

Lay Equal Stress on Land Utilization Efficiency & Ecological Environment - Adhere to Intensive Growth Oriented Development Zone Construction

1.Introduction: Overview of the growth of China's development zones

Ever since the end of 1950s, "Sci-Tech Park" has witnessed a rapid expansion of economy, under its model emphasized by governments and enterprises world widely, after Silicon Valleys had become the paragon of developing hi-tech industries through science and technology, drive for development of the regional economy and the pattern of economic growth. Every country in the world has invested huge resource into construction of various Sci-Tech parks. Since 1980s, China started to explore the pattern of economic growth in Sci-Tech parks. Subsequently, construction of the parks is visible everywhere and variety of development zones like "economic & technological development zones" mushroom in China, including Sci-Tech parks, economic & technological development zones, export processing zones and commercial development zone. By the end of 2007, there had been 54 state-level economic¹ & technological development zones and 56 state-level export processing zones², some of which has given a positive impetus to the local economic development. On the other hand, too large scale of land used or low efficiencies in land utilization, extravagant land consumption and low economic profits generally exist in construction of development zones.

2.Analysis on land utilization of China's development zones

Fact 1: slightly large scale of land utilization in many cities in China

Take Zhongguancun Science Park (hereinafter referred to Zhongguancun) as an example, Zhongguancun is one of the largest development zones in China, which has obtained support and administration from the government since its birth. By the end of 1986, various development companies had reached nearly 100 and gradually formed "The electronic street of Zhongguancun" from October, 1980 when the first privately-owned scientific organization was established. With Decision of the State Council Concerning the Deepening of the Reform of the Science and Technology Management System and support from governments at all levels, it has seen a rapid boom; moreover, in 1988, the General Office of the CPC Central Committee proposed the establishment of Zhongguancun Experimental Zone for the Development of New Technology Industries and decided to set up Beijing Yizhuang Economic and Technological Development Zone in 1991. Finally, the office officially determined to "One zone, five parks" development pattern of Zhongguancun with Haidian Science Park as its center, which is adjusted into "one zone with multiple parks". In order to further satisfy the demand for development of new and Hi-tech industries, Zhongguancun got re-extended at the beginning of 2006. (see picture-1)



Picture1 Profile for Zhongguancun (Source: Official Website of Zhongguancun
www.zgc.gov.cn)

| Name of the park | Size of the park(ha) | Name of the park | Size of the park (ha) |
|-----------------------------------|----------------------|--|-----------------------|
| Haidian Zone | 13306 | Fengtai Zone | 818 |
| Changping Zone | 1148 | Yizhuang Zone | 4128 |
| the Electronic City | 1680 | Daxing Biopharmaceutical Industrial Base | 963 |
| Shijingshan Zone | 345 | | |
| Desheng Zone | 864 | | |
| Beijing Zhongguancun Science Park | | Total Area 23232ha | |

Table1 The list form for the scale of main parks in Zhongguancun (cleared out according to Bulletin of PRC State Development and Reform Committee No.3, 2006)

As shown in the list-1, Zhongguancun covers a total area of 23232ha, equivalent to 1/5 of the central city of Beijing. Its counterparts in China also have a comparatively large scale. By the end of 2005, 54 state-level economic & technological development zones approved by the State Council occupy 841.72 square kilometers, of which 32 zones in the East cover 636.23 square kilometers, 9 in the Central 93.74 square kilometers and 13 in the West 111.75 square kilometers³. The scale of land utilization of development zones in China can be seen from these figures.

| Name of the park | Size of the park(ha) | Name of the park | Size of the park (ha) |
|-------------------------------|----------------------|----------------------|-----------------------|
| Dalian Science Park | 38800 | Wenzhou Science Park | 511 |
| Shanghai Minhang Science Park | 350 | Ningbo Science Park | 2960 |
| Tsingtao Science Park | 27321 | Taiyuan Science Park | 5000 |

Table2 The list form for the scale of some parks in China (Source: Official Website of the Science Park)

In 2004, the Ministry of Land and Resources thoroughly sought out variety of development zones and reduced 4813 zones nation widely, 70.1% of the total number. The planned land was cut down by 24.90 thousand square kilometers, 64.5% of the original size. The planned but unused land was recovered by 2617 square kilometers⁴.

