

# COMPARATIVE RESEARCH OF SPATIAL CONTROL IN URBAN DETAILED PLANNING IN CHINA AND GERMANY

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## Zusammenfassung

China befindet sich in einer Situation der Schnellurbanisierung und Industrialisierung, die zu immer größeren Umwelt-, Kultur- und Stadtproblemen führt. Viele aktuelle Probleme der chinesischen Stadtplanung stehen im Zusammenhang mit den räumlichen Kontrollfaktoren in der „regulatory planning“, der chinesischen Form der verbindlichen Bauleitplanung. Durch einen Vergleich der räumlichen Kontrolle in der Bebauungsplanung in China und Deutschland will die Dissertation die Probleme des chinesischen „regulatory plan“ identifizieren und eine Lösung für die bestehenden Probleme finden.

Zuerst führt die Dissertation in die deutschen und chinesischen Planungssysteme ein. Auf dieser Basis werden die Rolle, der Inhalt, die Aufstellung und die Durchführung der deutschen Bebauungsplanung und chinesischen „regulatory planning“ im jeweiligen System beschrieben. Diese Gegenüberstellung gewährleistet die Vergleichbarkeit der Forschung und bietet grundlegende Informationen an.

Die Dissertation entwickelt den allgemeinen Rahmen des Vergleichs basierend auf dem Konzept der nachhaltigen Entwicklung, dem Schlüsselthema der „United Nations Commission of Sustainable Development (UNCSD)“ und den Entwicklungszielen des chinesischen Nationalen 11. Fünf-Jahres-Plans. Darüber hinaus wird in diesem Rahmen zur Bewertung eine „Coding Method“ entwickelt.

Der erste Teil des Vergleichs bezieht sich auf die räumlichen Steuerungsziele der beiden Plantypen. Danach werden die qualitativen und quantitativen Methoden für den Vergleich der räumlichen Kontrollwirkung in der Bebauungsplanung in China und Deutschland angewendet. Dies beinhaltet theoretische Analysen und Fallstudien.

Schließlich werden in der Dissertation die charakteristischen Merkmale des deutschen Bebauungsplans und des chinesischen „regulatory plan“ herausgearbeitet. Dabei werden Probleme der räumlichen Kontrolle in der chinesischen „regulatory planning“ sichtbar. Darauf aufbauend werden innovative Vorschläge für die Optimierung des „regulatory planning“ Systems gemacht, die eine Rekonstruktion der Steuerungsziele, die Einrichtung eines neuen Kontrollsystems sowie die Einführung einer neuen Planstruktur beinhalten.

Die wichtigsten Ergebnisse der Dissertation sind:

Obwohl die ökonomischen und ökologischen Ziele des chinesischen Planungssystems nicht so detailliert formuliert sind wie die im deutschen System, verfolgen beide das Ziel einer

nachhaltigen Stadtentwicklung.

Zwar gibt es eine umfassende Definition für die nachhaltige Entwicklung in der chinesischen Planung, in der Praxis werden jedoch nur allgemeine ökologische Anforderungen definiert, wie zum Beispiel die Festsetzung eines Mindestanteils an Grünflächen.

In der chinesischen „regulatory planning“ werden die Steuerungsinstrumente im Gegensatz zur deutschen Bebauungsplanung nur teilweise bzw. lückenhaft angewendet.

In Theorie und Praxis ist die räumliche Steuerungsfähigkeit des chinesischen „regulatory plan“ schwächer als die des deutschen Bebauungsplans. Unterschiede bestehen vor allem in den Bereichen der Stadtgestaltung und der ökologischen Entwicklung.

Das grundlegende Problem der chinesischen „regulatory planning“ ist, dass es keinen entwickelten Mechanismus gibt, der die öffentlichen Interessen garantieren und die theoretischen Steuerungsziele gewährleisten kann. Die Probleme des Steuerungssystems der „regulatory planning“ und entsprechende Maßnahmen spiegeln dieses fundamentale Problem. Ein optimiertes Modell des chinesischen „regulatory plan“ könnte jedoch äquivalent zur Steuerungsfähigkeit des deutschen Bebauungsplans sein.

## Abstract

China is in a process of high-speed urbanization and industrialization which leads to increasingly serious environmental, cultural, and urban problems. Most of the existing problems are related with the spatial control factors in the urban detailed planning. Through a comparative research of spatial control in urban detailed planning in China and Germany, the dissertation is intended to identify the limitations of the Chinese regulatory planning and present a solution to the existing problems.

First of all, the dissertation has introduced the German and Chinese planning systems as the general background. On this basis, there is a summary on the German B-planning and the Chinese regulatory planning which identifies the role, content, preparation, and implementation of each detailed planning type in their respective planning system. This work has initially established the comparability of the research and provides the basic information.

Secondly, referring to the key themes suggested by the United Nations Commission of Sustainable Development (UNCSD) and the developmental objectives of the 11<sup>th</sup> National Five-Year Plan of China, the dissertation has created the general framework of the comparative research, which is based on the concept of sustainable development. In addition, a coding method has been developed under the framework.

Thirdly, as the initial part of the comparative research, the dissertation has compared the spatial control goals of both detailed planning types. From then on, the qualitative and quantitative methods have been applied to implement the comparative research of spatial control in urban detailed planning in China and Germany, which includes both theoretical analysis and case studies.

Finally, the dissertation has elaborated the distinguishing features of the German B-plan and the Chinese regulatory plan. According to comprehensive and systematic comparative research, the spatial control limitations of the Chinese regulatory planning have been identified and presented. Therefore, based on the limitations, the innovative proposals, which include optimizing the regulatory planning system, reconstructing the control goals, establishing a new control system, as well as establishing the new plan structure, have been proposed.

The main conclusions of the dissertation are:

Although the descriptions of the economic and environmental control goals in the Chinese



planning system are not as detailed as those in the German system, the spatial control goals of the Chinese urban planning are similar to those of the German urban planning. Both are intended to realize the sustainable urban development.

Although there is a comprehensive definition for sustainable development in the Chinese planning system, in practice, only general greening requirements, such as the minimum limits of greening rates, are regulated.

The theoretical spatial control factors of the B-planning are completely applied to the planning practice, while the theoretical spatial control factors of the regulatory planning are only partially applied to the planning practice.

No matter in theory or in practice, the overall spatial control capability of the regulatory plan is weaker than that of the B-plan. The distinctions concentrate particularly on the gaps in urban design control, and ecological and environmental control.

The fundamental problem of the regulatory planning is that there is no developed mechanism that can safeguard the public interest and reflect the theoretical planning goals. The limitations of the regulatory planning control system and relevant measures reflect this fundamental problem. The spatial control capabilities of the optimized regulatory plan model are equivalent to those of the B-plan.

# **Chapter 1 SUBSTANTIATION OF THE RESEARCH**

## **1.1 NECESSITY AND OBJECTIVE OF THE RESEARCH**

### **1.1.1 Topic of the Research**

Ancient China has a long and unique tradition of urban planning, which originated from traditional Chinese philosophy, art, political structure and management need. The urban form and the urban system created by this tradition have a far-reaching influence on Chinese society. Even today, we can still find this influence in most of Chinese cities.

From the Opium War, China had begun to learn from the West. Before the founding of the People's Republic of China, a few Chinese cities such as Nanjing, Shanghai, as well as some relatively developed coastal cities, used to prepare modern urban plans. However, because of frequent wars, only few plans partially put into practice.

After the establishment of the People's Republic of China, the Chinese government applied the former Soviet Union's practices to the economic and social construction. The vast underdeveloped inland was rapidly developed and the national economic plan stimulated the modernization of inland cities. Moreover, for the original relatively developed coastal cities, re-distribution of industries realized the industrialization of cities. During this period, Chinese urban construction, especially the development of infrastructure, had no doubt made great progress. However, paying more attention to the production restricted the quality of life for people.

Before the early 1980s, there was no regulatory plan or any other zoning plan in China. At the time, the only urban detailed plan was the site plan. The Reform<sup>1</sup> led to great changes in the urban building sector and Chinese planners realized that the old planning system was unable to guide and control the new urban developments. Therefore, based on the American zoning plan, the “regulatory plan” was developed as the principal basis of planning administration. Compared to the traditional detailed plan, the regulatory plan appeared to be much more practical.

Today, with China's marvelous economic growth, the urban planning is lagging behind the economic and social development. Under a condition of pursuing economic interests, ignoring

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<sup>1</sup> It refers to the economic reform in China after 1978. From then on, the market economy began to substitute the administrative economy.

social and environmental benefits, weak planning control leads to the poor quality of life for low-income people, the artificially mass constructed destruction of cultural heritages and urban fabric, as well as the deterioration of the environment.

Germany is the birthplace of zoning. From the 19th century to the present, German zoning practices have evolved over 100 years. As the urban detailed plan, the Bebauungsplan (B-plan)<sup>1</sup> is the successor of the traditional zoning concept. The successful experience of German B-plan would be extremely important for the development of Chinese urban planning.

The Chinese urban planning system is in principle a dual-level system. There are two types of plans in a hierarchical order, the master plan and the detailed plan. However, as far as the detailed plan is concerned, there is also a dual-level system, the regulatory plan and the site plan. The regulatory plan is a zoning plan while the site plan is actually a physical lay-out plan. At present, the Chinese regulatory plan is the primary urban detailed plan and the planning tool controlling building permission.

The regulatory plan should be prepared based on the master plan. Its designations (Festsetzungen) regulate and control the types of land uses, land use intensity, location of transport and technical infrastructures, as well as environmental measures. Regarding the German urban planning system, the Flächennutzungsplan (F-plan) is comparable to the Chinese master plan, and the B-plan is comparable to the Chinese regulatory plan.

Based on the research programs supported by the Gottlieb Daimler and Karl Benz Foundation (project Nr. 17-02/03, 10.2003-10.2005) and the Alexander von Humboldt Foundation (German Chancellor Scholarship, or Bundeskanzlerstipendium), the dissertation is written on the topic of **Comparative Research of Spatial Control in Urban Detailed Planning in China and Germany**. The dissertation is intended to present a solution to the existing problems of spatial control in the Chinese detailed planning. It may be regarded as the first scientific attempt that focuses on the comparative research of spatial control in urban detailed planning for China and Germany.

### 1.1.2 Necessity of the Research

The necessity of the research may be expressed in the following three aspects:

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<sup>1</sup> The German terminology “der Bebauungsplan” means “the legally binding land-use plan” or “the local development plan”. The dissertation uses its abbreviation “B-plan”, which is an international name of “der Bebauungsplan”.

### **1.1.2.1 Optimizing the Planning Control of Economic Growth**

In China, traditionally, the quality of life has been interpreted into one word “yi-shi-zhu-xing,” which means “clothing, food, dwelling and transit.” With the rapid economic growth, China has become a so-called “world factory.” The development of the market economy makes a highly developed commercial sector. Clothing and the food are not a problem any more. However, the former administrative housing system has become part of history and the land has a market value now. Along with the polarization of economic development, large Chinese cities like Beijing, Shanghai and Guangzhou attract a large number of rural immigrants. The large pool of population and economic activities results in a real contradiction between the social equality and the economic development. Through the comparative research of spatial control in urban detailed planning in China and Germany, the dissertation is intended to find a way to optimize the Chinese planning control which may solve or alleviate the contradiction and improve the quality of “dwelling and transit.”

### **1.1.2.2 Optimizing the Planning Control of Urban Cultural Heritages**

China is known for its long tradition of civilization. Many different architectural and urban cultures are witnesses of this. The traditional Chinese civilization created many valuable historical and cultural cities, which include capital cities, castles, cultural centers, and commercial and transportation centers. Other than the historical cities of Han Nationality, there are also hundreds of cultural cities of various nationalities.

The fast development of the economy and the overheated building sector are detrimental towards a new urban building culture. As the most important detailed plan, the regulatory plan should be able to secure the architectural and urban culture. The B-plan has rich experiences in this field. The proposed research will not only be helpful for the conservation of historical heritage in Chinese cities, but also for continuation of the Chinese cultural and architectural history.

### **1.1.2.3 Optimizing the Planning Control of Environment**

Due to the accelerating urbanization in China, the urban expansion is occupying large areas of arable land. Environmental pollution is another challenge in urban planning. In spite of its name, the regulatory “detailed” plan is not as detailed as the B-plan. The regulatory plan could be considered as a large scale instrument. The preparation of existing regulatory planning has very few studies on the ecological environment, which leads to a serious deficiency of environmental control factors. Therefore, it is difficult for the regulatory plan to achieve the goal for sustainable development. If the regulatory plan is intended to guide the

urban development in a sustainable pattern, its technical components must be improved. It must exercise control over land resources and balance environmental conflicts.

### 1.1.3 Objective of the Research

The general objective of the research is to identify the causes of existing problems for spatial control in the Chinese regulatory planning based on comprehensive and systematic comparative research, and propose an innovative concept for spatial control of the regulatory planning.

From the perspective of scientific research, the following hypotheses were developed:

1. There were distinctions of spatial control capabilities between the German B-plan and the Chinese regulatory plan;
2. With regard to the regulatory plan, these distinctions could impair the achievement of the sustainable development objectives;
3. Eliminating and minimizing these distinctions would enable the regulatory plan to achieve the objectives of sustainable development.

## 1.2 RELEVANT LITERATURES

### 1.2.1 German Literatures on the B-plan

#### 1.2.1.1 German Acts and Ordinances on the B-plan

As the local statute, the German B-plan is an integral part of the German legal system. The primary German acts and ordinances on the B-plan are: *The Federal Building Code (Baugesetzbuch)*, *The Land Utilization Ordinance (Baunutzungsverordnung)*, *The Planning Symbols Ordinance (Planzeichenverordnung)*, as well as *The Federal State Building Ordinance (Landesbauordnung)*. Moreover, other relevant acts, for instance, *The Federal Nature Protection Act (Bundesnaturschutzgesetz)*, must be carefully considered and implemented.

*The Federal Building Code (Baugesetzbuch)*, which forms the main body of the German urban planning acts, constructs the German urban planning system and regulates the planning

principals and procedures, guiding the preparation and implementation of urban planning.<sup>1</sup>

*The Land Utilization Ordinance (Baunutzungsverordnung)* provides the technical requirements for B-planning. First of all, it defines the types of building and land uses which are classified as the construction sites (Bauflächen) and the building sites (Baugebiete). Content and classification standard of each land use type are explained. Secondly, it clarifies the control requirements for the degree of building and land use, such as the site occupancy index (GRZ), plot ratio (GFZ), cubic density (BMZ), and coverage type (Bauweise). The control requirements for secondary structures are also available in this ordinance. For instance, the control requirements for garage and parking space are explained and defined. Moreover, the ordinance regulates the maximum values of the site occupancy index (GRZ), plot ratio (GFZ), and cubic density (BMZ).<sup>2</sup>

*The Planning Symbols Ordinance (Planzeichenverordnung)* provides the legally binding terminologies and legends for urban planning, which include the type and degree of building and land use, coverage type, building line (Baulinie), building restriction line (Baugrenze), public facilities, spaces for transportation, municipal utilities, green spaces, water bodies, topographic engineering, agricultural land and woodland, spaces for environmental protection and historic preservation. Matching the legal provisions in the Land Utilization Ordinance, those mapping standards are the keys to understand B-plans.<sup>3</sup>

In Germany, federal states have the high degree autonomies. Based on the local historic tradition and environment, *The Federal State Building Ordinance (Landesbauordnung)* provides detailed requirements for urban planning and architecture, which should be integrated in the B-plans. For example, *The Federal State Building Ordinance of Baden-Württemberg (LBOBW) (revised edition 2004)* includes nine parts: general provisions, building activities on the plot, general requirements for building, building types, building parts; dwellings as well as other structures, affected parties and building administrative authorities, administrative procedures & building responsibilities, and acts & ordinances. The LBOBW regulates many details of building behavior which cover the classification of building types, interrelations among buildings, internal structures, related facilities, building administration and so on.<sup>4</sup>

*The Federal Nature Protection Act (Bundesnaturschutzgesetz)* defines the measures affecting nature and landscape which must be balanced and compensated. In order to realize this goal,

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<sup>1</sup> Bundesministerium für Verkehr, Bau und Stadtentwicklung: *Baugesetzbuch (BauGB)*, zuletzt geändert Dezember, 2006.

<sup>2</sup> *Baunutzungsverordnung (BauNVO)*, 1993 (BGBl. I S.466)

<sup>3</sup> *Planzeichenverordnung (PlanzV 90)*. Verordnung über die Ausarbeitung der Bauleitpläne und die Darstellung des Planinhalts, vom 18. Dezember 1990 (BGBl.1991 I S.58), BGBl. III 213-1-6

<sup>4</sup> *Landesbauordnung für Baden-Württemberg (BW\_LBO)*, Stand April 2005

the regulation on interventions (Eingriffsregelung) measures should be applied. The provisions of environmental protection in *The Federal Nature Protection Act* have a profound effect on the decision-making mechanism of modern B-plans.<sup>1</sup>

### **1.2.1.2 Other Relevant German Literatures on the B-plan**

The urban land-use planning (Bauleitplanung)<sup>2</sup> hierarchy of the Federal Republic of Germany can be divided into two levels: the land use plan (Flächennutzungsplan) and the B-plan (Bebauungsplan). Relevant German literatures on the urban planning are mostly related to the B-planning. Among them, the classic literatures can be considered as one file type which discusses the theory and method of B-planning, such as the *Urban Land-use Planning (Bauleitplanung)*, *Town Planner Guide (Zeichnen für Stadtplaner)*, *Urban Land-use Planning for practice (Bauleitplanung für die Praxis)*, *B-plan booklet (Bebauungsplanfibel)*, *Urban Planning (Stadtplanung)* etc. Documents from another perspective state the B-plan control of urban ecology and environmental protection, such as the *Urban Land-use Planning and Nature Protection (Bauleitplanung und Naturschutz)*, *Environmental Protection in the B-plan (Umweltschutz in der Bebauungsplan)*, *Urban Ecology in B-plans (Stadtökologie in Bebauungsplänen)*, *Environmental Protection in B-plans (Immissionsschutz in Bebauungsplänen)*, and the *Environmental Protection by B-plans (Umweltschutz durch Bebauungspläne)*.

In addition to the literatures above, there are volumes of documents regarding the spatial control of the B-plan which focus on the physical structure, the urban renewal, and the environmental protection, such as the *Planning Law and Building Morphology (Planungsrecht und Baugestalt)*, *Urban Planning & Design Volume 1 & 2 (Städtebau Band 1 und Band 2)*, *New Building in Historical Environment (Neues Bauen in historischer Umgebung)*, *Historic Preservation and Heritage Maintenance (Denkmalschutz und Denkmalpflege)*, *Roof Planting (Dachbegruenung)*, *Basics of the Roof Planting (Grundlagen der Dachbegruenung)*, and *Roof Planting: An Ecological Balance (Dachbegruenung: ein ökologischer Ausgleich)*.

### **1.2.2 Chinese Literatures on the B-plan**

During the last decade, Chinese scholars have analyzed the theory and method of the German B-plan. However, so far the articles in this field concentrate on simple description of the concept, content, preparation and implementation of the B-plan. The spatial control of the B-plan has not been examined in great detail.

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<sup>1</sup> *Bundesnaturschutzgesetz*, vom 21 September 1998 (BGBl. I. S. 2995)

<sup>2</sup> The German terminology “Bauleitplanung” means “the urban land-use planning”.

In his postdoctoral research report “*Comparison on the Urban Planning Law in China and Germany*,” through the description and analysis of the urban planning legal system in Germany, Wu, Weijia introduced basic concepts, tasks and principles of the B-plan. He considered the German urban planning law an act of land use. “The safeguard of public interests is emphasized. The most important characteristic of German urban planning is the legal control as a tool of implementation. In spite of different legal applications in different regions, the German urban planning methods conform to a unified objective framework which can secure the interests of general public.”<sup>1</sup> Besides this report, he mentioned in 1996 the B-plan concept in one of his articles.<sup>2</sup> Later, in 2000, he introduced the B-plan concept as well as its preparation procedure in another publication.<sup>3</sup>

Li, Bingdi mentioned the concept of the B-plan.<sup>4</sup>

In his Ph.D. dissertation of Tsinghua University, Mao, Qizhi explained the development of German urban planning in terms of historical evolution. In chapter one, section two of this dissertation, “The Origin of Modern Urban Planning in Germany,” together with section four “The German Cities and their Planning before the First World War,” Mao, Qizhi discussed the origin and evolution of the German B-plan. In section two of chapter three “The Spatial Planning of the Federal Republic of Germany,” Mao described the concept, legislation, main content and preparation procedure of the B-plan. Moreover, as an appendix, there are Chinese translations of the catalogue of the German *Federal Building Code (Baugesetzbuch) version 1997*, its 1 - 5 - 8 - 9th clause (abridged translation), and the classification of land uses regulated by *The Land Utilization Ordinance (Baunutzungsverordnung)*. In section three of chapter five “Americanization of German zoning,” he sketched the impact of the German zoning concept on American urban planning.<sup>5</sup>

Hao, Juan introduced the urban planning system of the Federal Republic of Germany in her book “*The Urban Planning Theory & Practice in West Europe*.” The function, land use classification, content, and preparation of the German B-plan were mentioned.<sup>6</sup>

Wu, Zhiqiang discussed the primary concept and preparation procedure of the German

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<sup>1</sup> Wu, Weijia: *Comparison on the Urban Planning Law Between China and Germany*, postdoctoral research report, Tsinghua University, Beijing. 1995

<sup>2</sup> Wu, Weijia: *Comparison on the Urban Planning Law Between China and Federal Republic of Germany*, City Planning Review, 1/1995, p. 13, Beijing. 1996

<sup>3</sup> Wu, Weijia: *The Development, Framework and Organization of the Principal Acts in the German Urban Planning*, Urban Planning Overseas, 1/2000, p. 9, Beijing. 2000

<sup>4</sup> Li, Bingdi: *Survey of the Urban Planning Development in Germany*, Urban Planning Overseas, 4/1996, p. 21, Beijing. 1996

<sup>5</sup> Mao, Qizhi: *Exploring the Development of Modern Urban Planning in the West: Case Studies on Urban Land Use Planning in Germany and the United States*, Ph.D. dissertation, Tsinghua University, Beijing. 1997

<sup>6</sup> Hao, Juan: *The Urban Planning Theory & Practice in West Europe*, Tianjin University Press, Tianjin, 1997



B-plan.<sup>1</sup> In another article in 1999, he introduced the B-plan as a part of the spatial planning system in Germany, and analyzed three main principles and nine goals of German spatial planning.<sup>2</sup>

Tang, Zilai & Yao Kai explained the legislation, preparation and implementation of the B-plan. They considered that “the B-plan can be an effective tool for development control as well as design control. The B-plan, together with the building acts, design instruction and design guidance, construct a complete design control system. However, the coordination between the planning authorities and developers makes the implementation of design control flexible.”<sup>3</sup>

Qu, Weidong introduced the spatial planning system of Germany systematically. In this article, the definition and the status of the German B-plan were explained. Moreover, it introduced the relevant German acts and ordinances, such as: *the Baugesetzbuch*, *the Baunutzungsverordnung* and *the Planzeichenverordnung*.<sup>4</sup>

In his Master thesis, Wang, Dan introduced the legally binding control function and the preparation of the German B-plan briefly.<sup>5</sup> Lü, Huifen also mentioned the concept and the preparation of the B-plan in her Master thesis (She wrote the B-plan as the German zoning).<sup>6</sup>

In *The Urban Planning Database (Vol. 4): the Regulatory Planning*, the evolution of the B-plan content was generally discussed and two German B-plan cases were introduced. However, those cases had no plan texts shown.<sup>7</sup> In another publication “*The Regulatory Planning*,” the authors introduced the function and content of the German B-plan as well.<sup>8</sup>

### 1.2.3 Chinese Literatures on the Regulatory Plan

#### 1.2.3.1 Chinese Acts and Ordinances on the Regulatory Plan

The Chinese legal system of urban planning can be divided into two parts: planning acts and ordinances, technical standards.

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<sup>1</sup> Wu, Zhiqiang: *The Preparation Procedures of the German Urban Planning*, Urban Planning Overseas, 2/1998, p. 31, Beijing. 1998

<sup>2</sup> Wu, Zhiqiang: *The German Spatial Planning System and the Analysis of its Development*, Urban Planning Overseas, 4/1999, pp. 2-5, Beijing. 1999

<sup>3</sup> Tang, Zilai & Yao Kai (translated and edited): *Design Control in the German Urban Planning*, City Planning Review, 5/2003, pp. 44-47, Beijing. 2003

<sup>4</sup> Qu, Weidong: *Study on German Spatial Planning*, China Land Science, 2/2004, pp. 58-64, Beijing. 2004

<sup>5</sup> Wang, Dan: *Study on the Formation & Development of the Technology System in the Chinese Urban Planning*, Master thesis, Northeast Normal University, Jilin Province, 2003

<sup>6</sup> Lü, Huifen: *Evaluation-and-Analysis Study on the Effectiveness of Regulatory Detailed Planning*, Master thesis, Xi'an University of Architecture and Technology, Shaanxi Province, 2005

<sup>7</sup> Jiansu Institute of Urban Planning & Design (as the chief editor): *Urban Planning Database (Vol. 4): the Regulatory Planning*, China Architecture & Building Press, Beijing, 2002

<sup>8</sup> Xia, Nankai & Tian Baojiang: *Regulatory Planning*, Tongji University Press, Shanghai. 2005

“*The Town and Country Planning Act of the P. R. China (2007)*” is the basic planning act in China. Other ancillary acts and ordinances in the national, provincial, and municipal level formulate the planning legal system for the implementation of the basic planning act. On the other hand, technical standards consist of state or local technical standards and norms.<sup>1</sup>

Beside *The Town and Country Planning Act of the P. R. China (2007)* and *The Preparation Criteria of Urban Planning (2005)* in the national level, Chinese acts and ordinances on the regulatory plan also include urban planning ordinances and administrative measures of various municipalities.

It is regulated in *The Town and Country Planning Act of the P. R. China (2007)* that the regulatory plan is a formal urban detailed planning type.<sup>2</sup> Other than this basic definition, *The Preparation Criteria of Urban Planning (2005)* stipulates the goal for urban planning, and the preparation and content of the regulatory plan including compulsory control factors.<sup>3</sup> Moreover, based on different local conditions, urban planning ordinances and administrative measures of various municipalities provide supplementary requirements for preparation, content, and outcome of the regulatory plan.

The technical standards of the regulatory plan are mainly the relevant technical standards enacted by the Ministry of Construction of the P. R. China. The key technical regulations include the *Standard for Urban Land Use Classification, Building and Land Use(GBJ 137-90)*, *Code for Transport Planning on Urban Road (GB 50220-95)*, *Code for Settlement Planning & Design(version 2002)(GB 50180-93)*, and the *Standard for Basic Terminology of Urban Planning(GB/T 50280-98)*. The definition of the regulatory plan in the *Standard for Basic Terminology of Urban Planning* is: “On the basis of the master plan, the regulatory plan should regulate the type and degree of land use in the planning area by determining the values of control indicators, and regulate the controlling positions of roads and pipelines, as well as the requirements for environmental control.”<sup>4</sup>

### **1.2.3.2 Chinese Literatures on the Regulatory Plan**

From the birth of the regulatory plan, Chinese planners and scholars, focusing on the problems in the planning practice, have proposed various opinions on the regulatory planning. Until now, a total of more than 100 articles and theses have been published. The representative views can be summarized as follows:

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<sup>1</sup> (Chinese) National Administrative Board of Registered Urban Planners: *Urban Planning Theory*, China Planning Press, p. 43, Beijing, 2003, 2nd edition

<sup>2</sup> Standing Committee of the Tenth National People's Congress: *Town and Country Planning Act of the P. R. China*, 2007. §2

<sup>3</sup> Ministry of Construction of the P. R. China: *Preparation Criteria of Urban Planning*, 2005

<sup>4</sup> Ministry of Construction of the P. R. China: *Standard for Basic Terminology of Urban Planning*, China Architecture & Building Press, Beijing, p.5, 1999

Shen, Dexi argued that “the regulatory plan should cover the complete planning area. The systematic planning control system must be based on the careful investigation of the urban district plan.”<sup>1</sup> 2

Chen, Dingrong believed that “the land use classification, allocation of plots and control indicator system are the key issues of the regulatory plan.”<sup>3</sup>

Zhou, Jianjun considered that “the control designation system of the regulatory plan is not a scientific system. The designations (Festsetzungen) are out of control and inflexible. Moreover, the administrative mechanism of the planning implementation is not wholesome.”<sup>4</sup>

Based on the regulatory plan of the historic city of Beijing, Wu Liangyong argued that the regulatory plan must be improved by the urban design and planning competition.<sup>5</sup>

Duan, Jin and other scholars, proposed the methods for improving the regulatory plan in historical cities. Based on his practice in Suzhou, he claimed the following: the urban design should be integrated into the regulatory planning, planning zones should be subdivided, and the planning control system should be optimized.<sup>6</sup>

Wang, Fuhai introduced the evolution of the regulatory plan and the statutory plan in Shenzhen. The disadvantage of the regulatory plan, including its content, preparation procedure, implementation and management, were discussed.<sup>7</sup>

Chen, Yuyan claimed that “the current methods of the regulatory plan preparation are too rough. The technical standard of planning production is missing. In practice, different planners have usually different ideas, technical standards, technical requirements, and technical expression. It may lead to an inconsistency in different regulatory plans. Moreover, the quality of the plan can not be secured.” Therefore, she proposed that “the status of the

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<sup>1</sup> The “district plan” used to be a formal planning level between the master plan and the regulatory plan. However, it has been abolished in accordance with the provisions in *The Town and Country Planning Act of the P. R. China (2007)*. When it was a formal planning type, the district plan could be prepared by large and medium-sized cities in China in accordance with the actual situation and need for urban development. It worked as a bridge to connect the urban development strategy and the building control.

<sup>2</sup> Shen, Dexi: *Several Problems of Control-detailed Planning in Old Towns*, Urban Planning Forum, 6/1994, pp. 18-23, Shanghai, 1994

<sup>3</sup> Chen, Dingrong: *Comparative Research on the Domestic Regulatory Planning*, Modern Urban Studies, 2/1996, pp. 20-24, 1996

<sup>4</sup> Zhou, Jianjun: *Review on the Theory and Practice of Chinese Regulatory Plan*, Planners, 3/1996, pp. 45-49, Guangxi Province, 1996

<sup>5</sup> Wu, Liangyong: *Several Opinions on the Regulatory Detailed Plan of the Historic Part of Beijing*, City Planning Review, 2/1998, pp. 6-9, Beijing, 1998

<sup>6</sup> Duan, Jin etc.: *Regulatory Detailed Planning for No. 9 Neighborhood in Suzhou*, City Planning Review, 7/1999, pp. 58-60, Beijing, 1999

<sup>7</sup> Wang, Fuhai: *Analysis of the Urban Planning Development in Shenzhen*, City Planning Review, 1/2000, pp. 28-33, Beijing, 2000

regulatory plan within the urban planning system should be newly defined. The planning area should be divided rationally. The scale of zones should be controlled appropriately. There should be more subdivisions in land use types. In urban planning, more consideration should be given to the aspect of the topography.”<sup>1</sup>

Sun, Hui & Liang Jiang compared the contemporary Chinese regulatory planning to the American zoning. Since the American experience showed that the visual amenity could be realized by the urban design guideline, they believed that the legally binding planning control factors should focus on the economic development, and not the visual amenity.<sup>2</sup>

Zhou, Jin discussed the key issues of the regulatory plan with regard to the practice, the control system, and the technical expression. He believed that the control factors should be comprehensive and flexible and that the urban design should be strengthened in the planning process.<sup>3</sup>

Fan, Linyun & Zheng Hao believed that the idea of urban design should be summarized as the control factors of the regulatory plan so that it could be implemented in the development. They believed that each development project should have its own urban design points. For instance, the urban renewal should conserve the historical characteristics of the city and create a sense of community and neighborhood. Also, they believed that the development of new territory should protect the environment and create an impressive urban image.<sup>4</sup>

Xiong, Guoping proposed a solution for regulatory plan legislation which should integrate the case review with the legally binding plan control. He insisted that the legal status of the regulatory plan and the public participation procedure should be regulated in an *Urban Planning Ordinance*, and a *Technical Code for Urban Planning Administration* should be developed as the guide for the preparation of the regulatory plan.<sup>5</sup>

Based on the case study on a regulatory plan in Xiamen city, Xie, Yingting summarized several regulatory planning problems with regard to the preparation technique, administrative system, and implementation policy. She believed that “the primary problems are the lack of local planning technical standards, nonscientific planning proof, lack of public participation,

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<sup>1</sup> Chen, Yuyan: *Some Ideas on Deepening Control-detailed Planning Preparation*, *Planners*, 1/2000, pp. 55-57, Guangxi. 2000

<sup>2</sup> Sun, Hui & Liang Jiang: *The Objects to be Controlled in the Regulatory Detailed Planning: the Implication from the Local Planning Legislation of America*, *City Planning Review*, 5/2000, pp. 19-21, Beijing. 2000

<sup>3</sup> Zhou, Jin: *Study on the Control Function of the Regulatory Detailed Plan*, *Planners*, 1/2002, pp. 44-47. 2/2002, pp. 41-44. Guangxi Province, 2002

<sup>4</sup> Fan, linyun & Zheng Hao: *Urban Design and Regulatory Detailed Plan*, *Journal of Suzhou Institute of Urban Construction & Environmental Construction (Social Science)*, 1/2002, pp. 22-25, Suzhou. 2002

<sup>5</sup> Xiong, Guoping: *The Legislation Study of the Regulatory Detailed Planning*, *City Planning Review*, 3/2002, pp. 27-31, Beijing. 2002

as well as inefficient administration and passive implementation policy.”<sup>1</sup>

Yang, Jun reviewed the recent amendment of regulatory plans in Beijing and clarified the origin and method of this amendment. He considered that it was necessary to maintain the authority of regulatory plans, reduce the discretionary political power, and improve the public participation.<sup>2</sup>

Through the analysis of the amendment procedure of regulatory plans in Beijing, Li, Jiangyun claimed that “the problems of the amendment are the exceeding of the original maximum limits of building height, the insufficient information on land ownerships and a relatively close procedure.” Therefore, he proposed that the relevant planning acts and ordinances should be improved and “adjacent areas” should be involved into the regulatory plan.<sup>3</sup>

Deng, Qi considered that the so-called “Regulatory Detailed Plan of Beijing Central District” covered so large an area that it was actually a district plan rather than an urban detailed plan. She argued that the regulatory plan should pay attention to localities and be specific enough.<sup>4</sup>

Zhang, Wei & Chen Chenglin reviewed the implementation of the Regulatory Plan for the West City District of Beijing and summarized the major problems, which were the excess of the original maximum limits for building height and plot ratio, as well as the ineffective monitoring mechanism.<sup>5</sup>

Wang, Shifu claimed that the Chinese urban planning system should be divided into the formal plans and informal plans. In this system, the master plan and the district plan should be in charge of strategic control, while the regulatory plan should regulate the urban construction as a legally binding detailed plan. Moreover, the traditional site plan should not be a work of the municipality any more.<sup>6</sup>

While planning, Zhao, Jian & Qi Huifeng had integrated a regulatory plan in Dongying city with their urban design ideas.<sup>7</sup>

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<sup>1</sup> Xie, Yingting, *Case Study of Regulatory Detail Planning in Xiamen*, Planners, 2/2002, pp. 45-48, Guangxi Province, 2002

<sup>2</sup> Yang, Jun: *Beijing Regulatory Planning 1995-2002: Retrospect and Prospect of Regulatory Plan Amendments*, Beijing City Planning & Construction Review, 2/2003, pp. 69-71. Beijing, 2003

<sup>3</sup> Li, Jiangyun: *Discoveries on the Index Adjusting Process of Regulatory Detailed Plan of Beijing Central District*, City Planning Review, 12/2003, pp. 35-40, Beijing, 2003

<sup>4</sup> Deng, Qi: *Function and Effect of District Planning in Regulatory Plan*, Beijing City Planning & Construction Review, 6/2003, pp. 55-57. Beijing, 2003

<sup>5</sup> Zhang, Wei & Chen Chenglin: *Investigation and Thinking on Implementation of the Regulatory Plan of West City District of Beijing*, Beijing City Planning & Construction Review, 3/2003, pp. 67-70. Beijing, 2003

<sup>6</sup> Wang, Shifu: *Constructing Planning Making System Facing Implementation*, Planners, 5/2003, pp. 13-16, Guangxi Province, 2003

<sup>7</sup> Zhao, Jian & Qi Huifeng: *Regulatory Plan Integrating the Urban Design: a Case study on Dongying City*, City Planning Review, 8/2003, pp. 93-96, Beijing, 2003

Fu, Yuguang & Kong Linglong proposed that the regulatory planning should be improved by optimizing the control indicator system, land use classification, division of plots, control method, and planning mechanism.<sup>1</sup>

With regard to the legal function, land use classification and content, Li, Mingyang & Sun Xiang compared the regulatory plan to the urban detailed plans in the United States, Germany and Japan. They concluded that “the legal status of the regulatory plan is quite weak and the land use classification is too rigid. Therefore, the contemporary regulatory plan is not suitable for the development of modern societies. The content and public participation of the regulatory plan must be improved.”<sup>2</sup>

Based on the analysis of the preparation and implementation of a regulatory plan in Huzhou city, Wu, Xiaojun believed that “the urban design is a powerful tool of the regulatory planning and the successful implementation of the regulatory plan depends on the legal factors.”<sup>3</sup>

In his master thesis, Cai, Zhen analyzed the evolution of the Chinese regulatory plan and compared it to the American zoning. Moreover, he summarized legal and technical problems of the regulatory plan and proposed a concept for improving the planning legislation and planning techniques.<sup>4</sup>

In his master thesis, Liu, Lei discussed the urban design theory and method in the regulatory planning, and constructed a basic framework of urban design.<sup>5</sup>

Based on her case studies on Changsha and Shenzhen, Lü, Huifen analyzed and evaluated the effectiveness of regulatory planning in her master thesis. She believed that the adaptability of the regulatory plan could be optimized by improving the planning preparation techniques. In this case, an optimized adaptability could result in an increased effectiveness for the regulatory plans.<sup>6</sup>

Jin, Chao studied the regulatory planning of “Distribution Park” in his master thesis. He

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<sup>1</sup> Fu, Yuguang & Kong Linglong: *On the Adaptability of Regulatory Detailed Planning*, *Planners*, 8/2003, pp. 64-67, Guangxi Province, 2003

<sup>2</sup> Li, Mingyang & Sun Xiang: *Several Ideas on the Chinese Regulatory Planning: A Comparative View*, Information of China Construction, 9/2005, pp. 23-25, Beijing, 2005

<sup>3</sup> Wu, Xiaojun: *Exploration on One Model-Preparation of Controlled Detailed Planning in Combination with City Design—Follow-up Analysis of Preparation and Implementation of the Planning for Renhuangshan New Area in Huzhou*, *Planners*, 5/2005, pp. 65-68, Guangxi Province, 2003

<sup>4</sup> Cai, Zhen: *The Future Development of Regulatory Detailed Planning in China: a study on how regulatory detailed planning accommodates the needs of urban planning management*, Master thesis, Tsinghua University, Beijing, 2004

<sup>5</sup> Liu, Lei: *Control and Guidance: study on Urban Design at the Stage of Regulatory Planning*, Master thesis, Xi'an University of Architecture and Technology, Shaanxi Province, 2004

<sup>6</sup> LÜ, Huifen: *Evaluation-and-Analysis Study on the Effectiveness of Regulatory Detailed Planning*, Master thesis, Xi'an University of Architecture and Technology, Shaanxi Province, 2005

proposed some general principles of elasticity planning.<sup>1</sup>

#### 1.2.4 General Review

The literature review shows that the American zoning is the primary example of the Chinese regulatory plan. Regarding the German B-plan, Chinese planners and scholars have introduced the general information on the German urban planning acts and ordinances, as well as the basic concept, content, preparation, and outcome of the German B-plan. No systematic and comprehensive study of German B-plan has been found in China, and no comparative research of spatial control in urban detailed planning has been reported in China and in Germany.

Generally speaking, the discussion of the regulatory plan can be grouped as eight topics: the legal status, role, public participation, urban design, planning administration, spatial size of planning area, land classification, and its indicator system.

Weak legal status is the basic topic of the regulatory plan as well as a fundamental reason of ineffective planning control. Moreover, at present, the regulatory plan has no systematic legal system and authoritative technical requirements. The proposed measures are to establish and improve planning acts and ordinances at all levels, clarify the legal status of the regulatory plan, develop more specific technical standards, improve the supervision mechanism, and reduce the discretionary political powers. Some scholars believe that the nonscientific preparation of the regulatory plan leads to its weak legal status. Therefore, the prerequisite of improving the legal status of the regulatory plan is to develop a scientific procedure of planning preparation.

There are two opinions on the role of regulatory plan. One opinion considers that the regulatory plan should be legally binding and could control the urban development, while the master plan and the district plan should focus on more strategic issues. In addition, the traditional site plan should not be a work of the municipality any more. However, the other opinion insists that the existing Chinese urban planning system should be preserved.

The general view on public participation is that the importance of public participation in the planning process should be confirmed and the legally binding public participation procedure should be developed and implemented. The existing problems of public participation, which need to be solved, concentrate on the representation of public participation and technical methods.

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<sup>1</sup> Jin, Chao: *Index System and Elasticity Planning: the Study on Regulatory Detailed Planning of Distribution Park*, Master thesis, Dalian University of Technology, Liaoning Province, 2005

The urban design is generally considered an important and practical tool of regulatory planning, which may preserve the urban image and create new urban spaces. However, as the non-legally binding urban design guideline in the regulatory plan, in many cases, the idea of urban design can not be realized in practice.

It is believed that the discretionary political power is the main problem of the planning administration in China, and a healthy planning administration depends on scientific plan preparation, democratic decision-making, and effective supervision.

There are two opinions on the spatial size of planning area. One opinion is that the so-called “full coverage” planning is not a scientific direction. The “full coverage” planning would only serve the insane urban sprawl, deconstruct the urban fabric, and pollute the environment. However, the other opinion claims that the “full coverage” planning is the only measure which may keep the urban development under control.

With regard to the issue of land classification, the general view is to improve the compatibility of the land classification system in order to meet the demands of the market economy.

The indicator system of regulatory planning is a fixed system which applies a technical framework to each planning case. This system leads to many problems in practice and it is considered a result of nonscientific planning. Therefore, many Chinese planners and scholars propose developing a new flexible indicator system of regulatory planning which may be adaptable in different cases.

### **1.3 METHODOLOGY**

The comparative research focuses on three main approaches:

The theoretical approach includes studies on the history of urban planning, its legal framework, legislation, and its theory of each planning type. It is intended to compare and define the fundamental characters of both planning types, and to identify the most valuable features that the research focuses on.

Case studies illustrate the spatial control of the B-planning and the Chinese regulatory planning in their respective environments. It is intended to construct the practical basis of comparative research. The choice of case studies relates to the results of theoretical approach.

Analytical approach analyzes the output of the theoretical approach and the case studies. The



“coding” method is applied to the comparative research. The spatial control differences between German B-planning and Chinese regulatory planning are discussed and analyzed. Based on this, proposals to improve the regulatory planning are developed and evaluated.

## 1.4 DISSERTATION STRUCTURE

The structure of the dissertation can be grouped into five main parts:

**Part One:** This part introduces the urban planning systems in China and Germany. The focus is on the urban detailed planning, which has spatial control functions. The German B-plan and the Chinese regulatory plan are explained with regard to role, content, preparation, and implementation.

**Part Two:** Based on the idea of sustainable development, the general framework of the comparative research is developed, which becomes the criteria of the study. Afterwards, the specific method of the comparative research is established, which includes the coding standard and its operating details. Moreover, the spatial control goals of both planning types are identified and compared.

**Part Three:** By applying the theoretical approach, the binding factors and the unbinding factors of both planning systems are identified. Components, functions, correlations and practical procedures in the implementation of spatial control are examined. By using the coding method, the general spatial control factors of the German B-planning and the Chinese regulatory planning are compared under the general framework of the comparative research. The political, economic, social, and environmental differences between China and Germany are carefully considered. This stage carries out the comparative research on a general methodology.

**Part Four:** The comparative research is optimized by the comparison of case studies in China and Germany. The case studies help to analyze the spatial control in more details. Through case studies, the research objects of spatial control are specified under the general framework of the comparative research. Furthermore, the case studies are accomplished by applying the same coding and evaluating method mentioned in part three.

**Part Five:** Based on the output of part three and four, problems of the regulatory planning are analyzed and summarized. Finally, the dissertation presents innovative proposals for improvement of the Chinese regulatory planning in order to solve the existing problems and realize the sustainable urban development.

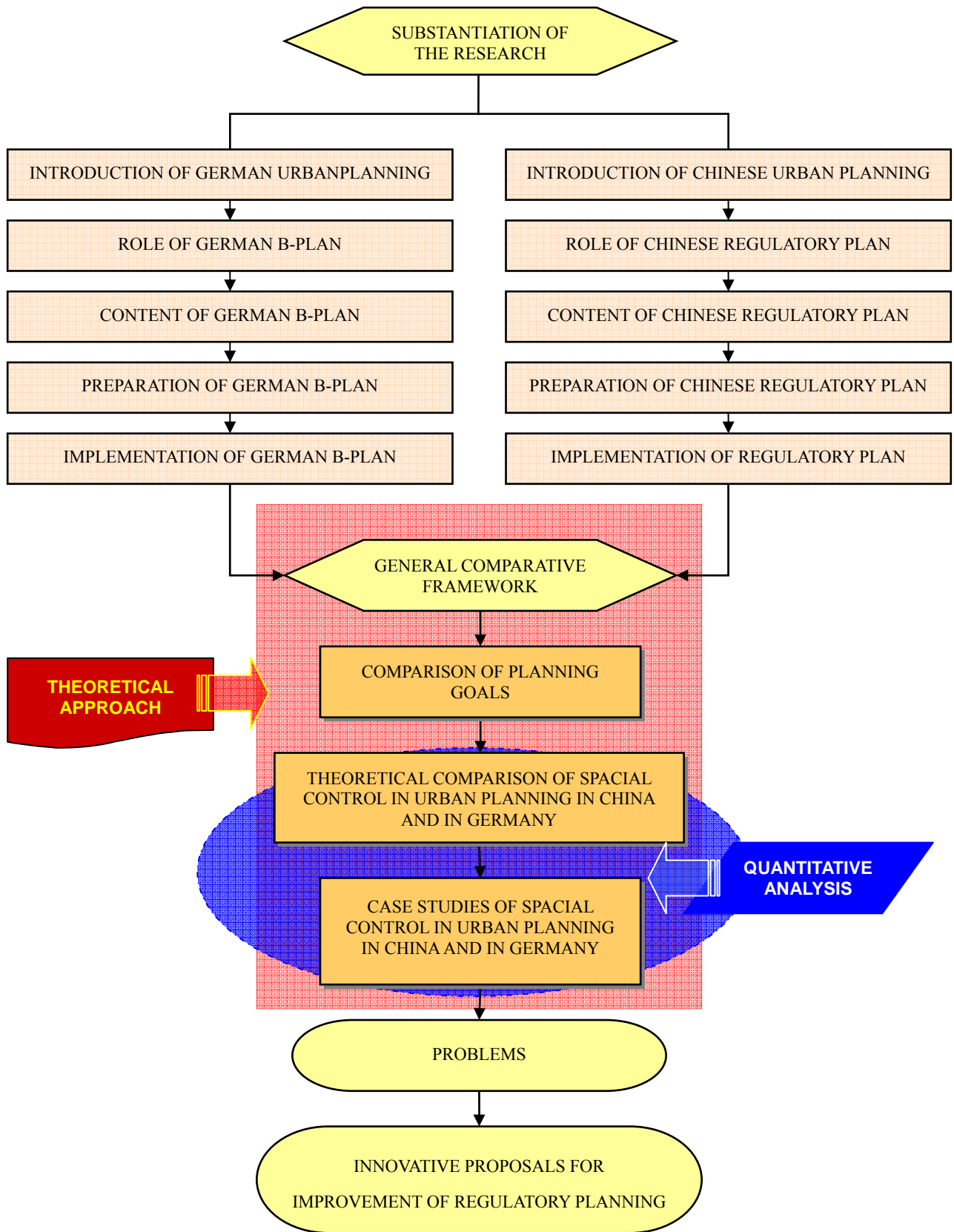


Fig. 1-1: Dissertation Structure

# **Chapter 2 INTRODUCTION OF THE URBAN DETAILED PLANNING IN CHINA AND GERMANY**

## **2.1 INTRODUCTION OF THE URBAN PLANNING SYSTEM IN CHINA AND GERMANY**

### **2.1.1 Introduction of the German Urban Planning System**

#### **2.1.1.1 Spatial Planning System of Germany**

The Federal Republic of Germany has a federal administrative system, which is in principle a three-level hierarchy structure: the federal government (Bund), the governments of federal states (Länder), and the local governments (Gemeinde or Kreis).<sup>1</sup> “This decentralization is reflected in the spatial planning system. The German planning system is a system based on clearly distinct levels of planning, each with its own legal foundation, organizational structures, and substantive focus. Although each level of planning is carried out on its own distinct legal basis, the various levels do interlock with each other as an effect of the so-called “feedback principle”, as well as through the application of statutory requirements calling for the exchange of information, participation and co-ordination, and adherence to designations or guidelines contained in certain plans emanating from a higher level.”<sup>2</sup>

The German spatial planning system can be generally divided into two major levels: the spatial planning level (Raumplanung), and the urban land–use planning level (Bauleitplanung).

The legal basis of the German spatial planning is *The Spatial Planning Act (Raumordnungsgesetz)*, which regulates the purpose and tasks of spatial planning. The German spatial planning can be grouped into three sub-levels: the federal level, the federal state level, and the regional level.

“According to *The Spatial Planning Act (Raumordnungsgesetz)*, the purpose of spatial planning is to support and safeguard the development and spatial order of the Federal Republic of Germany in its entirely thorough comprehensive, super ordinate spatial structure plans (Raumordnungspläne), and by co-coordinating plans and measures with spatial

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<sup>1</sup> The “Gemeinde” means the “municipality”, and the “kreis” means the “county”.

<sup>2</sup> Turowski, Gerd: *Spatial Planning in Germany: Structures and Concepts*, Akademie für Raumforschung und Landesplanung, Hannover, 2002. S. 11

impacts.”<sup>1</sup>

“*The Spatial Planning Act* stipulates that the tasks of spatial planning should be performed in accordance with the principles of sustainable spatial development; in other words, spatial planning should strive to reconcile social and economic demands on land use with the ecological functions of the land, and in so doing achieve a sustainable and balanced structure for the territory as a whole. This involves:<sup>2</sup>

1. Safeguarding the right to self-fulfillment within the community and showing responsibility toward future generations;
2. Conserving and developing the natural foundations of life;
3. Creating the conditions to promote economic development;
4. Leaving scope over the longer term for different types of land use;
5. Strengthening the diversity which helps to give localities their distinct character;
6. Establishing equivalent living conditions throughout the national territory;
7. Overcoming the spatial and structural disparities between the two previously separate (prior to reunification) parts of Germany;
8. Creating the spatial precondition for cohesion both within the European Community and in the broader European context.”

The German urban land use planning (Bauleitplanung) hierarchy can be divided into two levels: the land use plan (Flächennutzungsplan) and the B-plan (Bebauungsplan).<sup>3</sup> Urban land use plans should be brought into line with the aims of regional policy (Raumordnung).<sup>4</sup>

The working object of the German land use plan covers the entire city territory. It is actually the master plan or the comprehensive plan. The German B-plan is a detailed plan as well as a local statute which controls the urban development directly. In principle, a B-plan must be

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<sup>1</sup> Turowski, Gerd: *Spatial Planning in Germany: Structures and Concepts*, Akademie für Raumforschung und Landesplanung, Hannover, 2002. S. 12

<sup>2</sup> Ibid. S. 13

<sup>3</sup> Bundesministerium für Verkehr, Bau und Stadtentwicklung: *Baugesetzbuch (BauGB)*, zuletzt geändert Dezember, 2006, §1, para. 2

<sup>4</sup> Ibid. §1. para. 4

prepared in the framework of the relevant land use plan. However, the preparation of a B-plan may be independent if it can meet certain need of urban development.

B-plans are to be developed out of the land use plan. A land use plan is not required in cases where a B-plan is sufficient to organize an urban development.<sup>1</sup>

Preparation, amending, supplementation, and revocation of a B-plan may take place simultaneously with the preparation, amending, supplementation, and revocation of a land use plan (parallel procedure).<sup>2</sup> A B-plan may be prepared, amended, supplemented or revoked prior to the completion of the land use plan where urgent grounds for this exist, or where the B-plan will not be in conflict with proposed urban development within the territory of the municipality (anticipatory B-plan).<sup>3</sup>

In principle, the state development plan (Landesentwicklungsplan), regional plan (Regionalplan), land use plan (Flächennutzungsplan, FNP), and B-plan (Bebauungsplan) are the formal plans in Germany. Moreover, if it is necessary, German municipalities may also prepare informal plans. Designations (Festsetzungen) in informal plans may be integrated into relevant formal plans as legally binding designations.

### **2.1.1.2 German Sectoral Plans**

“Spatial plans (Raumpläne) and urban land use plans (Bauleitpläne) all represent general types of planning, as the decisions they express regarding the course of development within a given territory are all concerned with coordinating and collating the entire spectrum of plans and measures with implications for spatial development. On the other hand, sectoral plans (Fachpläne), which are used to prepare and to implement a systematic program of measures required to support development within a specific and clearly defined sector, are also important formal plans in Germany. Sectoral plans are performed by relevant competent sectoral authorities (for instance, federal or federal state ministries, local authority departments, territorial corporations, or other public law corporations). The sectors, which have substantial impact on spatial planning, are governed by dedicated legislation. The most important federal statutes governing sectoral planning are: <sup>4</sup>

#### **1. Transportation and Communication: *The General Railways Act (Allgemeines Eisenbahngesetz); The Federal Highways Act (Bundesfernstraßengesetz); The Waterways***

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<sup>1</sup> Bundesministerium für Verkehr, Bau und Stadtentwicklung: *Baugesetzbuch (BauGB)*, zuletzt geändert Dezember, 2006, §8, para. 2

<sup>2</sup> Ibid, §8, para. 3

<sup>3</sup> Ibid, §8, para. 4

<sup>4</sup> Turowski, Gerd: *Spatial Planning in Germany: Structures and Concepts*, Akademie für Raumforschung und Landesplanung, Hannover, 2002. S. 26

*Act (Bundeswasserstraßengesetz); The Highway Development Act (Fernstraßenausbaugesetz); The Aviation Act (Luftverkehrsgesetz); The Passenger Transport Act (Personenbeförderungsgesetz); The Telegraph Routes Act (Telegrafenwegegesetz);*

2. **Utilities:** *The Law on the Fuel and Electricity Industries (Energiewirtschaftsgesetz); The Recycling and Waste Act (Kreislaufwirtschafts und Abfallgesetz); The Water Management Act (Wasserhaushaltsgesetz);*
3. **Defense:** *The Land Procurement Act (Landbeschaffungsgesetz); The Protection Areas Act (Schutzbereichsgesetz);*
4. **Conservation and nature protection:** *The Federal Soil Protection Act (Bundes-Bodenschutzgesetz); The Federal Environmental Protection Act (Bundesimmissionsschutzgesetz); The Federal Nature Protection Act (Bundesnaturschutzgesetz); The Federal Forestry Act (Bundeswaldgesetz);*
5. **Agriculture:** *The Plot Realignment Act (Flurbereinigungsgesetz)."*

“In some areas these federal statutes are expanded on in the corresponding federal state legislation, for example in federal state statutes on nature protection, water management or on roads and highways.”<sup>1</sup>

“The principle role of sectoral planning is to support the implementation of public infrastructure projects (public works). These include transport-related schemes (roads, canals, airports etc.), utilities (power cables, sewerage, etc.), telecommunications (telephone cables, microwave radio links), and defense installations. In some sectoral plans, territorial designations are included which mark out sites to be given over to meeting or satisfying certain kinds of public needs and concerns. Examples include the designations of conservation and landscape protection areas, water protection areas, areas reserved for military installations, and areas close to airports in which building is not permitted.”<sup>2</sup>

“The central feature of some types of sectoral planning is a formalized statutory procedure known as the plan approval procedure (Planfeststellungsverfahren), which concludes with formal plan approval. This approval constitutes an administrative act and embraces all of the permits and consents required under public law for the project to proceed. However, there is a

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<sup>1</sup> Turowski, Gerd: *Spatial Planning in Germany: Structures and Concepts*, Akademie für Raumforschung und Landesplanung, Hannover, 2002. S. 27

<sup>2</sup> Ibid.

second group of sectoral plans (including, for example, planning to meet the need for hospitals) for which no specific procedures have been prescribed. In such cases the completion of the procedure does not represent a formal administrative act.”<sup>1</sup>

“In most cases the area covered by a sectoral plan extends beyond the boundaries of one single municipality. Therefore, it is necessary for sectoral plans to coordinate with relevant state development plans and regional plans. In order to support this function, legislation on sectoral planning contains what are referred to as spatial planning clauses (Raumordnungsklausel), which require sectoral plans to take account of the requirements of comprehensive spatial planning.”<sup>2</sup> These supra-local sectoral plans, which focus on the regional projects, are so-called privileged sector plans (privilegierte Fachpläne). From legal point of view, they are privileged because the sectoral planning law has the priority in contrast to the urban planning law. Regarding the privileged sector plans, their approval is not determined by the regulations of the urban planning law, and they are not affected by the designations of the B-plan.<sup>3</sup> “However, the priority of the sectoral planning could only take effect when the affected municipalities had been involved into the planning process. In addition, the urban planning interest should be considered.”<sup>4</sup>

### **2.1.1.3 Local Building Codes (örtliche Bauvorschriften)**

“Unlike the planning laws (for instance *The Federal Building Code (Baugesetzbuch)* and *The Land Utilization Ordinance (Baunutzungsverordnung)*), the building regulations law (Bauordnungsrecht) is an area reserved for legislation of federal states. Consequently, building regulations apply only within the territory of the federal state concerned. One key aspect of these regulations is the duty to observe generally recognized technical standards and technical building regulations in order to avert any risk to public safety and order.”<sup>5</sup>

Local building codes (örtliche Bauvorschriften), which are normally stipulated in *The Federal State Building Ordinance (Landesbauordnung)*, may play an important role in the spatial control in urban detailed planning. For instance, it is regulated in *The Federal State Building Ordinance of Baden-Württemberg (LBOBW) (edition 2004)* that in order to preserve the urban image, protect certain buildings or building parts, streets, squares or districts with historical, artistic or urban design values, and preserve cultural and natural monuments, the municipalities may under law adopt local statutes for certain built-up or undeveloped areas in

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<sup>1</sup> Turowski, Gerd: *Spatial Planning in Germany: Structures and Concepts*, Akademie für Raumforschung und Landesplanung, Hannover, 2002. S. 27

<sup>2</sup> Ibid

<sup>3</sup> Hans Büchner & Karlheinz Schlotterbeck: *Baurecht, Band 1: Städtebaurecht einschließlich örtlicher Bauvorschriften*, 2008. S. 10

<sup>4</sup> Ibid, S.12

<sup>5</sup> Turowski, Gerd: *Spatial Planning in Germany: Structures and Concepts*, Akademie für Raumforschung und Landesplanung, Hannover, 2002. S. 35

the municipal territories. These local statutes may cover regulations governing:<sup>1</sup>

1. Requirements for the design of the outside of buildings (Gestaltung), which can also include the maximum or minimum limits of building height as well as maximum building depths;
2. Requirements for advertising structures and automats, including their type, size, color, and location, as well as the exclusion of certain structures and automats;
3. Requirements for the outside design (Gestaltung) and use of undeveloped areas in built-up plots, their necessity and admissibility, as well as the type, outside design (Gestaltung), and height of fences;
4. The limitation or exclusion of the use of external antennas;
5. The inadmissibility of low voltage overhead lines in new development and redevelopment areas,

Other than the factors mentioned above, through adopting local statutes, it is also possible for the municipalities to control the obligatory provision of a specified number of parking spaces (Stellplatzverpflichtung) and the construction of parking spaces, garages, and children's playgrounds.<sup>2</sup>

The local building codes require the approval of the authority, which is responsible for approval of the B-plan.<sup>3</sup> The control factors stipulated in the local building codes may be integrated into a B-plan as legally binding designations.

