

Singapore's experience in planning and management and its enlightenment

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Abstract: Singapore has had many successes in urban planning, construction and management, and has made outstanding achievements in urban construction. The comprehensive guidance of planning has made Singapore have a good reputation worldwide. The article systematically combs the planning points and planning points of various development stages and stages of Singapore's planning, comprehensively combs the current planning system and the content characteristics of planning, and summarizes the experience that can be used for reference in such aspects as "coordination of planning departments, adherence and implementation of planning concepts, urban design management, planning information transmission, and planning implementation management", Put forward reflections and suggestions on domestic cities.

Key words: Singapore; Plan formulation; Planning and Administration

1. Introduction

Singapore is a world famous garden city. In 1965, the country achieved independence. In just over 40 years, it has leaped from a small land and resource-poor place to a globally recognized livable city. It has made remarkable achievements in urban development, in which planning has played an active leading role in urban development. Due to the timely adjustment of its planning system and the continuous improvement of its formulation and implementation, planners can better meet the development needs of different periods in different periods, and the planning authority has gradually changed from administration to service. Singapore's successful practice in planning, construction and management has provided us with useful reference. At present, there are many documents about Singapore's planning process, planning system, planning preparation, management, planning implementation, etc., but due to the late start, there is a lack of corresponding update and tracking in the planning system and planning preparation. Therefore, while summarizing the development process of Singapore's cities, this paper also summarizes the development characteristics of Singapore's cities, so that the majority of urban planners and relevant experts and scholars can have a deeper understanding and mastery of Singapore's development in this paper, so that our urban construction and development level can be further improved.

2. Overview of the development of Singapore's cities and plans in different periods

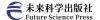
Singapore began to implement autonomy in 1959, separated from the Commonwealth in 1963, and completely separated from Malaysia in 1965, and established the Singapore government. Since then, in each period, Singapore will undergo a transformation of economic development, and each transformation of economic development will be accompanied by strategic changes. Its development process can be divided into the following according to time sequence.

Singapore was a period of rapid development from the early 1960s to the early 1970s. The Singapore Economic Development Commission was established in 1961, which was a large-scale

industrial revolution. This stage is mainly concentrated in laborintensive areas. There are many factories around the city, which urgently need a large number of labor and residents. However, the environment in the central urban area is poor and needs to be improved urgently. In 1960, the Housing and Housing Administration established a public housing strategy and evacuated residents to the surrounding new towns. The introduction of the Land Management Law in 1967 enabled the acquisition of land, thus opening up a new town and the development of a town. During this period, Singapore's planning system has only one comprehensive plan, that is, to regulate the use of land through use zoning, opening intensity, infrastructure and public facilities land reservation, and to control development. From the mid-1970s to the late 1980s, Singapore has developed from a labor-based country to a technology-based country in the past decade. Urban reconstruction has replaced the evacuation of residents, which is the most urgent work. The conceptual plan first proposed in 1971 put forward the strategy of building CBD in urban areas. Its basic way is to sell land and obtain funds through bundling and selling, thus increasing jobs. The city hall is responsible for most of the work. Most of the houses built during this period were realized through sales schemes. At the same time, this stage is at an important stage of development. During this period, Singapore adopted a two-level planning system, introduced a non-legal conceptual plan, implemented an overall development strategy under the guidance of the conceptual plan, and integrated short-term and long-term plans.

From the late 1980s to the middle 1990s, due to the rapid construction, a large number of sites were left idle. The large-scale reclamation project on the southern coast of Mana Island completed in the early 1980s made the region better developed. In comparison, the demolition of the old building makes the new building free and alleviates the degree of space tension. For this reason, the government of our country has rethought and proposed the protection of historical and cultural cities.