The scale of land use for development zones is so large while its economic profits are so low. Compared with the Hsinchu Science Park (Taiwan) occupying 2,000 ha, Zhongguancun, 9 times larger than the Hsinchu Science Park, is just one third of the park in per capita output value in 2003.

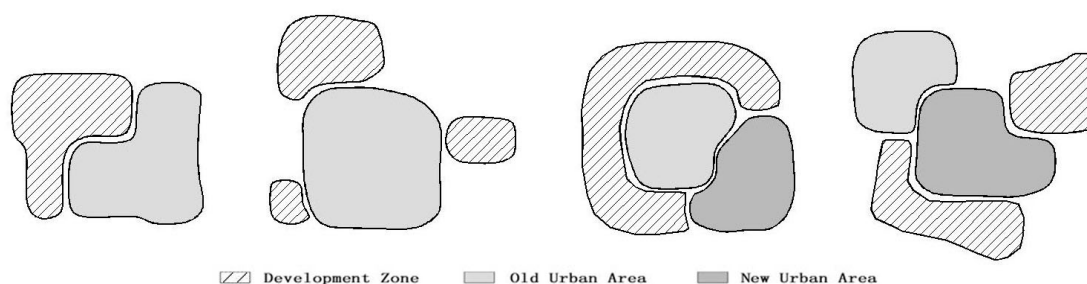
| | Stat. Year | Total Income (100 million US dollars) | Per capita output value (10 thousand US dollars) | Investment on R&D (100 million US dollars) | Per capita investment on R&D(10 thousand US dollars) | Practitioner s(10 thousand persons) |
|-----------------------------------|------------|---------------------------------------|--|--|--|--------------------------------------|
| Taiwan Xinzhu Science Park | 2003 | 252.3 | 24.79 | 13.85 | 1.36 | 10.16 |
| Beijing Zhongguancun Science Park | 2003 | 347.76 | 7.13 | 15.75 | 0.322 | 48.86 |

Table3 Comparison of major economic indicators between the Hsinchu Science Park (Taiwan) and Zhongguancun (source: Liubiao (2005) 《ZGC(Zhongguancun) Specialized Science Parks: Planning, Development and Management》, Tsinghua University)

Fact 2: unreasonable spatial layout of urban development zones in China

Our urban development zones are mostly located at the outskirts of cities or rural-urban continuums (see picture-2), closely related to the relevant industries. They are generally found scattered along transportation lines. However, farmers of these areas are land for agriculture and virescence in the fringe of cities, which is significant to curtail order-less urban expansion and ensure urban ecological security. Based simply on urban built-up areas, development zones put more pressure upon the cities' original infrastructure. It may be said that aggressive presence of development zones at the fringe of cities poses certain challenge for the construction of the park itself, urban ecological environment and agricultural

production.