#### **2.1.1.4 Regulation on Interventions (Eingriffsregelung) and Mitigation and Replacement Measure (Ausgleichs- und Ersatzmaßnahme)**

“The Federal Nature Protection Act (*Bundesnaturschutzgesetz*), The Federal Building Code (*Baugesetzbuch*) as well as nature protection statutes of the federal states all embody the principle that the instigator of an intervention into the landscape should be required to avoid causing any unnecessary damage or detriment to nature and landscape. Should unavoidable damage be made, the mitigation and replacement measure (Ausgleichs- und Ersatzmaßnahme) should be implemented within a fixed period of time. These laws provide regulations to

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<sup>1</sup> *Landesbauordnung für Baden-Württemberg (BW\_LBO)*, Stand April 2005, §74, para. 1

<sup>2</sup> *Ibid*, §74, para. 2 & 4

<sup>3</sup> *Ibid*, §74, para. 6



govern interventions and intrusions, which are defined by *The Spatial Planning Act (Raumordnungsgesetz)* as changes to the organization or use of land, which are capable of causing serious or long-term damage to the efficiency of the natural balance or to the visual impact of the landscape.”<sup>1</sup> “The process mentioned above is the regulation on interventions. Regarding the mitigation and replacement measure, its task is to offset or mitigate any unavoidable impairment. Existing laws do not require such mitigation to be implemented at precisely the same place as the actual intervention. Both *The Spatial Planning Act* and *The Federal Building Code* include options to allow the mitigation to be undertaken at another location. In addition to this possibility of physical separation, *The Federal Building Code* also allows a time interval between the intervention and the mitigation. According to the provisions in *The Federal Nature Protection Act*, an intervention is deemed to have been mitigated, if on completion of the mitigation measure, no serious or long-term impairment to the natural balance is left behind, or the appearance of the landscape has been suitably restored or repaired. Where the intervention into the nature or the landscape cannot be mitigated, as the outcome of a weighing process, the interests of intrusive development are given precedence over the interests of nature protection. Provided the federal states have introduced supplementary regulations as permitted under *The Federal Nature Protection Act*, the instigator of the intervention may be required to implement a replacement measure to compensate for the unmitigated impairment caused. Unlike the mitigation measure, it is not necessary for the replacement measure to create natural conditions like before, but to create conditions of an equivalent status. It could be the establishment of a new eco-system, which is comparable to the eco-system that has been impaired somewhere in the broader locality. Moreover, according to the provision of some federal states, the mitigation charge can also be levied. Mitigation charges may be levied in case where mitigation or replacement measures at some other location are not feasible.”<sup>2</sup>

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<sup>1</sup> Turowski, Gerd: *Spatial Planning in Germany: Structures and Concepts*, Akademie für Raumforschung und Landesplanung, Hannover, 2002. S. 43

<sup>2</sup> Ibid, S. 32

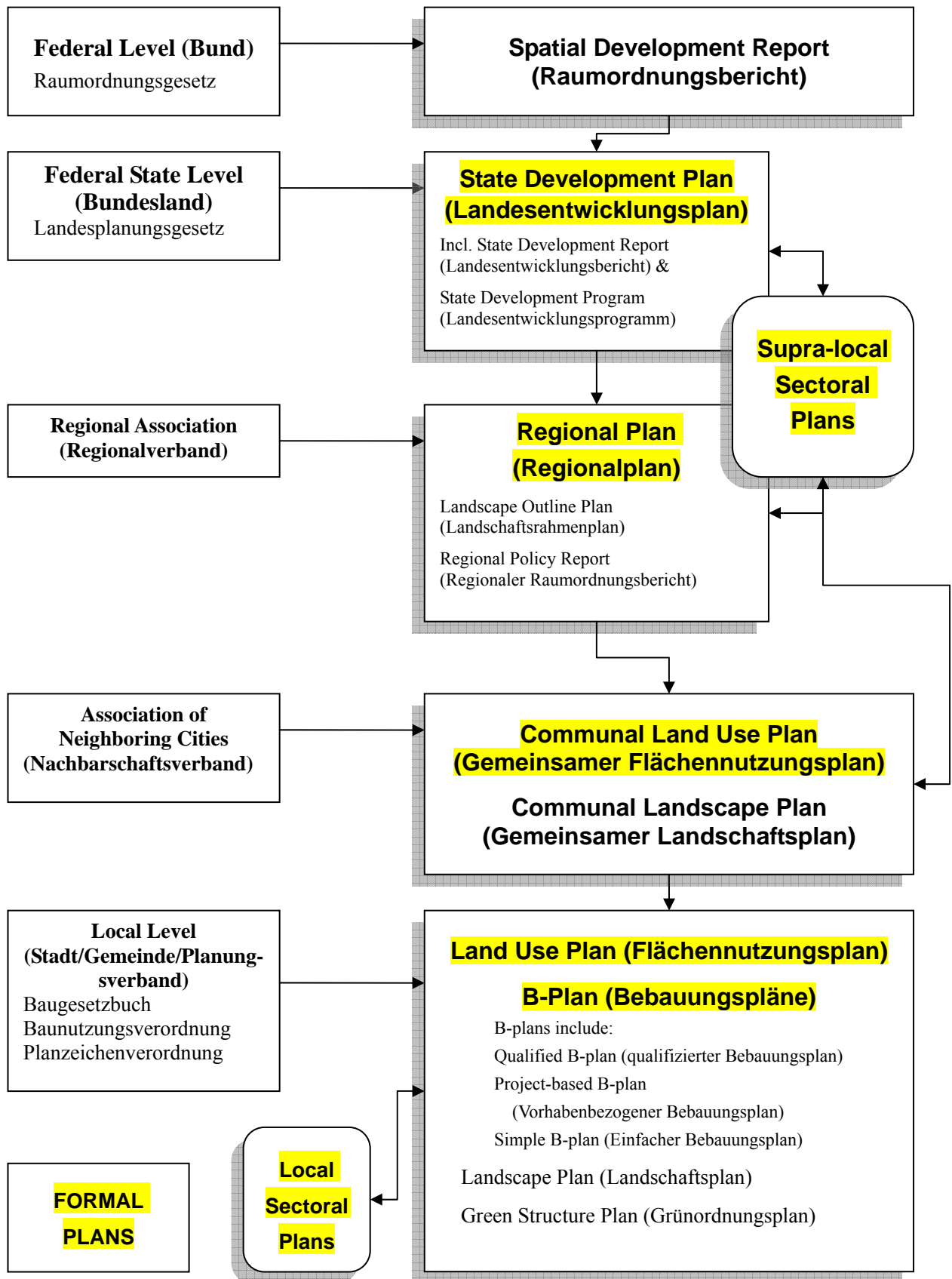


Fig. 2-1 Spatial Planning System of Germany

(Developed from: Ekkehard Hangarter: *Bauleitplanung, Bebauungspläne, Handbuch für Studium und Praxis*, 2006. S. 9)

## 2.1.2 Introduction of the Chinese Urban Planning System

### 2.1.2.1 Town and Country Planning System of China

“The central administrative system in the People's Republic of China includes: the central administrative organs under the system of the National People's Congress and the leadership of the central administrative organs over local administrative organs at various levels. The central administrative organ is the State Council of the People's Republic of China.

The entire country is divided into provinces, autonomous regions, and municipalities directly under the Central Government.

The provinces and autonomous regions are divided into autonomous prefectures, counties, autonomous counties, and cities. The counties and autonomous counties are divided into townships, ethnic townships, and towns.

The municipalities directly under the Central Government and large cities in the provinces and autonomous regions are divided into districts and counties. Autonomous prefectures are divided into counties, autonomous counties, and cities.”<sup>1</sup>

The hierarchy of the Chinese town and country planning system can be divided into five levels: the **urban system planning**, the **urban planning**, the **town planning**, the **rural planning**, and the **village planning**. Urban plans and town plans comprise the master plan and the detailed plan. The detailed plan has two sub-levels: the regulatory plan and the site plan.<sup>2</sup>

The town and country planning authority of the State Council, in cooperation with other relevant departments of the State Council, are responsible for the preparation of the National Urban System Plan. The National Urban System Plan requires the approval of the State Council.<sup>3</sup>

Governments of provinces and autonomous regions are responsible for the preparation of provincial urban system plans. Provincial urban system plans require the approval of the State Council. Provincial urban system plans should include the spatial layout and size control, spaces for key infrastructures, spaces for measures for protection and preservation of the

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<sup>1</sup> <http://www.china.org.cn/english/Political>

<sup>2</sup> Standing Committee of the Tenth National People's Congress: *Town and Country Planning Act of the P. R. China*, 2007, §2

<sup>3</sup> *Ibid*, §12

ecological environment and resources.<sup>1</sup>

City governments are responsible for the preparation of urban master plans. Urban master plans of the municipalities directly under the Central Government, the capital cities of provinces and autonomous regions, as well as other cities designated by the State Council, require the approval of the State Council. Urban master plans of other cities require the approval of corresponding provincial and autonomous regional governments.<sup>2</sup> Based on the requirements in relevant urban master plans, town and country planning authorities under city governments are responsible for the preparation of urban regulatory plans. Urban regulatory plans require the approval of city governments.<sup>3</sup>

County governments are responsible for the preparation of master plans of towns where the county governments are located. Town governments are responsible for the preparation of master plans of other towns. Town master plans require the approval of the higher administrative authorities.<sup>4</sup> Based on the requirements in relevant town master plans, town governments are responsible for the preparation of town regulatory plans. Town regulatory plans require the approval of the higher administrative authorities.<sup>5</sup>

Master plans of cities and towns should include the type of land uses appropriate to municipal territories that accord with the intended urban development, the integrated transportation system, suitable development areas, spatial boundaries of land use prohibition and restriction, as well as other sectoral plans. In principle, the planning interval of master plans is 20 years.<sup>6</sup>

Town and country planning authorities under city and county governments, as well as town governments may prepare site plans of important plots. Site plans should be consistent with the corresponding regulatory plans.<sup>7</sup>

Town and rural governments are responsible for the preparation of rural plans and village plans. Rural plans and village plans require the approval of the higher administrative authorities.<sup>8</sup> The content of the rural plan and the village plan should include the boundary of the planning area, spaces for facilities and structures of rural living and working, such as dwellings, roads, public utilities of water supply, drainage, sewerage, power supply and garbage collection, livestock and poultry production sites, as well as specific measures for the

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<sup>1</sup> Standing Committee of the Tenth National People's Congress: *Town and Country Planning Act of the P. R. China*, 2007, §13

<sup>2</sup> *Ibid.*, §14

<sup>3</sup> *Ibid.*, §19

<sup>4</sup> *Ibid.*, §15

<sup>5</sup> *Ibid.*, §20

<sup>6</sup> *Ibid.*, §17

<sup>7</sup> *Ibid.*, §21

<sup>8</sup> *Ibid.*, §22

protection of natural resources, historic and cultural heritages, and disaster prevention and mitigation.<sup>1</sup>

### **2.1.2.2 Chinese Sectoral Plans**

In China, known as the “Five-Year” Plans, economic and social development plans at national level are the most comprehensive plans. There is a hierarchy which is designed to achieve the objectives of the National Economic and Social Development Plan. This top-down system includes a National Economic and Social Development Plan, as well as relevant provincial, municipal, county, and even rural economic and social development plans.

There are sectoral sub-plans in the National Economic and Social Development Plan, which include infrastructure development projects of agriculture, water power, energy, transportation, communication etc., exploitation and protection policies of important resources like land, water, ocean, coal, petroleum, natural gas etc., as well as policies of ecological development, environmental protection, disaster prevention and mitigation, science and technology, education, culture, public health, social security, national defense, and other public utilities and public services. In fact, the sectoral sub-plans in the National Economic and Social Development Plan cover all areas in relation to social development and urban and rural construction.<sup>2</sup> However, these sectoral sub-plans are generally development policies or concepts. It is necessary for relevant sectoral authorities to prepare sectoral plans with implementation details. The most important national acts governing sectoral planning are:

*The Environmental Protection Act of the P. R. C., The Code for Nature Reserves of the P. R. C., The Water Act of the P. R. C., The Forest Act of the P. R. C., The Land Management Act of the P. R. C., The Historic Heritage Protection Act of the P. R. C., The Highway Act of the P. R. C..*

According to the hierarchy of the economic and social development plans, the Chinese sectoral plans may be grouped as four categories: sectoral plans at national level, sectoral plans at provincial level, sectoral plans at municipal level, and sectoral plans at county level. Sectoral plans should coordinate with town and country plans at the same level. On the other hand, in order to realize the comprehensive urban development, urban or town sectoral plans, which regulate the development of infrastructures and public utilities within municipal territories, are also prepared as parts of urban or town master plans.<sup>3</sup>

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<sup>1</sup> Standing Committee of the Tenth National People's Congress: *Town and Country Planning Act of the P. R. China, 2007*, §18

<sup>2</sup> [http://www.sdpc.gov.cn/fzgh/zcfg/t20051102\\_48079.htm](http://www.sdpc.gov.cn/fzgh/zcfg/t20051102_48079.htm)

<sup>3</sup> Standing Committee of the Tenth National People's Congress: *Town and Country Planning Act of the P. R. China, 2007*, §17

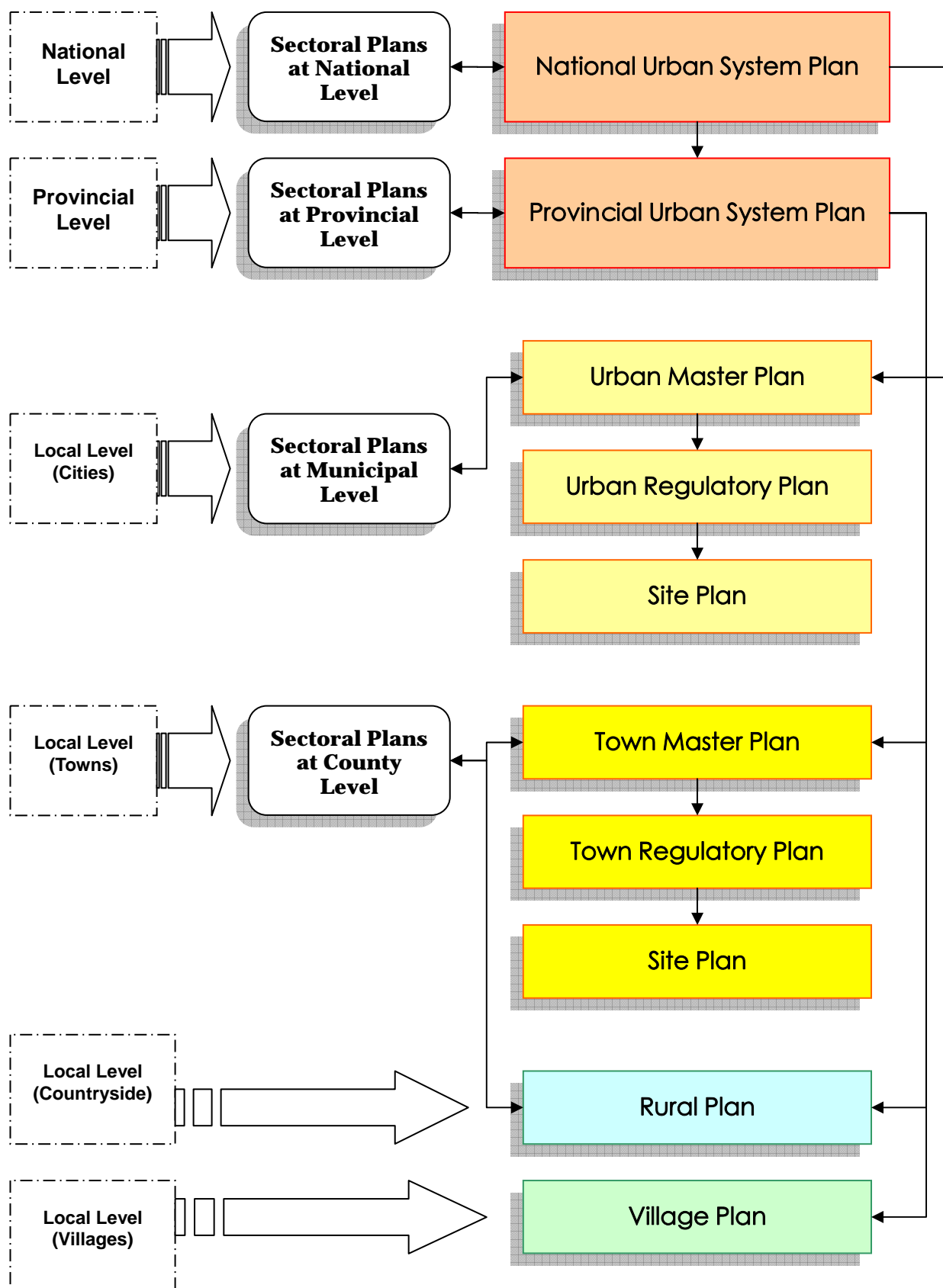


Fig. 2-2 Town & Country Planning System of China and its Relationship with Sectoral Plans

## 2.2 INTRODUCTION OF GERMAN B-PLAN

### 2.2.1 Types & Role of German B-plan

#### 2.2.1.1 Types of German B-plan

According to *The Federal Building Code (Baugesetzbuch)*, the German B-plan can be divided into three major types: the qualified B-plan (qualifizierter Bebauungsplan), the simple B-plan (einfacher Bebauungsplan), and the project-based B-plan (vorhabenbezogener Bebauungsplan).

1. The qualified B-plan (qualifizierter Bebauungsplan) & the simple B-plan (einfacher Bebauungsplan):

The qualified B-plan is “within the area covered by a B-plan which, either in isolation or jointly with other building regulations, contains the minimum designations on the type and degree of building and land use (Art und Maß der baulichen Nutzung), specification of plot areas which may or may not be built on (die überbaubaren Grundstücksflächen) and designation of public thoroughfares (die örtlichen Verkehrsflächen).” If a B-plan does not meet the requirements mentioned above, it is considered a simple B-plan. <sup>1</sup>

2. The project-based B-plan (vorhabenbezogener Bebauungsplan):

After the reunification of Germany, in order to meet the need for the rapid land development, a new type of B-plan has been introduced. It has a name of “the project-based B-plan”.

The municipality may enter into urban development contracts (Städtebauliche Verträge). Suitable subjects for urban development contracts include:

The preparation and implementation of urban development measures by and at the expense of the contract partner; this should include reordering zone boundaries, soil remediation and other preparatory measures, and the drawing up of urban development plans.

Promoting and safeguarding the aims pursued by urban land use planning, particularly the use of plots, the implementation of counterbalancing measures pursuant to Section 1a para. 3 in *The Federal Building Code (Baugesetzbuch)*, supplying the housing need of both groups

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<sup>1</sup> Bundesministerium für Verkehr, Bau und Stadtentwicklung: *Baugesetzbuch (BauGB)*, zuletzt geändert Dezember, 2006. §30

within society who experience special problems with regard to housing supply and the local community;

The assumption of responsibility for the costs and other expenses which the municipality incurs or has incurred with respects to urban development measures and which are either prerequisites or consequences of the proposed development project. This should include the provision of building plots.<sup>1</sup>

The municipality may employ a project-based B-plan to determine the admissibility of a development project if on the basis of a project and infrastructure plan (Vorhaben- und Erschließungsplan). The project and infrastructure plan is an integral part of the project-based B-plan. In the case of the project and infrastructure plan not being implemented within the stipulated time-limit, the municipality should revoke the binding land use plan. Moreover, the approval of the municipality is required for any change of developer.<sup>2</sup>

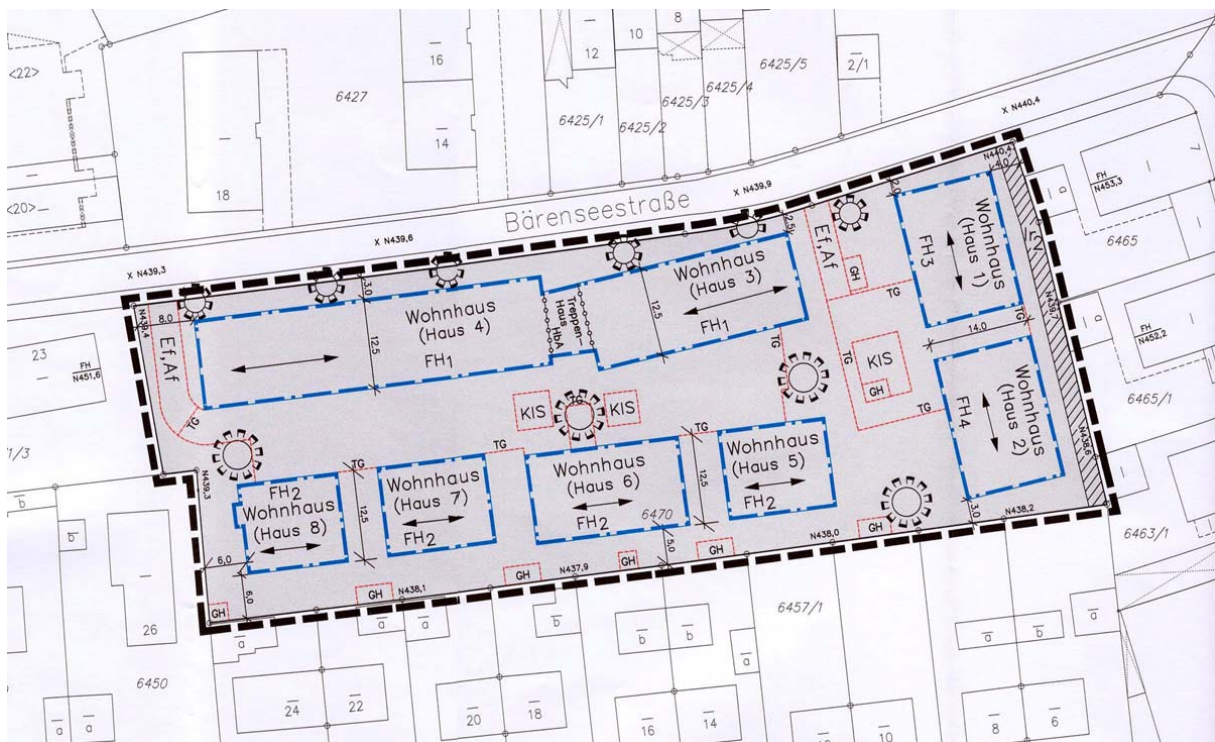


Fig. 2-3: Project-based B-plan Map “Wohnanlage Bärenseestraße” (Vaihingen 224)

(Source: Landeshauptstadt Stuttgart Amt für Stadtplanung und Stadterneuerung: *Vorhabenbezogener Bebauungsplan mit Satzung über örtliche Bauvorschriften, Wohnanlage Bärenseestraße Vaihingen 224, 2002*)

<sup>1</sup> Bundesministerium für Verkehr, Bau und Stadtentwicklung: *Baugesetzbuch (BauGB)*, zuletzt geändert Dezember, 2006. §11

<sup>2</sup> *Ibid.* §12



### **2.2.1.2 Role of German B-plan**

As a local statute, the German B-plan is the principal basis of urban planning administration. The B-plan guides and controls the individual building behavior in order to secure the public interest. The role of German B-plan is to balance conflicts between the public interest and the private interest.

The B-plan can finally realize the intentions in various spatial plans, since in the German planning system, the B-plan is the only legally binding land use plan which has the mandatory control functions. Therefore, development measures in urban and regional plans, such as infrastructures, ecological construction, environmental protection, and heritage conservation, must be implemented by the B-plans.

The B-plan is an effective tool of regulating spatial resources and realizing the sustainable development. The main objectives of the B-plan spatial control include not only the land resources, but also ecological resources, ground and underground natural resources, as well as various human resources. In Germany, the B-plan can integrate different control measures to realize the comprehensive spatial control of a certain plot.

Because of its direct manifestation of the urban design concept, the B-plan can be used as a powerful tool of urban design. The B-plan has an effective function of physical control so that the concept of urban design may be completely integrated into plan designations. Therefore, when a B-plan becomes a local statute, the concept of urban design can be implemented accordingly.

### **2.2.2 Content of German B-plan**

The B-plan may on urban-planning grounds make designations regarding:<sup>1</sup>

1. The type and degree of building and land use;
2. The coverage type, plot areas which may or may not be built on and the location of physical structures; 2a. Scopes and depths of distance spaces, which differ from the relevant regulations in construction codes;
3. Minimum dimensions for the size, width and depth of development sites (building plots), and also maximum dimensions for residential plots in the interests of economical and

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<sup>1</sup> Bundesministerium für Verkehr, Bau und Stadtentwicklung: *Baugesetzbuch (BauGB)*, zuletzt geändert Dezember, 2006, §9

- considerate exploitation of land;
4. Spaces for secondary structures which are required in accordance to other regulations on the use of land, such as play, leisure and recreational areas, and car-parking spaces, garages and drive-ways;
  5. Spaces for common facilities and for sports and play structures;
  6. The highest permitted number of dwellings in residential buildings, where such stipulation is required;
  7. Spaces which have been wholly or partly set aside for publicly subsidised housing developments;
  8. Spaces which have been wholly or partly set aside for housing developments for members of the population with special accommodation requirements;
  9. Special uses for sites;
  10. Spaces to be kept free from built development, with their use;
  11. Traffic areas including traffic areas for specific purposes, such as pedestrian areas, parking spaces for motor vehicles, bicycles, and links from other spaces to the public thoroughfares. Traffic areas can be designated as public or private areas;
  12. Utility areas;
  13. The location and course of ground or underground public utility installations and pipelines;
  14. Spaces for waste disposal and sewage disposal, including rainwater retention and seepage, and for tipping;
  15. Public and private green spaces, such as parks, allotment gardens, sports grounds and playgrounds, camping sites and bathing areas, and cemeteries;
  16. Water bodies and spaces for water supply and distribution, for installations for flood control and for the control of drainage;

17. Spaces for embankments, diggings and for quarrying of stone, earth, and other minerals;
18. a) agricultural land and, b) woodland;
19. Spaces for the construction of structures for keeping small domestic animals and for exhibiting and breeding, kennels, paddocks, etc.;
20. Measures for the protection, conservation and development of soil, of the natural environment, and of the landscape;
21. Spaces to be encumbered with walking and driving rights and rights of passage in favour of the general public, an agency charged with the provision of public infrastructure or a limited group of persons;
22. Spaces for community amenities to serve specific spatial areas, such as children's playgrounds, leisure structures, parking spaces and garages;
23. Areas in which, in order to provide protection against harmful measures affecting nature and landscape within the meaning of *The Federal Environmental Protection Act (Bundes-Immissionsschutzgesetz)*, certain materials which give rise to air pollution may not be used, or used only within defined limits. Areas with the installation of renewable energies, especially solar energy;
24. Protected areas to be kept free from development with their uses, spaces for specific installations and measures to provide protection against harmful measures affecting nature and landscape within the meaning of *The Federal Environmental Protection Act (Bundes-Immissionsschutzgesetz)*, and the provisions to be made, including building and other technical measures, to provide protection against such impact or to prevent or reduce such impact;
25. With respect to individual spaces or of areas covered by a B-plan or parts thereof, and of parts of physical structures, excluding spaces given over to agricultural use or for woodland a) planting of trees, shrubs and greenery of any other kind; b) obligations relating to planting and to the preservation of trees, shrubs and greenery of any other kind, and of water bodies;
26. Spaces for embankments, diggings and retaining walls, where these are required for road construction.

## 2.2.3 Preparation of German B-plan

### 2.2.3.1 Conventional Procedure of the B-plan Preparation

According to the relevant regulations in *The Federal Building Code (Baugesetzbuch)*, the conventional procedure of the B-plan preparation can be divided into twelve phases, which include:<sup>1</sup>

Initial preparation → resolution on plan preparation → preparation of preliminary plans → early public participation → preparation of draft plan → public notice, public participation → weighing → modification and supplement procedure → legislation → administrative control → local announcement → monitoring.

#### 1. Initial preparation

The initial preparation is intended to clarify the planning requirements. In this phase, it is necessary to examine the valid plans which have certain requirements for the development of the prospective planning area, such as the regional plan, land use plan (Flächennutzungsplan), sectoral plans (Fachpläne), basic ecological survey (ökologische Grundlagenerhebung), and structure plans (Strukturplanung). By examining the regional plan and the land use plan, targets of both upper-level plans can be clarified. The inventory of the traffic and other technical infrastructures can be clarified by studying the sectoral plans. Moreover, the basic environmental and ecological information can be acquired from the basic ecological survey, while the structure plans may provide alternative development concepts of the prospective planning area. In this step, the location, size, type, and border of the prospective planning area should be confirmed.

#### 2. Resolution on plan preparation (§ 2, para. 1, BauGB)

The municipality is responsible for the preparation of the B-plan. Public notice of the resolution on the preparation of a B-plan is to be made in the manner customary to the municipality.

#### 3. Preparation of preliminary plans

Planners are responsible for preparing the preliminary B-plan and green structure plan (Grünordnungsplan).

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<sup>1</sup> Bundesministerium für Verkehr, Bau und Stadtentwicklung: *Baugesetzbuch (BauGB)*, zuletzt geändert Dezember, 2006

#### 4. Early public participation (§ 2, para. 2; § 3, para. 1; § 4, para. 1; § 4a, BauGB)

The early public participation consists of two parts, which are the early participation of public authorities and other public bodies, as well as the early participation of the general public.

Pursuant to the regulation in *The Federal Building Code (Baugesetzbuch)*, the environmental assessment (Umweltprüfung, § 1, para. 6, No. 7; § 2, para. 4) is normally a necessary process of the B-plan preparation. The environmental assessment is implemented to discover the possible harmful measures affecting nature and landscape generated by the prospective development. The results of the environmental assessment should be clarified and explained in an environmental report (Umweltbericht, § 2a, BauGB). This environmental report (Umweltbericht) forms a separate part of the plan substantiation. The step “scoping” is intended to determine the scope and details of the environmental assessment (§ 2, para. 4, BauGB). Public authorities and other public bodies may participate in the scoping in order to optimize the scope and details of the environmental assessment.

The municipality should obtain comments and opinions from public authorities and from other public bodies whose activities are affected by the planning measure at the earliest opportunity. Participation of public bodies may take place simultaneously with the procedure of general public participation.

The general public is to be informed at the earliest possible stage about the general aims and purposes of planning, about significantly different solutions which are being considered for the redesign or development of an area, and of the probable impact of the scheme. The public is to be given suitable opportunity for comment and discussion.

In the case of urban land use plans capable of exerting a significant impact on a neighbouring country, municipalities and public bodies in the neighbouring country should be informed in accordance with the principles of mutuality and equivalence. The preparation of urban land use plans should be coordinated with relevant plans of neighbouring municipalities in order to realize the objective of regional planning, as well as appointed central supply areas.

#### 5. Preparation of draft plan

Based on the information from the early public participation, planners may modify the preliminary B-plan and green structure plan (Grünordnungsplan). Finally, the results of the environmental assessment should be integrated into the draft plan. Moreover, through a policy making process, the content of the green structure plan (Grünordnungsplan) can be regulated as legally binding designations in the relevant B-plan.

#### 6. Public notice, public participation (§ 3, para. 2; § 4, para. 2, BauGB)

The municipality approves the B-plan draft publicly. The B-plan draft with the accompanying explanatory report, including the environmental report, are to be put on public display for a period of one month. The place and time at which plans may be inspected are to be made public at least one week in advance in the manner customary to the municipality with the advice that suggestions may be lodged during the display period. Suggestions lodged within the period allowed are to be examined. Persons who have lodged suggestions are to be informed of the outcome of this examination.

Participation of public authorities and other public bodies may take place simultaneously with the procedure of general public participation. The municipality should obtain comments and opinions from public authorities and from other public bodies whose activities are affected by the planning measure within a period of one month.

#### 7. Weighing (§ 1, para. 7; § 2, para. 3, BauGB)

In preparing land use plans, public and private interests are to be duly weighed. Interests that are important to weighing should be identified and evaluated.

#### 8. Modification and supplement procedure (§ 4a, para. 3, BauGB)

Sometimes, the result of weighing leads to a necessity of modifying or supplementing the B-plan draft. In this case, new public notice should be organized in order to obtain comments and opinions from public authorities, other public bodies, as well as the general public. However, the new public participation can only focus on the parts of the plan that need to be modified or supplemented. The duration and deadline of the new public notice can also be shortened.

#### 9. Legislation (§10 para. 1, BauGB)

The municipality adopts the B-plan as a statute. Normally, the local parliament is responsible for implementing the legislative procedure and making the resolution.

#### 10. Administrative control (§10 para. 2; §246 para. 1a BauGB)

Legally binding B-plans require the approval of the higher administrative authority. The federal states may determine that B-plans and statutes adopted under Section 34 para. 4 sentence 1 for which permission is not required be notifiable to the higher administrative

authority prior to their entry into force. The higher administrative authority should raise any breaches of legal provisions which would warrant the refusal of permission under Section 6 para. 2 within a period of one month of receiving notification. B-plans and statutes may only be put into force if the higher administrative authority has not raised a breach of legal provisions within the stipulated time-limit.

#### 11. Local announcement (§10 para. 3, BauGB)

The B-plan and supporting documentation should be made available for inspection by the general public. Explanations and information on the content should be supplied on request. The advertisement should state where the B-plan is available for inspection. The B-plan enters into force on public announcement of approval.

#### 12. Monitoring (§4c, BauGB)

The municipalities monitor the significant environmental impacts, which originate from the implementation of the B-plan. If there are major accidents, particularly unexpected harmful measures affecting nature and landscape, the municipalities can adopt proper measures to alleviate the negative effects.

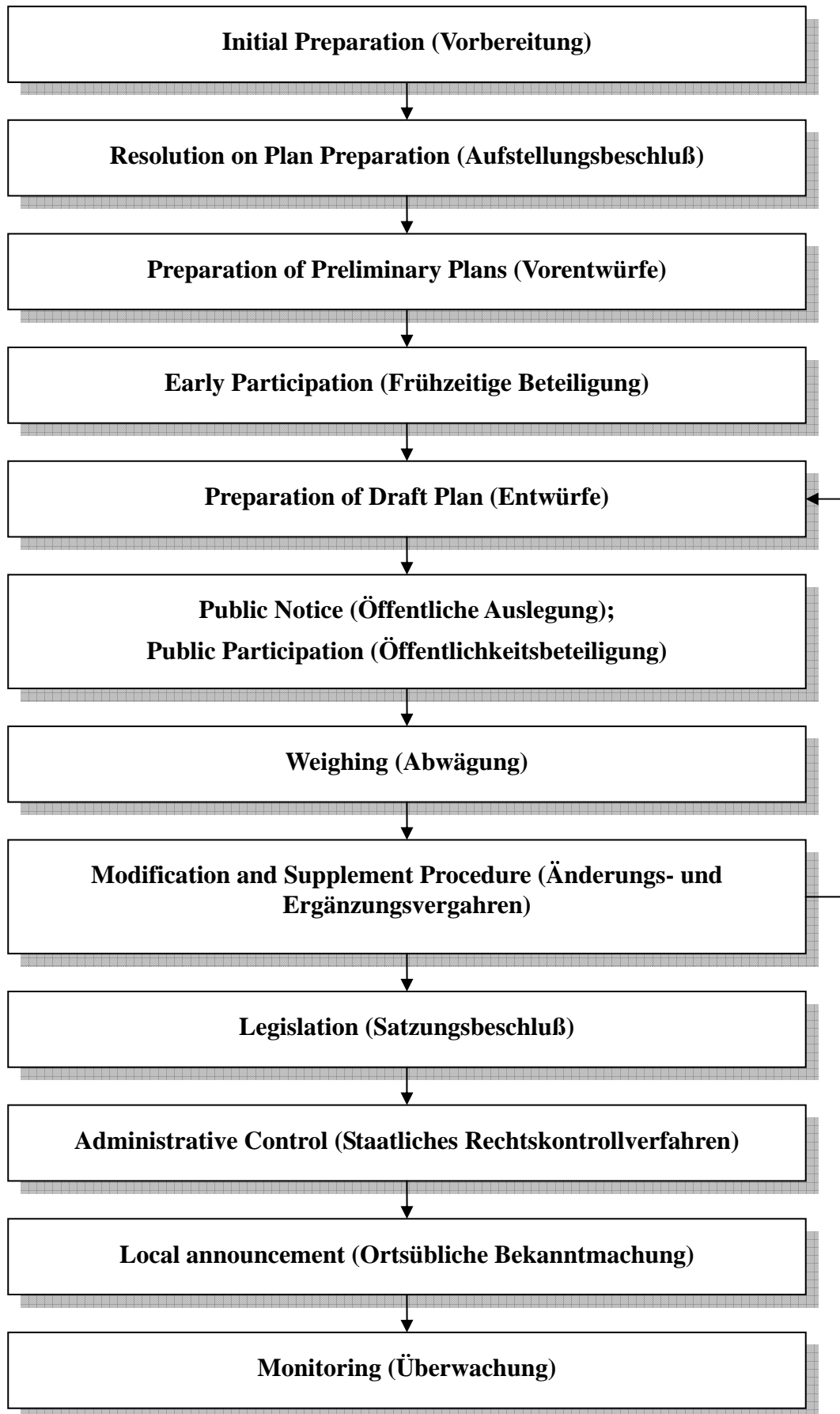


Fig. 2-4 Conventional Procedure of the B-plan Preparation (Referring to: Hans Büchner & Karlheinz Schlotterbeck: *Baurecht, Band 1: Städtebaurecht einschließlich örtlicher Bauvorschriften*, 2008. S. 53 -56)



Tab.2-1 Interactive Mechanism among the Stakeholders in the B-planning

	Municipality (Urban Planning Bureau)	Planners	General Public	Public Authorities and other Public Bodies	Local Parliament
Initial Preparation	●				
Resolution on Plan Preparation	●				
Preparation of Preliminary Plans		●			
Early Public Participation	●		○	○	
Preparation of Draft Plan		●			
Public Notice; Public Participation	●		○	○	
Weighing	●				
Legislation	●				●
Administrative Control	Approval of the higher administrative authority				
Local Announcement	●				
Monitoring	●				

● to undertake    ○ to participate

### **2.2.3.2 Simplified Procedure of B-plan Preparation**

Pursuant to the Section 13 of *The Federal building Code (Baugesetzbuch)*, where modifications or additions to an urban land-use do not affect the basic principles of the plan, it is permissible:<sup>1</sup>

1. To dispense with the requirement to provide information and to enter into discussion pursuant to Section 3 para. 1 and Section 4 para. 1;
2. To provide the affected citizens with the opportunity to comment within an appropriate period, or alternatively to make use of the public display procedure as provided under Section 3 para. 2;
3. To provide affected public bodies with the opportunity to comment within an appropriate period, or alternatively to make use of the participation procedure as provided under Section 4.

The simplified procedure can also dispense the requirement to implement the environmental assessment (Umweltprüfung) and the preparation of the environmental report (Umweltbericht). However, in the public participation, the affected general public must be informed with this dispense.

### **2.2.3.3 Accelerated Procedure of B-plan Preparation (B-plan of the Interior Development)**

According to the regulation in the new version of *The Federal Building Code (Baugesetzbuch)*, in order to realize the re-utilization of land, redevelopment, or other measures of interior development (B-plan of the Interior Development, Bebauungsplan der Innenentwicklung), a B-plan can be prepared by adopting an accelerated procedure. The phases of the accelerated procedure are shown in the figure 2-5:

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<sup>1</sup> Bundesministerium für Verkehr, Bau und Stadtentwicklung: *Baugesetzbuch (BauGB)*, zuletzt geändert Dezember, 2006, §13

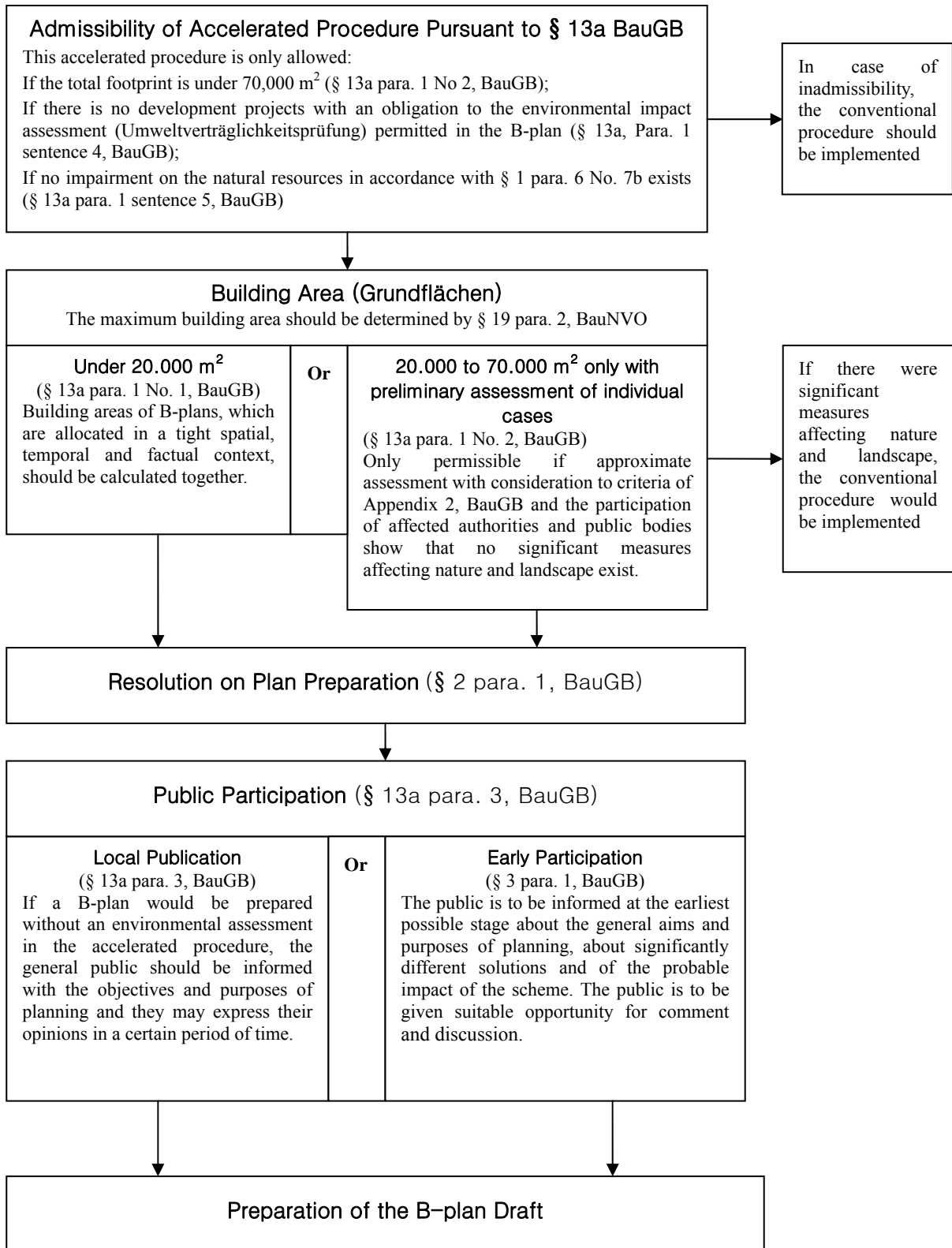


Fig. 2-5 Accelerated Procedure of B-plan Preparation (B-plan of the Interior Development)

(Source: Folkert Kiepe, Arnulf von Heyl: *Baugesetzbuch für Planer*, 2007. S. 344)

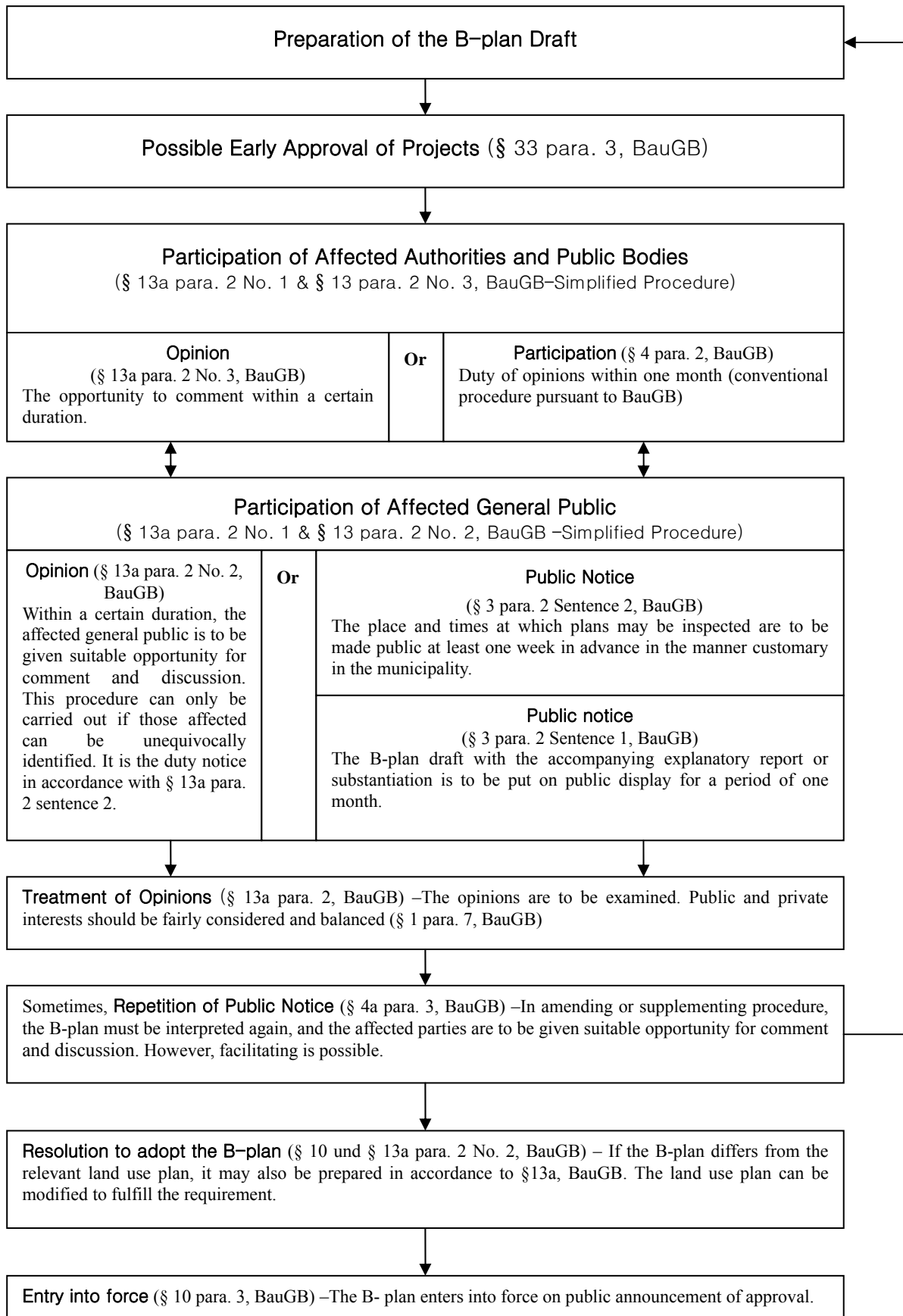


Fig. 2-5 (Part II) Accelerated Procedure of B-plan Preparation (B-plan of the Interior Development)  
 (Source: Folkert Kiepe, Arnulf von Heyl: *Baugesetzbuch für Planer*, 2007. S. 344)

## 2.2.4 Implementation of German B-plan

Municipalities are responsible for implementation and management of the B-plan, and guiding the development of municipal infrastructure and public facilities. After the completion of construction, municipalities must exercise monitoring functions, particularly the environmental monitoring function.

The B-plan can be implemented by issuing building permits. “Before a building or physical structure may be erected, altered or demolished, or subjected to a change of use, a permission must be sought from the competent authority. A building application must be given consent if the building project concerned is not in conflict with any public law regulations (an effect of the designations in a B-plan being legally binding). The decision to grant a building permission (Baugesuch) is thus guided entirely by the legal effects of planning law, building regulations, and any other relevant statutory rules. In most cases the authority responsible for giving building permissions is the county or municipal building control department (Baurechtsamt). The essential details of application and permission procedures are laid down in the building regulations of the various federal states.”<sup>1</sup>

In Baden-Württemberg, for instance, the municipal building control department (Baurechtsamt) is responsible for the issue of building permits. Full particulars are regulated by *The Federal State Building Ordinance (Landesbauordnung, §§52-59)*. “There are generally three different procedures for building applications and permissions: no permission required (verfahrensfreie Vorhaben), projects permitted upon the Baurechtsamt’s official notification (Kenntnisgabeverfahren), and projects that require a formal building permission issued by the Baurechtsamt (Antrag auf Baugenehmigung). The application for building permits must include all documents necessary to assess the building project and process the application (Bauvorlagen), in particular a site plan, the architect’s plans, written specifications, proof of stability and other technical proofs, and a drainage plan of the site. If no regulations subject to public law are infringed by the project, a building permit is to be granted (§58 *Landesbauordnung*).”<sup>2</sup>

With regard to the approval of development project, B-plans need to be dealt with separately in the three different types, which can be divided into the qualified B-plan, the project-based B-plan, as well as the simple B-plan.

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<sup>1</sup> Turowski, Gerd: *Spatial Planning in Germany: Structures and Concepts*, Akademie für Raumforschung und Landesplanung, Hannover, 2002. S. 33

<sup>2</sup> Landeshauptstadt Stuttgart Amt für Stadtplanung und Stadterneuerung: *Stufen der räumlichen Planung in Stuttgart, Arbeitspapiere zur Stadtentwicklungsplanung*, 2006

Within the area covered by a B-plan which, either in isolation or jointly with other building regulations, contains as a minimum designations on the type and extent of use for building, the land on which built development may take place and spaces dedicated as public thoroughfares (**a qualified B-plan**), a development project is permissible where it does not contravene these designations and the provision of local public infrastructure has been secured.<sup>1</sup>

Within the area covered by a B-plan adopted for the purpose of facilitating a development project pursuant to Section 12 (**a project-based B-plan**), a development project is permissible if it is not in conflict with the B-plan and the provision of required infrastructure can be guaranteed.<sup>2</sup>

Within the area covered by a B-plan which does not meet the requirements of para. 1 (**a simple B-plan**), the permissibility of development projects is determined in other respects by Section 34 or Section 35.<sup>3</sup>

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<sup>1</sup> Bundesministerium für Verkehr, Bau und Stadtentwicklung: *Baugesetzbuch (BauGB)*, zuletzt geändert Dezember, 2006, §30, para. 1

<sup>2</sup> Ibid, §30, para. 2

<sup>3</sup> Ibid, §30, para. 3

## 2.3 INTRODUCTION OF CHINESE REGULATORY PLAN

### 2.3.1 Evolution of Chinese Urban Planning and Birth of Regulatory Plan

#### 2.3.1.1 Chinese Urban Detailed Planning before the Foundation of the People's Republic of China<sup>1</sup>

After the Opium War in 1840, western powers began to interfere with Chinese affairs. They occupied land plots in many important Chinese ports and built their own colonial quarters. Therefore, various colonial and half-colonial cities emerged. Before the foundation of the People's Republic of China, there were two kinds of urban plans. One was the urban plans prepared by foreign occupiers. The other was the urban plans prepared by the Chinese governments at that time.

For cities and regions occupied by a unique western power, such as Hong Kong, Macao, Qingdao, Dalian, and Chanchun, relatively comprehensive urban plans used to be prepared and implemented. Those plans adopted popular planning methods in the occupiers' home countries with functional zones and the construction of transportation and public facility systems.

Under the environment of westernization, the urban image and urban structure of a few traditional Chinese cities changed to some extent, such as in Beijing. With regard to some traditional Chinese cities, such as Jinan and Fuzhou, new commercial areas were developed next to the old urban areas. Those cities had no comprehensive urban plans but just the plans of some grid road networks. At the beginning of 20<sup>th</sup> century, Nantong city of the Jiansu Province, managed to make a modern urban plan. On the other side, the Chinese governments at that time used to prepare the modern urban plans for Nanjing, Shanghai, Chongqing and Wuxi.

In general, aside from transplanting the western planning theories and methods, the urban planning, before the foundation of the People's Republic of China, had few investigations for the Chinese social, economic and natural conditions. Those urban plans focused on the land classification, planning of roads, public facilities, etc. However, nearly no urban detailed plan and urban redevelopment plan were prepared. Moreover, most of those plans prepared by the Chinese governments were not implemented.

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<sup>1</sup> China Encyclopedia Editorial Board on "architecture, landscape & urban planning": *China Encyclopedia (vol. Architecture, Landscape & Urban planning)*, China Encyclopedia Press, Beijing, Shanghai, 1988, 1st edition, pp. 556-557,

### **2.3.1.2 Chinese Urban Detailed Planning after the Foundation of the People's Republic of China- The site plan<sup>1</sup>**

After the People's Republic of China was founded, the Soviet style of urban detailed planning known as the site planning, had been introduced into the Chinese urban planning experience. The site planning would arrange for all development projects in details that covered the planning area completely.

The content of a site plan includes the land use arrangement, road system, architectural styles and standards, planning population, types, scale, land use and development order of public buildings, green spaces, parking spaces and garages, public facilities and pipelines, topographical planning, estimation of investment, and proposal of implementation. It is clear that the site plan is one kind of constructive urban detailed plan.

The site plan was a product of the administrative economy. At that time, the urban land was an administrative provision with no value and time limit. Moreover, the developers of urban land were also administrative authorities. Therefore, the site plan was actually one part of the national plan of China, which guided the development projects.

### **2.3.1.3 Background of the Birth of Chinese Regulatory Plan<sup>2</sup>**

Since the beginning of the Reform and Open period, the new market economy had been developed with an unbelievable speed. The rapid urbanization led to the alternation of urban land management and development, which gave the birth to the regulatory plan.

Regarding the alternation of urban land management, the unplanned land allocation became planned, while the uncharged land use became charged, and the administrative land management became a mixture of administrative, economic, and statutory management.

With regard to the alternation of urban land development, the original small-scale land development became large-scale, while the investment source became varied.

The new Chinese market economy generated the need for new effective plan that could guide and control the urban development behaviors, especially those of private developers. Clearly, the traditional site plan could not meet this kind of need. Therefore, it was necessary to introduce a practical plan that could be the basis of planning administration, as well as the

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<sup>1</sup> China Encyclopedia Editorial Board on "architecture, landscape & urban planning": *China Encyclopedia (vol. Architecture, Landscape & Urban planning)*, China Encyclopedia Press, Beijing, Shanghai, 1988, 1st edition, pp. 72-73

<sup>2</sup> Jiansu Institute of Urban Planning & Design (as the chief editor): *Urban Planning Database (Vol. 4): the Regulatory Planning*, China Architecture & Building Press, Beijing, 2002, 1st edition, p. 3



standard for land use.

### 2.3.1.4 Birth of Chinese Regulatory Plan

In 1980, several American architects visited China for academic communication. They introduced the concept of zoning to Chinese colleagues. In 1982, a new zoning style plan was prepared in Shanghai, which included eight control indicators such as the land use type, land use area, plot ratio, building density, building set-back, building height, entrance of vehicles, and parking capacity. This Hongqiao plan was proved a very effective tool to realize the planning goal. It was the beginning of zoning practice in China.<sup>1</sup>

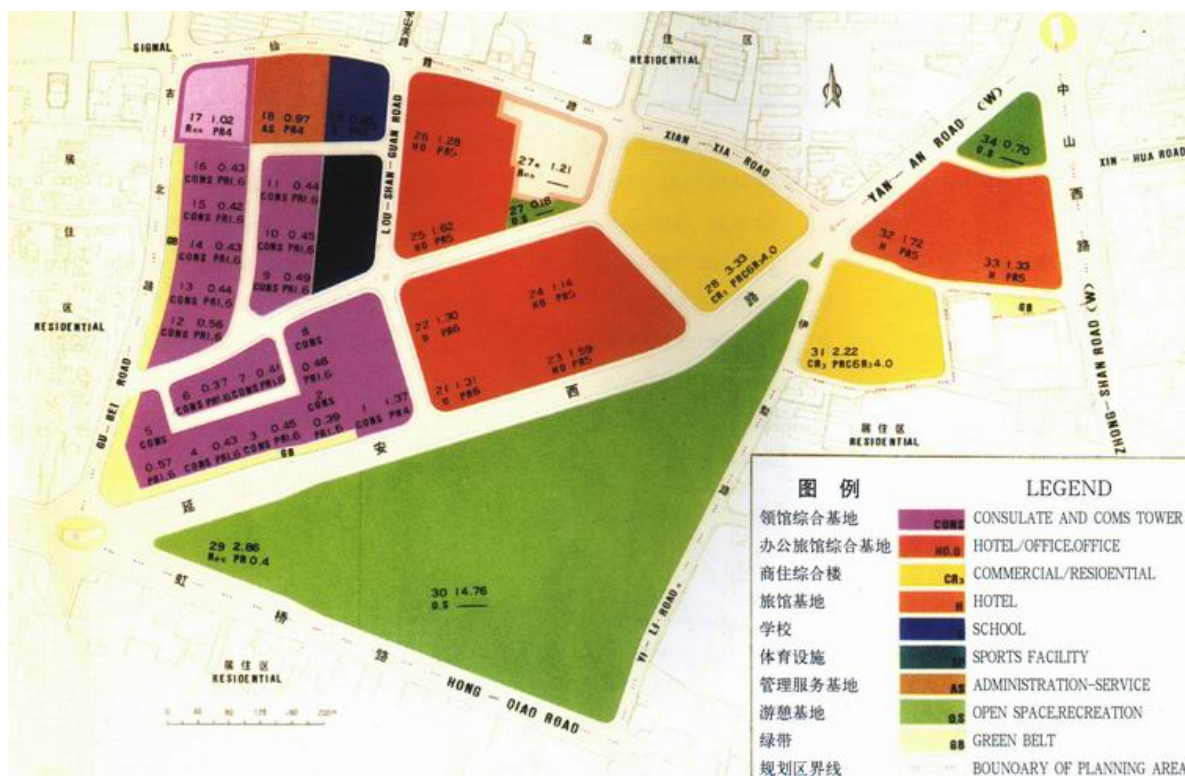


Fig. 2-6: The Detailed Plan of Hongqiao, Shanghai

(Source: *Urban Planning Database (Vol. 4): the Regulatory Planning*, 2002)

### 2.3.1.5 Evolution of Chinese Regulatory Plan<sup>2</sup>

In 1987, the detailed plan of the central area for Guilin city (Guangxi) was one of the most important successors of Hongqiao. Based on the control indicators of the Hongqiao plan, it was also integrated with the urban design idea. In the same year, the regulatory plan of Tong

<sup>1</sup> Jiansu Institute of Urban Planning & Design (as the chief editor): *Urban Planning Database (Vol. 4): the Regulatory Planning*, China Architecture & Building Press, Beijing, 2002, 1st edition, p. 4

<sup>2</sup> Ibid, p. 4

Fang Xiang residential block in Suzhou was made with the implementation measure and economic analysis. In Guangzhou, a regulatory plan, which covered 70 km<sup>2</sup>, was prepared with two local statutes. It made a new connection between the legislation procedure and the urban planning administration.

In 1989, the redevelopment plan of the historic town center of Wenzhou was prepared. It was a mixture of planning experiences at that time. The final version of the plan included the plan map and the plan text that formed a complete format of a regulatory plan. This regulatory plan was approved by the city government of Wenzhou and became legally valid. The plan of Wenzhou was a milestone that marked the maturation of regulatory plan.

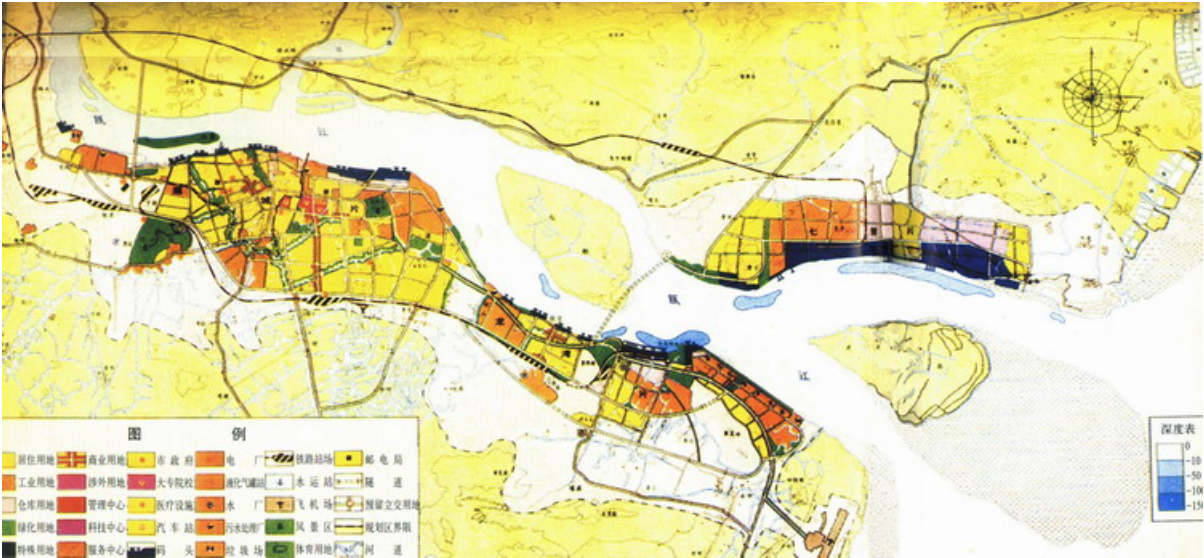


Fig. 2-7: The Regulatory Plan of Historic Town of Wenzhou, Zhejiang Province  
 (Source: *Urban Planning Database (Vol. 4): the Regulatory Planning*, 2002)

Based on the practices of regulatory planning, the theory of regulatory plan was summarized. In August 1989, the Jiansu Institute of Urban Planning & Design edited a brochure called “The Preparation Criteria of Regulatory Plan” (proposal), which mentioned some important issues such as the division of plots, establishment of indicators, and application of modern technology.

In 1991, the Southeast University of China and the Urban Planning Bureau of Nanjing summarized part of domestic practices of regulatory planning in a report called “Research on the Theory and Practice of Regulatory Planning in Nanjing”.

At the end of 1980s, the content and method of regulatory plan were finally established.

Therefore, it was integrated into the Chinese urban planning system by the amendment of acts. In 1991, the Ministry of Construction of China enacted *The Preparation Criteria of Urban Planning*, which clarified the requirements for the preparation of the regulatory plan. Sometime later, in 1995, the Ministry of Construction of China enacted the relevant *Implementation Details of the Preparation Criteria of Urban Planning* that standardized the specific content of regulatory planning. In 1990s, based on the national *Urban Planning Act* and codes mentioned above, local municipalities enacted some urban planning ordinances that regulated the contents of the regulatory plan in more details.

In 2007, in order to coordinate with the accelerating urban development in modern China, as well as to solve the existing problems of the urban and regional planning and administration, the new *Town and Country Planning Act of the People's Republic of China* was enacted. Based on the provisions in this new act, an optimized Chinese urban and regional planning system has been established.

### 2.3.2 Role of Chinese Regulatory Plan

In China, the regulatory plan is the most important basis for building permission.<sup>1</sup> It is to be developed out of the master plan,<sup>2</sup> and the site plan should be consistent with the regulatory plan.<sup>3</sup> Therefore, it is clear that the regulatory plan works as a primary tool for realizing the intentions of the master plan, as well as the basis of the site plan. It is undoubtedly a key planning level in the Chinese urban planning system.

As the main stage of the urban detailed plan, the regulatory plan turns the two-dimensional macrocontrol into the three-dimensional quantitative microcontrol, connecting the city-scale spatial control to the block-scale spatial control.

The regulatory plan is the principal basis of the Chinese planning administration. It adopts the concise and clear measures to develop quantitative indicators and control regulations. The role of the Chinese regulatory plan is to balance the conflicts between the public interest and the private interest.

The regulatory plan is also the key tool to realize urban design concepts. It is able to realize urban design concepts regulated in the master plan through the specific control indicators and requirements, which will guide the preparation of the site plan and the landscape plan.