In the middle and late 1990s, with the continuous development of technology, New Kolkata was increasingly integrated with globalization. A number of scientific research parks and business parks have been built in succession, and Weiyi Science and



Technology Park is its pioneer. While emphasizing innovative countries, Singapore is also increasing the investment of universities and research institutions, and also paying attention to tourism, human settlements and local culture. In addition, the development guidance blueprint of the 1990s has been integrated into an overall plan, which has changed from a record-type plan focusing on recording the land use status in the past to a far-sighted guiding land development direction. Singapore's planning and administrative system is also undergoing continuous adjustment. The transformation from architectural issues to social and people's life issues has had a huge impact on the development and policy system of Singapore's cities. In the 1990s, the overall urban design of Singapore also gradually tended to be systematic, statutory and comprehensive, and changed from a management type to a service type, making the planning system adapt to the needs of service and power adjustment, more concise and efficient.

Today, Singapore has been recognized globally as a highquality international garden. The key of planning and development lies in how to properly handle the coordination between planning, construction and management. The implementation and operation mechanism of planning also presents a strong intensive feature.

3. Singapore's current planning system

At present, Singapore's planning system is composed of two levels: conceptual plan (similar to domestic strategy and overall plan) and comprehensive plan (such as the overall integration of statutory plans and regulatory detailed plans). The comprehensive plan will play a direct guiding role in the development of land. Both plans are formulated by the Urban Construction Authority and approved by the government development department. The comprehensive plan is a legal instrument of Singapore's laws and regulations.

3.1 Conceptual plan (coordination plan)

The conceptual plan is the long-term development direction of Singapore in the next 40 to 50 years. Its development direction and principles, including shape and structure, spatial functional layout, infrastructure system and living conditions, are carried out once a decade to better reflect the current needs. The plan is to formulate long-term development strategies to ensure that Singapore has sufficient land to meet the long-term needs of population and social development, to coordinate and guide long-term public building plans, and to lay the foundation for the overall plan. The first conceptual plan was formulated in 1971. It laid a solid foundation for the development, transportation and quality of living of Singapore's new towns. The subsequent conceptual plans (such as 1991 and 2001) are designed to better adapt to the local and global development of Singapore, so as to ensure that Singapore's conceptual plan has practical significance and urgency, so as to better deal with current and future problems. The last concept plan was in 2011, which is very different from the previous concept plan. It contains feedback from the society, while this concept discusses how to build a sustainable social structure. This new concept plan is complementary to the Human Eloquence Report jointly published by the Singapore Population and Demographic Affairs Office in 2013. In addition, a land use plan has been developed to provide a reasonable and efficient land use strategy based on the realization of 6.5 to 6.9 million Singapore residents by 2030.

3.2 Comprehensive plan (maximum plan)

The comprehensive plan is a five-year short-term plan (10-15) formulated by the Singapore authorities. The comprehensive plan is a legal functional division, which translates the previous conceptual plan into a legal basis to guide the development of regulation. This guide provides a detailed plan for the development use of each block, including use, plot ratio, etc., to guide the development of each block in Singapore.

The plan was implemented in 1958, and the latest revision was 1980, 1985, 1993, 1998, 2003, 2008 and 2014). Since the implementation of the development guidance blueprint in the 1990s, major changes have taken place in the overall plan, which has changed from the recorded plan of land use status to the forwardlooking land development plan. Based on the concept put forward in 1991 and the overall plan for 1985, the Reconstruction Department has begun to formulate the plan. According to population, land, transportation, natural factors and other factors, Singapore is divided into 55 regions, and more detailed planning is proposed for the development of each region. The average number of residents in each area is 150000, and there is an urban center. Each region is subdivided into several regions, each with a business center. The development guidance map of these 55 regions was completed at the end of 1998, and then integrated into a legally effective administrative region. Since then, the name of the development guide has no longer been adopted (the blueprint of the development guide is specifically for the 1990s), but has become an overall plan. Comprehensive planning is the legal guide for formulating land development needs.