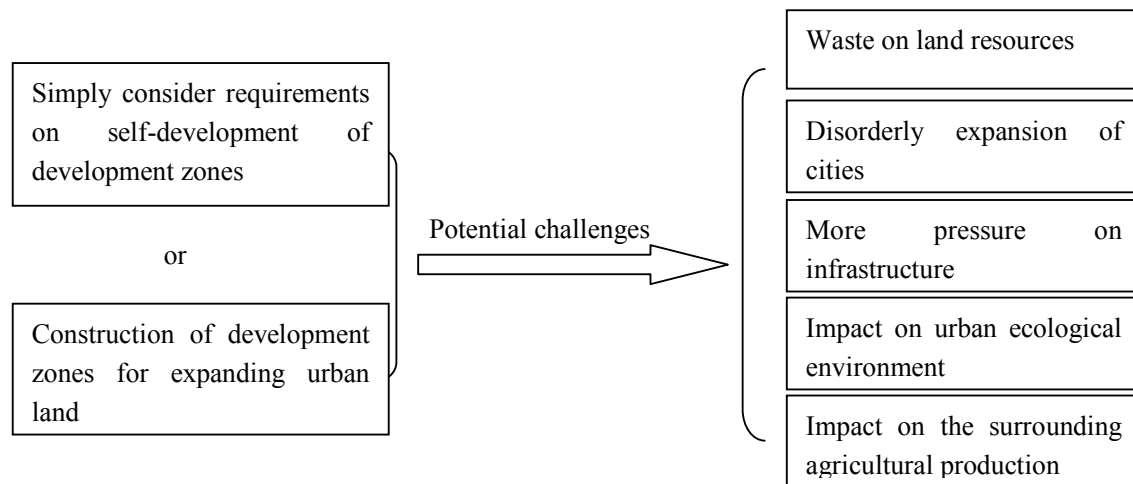
Picture 2 Schematic diagram for relation between development zones and location of the city (self-drawn)

In these days when land resources are so precious, land use of development zones gains general attention from all works of life. The Notice of the State Council on Promoting the Land Saving and Intensive Use (No.3 [2008] of the State Council) issued in January, 2008 fully embodies the government's resolution to clear up unreasonable land use of development zones. How to prevent new "enclosure movement", how to reduce challenge to urban ecological environment by constructing development zones and how to realize intensive utilization and order development of development zones have been urgent research topics. The analysis on the reasons why land use of development zones is generated is the key to solution of these topics.

Fact 3: The models for obtaining land are mostly defined by the government. The organs interested expropriate, organize and exploit the land.

By virtue of high risk and high return of Hi-tech industry, the convergence of enterprises, R & D and venture capital brings high efficiency and space for development to enterprises in the parks. At the same time, it contributes greatly to the development of regional economy. In addition, development zones in China enjoy many tax preferential policies, such as "The incubator for technological enterprise and national university S&T parks are exempt from business tax, income tax, housing property tax and land use tax in cities and towns since its confirmation"⁵. Therefore, governments at different levels provide strong support for development zones. The models for obtaining land are mostly defined by the government, and then the administrative organs interested have charge of expropriating land, demolition of houses and first-class land development.

Obviously, the land use of development zones and its development are interconnected. The initial startup and operation of the industry which is abundant and high in culling rate makes it necessary for development zones to follow the market and similar industries while depending on affordable land rent, well-suited infrastructure and vast space for development as well. However, from the angle alone of self-development or economic efficiency or even expansion of the construction land by local governments, it is absolute to cause problems in urban spatial structure and land use (see picture-3).



Picture3 Diagram for potential dangers in construction of development zones (self-drawn)

In order to avoid these problems, overall consideration should be given to construction of development zones to lead an order establishment. From the angle of planning development zones, attention should be given to the following aspects: 1. efficient and intensive utilization of land; 2. emphasis upon ecological environment; 3. stress on implementation and management.

Based on the above analyses, the article is intended to make a further discussion on planning measures of development zones through combining regulatory detailed planning of the northward extended Electronic City of Beijing Zhongguancun Science Park.

3.Case Study: Study on Regulatory Plan of the northward extended zone of the Electronic City of Beijing Zhongguancun Science Park⁶.

The northward extended zone of the Electronic City was one of extended areas at the beginning of 2006, totaling 276ha. As one part of Zhongguancun Electronic City, it is a new development zone for comprehensive industries centering communication and R&D.

