review is the combination of theory and design. The definition and measurement method of density is studied through theory, and the connection between density and livability combined both current design in the city and theory. To bridge theory with design, a field trip is carried out to study the current design in the site and how does it impact livability in current situations. After site analysis, the issues in the site for future design are concluded and strategies are put forward based on these conclusions. Besides, in order to improve spatial quality, designs of densification and streets are put forward in the project 1. Different options are designed to show the flexibility of the strategies. In pilot project 2, design is also based on strategies and different options are also provided.

So in a conclusion, design is highly linked with theory. Theory firstly form the strcture of analysis and provide the direction of strategy. Design is used to test and verify the theory during literature review and is a furthre step of strategy.

Transferability
This thesis aims at creating livable living environment for high-educated young migrants, which is a big problem not only in Shenzhen, but also in whole China. The thesis plan analyzes the demand of high-educated young migrants and the possibility and strategies of transforming current urban forms, more affordable housing and job opportunities could be provided, making

it possible to retain these driven forces of future development. The ways of urban regeneration in the thesis could be transferred not only to the other similar places in Shenzhen, especially in "guannei", but also other metropolitan cities which are also experiencing an on-going industrial upgrading, like Beijing and Shanghai. Besides, a long-time renting model is put forward in the thesis. As a testing land in China, the experiment of long-time renting in Shenzhen provide an alternative way to be transferred to other cities in China to solve the problems of high housing price.

Deficiency
The site of the thesis is located in "guannei", which is more developed and the housing quality and morphology of urban fabrics is a little bit different from "guanwai". Besides, even though the strategies could be transferred to other similar places, the limitation should still be noticed that each area has its own challenges and opportunities and the strategies in the thesis just give the basic instruction and does not meet demands of all areas in the city.

Progress
During this one year graduation thesis, a lot of progress is made from my perspective. The first thing that I would like to point out is the way of critical and logical thinking. After P1, the analysis should be carried out. At first I carried out the analysis just as all analyses people would carry out. However, during tutorial, I found out all analyses should have a backbone and should not be carried out casually. This was the first time that I realized the need of critical and logical thinking. Based on this, a lot of literature review was made and finally a list of indicators of livability was created, which became the basis of my analysis. After this, I always pay attention to the logic of

the thesis and always tries to keep the story line complete. The second thing I would like to mention is about social inclusiveness. When dealing with social housing and other dwelliing types, I made a distinction between them at the beginning since I thought the segregation would happen naturally and it would be very difficult for richer people to social interact with people in low-income. Likewise, this problem was also pointed out during tutorial. I started to realize that there should not be this physical distinction made by people intentionally. Besides, I firstly thought these social housing would be built by private developers as other dwelling types. While tutors reminded that these social housing could be built by state-owned developers for a better quality and suggested me to look up references of social housing in Netherlands. This process of discovering gives me a new idea of social inclusiveness.

In a word, during this one-year graudation project, the progress is not only in academic aspect, but also makes me understand more about insistence and time management.

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