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<sup>1</sup> See 2.3.5

<sup>2</sup> Standing Committee of the Tenth National People's Congress: *Town and Country Planning Act of the P. R. China*, 2007, §19, §20

<sup>3</sup> *Ibid.*, §21

In addition, the regulatory plan is the carrier of urban policies. There are many urban policies integrated in the process of regulatory planning and its implementation, such as the urban land use structure, population distribution, and environmental protection. Therefore, the uncertainty of the urban policies can be reduced so that the resources can be effectively exploited.<sup>1</sup>

### 2.3.3 Content of Chinese Regulatory Plan

The regulatory plan may on urban planning grounds make designations regarding:<sup>2</sup>

1. The boundary of planning area, type of building and land use, and land use compatibility;
2. Control indicators such as the building height, building density, plot ratio, and greening rate; Spaces for public facilities, locations of traffic entrances and exits, capacities of parking spaces, and set-back depths from boundary lines of roads;
3. The urban design guidelines such as the building volume, building form, and colors;
4. Spaces for traffic entrances and exits, public parking spaces, public traffic stations, pedestrian zones, and other traffic facilities in accordance with the urban transportation forecast. Boundary lines of roads, sections of roads, intersection forms and drainage measures, as well as coordinates of road control points;
5. Spaces for municipal utilities, including boundary lines, spatial locations, and diameters of pipelines. Requirements for underground development;
6. Relevant regulations on the land use and development control.

The type, building density, building height, plot ratio, greening rate, and regulations on infrastructures and public facilities designated in the regulatory plan should be the mandatory elements.<sup>3</sup>

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<sup>1</sup> Xia, Nankai & Tian Baojiang: *Regulatory Planning*, Tongji University Press, Shanghai. 2005, 1st edition, p. 6

<sup>2</sup> Ministry of Construction of the P. R. China: *Preparation Criteria of Urban Planning*, 2005, §41

<sup>3</sup> *Ibid*, §42

## 2.3.4 Preparation of Chinese Regulatory Plan

### 2.3.4.1 Procedure of the Regulatory Plan Preparation

The former procedure of the regulatory plan preparation can be grouped as six steps:

Preparation of working instruction → initial preparation of project → data collection → preparation of draft plan → finalization of the regulatory plan → approval procedure.

Regarding the six steps, the municipality (the administrative authority of urban planning) will undertake step one and step six. While the technical carrier of urban planning (the planners) will implement step two, step three, step four and step five.<sup>1</sup>

However, according to the provisions in *The Town and Country Planning Act of the P. R. China (2007)*, legally binding procedures of public participation, supervision, as well as plan modification have been established.

The optimized procedure of the regulatory plan preparation can be grouped as nine steps:

Preparation of working instruction → initial preparation of project → data collection → preparation of draft plan → public participation → finalization of the regulatory plan → approval procedure → publication → supervision.

#### 1. Preparation of working instruction

The function of the working instruction is to select the carrier of urban planning, such as design institutions or research organizations. The town and country planning authority is responsible for the preparation of working instruction. Normally, the town and country planning authority should organize a professional group to undertake this work. After the working instruction is finished, it must be inspected and approved by the town and country planning authority. The content of the working instruction covers the technical and qualification requirements for the planning carrier, introduction of the project, payment etc.

#### 2. Initial preparation of project

The planning carrier (the planners) should be acquainted with the contract and the stance of the customer, understanding the existing conditions of the project. Moreover, the planners

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<sup>1</sup> Xia, Nankai & Tian Baojiang: *Regulatory Planning*, Tongji University Press, Shanghai. 2005, 1st edition, pp.106-110

must prepare the working schedule and the technical working plan. The specific project staff should be confirmed in this step.

### 3. Data collection

Firstly, the planning carrier (the planners) should investigate the site of the project, clarifying following topics:

- a. Natural conditions, existing land use situation, ownerships etc;
- b. Stand of existing infrastructures and buildings;
- c. Surroundings of planning area;
- d. Cultural heritages in the planning area;
- e. Urban image of planning area.

Secondly, in the process of data collection, it is necessary for the town and country planning authority, as well as the planners, to obtain the opinions of relevant administrative departments, acquainted with the existing sectoral plans, which should be spatially implemented in the regulatory plan.<sup>1</sup>

Based on the data collection, the planners will analyze the data of various topics, including the land use structure, transportation, infrastructure, building quality, and landscape. Therefore, existing problems will be identified. The planning goal and concept will be developed.

### 4. Preparation of draft plan

In principle, the planning carrier (the planners) should design and modify the draft plan two or three times in order to make the subdivision of plots and stipulate the control indicators.

### 5. Public participation

Before the town and country plans are submitted for approval, they should be put on public display for a period of at least one month (public notice). In addition, substantiation meetings,

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<sup>1</sup> Ministry of Construction of the P. R. China: *Preparation Criteria of Urban Planning*, 2005, §15

hearings, or other means should be organized by the town and country planning authorities in order to collect suggestions from experts and the general public. Suggestions lodged within the period allowed should be carefully examined. On submission of town and country plans for approval, the adoption of suggestions should be included with the official reasons of the municipality.<sup>1</sup>

#### 6. Finalization of the regulatory plan

The core content of the regulatory plan concentrates on the control indicators. The final plan map and plan text should be edited in accordance with *The Preparation Criteria of Urban Planning* and its *Implementation Details*.

#### 7. Approval procedure

The approval of regulatory plans falls within the responsibility of the relevant municipality. Urban regulatory plans require the approval of city governments.<sup>2</sup> Town regulatory plans require the approval of the higher administrative authorities.<sup>3</sup>

#### 8. Publication

Omitting elements which are forbidden to be publicized under public law, approved town and country plans should be publicized in a timely manner.<sup>4</sup>

#### 9. Supervision

In the event of breaches regarding the designations in the town and country plan, any public bodies and individuals have the right to report or prosecute the illegal behaviors to town and country planning authorities or other relevant departments. Town and country planning authorities or other relevant departments should promptly accept the cases and take action.<sup>5</sup>

Governments above the county level, along with town and country planning authorities under these governments, should supervise the preparation, approval, implementation, and modification of town and country plans.<sup>6</sup> By law, the results of the inspection should be

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<sup>1</sup> Standing Committee of the Tenth National People's Congress: *Town and Country Planning Act of the P. R. China*, 2007, §26

<sup>2</sup> *Ibid.*, §19

<sup>3</sup> *Ibid.*, §20

<sup>4</sup> *Ibid.*, §8

<sup>5</sup> *Ibid.*, §9

<sup>6</sup> *Ibid.*, §51

publicized for public inspection and supervision.<sup>1</sup>

Local governments at various levels should report the implementation outcome of town and country plans to the Standing Committee of the People's Congress or the townships' People's Congress at the same levels for supervision.<sup>2</sup>

After being approved by the city government, an urban regulatory plan should be submitted to the Standing Committee of the People's Congress of the city and the higher government on a record.<sup>3</sup>

After being approved by the county government, a regulatory plan of the town where the county government is located should be submitted to the Standing Committee of the People's Congress of the county and the higher government on a record.<sup>4</sup>

Tab. 2-2: Interactive Mechanism among the Stakeholders in the Regulatory Planning

	Town & Country Planning Authority	Planners	General Public	Public Bodies	Standing Committee of the People's Congress
Preparation of Working Instruction	●				
Initial Preparation of Project		●			
Data Collection	○	●		○	
Preparation of Draft Plan		●			
Public Participation	●		○	○	
Finalization of the Regulatory Plan		●			
Approval Procedure	Approval of the relevant municipalities				
Publication	●				
Supervision	●		○	○	●

● to undertake ○ to participate

<sup>1</sup> Standing Committee of the Tenth National People's Congress: *Town and Country Planning Act of the P. R. China, 2007*, §54

<sup>2</sup> *Ibid.*, §52

<sup>3</sup> *Ibid.*, §19

<sup>4</sup> *Ibid.*, §20



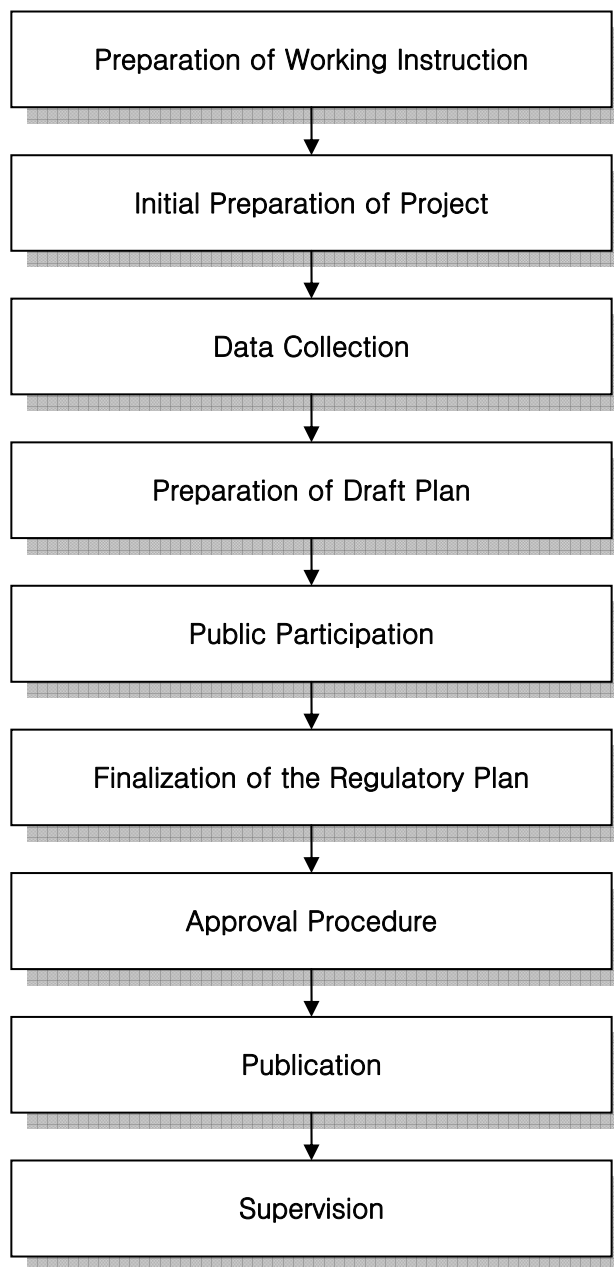


Fig. 2-8: Preparation Procedure of the Regulatory Plan

### **2.3.4.2 Procedure of the Regulatory Plan Modification**

According to the provisions in *The Town and Country Planning Act of the P. R. China (2007)*, the optimized procedure of the regulatory plan modification can be grouped as seven steps:

Substantiation → public participation → application → modification of the plan → approval procedure → publication → supervision

In order to modify a valid regulatory plan, town and country planning authorities should substantiate the necessity of the modification and obtain comments and opinions from public bodies and individuals whose activities are affected by the planning measure. Based on the processes mentioned above, town and country planning authorities may submit a specific report to the original approval authorities. The plan modification can only be started with the official agreement of the original approval authorities. Modified urban regulatory plans require the approval of city governments. Modified town regulatory plans require the approval of the higher administrative authorities. If the regulatory plan modification may change the mandatory elements in the corresponding urban or town master plan, the urban or town master plan should be modified as the first step.<sup>1</sup>

The public participation should also be implemented in the process of regulatory plan modification. The urban planning authority should obtain opinions from affected parties through organizing public notice, hearings, or other means. The adoption of opinions should be publicized.<sup>2</sup>

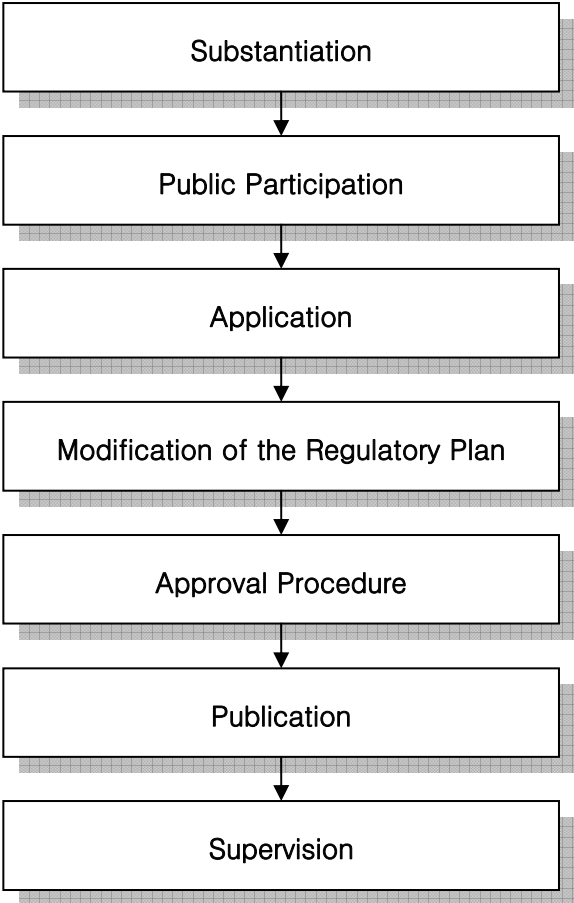


Fig. 2-9: Modification Procedure of the Regulatory Plan

<sup>1</sup> Standing Committee of the Tenth National People's Congress: *Town and Country Planning Act of the P. R. China*, 2007, §48

<sup>2</sup> Ministry of Construction of the P. R. China: *Preparation Criteria of Urban Planning*, 2005, §17

### 2.3.5 Implementation of Chinese Regulatory plan

In China, the regulatory plan itself can not directly implement the urban development. However, it works as the most important tool for building permission. Intentions of regulatory plans can be realized by issuing the **land use permit** and the **building permit**.

If a development site is going to be allocated to a developer with the right to use the state-owned land, the prospective development project, which may be built on this site, requires the approval of relevant departments according to the state regulation. In this case, the developer should submit the application for **permission note for location** to the town and country planning authority before the procedure of department approval. However, it is not necessary for other kinds of development projects to acquire the permission note for location.<sup>1</sup>

If a development site is going to be allocated to a developer with the right to use the state-owned land, and the site is located in the planning territories of cities and towns, the developer should submit the application for **land use permit** to the town and country planning authority of the city or county. The developer can only acquire the land from the land use administrative department with a valid land use permit.<sup>2</sup>

If the right to use a state-owned site is going to be sold to a developer, and the site is located in the planning territories of cities and towns, before the transaction, the town and country planning authority of the city or county should propose the **planning conditions** of this site on the basis of the relevant **regulatory plan**, including the location, type and degree of building and land use etc., as an integral part of the contract. No site is allowed to be sold without planning conditions. In this case, the developer can only acquire **the land use permit** from the town and country planning authority of the city or county with a valid contract.<sup>3</sup>

In the planning territories of cities and towns, regarding the development of buildings, structures, roads, pipelines and other construction projects, developers or individuals should submit the application for **building permit** to the town and country planning authorities of cities or counties, or the entitled town governments determined by the governments of provinces, autonomous regions and municipalities directly under the Central Government. The application for building permit must include relevant proof documents of land use, architectural plans, and a site plan if necessary. The building permit can be issued if the building application complies with the designations in the relevant **regulatory plan** and the

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<sup>1</sup> Standing Committee of the Tenth National People's Congress: *Town and Country Planning Act of the P. R. China*, 2007, §36

<sup>2</sup> *Ibid.*, §37

<sup>3</sup> *Ibid.*, §38

**planning conditions.**<sup>1</sup> The building permit enables the developer to start the building behavior.

## 2.4 Summary

This Chapter outlines the background for the dissertation.

Firstly, this chapter has given a general introduction to the planning systems in China and Germany. On this basis, regarding the German B-planning as well as the Chinese regulatory planning, the role, content, preparation, and implementation of each planning type have been stated respectively.

In the overall structure, the study has also highlighted the simplified procedure, accelerated procedure, environmental reporting, and public participation in the German B-plan preparation, as well as the evolution of Chinese regulatory plan and the new procedures of preparation and modification of the regulatory plan.

The content of this chapter has established the initial comparability for the Sino-German comparative research by offering the basic information of urban detailed planning in China and Germany.

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<sup>1</sup> Standing Committee of the Tenth National People's Congress: *Town and Country Planning Act of the P. R. China*, 2007, §40

# **Chapter 3 GENERAL FRAMEWORK OF THE COMPARATIVE RESEARCH & COMPARISON OF PLANNING GOALS**

## **3.1 General Framework of the Comparative Research**

### **3.1.1 Basic Concepts of the Comparative Research Framework**

#### **3.1.1.1 Concept of Sustainable Development**

The concept of sustainable development was proposed in the 1980s. In 1987, the well-known report, “Our Common Future” of the World Commission on Environment and Development was adopted by the 42<sup>nd</sup> General Assembly of the United Nations. From then, the sustainable development has become a focus in the world. In 1992, the United Nations held a conference on environment and development in Rio de Janeiro, Brazil. The conference adopted the “Agenda of 21<sup>st</sup> Century,” which showed the global consensus on the development and the environment protection. The “Agenda of 21<sup>st</sup> Century” was also the highest level of political commitment that promoted the international cooperation for the implementation of sustainable development strategies.

The meaning of sustainable development is the “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”<sup>1</sup> The sustainable development strategy aims to promote the harmony among human beings, as well as the harmony between human beings and nature. Its core idea is that the healthy economic development should be based on ecological sustainability, social justice, and people's active participation in decision-making. There are three principles of sustainable development:<sup>2</sup>

1. First, there is the principle of equality. It includes the generational equality, the intergenerational equality, as well as the equality of resource allocation and utilization.
2. Second, there is the principle of sustainability. It is required that the economic and social development can not exceed the carrying capacity of the environment.

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<sup>1</sup> World Commission on Environment and Development: *Our Common Future*, 1987

<sup>2</sup> Dong, Xianjun: *The Ecological Cities*, the Social Science Press of China, 2002, p. 97

3. Third, there is the principle of intercommunity. It holds that the sustainable development needs the common action of the world.

### 3.1.1.2 Key Themes of Sustainable Development Suggested by UNCSD

The United Nations Commission on Sustainable Development (UNCSD) presented the key themes of sustainable development, which summarized the primary issues. The framework of key themes of sustainable development comprises the social, economic, environmental, and institutional sub-themes, which form the main sectors of sustainable development. It is shown in the table below:<sup>1</sup>

Tab. 3-1: Key Themes Suggested by CSD Testing Country Priorities

Social	Environmental
Education	Freshwater/groundwater
Employment	Agriculture/secure food supply
Health/water supply/sanitation	Urban
Housing	Coastal Zone
Welfare and quality of life	Marine environment/coral reef protection
Cultural heritage	Fisheries
Poverty/Income distribution	Biodiversity/biotechnology
Crime	Sustainable forest management
Population	Air pollution and ozone depletion
Social and ethical values	Global climate change/sea level rise
Role of women	Sustainable use of natural resources
Access to land and resources	Sustainable tourism
Community structure	Restricted carrying capacity
Equity/social exclusion	Land use change
Economic	Institutional
Economic dependency/Indebtedness/ODA	Integrated decision-making
Energy	Capacity building
Consumption and production patterns	Science and technology
Waste management	Public awareness and information
Transportation	International conventions and cooperation
Mining	Governance/role of civic society
Economic structure and development	Institutional and legislative frameworks
Trade	Disaster preparedness
Productivity	Public participation

### 3.1.1.3 Objective of the 11<sup>th</sup> Five-Year Plan of China

The 11<sup>th</sup> Five-Year Plan of China (from 2006 to 2010) is the general guide of national development. It is the extension of the previous national plans of China.

The 11<sup>th</sup> Five-Year Plan of China pointed out that, “the arable land, freshwater, energy as well as important mineral resources are relatively insufficient in China. The ecological environment is relatively fragile and the economic structure is irrational. Moreover, it is still a

<sup>1</sup> Commission on Sustainable Development, UN: *Indicators of Sustainable Development: Guidelines and Methodologies*, Sep. 2001, [www.un.org/esa/sustdev/publications/indisd-mg2001.pdf](http://www.un.org/esa/sustdev/publications/indisd-mg2001.pdf)

tough task to solve the rural problems. There are also pressures on employment and independent innovation. The institutional mechanisms are still not healthy.” “In the period of the 10<sup>th</sup> Five-Year Plan, the rapid development has caused some obvious problems, for instance, the excessive energy and resource consumption, accelerating environmental pollution, irrational widening of regional development gaps, as well as underdevelopment of social affairs.”<sup>1</sup>

The core objective of the 11<sup>th</sup> Five-Year Plan of China is to turn the non-sustainable economic development into a sustainable economic development, building a resource-saving, environmentally friendly society. Moreover, another important task of the 11<sup>th</sup> Five-Year Plan of China is to build a new socialist countryside, which can enjoy the advantage of the modern physical environment and public services, including education, employment, and public health.

### 3.1.2 General Framework of the Comparative Research

The purpose of the comparative research is to study the differences in spatial control for urban detailed planning in China and Germany. This spatial control in urban detailed planning works as an important tool to achieve the objectives of sustainable development in urban areas. In order to illustrate the degree of spatial control in urban planning, the dissertation proposes a new definition which is **the spatial control capability**. The spatial control capability is designed to describe the capability of achieving the objectives of sustainable development. It works as the core concept of the comparative study.

According to the key themes of sustainable development suggested by the United Nations Commission on Sustainable Development (UNCSD), as well as the objective of the 11<sup>th</sup> Five-Year Plan of China, the General Framework of the Comparative Research is constructed from four aspects, which are the economic, social, environmental, and institutional fields.

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<sup>1</sup> <http://www.chinanews.com.cn/news/2006/2006-03-16/8/704065.shtml>

Tab.3-2: General Framework of the Comparative Research

<i>Major Areas</i>	<i>Themes</i>	<i>Sub-themes</i>
Economic	Economic structure and development	Healthy system of central places Healthy industrial structure
	Land use	Intensive use of land resources Preservation and sustainable use of arable land (Farmland) Sustainable forest management
	Transportation	Dynamic Traffic Static traffic
	Municipal utilities	Land supply Control of pipelines
	Employment	Type and density of building and land use
Social	Land use equality	Generational equality Intergenerational equality
	Housing	
	Public facilities	
	Urban image and locality	
	Heritages	
Environmental	Air pollution	Climate change Ozone depletion Air quality
	Noise	
	Soil	Wastes Soil contamination Soil degradation
	Water	Water quality Water quantity
	Biodiversity	Ecological system Species
	Energies and minerals	Sustainable use of energy Efficient use of minerals
	Landscape and tourism	Areas with natural and ecological values Areas with cultural values
	Institutional and legislative frameworks	
Institutional	Scientific decision-making	
	Public participation	Institutional framework of public participation Scope of public participation Public access to information
	Plan structure	



### **3.1.2.1 Economic Themes**

#### 1. Economic structure and development

With regard to each planning type, this theme is intended to clarify the spatial control capability of establishing a healthy system of central places as well as a healthy industrial structure. The national planning, regional planning, and urban master planning may establish the economic structure. In the stage of urban detailed planning, the objectives of higher planning levels can be implemented through the spatial organization in relatively small territories.

#### 2. Land use

A sustainable land use normally includes three main aspects: intensive use of land resources, preservation and sustainable use of arable land, and sustainable forest management. With regard to the urban detailed planning, the sustainable land use means the intensive use of land resources.

#### 3. Transportation

The urban transportation works as the arterial system of a city. The traffic activities are closely related to the economic, social, and environmental sustainable development. The spatial control of urban detailed planning includes not only the dynamic traffic, but also the static traffic.

#### 4. Municipal utilities

The municipal utilities consist of the water supply and sewerage, power supply, gas supply, heating, and waste disposal. These facilities safeguard the daily life of residents and reflect the quality of living for people. In addition, the municipal utilities also play a direct role in pollution control. Therefore, they are closely linked to the environmental sustainable development. The spatial control of municipal utilities is implemented by the control of land supply and the control of pipelines.

#### 5. Employment

The goal for employment control is to create and maintain working positions and therefore

safeguard the social stability. Through the regulation on the type and degree of building and land use, the space control of urban detailed planning can adjust the capacity of working population in the planning area.

### **3.1.2.2 Social Themes**

#### 1. Land use equality

The control objective of land use equality is to ensure the equitable access to land resources.

#### 2. Housing

The control objective of housing is to meet the housing needs of residents, especially that of low-income groups or vulnerable groups.

#### 3. Public facilities

The supply of public facilities is to meet the residents' basic needs for living. It can safeguard the quality of living for people. The spatial control objective of planning is to coordinate the supply of public facilities with the building use.

#### 4. Urban image and locality

The urban image and locality differentiates an urban community from other places by preserving and maintaining the urban fabric, and inheriting the architectural and cultural traditions of the city.

#### 5. Heritages

The objective of the heritage control is to protect and preserve heritages themselves, and integrate them into the urban development from the perspective of the physical environment.

### **3.1.2.3 Environmental Themes**

#### 1. Air pollution

The theme of air pollution can be divided into three topics: the climate change, ozone depletion, and air quality. The climate change is mainly determined by the emission of greenhouse gases, such as CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O and CFC (chlorofluorocarbons). The ozone

depletion is mainly created by the major ozone depletion elements, such as CFC (chlorofluorocarbons). The air quality in urban areas is primarily deteriorated by the urban air emissions (SO<sub>x</sub>, NO<sub>x</sub>, VOC). Therefore, the general solution to the atmospheric problem is to control emissions of greenhouse gases and harmful gases, and promote the use of clean energies.

## 2. Noise

“The noise pollution is closely related to the urban industrial, economic, and traffic activities. “Noise” can be defined as unwanted sound. It is a source of irritation and can even damage the hearing if it is loud enough. The noise in the street, construction site noise, noise at work, and transport noise are four common types of noise. The noise pollution can be prevented by keeping the noise level to a minimum.”<sup>1</sup> It is also an important problem that should be considered and controlled in the urban detailed planning.

## 3. Soil

In order to secure sustainable development, the planning spatial control must regulate all kinds of wastes, preventing the soil from being contaminated. Meanwhile, the soil degradation should also be controlled to maintain the potential of soil as farmland.

## 4. Water

In order to secure sustainable development, the planning spatial control must regulate water resources both qualitatively and quantitatively. “Major water quality problems stem from sewage pollution, the intensive agricultural use of fertilizers and pesticides, industrial wastes, saltwater intrusion, and soil erosion.”<sup>2</sup> Therefore, regarding the water quality, the pollution of wastes must be controlled. On the other hand, regarding the water quantity, the quantity of drinking water, surface water, and underground water should be considered. In more than 600 cities in China, there are currently over 400 cities which have inadequate water supply, and approximately 110 cities are seriously short of water.<sup>3</sup> The water management will be one of the most important issues in Chinese town and country planning.

## 5. Biodiversity

In order to secure sustainable development, biodiversity must be carefully regulated. On one

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<sup>1</sup> <http://www.ace.mmu.ac.uk/esd/Environment/Noise.html>

<sup>2</sup> Commission on Sustainable Development, Ninth Session, UN: *Indicators of Sustainable Development: Framework and Methodologies*, April, 2001

<sup>3</sup> <http://news.sina.com.cn/c/2004-08-12/10243381084s.shtml>

hand, the integrity of ecological system should be safeguarded; on the other hand, the species should be protected so that the decrease of species ceases.

#### 6. Energies and minerals

In order to secure sustainable development, the planning control should strive to realize the sustainable use of energies and efficient use of minerals. Therefore, it is necessary to gradually reduce the dependence on the non-renewable energies and encourage the exploitation of the renewable energies.

#### 7. Landscape and tourism

In order to realize the sustainable use of landscape and tourist resources, it is necessary to control the areas which have landscape values. The control objects can either be areas with natural and ecological values or areas with cultural values.

### **3.1.2.4 Institutional Themes**

#### 1. Institutional and legislative frameworks

The institutional and legislative frameworks are the fundamental guarantees of planning spatial control to realize sustainable development. In order to achieve the objective of sustainable development through the planning control, the research needs to examine the spatial control goals as well as the legal status of each planning type. By analyzing the institutional and legislative frameworks, the operational possibilities of each planning type can be defined.

#### 2. Scientific decision-making

The scientific decision-making is the technical support of planning spatial control to realize sustainable development. The scientific decision-making means scientific and rational decision-making methods and procedures in the planning process.

#### 3. Public participation

The public participation is the social and democratic support of planning spatial control to realize sustainable development. The topic of public participation can be analyzed from three perspectives: the institutional framework of public participation, the scope of public participation, and the public access to information.

#### 4. Plan structure

As a result of the plan preparation, the plan structure shows whether the plan map and text accurately reflect the planning control intention.

### 3.1.3 Method of the Comparative Research

#### **3.1.3.1 Basic Concept of the Comparative Method**

According to the general framework of the comparative research, the basic concept of the study is to make the qualitative comparative analysis on the institutional themes first, and then evaluate the economic, social, and environmental spatial control capabilities of each detailed planning type.

The spatial control capability on each topic will be defined by the value of spatial control capability. The comparative study is intended to clarify the spatial control factors which work as the tools to achieve the objectives of sustainable development. For each spatial control factor, the value of spatial control capability will be defined by the coding method. Therefore, in accordance with these spatial control factors, it is possible to compare the spatial control capabilities of Chinese regulatory planning with those of German B-planning quantitatively. The distinguishing features of the regulatory planning and the B-planning will be analyzed in details. Thus, regarding the objectives of sustainable development, the innovative structure of Chinese regulatory planning will be developed on the basis of the successful German experiences. In order to verify its effectiveness, the new structure of Chinese regulatory planning will be evaluated by the coding evaluation again under the general framework of the comparative research.

#### **3.1.3.2 Steps of the Comparative Research**

The specific steps of the comparative research can be grouped as follows:

**First of all**, the study is intended to analyze the control systems of German B-planning and Chinese regulatory planning, then summarize the sets of spatial control factors in each planning type.

**Secondly**, based on the general framework of the comparative research, the study will make qualitative comparative analysis on institutional issues in order to clarify their impacts on the

implementation of sustainable development objectives.

**Thirdly**, the study will quantitatively define the spatial control capability of each control factor in the economic, social, and environmental topics through the coding method. Therefore, the spatial control capabilities of German B-planning and Chinese regulatory planning, which are the approaches to realize the sustainable development, can be quantitatively described and compared. The process of coding analysis can be specified as follows:

The dissertation defines spatial control capabilities as five levels.

The first level (1 pm) represents a spatial control factor which is able to **completely** achieve the specific planning control goal and is **also** a mandatory legally binding constraint;

The second level (0.75 pm) represents a spatial control factor which is able to **partially** achieve the specific planning control goal and is **also** a mandatory legally binding constraint;

The third level (0.5 pm) represents a spatial control factor which is able to **completely** achieve the specific planning control goal and is **not** a mandatory legally binding constraint;

The fourth level (0.25 pm) represents a spatial control factor which is able to **partially** achieve the specific planning control goal and is **not** a mandatory legally binding constraint;

The fifth level (0 pm) represents that there is **no** spatial control factor to achieve the specific planning control goal.

Consequently, the overall score of each theme or sub-theme can be summed up in accordance to various themes matrix. The approach of summary is to make the standardization of scores. The formula is:

$$\text{Standardized score} = \frac{\sum \text{Each theme or Sub - theme}}{\text{Theoretically maximum score}}$$

The theoretically maximum score of each sub-theme is determined by the planning type which has more powerful spatial control capability.

**Fourthly**, on the basis of qualitative and quantitative analysis results, the dissertation will discuss the existing problems in the Chinese regulatory planning.

**Finally**, according to the existing problems found in the comparative research, the dissertation will propose innovative proposals for improvement of the Chinese regulatory planning. The new regulatory planning concept will be verified by the coding evaluation again in order to identify whether it could achieve the objectives of sustainable development.

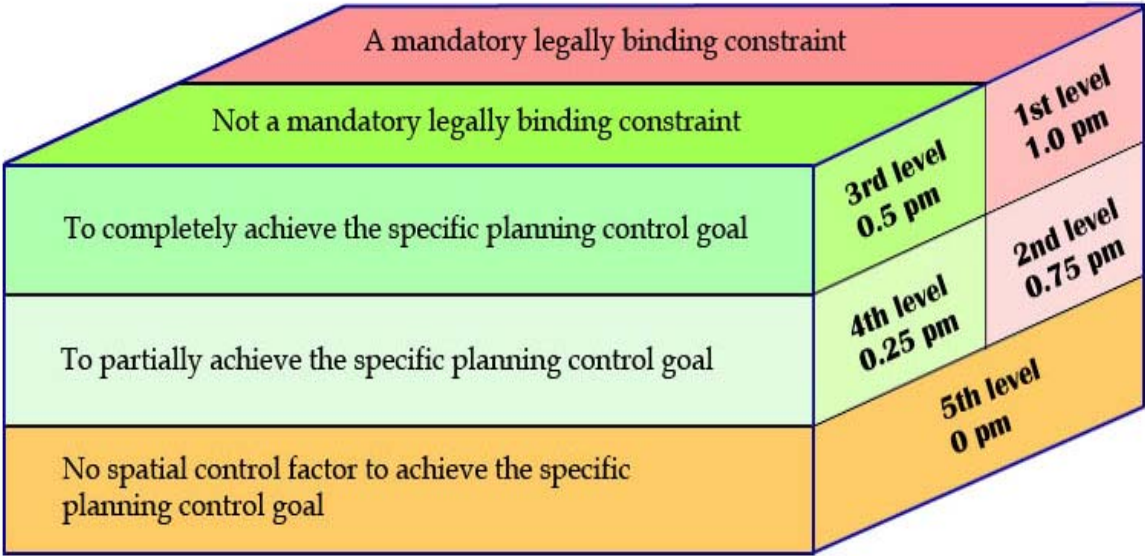


Fig. 3-1: Coding Heirarchy of the Comparative Research

## 3.2 Comparison of Spatial Control Goals of Urban Planning in China and Germany

### 3.2.1 Spatial Control Goals of German Urban Planning

The German land use plans (Bauleitpläne) should be brought into line with the aims of regional policy (Raumordnung).<sup>1</sup>

In general, the German land use plans (Bauleitpläne) should safeguard sustainable urban development, which brings the social, economic, and environmental requirements as well as the responsibility for future generations together in harmony, and a socially equitable utilization of land for the general good of the community. They should contribute to securing a more humane environment, to protecting and developing the basic conditions for natural life, to taking responsibility for the general climate protection (Klimaschutz), and to preserving and developing the urban morphology (städtebauliche Gestalt) and the scenery of locality and landscape (Orts- und Landschaftsbild).<sup>2</sup>

Based on the regulations in *The Federal Building Code (Baugesetzbuch)*, as well as the general framework of the comparative research, the spatial control goals of German B-planning can be categorized as follows:

#### 3.2.1.1 Economic Goal of German Urban Planning

In the preparation of urban land-use plans, attention is to be paid in particular to:<sup>3</sup>

1. The requirements of the economy, including maintaining the structural role of medium-sized companies, in the interests of local, close-to-the-consumer supply to the population, the requirements of agriculture and forestry, of the preservation, protection and creation of employment, of the postal and telecommunications services, of public utilities, particularly with energy and water;
2. The requirements of the passenger and freight transport and the mobility of the population, including the requirements of local public transport and non-motorized transport, with a particular emphasis on the prevention and reduction of transport-oriented urban development;
3. The preservation and development of key areas for public utilities (Versorgungsbereiche).

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<sup>1</sup> Bundesministerium für Verkehr, Bau und Stadtentwicklung: *Baugesetzbuch (BauGB)*, zuletzt geändert Dezember, 2006, §13

<sup>2</sup> *Ibid.*, §1, para. 5

<sup>3</sup> *Ibid.*, §1, para. 6, Nr. 8, 9, Nr. 4



### **3.2.1.2 Social Goal of German Urban Planning**

First of all, the social goal of the German urban land use planning (Bauleitplanung) is to safeguard a socially equitable utilization of land for the general good of the community.<sup>1</sup>

In the preparation of urban land use plans, attention is to be paid in particular to:<sup>2</sup>

1. The general requirement for living and working conditions which are conducive to good health, and the safety of the population at home and at work;
2. The housing requirements of the population, the creation and preservation of stable social structures for residents, increasing property ownership among broader sections of the population, particularly by supporting low-cost housing, and population development;
3. The social and cultural needs of the population, in particular those of families, the young and the elderly and those with handicaps, different effects on women and men, as well as regarding the requirements of the education system and the need for sports, leisure, and recreational facilities;
4. The preservation, renewal, development, adaptation, and the rebuilding of existing local centers (Ortsteile);
5. The requirements relating to the architectural culture, the preservation and maintenance of historic monuments and to local centers, streets and public spaces of historical, artistic or architectural importance which warrant preservation, and to the morphology of the scenery of locality and landscape (Orts- und Landschaftsbild);
6. The requirements of churches and religious organizations under public law for worship and pastoral care;
7. Defense and civil defense requirements, as well as the civilian use of military properties.

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<sup>1</sup> Bundesministerium für Verkehr, Bau und Stadtentwicklung: *Baugesetzbuch (BauGB)*, zuletzt geändert Dezember, 2006, §1, para. 5

<sup>2</sup> *Ibid.*, §1, para. 6, Nr. 1-Nr.6, Nr. 10

### 3.2.1.3 Environmental Goal of German Urban Planning

First of all, the environmental goal of the German urban land use planning (Bauleitplanung) is to protect and develop the basic conditions for natural life, to take responsibility for the general climate protection (Klimaschutz).<sup>1</sup>

In the preparation of urban land use plans, attention is to be paid in particular to the requirements of the environmental protection, including the protection of nature, and the preservation of the countryside (Landschaftspflege), in particular of:<sup>2</sup>

1. The effects on animals, plants, soil, water, air, climate and the effect structure among them as well as the landscape and the biodiversity;
2. The goal for preservation and protection of areas of joint importance and the European bird protection areas in the sense of *The Federal Nature Protection Act*;
3. Environmental effects on human beings, their health as well as the whole population;
4. Environmental effects on cultural properties and other special goods;
5. The avoidance of emissions as well as the adequate handling of wastes and wastewater;
6. The use of renewable energies as well as the economical and efficient use of energy;
7. The designations in landscape plans as well as in other plans, in particular, the provisions in the acts of water, waste and environmental protection;
8. The preservation of the optimum air quality in areas, in those by statutory order for the fulfillment of emission limit values, fixed by binding resolutions of the European communities not to be exceeded.

The environmental goal of the German urban land use planning (Bauleitplanung) also includes the requirements of the protection of natural resources<sup>3</sup> and the requirements of the flood control.<sup>4</sup>

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<sup>1</sup> Bundesministerium für Verkehr, Bau und Stadtentwicklung: *Baugesetzbuch (BauGB)*, zuletzt geändert Dezember, 2006, §1, para. 5

<sup>2</sup> *Ibid.*, §1, para. 6, Nr. 7

<sup>3</sup> *Ibid.*, §1, para. 6, Nr. 8

<sup>4</sup> *Ibid.*, §1, para. 6, Nr. 12

### 3.2.2 Spatial Control Goals of Chinese Urban Planning

The objectives of town and country planning are stipulated in *The Town and Country Planning Act of the P. R. China* as the following:

*The Town and Country Planning Act of the P. R. China* has been developed to optimize the town and country planning administration, coordinate the urban-rural spatial layout, improve the built environment and promote the sustainable development of both urban and rural areas.<sup>1</sup>

The preparation and implementation of town and country plans should pay attention to realize the urban-rural coordination, rational allocation of functional districts, intensive land use and compact development, as well as the authority of plans (developments must be controlled by plans). Town and country plans should contribute to improving the ecological environment and promoting the economical and efficient use of natural resources and energies, and to protecting arable land, other natural resources as well as historic and cultural heritages. It is also required to preserve local characteristics, national characteristics and traditional features, prevent pollution and other hazards, and meet the needs of regional population development, defense, disaster prevention and mitigation as well as public health and security.<sup>2</sup>

It is pointed out in *The Preparation Criteria of Urban Planning (2005)* that the urban planning objectives are:

The urban planning is one of the important public policies which can regulate the urban spatial resources, guide the urban and rural development, maintain the social justice, and protect the public security and public interest.”<sup>3</sup> “The preparation of urban planning should insist the urbanization with Chinese characteristics as well as the economical and efficient use of resources, and protect the ecological environment and cultural resources, promote the urban sustainable development.”<sup>4</sup> “The preparation of urban plans should pay attention to meet the needs of the people and improve living conditions of the population, especially that of the low-income people.”<sup>5</sup>

On the basis of the general framework of the comparative research, the specific spatial control goals of the Chinese regulatory planning can be categorized as follows:

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<sup>1</sup> Standing Committee of the Tenth National People's Congress: *Town and Country Planning Act of the P. R. China*, 2007, §1

<sup>2</sup> Ibid, §4

<sup>3</sup> Ministry of Construction of the P. R. China: *Preparation Criteria of Urban Planning*, 2005, §3

<sup>4</sup> Ibid, §4

<sup>5</sup> Ibid, §5

### **3.2.2.1 Economic Goal of Chinese Urban Planning**

In the preparation of town and country plans, attention is to be paid in particular:

1. To coordinate and balance the urban and rural development;
2. To rationally allocate functional districts;
3. To realize the intensive and compact development.

### **3.2.2.2 Social Goal of Chinese Urban Planning**

In the preparation of town and country plans, attention is to be paid in particular:

1. To maintain the social justice and protect the public interest;
2. To meet the needs of public health and security;
3. To meet the need of regional population development;
4. To meet the needs of the people and improve living conditions of the population, especially that of the low-income people;
5. To meet the needs of defense and disaster prevention and mitigation;
6. To preserve historic and cultural heritages;
7. To preserve local characteristics, national characteristics, and traditional features.

### **3.2.2.3 Environmental Goal of Chinese Urban Planning**

1. To protect the ecological environment;
2. To promote the economical and efficient use of natural resources and energies;
3. To protect arable land and other natural resources;
4. To prevent pollution and other hazards.

### 3.2.3 Comparison of Spatial Control Goals of Urban Planning in China and Germany

#### 3.2.3.1 Comparison of Economic Goals

After World War II, Germany adopted the social market economy, which is a macro-control economic system. It is conceptually similar but not completely identical to the socialist market economy that has been implemented in China since the Reform and Open period. Both systems are intended to avoid the absolute authority of the state as well as the absolute free trade.

According to the German economic system, the economical goal of German urban planning is to meet the needs for commodity exchange and population flow. On the other hand, although China is adopting the market economy system, the mechanism of Chinese urban planning is still a continuation of the administrative economy era. In practice, during the last 30 years of the Reform and Open period, China has experienced a rapid urbanization. Various cities have sprawled and expanded their territories. Consequently, the scope of farmland has become smaller and smaller, and the natural environment has degraded. In fact, the economic development has been the most important urban planning goal in China. However, this situation may be changed in the future. According to the provisions regulated in the new *Town and Country Planning Act*, theoretically, the Chinese planning should achieve the sustainable development in both urban and rural areas, and develop an ideal regional structure.

Under the general framework of the comparative research, it is clear that the economic goal of German planning explicitly includes the themes of economic structure, agriculture and forestry, transportation, infrastructure and public utilities, as well as employment. The economic goal of German planning perfectly corresponds with the standard goal for sustainable development.

The economic goal of Chinese planning may be considered to cover all economic themes of sustainable development. However, the definition of Chinese economic goal is only a description of principles, which is of great uncertainty and much simpler than the German economic goal. It has only a low correspondence with the standard economic themes for sustainable development.

Tab. 3-3: Comparison of the Economic Goals of Urban Planning in China and Germany

	<b>GERMANY</b>	<b>CHINA</b>
<b>Economic Goals</b>	<p>To create and maintain a healthy economic structure;</p> <p>To fulfill the requirements of agriculture and forestry;</p> <p>To fulfill the requirements of the passenger and freight transport, including local public transport and non-motorized transport;</p> <p>To fulfill the requirements of the postal and telecommunications services;</p> <p>To fulfill the requirements of public utilities, particularly with energy and water;</p> <p>To preserve and develop key areas for public utilities (Versorgungsbereiche);</p> <p>To preserve, protect, and create the employment.</p>	<p>To coordinate and balance the urban and rural development;</p> <p>To rationally allocate functional districts;</p> <p>To realize the intensive and compact development.</p>

### **3.2.3.2 Comparison of Social Goals**

The social goals of German and Chinese urban planning are generally identical. These social goals can be grouped as four parts: the social equality; the needs for public facilities and housing; the requirements of the defense and urban security; the preservation and maintenance of cultural heritages and urban characteristics.

With regard to the social equality, the social goal of each planning has a particular focus. The social goal of German planning focuses on the socially equitable utilization of land, while the social goal of Chinese planning pays attention to maintaining the social justice and protecting the public interest. However, the German goal, which ensures the public access to the land, is more explicit. The Chinese goal has only principles that lack clear directions.

Regarding the needs for public facilities and housing, the German and Chinese goals are in principle similar. But the German goal emphasizes the religious needs of the population.

Regarding the requirements of the defense and urban security, the German and Chinese goals are similar. But, the German goal emphasizes the civilian use of military properties, while the Chinese goal pays attention to disaster prevention and mitigation.

With regard to the preservation and maintenance of cultural heritages and urban characteristics, the German and Chinese goals are generally identical. However, the German goal is more specific.

Tab. 3-4: Comparison of the Social Goals of Urban Planning in China and Germany

		<b>GERMANY</b>	<b>CHINA</b>
<b>Social Goals</b>	Social Equality	To safeguard a socially equitable utilization of land;	To maintain the social justice and protect the public interest;
	Needs for Public Facilities and Housing	To fulfill the general requirement for healthy and safe living and working conditions; To fulfill the housing requirements of the population, to create and preserve stable social structures of residents, to support the development of the affordable housing as well as the population development; To meet the social and cultural needs of the population; To fulfill the requirements of churches and religious organizations under public law for worship and pastoral care;	To meet the needs of public health and security; To meet the need of regional population development; To meet the needs of the people and improve living conditions of the population, especially those of the low-income people;
	Requirements of the Defense and Urban Security	To fulfill the defense and civil defense requirements, as well as the civilian use of military properties;	To meet the needs of defense and disaster prevention and mitigation;
	Preservation and Maintenance of Cultural Heritages and Urban Characteristics	To fulfill the requirements of the preservation, renewal, development, adaptation and the rebuilding of existing local centers (Ortsteile) To fulfill the requirements relating to the architectural culture, the preservation and maintenance of historic monuments and to local centers, streets and public spaces of historical, artistic or architectural importance which warrant preservation, and to the morphology of the scenery of locality and landscape (Orts- und Landschaftsbild).	To preserve historic and cultural heritages; To preserve local characteristics, national characteristics, and traditional features.

Based on the general framework of the comparative research, the social goals of both German and Chinese urban planning include the social themes of land use equality, housing, supply of public facilities, urban image and locality, and cultural heritage. Both abundantly correspond to the standard goal for sustainable development.

### **3.2.3.2 Comparison of Environmental Goals**

The environmental goal of German urban planning, which covers nearly all aspects of environmental protection, is designed to realize the sustainable development. It emphasizes the protection and development of the basic conditions for natural life, responsibility for the general climate protection (Klimaschutz), and the preservation of the countryside (Landschaftspflege).

For a quite long time, there were few specific descriptions for environmental themes in the Chinese urban planning. However, in accordance with the provisions regulated in *The Town and Country Planning Act (2007)* and *The Preparation Criteria of Urban Planning (2005)*, the environmental goal of Chinese planning has been explicitly established for the first time.

Compared to the general framework of the comparative research, the environmental goal of German urban planning explicitly covers the themes of air pollution, noise, soil, water, biodiversity, energy and minerals, as well as landscape and tourism. It corresponds perfectly with the standard goal for sustainable development. The environmental goal of Chinese planning may be considered to theoretically include all environmental themes of sustainable development. However, it is not as specific as the German environmental goal.



Tab. 3-5: Comparison of the Environmental Goals of Urban Planning in China and Germany

	<b>GERMANY</b>	<b>CHINA</b>
<b>Environmental Goals</b>	<p>To consider effects on animals, plants, soil, water, air, climate and the effect structure among them, as well as the landscape and the biodiversity;</p> <p>To preserve and protect the ecologically sensitive areas of regional, national, or continental importance;</p> <p>To consider environmental effects on human beings, cultural properties, and other special goods;</p> <p>To avoid the emissions;</p> <p>To handle the wastewater and wastes adequately;</p> <p>To use renewable energies;</p> <p>To use energies economically and efficiently;</p> <p>To consider the designations in the landscape plans and other environment-related plans;</p> <p>To realize the provisions in landscape plans, other relevant plans, as well as the acts of water, waste and environmental protection;</p> <p>To preserve the optimum air quality, which should not exceed the European maximum values;</p> <p>To protect natural resources;</p> <p>To fulfill the requirements of the flood control.</p>	<p>To protect the ecological environment;</p> <p>To promote the economical and efficient use of natural resources and energies;</p> <p>To protect arable land and other natural resources;</p> <p>To prevent pollution and other hazards.</p>

### 3.3 Summary

The chapter has established the basic system of the Sino-German comparative study.

Sustainable development is the fundamental principle for existence and development for human beings. Based on the concept of sustainable development, referring to the key themes of sustainable development suggested by the UNCSD, as well as the objective of the 11<sup>th</sup> Five-Year Plan of China, this chapter has developed the general framework of the comparative research.

According to this general framework, the study has designed the comparative research and established the coding system.

At the very beginning of the comparative research, spatial control goals of urban detailed planning in China and Germany have been qualitatively analyzed. The results show that:

The spatial control goals of German urban planning perfectly define the related issues in the urban planning control. The EU legal framework, which guides the German legal system of spatial planning, has a strong impact on the spatial control goals of German planning.

From the economic point of view, the economic goal of German planning corresponds perfectly with the standard goal for sustainable development, while the economic goal of Chinese planning is a description of principles, which may be considered to include all economic themes of sustainable development. However, it is too simple to cover all economic topics.

From the social point of view, the social goals of German and Chinese urban planning are generally identical. Both can be grouped as four parts: the social equality; the needs for public facilities and housing; the requirements of the defense and urban security; the protection and maintenance of cultural heritages and urban characteristics.

From the environmental point of view, the environmental goal of German urban planning explicitly covers all environmental themes. It corresponds perfectly with the standard goal for sustainable development. Although the environmental goal of Chinese planning may be considered to theoretically include all environmental themes of sustainable development, it is still short of details.

# **Chapter 4 THEORETICAL COMPARATIVE RESEARCH ON URBAN DETAILED PLANNING IN CHINA AND GERMANY**

## **4.1 Spatial Control of German B-planning**

### **4.1.1 Components of the B-plan**

A German B-plan consists of a map, the text, and the document of substantiation (Begründung). The map and the text of a B-plan are organized together to form a unique legal document, while the document of substantiation is a separate file. The B-plan map and text constitute the statutory plan which is a legally binding local statute.

The text of a B-plan includes explanations of mapping designations and other supplementary provisions. In principle, the text of a B-plan must include stipulations based on *The Federal Building Code (Baugesetzbuch, BauGB)*, stipulations based on *The Land Utilization Ordinance (Baunutzungsverordnung, BauNVO)*, stipulations based on *The Federal State Building Ordinance (Landesbauordnung, LBO)*, as well as the hint.

The mapping of a B-plan should be in accordance with the legends regulated in *The Planning Symbols Ordinance (Planzeichenverordnung, PlanZV)*. The B-plan map shows the spatial control goals.

The document of substantiation (Begründung) is the comprehensive explanation of the planning project, which normally includes the following: the basis of the B-plan preparation; valid acts and other plans; principles of planning; morphology plan (Gestaltungsplan)<sup>1</sup>; transportation; social interests and infrastructure; supply and garbage disposal; environmental interests and the environmental impact assessment (Umweltverträglichkeitsprüfung); land purchase and cost; land use balance.

Pursuant to the stipulations in the relevant statutes, the scale of a B-plan should be 1: 500 or 1: 1000. The planning area covers a clearly delineated section of the municipal territory.

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<sup>1</sup> The morphology plan (Gestaltungsplan) means the design of the outside of buildings.

## 4.1.2 Control Approaches of the B-planning

The control approaches of German B-planning are the combination of qualitative, quantitative, and positioning control methods. With regard to different control targets, the B-planning allows one to adopt different control approaches to achieve the objective of planning. The control approaches of B-planning can be categorized as three main types: the textual provisions, the mapping designations, and the guidance.

### 4.1.2.1 Textual Provisions

By using the standardized language of law, the textual provisions of a B-plan are used to describe the requirements for control measures. The textual provisions allow one to control the building behaviors both qualitatively and quantitatively.

### 4.1.2.2 Mapping Designations

By using the standardized planning symbols (legends), the mapping designations of a B-plan are used to illustrate the requirements for control measures. The mapping designations are applied to realize the qualitative, quantitative, and positioning control.

### 4.1.2.3 Guidance

The hint of a B-plan states the guiding content which is the instruction for how to coordinate with other legal regulations in relevant acts and ordinances. It can be considered as guidance. The implementation of a B-plan may not encounter the situations mentioned in the hint. However, should it happen, the statements in the hint must be carefully considered and implemented.

## 4.1.3 Analysis of the B-planning Control System

### 4.1.3.1 General Analysis of B-planning Control System

The so-called **building window** (Baufenster) is not a formal planning word. It is, however, the core concept of the B-planning spatial control.

The plot area, where the building window is located, is the control target of land use type in the B-planning. The building window is a polygon which is enclosed by the **building restriction line** (Baugrenze) or the **building line** (Baulinie), or both of them. Building windows form **plot areas which may be built on** (die überbaubaren Grundstücksflächen). In many cases, stipulations of a B-plan may take the building window as a reference.

Outside the scope of the building window is the area of public interest, which includes traffic areas, public facilities, green spaces, etc. The spatial control stipulations on this area in the B-plan must be strictly implemented. That is to say, the location and scale of roads, squares, pipelines, and trees on the plan cannot be arbitrarily changed, and must be strictly implemented in accordance with the plan.

The qualified B-plan includes three important aspects which are the type and degree of building and land use (Art und das Maß der baulichen Nutzung), plot areas which may be built on (die überbaubaren Grundstücksflächen), and designation of public thoroughfares (die örtlichen Verkehrsflächen). The public thoroughfares, which construct the spatial framework of the planning area, comprise the use, scope, and location of each traffic area. The type and degree of building and land use, which establishes the spatial pattern, can control the use, volume, and location of each building. Each of these three aspects contains a variety of control factors. Those control factors are doubtless the core control elements of the B-planning.

Based on the analysis of *The Federal Building Code (Baugesetzbuch, BauGB)*, *The Land Utilization Ordinance (Baunutzungsverordnung, BauNVO)*, as well as *The Planning Symbols Ordinance (Planzeichenverordnung, PlanZV)*, the dissertation study develops the B-planning control system which consists of six groups of control factors:

The spatial control factors of building use; the land use control factors of infrastructures; the land use control factors of public needs; the land use control factors of ecological and environmental protection; the land use control factors of historic heritages; the spatial control factors of architectural purposes. The detailed structure of the B-planning control system is shown in tab. 4-1:

Tab. 4-1: Control System of German B-planning

<b>Spatial Control Factors of Building Use</b>	Type of building and land use	Control of the land use area
		Control of the land use boundary
		Control of the type of building and land use
		Control of the land use compatibility
	Degree of building and land use	Plot ratio (GFZ)
		Cubic density (BMZ)
		Site occupancy index (GRZ)
		Number of floors
		Building height
	Plot areas which may be built on	Building line
		Building restriction line
		Distance between building (restriction) line and street

Tab. 4-1: Control System of German B-planning (Part II)

<b>Land Use Control Factors of Infrastructures</b>	Traffic areas and traffic areas for specific purposes	Boundary control of road areas
		Street boundary line
		Boundary control of pedestrian zones
		Boundary control of parking spaces for motor vehicles
		Boundary control of parking spaces for bicycles
		Control of entrances and exits
	Spaces for secondary structures	Control of types of secondary structures
		Control of boundaries of secondary structures
		Control of types of parking spaces and/or garages
		Control of boundaries of parking spaces and/or garages
		Control of entrances of parking spaces and/or garages
	Spaces for embankments, diggings, and retaining walls	Boundary control of spaces for embankments, diggings and retaining walls, which are required for road construction
	Spaces for municipal utilities	Boundary control of spaces for power supply, water supply, heating, waste disposal, and sewerage
Spaces for municipal pipelines	Control of types and locations of ground/underground pipelines	
Spaces to be encumbered with walking and driving rights and rights of passage in favor of the general public, as well as the provision of public infrastructure	Control of types and boundaries of spaces to be encumbered with walking and driving rights and rights of passage in favor of the general public, as well as the provision of public infrastructure	
<b>Land Use Control Factors of Public Needs</b>	Spaces for public facilities	Boundary control of spaces for administrative areas
		Boundary control of spaces for schools
		Boundary control of spaces for churches, as well as the buildings and installations which serve religious purposes
		Boundary control of spaces for the buildings and installations, which serve social purposes
		Boundary control of spaces for the buildings and installations, which serve sanitary and medical purposes
		Boundary control of spaces for the buildings and installations, which serve the social purposes
		Boundary control of spaces for the buildings and installations, which serve sports purposes
		Boundary control of spaces for post offices
		Boundary control of spaces for air defense installations
		Boundary control of spaces for firehouses

Tab. 4-1: Control System of German B-planning (Part III)

<b>Land Use Control Factors of Ecological and Environmental Protection</b>	Public and private green spaces	Control of types and boundaries of green spaces, such as parks, allotment gardens, sports grounds and playgrounds, camping sites and bathing areas, and cemeteries
	Spaces for water bodies	Control of types and boundaries of water bodies , and spaces for water supply and distribution, flood control as well as control of drainage
	Spaces for agricultural land and woodland	Control of types and boundaries of spaces for agricultural land and woodland
	Spaces for the construction of structures for keeping small domestic animals and for exhibiting and breeding, kennels, paddocks, etc.	Control method (see spaces for secondary structures)
	Spaces for the protection, conservation and development of the natural environment and the landscape	Control of types and boundaries of spaces for the protection, conservation and development of the natural environment and the landscape
		Obligations relating to planting and to the preservation of trees, shrubs and greenery of any kind and of water bodies
	Spaces for other measures of protection	Control of types and boundaries
Spaces for earth deposits, excavation and for quarrying of stone, earth and other minerals	Control of types and boundaries of spaces for earth deposits, excavation and for quarrying of stone, earth and other minerals	
<b>Land Use Control Factors of Historic Heritages</b>	Preservation of Heritages	Preservation zone
		Preservation of building groups
		Preservation of individual buildings
<b>Spatial Control Factors of Architectural Purposes</b>	Coverage type (Bauweise)	Open development (offene Bauweise)
		Closed development (geschlossene Bauweise)
		Other development (abweichende Bauweise)
	Roof form	Roof form/roof angle (Dachform/Dachneigung)
		Direction of the ridge (Firstrichtung)
	Other details	Distance space (Abstandsfläche)
Other regulations on the architectural morphology		
		Control of miscellaneous building installations

### 4.1.3.2 Spatial Control factors of Building Use

#### 1. Type of building and land use

Pursuant to *The Land Utilization Ordinance (Baunutzungsverordnung, BauNVO)*, the B-planning can define the land use type of the plot area, where the building window is located.

The B-planning has various possibilities to define types of building and land use. It is able to define the generally permissible types of building and land use on a plot, as well as the exceptional cases which may be permitted. It is also possible to define a specific type of building and land use on a certain part of the plot, and/or make specific restrictive provisions on a certain part of the plot. With regard to existing buildings, the B-planning can develop regulations on the requirements for enlarging, renewing, and changing the use of these facilities. In this case, both generally permissible and exceptionally permissible approaches can be adopted.

*The Land Utilization Ordinance (Baunutzungsverordnung, BauNVO)* defines types of building and land use as a two-level hierarchy system with **the construction sites (Bauflächen)** as the upper level and **the building sites (Baugebiete)** as the lower level. The construction sites (Bauflächen) are general land use types which include the **land for housing construction (Wohnbaufläche, W)**, the **land for mixed development (gemischte Baufläche, M)**, the **trade zone land (gewerbliche Baufläche, G)**, and the **special building area (Sonderbaufläche, S)**. The building sites (Baugebiete) are the subdivisions of the construction sites. The B-planning is required to use the building sites.

The land for housing construction (W) is subdivided into the **homestead area (Kleinsiedlungsgebiet, WS)**, the **purely residential area (reines Wohngebiet, WR)**, the **general residential area (allgemeines Wohngebiet, WA)**, and the **special residential area (besonderes Wohngebiet, WB)**. The land for mixed development (M) is subdivided into the **village area (Dorfgebiet, MD)**, the **mixed area (Mischgebiet, MI)**, and the **core area (Kerngebiet, MK)**. The trade zone land (G) is subdivided into the **commercial area (Gewerbegebiet, GE)** and the **industrial area (Industriegebiet, GI)**. The special building area (S) includes the recreational area and other special areas. However, those land use types are all defined as the **special area (Sondergebiet, SO)**.<sup>1</sup>

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<sup>1</sup> *Baunutzungsverordnung (BauNVO)*, 1993 (BGBl. I S.466), §1.



The definitions for the building sites (Baugebiete) are briefly summarized as follows:<sup>1</sup>

The homestead area (WS) is the area devoted to smallholdings, including residential buildings with gardens and agricultural plots.

The purely residential area (WR) is the area for residential buildings only.

The general residential area (WA) is the area predominantly for residential buildings.

The special residential area (WB) is a land use type designed for urban renewal. Besides residential buildings, it is intended to preserve and develop other existing buildings and land use types which are compatible with the residential use.

The village area (MD) is the area for villages, including spaces for agricultural activities, rural dwellings, and non-disturbing commercial facilities.

The mixed area (MI) is the area designated for mixed-use development.

The core area (MK) is the area mainly for commercial purposes, but may also include administrative offices and cultural structures.

The commercial area (GE) is the area mainly for non-disturbing light industrial facilities.

The industrial area (GI) is the main area for industrial purposes, which are inadmissible in other land-use types, and without commercial activities.

The special area (SO) is the area specifically for weekend cottages, holiday villas, and camping sites. Other special areas refer to spaces for hot spring resorts, shopping centers, shopping malls, large commercial facilities, fairs, exhibition and congress centers, institutions, hospitals, and docks, etc.

*The Land Utilization Ordinance (Baunutzungsverordnung, BauNVO)* stipulates that each specific land use type has a land use compatibility. The land use compatibility is implemented by the three kinds of land use permissions, which are the generally permissible building, the exceptionally permissible building, as well as the exceptionally permissible building on the basis of special urban development reasons.

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<sup>1</sup> *Baunutzungsverordnung (BauNVO)*, 1993 (BGBl. I S.466), §§2-10.