The comprehensive plan specifies the basic land use needs (such as residential, commercial, industrial layout, etc.) to each area, including use, plot ratio, etc. The height is not considered in the overall design. It uses a conversion table of volume ratio to height to adjust the height of the building. The complete plan is based on the map of the land plan, with relevant text descriptions, so as to better understand the land plan. This is Singapore's only legal plan for future development or redevelopment.

In addition to covering all land use plans, the comprehensive plan also formulated five control plans for the central urban area (11 of 55 districts) and gradually expanded to all districts. The control plan of these five aspects is a good supplement to be considered from a specific perspective when implementing the overall plan 1 the control of street blocks, urban design, historical protection and memorial areas, delimiting more control areas, and proposing design guidelines for relevant land use; ② Planning of park and water body - the planning determines the park and open space, internal green space, roof green space, public commercial space to be connected, water body, existing square, potential square area, etc.; 3 Height plan of buildings - the height of most residential areas is determined by the floor or absolute height, while other areas are limited by the area ratio conversion table; 4 The control of the villa group has been strictly controlled underground activity incentive area, underground activity incentive area and underground activity incentive area.

In addition, the comprehensive plan is statutory and must be strictly implemented once it is passed. Relevant parties will formulate special development plans according to the overall development plan, such as the development plan of industrial parks



to determine the functions and areas of each industrial park; The housing plan will clarify the new development plan, design method and maintenance plan of the housing estates; The construction and maintenance plan of the park and water area makes the overall layout of the park at all levels clearer; The special control plan shall be coordinated with the overall plan and provide effective guidance.

4. Characteristics of planning and preparation in Singapore

4.1 Strengthen the coordination of preliminary research and plan, and make joint efforts to ensure that the plan is scientific and easy to implement

The Metropolitan Reconstruction Authority of Singapore is a formal legal body, which is a formal legal department under the National Development Department of Singapore. It mainly implements the urban plan of the National Development Department. The planning and implementation of Singapore are actually based on comprehensive planning. It is a highly authoritative administrative decision. It plays a guiding and regulating role in the development and construction of the city and is also the basis for its management. The Urban Reconstruction Authority of Singapore has closely contacted with relevant departments in the early planning and planning coordination, combining planning with planning in urban planning, transportation, housing, environment and other related fields, reflecting the characteristics of "multi-plan integration".

For example, the evaluation of the concept plan was conducted by the Urban Reconstruction Authority of Singapore, which participated in the work of more than 40 departments under the guidance of the Ministry of National Development. The needs of various industries, such as housing, industry, commerce, environment, transportation, public facilities and defense, have been investigated in detail, and are comprehensively collated and revised by the Urban Renewal Authority of Singapore. When formulating the comprehensive plan, the Economic and Trade Commission will conduct a detailed investigation on the development of different markets and industries, predict the development direction and industry development direction in the next five years according to the development trend, and determine the required land area and industry category. The Housing Development Department decides the new residential land area based on the planned population indicators; For example, the Land and Transportation Administration Bureau and the Municipal Landscape Administration Bureau will put forward clear requirements to relevant units on the development and construction of land scale, infrastructure and other fields. Similarly, other relevant units will also respond to the development requirements in the short term. In addition, professionals from the Urban Reconstruction Bureau, the Housing Development Bureau, the Land and Resources Bureau, the Park Bureau, the Transportation Bureau and other relevant legal institutions will form a high-level planning team, and will widely consult experts, scholars and the public from relevant aspects to formulate the preliminary design plan after comprehensive consideration, and finally implement it in the comprehensive planning map to ensure that the planning plan is highly consistent with the development needs, Reduce the possibility of planning modification or change Energy.