3.1 Analysis on the chosen location of the northward extended zone of the Electronic City

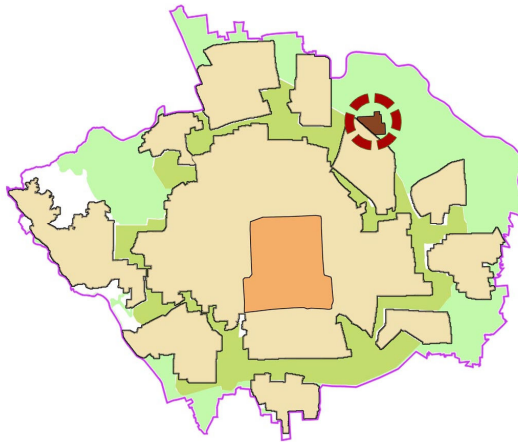
(1) Analyzing from its self-development

Located at the northeast corner of Beijing, outside of the Fifth loop-line (see picture-4), it is 9.7km away from Beijing Dongzhimen transportation hub, 13.5km away from Beijing CBD and 9.4km away from Beijing Capital International Airport (see picture-5). It is encircled by Beijing-Chengde Highway, Beijing-Shunyi Highway, The Capital Airport Expressway and the Fifth loop-line --urban express road (see picture-6). It is convenient for the extended zone to use Wangjing Group's infrastructure--its adjacent neighbor.

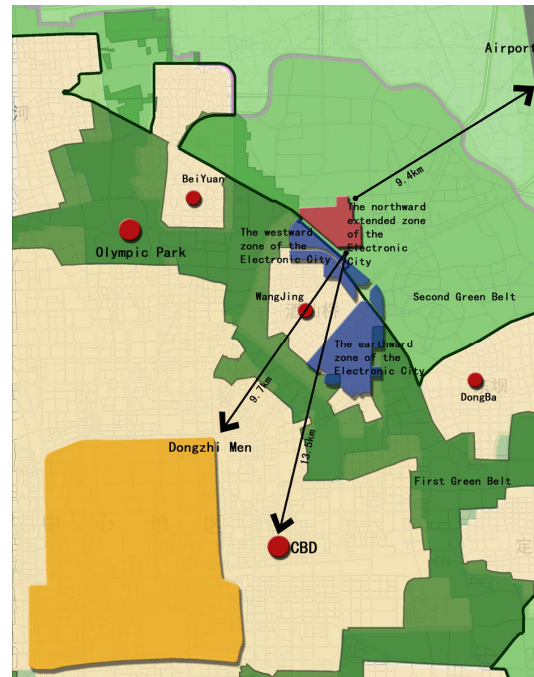
In the fields of relevant industries, a large quantity of enterprises and R&D institutes pool here in certain industrial scale through development of west and east areas of the electronic zone for nearly a decade. Its adjacence to the west and east areas of the Electronic City facilitates

its industrial development (see picture-7).

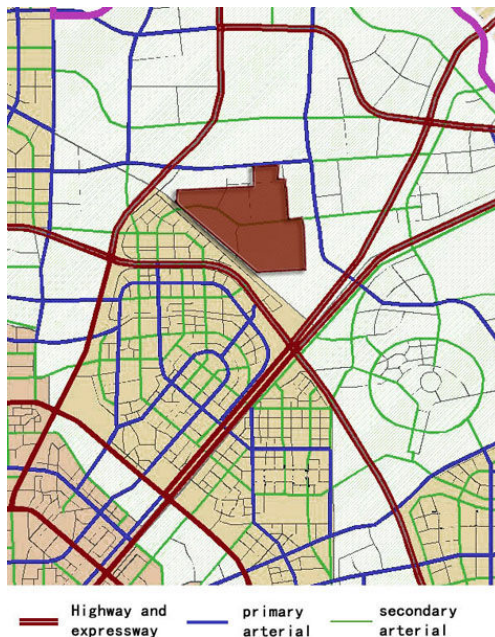
At present, the extended zone has three natural villages. Moreover, current land use is centering land use as plow-land and for township enterprises, whose cost and class-one land development is relatively low.