Tab 4-2: Land Use Compatibility of German B-planning

(Source: *The Land Utilization Ordinance (Baunutzungsverordnung, BauNVO, 1990)*)

Land Use Type	Generally Permissible Types of Building and Land Use	Exceptional Cases Which may be Permitted
Homestead Area (WS)	Smallholdings; Small shops, bars and restaurants; Non-disturbing crafts enterprises	Other residential buildings with no more than two dwellings; Structures which serve church, cultural, social, sanitary, medical, and sports purposes; Gas stations; Non-disturbing commercial facilities
Purely Residential Area (WR)	Residential buildings	Shops which may meet the need for daily life, non-disturbing crafts enterprises, as well as small hotels; Structures which serve social purposes, as well as the needs of the inhabitants; Structures which serve church, cultural, sanitary, medical, and sports purposes
General Residential Area (WA)	Residential buildings; Small shops, bars and restaurants; Non-disturbing crafts enterprises; Structures which serve church, cultural, social, sanitary, medical, and sports purposes;	Hotels; Other non-disturbing commercial facilities; Administrative structures; Horticultural facilities; Gas stations
Special Residential Area (WB)	Residential buildings; Shops, hotels, bars and restaurants; Other commercial facilities; Business and office buildings Structures which serve church, cultural, social, sanitary, medical, and sports purposes	Central administrative structures; Entertainment facilities, as long as they are not generally permissible in the core area because of their purposes or scales; Gas stations. <b>Exceptionally permissible cases on the basis of special urban development reasons:</b> Certain building floors are only permitted to be used as residential spaces, or; A certain part of the permissible floor area in the buildings, or a certain size of the floor area should be used as residential spaces
Village Area (MD)	Facilities of agriculture and forestry, as well as relevant dwellings; Small dwellings; Other residential buildings; Facilities of agricultural and forestry production and collection; Retail shops, hotels, bars and restaurants; Other commercial facilities; Structures which serve local administrative, church, cultural, social, sanitary, medical, and sports purposes; Horticultural facilities; Gas stations	Entertainment facilities, as long as they are not generally permissible in the core area because of their purposes or scales

Tab 4-2: Land Use Compatibility of German B-planning (Part II)

Land Use Type	Generally Permissible Types of Building and Land Use	Exceptional Cases Which may be Permitted
Mixed Area (MI)	Residential buildings; Business and office buildings Retail shops, hotels, bars and restaurants; Other commercial facilities; Structures which serve administrative, church, cultural, social, sanitary, medical, and sports purposes; Horticultural facilities; Gas stations	Entertainment facilities, as long as they are not generally permissible in the core area because of their purposes or scales
Core Area (MK)	Business, office and administration buildings; Retail shops, hotels, bars, restaurants, and entertainment facilities; Other commercial facilities without substantial disturbances; Structures which serve church, cultural, social, sanitary, medical, and sports purposes; Gas stations in connection with multi-storey parking buildings and large garages; Dwellings for supervision and duty personnel, as well as for business owners and managers; Other dwellings in accordance with the regulations in the B-plan	Other gas stations; Other dwellings <b>Exceptionally permissible cases on the basis of special urban development reasons:</b> Certain building floors are only permitted to be used as residential spaces, or; A certain part of the permissible floor area in the buildings or a certain size of the floor area should be used as residential spaces
Commercial Area (GE)	All kinds of commercial facilities, warehouses, depots, and public enterprises; Business, office, and administration buildings; Gas stations; Structures which serve sports purpose	Dwellings for supervision and duty personnel, as well as for business owners and managers, which subordinate to the commercial and industrial buildings; Structures which serve church, cultural, social, sanitary, and medical purposes; Entertainment facilities
Industrial Area (GI)	Commercial facilities, warehouses, depots, and public enterprises which are not permissible in other land use type; Gas stations	Dwellings for supervision and duty personnel, as well as for business owners and managers, which subordinate to the commercial and industrial buildings; Structures which serve church, cultural, social, sanitary, and medical purposes
Special Area (SO)	Areas of weekend cottages; Areas of holiday villas; Camping sites; Tourism areas; Shopping areas; Spaces for shopping centers and shopping malls; Spaces for fairs, exhibition and congress centers; Spaces for universities, hospitals, and docks; Spaces for research and development plants; Spaces for use of renewable energies, such as wind and solar power.	

## 2. Degree of building and land use

In order to control the degree of building and land use, a B-plan normally allows one to stipulate the site occupancy index (GRZ). Moreover, the plot ratio (GFZ), the cubic density (BMZ), and the building height are also core stipulations, which can be used to regulate the degree of building and land use.<sup>1</sup>

With regard to the plot ratio (GFZ), number of floors, and building height, the B-plan allows one to stipulate their maximum limits, minimum limits, or specific compulsory values. In the B-plan, stipulations of the degree of building and land use can be defined for an individual part of a plot and for an individual part of a building. The B-plan stipulations can be valid not only above, but also underneath the development plot.<sup>2</sup>

### a. Site occupancy index (Grundflächenzahl, GRZ)<sup>3</sup>

The site occupancy index indicates what portion of the plot area is permissible for building development. The calculation formula is:

Site occupancy index = (Permissible building footprint area)/(Total plot area)

When calculating the permissible building footprint area, areas of garages and parking spaces and their accesses, secondary structures, as well as the pure building understructures, should be taken into account. If the areas of garages and parking spaces and their accesses are calculated into the total building footprint area, the maximum limit of site occupancy index may be exceeded, and the permitted GRZ can be 0.8 or slightly more than 0.8.

### b. Plot ratio (Geschoßflächenzahl, GFZ)<sup>4</sup>

The plot ratio indicates the square meter of floor area that is permissible per square meter of plot area. The calculation formula is:

Plot ratio = (Permissible floor area)/(Total plot area)

The floor area is determined by the external complete floors of the building. The B-plan

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<sup>1</sup> *Baunutzungsverordnung (BauNVO)*, 1993 (BGBl. I S.466), §16, para. 2

<sup>2</sup> *Ibid.*, §16, para. 4 & 5

<sup>3</sup> *Ibid.*, §19

<sup>4</sup> *Ibid.*, §20

allows one to stipulate that the areas of lounges, including belonging stair spaces and their enclosure walls, are taken into account totally or partly, or not taken into account as exceptional cases.

Secondary structures, balconies, loggias, terraces, as well as structural installations within the scope of distance spaces allowed in the federal state ordinances, may not be taken into account when calculating the permissible floor area.

c. Cubic density (Baumassenzahl, BMZ)<sup>1</sup>

The cubic density indicates the cubic meter of building volume that is permissible per square meter of plot area. The calculation formula is:

$$\text{Cubic density} = \frac{\text{Permissible building cubage}}{\text{Total plot area}}$$

The cubic density is designed to control the development of commercial and industrial buildings. The building cubage is calculated from the ground of the lowest complete floor to the ceiling of the highest complete floor. Secondary structures, balconies, loggias, terraces, as well as structural installations within the scope of distance spaces allowed in the federal state ordinances, may not be taken into account when calculating the permissible floor area.

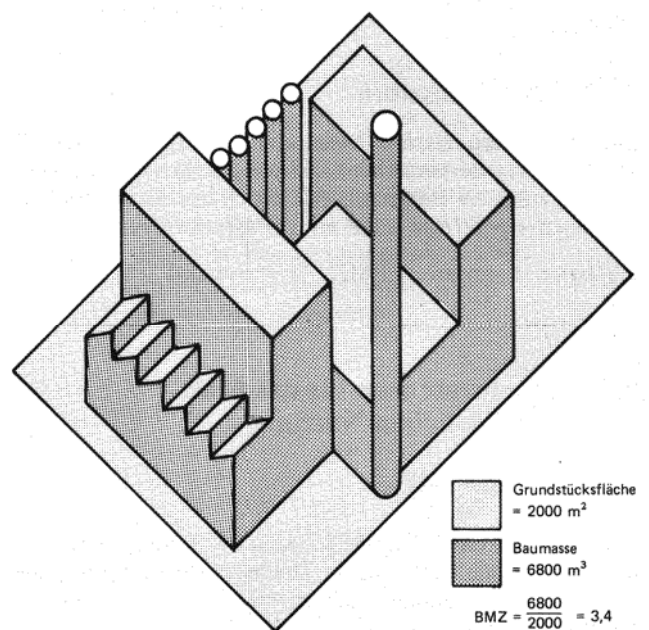


Fig. 4-1: Illustration of Cubic Density  
(Source: Harald Heinz, *Planungsrecht und Baugestalt*, 1985)

If there is no regulation on the building height or the cubic density, if a building height is more than 3.5 m, the cubic density (BMZ) of this building must not exceed 3½ of its permissible plot ratio (GFZ).

d. Number of floors (Z)

The number of floors is defined and judged in accordance to the relevant regulations of the federal states.

<sup>1</sup> *Baunutzungsverordnung (BauNVO)*, 1993 (BGBl. I S.466), §21

## e. Building height<sup>1</sup>

The B-plan allows one to define the building height based on the fiducial point or fiducial level. In practice, either a fixed value or a flexible scope may be stipulated.

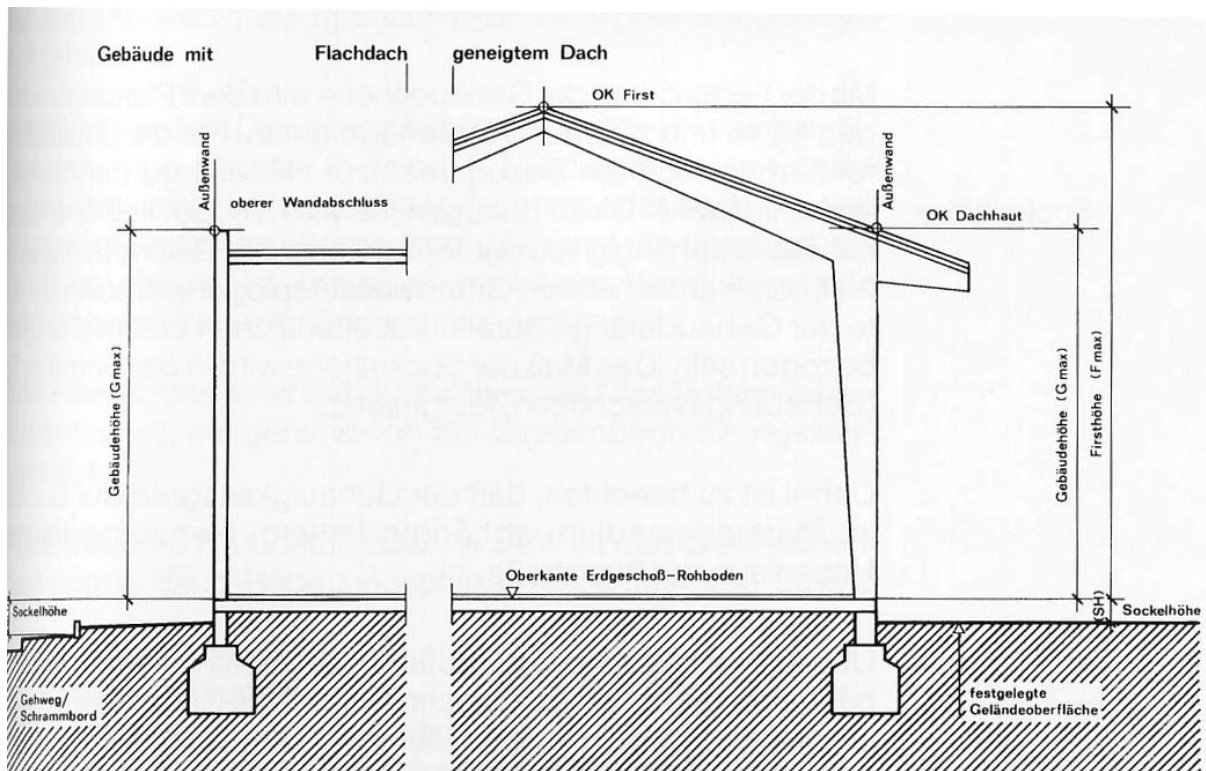


Fig. 4-2: Building Height Control in the B-plan  
(Source: Ekkehard Hangarter, *Bauleitplanung*, 1999)

*The Land Utilization Ordinance (Baunutzungsverordnung, BauNVO)* offers the upper limits of the degree of building and land use, which include the maximum limits of the site occupancy index (GRZ), plot ratio (GFZ), and cubic density (BMZ). See Tab. 4-3. However, on the basis of special urban development reasons, if the healthy living condition and the employer-employee relationship are not impaired, the negative impacts on the environment are avoided, the traffic need are met, and if other public interests are intact, then the B-plan stipulations on the degree of building and land use may exceed the upper limits regulated in the BauNVO.<sup>2</sup>

<sup>1</sup> *Baunutzungsverordnung (BauNVO)*, 1993 (BGBl. I S.466), §18

<sup>2</sup> *Ibid*, §17

Tab. 4-3: Upper Limits of the Degree of Building and Land Use in the German B-plan  
(Source: *The Land Utilization Ordinance (Baunutzungsverordnung, BauNVO, 1990)*)

Land Use Type	Site Occupancy Index (GRZ)	Plot Ratio (GFZ)	Cubic Density (BMZ)
Homestead Area (WS)	0.2	0.4	—
Purely Residential Area (WR)	0.4	1.2	—
General Residential Area (WA)			
Special Residential Area (WB)	0.6	1.6	—
Village Area (MD)	0.6	1.2	—
Mixed Area (MI)			
Core Area (MK)	1.0	3.0	—
Commercial Area (GE)	0.8	2.4	10.0
Industrial Area (GI)			
Other Special Area (SO)			
Weekend Villa Area (SO)	0.2	0.2	—

### 3. Plot areas which may be built on<sup>1</sup>

Plot areas which may be built on (überbaubaren Grundstücksflächen) are building windows that are enclosed by the building restriction line (Baugrenze) and/or the building line (Baulinie), or both of them. Although both building restriction lines and building lines can form the boundary of a building window, they are of great difference.

When a building line is stipulated, the building development must take place along this line. It may be permissible that building parts slightly exceed the building line. The B-plan allows one to stipulate further exceptional cases.

Once the building restriction line is defined, the buildings and building parts may not exceed this boundary. It may be permissible that building parts slightly exceed the building restriction line.

<sup>1</sup> *Baunutzungsverordnung (BauNVO)*, 1993 (BGBl. I S.466), §23

The B-plan can also define the distance between building (restriction) line and street. If there is no special regulation in the B-plan, the distance between building (restriction) line and street should be defined from actual street boundary lines.

#### **4.1.3.3 Spatial Control Factors of Infrastructures**

##### **1. Traffic areas and traffic areas for specific purposes**

The spatial control of traffic areas and traffic areas for specific purposes in the B-plan is a precise spatial governance, which designates types, boundaries, and even details of all kinds of traffic areas.

The B-plan allows one to use the street boundary line to define the land use scopes of traffic areas and traffic areas for specific purposes. The traffic areas for specific purposes, such as public parking spaces, pedestrian zones, and static traffic zones, will be markedly illustrated. Moreover, by regulating permissible or prohibitive entrance and exit zones, the B-plan also allows one to control entrances and exits.

##### **2. Spaces for secondary structures**

The secondary structures refer to structures which are necessary to the building and land use on the plot, and are located on the plot, albeit outside the building window. These facilities should not contradict the land use features of certain plot. The B-plan allows one to stipulate types and boundaries of secondary structures, types and boundaries of parking spaces and/or garages, as well as entrances of parking spaces and/or garages. The secondary structures may include structures for keeping small domestic animals, and for exhibiting and breeding, kennels, paddocks, etc. The B-plan also allows one to regulate that the construction of certain secondary structure is permitted, restricted, or prohibited.<sup>1</sup>

##### **3. Spaces for embankments, diggings, and retaining walls**

The B-plan allows one to designate the spaces for embankments, diggings, and retaining walls, which are required for road construction.

##### **4. Spaces for municipal utilities**

The B-plan allows one to designate the spaces for power supply, water supply, heating, waste disposal, and sewerage, etc. As long as there is no designation for municipal utilities in the

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<sup>1</sup> *Baunutzungsverordnung (BauNVO)*, 1993 (BGBl. I S.466), §14.



B-plan, as evident in exceptional cases, it is permissible to build municipal utilities for power supply, gas supply, heating, water supply, sewage, and disposal on the plot. In this case, the construction of structures for communication works and renewable energy may also be permitted.<sup>1</sup>

## **5. Spaces for municipal pipelines**

The B-plan allows one to control types and locations of ground/underground pipelines through mapping designations.

## **6. Spaces to be encumbered with walking and driving rights and rights of passage in favor of the general public, as well as the provision of public infrastructure**

In order to protect the public's access rights and the supply of pipelines, the B-plan allows one to designate the corresponding types and boundaries on the plot. These areas do not belong to traffic areas. Rather, they are actually traffic spaces with private ownerships, which must be unconditionally open to the public.

### **4.1.3.4 Spatial Control Factors of Public Needs**

In order to locate the structures which provide goods and services for the public and the private sector, the B-plan allows one to designate types and boundaries of spaces for public need. Those structures include administrative authorities, schools, churches, social, medical, cultural service facilities, sports facilities, post offices, air defense installations, and firehouses.

### **4.1.3.5 Spatial Control Factors of Ecological and Environmental Protection**

#### **1. Public and private green spaces**

The B-plan allows one to designate types and boundaries of green spaces, such as parks, allotment gardens, sports grounds and playgrounds, camping sites and bathing areas, and cemeteries.

#### **2. Spaces for water bodies**

The B-plan allows one to control water areas, such as ports, as well as boundaries of water

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<sup>1</sup> *Baunutzungsverordnung (BauNVO)*, 1993 (BGBl. I S.466), §14

management, hydropower management, and flood protection areas, such as flood control storage basins or flood areas. The B-plan also allows one to designate land use boundaries for the areas stipulated in *The Water Management Act*, such as the groundwater protection area, protection area of springs, and the surface water protection area.

### **3. Spaces for agricultural land and woodland**

The B-plan allows one to designate types and boundaries of spaces for agricultural land and woodland.

### **4. Spaces for the construction of structures for keeping small domestic animals, and for exhibiting and breeding, kennels, paddocks, etc.**

The B-plan allows one to stipulate types and boundaries of the establishments for keeping small domestic animals, and for exhibiting and breeding, kennels, paddocks, etc. See the “control of secondary structures.”

### **5. Spaces for the protection, conservation, and development of the natural environment and landscape**

The B-plan allows one to designate boundaries of spaces for protection, maintenance, and development of the natural environment and landscape, and stipulate the relevant control measures.

The B-plan allows one to regulate obligations relating to planting and to the preservation of trees, shrubs, greenery of any kind, and of water bodies. The planting and/or preservation obligations can be applied to certain part of the plot, and/or to trees, shrubs, and other plants.

Moreover, according to *The Federal Nature Protection Act (Bundesnaturschutzgesetz)*, the B-plan also allows one to define protection areas and objectives, such as nature reserves, nature parks, national parks, natural heritages, landscape protection areas, and landscape components.

### **6. Spaces for other measures of protection<sup>1</sup>**

In accordance with *The Federal Environmental Protection Act (Bundes-Immissionsschutzgesetz)*, in order to avoid the harmful impacts on the environment,

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<sup>1</sup> Bundesministerium für Verkehr, Bau und Stadtentwicklung, *Baugesetzbuch (BauGB)*, zuletzt geändert Dezember, 2006, §9

spatial boundaries of protective measures may be designated.

The B-plan allows one to define areas in which, in order to provide protection against harmful measures affecting nature and landscape within the meaning of *The Federal Environmental Protection Act*, certain materials which give rise to air pollution may not be used, or used only within defined limits

The B-plan also allows one to regulate protected areas to be kept free from development with their uses, spaces for specific installations and measures to provide protection against harmful measures affecting nature and landscape within the meaning of *The Federal Environmental Protection Act*, and the provisions to be made, including building and other technical measures, to provide protection against such impact or to prevent or reduce such impact.

## **7. Spaces for earth deposits, excavation, and for quarrying of stone, earth and other minerals**

The B-plan allows one to designate boundaries of spaces for earth deposits, excavation, and for quarrying of stone, earth and other minerals.

### **4.1.3.6 Spatial Control Factors of Heritages**

The B-plan allows one to designate boundaries of preservation zones, as well as control boundaries of overall building groups with historic values (preservation of building groups). Moreover, the B-plan allows one to define individual buildings with historic values (preservation of individual buildings).

### **4.1.3.7 Spatial Control Factors of Architectural Purposes**

#### **1. Coverage type (Bauweise)<sup>1</sup>**

The coverage types in the B-plan can be divided into the **open development (offene Bauweise)**, the **closed development (geschlossene Bauweise)**, and the **other development (abweichende Bauweise)**.

The open development (offene Bauweise) means that there are spatial intervals among buildings, such as independent houses (Einzelhäuser), semi-independent houses (Doppelhäuser), or house groups (Hausgruppen).

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<sup>1</sup> *Baunutzungsverordnung (BauNVO)*, 1993 (BGBl. I S.466), §22

The closed development (geschlossene Bauweise) means that there are no spatial intervals among buildings, while the other development (abweichende Bauweise) means that the construction pattern deviates from the open development (offene Bauweise) and the closed development (geschlossene Bauweise).

If the open development (offene Bauweise) is regulated in a B-plan, the developer must develop buildings with spatial intervals, which must not be more than 50 meters long. The B-plan also allows one to stipulate that only detached houses (Einzelhäuser), semidetached houses (Doppelhäuser), house groups (Hausgruppen), or only two from the three types may be permitted to be built on the plot.

If the closed development (geschlossene Bauweise) is regulated in a B-plan, the developer must develop buildings without spatial intervals.

Tab. 4-4: Illustration of the Coverage Types in the German B-planning  
(Source: Werner Braam: *Stadtplanung*, 1999)

	Open Development (offene Bauweise)	Closed Development (geschlossene Bauweise)	Other Development (abweichende Bauweise)
Detached Houses			
Semi-detached Houses			
House Groups			

## 2. Roof form

Based on *The Federal State Building Ordinance (Landesbauordnung)*, for instance, *The Federal State Building Ordinance of Baden-Württemberg (LBOBW)*, the B-plan allows one to control the external morphology of the building. It is intended to implement the architectural regulations of each federal state and connect urban design requirements with the following architectural designs.

The roof form/roof angle (Dachform/Dachneigung) is one of the most important elements to realize the idea of architectural morphology. The B-plan allows one to define various symbols of roof forms, such as the gable roof (SD), or the flat roof (FD). If it is necessary, the B-plan also allows one to stipulate permissible angles of specific roof types.

The direction of the ridge (Firstrichtung) is another tool of roof control. The B-plan allows one to designate the ridge direction in the map.



Fig. 4-3: Roof Form “Stuttgart”

(Source: Landeshauptstadt Stuttgart Amt für Stadtplanung und Stadterneuerung:  
*Denkmalschutz und Denkmalpflege*, 2000)

### 3. Other details

The distance space is an important spatial control factor on the basis of *The Federal State Building Ordinance*. It should be carefully considered in the process of B-planning. In the B-planning, the distance space refers to the distance from the building external wall, which must be kept free from development.

In accordance with *The Federal State Building Ordinance (Landesbauordnung)*, for instance, *The Federal State Building Ordinance of Baden-Württemberg (LBOBW)*, the B-plan allows one to stipulate other regulations on the architectural morphology, such as colors and facade materials of buildings. Moreover, the B-plan also allows one to stipulate building requirements for miscellaneous building installations, such as advertising installations, automats, fences, and garbage collection installations.

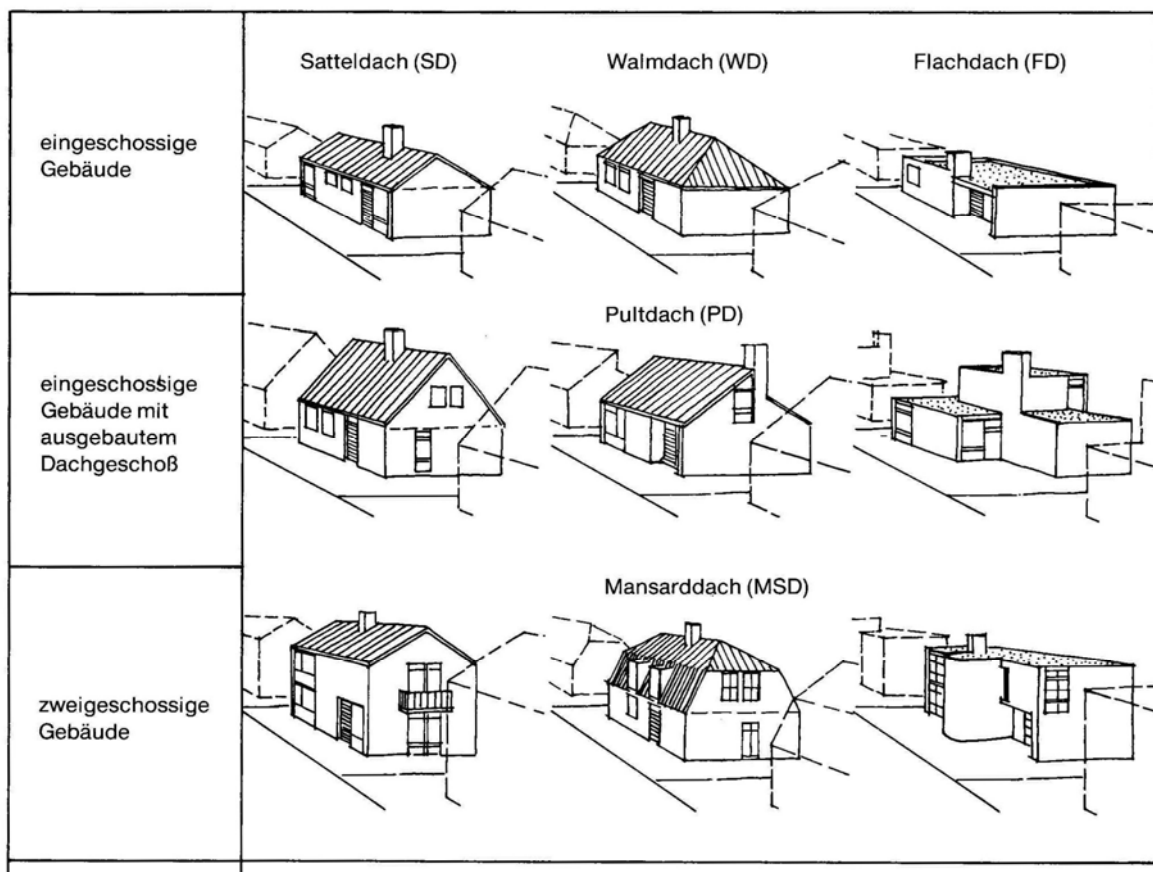


Fig. 4-4: Popular Roof Forms in Germany  
(Source: Dieter Prinz: *Städtebau Band 2*, 1992)

## 4.2 Spatial Control of Chinese Regulatory Planning

### 4.2.1 Components of the Regulatory Plan

The spatial control of the regulatory planning is the integration of various specific special control measures which may guide and regulate the urban development according to the planning goal. The mechanism of regulatory planning is essentially a zoning mechanism. It is necessary for the regulatory planning to divide the planning area into various zones and define the land use type of each zone first, then stipulate spatial control requirements for each zone. Therefore, the regulatory planning emphasizes the **control indicator system** which contains many kinds of control indicators. These control indicators constitute the technical system of the regulatory planning, and they are realized by the control approaches.

A regulatory plan consists of two parts, which are the **plan maps** and the **plan documents**. The plan documents include the **plan text** and the **plan accessory**.

In principle, firstly, the regulatory plan text describes the basis and principles of planning, as well as the planning authorities. Secondly, it precisely stipulates the requirements for land use and urban planning management, zoning, land use type of each zone, planning control measures, design elements, as well as control indicators of each zone. There is a control indicator table in the regulatory plan text which lists the limits of the control indicators.

The plan accessory includes the **plan instructions** and **data compilation**.

The plan maps include the **general zoning maps** and the **plot control maps**. The general zoning maps show the division of the planning area and regulate the general requirements for the overall control. The general zoning maps include a group of different maps, which are the site location map, the map of current land use, the map of planning land use, the zoning plan, the transportation plan, the topographic plan, the network plans of various municipal utilities, as well as other analysis maps.

A plot control map concentrates on a certain part of the general zoning map. The detailed building development can be regulated by plot control maps.

## 4.2.2 Control Approaches of the Regulatory Planning

With regard to different land use types, different projects and different development processes, the regulatory planning can adopt flexible control measures which include the quantitative indicators, textual provisions, mapping designations, and urban design guideline.<sup>1</sup>

### 4.2.2.1 Quantitative Indicators

The quantitative indicators, such as the plot ratio, building density, building height, and greening rate are used to implement the quantitative control of plot development. The regulatory planning should define values of these indicators which may become the control limits of the development. This approach is applied to the spatial control of the plot development based on the zoning control.

### 4.2.2.2 Textual Provisions

By describing control factors and their implementation rules, the textual provisions of a regulatory plan are used to designate the requirements for development of the planning area, such as land use types, and land use compatibilities. The textual provisions are applied to control building behaviors both qualitatively and quantitatively.

### 4.2.2.3 Mapping Designations

The mapping designations are used to define building boundaries of zones or facilities with different kinds of control points or control lines, such as the land use boundary, set-back depth, plot control coordinates, and other specific control lines.

The specific control lines are so-called “professional planning lines,” which include boundary lines of roads in red, boundary lines of urban green spaces in green, boundary lines of rivers and lakes in blue, boundary lines of high tension corridors in purple, and boundary lines of microwave channels in orange.

The mapping designations are applied to realize the positioning control of planning objects.

### 4.2.2.4 Urban Design Guideline

Through stipulating a series of requirements for urban design as well as illustrating specific

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<sup>1</sup> Jiansu Institute of Urban Planning & Design (as the chief editor): *Urban Planning Database (Vol. 4): the Regulatory Planning*, China Architecture & Building Press, Beijing, 2002, 1st edition, pp. 18-19



physical design ideas, the urban design guideline of the regulatory plan offers a design framework of development possibilities, such as building colors, building forms, building volumes, and the spatial organization of buildings. This approach is suitable for the control of important urban scenic quarters and historic parts, or the preservation of an urban built environment and urban characteristics.

### 4.2.3 Analysis of the Regulatory Planning Control System

#### 4.2.3.1 General Analysis of Regulatory Planning Control System<sup>1</sup>

The control system of regulatory planning can be grouped into four parts: the land use, the building construction, the facilities, as well as the activities. The control system forms the technical core of the regulatory planning.

**The land use** theme includes two topics, which are the land use control and the environmental capacity control. The land use control regulates the type, location, scale, and boundary of each zone. The content of land use control consists of the type, area, compatibility of land use, as well as zone boundary. In order to acquire the high urban environmental quality, the environmental capacity control is introduced to regulate the construction scale and the population agglomeration. The content of environmental capacity control includes the control of plot ratio, building density, residential density, greening rate, and open space ratio.

**The building construction** theme includes two topics, which are the building construction control and the urban design guideline. The building construction control, which regulates the building height, the set-back depth, and the building interval, is responsible for the arrangement of building layout and organization from a technical point of view. The urban design guideline, which presents architectural requirements and recommendations for plot development, may instruct the arrangement of building layout and organization from an aesthetic and artistic perspective. The content of the urban design guideline includes the control of building volume, building color, building form, spatial organization of buildings, and miscellaneous building installations, etc.

**The facilities** theme covers the control of municipal utilities and public facilities, which ensure the normal operation of the city. The control of public facilities regulates building requirements for necessary cultural, institutional, sports, medical, commercial, and other kinds of service facilities. On the other hand, the control of municipal facilities designates the

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<sup>1</sup> Jiansu Institute of Urban Planning & Design (as the chief editor): *Urban Planning Database (Vol. 4): the Regulatory Planning*, China Architecture & Building Press, Beijing, 2002, 1st edition, pp. 17-18

building of all necessary infrastructures, such as water supply utilities, sewerage utilities, power supply utilities, and transportation utilities. The control of facilities should be based on the national and local norms or standards.

Referring to the interactive relationship between the planning area and the external environment, **the activities** theme is designed to control traffic activities and environmental issues. The control of traffic activities focuses on the traffic organization and traffic entrances and exits. On the other hand, the regulations on environmental protection are intended to control the pollution caused by the noise, vibration, water pollutant, waste gas, solid waste etc. It is possible to regulate permissible maximum values of those pollutants in the regulatory plan so as to limit their impacts on the environment.

Tab. 4-5: Control System of Chinese Regulatory Planning  
 (Source: Jiansu Institute of Urban Planning & Design (as the chief editor): *Urban Planning Database (Vol. 4): the Regulatory Planning*, 2002)

<b>Land Use</b>	Control of Land Use	Land use area
		Land use boundary
		Land use type
		Land use compatibility
	Control of Environment Capacity	Plot ratio
		Building density
		Residential density
		Greening rate
<b>Building Construction</b>	Control of Building Construction	Open space ratio
		Building height
		Set-back depth
	Urban Design Guideline	Building interval
		Building volume
		Building color
		Building form
		Other requirements for built environment
		Spatial organization of buildings
		Miscellaneous building installations
<b>Facilities</b>	Municipal Utilities	Water supply utilities
		Sewerage utilities
		Power supply utilities
		Transportation utilities
		Others
	Public Facilities	Institutional facilities
		Medical facilities
		Commercial facilities
		Administrative facilities
		Cultural & sports facilities
		Secondary facilities
		Others

Tab. 4-5: Control System of Chinese Regulatory Planning (Part II)

<b>Activities</b>	Control of Traffic Activities	Traffic organization
		Control of entrances and exits
		Regulation on loading & discharging sites
	Regulations on Environmental Protection	Permissible maximum value of noise, vibration etc.
		Permissible maximum value of water pollutant emission
		Permissible maximum value of water pollutant concentration
		Permissible maximum value of waste gas emission
		Control of solid waste
		Others

### 4.2.3.2 Spatial Control Factors of Land Use

#### 1. Land use area and boundary

In the preparation process, the regulatory planning should first define the overall boundary of the planning area, and then divide the planning area into different zones (the zoning procedure). Secondly, with regard to each zone, the regulatory planning should also precisely define its boundary. The zone boundary separates the zone from the adjacent roads or other zones. Normally, it is a 3D boundary which is also valid in both ground and underground spaces.<sup>1</sup> Once a zone boundary is defined, its land use area can be confirmed. The plot ratio, building density, greening rate, and residential density are calculated based on the land use area of the zone.

The general principles of zoning include:<sup>2</sup>

- a. The zoning must be implemented according to the master plan and other sectoral plans which cover the planning area;
- b. One zone, one primary land use type;
- c. It is recommended that a zone should be adjacent to urban roads;
- d. The zoning should take natural borders and administrative borders into account;

<sup>1</sup> Xia, Nankai & Tian Baojiang: *Regulatory Planning*, Tongji University Press, Shanghai. 2005, 1st edition, p. 33

<sup>2</sup> Ibid.

- e. The zoning should consider the location premium differential;
- f. The zone size should be coordinated with the development of the planning area;
- g. The area, which has valuable historic heritages, should be preserved without specific control indicators;
- h. The zoning must fulfill the requirements of “professional planning lines”<sup>1</sup>;
- i. The zoning should respect current land use rights and ownerships;
- j. If there are vital changes of development approach and management, zones can be redefined in the plan implementation.

The zone size may be defined in two different ways. The zone size in the urban redevelopment area is recommended to be 0.5 – 3 ha, while the zone size in the new redevelopment area is recommended to be 3 – 5 ha.

In the regulatory planning, the zone area and boundary are generally controlled by mapping designations. In some cases, the zone area is also added to **the table of indicators** as a control indicator.

## **2. Land use type and land use compatibility (mandatory indicators)**

The Chinese land use types are officially grouped into three levels which are the **general land use types (10 types)**, the **subdivisions of general land use types (46 types)**, and the **specific land use types (73 types)**. In the preparation of the regulatory plan, the land use type of each zone should be defined as the specific land use type pursuant to the provision in *The Preparation Criteria of Urban Planning (2005)* and *The Implementation Details (1995)*.

In the current urban development, some anticipant land use types cannot be found in the Chinese national land use classification standard. Therefore, Chinese local municipalities are allowed to make supplementary provisions to define new land use types. Although those supplementary provisions are not a national standard, but merely planning techniques, the definitions of new land use types must be based on the national standard.

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<sup>1</sup> The “professional planning lines” see the explanation in 4.2.2.3

Tab. 4-6: Land Use Classification of Chinese Urban Planning

(Source: Ministry of Construction of the P. R. China: *Standard for Urban Land Use Classification (GBJ 137-90)*, 1990)

General Land Use Types	Subdivisions of General Land Use Types	Specific Land Use Types
Residential Land (R)	Residential Area I (Dwellings with the highest quality) (R1)	Dwelling area (R11)
		Public facility (R12)
		Road (R13)
		Green space (R14)
	Residential Area II (Dwellings with normal quality) (R2)	Dwelling area (R21)
		Public facility (R22)
		Road (R23)
		Green space (R24)
	Residential Area III (Dwellings with low quality) (R3)	Dwelling area (R31)
		Public facility (R32)
		Road (R33)
		Green space (R34)
	Residential Area IV (Dwellings with the lowest quality) (R4)	Dwelling area (R41)
		Public facility (R42)
		Road (R43)
		Green space (R44)
Public Facilities (C)	Administrative Area (C1)	Municipal administrative area (C11)
		Non-municipal administrative area (C12)
	Commercial & Financial Area (C2)	Commercial area (C21)
		Financial area (C22)
		Trading area (C23)
		Service area (C24)
		Hotel (C25)
		Market (C26)
	Cultural & Entertainment Area (C3)	Area for media or press (C31)
		Cultural area (C32)
		Broadcasting area (C33)
		Exhibition center (C34)
		Theater (C35)
		Entertainment area (C36)
	Sports Area (C4)	Stadium (C41)
		Training base (C42)

Tab. 4-6: Land Use Classification of Chinese Urban Planning (Part II)

General Land Use Types	Subdivisions of General Land Use Types	Specific Land Use Types
Public Facilities (C)	Medical Area (C5)	Hospital (C51)
		Quarantine site (C52)
		Sanatorium (C53)
	Institutional & Research Area (C6)	University & college (C61)
		Secondary school (C62)
		Amateur school (C63)
		Special school (C64)
Historic Heritage (C7)		
Other Public Facilities (C9)		
Industrial Land (M)	Industrial Area I (Industrial facilities nearly without interference and pollution) (M1)	
	Industrial Area II (Industrial facilities with interference and pollution) (M2)	
	Industrial Area III (Industrial facilities with serious interference and pollution) (M3)	
Warehouse Land (W)	Ordinary Warehouse (W1)	
	Warehouse for Dangerous Goods (W2)	
	Yard (W3)	
Intercity Transportation Land (T)	Railway Area (T1)	
	Highway Area (T2)	Expressway (T21)
		Long-distance highway (T22)
		Long-distance bus station (T23)
	Long-distance Pipeline (T3)	
	Port (T4)	Sea harbor (T41)
		River port (T42)
Air Port (T5)		

Tab. 4-6: Land Use Classification of Chinese Urban Planning (Part III)

General Land Use Types	Subdivisions of General Land Use Types	Specific Land Use Types
Roads and Squares (S)	Road (S1)	Arterial road (S11)
		Secondary trunk road (S12)
		Branch road (S13)
		Other roads (S19)
	Square (S2)	Traffic square (S21)
		Assembly square (S22)
	Public Parking Space & Garage (S3)	Public parking space & garage for motor vehicles (S31)
Public parking space & garage for non-motorized vehicles (S32)		
Municipal Utilities (U)	Supply Utility (U1)	Water supply utility (U11)
		Power supply utility (U12)
		Gas supply utility (U13)
		Heating utility (U14)
	Transportation Utility (U2)	Public transportation area (U21)
		Freight transportation area (U22)
		Other transportation utility (U29)
	Telecommunication Utility (U3)	
	Sanitation Utility (U4)	Sewerage & sewage treatment utility (U41)
		Garbage disposal utility (U42)
Construction & Maintenance Utility (U5)		
Funeral Utility (U6)		
Other Municipal Utility (U9)		
Green Space (G)	Public Green Space (G1)	Park (G11)
		Roadside green space (G12)
	Productive Plantation Area & Green Buffer (G2)	Productive plantation area (G21)
		Green buffer (G22)
Specially -designated Land (D)	Military Area (D1)	
	Foreign Affairs Area (D2)	
	Security Area (D3)	

Tab. 4-6: Land Use Classification of Chinese Urban Planning (Part IV)

General Land Use Types	Subdivisions of General Land Use Types	Specific Land Use Types
Waters and Miscellaneous (E)	Water Body (E1)	
	Farmland (E2)	Vegetable field (E21)
		Paddy (E22)
		Other farmland (E29)
	Garden (E3)	
	Forest (E4)	
	Pasture (E5)	
	Village (E6)	Village residential area (E61)
		Village commercial area (E62)
		Village road (E63)
		Other areas (E69)
Abandoned Area (E7)		
Open-pit Mine Site (E8)		

The land use type is normally controlled by textual provisions and mapping designations, while the land use compatibility is normally controlled by textual provisions.

### 3. Plot ratio (mandatory indicator)

The plot ratio indicates how much square meter of floor area is permissible per square meter of zone area. The calculation formula is:

$$\text{Plot ratio} = (\text{Permissible floor area}) / (\text{Total zone area})^1$$

The regulatory plan allows one to stipulate the limit or the value of fixed interval of the plot ratio. In principle, the plot ratio is determined by the comprehensive evaluation in accordance with the master plan, the land use type, the location of zone, the infrastructures, the population capacity, the built environment, as well as the urban design and urban morphology.<sup>2</sup>

<sup>1</sup> Ministry of Construction of the P. R. China: *Standard for Basic Terminology of Urban Planning*, China Architecture & Building Press, Beijing, 1999, p. 46

<sup>2</sup> Xia, Nankai & Tian Baojiang: *Regulatory Planning*, Tongji University Press, Shanghai, 2005, 1st edition, pp. 42 - 44



Based on American zoning practices, Chinese local municipalities are attempting to develop rules for the plot ratio bonus in the planning practice. It is regulated in the Chinese *Architectural Design Principles for Civil Buildings (JGJ37-87)* that “in the plot which has the plot ratio and the building density limits, if the developer unconditionally and eternally offers a certain portion of plot or a certain part of building (such as yards, terraces, corridors etc.) to the general public as spaces for public transportation and activities, the municipality may give the plot ratio and the building density bonus to the developer.”

The plot ratio is controlled by quantitative indicators.

#### **4. Building density (mandatory indicator)**

The building density indicates what portion of the zone area is permissible for building development. The calculation formula is:

$$\text{Building density} = (\text{Permissible building footprint area})/(\text{Total zone area})^1$$

In principle, the regulatory plan allows one to control the maximum limit of building density by quantitative indicators.

#### **5. Residential density**

In the Chinese urban planning land use administration, there are two definitions of population density. One is the “gross population density” which refers to the population density in the residential area. The other is the “net population density” which refers to the population density in the dwelling area of a residential area.<sup>2</sup> The residential density adopts the concept of gross population density.

The residential density indicates how many residents should live on per hectare of zone (number of residents per hectare). The regulatory plan allows one to control the maximum limit of residential density by quantitative indicators.

The residential density is primarily used in the settlement planning. In order to define the residential density, it is necessary to confirm the overall residential density in the planning area according to the master plan first, and then allocate the overall residential density to each zone.

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<sup>1</sup> Ministry of Construction of the P. R. China: *Standard for Basic Terminology of Urban Planning*, China Architecture & Building Press, Beijing, 1999, p. 46

<sup>2</sup> Ibid, p. 20

## **6. Greening rate (mandatory indicator)**

The greening rate is a basic indicator which can reflect the urban greening level. The calculation formula is:

$$\text{Greening rate} = (\text{Sum of green space areas})/(\text{Total zone area})^1$$

The green spaces here include public green spaces, gardens, and attached green spaces. Roof gardens are not included. If its area is less than 0.1% of the total green space area, areas of statues, pavilions, and ponds in public green spaces can be calculated as areas of green spaces.

The regulatory plan allows one to control the minimum limit of greening rate by quantitative indicators.

## **7. Open space ratio**

The open space ratio indicates the open space portion in the planning area. It may be controlled by quantitative indicators. The calculation formula is:

$$\text{Open space ratio} = (\text{Open space areas})/(\text{Total zone area})$$

### **4.2.3.3 Spatial Control Factors of Building Construction**

#### **1. Building height (mandatory indicator)**

The building height indicates the maximum building height that can be developed on the plot. The regulatory plan allows one to control the maximum limit of building height by quantitative indicators.

The building height is defined from a fiducial point. In practice, the stipulation of building height should be coordinated with both economic and social factors.

#### **2. Set-back depth**

The set-back depth indicates the building set-back distance from the “professional planning lines.” The regulatory plan allows one to control the minimum limit of set-back depth by textual provisions and mapping designations.

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<sup>1</sup> Ministry of Construction of the P. R. China: *Standard for Basic Terminology of Urban Planning*, China Architecture & Building Press, Beijing, 1999, p. 20

This control factor is designed to ensure necessary lighting and ventilation conditions, and meet the needs for fire safety, environmental protection, flood control, disaster prevention, and traffic safety.

### **3. Building interval**

The building interval is the horizontal distance between external walls of two buildings or structures. Normally, it is controlled by textual provisions.

In order to define the building interval, local conditions of the sunshine, ventilation, lighting, noise, interference prevention, fire resistance, greening, pipeline installation, building layout, as well as the intensive land use, should be comprehensively considered. In China, in most cases, building intervals are determined by the local insulation standard. The local insulation standard is prepared based on the climate and sanitary conditions. The Chinese *Standard for Urban Residential District Planning* (GB50180-93) explicitly stipulates the insulation standard of each region.<sup>1</sup>

### **4. Urban design guideline<sup>2</sup>**

The architectural control of an individual building normally includes the building volume, building color, architectural style, and advertising installations. Maximum control limits may be presented based on the anticipant vertical scale, horizontal scale, and physical volume of the building. The control of architectural style focuses on the control of architectural structure and roof form, while the control of building color covers the regulations on tone, brightness, and chroma. Moreover, the urban design guideline also allows one to control the location, form, and clearance of advertising installations.

The architectural control of a building group can be implemented by controlling the spatial organization of buildings. In practice, the spatial organization form, height-width proportion of streets, length-width proportion of open spaces, and architectural contour line are common approaches in the regulatory planning.

Besides the approaches above, the urban design guideline allows one to stipulate other requirements for a built environment, which should be based on planning requirements and local conditions.

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<sup>1</sup> Ministry of Construction of the P. R. China: *Standard for Basic Terminology of Urban Planning*, China Architecture & Building Press, Beijing, 1999, p. 47

<sup>2</sup> Jiansu Institute of Urban Planning & Design (as the chief editor): *Urban Planning Database (Vol. 4): the Regulatory Planning*, China Architecture & Building Press, Beijing, 2002, 1st edition, p. 18

The urban design guideline is a part of the regulatory plan text.

#### **4.2.3.4 Spatial Control Factors of Facilities<sup>1</sup>**

##### **1. Public facilities (mandatory indicators)**

The public facilities include commercial, administrative, cultural, institutional, sports, medical, and other service facilities. In the Chinese planning system, the public facilities can be grouped into two categories, which are the urban public facilities and the community public facilities.

The urban public facilities, which serve all the urban residents, are municipal administration offices, major medical facilities, and conventional facilities. They are stipulated in the master plan. The task of regulatory planning is to implement the relevant provisions in the planning area.

The community public facilities serve only the residents in a certain community. The regulatory planning allows one to stipulate the construction of necessary community public facilities in the planning area.

The public facilities are controlled by textual provisions and mapping designations.

##### **2. Transportation utilities (mandatory indicators)**

The regulatory plan allows one to regulate the location, boundary, capacity of parking spaces and garages by quantitative indicators and mapping designations.

With regard to public parking spaces and garages attached to the development project, the regulatory plan also allows one to regulate the location, boundary, capacity for the aforementioned with quantitative indicators and mapping designations.

The regulatory plan allows one to regulate boundary lines, sections, coordinates of control points of arterial roads, secondary trunk roads, and branch roads. Moreover, other transportation facilities, such as parking stations within boundary lines of roads, can also be controlled in the regulatory plan. Roads and parking stations are controlled by textual provisions and mapping designations.

##### **3. Municipal utilities (mandatory indicators)**

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<sup>1</sup> Xia, Nankai & Tian Baojiang: *Regulatory Planning*, Tongji University Press, Shanghai. 2005, 1st edition, pp. 71 - 75

Besides fulfilling the requirements of the master plan, the control of municipal utilities in the regulatory plan should also guide and control the site planning. In general, the control of municipal utilities in the regulatory plan can be divided into two parts, which are the control of municipal utility areas and the control of municipal pipelines.

In the zoning level, the control of municipal utility areas should stipulate certain land use as municipal utility types regulated in the **subdivisions of general land use types**. In the plot level, the control of municipal utility areas should stipulate certain land use as municipal utility types regulated in the **specific land use types**. In addition, it is necessary to regulate the location and volume of each municipal utility structure, as well as the capacity of attached parking spaces and garages.

With regard to the control of municipal pipelines, the regulatory plan allows one to designate the spatial location, diameter, section, manholes, as well as attached underground and ground structures of each pipeline.

Municipal utilities are controlled by textual provisions and mapping designations.

#### **4.2.3.5 Spatial Control Factors of Activities<sup>1</sup>**

##### **1. Traffic entrances and exits**

The control of traffic entrances and exits has several possibilities, which are locations of traffic entrances and exits, vehicle ban sections, and main flow positions.

In order to realize the efficient and safe transportation system, the vehicle ban section is introduced to define a part of the plot boundary which prohibits motor vehicles from entering the plot.

The main flow position is intended to designate the entrances and exits of the non-motorized traffic flow, which are used to establish a pedestrian zone.

There are also professional control lines that control traffic entrances and exits, such as the vehicle ban line and the motor vehicle orientation line, both of which illustrate the recommending plot entrances/exits.

Traffic entrances and exits are controlled by textual provisions and mapping designations.

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<sup>1</sup> Xia, Nankai & Tian Baojiang: *Regulatory Planning*, Tongji University Press, Shanghai. 2005, 1st edition, pp. 98 - 100

## 2. Capacity of parking spaces and/or garages

The capacity of parking spaces and/or garages is defined by how many vehicles (motor vehicles and non-motorize vehicles) can be parked in the zone. The regulatory plan allows one to control the minimum limit for capacity of parking spaces and/or garages by quantitative indicators.

## 3. Regulations on environmental protection

In accordance with the master plan and relevant environmental protection requirements regulated by the local environmental protection department, the regulatory plan allows one to stipulate the regulations on environmental protection, which include permissible maximum values of noise, vibration, water pollutant emission, water pollutant concentration, waste gas emission, as well as the control of solid waste.

Regulations on environmental protection are controlled by quantitative indicators.

Tab. 4-7: Analysis of Spatial Control Factors in the Chinese Regulatory Planning

	<b>Quantitative Indicators</b>	<b>Textual Provisions</b>	<b>Mapping Designations</b>	<b>Urban Design Guideline</b>
<b>Land Use</b>	<u>Plot ratio</u> <u>Building density</u> Residential density <u>Greening rate</u> Open space ratio	<u>Land use type</u>		
		<u>Land use compatibility</u>	Land use area Land use boundary	
<b>Building Construction</b>	<u>Building height</u>	Set-back depth		Building volume Building color Building form Other requirements for built environment Spatial organization of buildings Miscellaneous building installations
		Building interval		
<b>Facilities</b>		<u>Public Facilities</u>		
		<u>Municipal Utilities</u>		
<b>Activities</b>	Regulations on Environmental Protection	Control of Traffic Activities		

Note: the marked control factors represent the mandatory control indicators in the regulatory planning.

## 4.3 Theoretical Comparative Research on Spatial Control in Urban Detailed Planning in China and Germany

### 4.3.1 Comparison of Institutional Factors

#### 4.3.1.1 Legislation and Administration

##### 1. Comparisons of the legal status

In the German spatial planning system, from the spatial scale point of view, the state development plan (Landesentwicklungsplan) is equivalent to the Chinese provincial urban system plan, the German regional plan (Regionalplan) is equivalent to the Chinese urban system plan, the German land use plan (Flächennutzungsplan) is equivalent to the Chinese master plan, and the German B-plan (Bebauungsplan) is equivalent to the Chinese regulatory plan.

With respect to the urban planning system, specifically to the urban plans on the strategic level, both the German B-plan and the Chinese regulatory plan are statutory formal plans which are able to control and guide the urban development. Although the regulatory plan is not a local statute, its legally binding nature is the primary basis for building administration.<sup>1</sup>

However, the German B-plan differentiates from the Chinese regulatory plan in following aspects:

- a. There is no site plan level in the German statutory urban planning system. In the Chinese urban detailed planning system, there is a site plan that is controlled by the regulatory plan. However, Chinese municipalities of cities and towns may prepare site plans of important plots, but do not have to prepare them for every plot.
- b. In China, the regulatory plan must be prepared based on the urban master plan. On the other hand, although the German B-plan normally should be prepared based on the land use plan, in some cases, the preparation, modification, and amendment of the B-plan can be implemented simultaneously with or prior to the preparation, modification, and amendment of the land use plan. The reason is the German land use plan is a strategic development plan without legally binding effect, but the legally binding B-plan must be prepared to achieve the spatial control goals. However, theoretically, the Chinese master

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<sup>1</sup> It is regulated in *The Town and Country Planning Act of the P. R. China (2007)* that valid town and country plans must be followed by all public bodies and individuals.

plan is also a statutory formal plan, and the regulatory plan must be developed out of the master plan because the purpose of the upper-level plan must be implemented by the lower-level plans.

## **2. Comparison of the legal System**

The German B-plan has a solid legal basis. The spatial control of the German B-plan is strongly supported by the acts and ordinances of the federal level, the federal state level and the local level.

The Chinese legal system of urban planning is similar to the German model. It is formed by the state and local urban planning acts and ordinances, as well as the technical standards.

The technical standards of the regulatory plan are the technical standards and norms enacted by the state and local governments. They are organized to safeguard the quality of the professional urban planning work.<sup>1</sup> The preparation of town and country plans must follow these technical standards.<sup>2</sup> They work as the direct technical basis of the regulatory planning.

A obvious problem in the Chinese legal system of urban planning is that there is no mandatory maximum or minimum limits for the degree of building and land use in the relevant acts, ordinances or standards, such as mandatory maximum limits of building density and plot ratio. Moreover, there is also no statutory incentive regulations on the degree of building and land use existing in the Chinese legal system.

## **3. Comparison of the planning administration and supervision**

Both the German B-plan and the Chinese regulatory plan can be implemented by issuing building permits. The technical procedures of building application and permission are similar.

The regulatory plan may also control land use by issuing land use permits. However, regarding the administration of the land use permit, the regulatory plan can only control development projects with the right to use state-owned land sold to developers. For projects with the right to use state-owned land allocated to developers, the land use permission will be determined by case inspections.

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<sup>1</sup> (Chinese) National Administrative Board of Registered Urban Planners: *Urban Planning Theory*, China Planning Press, Beijing, 2003, 2<sup>nd</sup> edition

<sup>2</sup> Standing Committee of the Tenth National People's Congress: *Town and Country Planning Act of the P. R. China*, 2007, §24



Tab. 4-8: Comparison of the Urban Planning Legal System in China and Germany

	<b>GERMANY</b>	<b>CHINA</b>
<b>Basic Law of Urban Planning</b>	<i>The Federal Building Code (Baugesetzbuch)</i>	<i>The Town and Country Planning Act of the P. R. China (2007)</i>
<b>Technical Regulations</b>	<p><i>The Land Utilization Ordinance (Baunutzungsverordnung)</i></p> <p><i>The Planning Symbols Ordinance (Planzeichenverordnung)</i></p>	<p><i>The Preparation Criteria of Urban Planning</i></p> <p><i>The Standard for Drawing in Urban Planning (CJJ/T 97-2003)</i></p> <p><b>Other technical standards and norms, such as:</b></p> <p><i>The Standard for Urban Land Use Classification, Building and Land Use(GBJ 137-90)</i></p> <p><i>Code for Transport Planning on Urban Road (GB 50220-95)</i></p> <p><i>Code for Settlement Planning &amp; Design(version 2002)(GB 50180-93)</i></p> <p><i>Standard for Basic Terminology of Urban Planning(GB/T 50280-98)</i></p>
<b>Relevant Laws</b>	<p><b>Relevant federal acts:</b></p> <p><i>The Federal Nature Protection Act (Bundesnaturschutzgesetz)</i></p> <p><i>The Federal Environmental Protection Act (Bundesimmissionsschutzgesetz)</i></p> <p><i>The Water Management Act (WasserhaushaltsG (WHG))</i></p> <p><i>The Environmental Impact Assessment Act (Umweltverträglichkeitsprüfungsgesetz (UVPG) )</i></p> <p><i>The Regulation on the Recycling Energy (Gesetze über die erneuerbare Energie (EEG) vom 25.02.2000 )</i></p> <p><i>The Historic Preservation Act (Denkmalschutzgesetz (DSchG))</i></p> <p><i>The Maintenance and Modernization Act of Buildings with Cultural, Historic and Urban Planning Values (Gesetz zur Erhaltung und Modernisierung kulturhistorisch und städtebaulich wertvoller Gebäude vom 22.12.1977 )</i></p> <p><i>The Renewal Act of Dwellings and Energy-saving Heating Systems (Gesetz zur Förderung und Modernisierung von Wohnungen und von Maßnahmen zur Einsparung von Heizenergie vom 12.07.1978, BGBl. I S. 993)</i></p> <p><i>The Federal Highways Act (BundesfernstraßenG)</i></p> <p><i>The Approval Procedure Acceleration Act (Genehmigungsverfahrenbeschleunigungsgesetz)</i></p> <p><i>The Administrative Arbitration Ordinance ( Verwaltungsgerichtsordnung (VwGO) )</i></p> <p><i>The Administrative Procedure Act (Verwaltungsverfahrensgesetz (VwVfG)</i></p> <p><b>Relevant federal state regulations on the themes above</b></p>	<p><b>Relevant national acts:</b></p> <p><i>The Environmental Protection Act of the P. R. C.</i></p> <p><i>The Code for Nature Reserves of the P. R. C.</i></p> <p><i>The Water Act of the P. R. C.</i></p> <p><i>The Forest Act of the P. R. C.</i></p> <p><i>The Land Management Act of the P. R. C.</i></p> <p><i>The Building Act of the P. R. C.</i></p> <p><i>The Historic Heritage Protection Act of the P. R. C.</i></p> <p><i>The Highway Act of the P. R. C.</i></p> <p><i>The Administrative Sanction Act of the P. R. C.</i></p> <p><i>The Administrative Litigation Act of the P. R. C.</i></p> <p><b>Relevant provincial and local regulations on the themes above</b></p>
<b>Building Regulations</b>	<i>The Federal State Building Ordinance(Landesbauordnung)</i>	<i>Various architectural design standards</i>

In Germany, on sites within built-up areas without a B-plan in effect, a building permit can be granted if the building proposal blends with the characteristic features of its immediate environment, and the provision of local public infrastructure has been secured.<sup>1</sup> For the Chinese building permission, this possibility does not exist.

With regard to the administrative supervision, both the German B-plan and the Chinese regulatory plan have the legally binding procedure of supervision.

The general public and the public bodies in Germany are entitled to supervise the implementation of the B-plan, especially its impact on the environment. Public bodies also have the right to inform the municipality about the negative effects in plan implementation, particularly the significant negative environmental effects. In China, the general public and public bodies have the legally binding right to supervise the implementation of the regulatory plan. Moreover, the implementation of the regulatory plan should be supervised by relevant administrative authorities, Standing Committees of the People's Congresses or a township's People's Congress.

#### **4.3.1.2 Decision-making Methods**

The primary decision-making method of the German B-plan is the physical planning and urban design. Normally the winning program of the planning design competition is the basis of the B-plan preparation. From the initial design to the planning substantiation, the conclusions of the environmental assessment, the results of the public participation, and the economic analysis may all affect the formation of B-plan control indicators.

The decision-making methods of the Chinese regulatory planning consist of three kinds of models. The first model is the process of the indicator decomposition, which works from the macro level to the micro level, such as the **urban density zoning model**, the **environmental capacity anticipation model**, and the **population anticipation model**. The second model is the horizontal comparison model, such as the **analogy model**. The third model is the so-called **“typical experiment” model** which defines the control indicators based on the physical planning.<sup>2</sup>

According to the location theory of the micro-economics, the urban density zoning model determines the total urban development density (development degree) from the macro level to the micro level, thereby establishing the baseline model and amendatory model of the urban

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<sup>1</sup> Bundesministerium für Verkehr, Bau und Stadtentwicklung: *Baugesetzbuch (BauGB)*, zuletzt geändert Dezember, 2006, §34

<sup>2</sup> Xia, Nankai & Tian Baojiang: *Regulatory Planning*, Tongji University Press, Shanghai. 2005, 1st edition, pp. 111-116

density zoning. Based on the models, it is possible to distribute the total urban development density to each zone and then regulate the plot ratio of it.

The environmental capacity anticipation model develops the control indicators based on the environmental capacity feasibility. It is necessary to first anticipate the potential development scales of building sites, transportation, municipal utilities and public facilities. Then according to the per capita plan standards, it is possible to calculate the population scale and the plot ratio.

In accordance with the population capacity regulated in the master plan, the population anticipation model outlines the requirement for population density in the planning area. The population density value can be used to calculate the necessary total floor area. However, this mode is only applicable to the planning of a residential area.

The typical experiment model is intended to determine the control indicators on the basis of the physical planning as well as the existing experiences.

The analogy model can develop control indicators through the comparative analysis of existing cases, which are similar to the anticipating regulatory planning project in type and scale.

From the details mentioned above, it is not difficult to find that decision-making models of the Chinese regulatory plan are mainly the indicator decomposition processes from the macro level to the micro level, such as the urban density zoning model, the environmental capacity anticipation model, and the population anticipation model. This is the undoubted result of China's large-scale urban construction, rapid urbanization, as well as its high urban population density. In such circumstances, the top-down planning decision-making methods must be taken in the Chinese regulatory planning. However, such decision-making methods can effectively control the general situation, not the details.

From the Chinese model point of view, the decision-making method of the German B-plan is mainly a typical experiment model.