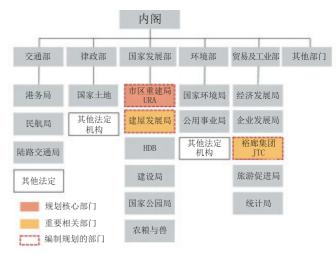


Figure 1 Relevant departments of Singapore's administrative structure and planning (Image source: self-drawn by the author)

Singapore has set up a number of special councils with multiple levels and departments to coordinate the coordination of various needs and conflicts. In terms of planning and construction, the leading group and comprehensive planning group of the conceptual plan are very important. The Council is composed of professionals from various ministries and commissions, including the Ministry of National Development, the Ministry of Justice, the Ministry of Trade and Industry, the Ministry of Environment and Water Resources, and other relevant fields. Led by the organization, it can effectively resolve the direct contradictions and conflicts between various departments. The Reconstruction Bureau undertakes the functions of leading, integrating and checking.

4.2 We should adhere to a stable plan for a long time and adjust the power step by step to ensure the time limit

An important feature of Singapore's urban development is "big planning and big projects". As early as 1971, when the plan was first conceived, it formulated a space blueprint for Singapore's longterm development. The so-called "grand plan" is Singapore's X year plan. In the future development, we should consider the space and space of the city. Singapore's vision is 10 million people, and Singapore's plans at all levels are consistent with this. Although the current population of Singapore is only 5.5 million, it is not eager to carry out large-scale construction in the short term, but will leave a lot of land to ensure that it can provide 10 million people to live in Singapore when necessary in the future. This is the main reason why Singapore can guarantee its high-quality urban construction quality. The so-called "long-term plan" is the longterm development of Singapore. From a long-term perspective, the concept plan determines the direction, structure and focus of land use, the development direction, structure and focus of the region, and "the overall urban structure, land use and transportation layout, laying a reasonable basis for the formulation of a reasonable legal overall plan". In each revision, there will be a basic spatial layout and gradual adjustment based on the characteristics of the times. For example, in the 1971 concept, the concept of "ring city" was put forward. In the form of satellite city, the urban area was connected with each satellite town by high-speed railway, thus forming an overall spatial structure; Since 1981, it has been committed to developing a wider range of comprehensive transport facilities, taking public transport as the leading factor, to maintain historical



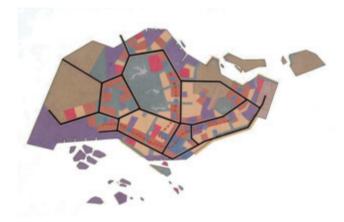
buildings and maintain their original style; Since 1991, it has carried out the development and construction of the comprehensive functions of the regional central area, and established a new business district; In 2001, it was suggested to expand the scale of the city and build a garden-type city in urban planning; The 2011 concept plan focuses on promoting the renewal of new towns and old cities to expand the number of residents, build more multipurpose industrial parks, expand railways, highways, ports and airports, and improve the utilization rate of mass transportation. Although the purpose and focus of urban development are different in different periods, the pattern of urban development in Singapore has not changed much from the first version to the latest conceptual design. From 1971 to 2011, the overall pattern of urban development has been carried out according to the original plan, gradually improved, optimized and improved, and the urban development track has gradually become clear.

The conceptual plan is once every ten years and the overall plan is once every five years, which is revised and revised by the Metropolitan reorganization. In five years, the comprehensive plan will not remain unchanged. It will become a guide on land use. The purpose is to reflect the development expectations of the land in five years as much as possible. These expectations can be determined by the government or the market. If necessary, the Urban Reconstruction Authority will submit a change application to the National Development Department. Although the conceptual plan is revised every ten years, the reservation case was started five years ago to evaluate the implementation of the plan and adjust the development in a timely manner, which not only ensures the timeliness and accuracy of the plan, but also ensures the authority and time of the plan.