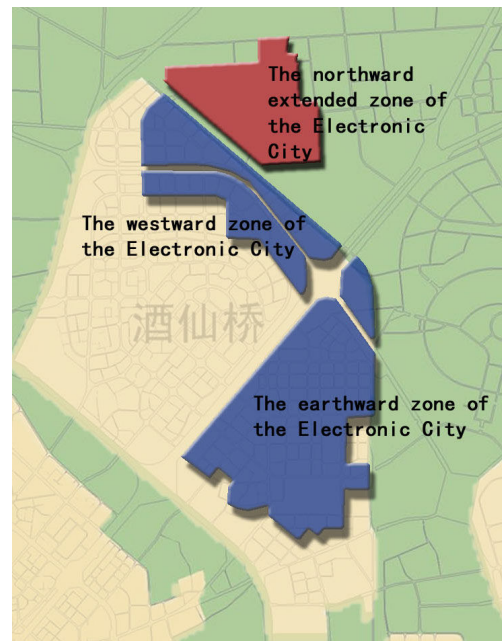
Picture4 The map of the northward extended zone of the Electronic City (self-drawn)



Picture5 The map of the northward extended zone of the Electronic City (self-drawn)



Picture6 The map of transportation around the northward extended zone of the



Picture7 The map of spatial relation between the northward extended zone

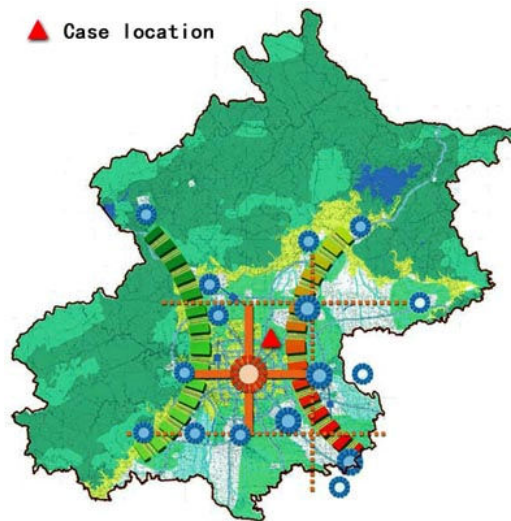
**Electronic City (Source: Regulatory plan of
The northward extended zone of the
Electronic City)**

**and the west and east areas of the
Electronic City. (self-drawn)**

(2) Analysing from urban angle



Picture8 The sketch map of Beijing Green Belt and Green passage (Source: The plan of Beijing's Green Belt)



Picture9 The spatial layout for development in Beijing (Source: The Master plan of Beijing 2004-2020)

The northward extended zone of the Electronic City belongs to outskirts of the city, within Beijing's second Green Belt, and located at Beijing's major green passage (see picture-8), which possibly has adverse effect on Beijing's ecological environment. In 2004, Beijing determined "Master Plan of the City" to focus on the developmental theme of "two axes, two zones and more centers" (see picture-9). The west of Beijing focuses on environmental protection—the axis of ecological development while the east on industrial development—the axis of industrial development. The extended zone is regarded as one part of the East Industrial Zone in the Master plan. From the angle of Beijing central city, the central city adopts development pattern of fringe groups. The extended zone is an example among them, which relies on Wangjing fringe group with a comparatively better infrastructure and has a good condition for industrial development because of its adjacency to the west and east areas of the Electronic City. The zone's development will fulfill positive function upon the city's urban economy.

A comprehensive analysis from both spatial space and ecological environment shows the chosen location may raise problems generally existing in land use in construction of development zones in China on the one hand and becomes an advantage for the urban industrial development.

3.2 Planning conception

Based on the characteristics of chosen location of the northward extended zone and reflection on the context, the following strategies are put forward in practice of planning.

(1) Efficient, intensive land use

The northward extended zone as an industrial park mainly focuses on new and Hi-Tech industries and becomes a new zone for industrial development centering R&D of Electronics & Communications Industry with core manufacturing technology like the pilot test closely related to R&D. One of its significant reasons why it is paid attention to is its characteristics of industries in the zone. Good transportation conditions is needed to sustain development of new and Hi-Tech industries, meanwhile land resources have to be efficiently utilized to guarantee the economic profits of the development zone. What is more, economical and reasonable layouts, full play of policy advantages and ample auxiliary measures as support are indispensable. Dissected from the overall angle of the city, high-efficient, intensive land use is more significant.