### 4.3.1.3 Public Participation

From the procedural point of view, the preparation procedure of the German B-plan is similar to that of the Chinese regulatory plan. There are definite provisions for public participation in the German *Federal building Code (Baugesetzbuch)*. Similarly, there are also provisions for public participation in the Chinese *Town and Country Planning Act*. Before the enactment of *The Town and Country Planning Act*, public participation in urban planning had already been implemented by many Chinese cities. The Sino-German comparison of the urban planning public participation can be shown as below:

Tab. 4-9: Comparison of the Public Participation in Urban Detailed Planning in China and Germany

	<b>GERMAN B-PLANNING</b>	<b>CHINESE REGULATORY PLANNING</b>
<b>Stage of Public Participation</b>	Early public participation; Formal public participation	Participation of relevant local administrative departments in the data collection stage; Public participation before the approval procedure
<b>Content of Public Participation</b>	Public notice; Obtaining public opinions and suggestions; Weighing; Feedback	Public notice; Obtaining public opinions and suggestions; Examination of public opinions and suggestions; Feedback
<b>Scope of Public Participation</b>	General public; Public bodies; Neighboring municipalities and agencies (if necessary)	General public; Public bodies; Relevant local administrative departments
<b>Public Access to Information</b>	Electronic information technology <sup>1</sup> ; Media publicity; Public notice	Electronic information technology <sup>2</sup> ; Media publicity; Public notice

It is evident that on the basis of both theory and practice, China has developed a clear framework for the urban planning public participation, which has identical intention to the German system.

There is no early public participation regulated in the Chinese planning acts or ordinances. However, in the process of data collection, it is necessary for relevant local administrative

<sup>1</sup> Bundesministerium für Verkehr, Bau und Stadtentwicklung: *Baugesetzbuch (BauGB)*, zuletzt geändert Dezember, 2006, §4a, para. 4

<sup>2</sup> Ministry of Construction of the P. R. China: *Preparation Criteria of Urban Planning*, 2005, §26

departments to offer suggestions, opinions, and information.

The Chinese public participation before the approval procedure is similar to the German formal public participation. Both include the steps of public notice, obtaining public opinions and suggestions, weighing, and feedback.

Theoretically, the contents of the Chinese and German public participation are generally identical. However, with regard to the scope of the public participation, there is no regulation on the regional coordination or the coordination with neighbouring municipalities and agencies in the Chinese regulatory planning.

Regarding the public access to information, there is no obvious distinction between the two planning types. In practice, because of the rapidly growing popularity in China, the internet has become one of the most important forms of media in China's urban planning public participation.

In general, in contrast to the experienced German system, the Chinese urban planning public participation is only at its initial stage. However, in the future, the public participation in China will definitely be developed with celerity.

#### **4.3.1.4 Plan Structure**

The German B-plan consists of the map, the text, and the document of substantiation (Begründung). The map and the text of a B-plan are organized together to form the legally binding document, while the document of substantiation is a separate file. Besides the map, the text, and the document of substantiation, the project-based B-plan also adopts the urban development contract to control the requirements for building development.

The regulatory plan consists of two parts, which are plan maps and plan documents. The plan documents include the plan text and the plan accessory. The plan maps and the plan text form the planning regulations, but they are separate files.

#### **1. Comparisons of the plan map**

In accordance with the German regulations, the mapping scale of the B-plan is 1: 500 or 1: 1000. The B-plan mapping is based on the provisions in *The Planning Symbols Ordinance (Planzeichenverordnung)*. From the spatial scale point of view, the German B-plan is evidently a block control, while the planning area of the Chinese regulatory is enclosed by urban arterial roads, secondary trunk roads, or branch roads. The planning area of the Chinese

regulatory plan is much larger than that of the German B-plan. In the regulatory planning, the block control is realized by the plot control maps.

A B-plan has only one document which includes both map and text, while a set of maps must be prepared to develop a regulatory plan.

## **2. Comparisons of the plan text**

The B-plan text clarifies the mapping designations and other supplementary regulations in the form of legal provisions. The legal basis of each stipulation in the B-plan text must be stated. The regulatory plan text also describes the control indicators in the form of legal provisions, but without the statements of legal basis. Moreover, the control indicators in the regulatory plan text are grouped according to the control objects, while the B-plan stipulations are classified based on different regulations.

The control indicators in the regulatory plan are divided into two types, which are the mandatory indicators and the non-mandatory indicators. Only the mandatory indicators are subject to enforcement. Therefore, from a legal perspective, only the mandatory indicators of the regulatory plan are equivalent to the B-plan stipulations (hint is not inclusive). There is no requirement in the regulatory plan text which focuses on the plan coordination with other regulations, as that which is regulated in the B-plan hint.

## **3. Comparisons of the substantiation document**

The B-plan substantiation document (Begründung) is the comprehensive explanation of the planning project, while the instructions of the regulatory plan are intended to analyze the current situation, justify the planning intentions and explain the plan text. Both are generally identical.

The main distinction between the B-plan substantiation document and the instructions of the regulatory plan is that the B-plan substantiation document has the legally binding content of the environmental impact assessment as well as the environmental report.

### 4.3.1.5 Summary of the Comparison Results

According to the main institutional themes of sustainable development, the institutional spatial control factors of each planning type can be summarized and compared in the following table.

Tab. 4-10: Summary of the Comparison Results of Institutional Factors

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
Legal Status	Statutory formal plans	
	Legally binding local statute	Plan with a legally binding nature
Legal System	Developed legal system	Complete but developing legal system
Administration and Supervision	Building permission control	Building permission control; Land use permission control
	Legally binding procedure of supervision	
Decision-making Methods	Mainly typical experiment model	Top-down planning decision-making methods based on the economic and social analysis; Typical experiment model
Public Participation	Public participation with the legal status and legally binding details;	
	Comprehensive scope of public participation	Limitative scope of public participation
	Reliable public access to information	
Plan Structure	The plan (integrating the map and the text as one document) with the document of substantiation (Begründung)	A set of maps with the plan text and the plan accessory

## 4.3.2 Comparison of Economic Control Factors

### 4.3.2.1 Economic Structure and Development

In the level of the urban detailed planning, the spatial control of the economic structure and development is mainly a spatial organization of economic elements so as to achieve the objective of economic sustainable development. The dissertation considers that this spatial organization of economic elements can be realized by the control of the land use type, which includes the control of the land use area, boundary, type, and compatibility.

#### 1. Comparison of the land use area and boundary

Using the B-plan spatial boundary (Grenze des räumlichen Geltungsbereichs des Bebauungsplans)<sup>1</sup>, the German B-plan allows one to limit the boundary of the planning area. In practice, the boundary line of the B-plan can be the street boundary line (Straßenbegrenzungslinie) or other borders. The B-plan street boundary line is equivalent to the boundary line of a road in the Chinese regulatory plan. With regard to the definition of the land use area and boundary, the spatial control approaches of both planning types are identical.

The spatial control of the land use area and boundary in the German B-plan is undoubtedly a statutory mandatory control. On the other hand, the spatial control of the land use area and boundary in the Chinese regulatory plan should be considered an integral part of the general topic “land use.” Therefore, it is also a mandatory spatial control factor.<sup>2</sup>

#### 2. Comparison of the land use type and compatibility

The land use types of the German urban planning is a two-level hierarchy system with 4 construction sites (Bauflächen) as the upper level, and 10 building sites (Baugebiete) as the lower level. The B-planning is required to use the classification of building sites.

The Chinese land use types are grouped into 3 levels which include 10 general land use types, 46 subdivisions of general land use types, and 73 specific land use types. It is necessary for the regulatory planning to apply the specific land use types.

The concept of German land classification is different from that of the Chinese. Besides the types of building and land use, which are the primary spatial control target in the B-planning,

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<sup>1</sup> Ekkehard Hangarter: *Bauleitplanung*, Werner Verlag GmbH & Co.KG, Düsseldorf, 1999, S. 257

<sup>2</sup> Ministry of Construction of the P. R. China: *Preparation Criteria of Urban Planning*, 2005, §42



there are also other land use types, such as public facilities, traffic areas, municipal utilities, green spaces, water bodies, soil engineering sites, forests, environmental protection zones, and heritage conservation areas. These areas are organized and controlled by the local government as the public interest areas. However, China attempts to establish an orderly system with all possible types of land use. Theoretically, each land use type can be controlled by the quantitative indicators. For example, it is possible to regulate the building density limit even for green spaces.

With regard to the land use compatibility, the German land classification is a compatible system provided in *The Land Utilization Ordinance (Baunutzungsverordnung, BauNVO)*. The B-plan practice shows that this approach can effectively meet the requirements for the land use compatibility.

The Chinese land classification is a mutually exclusive system. In this system, only in the residential areas, the residential land use is compatible with public facilities, roads, and green spaces, while the other land use types are mutually exclusive classification. Such approach may facilitate the functional zoning, but it is difficult to determine the land use type in cases of mixed development. Therefore, Chinese municipalities may supplement the additional land use types if it is necessary. As a part of the land use type control, the Chinese land use compatibility control is definitely a mandatory spatial control factor.

In general, the spatial controls of the land use type in both planning types are all mandatory factors, which are vital tools to achieve the planning goal. Therefore, they should be defined as the spatial control capability level 1 (1 pm).

Tab. 4-11: Comparison of the Economic Structure and Development Control Factors in Urban Detailed Planning in China and Germany

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
<b>Economic Structure and Development Control Factors</b>	Land use area and boundary (1)	Land use area and boundary (1)
	Land use type (1)	Land use type (1)
	Land use compatibility (1)	Land use compatibility (1)

#### **4.3.2.2 Land Use**

In order to achieve the economic sustainability of the land use, the urban detailed planning should advocate the intensive and efficient land use. Based on objectives of urban development projects, the urban detailed planning should control the building's volume and intensity reasonably so, as to achieve the economic development goals, and safeguard a considerable proportion of land which could be available for survival and development of future generations. Moreover, the planning should also realize the functional mixed land use to create a vivid urban life.

The spatial control of the land use type in both German B-planning and Chinese regulatory planning can realize the gross control of the land resources. See 4 .3.2.1.

With regard to the German B-plan, the spatial control factors of the degree of building and land use include the plot ratio (GFZ), the cubic density (BMZ), the site occupancy index (GRZ), the number of floors, as well as the building height, which can all achieve the goal of economic development. In contrast, the Chinese plot ratio, building density, residential density, and building height are the corresponding spatial control factors in the regulatory plan.

By defining the building window, the German B-plan allows one to control the plot areas which may be built on, thereby reserving a certain proportion of land for survival and the development of future generations. In the Chinese regulatory plan, the set-back depth and the building interval allow one to regulate both the proportion of plot development and the location of the building construction.

The German B-plan allows one to control types, locations, and development degrees of secondary structures. It is intended to support economic activities and regulate the plot development ratio out of the building window. There is no secondary structure control in the Chinese regulatory plan.

Each planning type is able to regulate the farmland and forest by the controls of land use type and permissive building scope.

##### **1. Comparison of the building density control**

The concept and calculation method of the Chinese building density is identical to that of the German site occupancy index (GRZ). However, the German site occupancy index (GRZ) is restricted by the building window.

Regarding the Chinese regulatory plan, as long as the requirements for set-back depth and building degree can be fulfilled, the developer will be relatively free to choose the location of building footprint, whereas in the German B-plan, even if the condition of the GRZ were met, the building footprint should also be limited by the building window. In addition, once the building line is defined, one of the building sides must be on this line. The size of the building window differs from one B-plan plot to another. If the building window considers only the distance between building (restriction) line and street, its function is similar to the set-back depth control in the regulatory plan. However, the building window can be used to define exact boundaries of prospective buildings; in this case, it may actually substitute for GRZ.

## **2. Comparison of the plot ratio control**

The concept and calculation method of the Chinese plot ratio is identical to that of the German plot ratio (GFZ).

In many cases, for industrial and commercial buildings with unique structures, their plot ratio (GFZ) values may be close to their site occupancy index (GRZ) values. Therefore, the German cubic density (BMZ) is designed for the volume control of those buildings. There is no similar control factor in the Chinese regulatory plan. In Chinese practice, the plot ratio is used to control the building volume of each land use type.

## **3. Comparison of the building height control**

There are two approaches for building height control in the German B-plan, which are the floor number control and the building height control. With regard to the building height control, the control objects may include the eave height (TH, the height from the bottom of the groundfloor to the geometrical center of the eave section), the ridge height (FH, the height from the bottom of the groundfloor to the geometrical center of the ridge section), and the foundation height (the height from the plot ground to the bottom of the groundfloor). For flat roofs, the building height is the height from the bottom of the groundfloor to the upper edge of the outer wall. For gable roofs, either the eave height or the ridge height should be controlled.<sup>1</sup> In practical application, the B-plan can stipulate either a fixed value or a flexible scope.<sup>2</sup>

The definition of the Chinese building height is basically identical to that of the Germans. For instance, according to the provisions in *The Planning and Design Criteria of Building*

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<sup>1</sup> Ekkehard Hangarter: *Bauleitplanung*, Werner Verlag GmbH & Co.KG, Düsseldorf, 1999, S.146

<sup>2</sup> *Planzeichenverordnung (PlanzV 90). Verordnung über die Ausarbeitung der Bauleitpläne und die Darstellung des Planinhalts*, vom 18. Dezember 1990

*Projects in Beijing Region (Version of Probation)*, with regard to buildings in heritage conservation zones, world heritage protection zones, and airport control districts, their building heights should be measured from the plot ground to the highest point of the building and its subsidiary structures, including elevators, stairways, water tanks, chimneys, and antennas. In other areas, the building height should be measured from the plot ground to the upper edge of the outer wall (for flat roof), or the average of eave height and ridge height (for gable roof). In addition, the building height of the traditional Chinese architecture should be the eave height, but if the roof's slope is greater than 30 degrees, the building height should also be the average of eave height and ridge height.<sup>1</sup>

#### 4. Comparison of the permissive building scope control

The German B-plan allows one to control the permissive building scope by the building window (Baufenster) which is enclosed by the building restriction line (Baugrenze) and/or the building line (Baulinie). The B-plan may permit that building parts, for instance steps, and terraces, slightly exceed the building window. The Chinese building line, which has a similar function as the German building restriction line (Baugrenze), allows one to regulate the permissive building scope in the regulatory plan. However, there is no "building window" concept in the regulatory planning.

Theoretically, the distance between building (restriction) line and street, which should be measured from the actual street boundary line, can be defined in the B-plan.<sup>2</sup> This control approach is equivalent to the set-back depth control in the regulatory planning.

The building interval control in the Chinese urban planning is mainly based on the local insulation standard, as well as the requirements for ventilation, lighting, noise, interference prevention, fire resistance, greening, pipeline installation, building layout, and intensive land use. In China, in most cases, building intervals are determined by the local insulation standard. When calculating the building interval, there is a **building interval coefficient** that works as the most important calculation basis. The calculation formula is:

Building interval coefficient = (Horizontal distance between the buildings in the North-South or East-West direction)/( Height of the front building)

The correct building interval coefficient is given in the local building standard. Therefore, it is possible to calculate the corresponding building interval based on the building interval

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<sup>1</sup> Beijing Municipal Commission of Urban Planning: *The Planning and Design Criteria of Building Projects in Beijing Region (Version of Probation)*. 2003. pp. 15 -16

<sup>2</sup> *Baunutzungsverordnung (BauNVO)*, 1993 (BGBl. I S.466), §23

coefficient and the height of the front building.<sup>1</sup>

In Germany, there are also requirements for distance space, which are regulated by building ordinances of federal states. For instance, *The Federal State Building Ordinance of Baden-Württemberg (LandesbauordnungBW)* regulates that distance spaces (Abstandfläche) must be kept in order to safeguard the necessary distance between buildings. Distance spaces must be kept from land ownership boundaries, public roads, public green spaces, as well as public water bodies. The distance space calculation is based on the height of the outer building wall. Normally, the minimum limit of the distance space is 0.6 times of the height of the outer building wall. However, for special residential areas (WB), village areas (MD) and core areas (MK), this value is 0.4. For commercial areas (GE), industrial areas (GI) and non-recreational special areas (SO), this value is 0.25. The German distance space is valid in each direction.<sup>2</sup>

The German spatial control factors of land use are all mandatory statutory constraints. However, with regard to the economic goal for sustainable development, the control of secondary structures is not a core element of regulating the intensive land use, but a micro-precision control of plot use outside the building window. Therefore, it should be defined as the spatial control capability level 2 (0.75 pm). Other German spatial control factors of land use belong to the spatial control capability level 1 (1 pm).

The Chinese building density, plot ratio, and building height are mandatory control factors. In contrast to the German approaches, the cubic control of industrial and commercial buildings (BMZ) is missing. However, the regulatory planning can regulate the volume of industrial and commercial buildings by integrating the building density control and the building height control. These Chinese spatial control factors of land use should be defined as the spatial control capability level 1 (1 pm).

The Chinese residential density control has only indirect impact on the land use, and it is not a mandatory control factor. Therefore, it can only be considered as a control factor with the spatial control capability level 4 (0.25 pm), which partially reflects the intention of land use control and is not a mandatory legally binding constraint.

In the regulatory plan, the building line, set-back depth, building interval, and open space ratio are important means of realizing the intensive land use. In practice, the building line and set-back depth, which belong to the land use control, are regulated by mapping designations.

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<sup>1</sup> Beijing Municipal Commission of Urban Planning: *The Planning and Design Criteria of Building Projects in Beijing Region (Version of Probation)*. 2003. p. 22

<sup>2</sup> *Landesbauordnung für Baden-Württemberg (BW\_LBO)*, Stand April 2005, §6

They are vital mandatory spatial control factors that should be defined as the spatial control capability level 1 (1 pm). However, although the building interval is crucial for the quality of life, the regulatory plan controls it only by textual provisions, which normally guides the overall layout without mandatory content. So, the building interval control in the regulatory planning belongs to the spatial control capability level 3 (0.5 pm). In principle, the open space ratio is not used in the regulatory planning, but theoretically, it has the same spatial control capability as the building interval.

Tab. 4-12: Comparison of the Land Use Control Factors in Urban Detailed Planning in China and Germany

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
<b>Land Use Control Factors</b>	Land use area and boundary (1)	Land use area and boundary (1)
	Land use type (1)	Land use type (1)
	Land use compatibility (1)	Land use compatibility (1)
	Site occupancy index (GRZ) (1)	Building density (1)
	Plot ratio (GFZ) (1)	Plot ratio (1)
	Cubic density (BMZ) (1)	Building density + Building height (1)
	Number of floors, Building height (1)	Building height (1)
		Residential density (0.25)
	Building restriction line (Baugrenze), Building line (Baulinie) (1)	Building line (1)
	Distance between building (restriction) line and street (1)	Set-back depth (1)
	Distance space (1)	Building interval (0.5)
		Open space ratio (0.5)
	Control of secondary structures (0.75)	
	Farmland and forest control (1)	Farmland and forest control (1)

### 4.3.2.3 Transportation

The road control has a long tradition in Germany and the B-plan originated from the road control. The transportation control of German B-planning adopts completely rigid control methods, which regulate all details of transportation spaces. Mapping designations and textual provisions are main control approaches in the B-planning practice.

The transportation control of Chinese regulatory planning is not so rigid as that of German B-planning. Its control approaches are the mixture of mapping designations, quantitative indicators, and textual provisions.

The transportation control can be divided into two aspects, which are the static traffic control and the dynamic traffic control.

Tab. 4-13: Comparison of the Transportation Control in Urban Detailed Planning in China and Germany

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
<b>Dynamic Traffic Control</b>	<p>Control of scopes of public thoroughfares and public thoroughfares for specific purposes by defining street boundary lines;</p> <p>Control of land use scopes of motor vehicle lanes, non-motorized vehicle lanes, and sidewalks;</p> <p>Control of coordinates and elevations of control points, as well as road slopes;</p> <p>Control of entrances and exits;</p> <p>Control of types and boundaries of spaces to be encumbered with walking and driving rights and rights of passage in favor of the general public</p>	<p>Control of scopes of arterial roads, secondary trunk roads, and branch roads by defining road boundary lines;</p> <p>Control of road forms by defining road section forms and intersection forms;</p> <p>Control of coordinates and elevations of control points;</p> <p>Control of entrances and exits;</p> <p>Control of roads inside residential areas;</p> <p>Traffic organization</p>
<b>Static Traffic Control</b>	<p>Control of parking spaces for motor vehicles and non-motorized vehicle;</p> <p>Control of stops of public transportations;</p> <p>Control of parking spaces and/or garages on the plots and their entrances;</p> <p>Control of spaces for embankments, diggings, and retaining walls, which are required for road construction;</p> <p>Control of traffic areas for specific purposes (which could be either static traffic areas or dynamic traffic areas)</p>	<p>Control of public parking spaces and/or garages;</p> <p>Control of stops of public transportations;</p> <p>Control of capacities of parking spaces and/or garages;</p> <p>Control of loading &amp; discharging sites;</p> <p>Control of public parking spaces and/or garages inside residential areas (that is included in the control of roads inside residential areas)</p>

In general, the transportation control of Chinese regulatory planning is similar to that of

German B-planing. However, from the dynamic traffic point of view, there are still some uncertainties existing in the road form control of Chinese regulatory planning which contrasts to the complete positioning control of German B-planing.

The regulatory planning may regulate the types of vehicles which are permitted to enter or pass through the plot.<sup>1</sup> This control approach is equivalent to the authorized transit in the control of spaces to be encumbered with walking and driving rights and rights of passage in favor of the general public in the B-planing. Moreover, the regulatory planning can also realize the positioning control of the spaces to be encumbered with walking and driving rights and rights of passage in favor of the general public by defining pedestrian zones, bicycle lanes (S14), as well as roads inside residential areas (R13, R23, R33, R43).<sup>2</sup>

With regard to static traffic, within road scopes, the regulatory planning is able to control public transportation stops. On the plot, the control of public parking spaces and/or garages in the regulatory planning is similar to the German B-planing approach. However, the control of capacities for parking spaces and/or garages in the regulatory planning is a quantitative indicator regulation, which is different from the qualitative and positioning control of parking spaces and garages in German B-planing.

The control of traffic areas for specific purposes in B-planing can be realized in the regulatory planning by the land use control. For instance, the regulatory planning may implement the positioning control by defining traffic squares (S21), assembly squares (S22), public parking spaces & garages for motor vehicles (S31), and public parking spaces & garages for non-motorized vehicles (S32). However, in the Chinese system, those land use types are not included in the road areas but independent land use units.<sup>3</sup> Of course, there is no theoretical barrier for integrating S31 or S32 into the road area. In addition, it is also possible to implement the positioning control of parking spaces & garages within road scopes by regulating road section forms together with relevant textual provisions.

All German transportation control factors are legally binding factors which have the spatial control capability level 1 (1 pm). On the other hand, most transportation control factors in the Chinese regulatory planning are mandatory constraints,<sup>4</sup> which should be defined as the spatial control capability level 1 (1 pm). However, although the traffic organization and the control of entrances and exits are important connections between plot spaces and road spaces,

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<sup>1</sup> Jiansu Institute of Urban Planning & Design (as the chief editor): *Urban Planning Database (Vol. 4): the Regulatory Planning*, China Architecture & Building Press, Beijing, 2002, 1st edition, p. 18

<sup>2</sup> Ministry of Construction of the P. R. China: *The Standard for Urban Land Use Classification, Building and Land Use (GBJ 137-90)*, 1991

<sup>3</sup> Ibid.

<sup>4</sup> Ministry of Construction of the P. R. China: *Preparation Criteria of Urban Planning*, 2005, §42



which are of great significance to achieved traffic control objectives, they are not on the list of mandatory control factors. Thus, they have to be grouped into the spatial control capability level 3 (0.5 pm).

In principle, the control of loading & discharging sites are not used in regulatory planning practice, since the so-called loading & discharging sites have the same meaning as a land use type “yards”(W3). Thus, the loading & discharging site should be consider as a redundant control factor with the spatial control capability level 4 (0.25 pm).

The German B-planning has the control of spaces for embankments, diggings, and retaining walls, which are required for road construction. In China, this task is implemented by the vertical planning (topographical planning) in the site planning, which is guided by the regulatory planning.

Tab. 4-14: Comparison of the Transportation Control Factors in Urban Detailed Planning in China and Germany

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
<b>Transportation Control Factors</b>	Street boundary lines (1)	Road boundary lines (1)
	Control of land use scopes of motor vehicle lanes, non-motorized vehicle lanes, and sidewalks (1)	Control of road forms by defining road section forms and intersection forms (1)
	Control of coordinates and elevations of control points, as well as road slopes (1)	Control of coordinates and elevations of control points (1)
	Control of entrances and exits (1)	Control of entrances and exits (0.5)
	Control of types and boundaries of spaces to be encumbered with walking and driving rights, and rights of passage in favor of the general public (1)	Control of pedestrian zones & bicycle lanes (1) Control of roads inside residential areas (1) Traffic organization (0.5)
	Control of parking spaces for motor vehicles and non-motorized vehicle within road scopes (1)	Control of public parking spaces and/or garages or regulating road section forms together with relevant textual provisions (1)
	Control of stops for public transportations (1)	Control of stops for public transportations (1)
	Control of parking spaces and/or garages on the plots and their entrances (1)	Control of public parking spaces and/or garages; Control of capacities of parking spaces and/or garages (1)
	Control of traffic areas for specific purposes (1)	Land use control of squares (1)
		Control of loading & discharging sites (0.25)
	Vertical planning (topographical planning) (1)	
	Control of spaces for embankments, diggings, and retaining walls, which are required for road construction (1)	

### 4.3.2.4 Municipal Utilities

The municipal utilities consist of the water supply and sewerage, power supply, gas supply, heating, and waste disposal, which may safeguard the quality of living for the people and play a direct role in pollution control.

The municipal utility control may be divided into two aspects, which are the land use control and the pipeline control.

Tab. 4-15: Comparison of the Municipal Utility Control in Urban Detailed Planning in China and Germany

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
<b>Land Use Control</b>	Control of spaces for power supply, water supply, heating, waste disposal, and sewerage; Control of types and boundaries of spaces to be encumbered with the provision of public infrastructure; Control of municipal secondary structures on the plots	Control of spaces for supply utilities (U1) (water supply, power supply, gas supply, heating utilities); Control of spaces for telecommunication utilities (U3); Control of spaces for sanitation utilities (U4) (sewerage & sewage treatment utilities, Garbage disposal utilities); Control of spaces for construction & maintenance utilities (U5); Control of spaces for funeral utilities (U6); Control of spaces for other municipal utilities (U9)
<b>Pipeline Control</b>	Control of types and locations of ground/underground pipelines	Control of boundaries, spatial locations and diameters of pipelines, as well as relevant ground/underground structures

All German municipal utility control factors are legally binding factors which have the spatial control capability level 1 (1 pm), while the municipal utility control factors in the Chinese regulatory planning are also mandatory constraints,<sup>1</sup> defined as the spatial control capability level 1 (1 pm) as well.

The municipal utility control of Chinese regulatory planning is a relatively independent part which is quite different from that of B-planning. The regulatory planning must regulate municipal utilities according to the master plan. In contrast to the German plan, the regulatory plan allows one to control a much larger planning area and regulate more details. On the other hand, the municipal utility control of B-planning is relatively independent. There is sectoral planning for municipal utilities in Germany, which is organized by specialized departments. The B-planning is only responsible for coordination with the specific municipal planning in its smaller scope.

<sup>1</sup> Ministry of Construction of the P. R. China: *Preparation Criteria of Urban Planning*, 2005, §42

The effect of the B-planning control of municipal secondary structures on the plots can be realized by the municipal land use control in the regulatory planning.

Tab. 4-16: Comparison of the Municipal Utility Control Factors in Urban Detailed Planning in China and Germany

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
<b>Municipal Utility Control Factors</b>	Control of spaces for power supply, water supply, heating, waste disposal and sewerage (1)	Control of spaces for municipal utilities as specific land use types (1)
	Control of types and boundaries of spaces to be encumbered with the provision of public infrastructure (1)	
	Control of municipal secondary structures on the plots (1)	Land use control of municipal structures on the plots (1)
	Control of types and locations of ground/underground pipelines (1)	Spatial control of pipelines (1)

#### 4.3.2.5 Employment

The urban detailed planning achieves its goal for employment with the control of the type and degree of building and land use, which can regulate physical spaces for employment provision.

Tab. 4-17: Comparison of the Employment Control Factors in Urban Detailed Planning in China and Germany

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
<b>Employment Control Factors</b>	Land use area and boundary (1)	Land use area and boundary (1)
	Land use type (1)	Land use type (1)
	Land use compatibility (1)	Land use compatibility (1)
	Site occupancy index (GRZ) (1)	Building density (1)
	Plot ratio (GFZ) (1)	Plot ratio (1)
	Cubic density (BMZ) (1)	Building density + Building height (1)
	Number of floors, Building height (1)	Building height (1)

### 4.3.2.6 Summary of the Comparison Results

According to the main economic themes of sustainable development, the economic spatial control factors of each planning type can be summarized in the following table.

Tab. 4-18: Comparison of the Economic Spatial Control Factors in Urban Detailed Planning in China and Germany

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
<b>Economic Structure and Development Control Factors</b>	Type of building and land use (land use area and boundary, land use type, land use compatibility)	Control of land use (land use area and boundary, land use type, land use compatibility)
<b>Land Use Control Factors</b>	Type of building and land use; Degree of building and land use (site occupancy index (GRZ), plot ratio (GFZ), cubic density (BMZ), number of floors, building height); Plot areas which may be built on (building restriction line (Baugrenze), building line (Baulinie), distance between building (restriction) line and street, distance space); Spaces for secondary structures (control of secondary structures); Spaces for agricultural land and woodland (control of types and boundaries)	Control of land use; Control of environment capacity (building density, plot ratio, residential density, open space ratio); Control of building construction (building height, building line, set-back depth, building interval); Spaces for agricultural land and woodland (control of types and boundaries)
<b>Transportation Control Factors</b>	Public thoroughfares and public thoroughfares for specific purposes (control of traffic land use scopes, control points, entrances and exits, parking spaces, stops for public transportations, traffic areas for specific purposes); Spaces for secondary structures (parking spaces and/or garages on the plots and their entrances); Spaces for embankments, diggings, and retaining walls (boundary control); Spaces to be encumbered with walking and driving rights and rights of passage in favor of the general public (boundary control)	Traffic land use control (control of road forms, control points, pedestrian zones & bicycle lanes, public parking spaces and/or garages, stops for public transportations, capacities of parking spaces and/or garages, squares); Control of roads inside residential areas; Control of traffic activities (traffic organization, entrances and exits, control of loading & discharging sites)
<b>Municipal Utility Control Factors</b>	Spaces for municipal utilities (control of spaces for power supply, water supply, heating, waste disposal and sewerage, etc); Spaces for municipal pipelines (control of types and locations of ground/underground pipelines); Spaces to be encumbered with the provision of public infrastructure (boundary control); Spaces for secondary structures (boundary control)	Municipal utilities (control of spaces for municipal utilities as specific land use types); Municipal utilities (land use control of municipal structures on the plots); Municipal utilities (spatial control of pipelines)
<b>Employment Control Factors</b>	Type of building and land use; Degree of building and land use	Control of land use; Control of environment capacity (building density, plot ratio); Control of building construction (building height)

In order to implement the scientific quantitative analysis, the dissertation optimizes the economic themes of sustainable development by integrating some control factors with the same spatial control functions. Base on the table above, it is clear that the main economic themes of sustainable development can be reorganized as five themes which are the type of building and land use, degree of building and land use, plot areas which may be built on, transportation, and municipal utilities.

The control of secondary structures in the B-planning has no significant effect on the degree of buliding and land use. The Chinese residential density is an auxiliary control factor without mandatory control capability. The Chinese open space ratio and loading & discharging site are non-mandatory control factors and are not used in regulatory planning practice. Therefore, the control factors mentioned above are omitted in the quantitative analysis.

The Chinese bicycle lanes (S14) and roads inside residential areas (R13, R23, R33, R43) are mandatory constraints, which are defined as the spatial control capability level 1 (1 pm). The Chinese traffic organization has the spatial control capability level 3 (0.5 pm). In contrast to the spaces to be encumbered with walking and driving rights and rights of passage in favor of the general public in the B-planning, the same mission can be accomplished in regulatory planning with bicycle lanes and roads inside residential areas together with the regulation on the traffic organization. Therefore, these two factors may be merged as integral factor which have the spatial control capability level 1 (1 pm). The reason is that the land use control itself has already been able to achieve the general control objective of this topic.

Tab. 4-19: Summary of the Comparison Results of Economic Factors

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
Type of Building and Land Use	Land use area and boundary (1)	Land use area and boundary (1)
	Land use type (1)	Land use type (1)
	Land use compatibility (1)	Land use compatibility (1)
Degree of Building and Land Use	Site occupancy index (GRZ) (1)	Building density (1)
	Plot ratio (GFZ) (1)	Plot ratio (1)
	Cubic density (BMZ) (1)	Building density + Building height (1)
	Number of floors; building height (1)	Building height (1)

Tab. 4-19: Summary of the Comparison Results of Economic Factors (Part II)

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
<b>Plot Areas Which may be Built on</b>	Building restriction line (Baugrenze), Building line (Baulinie) (1)	Building line (1)
	Distance between building (restriction) line and street (1)	Set-back depth (1)
	Distance space (1)	Building interval (0.5)
<b>Transportation</b>	Street boundary lines (1)	Road boundary lines (1)
	Control of land use scopes of motor vehicle lanes, non-motorized vehicle lanes, and sidewalks (1)	Control of road forms by defining road section forms and intersection forms (1)
	Control of coordinates and elevations of control points, as well as road slopes (1)	Control of coordinates and elevations of control points (1)
	Control of entrances and exits (1)	Control of entrances and exits (0.5)
	Control of types and boundaries of spaces to be encumbered with walking and driving rights, and rights of passage in favor of the general public (1)	Control of pedestrian zones & bicycle lanes; control of roads inside residential areas; traffic organization (1)
	Control of parking spaces for motor vehicles and non-motorized vehicle within road scopes (1)	Control of public parking spaces and/or garages or regulating road section forms together with relevant textual provisions (1)
	Control of stops for public transportations (1)	Control of stops for public transportations (1)
	Control of parking spaces and/or garages on the plots and their entrances (1)	Control of public parking spaces and/or garages; control of capacities of parking spaces and/or garages (1)
	Control of traffic areas for specific purposes (1)	Land use control of squares (1)
<b>Municipal Utilities</b>	Control of spaces for power supply, water supply, heating, waste disposal, and sewerage (1)	Control of spaces for municipal utilities as specific land use types (1)
	Control of types and boundaries of spaces to be encumbered with the provision of public infrastructure (1)	
	Control of municipal secondary structures on the plots (1)	Land use control of municipal structures on the plots (1)
	Control of types and locations of ground/underground pipelines (1)	Spatial control of pipelines (1)

The arithmetic average of each economic theme can be calculated and compared according to the five economic themes of sustainable development. The result is shown in the following figure.

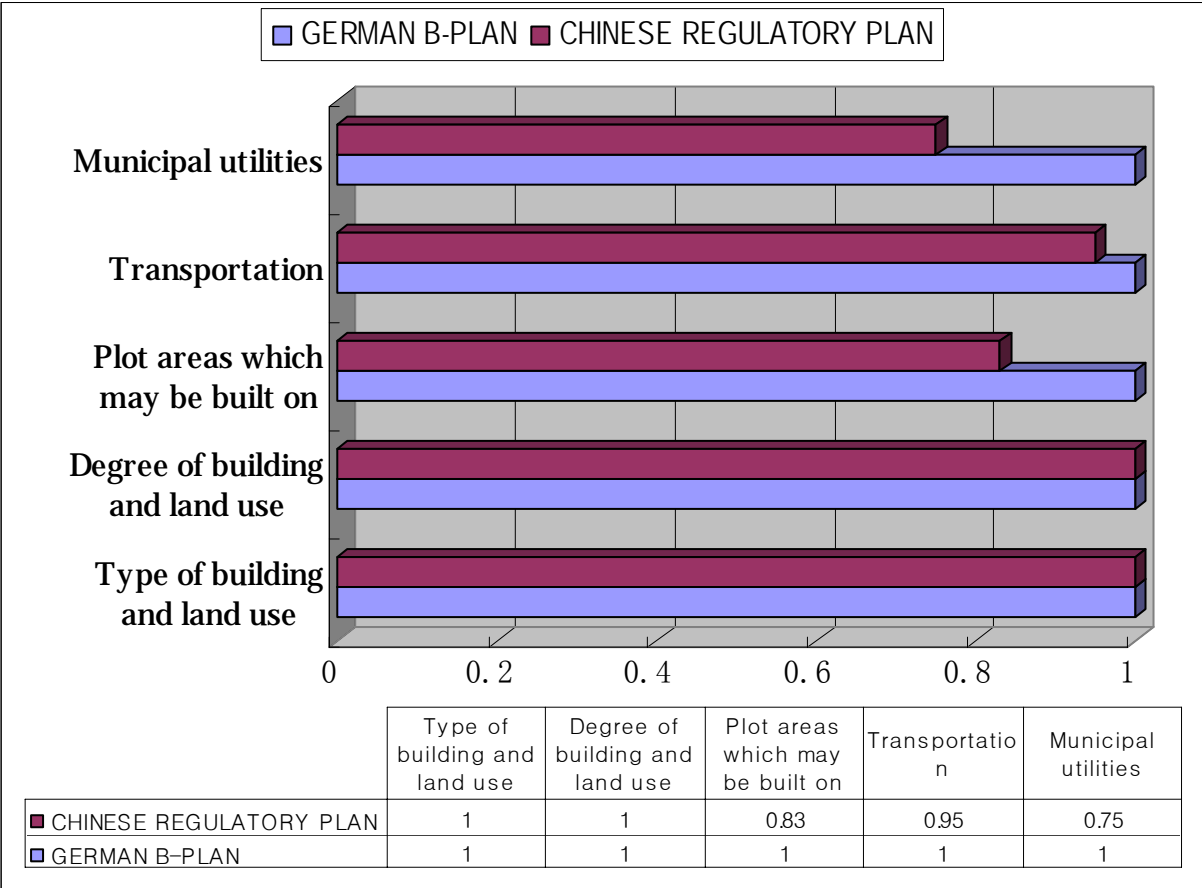


Fig. 4-5: Theoretical Comparison of Economic Spatial Control Capabilities in Urban Detailed Planning in China and Germany

### 4.3.3 Comparison of Social Control Factors

#### 4.3.3.1 Land Use Equality

The land is the basic carrier of the urban development. The land resource has both a natural attribute and a social attribute. The natural attribute is the spatial positioning of land and the resulting geographic advantages and disadvantages, as well as the soil and geomorphologic features. The social attribute is considered the land ownership and the economic value of land.<sup>1</sup> Therefore, the **land use equality** can be divided into two dimensions, which are the **social equitable access to land resources** and **intergenerational equitable access to land resources**. The former dimension focuses on the social attribute, while the later dimension focuses on the natural attribute.

With regard to the urban detailed planning, the social equitable access to land resources depends on the developed legal system and public participation.

According to the research findings in 4.3.1, the German planning legal system that the B-planning is based on can completely reflect the intentions of sustainable development. Meanwhile, it contains complete legally binding elements of statutory constraints. Thus, the German planning legal system should be defined as the spatial control capability level 1 (1 pm). For the Chinese planning legal system, according to the research findings in 4.3.1 and 3.2.2, it is clear that the Chinese planning legal system cannot systematically reflect the intentions of sustainable development, but the regulatory plan is the plan with the legally binding nature. Therefore, it should be defined as the spatial control capability level 2 (0.75 pm).

According to the research findings in 4.3.1, the public participation in German B-planning has a clear legal status and statutory operational mechanism, which is able to realize the goal for planning control. Thus, the German public participation should be defined as the spatial control capability level 1 (1 pm). On the other hand, the public participation in regulatory planning has legal status, legally binding details, and reliable access to information. However, the participation scope has no explicit definition. Therefore, theoretically, the public participation in the regulatory planning can only partially achieve the planning control goal. For that reason, it should be defined as the spatial control capability level 2 (0.75 pm).

The intergenerational equitable access to land resources can only be realized by the sustainable environmental and ecological development. It is analyzed in 4.3.4, which focuses

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<sup>1</sup> Li, Dehua (as the chief editor): *Urban Planning Theory*, China Architecture & Building Press, Beijing, 2001, 3rd edition, p.58



on the comparison of environmental control factors.

Tab. 4-20: Comparison of the Control of Land Use Equality in Urban Detailed Planning in China and Germany

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
Land Use Equality Control Factors	Planning legal system (1)	Planning legal system (0.75)
	Public participation (1)	Public participation (0.75)

### 4.3.3.2 Housing

“Every man has his house” is an important traditional political program in China. The equitable and reasonable housing policy is of special significance for the achievement of sustainable social development. The United Nations adopts the “Floor Area per Person” as the indicator of living conditions and thus a measurable indicator of the housing level.<sup>1</sup> Clearly, this indicator directly corresponds to the plot ratio in both the German B-planning and the Chinese regulatory planning.

Tab. 4-21: Comparison of the Housing Control in Urban Detailed Planning in China and Germany

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
Housing Control Factors	Plot ratio (GFZ) (1)	Plot ratio (1)

### 4.3.3.3 Public Facilities

The German B-planning regulates public facilities by the land use control. It is a control of the types and boundaries of spaces for public need, which include administrative authorities, schools, churches, social, medical, cultural service facilities, sports facilities, post offices, air

<sup>1</sup> Division for Sustainable Development of the United Nations: *Indicators of Sustainable Development: Guidelines and Methodologies*, 2005. p.35

defense installations, and firehouses.<sup>1</sup> For public facilities, the Chinese regulatory planning has nearly the same control approach as the B-planning, which is also a land use control mode. The public facilities regulated in the regulatory planning include specific land use types of administrative areas (C1), commercial & financial areas (C2), cultural & entertainment areas (C3), and sports areas (C4).<sup>2</sup> However, the German public facilities do not include commercial & financial areas. This contrasts with the Chinese land use classification system. In the German system, commercial & financial areas belong to the types of building and land use.

In the B-planning, the control approach of public facilities is identical to that of the types of building and land use. Each building development is controlled by regulating the plot boundary, building window, and control factors of the degree of building and land use.

This rule is also valid in the regulatory planning. The control approach of public facilities in the regulatory planning is the same as that of other land use types. The general approach is to define every zone boundary and then regulate the control indicators. As the land use control, the public facility control in the regulatory planning is undoubtedly the mandatory constraint.<sup>3</sup>

Tab. 4-22: Comparison of the Public Facility Control in Urban Detailed Planning in China and Germany

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
<b>Public Facility Control Factors</b>	Land use type, boundary and compatibility (1)	Land use type, boundary and compatibility (1)
	Site occupancy index (GRZ) (1)	Building density (1)
	Plot ratio (GFZ) (1)	Plot ratio (1)
	Cubic density (BMZ) (1)	Building density + Building height (1)
	Number of floors, Building height (1)	Building height (1)
	Building restriction line (Baugrenze), Building line (Baulinie) (1)	Building line (1)
	Distance between building (restriction) line and street (1)	Set-back depth (1)
	Distance space (1)	Building interval (0.5)

<sup>1</sup> Ekkehard Hangarter: *Bauleitplanung*, Werner Verlag GmbH & Co.KG, Düsseldorf, 1999, S. 244.

<sup>2</sup> Ministry of Construction, the P. R. China: *Standard for Urban Land Use Classification (GBJ 137-90)*, 1990

<sup>3</sup> Ministry of Construction of the P. R. China: *Preparation Criteria of Urban Planning*, 2005, §42

#### **4.3.3.4 Urban Image and Locality**

The B-plan architectural control is the main approach to regulate the urban image and locality. Its major measures include the coverage type control, roof form control, as well as control of other details.

The urban design guideline in the regulatory planning, which includes the building volume, building color, architectural style, and advertising installations, has the similar content to the B-plan architectural control. However, the German B-plan architectural control is a legally binding control factor group which should be defined as the spatial control capability level 1 (1 pm), while the Chinese urban design guideline is not the mandatory constraint. Thus, the Chinese urban design guideline has only the spatial control capability level 3 (0.5 pm).

##### **1. Comparison of the building volume control**

In the regulatory planning, the building volume may be guided by three perspectives, which are the anticipant vertical scale, horizontal scale, and physical volume of the building. Normally the maximum control limits will be regulated.<sup>1</sup> Such control objective can be realized by the control of the degree of building and land use, as well as the plot areas which may be built on in the B-planning. The building window and the building height, or the cubic density (BMZ), are effective tools for this purpose.

##### **2. Comparison of the roof form control**

The regulatory planning may regulate main building forms and roof forms, while the B-planning can regulate roof forms as well as materials of roofs and facades. In the B-planning, greening control factors can be integrated into control factors of roof forms and facades. Moreover, the B-planning may also control roof forms of garages and secondary structures.

##### **3. Comparison of the building color control**

The regulatory planning may control the tone, brightness and chroma of the building color. The German B-planning has identical control measures which are applied to the color control of building roofs, facades, and advertising installations.

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<sup>1</sup> Jiansu Institute of Urban Planning & Design (as the chief editor): *Urban Planning Database (Vol. 4): the Regulatory Planning*, China Architecture & Building Press, Beijing, 2002, 1st edition, p. 18

#### 4. Comparison of the miscellaneous building installation control

The regulatory planning may control the location, form, and clearance of miscellaneous building installations, which is similar to the B-plan control of miscellaneous building installations, such as advertising installations, automats, fences, and garbage collection installations.

#### 5. Comparison of the building group control

The regulatory planning may realize the building group control by controlling the spatial organization of buildings, which is equivalent to the coverage type in the B-planning. However, there is no strict definition for the spatial organization of buildings in the regulatory planning, such as the open development (offene Bauweise), the closed development (geschlossene Bauweise), and the other development (abweichende Bauweise) in the B-planning. Therefore, in practice, the regulatory planning can freely define the types of building organization. This measure is helpful for optimizing the physical control of the regulatory planning, but it is difficult for building developers to understand and implement non-normative definitions.

Tab. 4-23: Comparison of the Control of Urban Image and Locality in Urban Detailed Planning in China and Germany

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
<b>Urban Image and Locality Control Factors</b>	Degree of Building and land use, plot areas which may be built on (1)	Building volume (0.5)
	Roof form (1)	Roof form (0.5)
	Materials of roofs and facades (1)	Main building forms(0.5)
	Building color (1)	Building color (0.5)
	Miscellaneous building installations (1)	Miscellaneous building installations (0.5)
	Coverage type (1)	Spatial organization of buildings (0.5)

### 4.3.3.5 Heritages

The heritage control of the B-planning can be divided into three sorts, which are the preservation zone, preservation of building groups, as well as the preservation of individual buildings. The B-planning can designate not only the boundary of a preservation zone or a building group, but also individual buildings with historic values. The German heritage control factors are legally binding factors which have the spatial control capability level 1 (1 pm).

In the Chinese regulatory planning, it is possible to define the land use type as a historic heritage area (C7), which refers to the following: ancient relics, ancient tombs, historical architectures, revolutionary sites, and other sites with important values. In practice, the regulatory planning can regulate both building groups and individual buildings. Therefore, the heritage control of the regulatory planning is one kind of land use control that should also be the mandatory constraint with the spatial control capability level 1 (1 pm).<sup>1</sup>

Tab. 4-24: Comparison of the Heritage Control in Urban Detailed Planning in China and Germany

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
<b>Heritage Control Factors</b>	Preservation zone (1)	Preservation zone (1)
	Preservation of building groups (1)	Preservation of building groups (1)
	Preservation of individual buildings (1)	Preservation of individual buildings (1)

### 4.3.2.6 Summary of the Comparison Results

According to the main social themes of sustainable development, the social spatial control factors of each planning type can be summarized and compared in the following table.

<sup>1</sup> Ministry of Construction of the P. R. China: *Preparation Criteria of Urban Planning*, 2005, §42

Tab. 4-25: Summary of the Comparison Results of Social Factors

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
Land Use Equality	Planning legal system (1)	Planning legal system (0.75)
	Public participation (1)	Public participation (0.75)
Housing	Plot ratio (GFZ) (1)	Plot ratio (1)
Public Facilities	Land use type, boundary, and compatibility (1)	Land use type, boundary, and compatibility (1)
	Site occupancy index (GRZ) (1)	Building density (1)
	Plot ratio (GFZ) (1)	Plot ratio (1)
	Cubic density (BMZ) (1)	Building density + Building height (1)
	Number of floors, Building height (1)	Building height (1)
	Building restriction line (Baugrenze), Building line (Baulinie) (1)	Building line (1)
	Distance between building (restriction) line and street (1)	Set-back depth (1)
	Distance space (1)	Building interval (0.5)
Urban Image and Locality	Degree of Building and land use, plot areas which may be built on (1)	Building volume (0.5)
	Roof form (1)	Roof form (0.5)
	Materials of roofs and facades (1)	Main building forms (0.5)
	Building color (1)	Building color (0.5)
	Miscellaneous building installations (1)	Miscellaneous building installations (0.5)
	Coverage type (1)	Spatial organization of buildings (0.5)
Heritages	Preservation zone (1)	Preservation zone (1)
	Preservation of building groups (1)	Preservation of building groups (1)
	Preservation of individual buildings (1)	Preservation of individual buildings (1)

The arithmetic average of each social theme can be calculated and compared according to the five social themes of sustainable development. The result is shown in the following figure.

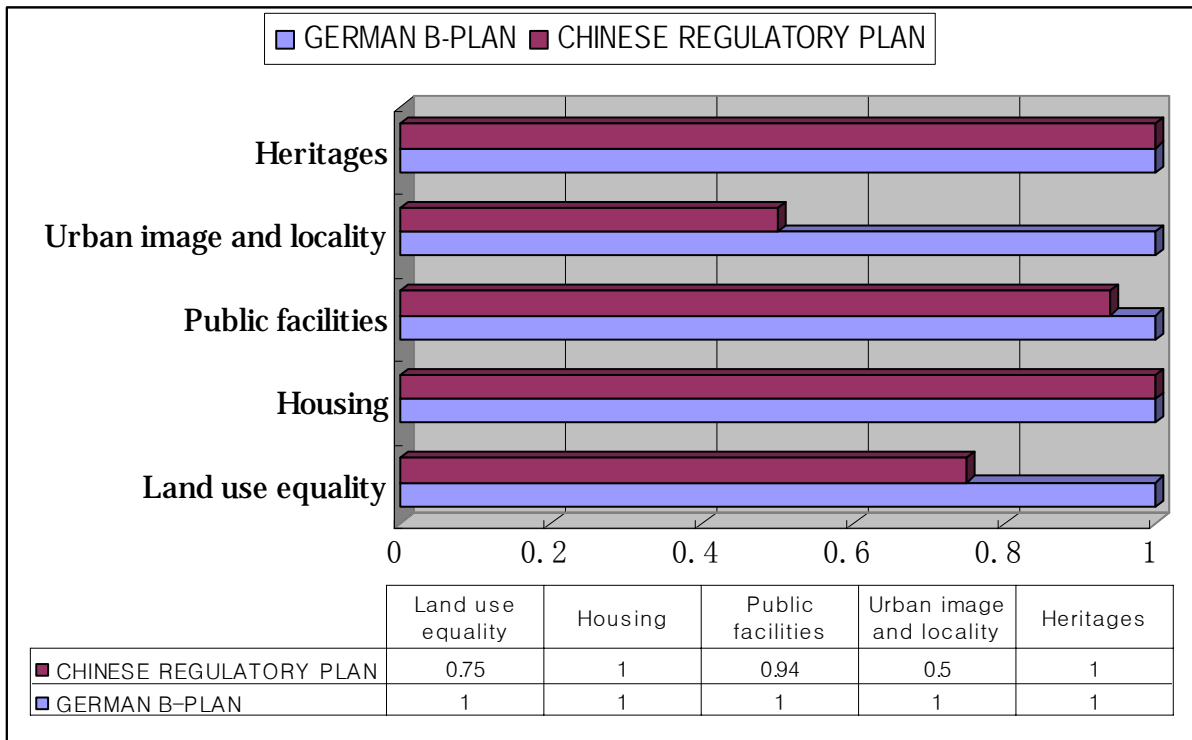


Fig. 4-6: Theoretical Comparison of Social Spatial Control Capabilities in Urban Detailed Planning in China and Germany

## 4.3.4 Comparison of Environmental Control Factors

### 4.3.4.1 Air pollution

In order to achieve the goal of sustainable development, air pollution control, climate change, ozone depletion, and air quality must be carefully considered. The German B-planning is able to realize the air pollution control by regulating the emission of greenhouse gases and the harmful gases, the protected areas, and the exploitation of renewable energy.

The B-planning can define areas in which, in order to provide protection against harmful measures affecting nature and landscape within the meaning of *The Federal Environmental Protection Act (Bundes-Immissionsschutzgesetz)*, certain materials which give rise to air pollution may not be used, or used only within defined limits.<sup>1</sup> The B-planning can also regulate protected areas to be kept free from development with their uses, spaces for specific installations and measures to provide protection against harmful measures affecting nature and landscape within the meaning of *The Federal Environmental Protection Act*, and the provisions to be made, including building and other technical measures, to provide protection against such impact or to prevent or reduce such impact.<sup>2</sup> Moreover, the B-planning may control the exploitation of renewable energy, especially solar energy.<sup>3</sup>

It is regulated in *The Land Utilization Ordinance (Baunutzungsverordnung)* that outside the building window but within the plot scope, even if there is no area reserved for building energy-saving and environmental protection structures, the B-planning may enable the building of those kinds of structures as exceptions.<sup>4</sup> In the building window, the B-planning is able to provide incentives for building energy-saving and environmental protection structures.

The German air pollution control is a legally binding control factor group which should be defined as the spatial control capability level 1 (1 pm).

In China, with regard to the air pollution control, the regulatory planning may stipulate the permissible maximum value of waste gas emission. However, such emission control is the responsibility of environmental protection departments. Thus, planning bureaus cannot control the waste gas emission directly. The emission monitoring can only be implemented after the development behavior, and is not a planning guidance, but a general management tool. Although it reflects the intention of sustainable development, the waste gas emission

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<sup>1</sup> Bundesministerium für Verkehr, Bau und Stadtentwicklung: *Baugesetzbuch (BauGB)*, zuletzt geändert Dezember, 2006, § 9 para. 1 Nr. 23a

<sup>2</sup> *Ibid.*, § 9 para. 1 Nr. 24

<sup>3</sup> *Ibid.*, § 9 para. 1 Nr. 23b

<sup>4</sup> *Baunutzungsverordnung (BauNVO)*, 1993 (BGBl. I S.466), §14



control is not a mandatory constraint, and has only the spatial control capability level 3 (0.5 pm).<sup>1</sup>

The specific land use type “green buffers” (G22) in the regulatory planning is able to realize the control function of protected areas in the B-planning. As a land use control measure, the green buffer control is a mandatory constraint, which has the spatial control capability level 1 (1 pm). The air pollution control factors of the regulatory planning partially reflects the control objective concerning climate change, ozone depletion, and air quality, but the renewable energy control approach doesn’t exist in the regulatory planning.

Tab. 4-26: Comparison of the Air Pollution Control in Urban Detailed Planning in China and Germany

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
<b>Air Pollution Control Factors</b>	Emission of greenhouse gases and the harmful gases (1)	Permissible maximum value of waste gas emission (0.5)
	Protected areas (1)	Green buffers (1)
	Renewable energy exploitation (1)	

#### **4.3.4.2 Noise**

There are two main measures of noise control in the B-planning, which are the active protection and the passive protection. These noise control measures are implemented by physical constructions. The so-called active protection is intended to reduce noise emissions from noise sources, such as reducing the engine noise. The so-called passive protection is to reduce the noise absorption, such as the installation of sound insulation windows on buildings.<sup>2</sup> The German noise control is a legally binding control factor group which should be defined as the spatial control capability level 1 (1 pm).

The Chinese regulatory planning may regulate the permissible maximum value of noise to implement the noise control. This approach tries to reduce noise emissions from noise sources, so it belongs to the type of active protection. However, like the permissible maximum value of waste gas emission, the Chinese noise control is not a direct control possibility and has no connection to physical space. It is not a mandatory constraint, thus, it has only the spatial

<sup>1</sup> Ministry of Construction of the P. R. China: *Preparation Criteria of Urban Planning*, 2005, §42

<sup>2</sup> Dieter Prinz: *Städtebau Band 1*, W. Kohlhammer GmbH, Stuttgart, Berlin, Köln, 1999, S.161

control capability level 3 (0.5 pm).<sup>1</sup>

In addition, the Chinese green buffer control also works as a noise control measure, which is a passive protection approach.

Tab. 4-27: Comparison of the Noise Control in Urban Detailed Planning in China and Germany

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
<b>Noise Control Factors</b>	Active protection (1)	Permissible maximum value of noise (0.5)
	Passive protection (1)	Green buffers (1)

#### **4.3.4.3 Soil**

From the perspective of sustainable development, the urban detailed planning must control the contamination of living, industrial, hazardous, and nuclear wastes, preventing the soil degradation and maintaining the agricultural potential of the soil.

The B-planning can limit the development scope by defining the plot areas which may be built (the building restriction line (Baugrenze), building line (Baulinie), and distance between building (restriction) line and street). Moreover, the B-planning may indicate spaces where the ground has been severely contaminated by hazardous materials,<sup>2</sup> which should be paid attention to in the development. For soil resources, the B-planning can also regulate measures for the protection, conservation, and development of topsoil.<sup>3</sup> The soil control of the B-planning sufficiently reflects the objective of sustainable development.

The Chinese building line and set-back depth can somehow limit the development scope. The specific land use type “abandoned areas” (E7) in the regulatory planning refer to areas which are not used or cannot yet be used due to various reasons. It may be used to control spaces where the ground has been contaminated by hazardous materials.

The regulatory planning attempts to control soil contamination by regulating permissible

<sup>1</sup> Ministry of Construction of the P. R. China: *Preparation Criteria of Urban Planning*, 2005, §42

<sup>2</sup> Bundesministerium für Verkehr, Bau und Stadtentwicklung: *Baugesetzbuch (BauGB)*, zuletzt geändert Dezember, 2006, § 9 para. 5 Nr. 3

<sup>3</sup> *Ibid.*, § 9 para. 1 Nr. 20

maximum values of wastewater and solid wastes. This situation is the same as the air pollution control. Although it reflects the intention of sustainable development, the emission control is not a mandatory constraint which has only the spatial control capability level 3 (0.5 pm).<sup>1</sup>

Tab. 4-28: Comparison of the Soil Control in Urban Detailed Planning in China and Germany

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
<b>Soil Control Factors</b>	Building restriction line (Baugrenze), Building line (Baulinie) (1)	Building line (1)
	Distance between building (restriction) line and street (1)	Set-back depth (1)
	Measures for the protection, conservation, and development of topsoil (1)	Emission control (0.5)
	Spaces where the ground has been severely contaminated by hazardous materials (1)	Abandoned areas (1)

#### **4.3.4.4 Water**

The B-planning can control water bodies and spaces for water supply and distribution, for installations for flood control, and for the control of drainage,<sup>2</sup> as well as spaces for waste disposal and sewerage, including rainwater retention and seepage, and tipping.<sup>3</sup> These measures may regulate water resources from the perspectives of both water quality and water quantity. The German water control is legally binding and has the spatial control capability level 1 (1 pm).

In the regulatory planning, the land use types “water bodies” (E1), “water supply utilities” (U11) and “sewerage & sewage treatment utilities” (U41) cover the elements of both water quality and water quantity. Theoretically, the regulatory planning can control water pollution by regulating permissible maximum values for water pollutant emission and water pollutant concentration. The nature and defects of these measures are identical to other emission controls mentioned above.

<sup>1</sup> Ministry of Construction of the P. R. China: *Preparation Criteria of Urban Planning*, 2005, §42

<sup>2</sup> Bundesministerium für Verkehr, Bau und Stadtentwicklung: *Baugesetzbuch (BauGB)*, zuletzt geändert Dezember, 2006, § 9 para. 1 Nr. 16

<sup>3</sup> *Ibid.*, § 9 para. 1 Nr. 14

Tab. 4-29: Comparison of the Water Control in Urban Detailed Planning in China and Germany

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
<b>Water Control</b>	Water bodies and spaces for water supply and distribution, for installations for flood control, and for the control of drainage (1)	Water bodies, water supply utilities, sewerage & sewage treatment utilities (1)
<b>Factors</b>	Spaces for waste disposal and drainage, including rainwater retention and seepage, and for tipping (1)	Emission control (0.5)

#### **4.3.4.5 Biodiversity**

The German B-planning can implement biodiversity control by regulating public and private green spaces, structures for keeping small domestic animals, exhibitions, breeding, kennels, paddocks, as well as planting and preservation obligations. The German biodiversity control is the legally binding control factor group, which is defined as the spatial control capability level 1 (1 pm).

A planting or preservation obligation requires the developer to plant or preserve a tree or shrub in a given position, or to implement the greening in a specific area. The roof garden and the ground cover planting are the measures that are frequently used in the B-plan control. The roof garden can be built on buildings with flat roofs or approximate flat roofs, while the ground cover planting may be implemented on underground structures, such as underground garages. Both roof gardens and ground cover planting are ecological compensation measures against the constructive intrusion.

German roof gardens can be divided into two types, which are the extensive greening (Extensivbegrünungen) and the intensive greening (Intensivbegrünungen). The extensive greening refers to the roof garden planting with little maintenance work. The biotope greening, which is intended to keep the natural structure of plants, is also an extensive greening, but without the maintenance work.<sup>1</sup> The intensive greening includes the simplified intensive greening (Einfache Intensivbegrünungen) and the luxurious intensive greening (Aufwendige Intensivbegrünungen).<sup>2</sup> It is necessary for the implementation of the luxurious intensive greening to sod and plant shrubs, bushes, and trees, which show a height diversification and

<sup>1</sup> Jens Drefahl: *Dachbegrünung: Abdichtung, Dichtungsschutz, Konstruktiver Aufbau*, Verlagsgesellschaft Rudolf Müller, Köln, 1995, S.11~13

<sup>2</sup> Hans-Joachim Liesecke, Bernd Krupka; Gilbert Losken; Hilke Brüggemann: *Grundlagen der Dachbegrünung: zur planung, ausführung und unterhaltung von extensivbegrünungen und einfachen intensivbegrünungen*, Patzer Verlag, Berlin, 1989, S.20~21

should be regularly maintained. On the other hand, the simplified intensive greening is required for sod and plant shrubs, and bushes, which should be maintained only in necessary cases.<sup>1</sup>

The B-planning is able to realize the overall protection of the ecosystem. The green space control and the planting and preservation obligations form the ecological control capability. This ecological control capability, together with the control of structures for small domestic animals, may serve the purpose of protecting species.