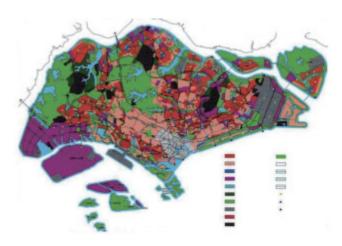
4.3 Highlighting of urban planning function, connection and coordination with the government

The quality and quality of Singapore's planning and construction come from a comprehensive and efficient urban design guide (see Figure 3). Urban design is a major component of Singapore's second system. Urban design is a major component of urban design. Its urban design and urban design, historical protection and control of memorial areas are major components of urban design. Singapore's urban planning has achieved targeted control in space, and has developed a set of planning guidelines with the region as the core and the region as the core. Its urban planning guide consists of general principles and norms. The general principles cover many details, such as pedestrian corridors, building envelopes, building boundaries, outdoor signs, lighting systems, facility shelters, outdoor commercial facilities, environmental art, etc. The specific contents include: location, use, use of the first floor underground, use of the first floor, use of the second floor, space use of the surrounding streets, general form of the building, building height, greening and landscape design, building interface, shared partition, public space (urban room), roof, night lighting, underground ground, and air pedestrian network, logistics, transportation, parking, consistency with the surrounding streets, open walkway Requirements for bicycle lanes, shrubs and trees, connection with commuting facilities, street lighting, columns, floor tiles, etc. All internal facilities in the urban design specifications should be included in the statutory planning scope, and their contents should also have legal binding force. Fine urban planning management can prevent quality control and aimless

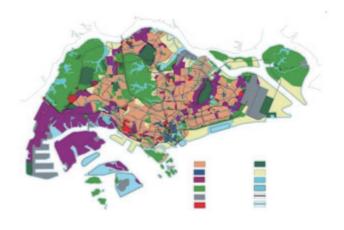
over-control. Therefore, if a piece of land enters an important area, it must meet the requirements of the "urban design guide" of the area on the premise of meeting the overall planning of the area. Singapore also attaches great importance to the effect of urban design, transforming the concept of city into terms and "urban system" in policy language, reducing the cumbersome mapping and making its relationship with planning closer. The formulation of its "performance" system and the control of indicators ensure the existence of "hidden order" in the design process, and ensure the diversity of various developers in the development process.



(a) 1971 conceptual planning structure



(b) Conceptual planning 1991



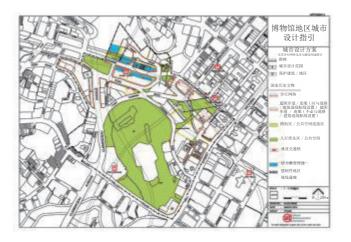
(c) Conceptual planning 2001



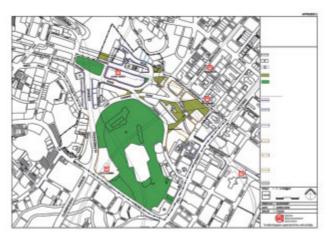


(d) Conceptual planning 2011

Figure 2 Evolution of Singapore's conceptual planning scheme (Image source: https://www.ura.gov.sg)



(a) Ground floor walking system and vitality excitation diagram



(b) Public space and building fallback control plan

Figure 3 Some urban design plans of the Museum Planning Area in Singapore (Image source: https://www.ura.gov.sg)

4.4 Improve technical specifications to achieve efficient implementation

Singapore's planning can accurately and efficiently guide the development of fine land, which is closely related to the

regulations formulated by Singapore. Take the land use categories in Singapore's overall plan for example, and divide the land into 31 categories. In China, when the land is divided into three types: large, medium, large and medium, all 31 categories are a mixed type, and each category contains a basic ability and an auxiliary ability. In addition, the "white land" unique to Singapore also belongs to one of the above 31 categories. Compared with the other 30 kinds of land, white land pays more attention to comprehensive use, usually using more than two kinds of land at the same time. However, in order to develop "white land", the following requirements must be met: 1) the geographical location of the land is good; ② The surrounding ecological conditions are increasingly perfect; 3 Convenient transportation, subway, light rail and other means of transportation, there is a good space for development; 4 If there are many historic sites around, more factors should be considered for market operation. According to the requirements of the comprehensive plan document, the "white land" is advocated to be integrated in various functions, namely the socalled geographical location sharing. The plan is white land, which can be adjusted according to the law within the scope of the law, without paying the land price 2. In addition, the other item of the comprehensive plan is "reserved development land" for use when future development is uncertain and for temporary lease.