(2) Stress on ecological environment

The northward extended zone located at the outskirts of the city was an area dominated by green land within the second green belt. Nevertheless, sometimes the aggressive expansion of a city goes beyond our ability. Facing such an urban expansion from rural area to construction land of nearly 3 square kilometers, we need to possibly protect local ecological environment and promote local environmental quality when planning. Therefore, "environment" becomes another factor to be considered during planning the extended zone and also the boldest attempt, namely integrating urban design with the regulatory plan and putting the concepts of urban design into the regulatory plan.

(3) Urban planning management

Ideas of urban design are much adopted in the planning to improve the local environment. However, urban design has not gained legal status in China and not involved in the newly issued City and Country Planning Law. Urban design, therefore, can be deemed as in a stage of "informal". Under such a circumstance, we should take into account the regulatory plan—the platform of planning management in China at present by integrating the content of urban design into the regulatory plan to ensure its implementation.

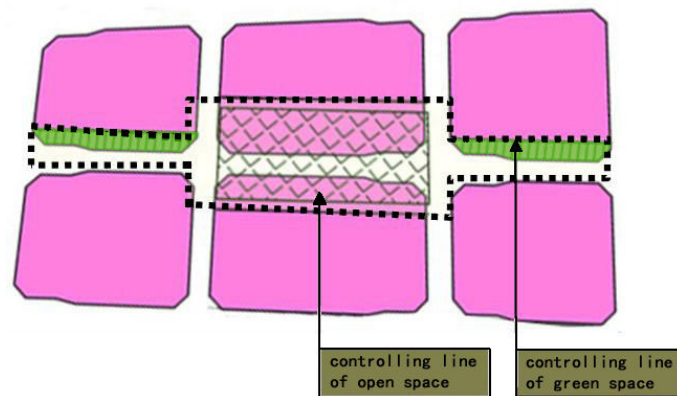
3.3 Planning method:

It needs a series of specific planning measures to realize the above-principles

(1) Through the control of "space" and "function", the high-efficient land use will be achieved so as to guarantee the comfortable and soothing environment of the street.

The early planning was always starting from the physical space, depicting the blueprints of regional development. In this planning, we have replaced the original mode of planning "space" alone with "function" in the planning. This can be found mainly in the public space. We believe that we could control and guide the efficiency and environment of total area in an all-around way so long as we guarantee the efficiency and environment of the public spaces. In the northward extended zone, the system of the public space consists of three parts. The first one is a system of the public space formed on the basis of adjustments on the original

waters and composed by waters, waterfront green space and major public facilities. This part creates a comfortable leisure space by combining with waters, also provides the visually clear large-sized passage, using independent land in the regulatory plan with the explicit function; Secondly, the group public centers are sent aside in the form of controlling line of open space and controlling line of green space in various industries groups,(see picture 10) this part of space to be realized through the control of the land-use regulations which increase the green space control line or the construction line. Specifically, it is no hard rules of the green space and plaza space, but set out green space and controlling line of open space. In the process of planning & management, the open space and the green space should be concentrated in the range of controlling line of green space and controlling line of open space. Create a public space sequence by adjusting the green space and open space layout. In application, definitely indicate the application of public space around the substruction; the third part contains the indoor, semi-indoor and underground room public space, this part is mainly composed of industries construction, which linked to commercial service construction, the bottom space of construction for industries around the center of public groups, and the construction on the two sides of under ground channel, Simultaneously, the space restricted in the planning of construction applications is clearly defined, specifically speaking, it is a subdivision of certain functions, formulate the permitted use and restricted use of the constructions around the public centers, especially the bottom construction. Through the three-part public space control, the overall environmental quality of the extended zone is generally guaranteed.