The Chinese regulatory planning can regulate the land use types of public green spaces (G1) and productive plantation areas & green buffers (G2). Public green spaces include parks (G11) and roadside green spaces (G12), while productive plantation areas & green buffers include productive plantation areas (G21) and green buffers (G22). There is no planting and preservation obligation in the regulatory planning, but there is the greening rate, which is designed to control the greening proportion on the plot.

The land use control and the greening rate are all mandatory constraints.<sup>2</sup> The green space control has undoubtedly the spatial control capability level 1 (1 pm). However, since the greening rate can only partially achieve the planning control goal, it should be defined as the spatial control capability level 2 (0.75 pm). The idea of the greening rate is intended to conserve a portion of plot to build the green space. This idea considers only human beings rather than nature. Thus, it is possible to build a valid green space but destroy the ecological environment. Therefore, the green space control and the greening rate can control the biodiversity and species. But with regard to the control of the ecological diversity, the greening rate should not be considered as a perfect tool. Moreover, due to the lack of regulation on structures for small domestic animals, the regulatory planning has nearly no direct control measure to protect animals.

Tab. 4-30: Comparison of the Biodiversity Control in Urban Detailed Planning in China and Germany

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
<b>Biodiversity</b>	Public and private green spaces (1)	Public green spaces, productive plantation areas & green buffers (1)
<b>Control Factors</b>	Planting and preservation obligations (1)	Greening rate (0.75)
	Structures for small domestic animals (1)	

<sup>1</sup> Albrecht Dürr: *Dachbegrünung: ein ökologischer Ausgleich – Umweltwirkungen, Recht, Förderung*, Bauverlag, Wiesbaden und Berlin, 1994, S.11

<sup>2</sup> Ministry of Construction of the P. R. China: *Preparation Criteria of Urban Planning*, 2005, §42

#### 4.3.4.6 Energies and Minerals

The German B-planning is able to control spaces for earth deposits, excavation, and for quarrying of stone, earth and other minerals.<sup>1</sup> These land use control measures can realize the spatial control of mineral exploitation. In addition, the B-planning may also provide incentives for the building of energy-saving and environmental protection structures, which enable the sustainable exploitation of natural resources. The German energy and mineral control factors are legally binding and therefore have the spatial control capability level 1 (1 pm).

The Chinese regulatory planning can limit the land use boundary of the open-pit mine site (E8), which is a land use control with the spatial control capability level 1 (1 pm). However, there is no regulation on incentives for the building of energy-saving and environmental protection structures.

Tab. 4-31: Comparison of the Energy and Mineral Control in Urban Detailed Planning in China and Germany

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
<b>Energy and Mineral Control Factors</b>	Spaces for earth deposits, excavation and for quarrying of stone, earth and other minerals (1)	Open-pit mine site (1)
	Renewable energy exploitation (1)	

#### 4.3.4.7 Landscape and Tourism

The German B-planning can control spaces for measures for the protection, conservation, and development of the natural environment and the landscape.<sup>2</sup> Moreover, there are also possibilities for regulating public and private green spaces as well as planting and preservation obligations. These measures, which are legally binding control factors with the spatial control capability level 1 (1 pm), are able to control landscape and tourist areas with natural values and/or cultural values.

<sup>1</sup> Bundesministerium für Verkehr, Bau und Stadtentwicklung: *Baugesetzbuch (BauGB)*, zuletzt geändert Dezember, 2006, § 9 para. 1 Nr. 17

<sup>2</sup> *Ibid.*, § 9 para. 1 Nr. 20

In the land classification system of Chinese urban planning, the specific land use type “parks” (G11) may include areas of multifunctional parks with both landscape and tourist values, memorial parks, children parks, zoos, botanical gardens, classical gardens, and other scenic spots. Therefore, the Chinese land use control “parks” (G11) is equivalent to the German spatial control of the protection, conservation, and development of the natural environment and the landscape.

Besides the land use control of parks, in order to realize the landscape and tourism control, the regulatory planning may also regulate public green spaces (G1) and productive plantation areas & green buffers (G2), as well as the greening rate. However, the disadvantage of the greening rate is the same as mentioned in 4.3.4.5.

Tab. 4-32: Comparison of the Landscape and Tourism Control in Urban Detailed Planning in China and Germany

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
<b>Landscape and Tourism Control Factors</b>	Spaces for measures for the protection, conservation, and development of the natural environment and the landscape (1)	Parks (1)
	Public and private green spaces (1)	Public green spaces, productive plantation areas & green buffers (1)
	Planting and preservation obligations (1)	Greening rate (0.75)

**4.3.4.8 Summary of the Comparison Results**

The urban development and the exploitation of resources should not exceed the carrying capacity of the environment; this is the fundamental prerequisite and basic principle for sustainable development. The implementation of this principle leads to the harmony and unity between human beings and nature, enabling both generational and intergenerational equitable development.

According to the main environmental themes of sustainable development, the environmental spatial control factors of each planning type can be summarized and compared in the following table.

Tab. 4-33: Summary of the Comparison Results of Environmental Factors

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
Air pollution	Emission of greenhouse gases and the harmful gases (1)	Permissible maximum value of waste gas emission (0.5)
	Protected areas (1)	Green buffers (1)
	Renewable energy exploitation (1)	
Noise	Active protection (1)	Permissible maximum value of noise (0.5)
	Passive protection (1)	Green buffers (1)
Soil	Building restriction line (Baugrenze), Building line (Baulinie) (1)	Building line (1)
	Distance between building (restriction) line and street (1)	Set-back depth (1)
	Measures for the protection, conservation and development of topsoil (1)	Emission control (0.5)
	Spaces where the ground has been severely contaminated by hazardous materials (1)	Abandoned areas (1)
Water	Water bodies and spaces for water supply and distribution, for installations for flood control, and for the control of drainage (1)	Water bodies, water supply utilities, sewerage & sewage treatment utilities (1)
	Spaces for waste disposal and drainage, including rainwater retention and seepage, and for tipping (1)	Emission control (0.5)
Biodiversity	Public and private green spaces (1)	Public green spaces, productive plantation areas & green buffers (1)
	Planting and preservation obligations (1)	Greening rate (0.75)
	Structures for small domestic animals (1)	
Energies & Minerals	Spaces for earth deposits, excavation and for quarrying of stone, earth and other minerals (1)	Open-pit mine site (1)
	Renewable energy exploitation (1)	
Landscape & Tourism	Spaces for measures for the protection, conservation, and development of the natural environment and the landscape (1)	Parks (1)
	Public and private green spaces (1)	Public green spaces, productive plantation areas & green buffers (1)
	Planting and preservation obligations (1)	Greening rate (0.75)



The arithmetic average of each environmental theme can be calculated and compared according to the seven environmental themes of sustainable development. The result is shown in the following figure.

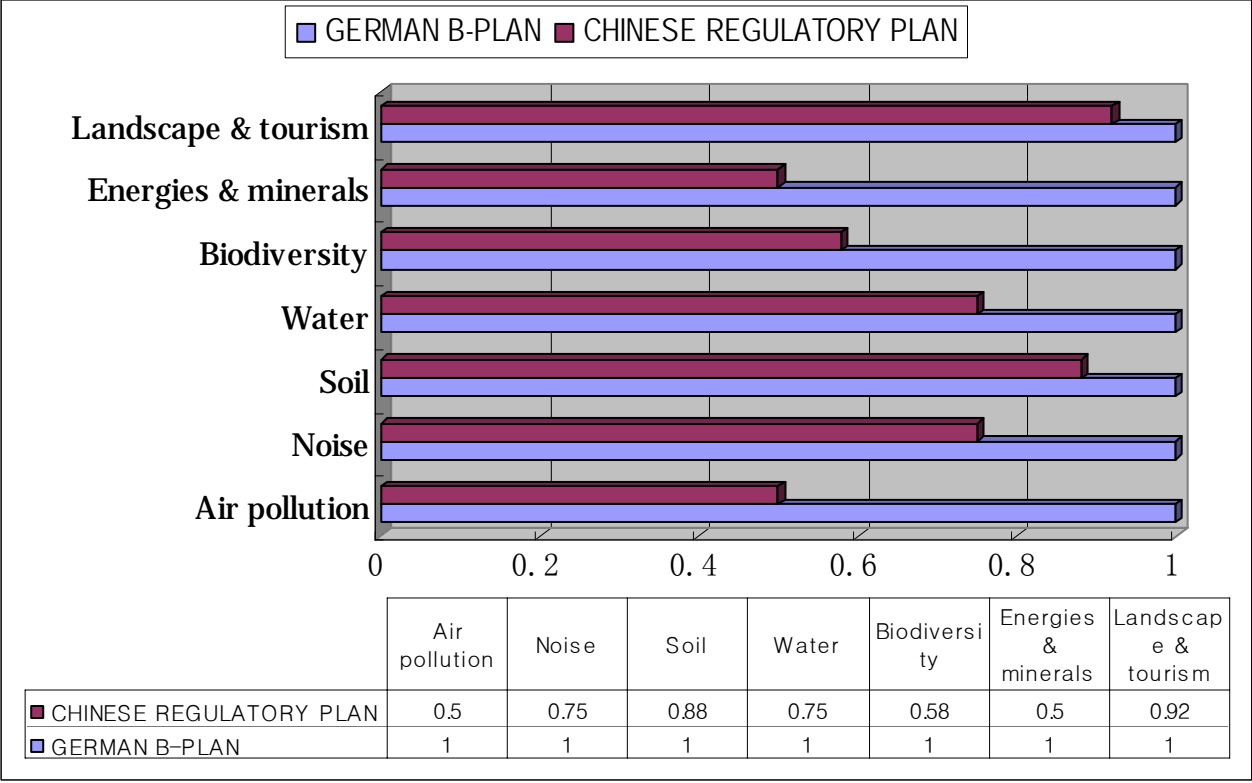


Fig. 4-7: Theoretical Comparison of Environmental Spatial Control Capabilities in Urban Detailed Planning in China and Germany

## 4.4 Summary

From the theoretical perspective of urban planning, the chapter has accomplished the systematical comparative study of spatial control in urban detailed planning in China and Germany.

Firstly, the chapter has analyzed the spatial control of the German B-planning qualitatively and theoretically. Based on the analysis of the B-plan components and control approaches, the chapter has summarized the control system of the B-planning, which includes the spatial control factors of building use, the land use control factors of infrastructures, the land use control factors of public needs, the land use control factors of ecological and environmental protection, the land use control factors of historic heritages, as well as the spatial control factors of architectural purposes.

Secondly, the chapter has analyzed the spatial control of the Chinese regulatory planning qualitatively and theoretically. Based on the analysis of the regulatory plan components and control approaches, the chapter has presented the control system of the regulatory planning, which includes the land use control factors, the building construction control factors, the control factors of facilities, as well as the control factors of activities.

Finally, according to the general framework of the comparative research, the chapter has compared and analyzed the spatial control in urban detailed planning in China and Germany. In order to clarify the spatial control capability of each planning type, which reflects the possibility of realizing the sustainable development, the theoretical comparative study has been implemented in the institutional, economic, social, and environmental themes. For the institutional theme, the qualitative analysis has been adopted for comparative study. For the economic, social, and environmental themes, both qualitative analysis and quantitative analysis have been adopted, and the spatial control capabilities of control factors have been defined and compared.

The research results show that:

Both German B-plan and Chinese regulatory plan are statutory formal plans with spatial control functions. The German B-plan is the legally binding local statute supported by a developed legal system, while the regulatory plan is the plan with the legally binding nature supported by a complete and rapidly developing legal system. The implementation of the B-plan is mainly a building permission control, while the implementation of the regulatory

plan is the control of land use and building permission. Both planning types have the legally binding procedure of supervision.

In order to meet the needs of China's large-scale urban development, rapid urbanization, as well as high urban population density, the decision-making methods of the regulatory planning are the top-down planning decision-making methods based on economic and social analysis. In contrast, the decision-making method of the B-planning follows the typical experiment model with detailed substantiations of economic, social and environmental issues.

The public participation of both planning types has legal status, legally binding details, and reliable access to information. However, the participation scope of the B-plan is more comprehensive than that of the regulatory plan.

The qualitative and quantitative analysis of the economic, social, and environmental themes shows that for each theme, the general spatial control capability of the regulatory planning is weaker than that of the B-planning.

With regard to the **economic theme**, the Chinese spatial control capabilities of the type and degree of building and land use are equivalent to the German control capabilities. The Chinese spatial control capabilities of the plot areas which may be built on, transportation, and municipal utilities are close to the German control capabilities. The differences are that the regulatory planning has no control of spaces to be encumbered with the provision of public infrastructure, and that the controls of the building interval and entrances and exits have insufficient statutory effects.

With regard to the **social theme**, the Chinese spatial control capabilities of the housing and heritages are equivalent to the German control capabilities. The Chinese spatial control capability of the public facilities is close to that of the Germans. However, the Chinese spatial control capability of land use equality is weaker than China's counterpart, while the Chinese spatial control capability of the urban image and locality is much weaker than the German measure. The differences are that the Chinese planning legal system and public participation are still in a transitional period, while the Chinese urban design guideline and the building interval control are not the mandatory constraints.

With regard to the **environmental theme**, the Chinese spatial control capabilities in all aspects are significantly weaker than the German control capabilities. The differences are grouped as follows:

There are no controls for renewable energy exploitation and the structures for small domestic

animals in the regulatory planning;

The control of the greening rate doesn't completely reflect the idea of sustainable development;

The emission controls are not mandatory constraints. Since they are not spatial control methods, it is difficult to implement the emission controls in practice.

# **Chapter 5 COMPARATIVE RESEARCH ON URBAN DETAILED PLANNING IN CHINA AND GERMANY: CASE STUDIES**

## **5.1 Selection of Cases**

### **5.1.1 Principles of the Case Selection**

The basic principle of the case selection is to select typical and current plan cases, which can provide rich informations for case studies.

In order to study the spatial control of various development projects, it is necessary to select both urban renewal cases and new urban development cases.

In order to study the spatial control of different land use types, the residential, industrial, and town center development cases should be selected.

In the comparative study, particular attention should be paid to spatial scales of plan cases. In contrast to the German B-plan, although the Chinese regulatory plan is also the urban detailed plan, its planning area normally covers more than 10 blocks. In this case, the planning area of a German B-plan is roughly comparable with the area of a zone or a plot in the regulatory plan. Therefore, in order to enable a reasonable comparative study, the dissertation has selected specific development projects in the regulatory plan cases whose spatial scales are similar to those of the B-plan cases.

### **5.1.2 Selection of Cases**

The selection of cases may be illustrated and compared in the following tables.

Tab. 5-1: Selection of Residential Land Use Cases

	<b><i>GERMAN B-PLAN CASE: RESIDENTIAL LAND USE</i></b>	<b><i>CHINESE REGULATORY PLAN CASE: RESIDENTIAL LAND USE</i></b>
Plan Name	B-plan "Im Raiser" (former grenadier barrack) Zuffenhausen (Zu 212)	Regulatory Plan of the Industrial Part of Shuangjing Area in Beijing
Date of Plan Validation	2001	December, 2000
Development Type	Urban renewal	Urban renewal
Land Use Type	Residential land use: the development of a new settlement	Residential land use: the development of a new settlement
Spatial Scale	9.3 ha	Baihuan Residence (B1 zones): 9.35 ha

Tab. 5-2: Selection of Industrial Land Use Cases

	<b><i>GERMAN B-PLAN CASE: RESIDENTIAL LAND USE</i></b>	<b><i>CHINESE REGULATORY PLAN CASE: RESIDENTIAL LAND USE</i></b>
Plan Name	B-plan Zuse-/Curiestraße (Unterer Grund) Vaihingen 236	Regulatory Plan of Changgou Town, Fangshan District, Beijing
Date of Plan Validation	2001	July, 2004
Development Type	New urban development	New urban development
Land Use Type	Industrial land use: the development of a new commercial area	Industrial land use: the development of a new industrial park
Spatial Scale	11.09 ha	Hi-tech industrial park: 17.287 ha

Tab. 5-3: Selection of Town Center Development Cases

	<b><i>GERMAN B-PLAN CASE: RESIDENTIAL LAND USE</i></b>	<b><i>CHINESE REGULATORY PLAN CASE: RESIDENTIAL LAND USE</i></b>
Plan Name	B-plan Haupt-/Bachstraße (brewery plot) Vaihingen 234	Regulatory Plan of Zhongguancun West in Beijing
Date of Plan Validation	2003	June, 1999
Development Type	Urban renewal	Urban renewal
Land Use Type	Core land use: the development of a new civic center	Commercial areas & public facilities: the development of a new civic center
Spatial Scale	3.75 ha	Commercial & cultural center (S-6): 5.46 ha

All three B-plan cases are from current German urban planning data which have already been implemented. Until now, all developments have been accomplished based on the B-plans. The regulatory plan cases are prepared during the same period as the B-plans. The Baihuan Residence has been developed and it is a active community now. As the new civic center of Beijing, as well as the national innovative base, most parts of the Zhongguancun West have already been developed. However, the hi-tech industrial park of Changgou town is still under construction.

## 5.2 Comparative Research on Spatial Control of Residential Development Cases

### 5.2.1 Comparison of Spatial Control Goals of Residential Development Cases

#### 5.2.1.1 Spatial Control Goal of B-plan Case “Im Raiser”

The planning goal of the B-plan “Im Raiser” Zuffenhausen (Zu 212) is to develop a residential community which is suitable for family use, especially young families with more than one child. In accordance with the principles of intensive land use, reasonable cost, and environmental protection, the B-plan should optimize the development quality and maximize possibilities of energy saving.<sup>1</sup> Therefore, the spatial control goal of the B-plan case “Im Raiser” can be divided into three parts:

1. To alter the land use type from military use to residential use;
2. To meet the housing needs of residents, especially young families with more than one child, by developing the economical, but high-quality dwellings;
3. To protect ecological resources as well as to realize the intensive land use and energy-saving development.

#### 5.2.1.2 Spatial Control Goal of Regulatory Plan Case “Shuangjing”

The planning goal of the regulatory plan “Shuangjing” is to alter the original land use type from industrial use to residential use. On the basis of moving the factories in the planning area to other places, it is intended to develop new residential communities with a comfortable environment. The necessary public facilities and infrastructure should be updated and built synchronously. Moreover, the environment should be improved with more green spaces, and the principle of reasonable and intensive land use should be carefully considered.<sup>2</sup>

The spatial control goal of the regulatory plan “Shuangjing” can be divided into three parts:

1. To alter the land use type from industrial use to residential use;

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<sup>1</sup> Landeshauptstadt Stuttgart Amt für Stadtplanung und Stadterneuerung: *Bebauungsplan Im Raiser Zuffenhausen (Zu 212) Begründung*, 2001, S.4

<sup>2</sup> Beijing Municipal Institute of City Planning and Design (BMICPD): *The Regulatory Plan of the Industrial Part of Shuangjing Area in Beijing*, 2000



2. To meet the housing need and develop relevant public facilities and infrastructure;
3. To develop more green spaces to improve the environmental quality.

### **5.2.1.3 Comparison of Spatial Control Goals of Residential Plan Cases in China and Germany**

The spatial control goal of the B-plan case was based exactly on the relevant regulations in *The Federal Building Code (Baugesetzbuch)*. However, in contrast to the German act, the Chinese *Urban Planning Act* and *Preparation Criteria of Urban Planning* had more principles rather than details. The Chinese *Urban Planning Act*, which was still the Chinese basic law of urban planning at that time, could not systematically reflect the concept of sustainable development. Therefore, the legal obligation of the regulatory planning was far less than that of the German B-planning.

With regard to the economic goals, both the German B-plan “Im Raiser” and the Chinese regulatory plan “Shuangjing” are the alteration of land use. Each plan case is intended to develop the new urban settlement that should be implemented mainly by the spatial layout of land use and infrastructure. Thus, the economic goal of the B-plan case is primarily identical to that of the regulatory plan case.

With regard to the social goals, the German B-plan “Im Raiser” is intended to meet the housing need of residents. The social goal of the Chinese regulatory plan “Shuangjing” is similar to that of the B-plan case.

With regard to the environmental goals, the difference between two plans begin to unfold. According to the idea of sustainable development, in the B-plan “Im Raiser,” it is regulated to protect ecological resources and realize the intensive land use and energy-saving development. However, in the regulatory plan “Shuangjing,” it is required only to develop more green spaces to improve the environmental quality. Such environmental control goals are based on the idea of the landscape development, and ignore the unity of ecological environment and its interactive relationship with human activities. It obviously deviates from the idea of sustainable development.

Tab. 5-4: Comparison of Spatial Control Goals of Residential Plan Cases in China and Germany

	<b>GERMAN B-PLAN CASE “Im Raiser”</b>	<b>CHINESE REGULATORY PLAN CASE “Shuangjing”</b>
<b>Economic Goal</b>	Alteration of land use: from military use to residential use	Alteration of land use: from industrial use to residential use; To improve infrastructure conditions
<b>Social Goal</b>	To meet the housing need of residents, especially young families with more than one child	To meet the housing need; To develop relevant public facilities
<b>Environmental Goal</b>	To protect ecological resources; To realize the intensive land use and energy-saving development	To develop more green spaces to improve the environmental quality

## 5.2.2 Analysis of the Spatial Control System of the B-plan Case: Im Raiser

### 5.2.2.1 Analysis of Institutional Factors of the B-plan “Im Raiser”

#### 1. Preparation of the B-plan “Im Raiser”<sup>1</sup>

The planning area is located in Zuffenhausen, north of Stuttgart. From 1936 to 1945, this area used to be the grenadier barrack of the German Wehrmacht. After World War II, from 1945 to 1993, this barrack turned into the military area of the U. S. military force. In 1993, this military area was returned back to the Federal Republic of Germany by the U. S. army. From then on, the municipality of Stuttgart city initiated the B-plan procedure. In order to provide comfortable and affordable housing to young families with multiple children, the municipality was intended to redevelop this area as a residential area. At present, the development has already been accomplished.

The municipality and the urban planning bureau initiated the plan preparation by proposing the concept of planning and the morphology plan. Then, an urban design competition “former grenadier barrack” was held. The design of the competition winner became the basis of the B-plan.

From then on, the planning followed the conventional procedure of the B-plan preparation, which included early public participation, substantiation, draft plan design, formal public participation, as well as the formation & legislation of the B-plan.

#### 2. Plan substantiation<sup>2</sup>

Based on the planning goal, the main content of substantiation (Begründung) was the analysis of important planning issues, such as the coordination between the B-plan and other relevant valid plans, transportation infrastructure, public facilities, garbage disposal and municipal utilities, environmental protection, and development cost. The B-plan substantiation was intended to find and define the public’s interest in this project so that the justified conclusions could be embodied in the B-plan regulations.

The substantiation of the B-plan “Im Raiser” concentrated on the following aspects:

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<sup>1</sup> Landeshauptstadt Stuttgart Amt für Stadtplanung und Stadterneuerung: “*IM RAISER*” Städtebauliche Entwicklungsmaßnahme Stuttgart-Zuffenhausen, 2004, S.1~2

<sup>2</sup> Landeshauptstadt Stuttgart Amt für Stadtplanung und Stadterneuerung: *Bebauungsplan Im Raiser Zuffenhausen (Zu 212) Begründung*, 2001

- a. The situation of the planning area was examined. Other valid plans and regulations, which covered the planning area, were clarified. And the coordination measures were developed;
- b. According to the urban transportation forecast, the necessary transportation infrastructure was analyzed, including motor vehicle facilities, pedestrian and bicycle facilities, parking spaces and garages, as well as public transportation facilities;
- c. Based on the planning goal, land use, and location of the planning area, the necessary public facilities were analyzed;
- d. Based on the forecast data, the necessary garbage disposal and municipal utilities were analyzed;
- e. A large part of the substantiation discussed issues concerning environmental interest. There were five main points including the landscape and nature, climate, biotope, noise, as well as remaining industrial waste. the Wehrstein Geotechnik office examined and analyzed the remaining industrial waste in the planning area. The conclusion showed that the military use of the planning area in the past 70 years definitely had negative effects on the environment, especially on the biotope. Moreover, the industrial wastes generated by the repair and maintenance of military vehicles were still in the soil. The Bender and the Stahl firm monitored the noise pollution. The result indicated that the buildings in the planning area which would be located along the Schozacher street would be subject to intense noise interference. The normal living would be affected. Moreover, the Roter Stich street would also generate certain noise which could affect the planning area. Based on the conclusions above as well as informations from the environmental department, the substantiation proposed that the prospective development should:

Exploit environmental compatible energies for heating; improve heat insulating measures; exploit the solar energy and other clean energy sources;

Build roof gardens and water permeable parking spaces;

Preserve the valuable shrubs and bushes at the edge of the planning area; regulate these area as the public green space;

Preserve the existing stone wall which contains several types of plants; make full use of original materials, such as wall stones, paving materials, sands, cobblestones and so on;

Create nesting possibilities for the swallow (Mauersegler) on the buildings along the Schozacher street;

Clean the industrial waste in the soil by divesting, replacing, or other appropriate methods;

Establish a noise insulating installation which should be located from the southeast edge to the northeast corner of the planning area. The minimum height of this installation should be 2.5m (calculated from the plot level). The rooms in the buildings along the Schozacher street which need to be protected from the noise (for example, children's rooms, bedrooms, living rooms), should be organized on the back side to the street in the architectural design. If it is not possible, the passive sound insulating measures must be adopted.

f. Finally, the development cost was analyzed in the substantiation.



Fig. 5-1: Dwelling Development "Im Raiser"

## **5.2.2.2 Analysis of Economic Control Factors of the B-plan “Im Raiser”**

### **1. Type of building and land use**

The boundary of the planning area and land use types are designated in the B-plan map. The permissive building types and the land use compatibility are stipulated in the B-plan text.

### **2. Degree of building and land use**



There is no value of the site occupancy index (GRZ) in the map or text. However, the building line and the building restriction line are used to define the permissive scopes of buildings. Moreover, the building height is regulated. Therefore, the spatial volume of each building can be controlled.

For general residential areas (WA) and mixed areas (MI), the elevation of the ground floor (EFH) is first regulated, then the building height based on the EFH is defined. For the building 406, the ridge height (FH) stipulation is also applied.

### **3. Plot areas which may be built on**

Because of the absence of the GRZ and GFZ, the building line and the building restriction line are of great importance to implement the spatial control goals. Through the building line and the building restriction line, the plot areas which may be built on are defined.

### **4. Transportation**

There is only a yellow colored legend in the B-plan which represents traffic areas, including motor vehicle roads, pedestrian and bicycle lanes, and parking spaces for motor vehicles. However, different signs clarify different uses, for example, “Schozacher Straße” and “Weg B” represent motor vehicle roads, “Geh- u. Radweg” represents pedestrian and bicycle lanes,  represents parking spaces for motor vehicles, and  represents traffic green spaces.

The spatial scopes of embankments and retaining walls, which are necessary to the road development, are designated in the B-plan map. Spatial scales of them are stipulated in the B-plan text.

The coordinates of road control points and the maximum limits of road slopes are designated in the B-plan map.

In the B-plan “Im Raiser”, the parking spaces (St) on the plots are also regulated both in the map and in the text. The difference between parking space (St) and parking space for motor vehicles (Ⓟ) is that the parking space (St) must be built as water permeable ground.

There are two kinds of garages regulated in the B-plan. One is the public underground garage (GGa), the other is the ground garage with the roof (Ga). Parking spaces (St) and public underground garages (GGa) are constructed for MI areas and WA<sub>2</sub> areas. Normal ground garages (Ga) are permitted to be built in the so-called “free financing area”.

Spaces to be encumbered with rights of passage in favor of the general public are regulated both in the map and in the text. In this B-plan, the function of these spaces is similar to pedestrian and bicycle lanes.



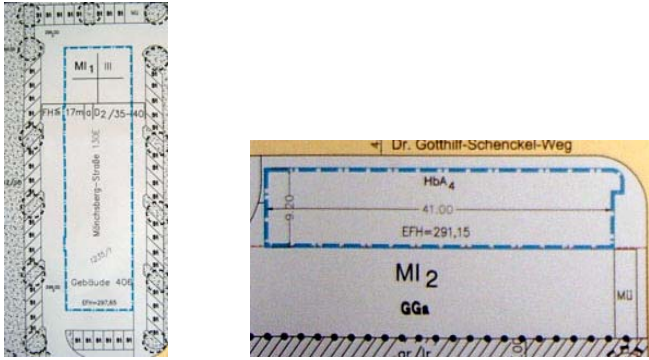


## **5. Municipal utilities**

Spatial scopes of garbage cans are designated in the B-plan map. Meanwhile, the physical formation of garbage cans is stipulated in the B-plan text. The necessary distance from the garbage can to the road is proposed in the hint.

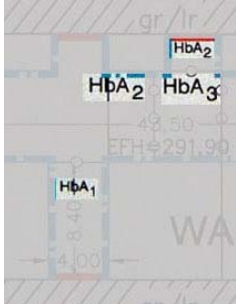

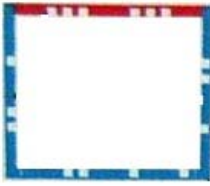


Spatial scopes of municipal utility structures on the plots are designated in the B-plan map.

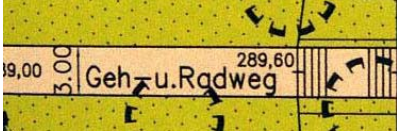

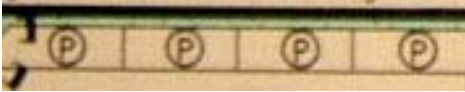



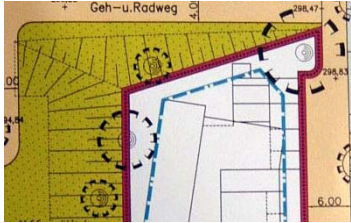



Locations of underground pipelines are also designated in the B-plan map. In the plan hint, it is proposed that with regard to underground pipelines, the developer should coordinate with the Neckarwerken Stuttgart, the LW, the Deutsch Telekom, and the underground engineering bureau.

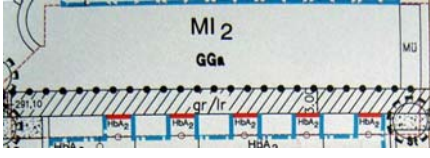
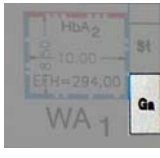


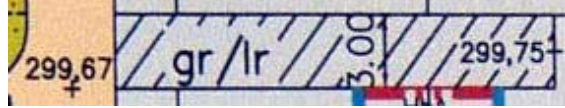

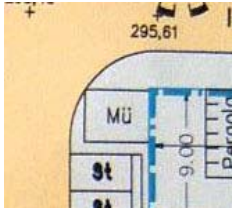




Tab. 5-5: Analysis of Economic Control Factors of the B-plan “Im Raiser”

TYPE OF BUILDING AND LAND USE		
	Mapping Designations & Textual provisions	Site Photos
<b>GENERAL RESIDENTIAL AREA</b>	 <p>WA<sub>1+2</sub>: In each residential building, there will be only 1 dwelling permitted. If another necessary parking space is justified, the second dwelling can be permitted in an exceptional case. The exceptional cases pursuant to BauNVO §4Para. 3 are not permitted. (§9 para. 1, No.6. BauGB; §4, §1para. 5, BauNVO)</p> <p>WA<sub>2</sub>: Each residential building has 1 berth in the public garage. (§9 para. 1, No.4, BauGB) The parking responsibility of 2 parking spaces is not affected. (see “garages &amp; general parking spaces”)</p>	
<b>MIXED AREA</b>	 <p>MI<sub>1+2</sub>: Residential buildings, commercial and office buildings, retail shops, administration facilities, as well as structures for churches, cultural, social and hygienic goals, are permitted. (§9 para. 1, No.1&amp; §6, BauGB ; §1para. 4, 5, 6 &amp; para. 9, BauNVO)</p> <p>MI<sub>2</sub>: Each housing unit has 1 berth in the public garage.</p>	
DEGREE OF BUILDING AND LAND USE		
	Mapping Designations & Textual provisions	Site Photos
<b>BUILDING COVERAGE (GR)</b> <b>SITE OCCUPANCY INDEX (GRZ)</b>	<p>GR is defined by plot areas which may be built on. Roof bulges, terraces, secondary building parts and building projections, which are relevant to GR, may exceed GRZ up to additional 0.1. The upper limit regulated in §17 para. 1, BauNVO for WA (0.4) is not affected. (§16 para. 2 No. 1, §19 §21a, BauNVO)</p> <p>For building plots of public garages, GRZ is permitted up to 1.0. (§19 para. 4 sentence 3 &amp; §21a para. 3, BauNVO)</p> <p>Parking spaces whose surfaces are water permeable, together with passages, garages and secondary structures pursuant to §14 BauNVO, may exceed the permitted GRZ up to 0.8. (§19 para. 4 sentence 2 and 3, BauNVO)</p>	



<p><b>BUILDING HEIGHT (HBA)</b></p>		
	<p>General regulations: with regard to the building height (HbA), chimneys, exhausts, heat insulation layers, roof gardens and cocklofts, in following exceptional cases, may exceed the regulated limit by at most 0.5 m.</p> <p>HbA<sub>1</sub>: Maximal HbA 3.5m, calculated from the bottom of the ground floor.</p> <p>HbA<sub>2</sub>: Maximal HbA 6.5m, calculated from the bottom of the ground floor. As far as HbA<sub>2</sub> and HbA<sub>3</sub> are stipulated, in exceptional cases, roof terraces with pavilions and banisters may be higher than the roof of the first floor.</p> <p>HbA<sub>3</sub>: Maximal HbA 9.5m, calculated from the bottom of the ground floor.</p> <p>HbA<sub>4</sub>: Maximal HbA 12.0m, calculated from the bottom of the ground floor.</p> <p>HbA<sub>5</sub>: Maximal HbA 3.5m, calculated from the bottom of the ground floor. In exceptional cases, roof terraces (maximum 80 m<sup>2</sup>) with pavilions (maximum 25 m<sup>2</sup>) and banisters may exceed HbA. (§16, §18, BauNVO)</p>	
<p><b>PLOT AREAS WHICH MAY BE BUILT ON</b></p>		
	<p><b>Mapping Designations &amp; Textual provisions</b></p>	<p><b>Site Photos</b></p>
<p><b>BUILDING LINE (BAULINIE); BUILDING RESTRICTION LINE (BAUGRENZE)</b></p>		
<p><b>TRANSPORTATION</b></p>		
	<p><b>Mapping Designations &amp; Textual provisions</b></p>	<p><b>Site Photos</b></p>
<p><b>MOTOR VEHICLES ROADS</b></p>		

<p><b>PEDESTRIAN AND BICYCLE LANES</b></p>	 <p>Access to garages and parking spaces is permitted. (§9 para. 1No. 11, BauGB)</p>	
<p><b>PARKING SPACES FOR MOTOR VEHICLES</b></p>		
<p><b>TRAFFIC GREEN SPACES</b></p>		
<p><b>EMBANKMENTS &amp; RETAINING WALLS</b></p>	 <p>So long as the map contains no other regulations, corridors next to transportation areas are available for embankments, diggings, and retaining walls. The horizontal distance should be 2.0m from the street boundary line (Straßenbegrenzungslinie), while the vertical distance should be 1.0m from the road altitude. The regulation is also valid for underground retaining structures which are required for road construction (horizontal range 0.1m, vertical range 0.4m). (§9 para. 1No. 26, BauGB)</p>	
<p><b>GENERAL REGULATIONS ON SECONDARY STRUCTURES, GARAGES AND PARKING SPACES</b></p>	<p>General regulations: In plot areas which may not be built on, maximum 20 m<sup>3</sup> of secondary structures may be permitted. (§23 para. 5, BauNVO)</p> <p>General regulations on garages and parking spaces:</p> <p>The parking responsibility boosted to 2 parking spaces. (§74 para. 2 No. 2, LBO)</p> <p>Outside plot areas which may be built on, garages and parking spaces with roofs (carports) are only permitted on the plots marked Ga, Cp, St. The exceptional cases of WA<sub>1</sub> area are not affected. Here, parking possibilities for other housing units inside plot areas which may be built on should be explained (for example, in the house). (§9 para. 1No. 4, BauGB; §12 para. 5, 6, §23 para. 5, BauNVO; §74 para 1, 2, LBO)</p>	
<p><b>PARKING SPACES</b></p>	 <p>St: Parking spaces without roofs (St).</p>	

<p><b>GARAGES</b></p>	  <p>GGa: Public garages covered by soil. They serve MI<sub>2</sub> areas and WA<sub>2</sub> areas. As long as there are no building developments such as pedestrian zones, play grounds, passages, terraces, and secondary structures, those garages should be covered with at least 0.6m-thick topsoil. The planting must be implemented and maintained.</p> <p>Ga: The roof form of garages (Ga) and carports (Cp) should be the flat roof or approximate flat roof which has slope angles less than or equal to 7°. The topsoil on those roofs should be at least 12cm thick, where the planting should be implemented extensively.</p>	 
<p><b>SPACES TO BE ENCUMBERED WITH RIGHTS OF PASSAGE IN FAVOR OF THE GENERAL PUBLIC</b></p>	 <p>gr/lr: Spaces to be encumbered with rights of walking and passage in favor of the general public, an agency charged with the provision of public infrastructure or a limited group of persons. The driving of bicycles is permitted in those spaces. (§9 para. 1No. 21, BauGB)</p>	
<p><b>MUNICIPAL UTILITIES</b></p>		
	<p><b>Mapping Designations &amp; Textual provisions</b></p>	<p><b>Site Photos</b></p>
<p><b>PLACES FOR GARBAGE CANS</b></p>	 <p>Garbage cans should be located in the building or in the green space. Meanwhile, the roof formation and the hint "garbage disposal" should be considered. If the garbage disposal interest is regarded, exceptional cases may be permitted. (§74 para. 1, LBO)</p> <p>The location of a garbage can should be maximum 1.5 m from the road edge so that it is accessible for disposal vehicles. The details are regulated in the morphology plan.</p>	
<p><b>MUNICIPAL UTILITY STRUCTURES</b></p>		
<p><b>PIPELINES</b></p>		

### **5.2.2.3 Analysis of Social Control Factors of the B-plan “Im Raiser”**

#### **1. Land use equality**

The preparation of the B-plan followed the stipulations in the relevant acts and ordinances. The public participation was also implemented. The planning goal, which focuses on the affordable housing of young families with more than one child, is consistent with the objective of sustainable social development.

#### **2. Housing**

The floor area, which is controlled by the building line, building restriction line, as well as the building height in the B-plan “Im Raiser”, reflects the housing level.

#### **3. Public facilities**

Regarding areas for public facilities (GB), the plot areas which may be built are designated in the B-plan map by building restriction lines, as well as the maximum number of floors.

#### **4. Urban image and locality**

Roof forms of buildings in the WA<sub>2</sub>, WA<sub>1</sub>, MI<sub>2</sub> and MI<sub>1</sub> areas and the requirements for roof gardens are stipulated in the B-plan text. The roof symbol of the building 406 is designated in the B-plan map.

The requirement for building façade is proposed in the B-plan hint.

The requirement for antenna is stipulated in the B-plan text.

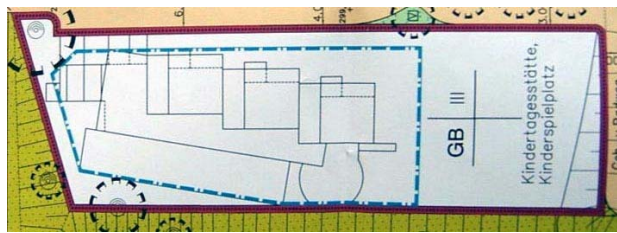

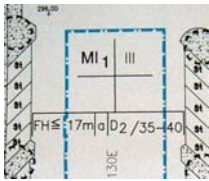


In order to ensure urban design characters, the requirement for advertising installations and automats is stipulated in the B-plan text.



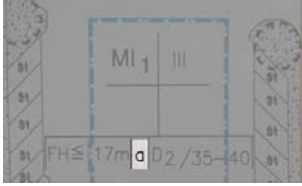
The general requirement for coverage type is stipulated in the B-plan text. Moreover, The coverage type symbol of the building 406 is designated in the B-plan map.

#### **5. Heritages**

The requirement for archaeological discovery is proposed in the B-plan hint.

Tab. 5-6: Analysis of Social Control Factors of the B-plan “Im Raiser”

<b>LAND USE EQUALITY</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>LEGAL SYSTEM</b>	See institutional factors.	
<b>PUBLIC PARTICIPATION</b>	See institutional factors.	
<b>HOUSING</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
	See the Building line (Baulinie), building restriction line (Baugrenze) and the building height (HbA).	
<b>PUBLIC FACILITIES</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>AREAS FOR PUBLIC FACILITIES (GB) NUMBER OF FLOORS</b>		
<b>URBAN IMAGE &amp; LOCALITY</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>ROOF FORMS</b>	 <p>WA<sub>2</sub>: Approximate flat roof which has slope angles up to 7°. Exceeding to the regulated scope can be permitted. Roofs, including roofs of secondary structures, should be developed as roof gardens. Topsoil on roofs should be at least 12cm thick, where grasses, shrubs can be planted and maintained. The regulations on garages are not affected.</p> <p>WA<sub>1</sub>+MI<sub>2</sub>: Similar to that of WA<sub>2</sub>. If the regulation of HbA is conformed to, in exceptional cases, special cases of roof forms and slope angles may be permitted.</p> <p>MI<sub>1</sub> D<sub>2</sub>/35-40: Roof angles 35° to 40°. The tile-cover gable roof. Solar energy structures and roof gardens may be permitted in exceptional cases. (§74Para. 1No. 1, LBO)</p>	 

<p><b>BUILDING FACADE</b></p>	<p>Refer to the regulations on the façade material and color in the morphology plan.</p>	
<p><b>ANTENNA</b></p>	<p>Each building permits maximum 1 outdoor antenna installation. If the visibility is only subordinate from the public traffic space, exceptional cases may be permitted. (§74 para. 1No. 4, LBO)</p>	
<p><b>ADVERTISING INSTALLATIONS AND AUTOMATS</b></p>	<p>In WA area, advertising installations are not permitted. In exceptional cases, obligative locations may be permitted. In MI area, advertising installations and automats are permitted to be located in obligative locations and under the building eaves. However, only individual letter can be higher than 0.8m. (§74 para. 1No. 2, LBO)</p>	
<p><b>COVERAGE TYPE (BAUWEISE)</b></p>	<div style="text-align: center;">  </div> <p>a: As long as the coverage type is not an open development (offene Bauweise), the length of the building must be less than 66m. (§22, BauNVO)</p>	
<p><b>HERITAGES</b></p>		
	<p><b>Mapping Designations &amp; Textual provisions</b></p>	<p><b>Site Photos</b></p>
<p><b>HINT</b></p>	<p>In cases of discovering archaeological heritages, it is required to report this to the heritage bureau or the police station (§20, DSchG).</p>	

#### **5.2.2.4 Analysis of Environmental Control Factors of the B-plan “Im Raiser”**

##### **1. Air pollution**

It is stipulated in the B-plan text that special precaution be taken in order to provide protection against harmful measures affecting nature and landscape.

According to the conclusion of the plan substantiation, the roof garden is necessary to improve the climate and air quality. Therefore, various roof gardens are stipulated in the B-plan text.

Moreover, the requirement for use of certain materials, which give rise to air pollution, is proposed in the B-plan hint.

##### **2. Noise**

The location of noise protecting facility (Lärmschutzeinrichtung), as well as the requirement for the protection against the noise, are stipulated in the B-plan text.

##### **3. Soil**

The building line and building restriction line can limit development scopes of buildings so that the soil outside the building window can be protected. Moreover, the requirements for soil exploitation are proposed in the B-plan hint.

##### **4. Water**

The requirement for paving materials of outdoor parking spaces is stipulated in the B-plan text. The requirement for water exploitation is proposed in the B-plan hint.

##### **5. Biodiversity**

Spatial scopes of public green spaces and children’s playgrounds (KiSpi), the location of the stone wall which should be preserved, as well as the locations of planting and preservation obligations, are designated in the B-plan map.

The requirements for children’s playgrounds (KiSpi), planting and preservation obligations, as

well as nesting possibilities for swallows (Mauersegler), are stipulated in the B-plan text.



## 6. Energies & Minerals

The privilege of renewable energy exploitation is stipulated in the B-plan text..

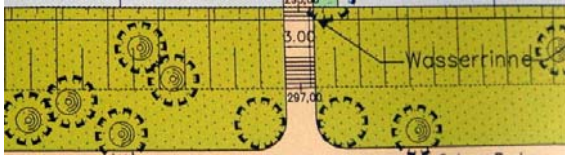

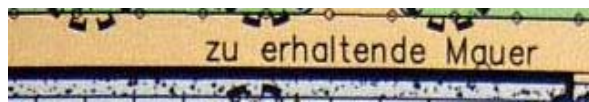

## 7. Landscape & Tourism




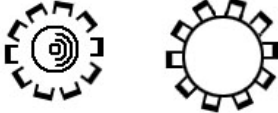

In the B-plan “Im Raiser”, the landscape and tourism control is realized by the control of public green spaces, children’s playgrounds (KiSpi), and planting and preservation obligations. The children’s playground is also one kind of public green spaces in the B-plan.

Tab. 5-7: Analysis of Environmental Control Factors of the B-plan “Im Raiser”

AIR POLLUTION		
	Mapping Designations & Textual provisions	Site Photos
<b>INDICATION</b>	<p>Indication of special precaution which should be taken in order to provide protection against harmful measures affecting nature and landscape.</p> <p>The plan should indicate spaces which will require special provisions to counter the traffic air pollution.(§9 para. 5, BauGB)</p>	
<b>REGULATIONS ON ROOF GARDENS</b>	See roof forms.	
<b>HINT</b>	Environmental protection, air: the limitation order of the utilization of air polluting fuels should be referred to (1997/5).	
NOISE		
	Mapping Designations & Textual provisions	Site Photos
<b>PHISICAL PROTECTION AGAINST THE NOISE</b>		



	Along the Schozacher street, Moenchsberg street and Roter Stich street, there is a certain range, which has a maximum of 50 m in horizontal distance from the street edge. In this range, it is required to provide physical protection against the outdoor noise (for example, the installation of sound insulating windows). The outdoor noise level nearby is up to 67dB (A) during daytime, and 59 dB (A) at night. (§9 para. 1No. 24, BauGB)	
<b>SOIL</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>HINT</b>	<p>In cases of discovering the soil contamination, it must be reported to the department of urban environmental protection.</p> <p>Constructive plots: the geologic professionals should be involved to examine the building foundation.</p> <p>The topsoil protection: when the building is constructed and the essence of the topsoil is changed, the developer has the responsibility to maintain the healthy condition of the topsoil. (§202, BauGB).</p>	
<b>WATER</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>PARKING SPACES</b>	The parking spaces should be built with water permeable ground (for example, seams by sand).	
<b>HINT</b>	Protection of water resources: it is required for each measure concerned with underground water to acquire the permission of <i>The Water Management Act (Wasserhaushaltsgesetz)</i> . The regulations in <i>The Water Management Act</i> of Baden-Württemberg should be referred to.	
<b>BIODIVERSITY</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>PUBLIC GREEN SPACES</b>		
<b>PRESERVATION OF THE ORIGINAL STONE WALL</b>		

<p><b>CHILDREN'S PLAYGROUNDS (KISPI)</b></p>	 <p>Children's playgrounds (KiSpi): The Children's playgrounds should have game installations as follows: slides, swings, water pumps, as well as climbing and ball playing installations. The Children's playground which is close to the Schozacher street, should provide physical protection against the noise. Game installations should be established on the water permeable ground. Non-accessible areas should be planted as green spaces.</p>	
<p><b>PLANTING &amp; PRESERVATION OBLIGATIONS</b></p>	 <p>General regulation: As long as they are not essential pedestrian areas, passages, parking spaces, terraces, as well as other infrastructures and recreational facilities, plot areas which may not be built on should be planted as gardens or green spaces with trees and shrubs which suit the local climate and environment. (§9 para.1No.25, BauGB; §74 para. 1No. 3, LBO)</p>  : Planting shrubs and bushes.  : According to the explanation in the legend, there are obligations relating to the planting and preservation of trees. At the planting time, the trunk perimeter of the small crown tree should be 0.14 meter, the medium crown tree 0.18 meter, and the large crown tree 0.25 meter. The deviation from the controlling location may be permitted within the scope of 3m. <p>In the area of underground pipelines, the planting of trees and shrubs is permitted in the range 2.5m from the pipelines, in cases where the owner agrees. Changes of horizontal distances are not permitted if they are more than 0.20 m.</p>	 

<p><b>NESTING POSSIBILITIES FOR SWALLOWS (MAURSEGLER)</b></p>	<p>In order to protect swallows (Mauersegler), in this area, nesting possibilities should be secured on eastern sides of buildings in the MI area. Detailed descriptions can be acquired from the Bureau of the Environmental protection. (§9 para. 1No. 20, BauGB)</p>	
<p><b>ENERGIES &amp; MINERALS</b></p>		
	<p><b>Mapping Designations &amp; Textual provisions</b></p>	<p><b>Site Photos</b></p>
<p><b>PRIVILEGE OF RENEWABLE ENERGY EXPLOITATION</b></p>	<p>In order to realize energy-saving programs in accordance with §56 para.2 no.3, LBO, with regard to heat insulating structures and secondary energy profit programs, especially positive and passive solar energy installations integrated with the building, if they coordinate with the public interest, they may be permitted to be built as exceptional cases:</p> <p>1) According to the regulations pursuant to §31para. 1, BauGB; §16 para. 6, BauNVO: Those structures can exceed the building restriction line by maximum 0.2m. The observance to GRZ is not affected. Those structures can exceed HbA by maximum 0.5m. (See the general regulations on HBA)</p> <p>2) The local building codes in accordance with §56 para. 3, LBO. The requirements of roof forms in accordance with §74 para. 1 No. 1&amp; 3, LBO. (§9 para. 1No. 24, BauGB)</p>	
<p><b>LANDSCAPE &amp; TOURISM</b></p>		
	<p><b>Mapping Designations &amp; Textual provisions</b></p>	<p><b>Site Photos</b></p>
	<p>See the biodiversity: public green spaces, children's playgrounds (KiSpi), and planting and preservation obligations</p>	

## 5.2.3 Analysis of the Spatial Control System of the Regulatory Plan Case “Shuangjing”

### 5.2.3.1 Analysis of Institutional Factors of the Regulatory Plan “Shuangjing”

#### 1. Regulatory Plan of the Beijing Central District

From 1995 to 1999, the municipality of Beijing had prepared *The Regulatory Plan of the Beijing Central District* in accordance with *The Master Plan of Beijing*. The plan was intended to further implement the requirements of the urban land use layout and infrastructure regulated in *The Master Plan of Beijing*. Through the quantitative control of the type and degree of land use, more specific requirements for urban development were proposed.

*The Regulatory Plan of the Beijing Central District* was approved by the municipality of Beijing in 1999. There were seven control indicators proposed in the plan, which include the number of zone, land use area, land use type, building height, plot ratio, greening rate, and building density. The seven control indicators became the direct basis for issuing the permission note for location, land use permit, and building permit. However, *The Regulatory Plan of the Beijing Central District* did not have all necessary details regulated in *The Preparation Criteria of Urban Planning*. It is essentially an intermediate plan between the master plan and the regulatory plan.

#### 2. Reason for initiation of the regulatory plan amendment in Beijing

With rapid urban development in Beijing, there was the constantly increasing need for urban space. In the environment of the market economy, some regulated indicators in *The Regulatory Plan of the Beijing Central District* were challenged by economic and social need. Therefore, the regulatory plan amendment was inevitable. It was not only a continuation and deepening of the existing *Regulatory Plan of the Beijing Central District*, but also a result of the urban development reality.

**The regulatory plan “Shuangjing”** was a case of the regulatory plan amendment in Beijing, which had been prepared following the general process of the regulatory plan amendment. In the planning area, many projects, like the Baihuan residence, were developed in 2007. Nowadays, the Baihuan residence is a large residential community which has resolved the housing problem of thousands of citizens.

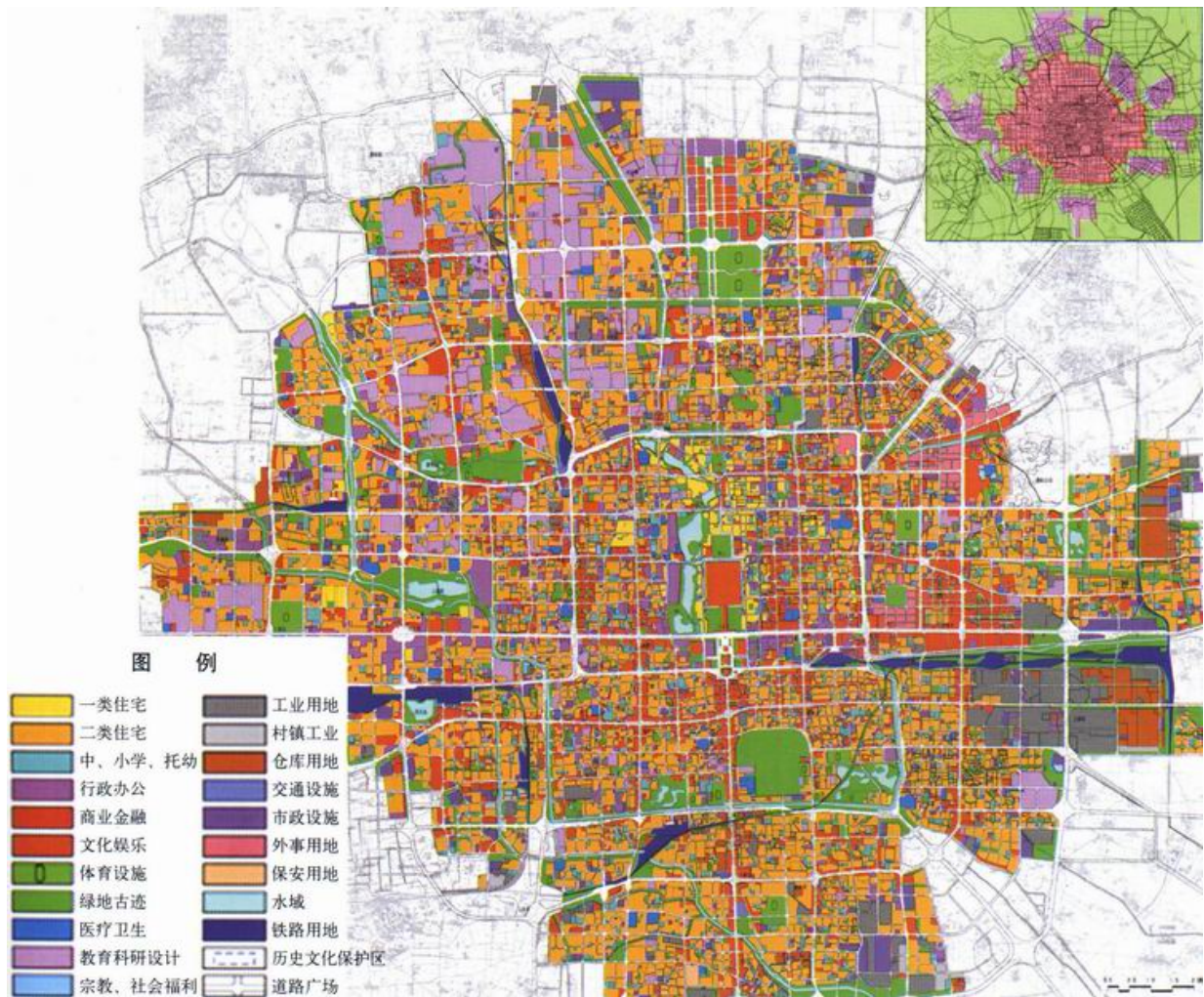


Fig. 5-2: The Regulatory Plan of the Beijing Central District

(Source: *Urban Planning Database (Vol. 4): the Regulatory Planning*, 2002)

### 3. Process of the regulatory plan amendment in Beijing

The urban planning bureau of Beijing was responsible for the amendment and implementation of regulatory plans. The regulatory plan amendment process had four steps, which were the application for plan amendment, pretrial and publicity, review, and issuance. The pretrial and the publicity were undertaken simultaneously. The duration of publicity should be 15 working days.

Tab. 5-8: Interactive Mechanism among the Stakeholders in the Regulatory Plan Amendment in Beijing

	Municipality (Urban Planning Bureau)	Relevant Public Bodies	Planners	Developers	General Public
Application			●	●	
Pretrial	●				○
Review	●	●			
Issuance	●				

● to undertake ○ to participate

#### 4. Implementation of the regulatory plan amendment in Beijing

The urban planning bureau of Beijing, which represented the municipality, was responsible for the implementation of amended regulatory plans including the regulatory plan “Shuangjing”. The implementation mechanism of the regulatory plan amendment was a mixture of both case inspection and plan-based direct building permission. If the building application met the control requirements regulated in the regulatory plan, the urban planning bureau would issue the building permission in accordance with the plan. It was a plan-based direct building permission. However, when the building application did not meet the control requirements regulated in the regulatory plan, the developer could submit an application of regulatory plan amendment to the urban planning bureau in order to realize the building project. In this case, the feasibility of the regulatory plan amendment would be determined by the rigorous process mentioned above. This was a mechanism of case inspection.

#### 5. Decision of control indicators

In order to preserve the precious historic urban center of the Chinese capital city, it was regulated in *The Regulatory Plan of the Beijing Central District* that building heights must be controlled so that the historic skyline would not be impaired. Moreover, as another important control indicator that was closely connected with the building height, the plot ratio must also be controlled.

The building height control in *The Regulatory Plan of the Beijing Central District* was intended to protect the traditional pattern of the historic city of Beijing and preserve traditional urban landmarks, urban landscapes and ventilation corridors, as well as valuable urban communities.

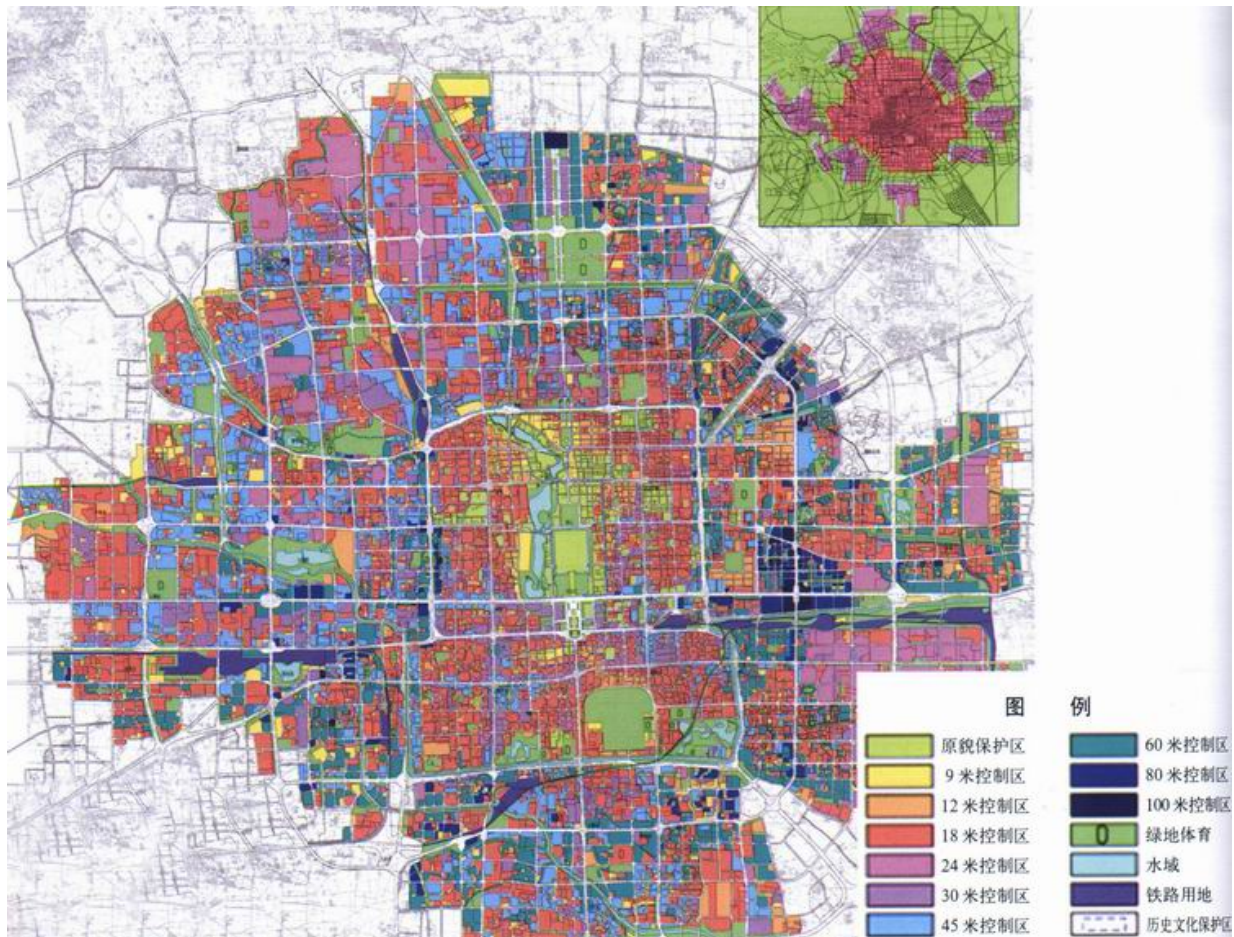


Fig. 5-3: The Building Height Control of the Beijing Central District  
(Source: *Urban Planning Database (Vol. 4): the Regulatory Planning*, 2002)

The plot ratio in *The Regulatory Plan of the Beijing Central District* was determined by the building height. In practice, on the basis of the investigation and analysis of typical public buildings and residential communities, the data of the plot ratio was summarized.<sup>1</sup> According to the data, the control parameter table was developed.<sup>2</sup>

It was stipulated in *The Technical Standard of the Regulatory Plan Amendment Review* that building projects should be grouped as housing projects or non-housing projects, and the plot

<sup>1</sup> Jiansu Institute of Urban Planning & Design (as the chief editor): *Urban Planning Database (Vol. 4): the Regulatory Planning*, China Architecture & Building Press, Beijing, 2002, 1st edition, p. 116

<sup>2</sup> Li, Jiangyun: *Discoveries on the Index Adjusting Process of Regulatory Detailed Plan of Beijing Central District*, City Planning Review, 12/2003, Beijing, 2003, p. 37

ratio could be divided into the standard plot ratio and the maximum plot ratio. The so-called standard plot ratio was regulated in the control parameter table in *The Regulatory Plan of the Beijing Central District*. Maximum plot ratios had been developed based on *The Code for Settlement Planning & Design* (maximum plot ratio for housing projects) or typical development experiences in the Beijing CBD (maximum plot ratio for non-housing projects). In the planning administration, if a development project could make contribution to the city, the standard plot ratio could be raised as a bonus. However, it was not allowed to exceed the regulated maximum plot ratio.