The improvement of the technical specifications of the Singapore Plan also depends on the good interaction of various industries. In the process of development, the good interaction of various industries can timely adjust the specifications of the plan, thus providing strong support for the development needs. For example, since 2000, in addition to focusing on the important aspects of industrial development, the Economic Development Agency in charge of industrial development has also actively analyzed the space needs of the four-generation parks, and put forward specific requirements such as functional mixing, urban service supply, and increased development density. Then the planning department immediately adjusted the corresponding planning land types, and implemented the work of increasing industrial white land and subdividing industrial categories ③.

4.5 Fully implement the planning idea and effectively support the development of technology and policy implementation

Singapore has implemented the national development strategy of "garden city", from macro to micro, from technology to policy, from macro to micro, from technology to policy, all from seven levels

4.5.1 Green areas subject to statutory and indicator control

On a large scale, the nature reserve is planned, developed in a legal way, the natural ecological area is permanently preserved, and its ecological benefits are continuously cultivated. In areas such as regional parks, green belts, street parks, parking lots, highways, viaducts, sidewalks, building roof greening, facade greening, etc., there are detailed definitions of greening location, area, scale and responsible person. The plan sets the goal of per capita greening area of 8 square meters and defines its grading scale.

4.5.2 Quantitative and operable green network connection

Taking the overall green ecosystem as the core, the implementation of "green line control", taking the greening and public space of the whole island as the link, has greatly improved



the utilization rate and efficiency of the park and other green areas, connecting the walking and bicycle network, and surrounding the whole city. At the design stage, the architectural needs and action plans are proposed.

4.5.3 Ecological protection and restoration in project construction

Singapore's construction projects should try to maintain and restore the original landscape. Take the new city as an example. In the architectural design, in addition to maintaining the vegetation and terrain, the low-impact development architectural form has also been adopted to minimize the excavation and utilization of underground space, and the above-ground garage and corridor have been adopted to link the various units, so as to improve the permeability of the surface and strengthen the protection of the ecological base in the developed area.

4.5.4 Policies and measures to encourage environmental protection construction

Singapore not only stipulates the green coverage rate of the oasis and a certain green area, but also rewards the designated green houses on the building area. For example, when obtaining the "platinum" level development project, it is allowed to occupy more than 2% (up to 5000 square meters) of the land; When the development project gets the "gold+" environmental protection label, it will get 1% of the construction land (up to 2500 square meters).

In addition, under the people-oriented concept, Singapore has also put forward various technical measures and incentives in the areas of building rainwater corridor system and pedestrian system. Singapore has made remarkable achievements in implementing green and people-oriented planning ideas results.

4.6 There is a strong consistency in converting plans and designs into terms related to land development

All control requirements for planning, planning and planning in the Singapore Integrated Planning and Urban Planning Guide will be translated into "land transfer plan", and the planning results (in the sales process) will take on the shape of an "equilateral triangle". In the process of land transfer, the management and design of land use rights are very detailed, and the main control factor is performance indicators. For example, the land use right of Binhai Bay includes 27 projects, 132 projects and 58 projects, including detailed planning and design (see Table 1).

4.7 The competent cadre in charge of overall planning has high quality and overall planning approval

The secondary plan of Singapore was finally completed by the managers of the Urban Reconstruction Office. The Urban Construction Administration has a total of more than 10000 staff, and the planners in each area are held by a planner, and the government representatives and local residents conduct comprehensive exchanges. In addition, when formulating the plan, a committee composed of experts and various social forces was adopted to make it more open and transparent, and the management system of the public sector was effectively guaranteed. In the administrative agencies of 11 regions, more than 80% of the administrative officials have the professional knowledge of architects (that is, they have a good understanding of urban planning guidelines and architectural design), and 50% of the architects

are responsible for formulating planning guidelines and approval of construction projects in the central region (this department is responsible for formulating land transfer rules related to architectural design). With rich experience in architectural design, managers can provide better services in urban design, architectural design and high-quality architectural environment (see 4).