**Picture10 The sketch map of the controlling line in vacant land and green land
(self-drawn)**

Based on this, we put forward the advice of the urban design on the aspects of entire spatial form of the area, spatial composition mode of the construction group, construction interface, disposal of stream line and the design of road section, and so on. We try to create an elegant and comfortable spatial environment with a suitable dimension.

(2) Take rigid control over the public space, enhance flexibility in other areas to ensure the public interests and leave space for the development of industry;
The rigid content of planning control is mainly embodied in the protection of public services, infrastructure and public safety facilities. For the northward extended zone of the Electronic

City, the focus is to protect facilities for the regional transportation and the public service.

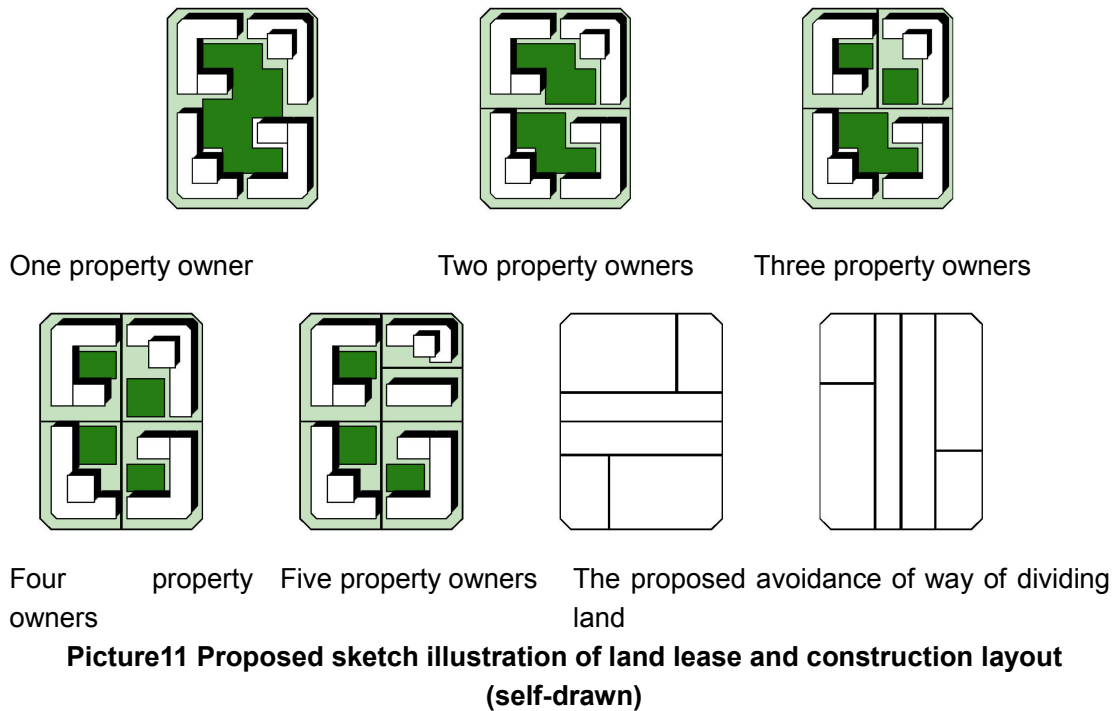
In the respect of transportation, the extended zone is interconnected with the Electronic city and the central city, thus enhancing its relation with the west area of the Electronic City and with exterior world. Four railway tunnels are planned to keep a connection to the west areas. Taking into account the transportation characteristics of the industrial zone in internal transportation, this plan no longer uses usual three-class road network: main road-minor road-turnoff, but under the premise of ensuring the major roads in touch with the outside. Other roads employ the two-level network which uniformly uses 25m of red line, and give a certain degree of flexibility on the treatment of cross section of other roads. For example: the sidewalk will be arranged on the green-belt in the two adjacent block of green space, the road will be arranged into three-lane road. While taking into account the pendulum-model traffic in the North area; the middle lane of the three will be arranged to transport in accordance with the different direction of traffic; it is flexible to carry out the assessment on traffic impact. This method ensures not only a good environment for walking and the transportation capacity of the road but also saves the use of land.