Referring to the control parameter table regulated in *The Regulatory Plan of the Beijing Central District*, the regulatory plan “Shuangjing” defined the maximum building height of each zone in accordance with relevant regulations.

Tab. 5-9: Plot Ratio Control of Housing Projects in Beijing  
(Source: *The Technical Standard of the Regulatory Plan Amendment Review*, Beijing)

Building Height (m)	Standard Plot Ratio	Maximum Plot Ratio
<18	1.0	1.1
18	1.6	1.7
30	2.1	2.2
45	2.2	2.5
60	2.5	3.0
>=80	3.0	3.5

Tab. 5-10: Plot Ratio Control of Non-housing Projects in Beijing  
(Source: *The Technical Standard of the Regulatory Plan Amendment Review*, Beijing)

Building Height (m)	Standard Plot Ratio	Maximum Plot Ratio
<18	1.5	1.8
18	2.0	2.5
30	2.5	3.5
45	3.0	4.0
60	3.5	4.5
80	4.0	5.0
>=100	4.5	5.5





Fig. 5-4: Dwelling Development “Shuangjing”

### **5.2.3.2 Analysis of Economic Control Factors of the Regulatory Plan “Shuangjing”**

#### **1. Type of building and land use**

In the zoning map, the land use plan map and the building height control map, the boundary and the land use type of each zone are designated. The B1-10, B1-11 and B1-12 zones, which form the territory of the Baihuan Residence, are also regulated in this mode.

The planning area is divided into five large groups of zones, which are named as A1, A2, A3, A4, and B1. They are separated by urban roads. In each zone group, zones are defined and numbered. The control indicator table in the regulatory plan text is designed to regulate control indicators of each zone, which are called “quantitative indicators”.

The area and the land use type of each zone are stipulated in the control indicator table as quantitative indicators, while the land use type of each zone is illustrated in the land use plan map.

#### **2. Degree of building and land use**

The maximum plot ratio of each zone is stipulated in the control indicator table as a quantitative indicator.

The maximum building density of each zone is stipulated in the control indicator table as a quantitative indicator.

The maximum building height of each zone is stipulated in the control indicator table as a quantitative indicator. The maximum building height of each zone is illustrated in the building height control map.

The maximum residential density of residential zones is stipulated in the control indicator table as a quantitative indicator.

#### **3. Plot areas which may be built on**

In the zoning map, the land use plan map, and the building height control map, the building line of each zone is designated.

#### 4. Transportation

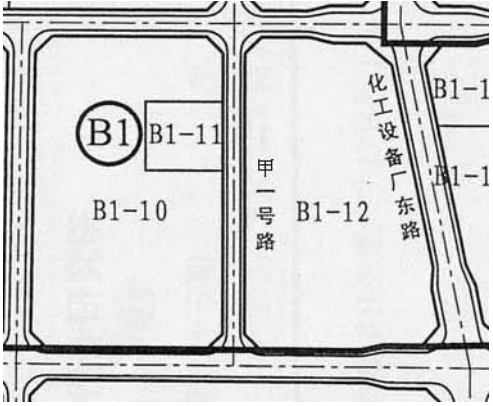

In the zoning map, the land use plan map and the building height control map, the boundary of each road is designated. The Baihuan Residence is enclosed by the Great Sacrificial Pavilion No.3 Street in the north, the Rising China Residence Road in the west, the People’s Factory Road in the south, and the Chemical Factory Road in the east. The A No. 1 Road is located in the middle of the Baihuan Residence, separating the B1-10, B1-11 zones from the B1-12 zone.

The parking berth number of each zone is also available in the control indicator table as a quantitative indicator. It is defined according to relevant national standards. Parking spaces and/or garages should be developed based on the regulated parking berth number. With regard to the Baihuan Residence, the standard is seven parking berths per 10 families.



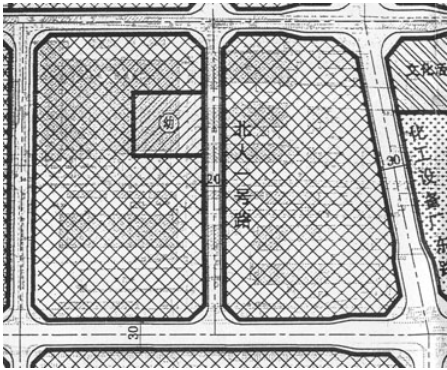



#### 5. Municipal utilities

The land use boundary of each municipal utility is designated in the zoning map and the land use plan map. The corresponding plot ratio, building density, building height, floor area, and greening rate are stipulated in the control indicator table as quantitative indicators.

Tab. 5-11: Analysis of Economic Control Factors of the Baihuan Residence (B1 zone) in the Regulatory Plan “Shuangjing”

TYPE OF BUILDING AND LAND USE		
	Mapping Designations & Textual provisions	Site Photos
<b>RESIDENTIAL AREA</b>		
	<p>B1-10: Residential Areas II (Dwellings with normal quality) (R2), area 4.49ha;</p> <p>B1-12: Residential Areas II (Dwellings with normal quality) (R2), area 4.43ha</p>	

**DEGREE OF BUILDING AND LAND USE**

	Mapping Designations & Textual provisions	Site Photos
<b>PLOT RATIO</b>	Quantitative indicators: maximum limits B1-10: 2.5 B1-12: 2.5	
<b>BUILDING DENSITY</b>	Quantitative indicators: maximum limits B1-10: 30% B1-12: 30%	
<b>BUILDING HEIGHT</b>	<div style="text-align: center;">  </div> <p>  represents the maximum building height is 60 m;   represents the maximum building height is 12 m                 </p>	
<b>RESIDENTAL DENSITY</b>	Quantitative indicators: B1-10: 3817 B1-12: 3766	

**PLOT AREAS WHICH MAY BE BUILT ON**

	Mapping Designations & Textual provisions	Site Photos
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<p><b>BUILDING LINE</b></p>		
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**TRANSPORTATION**

	<p style="text-align: center;"><b>Mapping Designations &amp; Textual provisions</b></p>	<p style="text-align: center;"><b>Site Photos</b></p>
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<p><b>ROAD CONTROL</b></p>		
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<p><b>PARKING BERTH NUMBER</b></p>	<p>Quantitative indicators:          B1-10: 835          B1-12: 824</p>	
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### **5.2.3.3 Analysis of Social Control Factors of the Regulatory Plan “Shuangjing”**

#### **1. Land use equality**

The regulatory plan amendment in Beijing was intended to amend the urban land use layout and modify control indicators according to the principles of the market economy. Some elements of the legally binding process and public participation were embodied in the plan preparation.

#### **2. Housing**

The plot ratios of the B-10 and B1-12 zones are regulated to control the total floor area of the Baihuan Residence.

#### **3. Public facilities**

The land use boundary and the land use type of each public facility are designated in the land use plan map. The corresponding plot ratio, building density, building height, floor area, and greening rate are stipulated in the control indicator table as quantitative indicators. Public facilities designated in the regulatory plan “Shuangjing” cover institutional, sanitary, commercial, administrative, office, cultural, and sports facilities.

With regard to the Baihuan Residence, the B1-11 zone is defined as the R53 area where a kindergarten should be developed. The corresponding maximum plot ratio, building density, building height, floor area, and minimum greening rate are stipulated in the control indicator table as quantitative indicators.

#### **4. Urban image and locality**

The urban design guideline in the regulatory plan “Shuangjing” is intended to control building volumes and landscape axes in the planning area.



With regard to the overall planning area, the building volume control proposes a laddered variation of the building height, as well as two landmark points with buildings of 80m high. The landscape axis control requires the development of one primary landscape axis along the Guangqu Road, and two subsidiary landscape axes along the Chemical Factory Road and the Nine-dragon Residence East Road.


With regard to the Baihuan Residence, the subsidiary landscape axis along the Chemical Factory Road should be considered.

## 5. Heritages

There is no regulation on the heritage in the regulatory plan “Shuangjing”.

Tab. 5-12: Analysis of Social Control Factors of the Baihuan Residence (B1 zone) in the Regulatory Plan “Shuangjing”

LAND USE EQUALITY		
	Mapping Designations & Textual provisions	Site Photos
<b>LEGAL SYSTEM</b>	See institutional factors.	
<b>PUBLIC PARTICIPATION</b>	See institutional factors.	
HOUSING		
	Mapping Designations & Textual provisions	Site Photos
	See the plot ratio.	
PUBLIC FACILITIES		
	Mapping Designations & Textual provisions	Site Photos
<b>R53 AREA (KINDERGARTEN )</b>	 <p>Quantitative indicators of the B1-11 zone:            Maximum plot ratio: 0.8;            Maximum building density: 30%;            Maximum building height: 12m;            Maximum floor area: 0.34ha;            Minimum greening rate: 30%</p>	

URBAN IMAGE & LOCALITY		
	Mapping Designations & Textual provisions	Site Photos
	To develop the subsidiary landscape axis along the Chemical Factory Road.	

#### **5.2.3.4 Analysis of Environmental Control Factors of the Regulatory Plan “Shuangjing”**

There was no environmental or ecological assessment being implemented in the planning process. Therefore, there was no substantiation about the air pollution, noise, soil, water, biodiversity, or energies & minerals in the regulatory plan “Shuangjing.”



There are two environmental control factors in the regulatory plan “Shuangjing”. One is the control of public green spaces, and the other is the control of the greening rate.

Spatial scopes for public green spaces are designated in regulatory plan map, while corresponding control indicators are stipulated in the control indicator table. Moreover, the minimum greening rate of each zone is also regulated in the control indicator table as an important quantitative indicator. However, the control of the greening rate has no sufficient ecological research basis.

With regard to the Baihuan Residence, the only environmental control factor is the minimum greening rate.



Tab. 5-13: Analysis of Environmental Control Factors of the Baihuan Residence (B1 zone) in the Regulatory Plan “Shuangjing”

ENVIRONMENTAL CONTROL FACTOR		
	Mapping Designations & Textual provisions	Site Photos
<b>GREENING RATE</b>	Quantitative indicators: minimum limits B1-10: 30%; B1-11: 30%; B1-12: 30%	 

## 5.2.4 Comparison of Spatial Control of Residential Development Cases

### 5.2.4.1 Comparison of Economic Control Factors

#### 1. Comparison of the land use type control

With regard to the land use type control, the spatial control approach of the B-plan case “Im Raiser” is similar to that of the regulatory plan case “Shuangjing”. In both plan cases, land use types and land use compatibilities are all regulated by mapping designations and textual provisions. Mapping designations control land use boundaries of plots, while textual provisions control land use types and compatibilities of plots.

The land use type control factors in both plan cases are all mandatory factors with important functions to achieve the planning goal. Therefore, they should be defined as the spatial control capability level 1 (1 pm).

#### 2. Comparison of the land use degree control

The site occupancy index (GRZ) is controlled by textual provisions in the B-plan case “Im Raiser”. The textual provisions regulate the permissible cases of GRZ, which include additional GRZ bonus for building parts, garages, and parking spaces. The regulation on the development of water permeable parking spaces is intended to protect the soil and the water system.

The maximum building density of each zone is controlled by quantitative indicators in the text of the regulatory plan case “Shuangjing”. With regard to the Baihuan Residence, three zones have the same maximum building density of 30%. This value is less than the maximum limit (0.4) regulated in §17 para. 1, BauNVO for general residential areas (WA). The control approach of the Chinese building density is identical to that of the German site occupancy index (GRZ). However, in the regulatory plan case, there is no regulation on the building density bonus for building parts, garages, and parking spaces.

With regard to the plot ratio control, there is no regulation on the plot ratio in the B-plan case “Im Raiser”. However, since the building windows in the B-plan “Im Raiser” are quite precise, the plot ratio control can be realized by the combination of the building window control and the building height control. On the other hand, in the regulatory plan case “Shuangjing”, the maximum plot ratio of the Baihuan Residence is 2.5, which is the standard plot ratio of the

residential area with a permissible maximum building height of 60m.<sup>1</sup> However, this value is far greater than the maximum plot ratio (GFZ) limit (1.2) regulated in §17 para. 1, BauNVO for general residential areas (WA).

With regard to the building height control, relative building heights, which are calculated from the elevation of the ground floor (EFH), are regulated in the B-plan case “Im Raiser”. As for the existing Building 406, the ridge height (FH) is controlled. In the regulatory plan case “Shuangjing”, the building height control is the key point and basis of the plan. There is a specific building height control map which illustrates the maximum building height of each zone. The the control indicator table in the plan text controls maximum building height of each zone, which also refers to the relative building height calculated from the elevation of the ground. The maximum building height of the Baihuan Residence is 60m, which is far greater than the maximum building heights regulated in the B-plan case “Im Raiser”. Therefore, based on these regulations, it is clear that the Baihuan Residence project should be a development with low building density but high plot ratio and building height, where high-rise residential buildings should definitely be constructed.

Both German and Chinese land use degree control factors are vital mandatory statutory constraints which should be defined as the spatial control capability level 1 (1 pm).

The regulatory plan case “Shuangjing” also controls the maximum residential density of each residential zone. The formula is:

Total floor area of each zone = (Zone area) \* (Plot ratio)

Maximum residential density = (Total floor area of the zone) / (Planning housing area per capita)

The residential density control is not a mandatory control indicator. It is actually a basic data of the public facility and parking space planning.

### **3. Comparison of the control of plot areas which may be built on**

In the B-plan case “Im Raiser,” building lines and building restriction lines are defined to control plot areas which may be built on (building windows). In the regulatory plan case “Shuangjing”, plot areas which may be built on are controlled by defining building lines, which are situated directly above road boundary lines.

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<sup>1</sup> See Tab. 5-9: Plot Ratio Control of Housing Projects in Beijing

Due to the building interval regulations of Beijing, for the development with the low building density but high plot ratio and building height, high-rise residential buildings must be developed along building lines in order to realize the project. Necessary building intervals are realized in the B-plan case “Im Raiser” by the building window control.

In both plan cases, the control factors of plot areas which may be built on are vital mandatory statutory constraints. The building restriction line and the building line in the B-plan case should be defined as the spatial control capability level 1 (1 pm). However, in the regulatory plan case, since there is actually no difference between the building line and the road boundary line, the control of building lines has no practical function. In this case, the building line in the regulatory plan case can only be defined as the spatial control capability level 2 (0.75 pm).

#### **4. Comparison of the transportation control**

The transportation control of the B-plan case “Im Raiser” is a complete positioning control, which designates the detailed structure of each road, such as motor vehicle roads, pedestrian and bicycle lanes, parking spaces for motor vehicles, traffic green spaces, embankments and retaining walls that are necessary to the road development, and coordinates of road control points. Moreover, planting and preservation obligations are applied to control traffic green spaces.

The transportation control of the regulatory plan case “Shuangjing” is similar to that of the B-plan case “Im Raiser.” However, it is not a complete positioning control. The regulatory plan case controls the land use area of each road by designating road boundary lines.

Parking spaces and garages are controlled by mapping designations and textual provisions in the B-plan case “Im Raiser.” Building scopes of them are designated in the plan map, while relevant architectural and ecological requirements are stipulated in the plan text. The regulatory plan case “Shuangjing” adopts the parking berth number to control the necessary development of parking installations. The parking berth numbers of the Baihuan Residence come from the relevant maximum residential densities.

Spaces to be encumbered with rights of passage in favor of the general public are controlled by mapping designations and textual provisions in the B-plan case “Im Raiser.” There is no similar control approach in the regulatory plan case “Shuangjing.”

In both plan cases, the transportation control factors are vital mandatory statutory constraints, which should be defined as the spatial control capability level 1 (1 pm).

## **5. Comparison of the municipal utility control**

With regard to the municipal utility control, there are two control approaches in the B-plan case “Im Raiser,” which are the municipal utility control and the pipeline control. The municipal utility control regulates land use scopes of municipal utilities, which should be developed on different plots, as well as their building requirements. The pipeline control designates the type, location, and direction of each pipeline in the road space, and spaces to be encumbered with the provision of public infrastructure (together with the spaces to be encumbered with rights of passage in favor of the general public).

In the regulatory plan case “Shuangjing”, in principle, there is no difference between the municipal utility control and the control of any other land use type. Large municipal utilities, such as the fire brigade (A2-6 zone) and the telephone authority (B1-7 zone), are controlled by mapping designations and textual provisions. As residential areas, mapping designations control land use boundaries of municipal utilities, while land use degrees are controlled by quantitative indicators in the plan text. However, with regard to the Baihuan Residence, there is no detailed regulation on small scale municipal utilities in the residential areas.

Although normally a regulatory plan should include specific municipal pipeline plans, the regulatory plan case “Shuangjing” belongs to the regulatory plan amendment in Beijing, whose planning goal is to regulate the type and degree of building and land use. In this case, relevant pipeline networks and municipal utilities will be controlled by specific municipal infrastructure plans.

In both plan cases, the municipal utility control factors are vital mandatory statutory constraints, which should be defined as the spatial control capability level 1 (1 pm).

Tab. 5-14: Comparison of Economic Control Factors of Residential Development Cases

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
Type of Building and Land Use	Land use area and boundary (1)	Land use area and boundary (1)
	Land use type (1)	Land use type (1)
	Land use compatibility (1)	Land use compatibility (1)
Degree of Building and Land Use	Site occupancy index (GRZ) (1)	Building density (1)
	Building window + building height (1)	Plot ratio (1)
	Building height (1)	Building height (1)
Plot Areas Which may be Built on	Building restriction line (Baugrenze), Building line (Baulinie) (1)	Building line (0.75)
Transportation	Street boundary lines (1)	Road boundary lines (1)
	Control of land use scopes of motor vehicle lanes, non-motorized vehicle lanes, and sidewalks, as well as parking spaces for motor vehicles and non-motorized vehicle within road scopes (1)	Control of road spaces (1)
	Control of coordinates and elevations of control points, as well as road slopes (1)	
	Control of types and boundaries of spaces to be encumbered with walking and driving rights and rights of passage in favor of the general public (1)	
	Control of parking spaces and/or garages on the plots (1)	Control of parking berth numbers (1)
	Control of spaces for embankments, diggings, and retaining walls, which are required for road construction (1)	
Municipal Utilities	Control of types and boundaries of spaces to be encumbered with the provision of public infrastructure (1)	
	Control of municipal secondary structures on the plots (1)	Land use control of municipal structures on the plots (1)
	Control of types and locations of ground/underground pipelines (1)	Regulations on specific municipal infrastructure plans (1)

The arithmetic average of each economic theme can be calculated and compared according to the five economic themes of sustainable development. The result is shown in the following figure.

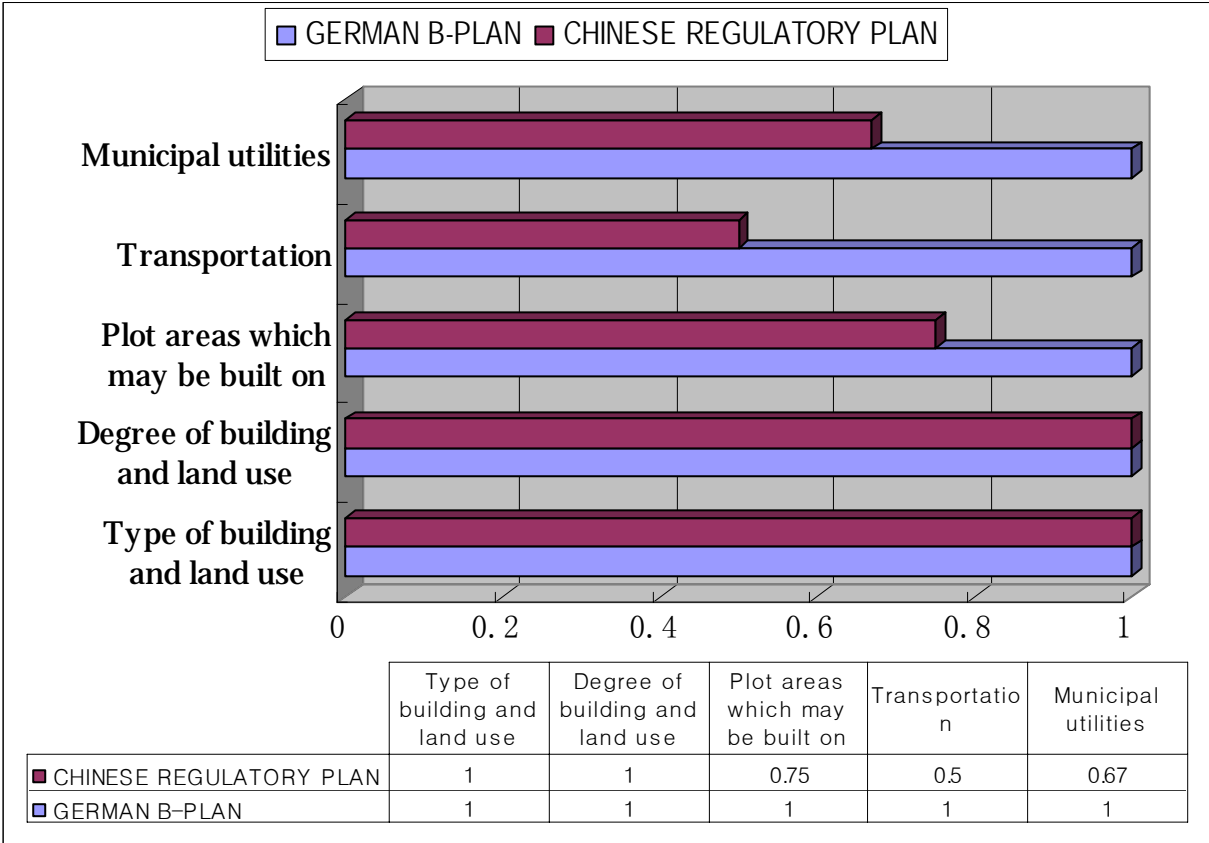


Fig. 5-5: Comparison of Economic Spatial Control Capabilities of Residential Development Cases

The figure shows that the spatial control capabilities of the regulatory plan case “Shuangjing” are equivalent to those of the B-plan case “Im Raiser” in terms of type and degree of building and land use. In the theme of plot areas which may be built on, the regulatory plan is short of the practical building control line which can effectively and flexibly regulate the building construction.

With regard to the transportation control, the B-plan case “Im Raiser” has precise control tools with much more powerful spatial control capabilities than the regulatory plan case “Shuangjing”.

With regard to the municipal utility control, in contrast to the B-plan case “Im Raiser,” the regulatory plan case “Shuangjing” has no spatial control capability to regulate pipelines on the building plots.

## **5.2.4.2 Comparison of Social Control Factors**

### **1. Comparison of the land use equality control**

The preparation of the B-plan case “Im Raiser” followed the conventional procedure of preparation, which includes the early public participation, substantiation, draft plan design, formal public participation, as well as formation & legislation of the B-plan. In the substantiation process, economic, social, and ecological issues were carefully and comprehensively studied. The research results, which included various countermeasures against negative effects that might be generated by the building development, became the regulations in the B-plan.

The B-plan case “Im Raiser” contains systematic legally binding constraints which effectively reflect the objective of sustainable development. The B-plan was approved as a local statute through a rigid statutory procedure with legally binding public participations. Therefore, the planning legal system and the public participation of the B-plan case “Im Raiser” should be defined as the spatial control capability level 1 (1 pm).

The regulatory plan “Shuangjing” was a case of the regulatory plan amendment in Beijing prepared by the four-step procedure, which were the application for plan amendment, pretrial and publicity, review, and issuance. The regulatory plan case “Shuangjing” ignored the integrality of the ecological environment and its interactive relationship with human activities. It did not really reflect the idea of sustainable development and it worked only as a technical document of the municipality, but not as a statutory plan. From the perspective of the planning legal system, the regulatory plan case “Shuangjing” should be defined as the spatial control capability level 4 (0.25 pm).

There was a process of publicity in the procedure of the regulatory plan amendment in Beijing. However, such public participation had no definite legal status and statutory mechanism. On the other hand, the absence of the ecological and environmental substantiation led to the incomplete information, which would have been of great importance to the public’s decision-making process. In this case, the objective of sustainable development could not be realized by the regulatory plan. Therefore, with regard to the public participation, the regulatory plan case “Shuangjing” should also be defined as the spatial control capability level 4 (0.25 pm).



## **2. Comparison of the housing control**

The main dwelling types in the B-plan case “Im Raiser” are independent houses (WA<sub>1</sub>) and semi-independent houses (WA<sub>2</sub>). Among them, most houses were developed in the framework of a welfare housing project which was financially supported by the local government. The regulatory plan case “Shuangjing” was also intended to develop economical dwelling projects in order to solve the housing problem of middle and low-income residents. Those projects had the financial aid from the municipality of Beijing.

The plot ratio is controlled in both plan cases. The plot ratio control in the B-plan case “Im Raiser” can be realized with the combination of the building window control and the building height control, while there is a direct regulation on the plot ratio of each zone in the regulatory plan case “Shuangjing.”

## **3. Comparison of the public facility control**

Each plan case is intended to develop a kindergarten in order to provide the service to the prospective residential community.

In the B-plan case “Im Raiser,” the kindergarten is designated in the plan map as areas for public facilities (Gemeinbedarfsflächen, GB). Moreover, building restriction lines and maximum number of floors are regulated to control the type and degree of building and land use. The spatial control of the kindergarten development in the regulatory plan case “Shuangjing” is similar to that of the B-plan case. Beside the regulation on the land use boundary of the kindergarten in the Baihuan Residence, the corresponding maximum plot ratio, building density, building height, floor area, and minimum greening rate are also stipulated in the regulatory plan case to control the degree of building and land use.

The main difference is that there is a definite concept of the building window in the B-plan case “Im Raiser,” while quantitative indicators are used to control the development behavior in the regulatory plan case. In this case, the B-plan case clearly has more powerful spatial control potentials.

In both plan cases, the public facility control factors are vital mandatory statutory constraints, which should be defined as the spatial control capability level 1 (1 pm).

#### **4. Comparison of the urban image and locality control**

With regard to the urban image and locality control, the roof form, building façade, coverage type, antenna, as well as advertising installations and automats, are considered and regulated in the B-plan case “Im Raiser”. Through these detailed control approaches, it is possible to preserve the traditional German urban image and maintain/create the local character. In practice, the urban image and locality control was effectively implemented and the satisfactory control outcome was achieved. These control factors in the B-plan case “Im Raiser” are all legally binding constraints which should be defined as the spatial control capability level 1 (1 pm).

In the regulatory plan case “Shuangjing,” the building volume control and the landscape axis control are adopted to regulate the urban image and locality. The building volume control can be realized by the building window control and the land use degree control in the B-plan. Since the building window control and the land use degree control are fundamental control factors in every qualified B-plan, the building volume control is actually a basic function of the B-plan control.

The landscape axis control is intended to control urban landscape. With regard to the Baihuan Residence, it is a requirement to develop the subsidiary landscape axis along the Chemical Factory Road. From a legal point of view, this control factor is not a mandatory constraint. Moreover, in practice, it is quite difficult to judge whether the building development meets this abstract requirement. Therefore, the landscape axis control in the regulatory plan case should be defined as the spatial control capability level 4 (0.25 pm).

#### **5. Comparison of the heritage control**

Although there is no valuable cultural heritage in the planning area, the requirement for archaeological discovery is still proposed in the B-plan case “Im Raiser.” As a guiding control, it has the spatial control capability level 3 (0.5 pm).

There is also no valuable cultural heritage in the planning area of the regulatory plan case “Shuangjing,” however, the regulatory plan has no regulation on the potential situation.

Tab. 5-15: Comparison of Social Control Factors of Residential Development Cases

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
Land Use Equality	Planning legal system (1)	Planning legal system (0.25)
	Public participation (1)	Public participation (0.25)
Housing	Building window + building height (1)	Plot ratio (1)
Public Facilities	Land use type, boundary, and compatibility (1)	Land use type, boundary, and compatibility (1)
	Site occupancy index (GRZ) (1)	Building density (1)
	Building window + building height (1)	Plot ratio (1)
	Number of floors (1)	Building height (1)
Urban Image and Locality	Roof form (1)	
	Building façade (1)	
	Building color (1)	
	Miscellaneous building installations (1)	
	Coverage type (1)	Landscape axis control (0.25)
Heritages	Hint: the requirement for archaeological discovery (0.5)	

The arithmetic average of each social theme can be calculated and compared according to the five social themes of sustainable development. The result is shown in the following figure.

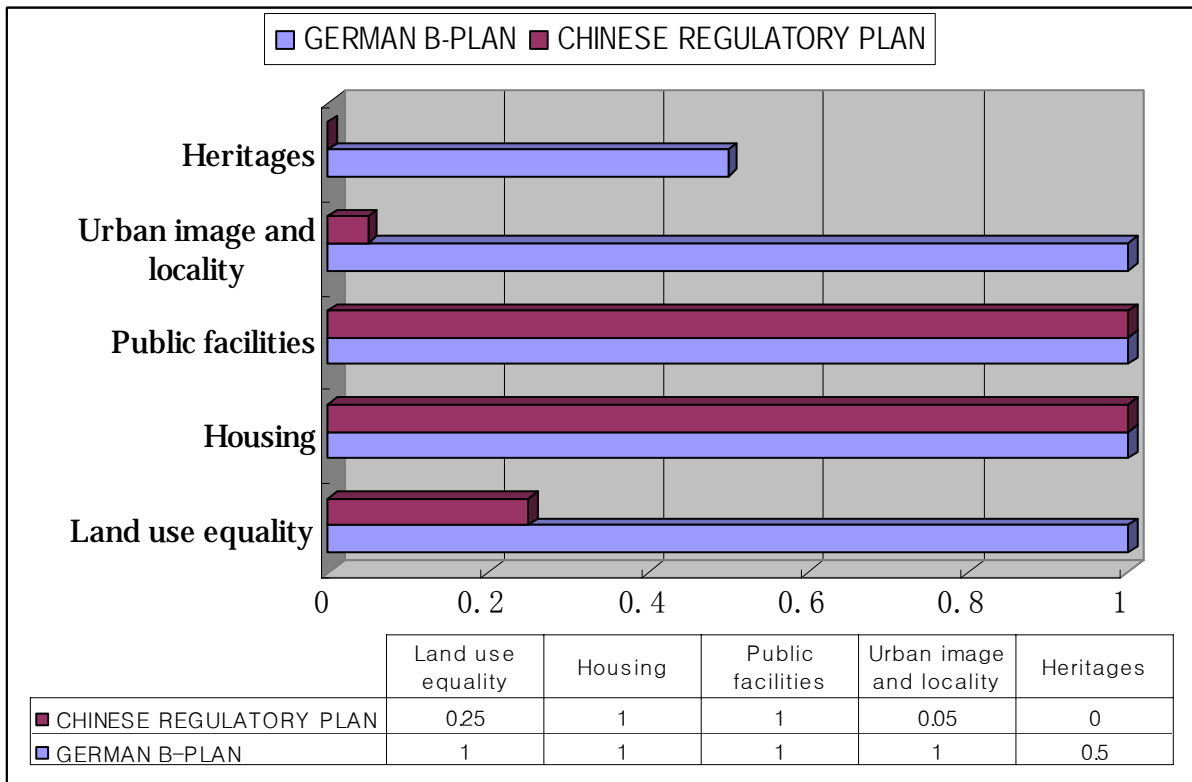


Fig. 5-6: Comparison of Social Spatial Control Capabilities of Residential Development Cases

The figure shows that the spatial control capabilities of the regulatory plan case “Shuangjing” are equivalent to those of the B-plan case “Im Raiser” in terms of housing and public facilities. However, the planning legal system and the public participation of the Chinese regulatory planning should be further improved to provide equitable access to land resources. With regard to the urban image and locality control, the spatial control capability of the regulatory plan case is extremely weak. Moreover, there is no heritage control measure in the regulatory plan case.

### **5.2.4.3 Comparison of Environmental Control Factors**

Since the initiation of the B-plan preparation, the planners had paid great attention to issues of sustainable development, especially ecological issues. The interaction between the B-planning area and relevant districts of climate, nature, landscape, forest, and heritage protection was carefully studied and coordinated. The B-plan substantiation had specific topics on the landscape and nature, climate, species and biotope, noise, and industrial waste.

The conclusions of the B-plan substantiation was directly applied to the preparation of the B-plan regulations. The spatial control measures of the air pollution, noise, soil, water, biodiversity, energies and minerals, as well as landscape and tourism, were developed in accordance to the objective of sustainable development. The built-up community shows that the implementation of these control measures is extremely effective in realizing the ecological and environmental sustainable development.

The regulatory plan case “Shuangjing” was a regulatory plan amendment in Beijing. There was nearly no specific ecological and environmental substantiation in the planning process. Only the control of public green spaces and the greening rate control are available to regulate the ecological interest. With regard to the overall regulatory planning area, the public green space is stipulated with a greening rate 100%, while the preserved zone with the original land use type and boundary is stipulated with a greening rate that shows the present ratio of green spaces, for instance the A2-7 zone (the residential area with a greening rate 31%) and the A2-8 zone (the residential area with a greening rate 35.3%). Other zones are controlled with the minimum greening rate of 30%. The B1-10, B1-11, and B1-12 zones of the Baihuan Residence also have the minimum greening rate of 30%.

Because of the harsh climate in Beijing, particularly the many sandstorms in the spring, the ideal greening model is the planting of tall trees. However, based on the greening rate control in the regulatory plan case “Shuangjing,” it was very difficult to implement this model. In contrast to the B-plan case, the greening rate control in the regulatory plan case is equivalent to the planting and preservation obligations. This control is intended to require the developer to develop a certain percentage of green space in the residential community. In practice, due to the building interval regulations in Beijing, under conditions of low building density but high plot ratio and building height, high-rise residential buildings had to be developed along building lines in order to realize the project. Meanwhile, in order to implement the parking berth number and greening rate regulated in the regulatory plan simultaneously, the developer had to construct underground garages and develop green spaces on them. This measure is similar to the German B-plan case. However, the degree of building and land use in the

German B-plan case is much lower than the regulatory plan case. Hence, less underground spaces are occupied in the German case. On the other hand, because of the high degree of building and land use, and the large parking berth number regulated in the regulatory plan case, relatively large underground spaces are occupied to build the underground garages. In this case, the topsoil on the underground garages is not enough to support tall trees in the droughty Beijing region.

Tab. 5-16: Comparison of Environmental Control Factors of Residential Development Cases<sup>1</sup>

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
Air pollution	Control of the emission of greenhouse gases and the harmful gases (1)	
	Area control in accordance with the limitation order for the utilization of air polluting fuels (0.5)	
Noise	Active protection (1)	
	Passive protection (1)	
Soil	Building restriction line (Baugrenze), Building line (Baulinie) (1)	
	Measures for the protection, conservation, and development of topsoil (0.5)	
Water	Development of the water permeable ground (1)	
	Permission of the underground water exploitation (0.5)	
Biodiversity	Public green spaces (1)	Public green spaces (1)
	Planting and preservation obligations (1)	Greening rate (0.75)
	Structures for small domestic animals (1)	
Energies & Minerals	Renewable energy exploitation (1)	
Landscape & Tourism	Public green spaces (1)	Public green spaces (1)
	Planting and preservation obligations (1)	Greening rate (0.75)

<sup>1</sup> In order to realize the scientific comparison, although the control of public spaces is not applied to the Baihuan Residence but to other plots in the planning area, this control measure should still be included as an important environmental control factor.

The arithmetic average of each environmental theme can be calculated and compared according to the seven environmental themes of sustainable development. The result is shown in the following figure.

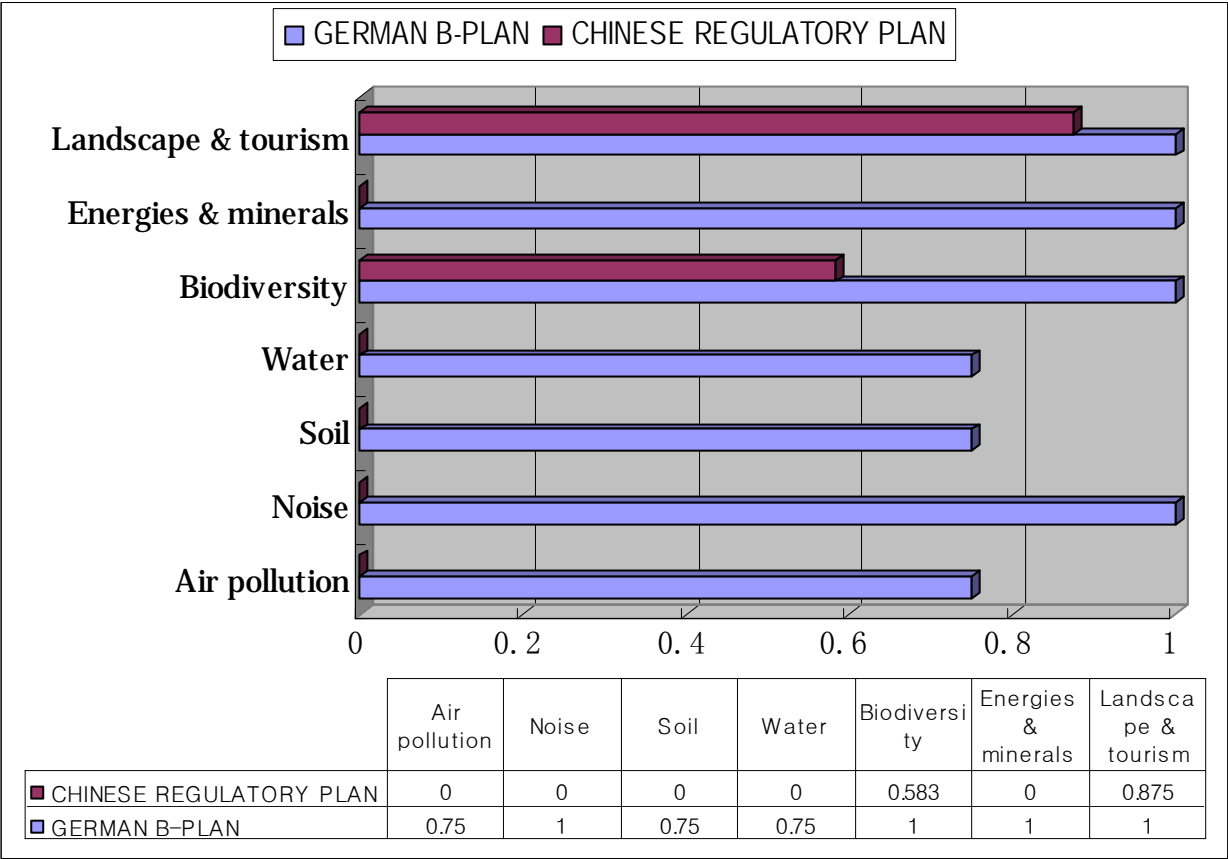


Fig. 5-7: Comparison of Environmental Spatial Control Capabilities of Residential Development Cases

The figure shows that the environmental spatial control of the regulatory plan case “Shuangjing” has very limited possibilities in contrast to that of the B-plan case “Im Raiser.” The environmental spatial control capability of the regulatory plan case is extremely weak.

## **5.3 Comparative Research on Spatial Control of Industrial Development Cases**

### **5.3.1 Comparison of Spatial Control Goals of Industrial Development Cases**

#### **5.3.1.1 Spatial Control Goal of B-plan Case “Zuse-/Curiestraße”**

The B-plan “Zuse-/Curiestraße” is intended to create a new urban quarter which provides spaces for IT enterprises and administrative management. It is required to create extraordinary urban design features based on topographic characteristics, and be compatible with the surroundings.<sup>1</sup> Therefore, the spatial control goal of the B-plan case “Zuse-/Curiestraße” can be grouped into three parts:

1. To develop a new commercial area, and hence provide working places;
2. To develop a new urban landscape by integrating the urban design concept;
3. To coordinate with the surroundings.

#### **5.3.1.2 Spatial Control Goal of Regulatory Plan Case “Changgou Town”**

The regulatory plan “Changgou Town” is intended to upgrade the local industrial structure and develop a modernized small town. The planning goal is to develop high-efficient industrial areas, comfortable and pleasant waterfront residential communities with modern public facilities and services, and to integrate the urban development with the environmental protection.<sup>2</sup> In the planning area, one of the most important projects is the industrial park. Its planning goal is to develop a high-tech industrial park on the basis of the existing industrial structure. The high-tech industrial park should be environmentally protective, energy-saving, and provide working places for local residents.<sup>3</sup>

#### **5.3.1.3 Comparison of Spatial Control Goals of Industrial Plan Cases in China and Germany**

Considering the land use type and the spatial scale, the hi-tech industrial park in the

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<sup>1</sup> Landeshauptstadt Stuttgart Amt für Stadtplanung und Stadterneuerung: *Bebauungsplan Zuse-/Curiestraße (Unterer Grund) Vaihingen 236 Begründung*, 2001, S.3

<sup>2</sup> China Institute of Urban Planning and Design: *The Regulatory Plan of Changgou Town, Fangshan District, Beijing*, 2004, p.1

<sup>3</sup> Ibid. p.2



regulatory plan case “Changgou Town” was selected as the countertype of the B-plan “Zuse-/Curiestraße.”

With regard to the economic goals, the spatial control goal of the German B-plan “Zuse-/Curiestraße” is identical to that of the hi-tech industrial park in the regulatory plan case “Changgou Town.” They are all intended to regulate the development of a new industrial area and provide working places.

With regard to the social goals, the spatial control goal of the B-plan “Zuse-/Curiestraße” is to create a new urban landscape, while that of the hi-tech industrial park in the regulatory plan case “Changgou Town” is to prevent the urban landscape from being destroyed by large industrial buildings.<sup>1</sup> Therefore, the social goal of the German B-plan “Zuse-/Curiestraße” is similar to that of the hi-tech industrial park in the regulatory plan case.

With regard to the environmental goals, the spatial control goal of the German B-plan “Zuse-/Curiestraße” is to coordinate with the surroundings. Here, “the surroundings” mean both physical environment and ecological environment. The coordination with the physical environment is equivalent to the urban landscape protection in the regulatory plan case, while the coordination with the ecological environment is equivalent to the environmentally protective, energy-saving hi-tech industrial park development in the regulatory plan case. Therefore, the environmental goal of the German B-plan “Zuse-/Curiestraße” is also identical to that of the hi-tech industrial park in the regulatory plan case.

Tab. 5-17: Comparison of Spatial Control Goals of Industrial Plan Cases in China and Germany

	<b>GERMAN B-PLAN CASE “Zuse-/Curiestraße”</b>	<b>CHINESE REGULATORY PLAN CASE “Changgou Town”</b>
<b>Economic Goal</b>	To develop a new commercial area and provide working places	To develop a high-tech industrial park and provide working places
<b>Social Goal</b>	To develop a new urban landscape by integrating the urban design concept	To prevent the urban landscape from being destroyed by large industrial buildings
<b>Environmental Goal</b>	To coordinate with the surroundings	To develop an environmentally protective, energy-saving hi-tech industrial park

<sup>1</sup> China Institute of Urban Planning and Design: *The Regulatory Plan of Changgou Town, Fangshan District, Beijing*, 2004, p.3

## 5.3.2 Analysis of the Spatial Control System of the B-plan Case: Zuse-/Curiestraße

### 5.3.2.1 Analysis of Institutional Factors of the B-plan “Zuse-/Curiestraße”

#### 1. Preparation of the B-plan “Zuse-/Curiestraße”<sup>1</sup>

The planning area is located in the city district Stuttgart-Vaihingen. Before the development of the commercial area, the land use was mainly for horse feeding. In 1994, the legally binding B-plan “Unterer Grund” regulated this area as the commercial area with the GRZ 0.4, BMZ 3.7 and additional BMZ 0.8 for underground garages. Heights of buildings varied from about 18 m to 30 m. In one location, the building height could be 60 m high above the ground. Meanwhile, the plan also regulated that the large scale planting should be implemented.

In order to fulfill the requirement of the Hewlett Packard (HP) Company, as well as provide a new competitive platform for modern innovative enterprises, it was necessary to modify regulations of the original B-plan. Therefore, the new legally binding B-plan was prepared.

The land use plan (Flächennutzungsplan) 2010 defined the planning area as a land for mixed development (M) with the administrative and management functions. The definition of the commercial area was compatible with the regulation in the land use plan.

The B-planning followed the conventional procedure of the B-plan preparation. The design of the competition winner became the basis of the B-plan.

#### 2. Plan substantiation<sup>2</sup>

Based on the planning goal, the main content of substantiation (Begründung) was the analysis of important planning issues, such as the coordination between the B-plan and other relevant valid plans, transportation infrastructures, garbage disposal and municipal utilities, environmental protection, and development costs. The B-plan substantiation was intended to find and define the public interest in this project so that the justified conclusions could be embodied in the B-plan regulations.

The content and method of the B-plan “Zuse-/Curiestraße” substantiation (Begründung) were basically identical to that of the B-plan “Im Raiser.”

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<sup>1</sup> Landeshauptstadt Stuttgart Amt für Stadtplanung und Stadterneuerung: *Bebauungsplan Zuse-/Curiestraße (Unterer Grund) Vaihingen 236 Begründung*, 2001, S. 1~2

<sup>2</sup> Ibid.

Due to the prospective development of a light industry area, the potential impact on the environment was carefully studied. On the basis of the environmental intrusion concept regulated in *The Federal Nature Protection Act (Bundesnaturschutzgesetz)*, the interaction between the anticipative development and the climate, air, noise, and soil was examined and analyzed by professional agencies. Compensatory measures, such as the construction of green spaces and roof gardens, planting and preservation obligations, were proposed according to the conclusions of the environmental evaluation mentioned above. Moreover, the potential need for public facilities and housing were also considered and analyzed in the substantiation.



Fig. 5-8: Commercial Area “Zuse-/Curiestraße”

### **5.3.2.2 Analysis of Economic Control Factors of the B-plan “Zuse-/Curiestraße”**

#### **1. Type of building and land use**

The boundary of the planning area and land use types (commercial areas: GE<sub>1</sub>, GE<sub>2</sub>) are designated in the B-plan map. The permissive building types and the land use compatibility are stipulated in the B-plan text.

## **2. Degree of building and land use**

In the B-plan “Zuse-/Curiestraße,” the site occupancy index (GRZ) is regulated in both map and text. Moreover, in order to control spatial volumes of buildings and realize the urban design concept, maximum cubic density (BMZ) and building height of each plot are designated in the B-plan map. Relevant requirements for building height are stipulated in the B-plan text.

## **3. Plot areas which may be built on**

Through the building restriction line, the plot areas which may be built on are defined.

## **4. Transportation**

A traffic area for specific purpose is regulated both in the map and in the text. It is the central plaza of the planning area which is named as the “Gropius platz.”

Normal traffic areas are designated in the map, including motor vehicle roads, pedestrian and bicycle lanes, parking spaces for motor vehicles, as well as entrances and exits of vehicles. Different signs clarify different uses, for example, “Zusestraße” represents motor vehicle roads, “Geh- u. Radweg” represents pedestrian and bicycle lanes,  $\textcircled{P}$  represents parking spaces for motor vehicles,  $\textcircled{V}$  represents traffic green spaces.

In the B-plan “Zuse-/Curiestraße,” parking spaces are allowed to be developed in the building windows or regulated scopes with “St” symbols. The difference between parking space (St) and parking space for motor vehicles ( $\textcircled{P}$ ) is that the parking space (St) must be built as water permeable ground.

There are two kinds of garages regulated in the B-plan. One is the underground garage (TG), the other is the garage building (St<sub>2</sub>). They are controlled both in the map and in the text.

The B-plan “Zuse-/Curiestraße” also regulates spaces to be encumbered with rights of passage in favor of the general public both in the map and in the text. In this B-plan, the function of these spaces is similar to pedestrian and bicycle lanes.

The spatial scopes of embankments and retaining walls, which are necessary to the road development, are designated in the B-plan map. The spatial scales of them are stipulated in the B-plan text.

The coordinates of road control points and the maximum limits of road slopes are designated in the B-plan map.

**5. Municipal utilities**

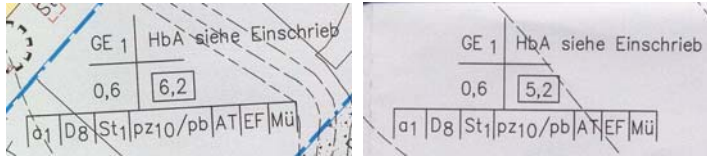

In the B-plan “Zuse-/Curiestraße,” spaces to be encumbered with the provision of public infrastructure are regulated both in the map and in the text.

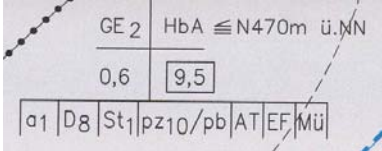

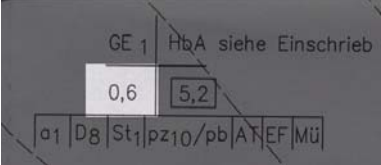
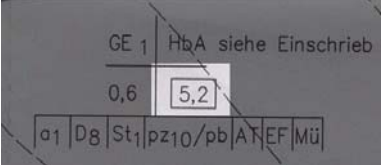
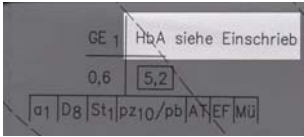
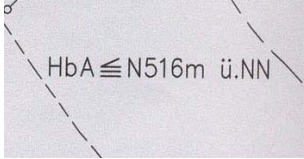


The spatial scope of a municipal utility structure (V<sub>2</sub>) on the plot is designated in the B-plan map. It is stipulated in the plan text as a net station of the Neckarwerke Stuttgart

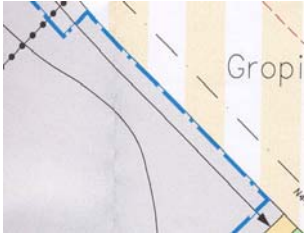
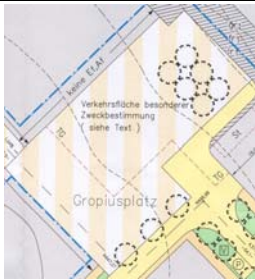

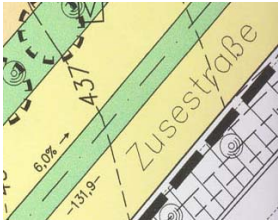

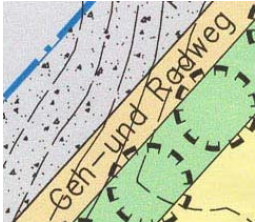

Plots on which garbage cans should be located are designated in the B-plan map. Meanwhile, the general requirement for garbage cans is stipulated in the plan text.



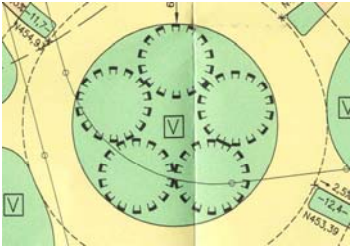

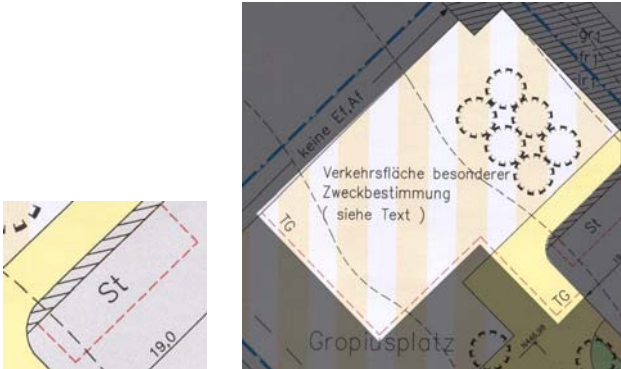


Locations of pipelines are also designated in the B-plan map.

Tab. 5-18: Analysis of Economic Control Factors of the B-plan “Zuse-/Curiestraße”



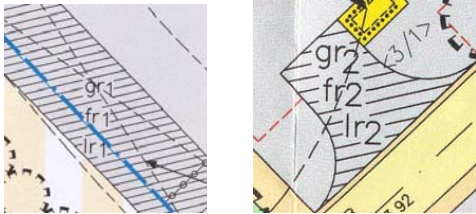

TYPE OF BUILDING AND LAND USE		
	Mapping Designations & Textual provisions	Site Photos
<b>COMMERCIAL AREA (GE<sub>1</sub>)</b>	<div style="display: flex; justify-content: space-around;">  </div> <p>GE<sub>1+2</sub>: It is only permitted to develop enterprises and installations which have no essential interferences on residential areas along the Robert-Leicht Street and north of the Paradies Street. So long as grounds of parking space, garages, plot passages, and roads are water permeable, or underground garages are covered by the massive earth layer with the thickness of minimum 0.7 m, pursuant to §19(4) BauNVO, GRZ may exceed the permitted value up to 0.8.</p> <p>GE<sub>1</sub>: It is only permitted to develop office and administrative buildings. Dwellings pursuant to §8 (3)1 BauNVO may be permitted as exceptional cases, if specific measures (for example, the installation of sound insulating windows, application of dam building materials etc.) are provided to counter the traffic/noise pollution.</p> <p>Other enterprises and installations listed in §8 (2) and (3) BauNVO are not permitted.</p> <p>If the transgression can be compensated in other locations, cases of exceeding building restriction lines or building height limits may be permitted to a maximum 5 m in horizontal direction as exceptional cases. The regulation of pz<sub>1</sub>/pb is unaffected.</p>	

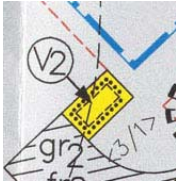



<p><b>COMMERCIAL AREA (GE<sub>2</sub>)</b></p>	 <p>GE<sub>2</sub>: Enterprises and installations pursuant to the following No.1 and No. 2 are permitted.</p> <ol style="list-style-type: none"> <li>1. Business, office, and administrative buildings are generally permitted;</li> <li>2. The following situations may be permitted as exceptional cases: <ul style="list-style-type: none"> <li>2.1 Installations for cultural, social, and health purposes, so long as they have direct relationships with the uses of No. 1 or GE<sub>1</sub>.</li> <li>2.2 Dwellings pursuant to §8 (3) BauNVO.</li> </ul> </li> </ol> <p>Other enterprises and dwellings listed in §8 (2) BauNVO are not permitted.</p> <p>(§8, §1para. 4-6, 9-10, BauNVO; §9 para. 1, No.24, BauGB)</p>	
<p><b>DEGREE OF BUILDING AND LAND USE</b></p>		
	<p><b>Mapping Designations &amp; Textual provisions</b></p>	<p><b>Site Photos</b></p>
<p><b>SITE OCCUPANCY INDEX (GRZ)</b></p>		
<p><b>CUBIC DENSITY (BMZ)</b></p>		
<p><b>BUILDING HEIGHT (HBA)</b></p>	  <p>HbA: The maximum limit of the building height from the fiducial point (NN). The altitude adopts the new system (N).</p> <p>HbA<sub>1</sub>: In the regulated area, HbA is permitted to be N500 m above NN. For other areas, HbA N472 m above NN applies.</p> <p>The house technical superstructure:</p> <p>Once the superstructure coverage is less than 25% of the building coverage, and the superstructure sets back from the edge of the building, maximum 4.0 m higher than the HbA limit can be permitted in the framework of the BMZ. If it is regulated in other acts or ordinances, higher structure (for instance: chimney) may be permitted. (§9 para. 1, BauGB; §16 para. 2, BauNVO)</p>	 

PLOT AREAS WHICH MAY BE BUILT ON		
	Mapping Designations & Textual provisions	Site Photos
<b>BUILDING RESTRICTION LINE (BAUGRENZE)</b>		
TRANSPORTATION		
	Mapping Designations & Textual provisions	Site Photos
<b>GENERAL REGULATIONS ON TRAFFIC AREAS AND TRAFFIC GREEN SPACES</b>	<p>With regard to traffic areas and traffic green spaces which are regulated in the B-plan, if it is compatible with basic characteristics of plan regulations, the modification of the location may be permitted under the framework of the street construction program.</p> <p>Entrances and exits of vehicles which pass through traffic green spaces and parking belts can be permitted.</p>	
<b>TRAFFIC AREA FOR SPECIFIC PURPOSE</b>	 <p>Motor vehicles are forbidden to enter into the traffic area for specific purpose. Vehicles of emergency services and supplies can be permitted to enter into this area as exceptional cases.</p> <p>Details of the Gropius plaza are regulated in the sectoral plan.</p>	
<b>MOTOR VEHICLES ROADS</b>		
<b>PEDESTRIAN AND BICYCLE LANES</b>		

<p><b>PARKING SPACES FOR MOTOR VEHICLES</b></p>		
<p><b>TRAFFIC GREEN SPACES</b></p>		
<p><b>ENTRANCES AND EXITS OF VEHICLES</b></p>	<p><i>Keine Ef, Af.</i> Entrances and exits of vehicles are not permitted in the marking zone. (§9 para. 1No. 4, 11, BauGB)</p>	
<p><b>EMBANKMENTS &amp; RETAINING WALLS</b></p>	<p>So long as the map contains no other regulations, corridors next to transportation areas are available for embankments, diggings, and retaining walls. The horizontal distance should be 3.0m from the street boundary line (Straßenbegrenzungslinie), while the vertical distance should be 2.0m from the road altitude. The regulation is also valid for underground retaining structures which are required for road construction (horizontal range 0.1m, vertical range 0.4m). (§9 para. 1No. 26, BauGB)</p>	
<p><b>PARKING SPACES &amp; UNDERGROUND GARAGES</b></p>		 
<p>St<sub>1</sub>: Parking spaces and garages are only permitted on plot areas which may be built on. Parking spaces are permitted on “St” areas.</p> <p>With regard to parking spaces, broad-leaved trees with large crowns should be planted in proper locations (at the time of planting, at the location of 1 m from the ground, the trunk perimeter of the tree should be at least 20 cm) and be maintained. The area of the scarification around the tree root must be reserved as at least 16 m<sup>2</sup>. An account based on the regulation of pz<sub>10</sub>/pb is not permitted.</p> <p>If underground garages are covered by the minimum 0.70 m-thick massive earth layer, they can be permitted outside plot areas which may be built on,.</p> <p>In TG areas, substructures of underground garages can be built.</p> <p>The regulation St<sub>1</sub> will not affect the regulation pz<sub>1</sub>/pb.</p> <p>(§12 para. 6, §23 para. 5, BauNVO; §74 para. 1 No. 1, LBO)</p>		



<p><b>GARAGE BUILDING</b></p>	 <p>St<sub>2</sub>: On the St<sub>2</sub> area, it is permitted to build a garage building with the maximal height of N465 m above NN. This garage building should have a flat roof (angle from 0° to 7°) with an extensive roof garden in accordance with the regulation D<sub>8</sub>.</p> <p>As far as the calculation of the BMZ, pursuant to §21a (4)3, BauNVO, the volume of the garage building should not be taken into consideration.</p> <p>Parking spaces are permitted on St areas. The ground material should refer to St<sub>1</sub>.</p> <p>(§12 para. 6, §23 para. 5, BauNVO; §74 para. 1 No. 1, LBO)</p>	
<p><b>SPACES TO BE ENCUMBERED WITH RIGHTS OF PASSAGE IN FAVOR OF THE GENERAL PUBLIC</b></p>	 <p>gr<sub>1</sub>, fr<sub>1</sub>: Spaces to be encumbered with walking and driving rights in favor of the general public.</p> <p>gr<sub>2</sub>, fr<sub>2</sub>: Spaces to be encumbered with walking and driving rights. Hint: see lr<sub>1</sub>.</p> <p>(§9 para. 1No. 21, BauGB)</p>	
<p><b>MUNICIPAL UTILITIES</b></p>		
	<p><b>Mapping Designations &amp; Textual provisions</b></p>	<p><b>Site Photos</b></p>
<p><b>SPACES TO BE ENCUMBERED WITH THE PROVISION OF PUBLIC INFRA-STRUCTURE</b></p>	<p>See gr<sub>2</sub>, fr<sub>2</sub>.</p> <p>lr<sub>1</sub>: Spaces to be encumbered with rights of the provision of public infrastructure in favor of the state capital city Stuttgart. Hint: the marked area can be built, planted or used only by regulated measures, and only under the permission of the infrastructure developer. This also applies when the boundary of an existing plot changes.</p> <p>lr<sub>2</sub>: Spaces to be encumbered with the provision of public infrastructure in favor of the Neckarwerke Stuttgart (NWS). Hint: see lr<sub>1</sub>.</p> <p>(§9 para. 1No. 21, BauGB)</p>	<p>See gr<sub>2</sub>, fr<sub>2</sub>.</p>

<p><b>MUNICIPAL UTILITY STRUCTURE</b></p>		
<p><b>PLACES FOR GARBAGE CANS</b></p>	<p>The sight towards garbage cans should be shielded by proper measures (for example: the partition or the vegetation). Garbage cans should be shielded from the direct sunlight. (§74 para. 1No. 1, LBO)</p>	
<p><b>PIPELINES</b></p>		

### **5.3.2.3 Analysis of Social Control Factors of the B-plan “Zuse-/Curiestraße”**

#### **1. Land use equality**

The preparation of the B-plan “Zuse-/Curiestraße” followed the regulations in the relevant acts and ordinances. The public participation was also implemented.

#### **2. Housing & public facilities**

The potential needs for public facilities and housing were considered and analyzed in the plan substantiation. Since the needs for public facilities and housing could be met in other locations near the planning area, dwellings or public facilities were not regulated in the B-plan.

#### **3. Urban image and locality**

Roof forms of buildings on each plot, as well as the requirements for roof gardens, are stipulated in the B-plan text. The roof symbol on each plot is designated in the B-plan map.

The requirements for building façade, antenna, fence, and advertising installations and automats are stipulated in the B-plan text.

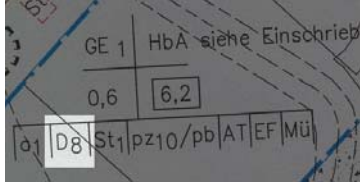




The fence symbol on each plot is designated in the B-plan map.