5. Conclusion

At present, with the development of metropolis and the continuous improvement of living conditions, it is urgent to strengthen urban planning and construction to improve the quality of the city. Although compared with Singapore, there is still a gap in the development background, stage and management mechanism of China, Singapore's development model has many useful lessons for China's development, such as how to optimize and simplify the planning level, how to conduct dynamic adjustment, and timely respond to the needs of urban development; Strengthen the cooperation among various industries, focus on the land use plan, and promote the integration of multiple regulations; Optimize and adjust the planning standards, refine the management content, especially the planning content, transform the planning content into the gist of land transfer, and strengthen the professional quality of managers to improve the management level.

remarks:

- ① For example, within the scope of zoning, it includes the mixture of commercial, commercial and residential land on the first floor (less than 40% of residential and commercial land), the white land in the business park (15% of the white land, the remaining 10 types of business office buildings, and the area of the other 11 types of business office buildings cannot exceed 40% of the other 85%), and so on.
- ② Singapore's 1964 Plan Regulation was amended, which pointed out that if the plan permits, the development of the development can exceed the designated level of development, and the designated area of use can also be changed, but the development tax must be paid; If the developer has signed a national restrictive contract, it must provide additional fees for the use and use of the land, while the white land does not need to pay development taxes and additional fees.
- ③ In 1995, the white land of the industrial park was proposed because it can adapt to the overhaul area. Because the site area of the project is small, the overall planning has been carried out in the whole project. For some land with certain historical value or survey objects with certain scale, appropriate land can be selected for planning according to the final grid analysis.

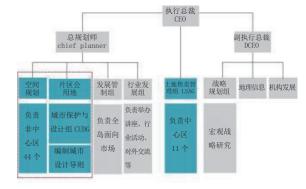


Figure 4 Department structure of the Urban Renewal Authority of Singapore (photo source: self-drawn by the author)



1 Comparison of detailed design rules for land transfer in key areas, general areas and a district in Shenzhen in Singapore ④

Transferred land	A plot in the Central Avenue area of Binhai Bay	Lot 1, Jintaiwen Avenue	Bookstore plot in a sub-central district of Shenzhen
Location and zoning	The central area and zoning type are white ground	Non-central area, zoning type is residential	Secondary central area, land for cultural facilities
Page number of transfer details	Page 58	Page 11	Page 2
Key points of transfer rules	1. Planning and design guidelines (Land use scope, zoning type, and specific mixed use regulations, maximum plot ratio, land subdivision requirements, first floor function, outdoor leisure space, child care center, building volume and shape, building height, underground space development, building interface, building fallback, roof, landscape design requirements, public space, visual access, public art, night lighting, underground ground and air walking network, service logistics mobility Vehicle flow line, motor vehicle and bicycle parking lot, other municipal requirements); 2. Detailed explanation of planning and design guidelines; 3. Design Advisory Committee (specifies that the approval of the Design Advisory Committee must be passed first in the development management approval process); 4. In addition to the conventional regulations, the requirements for the infrastructure related to the building also consider the possible redevelopment of the building	use scope, zoning type, housing development type, maximum plot ratio, maximum height, floor height, backline, coverage/shared space, building layout); 2. Development guidelines (development control, access to state-owned land, parking of automobiles, motorcycles and bicycles, entrance and exit of motor vehicles, boundary treatment, garbage station setting); 3. Others (provide permanent public pedestrian passage, transform	land type, plot ratio, coverage ratio, spacing, building height, building area); 2. Overall layout and building fallback (fallback, green space rate, architectural style, line of sight, underground connection, cross-street connection, air walkway, ground walkway, fire protection requirements, parking