In supporting facilities, the industrial areas need a certain supporting facilities, such as management, commercial displays, hotels, catering services, but it's difficult to define their size. In order not to waste land sources and give a convenient arrangements of various types of facilities, the land used for public service facilities in the planning is uniformly identified as compatible land to enhance the planning flexibility. As for the various groups in the industry, some restrictions are adopted on the use of base architectural features together with the supporting facilities for public services, which are both convenient and flexible.

(3) In the implementation and management, make entrance policies of the industry to ensure intensive growth of development zones

In order to put the exploration in planning into practice, we bring the above methods into the regulatory detailed plan⁷ in this planning for the post implementation and management of planning. At the same time, considering the Regulatory Committee of the Electronic City as one major organ of management and development of the park, we cooperate with the committee to specially make the land leasehold system and advice on entrance policies so as to facilitate supervision over enterprises in the park and class-one land development by the Regulatory Committee.

In the aspect of land lease, it proposed Enclosing Layout of Residential Buildings in construction layout of leased land as a whole to ensure continuous section of the streets and expected spatial type. The partially leased land has equivalent form of leasing and needs to be tidy to facilitate the following control over construction and create continuous section of the streets and expected spatial type.



Meanwhile, considering the phenomena that some Chinese development zones apply for the preferential tax policies in the name of new and Hi-tech development zones and in fact introduce some processing enterprises high in input but low in output and polluting, adversely impacting the efficiency of the development zones, we have made entrance policies and rigid regulation on their investment and operating programs in the park. We propose what kind of enterprises is accepted or forbidden to ensure the intensive growth of the park and lead a healthy regional development.

4. Conclusion

The northward extended zone of the Electronic City, as one part of Zhongguancun, is a typical case among construction of development zones in China. We intend to plan the development zones in the area by integrating the local planning. We believe that, from the overall planning of development zones, we should lay equal stress on high-efficient utilization of land and ecological environment and construct development zones in the way of intensive growth. Meanwhile, we should make bold attempt on planning methods and explore effective methods according to the local characteristics. From China's current development, our country pays increasing attention to land use of development zones and specially, deeply study and plan many development zones. So, we should follow this trend and satisfy the requirements on urban development by adjusting planning methods.

Notes:

1 China Investment Guide Net(<http://www.fdi.gov.cn/pub/FDI/gjjjkkf/gjjkfz/default.htm>)

2 eBay (<http://www.ebuywww.cn/news/2006103181756.htm>)

3 China Investment Guide Net

(http://www.fdi.gov.cn/pub/FDI/gjjjfkfz/fzbg/fzbg2006/t20070118_72536.htm)

4 Sun Wensheng(2005)"Strictly manage land resources and safeguard the lawful rights and interests of peasant worker—Speech at the state Council's third working conference on clean and honest administration", National Land & Resources Information, No.4~5 (Month)

5 The Notice on Several Supporting Policies for the National Outlines for Medium and Long-term Planning for Scientific and Technological Development (2006-2020) of the State Council (No. 6 [2006] of the State Council)

6 Regulatory plan of The northward extended zone of the Electronic City has its full name as "Regulatory Detailed Plan of The northward extended zone of Beijing Electronic City Science and Technology Park", worked out by Beijing Municipal Institute of City Planning & Design cosigned by the Regulatory Committee of the Electronic City (former the Management and Service Office of the New Area of the Electronic City)

7 Under China's current system of planning management, the administrative organs mainly take the Regulatory Detailed Plan as evidence in approval of projects.

Reference:

1. "Regulatory Detailed Plan of The northward extended zone of Beijing Electronic City Science and Technology Park" worked out by Beijing Municipal Institute of City Planning & Design cosigned by the Regulatory Committee of the Electronic City (former the Management and Service Office of the New Area of the Electronic City)
2. Liubiao (2005) 《ZGC(Zhongguancun) Specialized Science Parks: Planning, Development and Management》, Beijing: Tsinghua University.

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