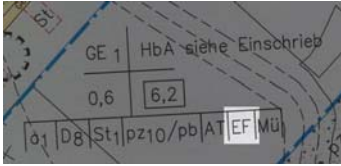

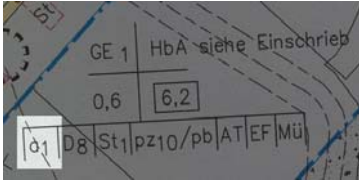
The general requirement for coverage type is stipulated in the B-plan text. Moreover, The coverage type symbol on each plot is designated in the B-plan map.

#### **4. Heritages**

The requirement for archaeological discovery is proposed in the B-plan hint.

Tab. 5-19: Analysis of Social Control Factors of the B-plan “Zuse-/Curierstraße”

<b>LAND USE EQUALITY</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>LEGAL SYSTEM</b>	See institutional factors.	
<b>PUBLIC PARTICIPATION</b>	See institutional factors.	
<b>URBAN IMAGE &amp; LOCALITY</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>ROOF FORMS</b>	 <p>D<sub>8</sub>: Approximate flat roofs with angles up to 7°. Roof gardens should be built. Cover layers on roofs should be at least 12cm thick, where grasses and shrubs can be planted and maintained.</p> <p>Solar energy collectors and technical superstructures on houses may be permitted as exceptional cases (see HbA - the technical superstructure).</p> <p>(§74 para. 1No. 1, LBO; §9 para. 1No. 25, BauGB)</p>	 
<b>BUILDING FACADE</b>	<p>FG<sub>1</sub>: Building facades which face public spaces (traffic areas and green spaces) should be covered by plasters or natural stones. Clear vertical divisions of facades are required with the minimum limit of 30 m. Shining and reflecting surface materials, as well as glaring colors, would not be permitted. The glass is not affected by the regulation above.</p> <p>If there is no substantial impairment on the urban design, individual cases may be permitted as exceptional cases. (§74 para. 1 No.1, LBO)</p>	 
<b>ANTENNA</b>	Each building permits 1 land and satellite antenna which can be seen clearly from the public street. If an antenna (together with the attached basis structure) sets back from the house edge and exceeds the permitted HbA no more than 10.0 m, it (for example: the radio antenna, etc.) may be permitted as an exceptional case. (§74 para. 1No. 4, LBO)	

<p><b>FENCE</b></p>		
	<p>EF: The fence is not permitted in the planning area. According to special need for security which has been proved, as long as a fence is “not close“ and in a green environment, individual cases may be permitted as exceptional cases. (LBO§74 para. 1No. 3)</p>	
<p><b>ADVERTISING INSTALLATIONS AND AUTOMATS</b></p>	<p>Advertising installations must not impair the traffic safety of peripheral streets.</p> <p>Advertising installations are not permitted to be built in public green spaces, public traffic areas, pz<sub>1</sub>/pb areas, as well as on fences. Advertising installations on buildings can only be permitted if they do not exceed maximum limits of relevant regulations. If a complete height (a wall and an advertising installation together) is less than 10 m, the advertising installation (with the light and without the light) beyond the maximum limit of the building height may be permitted as an exceptional case.</p> <p>Exceptional cases may be permitted especially in working locations. (§74 para. 1No. 2, LBO)</p>	
<p><b>COVERAGE TYPE (BAUWEISE)</b></p>		
	<p>a<sub>1</sub>: Other development (abweichende Bauweise). The coverage type deviates from the open development (offene Bauweise). The length limit (50 m) is canceled. (§22 para. 4, BauNVO)</p>	
<p><b>HERITAGES</b></p>		
	<p><b>Mapping Designations &amp; Textual provisions</b></p>	<p><b>Site Photos</b></p>
<p><b>HINT</b></p>	<p>In cases of discovering archaeological heritages, it is required to report this to the heritage bureau or the police station (§20, DSchG).</p>	

#### **5.3.2.4 Analysis of Environmental Control Factors of the B-plan “Zuse-/Curiestraße”**

##### **1. Air pollution**

It is stipulated in the B-plan text that the special precaution be taken in order to provide protection against harmful measures affecting nature, landscape, and light industrial pollution.

The requirements for roof gardens are stipulated in the B-plan text. The relevant roof symbol on each plot is designated in the B-plan map.

Moreover, the requirement for use of certain materials, which give rise to air pollution, is proposed in the B-plan hint.

##### **2. Noise**

Passive protection measures, which should be taken to counter the noise pollution, are stipulated in the B-plan text.

##### **3. Soil**

The requirement for development of a former quarrying site is stipulated in the B-plan text. The spatial scope of the former quarrying site is designated in the B-plan map. Moreover, the requirements for soil exploitation are proposed in the B-plan hint.

##### **4. Water**

The requirement for paving materials of outdoor parking spaces is stipulated in the B-plan text. The requirement for water exploitation is proposed in the B-plan hint.

##### **5. Biodiversity**

The locations of planting obligations are designated in the B-plan map, while relevant requirements are stipulated in the B-plan text.

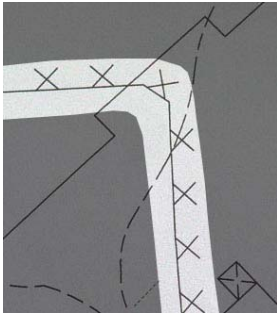
##### **6. Energies & Minerals**

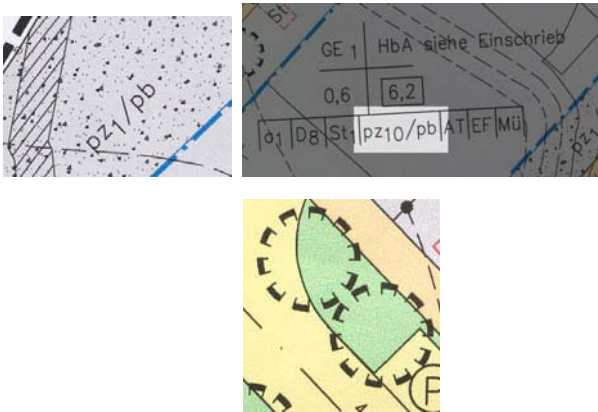

The privilege of renewable energy exploitation is stipulated in the B-plan text.

## 7. Landscape & Tourism


In the B-plan “Zuse-/Curiestraße,” the landscape and tourism control is realized by the control of the planting obligations.

Tab. 5-20: Analysis of Environmental Control Factors of the B-plan “Zuse-/Curiestraße”

<b>AIR POLLUTION</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>INDICATION</b>	Pollution generated by the transportation and the light industry: In the planning area, special physical precautions should be taken in the indicated area to counter the pollution generated by the transportation and light industry.	
<b>REGULATIONS ON ROOF GARDENS</b>	See the regulation on D <sub>8</sub> .	
<b>HINT</b>	Environmental protection, air: The limitation order of the utilization of air polluting fuels should be referred to (1997/5).	
<b>NOISE</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>NOISE PREVENTION</b>	Measures should be taken in this area to provide protection against the outdoor noise (for example: the installation of sound insulating windows, the arrangement of bedrooms), so that the interior noise level may not exceed the stipulation in the DIN4109 (data of November, 1989). (See §9(5), BauGB) (§9 para. 1No. 24, BauGB)	
<b>SOIL</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>INDICATION</b>		

	Quarrying site: The indicated area represents the old quarrying site which had been exploited until 1955. At that time, there was no report on the contamination. However, if the polluted material is discovered, the construction should be immediately stopped. In this case, the developer should report the situation to the environmental protection bureau and wait for the indication of the further activity. (§9 para. 5, BauGB)	
<b>HINT</b>	Protection of the soil: Regulations in <i>The Federal Soil Protection Act</i> and <i>The Soil Protection Act of Baden-Württemberg</i> (BBodSchG und BodSchG BW) should be noted.	
<b>WATER</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>GENERAL REGULATIONS ON GARAGES AND PARKING SPACES</b>	<p>Except parking spaces on underground garages and parking spaces for handicap people, parking spaces and their accesses should be built with the water permeable ground (for example, the grass pavement, etc.).</p> <p>With regard to access to parking spaces and garages, if they serve mainly for camions, exceptional cases may be permitted.</p>	
<b>HINT</b>	Protection of water resources: Regulations on the water right in <i>The Water Management Act (WHG)</i> , especially those on “the official permission of the water exploitation, the exploitation and preservation of the underground water, the drainage and loop way (detour), and water pollutants” should be noted.	
<b>BIODIVERSITY</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>PLANTING OBLIGATIONS</b>	 <p>pz<sub>1</sub>/pb: Broad-leaved trees with large crowns (for example: plane trees, linden trees, chest-nut trees, Oaks, maple trees or other tall trees) should be planted in proper locations. At the time of planting, at the location of 1 m from the ground, the trunk perimeter of the tree should be at least 20 cm. Moreover, shrubs and grasses should also be planted and maintained. The area of the scarification around the tree root must be reserved at least 16 m<sup>2</sup>. The surface closure should be prevented.</p>	



	<p>Pz<sub>10</sub>/pb: At least 20% of the plot should be built as green spaces. Local broad-leaved trees and shrubs should be planted and maintained. The pz<sub>1</sub>/pb can be included. If there were more compensation in other locations in GE<sub>1</sub>/GE<sub>2</sub> areas, individual cases may be permitted as exceptional cases.</p> <p>So long as they are not essential entrances and exits and accesses, plot areas which may not be built on should be built as gardens or green spaces, and be maintained.</p> <p>(§9 para. 1No. 25, BauGB; §74 para. 1No. 3, LBO)</p>	
<b>ENERGIES &amp; MINERALS</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>PRIVILEGE OF RENEWABLE ENERGY EXPLOITATION</b>	<p>With regard to the building height, energy saving structures especially solar energy structures can be permitted to be built as exceptional cases (see antenna).</p> <p>(§9 para. 1, BauGB; §16 para. 2, BauNVO)</p>	
<b>LANDSCAPE &amp; TOURISM</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
	See the planting obligations.	

### 5.3.3 Analysis of the Spatial Control System of the Regulatory Plan Case “Changgou Town”

#### 5.3.3.1 Analysis of Institutional Factors of the Regulatory Plan “Changgou Town”

##### 1. Preparation of the regulatory plan “Changgou Town”

Commissioned by the town government of Changgou, *The Regulatory Plan of Changgou Town, Fangshan District, Beijing* was prepared by China Institute of Urban Planning and Design. The regulatory planning followed the former conventional procedure, which included steps for the preparation of working instruction, initial preparation of project, data collection, draft plan design, formation of regulatory plan as well as approval procedure.



Fig. 5-9: Site of the Hi-tech Industrial Park in Changgou Town

##### 2. Plan substantiation

The preparation of the regulatory plan “Changgou” was based on *The Urban Planning Act of*

*the P. R. China (1989), The Preparation Criteria of Urban Planning (1991), The Standard for Urban Land Use Classification, Building and Land Use (GBJ 137-90), The Code for Settlement Planning & Design(version 2002)(GB 50180-93), The Master Plan of Changgou Town, Fangshan District, Beijing, as well as other relevant standards and norms.*

The **planning principles** were explained as follows:<sup>1</sup>

The integrality: the development of residential areas should be coordinated with that of industrial areas and the town center.

The priority of the ecological environment: ecological advantages and characteristics of Changgou Town should be maintained and developed.

The urban management: the overall value of Changgou Town should be enhanced by the reasonable exploitation of urban resources.

The workability: the plan should be practical and flexible so that it could be implemented in practice.

The **planning concept** was a spatial structure with two quarters, four axes, one center, and six groups.<sup>2</sup>

The two quarters were the industrial quarter and the residential quarter.

The four axes included two urban axes along main city streets, one industrial park axis, and one ecological landscape axis along the brook.

The one center was the public service center between the industrial quarter and the residential quarter.

The six groups were the high-tech industrial area, the industrial area of modern building material manufactories, the industrial area of bio-food and electronic productions, the general residential community, the residential community near Government Road, and the waterfront residential community along the brook.

Based on the planning goal, the plan substantiation analyzed important planning issues, such

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<sup>1</sup> China Institute of Urban Planning and Design: *The Instructions of the Regulatory Plan of Changgou Town, Fangshan District, Beijing*, 2004, p.2

<sup>2</sup> Ibid.

as the overall spatial layout, landscape network, traffic system, plan structure, resettlement of villages, and municipal utilities. The justified conclusions were embodied in the regulations of the regulatory plan.

### **5.3.3.2 Analysis of Economic Control Factors of the Regulatory Plan “Changgou Town”**

The high-tech industrial park is located in the northwest corner of the planning area. It should be developed as an environmentally protective and energy-saving base of new technologies. In order to optimize the comparative study, it was selected as the comparative object of the German B-plan “Zuse-/Curierstraße,” since the spatial scale of it (17.287 ha) is at the same level as that of the German’s (11.09 ha). The high-tech industrial park contains five zones, which are 1-1-1, 1-1-2, 1-1-3, 1-2-1, and 1-2-2.

#### **1. Type of building and land use**

The number, boundary, and land use type of each zone are designated in the plan maps. Moreover, the land use type and area of each plot are also regulated in the control indicator table in the regulatory plan text. There is a table of the land use compatibility in the plan text, which stipulates the land use compatibility of each plot.

In principle, the land use type should be defined as the specific land use type. However, since there is no specific land use type for industrial areas regulated in *The Standard for Urban Land Use Classification, Building and Land Use(GBJ 137-90)*, the subdivisions of general land use types are adopted. With regard to the high-tech industrial park in the planning area, the 1-1-3 and 1-2-2 zones are defined as Industrial Areas I (Industrial facilities nearly without interference and pollution) (M1). Their land use compatibilities are stipulated in the control indicator table.

#### **2. Degree of building and land use**

Maximum plot ratios, building densities, and the building heights of the 1-1-3 and 1-2-2 zones are stipulated in the control indicator table as quantitative indicators. Meanwhile, the textual provision of the plot ratio must also be followed.

#### **3. Plot areas which may be built on**

Plot areas which may be built on are limited by building lines and the distance between building (restriction) line and streets in the plan maps.

#### **4. Transportation**

In the regulatory plan “Changgou Town,” land use boundaries of roads are limited by road boundary lines in the plot control maps. Moreover, in order to control the spatial structure of each road, particularly the width and location of motor vehicle lanes, pedestrian and bicycle lanes, and traffic green spaces, the cross-sectional form of each road is designated in the transportation plan map.

With regard to the high-tech industrial park located in the plot control map-01, the Yunjusi Road, Latitudinal No.1 Road, East Route of the South-North Water Diversion, and Gold Street are controlled.

Proposed entrances and exits of vehicles are designated in the plot control maps, while relevant regulation is stipulated in the plan text.

The parking berth number of each zone is also available in the control indicator table as a quantitative indicator. It is defined according to the regulation in the plan text. With regard to M1 areas, the calculation coefficient is 0.1 parking berth per 100 m<sup>2</sup> floor area. So the formula is:

The parking berth number = (Zone area) \* (Plot ratio) \* 0.1/100

Parking spaces and/or garages should be developed based on the regulated parking berth number.

If the developer offered additional squares, accesses, parking spaces or garages to the general public, a bonus of the plot ratio or building density would be possible. Relevant details are stipulated in the plan text.

In addition, in order to prevent roads from being affected by the construction of buildings and structures, the building rights within spatial scopes defined by road boundary lines are also clarified in the plan text.<sup>1</sup>

#### **5. Municipal utilities**

There are three types of municipal utility controls in the regulatory plan “Changgou Town,” which can be grouped as the control of spaces for municipal utilities as specific land use types,

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<sup>1</sup> China Institute of Urban Planning and Design: *The Regulatory Plan of Changgou Town, Fangshan District, Beijing, 2004*, p.2

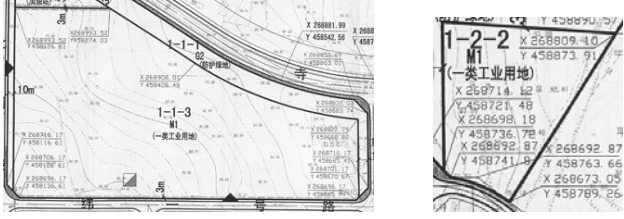

the land use control of municipal structures on the plots, as well as the spatial control of pipelines.


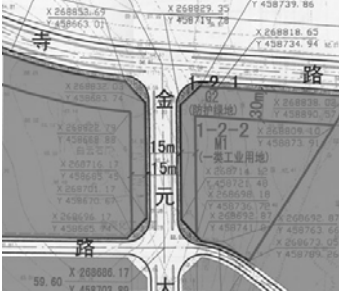

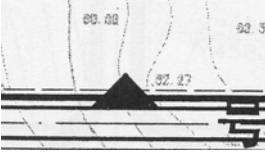
In the territory of the high-tech industrial park, for example, the 1-1-2 zone is designated as a gas station (U29: other transportation utilities) in the plot control map-01. The spatial control method of the U29 area is similar to that of industrial areas. The corresponding plot ratio, building density, and building height are stipulated in the control indicator table as quantitative indicators.

With regard to the land use control of municipal structures on the plots, planned municipal structures are designated in the plot control maps. Similarly, they are also clarified in the control indicator table. In the high-tech industrial park, a heat transfer station is regulated in the 1-1-3 zone (M1).

With regard to the spatial control of pipelines, six specific municipal systems, which include the water supply, sewerage, power supply, telecommunication, gas, and heating, are planned as a comprehensive municipal network of Changgou Town. There is a plan for the comprehensive municipal network which designates cross-sectional structures of underground pipelines of various roads. In the high-tech industrial park, cross-sectional structures of underground pipelines of the Yunjusi Road, Latitudinal No.1 Road, East Route of the South-North Water Diversion, and Gold Street are controlled.

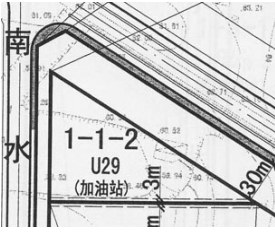
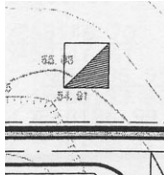
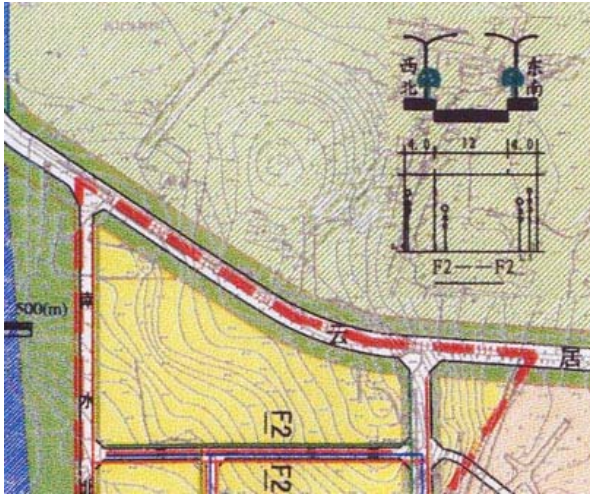
Tab. 5-21: Analysis of Economic Control Factors of the Hi-tech Industrial Park in the Regulatory Plan  
“Changgou Town”

<b>TYPE OF BUILDING AND LAND USE</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>INDUSTRIAL AREA</b>	 <p>1-1-3: Industrial Areas I (M1), area 119052m<sup>2</sup>; 1-2-2: Industrial Areas I (M1), area 14948m<sup>2</sup></p> <p>Textual provision: Multi-storey dwellings, warehouses and municipal utilities could be developed in the M1 areas (Industrial Areas I) with special permissions.</p>	Not yet being developed.
<b>DEGREE OF BUILDING AND LAND USE</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>PLOT RATIO</b>	<p>Quantitative indicators: Maximum limits</p> <p>1-1-3: 1.1 1-2-2: 1.1</p> <p>Textual provision: In order to improve the efficiency of land use, it is regulated that the plot ratio of industrial areas should be a minimum 0.8 and a maximum 1.2.</p>	
<b>BUILDING DENSITY</b>	<p>Quantitative indicators: Maximum limits</p> <p>1-1-3: 40% 1-2-2: 40%</p>	
<b>BUILDING HEIGHT</b>	 <p>Quantitative indicators: Maximum limits</p> <p>1-1-3: 18m 1-2-2: 18m</p>	
<b>PLOT AREAS WHICH MAY BE BUILT ON</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>

<p><b>BUILDING LINE &amp; SET-BACK DEPTH</b></p>		
<p><b>TRANSPORTATION</b></p>		
	<p><b>Mapping Designations &amp; Textual provisions</b></p>	<p><b>Site Photos</b></p>
<p><b>ROAD CONTROL</b></p>		
<p><b>CROSS-SECTIONAL STRUCTURES OF ROADS</b></p>		
<p><b>ENTRANCES AND EXITS OF VEHICLES</b></p>	 <p>Textual provision: In principle, calculated from tangent points of intersection arc lines, entrances and exits of vehicles are prohibited in the range of 50-70 meters along trunk roads, and 20 meters along branch roads.</p>	
<p><b>PARKING BERTH NUMBER</b></p>	<p>Quantitative indicators: Minimum limits</p> <p>1-1-3: 130</p> <p>1-2-2: 14</p>	
<p><b>OPEN SPACE BONUS</b></p>	<p>Textual provision: If the developer provided additional open spaces to the general public, in compliance with requirements for fire, health, transportation etc, additional floor area could be permitted to develop as a bonus. However, the additional floor area should not exceed 15% of the regulated maximum floor area. Open spaces refer to indoor and outdoor public spaces, such as public squares, accesses, parking spaces/garages, roof platforms, etc.</p>	



## MUNICIPAL UTILITIES

	Mapping Designations & Textual provisions	Site Photos
<b>LAND USE CONTROL OF THE GAS STATION</b>		
	<p>Quantitative indicators of the 1-1-2 zone:</p> <p>Area: 6911m<sup>2</sup>,</p> <p>Maximum plot ratio: 1.0;</p> <p>Maximum building density: 50%;</p> <p>Maximum building height: 12m.</p>	
<b>LOCATION CONTROL OF THE HEAT TRANSFER STATION</b>		
	<p>Regulation in the control indicator table: A heat transfer station should be built in the 1-1-3 zone (M1).</p>	
<b>PIPELINE CONTROL</b>		
	<p>Textual provision: The layout, location, cross-sectional structure of each kind of municipal pipeline should be consistent with the requirements in specific municipal plans.</p>	

### **5.3.3.3 Analysis of Social Control Factors of the Regulatory Plan “Changgou Town”**

#### **1. Land use equality**

Since the preparation of the regulatory plan “Changgou Town” was based on nearly all relevant acts, norms, and plans, it may be considered a good example of normative regulatory planning. However, the regulatory plan itself was still a technical document for building permission of the urban planning authority. Its legal status was weak.

The preparation of the regulatory plan “Changgou Town” followed the former conventional procedure. Therefore, the implementation of the public participation stayed at the basic level.

#### **2. Housing & public facilities**

The potential needs for public facilities and housing were considered and analyzed in the plan substantiation. Residential communities and public facilities were located in the planning area. However, with regard to the hi-tech industrial park, since the needs for public facilities and housing could be met in other locations near the zones, dwellings or public facilities were not regulated.

#### **3. Urban image and locality**

There is no regulation on the roof form or building façade in the regulatory plan “Changgou Town.”

The requirements for advertising installations and spatial organization of buildings are stipulated in the regulatory plan text.

In addition, it is proposed in the plan text that the Gold Street be controlled as the landscape axis of the industrial area in the west part of the planning area. The urban design focuses on the prospective new town center, traditional neighborhoods, and commercial streets. In order to prevent the urban landscape from being impaired by large industrial buildings, building heights of industrial buildings should be less than 18m, and tall trees should be planted around those buildings.<sup>1</sup>

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<sup>1</sup> China Institute of Urban Planning and Design: *The Regulatory Plan of Changgou Town, Fangshan District, Beijing, 2004*, p.3, 5

#### 4. Heritages

There is no regulation on the heritage in the regulatory plan “Changgou Town.”

Tab. 5-22: Analysis of Social Control Factors of the Hi-tech Industrial Park in the Regulatory Plan  
“Changgou Town”

<b>LAND USE EQUALITY</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>LEGAL SYSTEM</b>	See institutional factors.	
<b>PUBLIC PARTICIPATION</b>	See institutional factors.	
<b>URBAN IMAGE &amp; LOCALITY</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>ADVERTISING INSTALLATIONS</b>	Textual provision: In the planning area, the location and size of signs, public notices, and advertising signs must be consistent with the relevant permissions issued by the urban planning authority.	
<b>SPATIAL ORGANIZATION OF BUILDINGS</b>	Textual provision: Each building interval should be in line with relevant insulation, fire, health standards, as well as the norms of pipeline installation and architectural design.	

#### 5.3.3.4 Analysis of Environmental Control Factors of the Regulatory Plan “Changgou Town”

##### 1. Air pollution

In order to improve the air quality, green buffers are regulated in the regulatory plan “Changgou Town” as a subdivision of general land use type (G2). The land use type (G2), land use area, and greening rate of the 1-1-1 and 1-2-1 zones are stipulated in the control indicator table as quantitative indicators. Meanwhile, the relevant textual provision must also be followed. The boundary and the width of Green buffer zones are designated in the plot control map-01.

## **2. Noise**

The 1-1-1 and 1-2-1 zones, which are green buffers, are able to reduce the noise pollution.

## **3. Soil**

The control of building lines and set-back depths in the regulatory plan restrains the building scope so that the intensive land use can be realized.

## **4. Water**

Since there is no rainwater sewerage system available in the planning area, the requirement for paving materials is stipulated in the plan text.

## **5. Biodiversity**

In the regulatory plan “Changgou Town,” planting obligations are controlled by the greening rate. The greening rates of the 1-1-1, 1-2-1, 1-1-3, and 1-2-2 zones are stipulated in the control indicator table as quantitative indicators.

The planting requirements for traffic green spaces are regulated both in the plan map and in the plan text. In the transportation plan map, the basic forms of traffic green spaces are designated by controlling the cross-sectional forms of roads. The requirement for planting is stipulated in the plan text.

In addition, the open space bonus stipulated in the plan text may also promote the reservation of land.

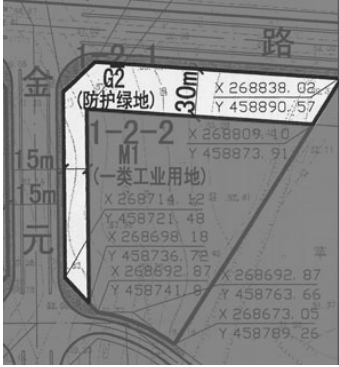
## **6. Energies & Minerals**

There is no relevant regulation or hint in the regulatory plan “Changgou Town.”

## **7. Landscape & Tourism**

In the regulatory plan “Changgou Town,” the landscape and tourism control may be realized by the control of green buffers, greening rates, and traffic green spaces.

Tab. 5-23: Analysis of Environmental Control Factors of the Hi-tech Industrial Park in the Regulatory Plan  
 “Changgou Town”

<b>AIR POLLUTION</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>GREEN BUFFER</b>		
	<p>Quantitative indicators:</p> <p>1-1-1 (G2: green buffer):                      Area: 24233m<sup>2</sup>, Greening Rate: 100%</p> <p>1-2-1 (G2: green buffer):                      Area: 7726m<sup>2</sup>, Greening Rate: 100%</p> <p>Textual provision: No building is allowed to be built in the green buffers.</p>	
<b>NOISE</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>GREEN BUFFER</b>	The green buffer can reduce the noise pollution. See previous article.	
<b>SOIL</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>BUILDING LINE &amp; SET-BACK DEPTH</b>	See the building line and set-back depth.	
<b>WATER</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>PAVING MATERIALS</b>	Textual provision: In the planning area, leisure squares and sidewalks should be paved with water permeable materials in order to reduce rainwater runoff.	

<b>BIODIVERSITY</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>GREENING RATE</b>	Quantitative indicators: Minimum limits 1-1-1 (G2): 100%; 1-1-3 (M1): 15%; 1-2-1 (G2): 100%; 1-2-2 (M1): 15%.	
<b>TRAFFIC GREEN SPACES</b>	See cross-sectional forms of roads.	
	Textual provision: In the planning area, street trees and other greening isolations should be developed according to the regulated cross-sectional forms of roads.	
<b>OPEN SPACE BONUS</b>	See the open space bonus in the table of economic control factors.	
<b>LANDSCAPE &amp; TOURISM</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
	See the green buffers, greening rate, and traffic green spaces	

## 5.3.4 Comparison of Spatial Control of Industrial Development Cases

### 5.3.4.1 Comparison of Economic Control Factors

#### 1. Comparison of the land use type control

With regard to the land use type control, the spatial control approach of the B-plan case “Zuse-/Curiestraße” is identical to that of the regulatory plan case “Changgou Town.” In both plan cases, land use types and land use compatibilities are all regulated by mapping designations and textual provisions. Land use boundaries of plots are controlled by mapping designations, while land use types and compatibilities of plots are controlled by textual provisions.

The land use type control factors in both plan cases are all mandatory factors with important functions to achieve the planning goal. Therefore, they should be defined as the spatial control capability level 1 (1 pm).

#### 2. Comparison of the land use degree control

The maximum site occupancy index (GRZ) is controlled by mapping designations in the B-plan case “Zuse-/Curiestraße.” On the other hand, in the regulatory plan case “Changgou Town,” the maximum building density for each zone of the hi-tech industrial park is controlled by quantitative indicators in the plan text. Two industrial zones in the regulatory plan case have the same maximum building density of 40%. This value is less than the maximum limit (0.6) regulated in the B-plan case. The control approach of the Chinese building density is identical to that of the German site occupancy index (GRZ).

The maximum cubic density (BMZ) is controlled by mapping designations in the B-plan case “Zuse-/Curiestraße.” It is determined by the industrial land use type. In principle, the volume of industrial buildings is regulated by the BMZ in the B-plan. However, in the regulatory plan case “Changgou Town,” the maximum plot ratio of each industrial zone is regulated in order to control the building volume. The reason is that there is no BMZ control approach in the regulatory planning. For industrial buildings with high interior heights, it is obviously not scientific to use the plot ratio to control the building volume. On the other hand, the BMZ control objective can be realized by the combination of building density control and building height control.

With regard to the building height control, absolute building heights, which are calculated

from the elevation of the German benchmark, are regulated in the B-plan case “Zuse-/Curiestraße.” From the analysis of the B-plan cases, it is clear that the absolute altitude control has substituted the relative altitude control in the planning practice. It is clearly intended to define the authoritative and scientific building height. In the regulatory plan case “Changgou Town,” there is a specific building height control map which illustrates the maximum building height of each zone. The control indicator table in the plan text controls maximum building height of each zone, which is the relative building height calculated from the elevation of the ground.

In the B-plan case “Zuse-/Curiestraße,” there is also a control approach for the building superstructure, which refers to engineering structures on the building roof, such as chimneys. The building superstructure is controlled by a small but flexible building window, which can limit the building scope of superstructures. Additionally, besides this small building window control, the maximum height of the superstructures is also available. This control mechanism is used to prevent the urban image from being impaired. The basic idea is that building superstructures should be invisible from public spaces.

With regard to the building superstructure control, there is no specific regulation in the regulatory plan case. However, there is a general principle valid in Beijing. According to *The Planning and Design Criteria of Building Projects in Beijing Region (Version of Probation)*, for buildings in heritage conservation zones, world heritage protection zones, and airport control districts, building heights should include heights of superstructures. For other districts, building superstructures less than 4m high, and whose footprints are no more than 20% of roof areas, should not be included.<sup>1</sup>

This Chinese building superstructure control approach is similar to the German control approach. However, there is no set-back depth control of building superstructures in the regulatory planning. This means that the regulatory planning has the vertical control mechanism of superstructures, but has no complete horizontal control mechanism for it.

Both German and Chinese land use degree control factors are vital mandatory statutory constraints which should be defined as the spatial control capability level 1 (1 pm).

### **3. Comparison of the control of plot areas which may be built on**

The B-plan case “Zuse-/Curiestraße” defines building restriction lines to control plot areas which may be building on (building windows). In the regulatory plan case “Changgou Town,”

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<sup>1</sup> Beijing Municipal Commission of Urban Planning: *The Planning and Design Criteria of Building Projects in Beijing Region (Version of Probation)*. 2003. p. 16



plot areas which may be building on are controlled by defining building lines and set-back depths. If there is a set-back depth in addition to a building line regulated, this set-back depth is the limiting line for building behaviors. If there is no set-back depth but only a building line regulated, this building line is the limiting line for building behaviors.

In both plan cases, the control factors of plot areas which may be built on are vital mandatory statutory constraints, which should be defined as the spatial control capability level 1 (1 pm).<sup>1</sup>

#### **4. Comparison of the transportation control**

The transportation control of the B-plan case “Zuse-/Curiestraße” is a complete positioning control, which designates the detailed structure of each road, such as motor vehicle roads, pedestrian and bicycle lanes, parking spaces for motor vehicles, traffic green spaces, embankments and retaining walls that are necessary to the road development, and coordinates of road control points. Moreover, planting and preservation obligations are applied to control traffic green spaces.

The transportation control of the regulatory plan “Changgou Town” is similar to that of the B-plan “Zuse-/Curiestraße.” The land use boundary and the cross-sectional form of each road, which illustrate the basic road structure including motor vehicle lanes, pedestrian and bicycle lanes, parking spaces for motor vehicles, and traffic green spaces, are designated in the transportation plan map. According to the regulations in the transportation plan map, exact boundaries and spatial structures of roads are controlled in the plot control maps. Moreover, the building right within street boundary lines and the greening obligation of traffic green spaces are regulated in the plan text.

In the B-plan “Zuse-/Curiestraße,” the traffic area for specific purpose is actually a square control. Moreover, boundaries of spaces to be encumbered with rights of passage in favor of the general public are designated in the B-plan map, while relevant requirement is stipulated in the B-plan text. On the other hand, the open space bonus in the regulatory plan is intended to encourage the development of public squares, accesses, parking spaces, and garages.

In the B-plan “Zuse-/Curiestraße,” entrances and exits of vehicles are controlled by mapping designations and textual provision. In the regulatory plan “Changgou Town,” entrances and exits of vehicles are also controlled by mapping designations and textual provision.

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<sup>1</sup> Besides the mandatory control indicators regulated in *The Preparation Criteria of Urban Planning*, the set-back depth is also regulated as a mandatory control indicator in the regulatory plan text. Therefore, it should be defined as the spatial control capability level 1 (1 pm).

The garage building, parking spaces, and garages are controlled by mapping designations and textual provisions in the B-plan “Zuse-/Curiestraße.” Permissible building scopes are designated in the plan map, while relevant architectural and ecological requirements are stipulated in the text. The regulatory plan case “Changgou Town” adopts the parking berth number to control the necessary development of parking installations.

Most of the transportation control factors in both plan cases are vital mandatory statutory constraints, which should be defined as the spatial control capability level 1 (1 pm). However, the open space bonus is an important but not mandatory control indicator in the regulatory plan case, so it should be defined as the spatial control capability level 3 (0.5 pm).<sup>1</sup>

## **5. Comparison of the municipal utility control**

With regard to the municipal utility control, there are two control approaches in the B-plan case “Zuse-/Curiestraße,” which are the municipal utility control and the pipeline control. The municipal utility control regulates land use scopes of municipal utilities, (which should be developed on different plots), as well as their building requirements. In contrast, the pipeline control designates the type, location, and direction of each pipeline in the road space, spaces to be encumbered with the provision of public infrastructure, and the spaces to be encumbered with rights of passage in favor of the general public.

In the regulatory plan case “Changgou Town,” the control of the gas station (1-1-2 zone) is identical to that of the industrial area. The land use boundary of the 1-1-2 zone is designated in the plan map, while land use degrees are controlled by quantitative indicators in the plan text. However, the control of the heat transfer station in the hi-tech industrial park is nearly identical to that of municipal utilities in the B-plan case. The municipal network is sufficiently justified in the regulatory planning. In the spatial scope of the hi-tech industrial park, the relative location of each underground pipeline is controlled. This approach is identical to the German pipeline control.

In contrast to the German municipal utility control, there is no regulation on spaces to be encumbered with the provision of public infrastructure in the regulatory plan case.

In both plan cases, the municipal utility control factors are vital mandatory statutory constraints, which should be defined as the spatial control capability level 1 (1 pm).

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<sup>1</sup> Besides the mandatory control indicators regulated in *The Preparation Criteria of Urban Planning*, the entrance and exit of vehicles as well as the building right within road boundaries, are also regulated as mandatory control indicators in the regulatory plan text. Therefore, they should be defined as the spatial control capability level 1 (1 pm).

Tab. 5-24: Comparison of Economic Control Factors of Industrial Development Cases

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
Type of Building and Land Use	Land use area and boundary (1)	Land use area and boundary (1)
	Land use type (1)	Land use type (1)
	Land use compatibility (1)	Land use compatibility (1)
Degree of Building and Land Use	Site occupancy index (GRZ) (1)	Building density (1)
	Cubic density (BMZ) (1)	Plot ratio (1)
	Building height (1)	Building height (1)
Plot Areas Which may be Built on	Building restriction line (Baugrenze) (1)	Building line & set-back depth (1)
Transportation	Street boundary lines (1)	Road boundary lines (1)
	Control of land use scopes of motor vehicle lanes, non-motorized vehicle lanes and sidewalks, as well as parking spaces for motor vehicles and non-motorized vehicle within road scopes (1)	Control of the land use boundary and cross-sectional form of each road (1)
	Control of coordinates and elevations of control points, as well as road slopes (1)	Control of coordinates and elevations of control points (1)
	Control of the traffic area for specific purpose (1)	Open space bonus (0.5)
	Control of spaces to be encumbered with walking and driving rights and rights of passage in favor of the general public (1)	Open space bonus (0.5)
	Control of entrances and exits of vehicles (1)	Control of entrances and exits of vehicles (1)
	Control of parking spaces and/or garages on the plots (1)	Control of parking berth numbers (1)
	Control of spaces for embankments, diggings, and retaining walls, which are required for road construction (1)	building right within road boundaries (1)
Municipal Utilities	Control of types and boundaries of spaces to be encumbered with the provision of public infrastructure (1)	
	Control of municipal secondary structures on the plots (1)	Land use control of municipal structures (1)
	Control of types and locations of ground/underground pipelines (1)	Control of pipelines (1)

The arithmetic average of each economic theme can be calculated and compared according to the five economic themes of sustainable development. The result is shown in the following figure.

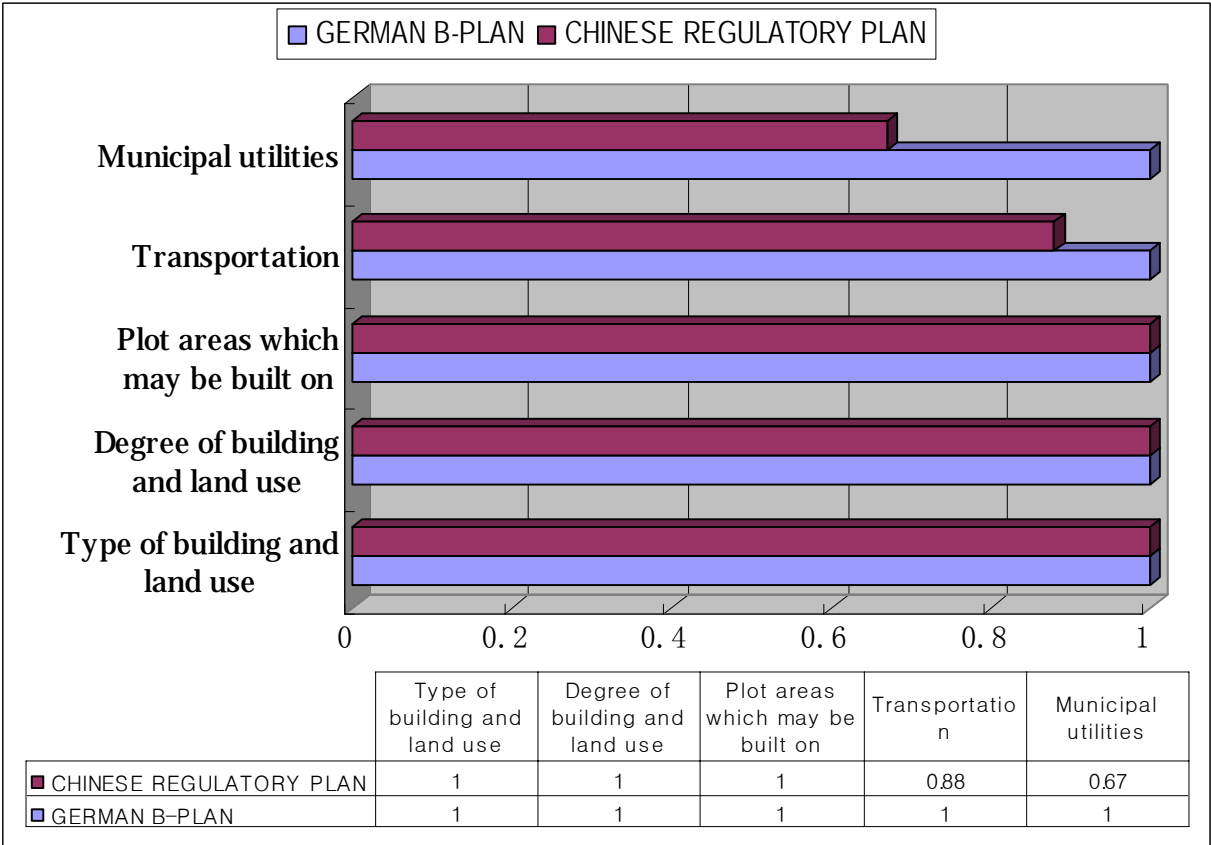


Fig. 5-10: Comparison of Economic Spatial Control Capabilities of Industrial Development Cases

The figure shows that the spatial control capabilities of the regulatory plan case “Changgou Town” are equivalent to those of the B-plan case “Zuse-/Curiestraße” in terms of type and degree of building and land use, as well as plot areas which may be built on. Moreover, in terms of transportation and municipal utilities, the spatial control capabilities of the regulatory plan case are close to those of the B-plan case. The distinction is that there is no spatial control capability to regulate pipelines on the building plots in the regulatory plan case.

### **5.3.4.2 Comparison of Social Control Factors**

#### **1. Comparison of the land use equality control**

The preparation of the B-plan “Zuse-/Curiestraße” followed the conventional procedure. The B-plan contains systematic legally binding constraints which effectively reflect the objective of sustainable development. The B-plan was approved as a local statute through a rigid statutory procedure with legally binding public participation. Therefore, the planning legal system and the public participation of the B-plan case “Zuse-/Curiestraße” should be defined as the spatial control capability level 1 (1 pm).

The regulatory plan case “Changgou Town” was only a technical document without a clear legal status. However, it had a relatively comprehensive consideration on economic, social, and environmental issues. Therefore, from the perspective of the planning legal system, the regulatory plan case “Changgou Town” should be defined as the spatial control capability level 3 (0.5 pm). On the other hand, the preparation of the regulatory plan “Changgou Town” followed the former procedure which had no statutory mechanism of public participation. In this case, with regard to the public participation, the regulatory plan case “Changgou Town” should be defined as the spatial control capability level 4 (0.25 pm).

#### **2. Comparison of the housing & public facility control**

Both plan cases had analyzed the potential needs for public facilities and housing in the plan substantiations. With regard to the commercial area in the B-plan case and the hi-tech industrial park in the regulatory plan case, the needs for public facilities and housing could be met in other locations near the zones. Therefore, dwellings or public facilities were not regulated in the industrial areas.

#### **3. Comparison of the urban image and locality control**

With regard to the urban image and locality control, the roof form, building façade, building color, coverage type, as well as miscellaneous building installations, are considered and regulated in the B-plan case “Zuse-/Curiestraße.” The roof form control covers both industrial buildings and the garage building. Through these detailed control approaches, it is possible to preserve the traditional German urban image and create the local character. In practice, the urban image and locality control were effectively implemented and the satisfactory control outcome was achieved. These control factors in the B-plan case “Zuse-/Curiestraße” are all legally binding constraints which should be defined as the spatial control capability level 1 (1

pm).

In the regulatory plan case “Changgou Town,” miscellaneous building installations, the landscape axis, as well as the spatial organization of buildings are controlled to regulate the urban image and locality. The requirements for miscellaneous building installations and the spatial organization of buildings are stipulated as guiding indicators in the regulatory plan text. However, since they are important control factors that are able to realize the social goal, they should be defined as the spatial control capability level 3 (0.5 pm). The landscape axis control has no practical control measure, so it should be defined as the spatial control capability level 4 (0.25 pm).

#### 4. Comparison of the heritage control

Although there is no valuable cultural heritage in the planning area, the requirement for archaeological discovery is still proposed in the B-plan case “Zuse-/Curiestraße.” As a guiding control, it has the spatial control capability level 3 (0.5 pm).

The regulatory plan “Changgou Town” has no regulation on heritage control.

Tab. 5-25: Comparison of Social Control Factors of Industrial Development Cases

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
Land Use Equality	Planning legal system (1)	Planning legal system (0.5)
	Public participation (1)	Public participation (0.25)
Urban Image and Locality	Roof form (1)	
	Building façade (1)	
	Building color (1)	
	Miscellaneous building installations (1)	Miscellaneous building installations (0.5)
	Coverage type (1)	Spatial organization of buildings (0.5) Landscape axis control (0.25)
Heritages	Hint: The requirement for archaeological discovery (0.5)	

The arithmetic average of each social theme can be calculated and compared according to the three social themes of sustainable development. The result is shown in the following figure.

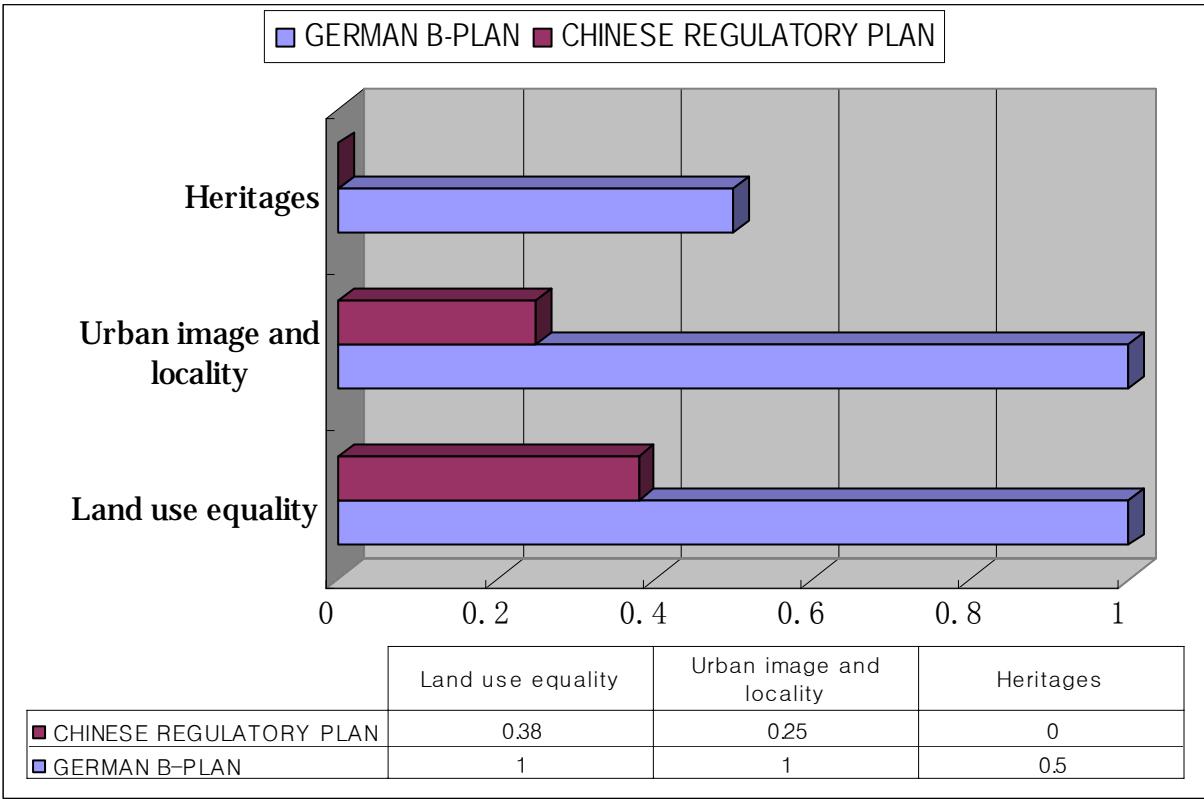


Fig. 5-11: Comparison of Social Spatial Control Capabilities of Industrial Development Cases

The figure shows that the planning legal system and the public participation of the Chinese regulatory planning should be further improved to provide equitable access to land resources. With regard to the urban image and locality control, the spatial control capability of the regulatory plan case is extremely weak, but the spatial organization of buildings fulfills the basic requirements for sanitation and safety. In addition, there is no heritage control measure in the regulatory plan case.

**5.3.4.3 Comparison of Environmental Control Factors**

**1. Comparison of the air pollution control**

In the B-plan “Zuse-/Curiestraße,” the air pollution control includes the emission control and the protective control. The emission control is regulated in the plan hint, while the protective control is regulated both in the map and in the text. The special precaution and roof gardens are required to implement the protective control. The protective control factors are vital mandatory statutory constraints which should be defined as the spatial control capability level 1 (1 pm). The emission control factor is an important guiding constraint which should be

defined as the spatial control capability level 3 (0.5 pm).

In the regulatory plan “Changgou Town,” two green buffers (1-1-1 and 1-2-1 zones) are regulated to reduce the air and noise pollution. The Chinese green buffer control is clearly a protective control, which is a mandatory control indicator with the spatial control capability level 1 (1 pm).

## **2. Comparison of the noise control**

With regard to the noise control, the spatial control approach of the B-plan case “Zuse-/Curiestraße” is similar to that of the regulatory plan case “Changgou Town.” The idea of the passive noise protection is applied in both plan cases. Both noise control factors are vital mandatory statutory constraints which should be defined as the spatial control capability level 1 (1 pm).

## **3. Comparison of the soil control**

In the B-plan “Zuse-/Curiestraße,” the building restriction line control is able to limit the scope of the building behavior in order to realize the intensive land use and reduce the proportion of the ground closure. Moreover, the requirement for development of a former quarrying site is regulated both in the map and in the text, and the requirements for soil exploitation are proposed in the plan hint. The building restriction line control and the former quarrying site control are vital mandatory statutory constraints which should be defined as the spatial control capability level 1 (1 pm). The hint is important guiding constraint which should be defined as the spatial control capability level 3 (0.5 pm).

In the regulatory plan “Changgou Town,” the set-back depth is regulated to control the intensive land use. However, the designated set-back depth is only 3 m on the plots of the hi-tech industrial park. In this case, it is difficult to achieve the objective of intensive land use. Therefore, the set-back depth control, which is a vital mandatory constraint, should be defined as the spatial control capability level 2 (0.75 pm).

## **4. Comparison of the water control**

Both plan cases control the paving materials of the outdoor ground in order to keep the water balanced. Both control measures of the paving materials are mandatory statutory constraints which should be defined as the spatial control capability level 1 (1 pm). The B-plan hint of the water exploitation can be considered an important guiding constraint which should be defined as the spatial control capability level 3 (0.5 pm).



## **5. Comparison of the biodiversity control**

In the B-plan “Zuse-/Curiestraße,” the planting obligations are able to realize greening requirements. Such provisions are complete positioning controls with entirely legally binding effects. Therefore, they should be defined as the spatial control capability level 1 (1 pm).

In the regulatory plan “Changgou Town,” the greening rate and the greening obligation of traffic green spaces are regulated to realize the planting obligations. The green buffer control can be considered a positioning control because its greening rate is 100%. But for industrial areas and the municipal utility, the greening rate control is a mandatory non-positioning control. Since the greening rate cannot completely reflect the ecological control goal, it should be defined as the spatial control capability level 2 (0.75 pm). On the other hand, the greening obligation of traffic green spaces is a guiding control, which is an important guiding constraint and should be defined as the spatial control capability level 3 (0.5 pm).

## **6. Comparison of the energy and mineral control**

In the B-plan “Zuse-/Curiestraße,” the privilege of renewable energy exploitation is stipulated in the plan text. It is a practical statutory constraint which should be defined as the spatial control capability level 1 (1 pm). The regulatory plan “Changgou Town” has no regulation on the theme.

## **7. Comparison of the landscape and tourism control**

In the regulatory plan “Changgou Town,” the green buffer, greening rate, and greening obligation of traffic green spaces are also intended to create the landscape. They correspond to the different forms of planting obligations in the B-plan “Zuse-/Curiestraße.”

Tab. 5-26: Comparison of Environmental Control Factors of Industrial Development Cases

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
Air pollution	Control of the emission of greenhouse gases and harmful gases (1)	Green buffer (1)
	Roof garden (1)	
	Area control in accordance with the limitation order for the utilization of air polluting fuels (0.5)	
Noise	Passive protection (1)	Green buffer (1)
Soil	Building restriction line (Baugrenze) (1)	Set-back depth (0.75)
	Indication of the soil contamination (1)	
	Measures for the protection, conservation, and development of topsoil (0.5)	
Water	Development of water permeable ground (1)	Development of water permeable ground (0.5)
	Permission of underground water exploitation (0.5)	
Biodiversity	Planting obligations (1)	Greening rate (0.75)
	Planting obligation of traffic green spaces (1)	Greening obligation of traffic green spaces (0.5)
Energies & Minerals	Renewable energy exploitation (1)	
Landscape & Tourism	Planting obligations (1)	Green buffer (1)
	Planting obligations (1)	Greening rate (0.75)
	Planting obligation of traffic green spaces (1)	Greening obligation of traffic green spaces (0.5)

The arithmetic average of each environmental theme can be calculated and compared according to the seven environmental themes of sustainable development. The result is shown in the following figure.

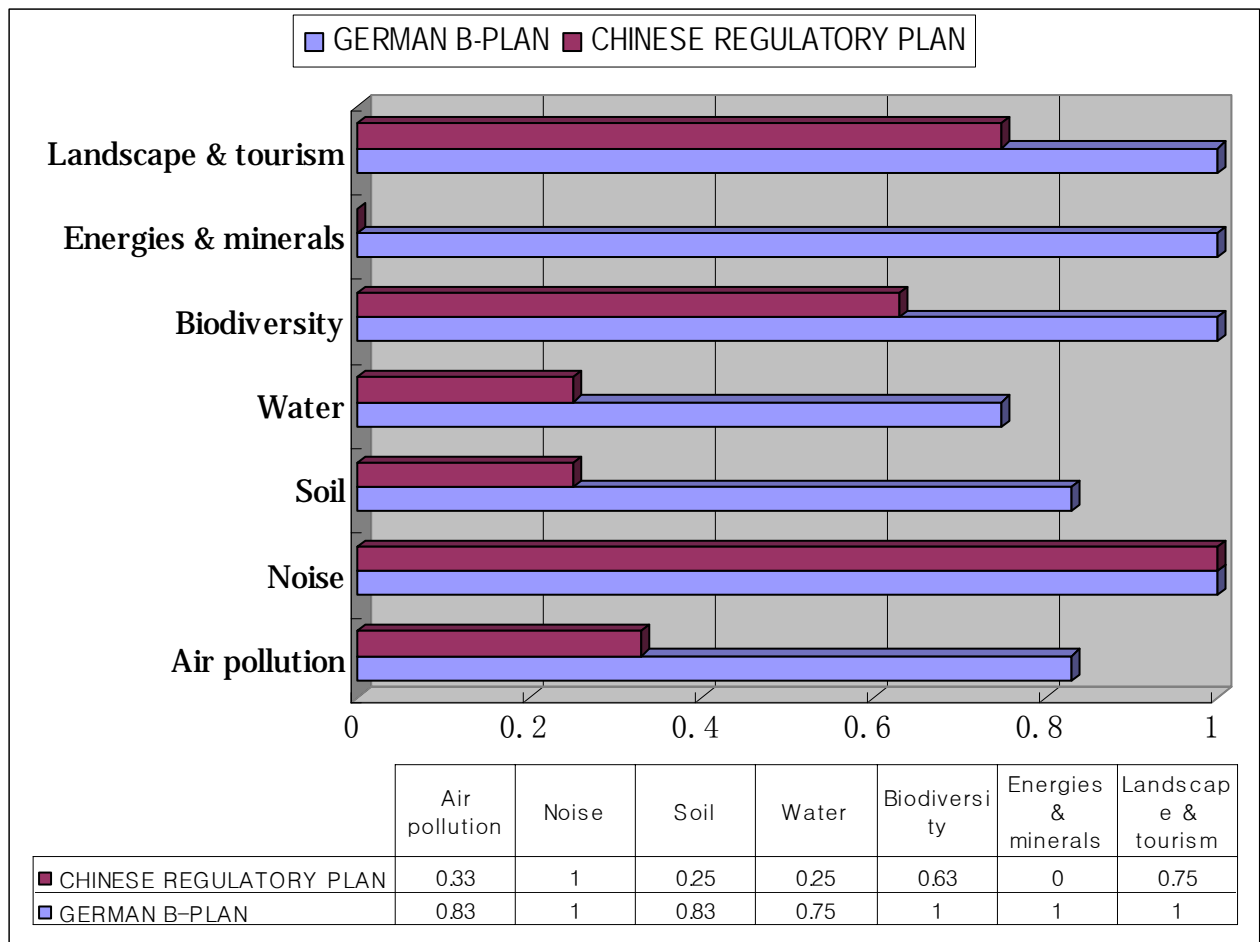


Fig. 5-12: Comparison of Environmental Spatial Control Capabilities of Industrial Development Cases

The figure shows that the noise control capability of the regulatory plan case “Changgou Town” is equivalent to that of the B-plan case “Zuse-/Curiestraße.” However, other spatial control capabilities of the regulatory plan case are weaker than those of the B-plan case.

## 5.4 Comparative Research on Spatial Control of Town Center Development Cases

### 5.4.1 Comparison of Spatial Control Goals of Town Center Development Cases

#### 5.4.1.1 Spatial Control Goal of B-plan Case “Haupt-/Bachstraße”

The B-plan “Haupt-/Bachstraße” is intended to develop a new town center for Stuttgart-Vaihingen, which provides high-quality economic, administrative, and cultural facilities. It is required to be compatible with the urban design features of the planning area as well as the surroundings.<sup>1</sup> Therefore, the spatial control goal of the B-plan case “Haupt-/Bachstraße” can be grouped into three parts:

1. To develop a new town center and provide working places;
2. To preserve the urban morphology and create a new town center by integrating the urban design concept;
3. To coordinate with the surroundings.

#### 5.4.1.2 Spatial Control Goal of Regulatory Plan Case “Zhongguancun West”

The “Zhongguancun West” used to be the place for the Haidian District Government of Beijing City, which was located in the Haidian Town of Beijing. The planning area is enclosed by the Fourth City Ring in the north, planning Caihefang Street in the west, planning Haidian South Street in the south, and Zhongguancun Street in the east. The total planning area is 51.44 ha.<sup>2</sup>

The regulatory plan “Zhongguancun West” is intended to develop a new civic center, which has modern commercial and cultural facilities, as well as key high-tech incubators in Beijing. The new development should be compatible with the existing physical surroundings.<sup>3</sup> The spatial control goals of the regulatory plan “Zhongguancun West” can be grouped into three

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<sup>1</sup> Landeshauptstadt Stuttgart Amt für Stadtplanung und Stadterneuerung: *Bebauungsplan mit Satzung über örtliche Bauvorschriften, Haupt-/Bachstraße (Braureigelände) Vaihingen 234 Begründung*, 2003, S.3

<sup>2</sup> Jiansu Institute of Urban Planning & Design (as the chief editor): *Urban Planning Database (Vol. 4): the Regulatory Planning*, China Architecture & Building Press, Beijing, 2002, p. 188

<sup>3</sup> Beijing Municipal Institute of City Planning and Design (BMICPD): *The Regulatory Plan of the Zhongguancun West in Beijing*, 1999, p. 3

parts:

1. To develop a new town center and provide working places;
2. To preserve the local historic and cultural context, and create new urban spaces by integrating the urban design concept;
3. To coordinate with the existing physical surroundings.

#### **5.4.1.3 Comparison of Spatial Control Goals of Town Center Plan Cases in China and Germany**

Considering the land use type and the spatial scale, the commercial and cultural center (S-6 zones) in the regulatory plan case “Zhongguancun West” was selected as the countertype of the B-plan “Haupt-/Bachstraße.”

With regard to the economic goals, the spatial control goal of the German B-plan “Haupt-/Bachstraße” is identical to that of the commercial and cultural center (S-6 zones) in the regulatory plan case “Zhongguancun West.” Both plan cases are intended to develop the new town center and provide working places.

With regard to the social goals, the spatial control goal of the German B-plan “Haupt-/Bachstraße” is identical to that of the commercial and cultural center (S-6 zones) in the regulatory plan case “Zhongguancun West.” Both plan cases are intended to preserve and extend the urban context, and create new urban spaces by integrating the urban design concept.

With regard to the environmental goals, the spatial control goal of the German B-plan “Haupt-/Bachstraße” is to coordinate with the surroundings. Here, “the surroundings” mean both physical environment and ecological environment. The spatial control goal of the commercial and cultural center (S-6 zones) in the regulatory plan case is similar to that of the German concept. However, the regulatory plan focuses on the coordination with the physical surroundings rather than the ecological environment. Its dominant consideration is the urban design and landscape.

Tab. 5-27: Comparison of Spatial Control Goals of Town Center Plan Cases in China and Germany

	<b>GERMAN B-PLAN CASE “Haupt-/Bachstraße”</b>	<b>CHINESE REGULATORY PLAN CASE “Zhongguancun West”</b>
<b>Economic Goal</b>	To develop a new town center and provide working places	To develop a new town center and provide working places
<b>Social Goal</b>	To preserve the urban morphology and create a new town center by integrating the urban design concept	To preserve the local historic and cultural context and create new urban spaces by integrating the urban design concept
<b>Environmental Goal</b>	To coordinate with the surroundings	To coordinate with the existing physical surroundings

## 5.4.2 Analysis of the Spatial Control System of the B-plan Case: Haupt-/Bachstraße

### 5.4.2.1 Analysis of Institutional Factors of the B-plan “Haupt-/Bachstraße”

#### 1. Preparation of the B-plan “Haupt-/Bachstraße”

The B-planning followed the conventional procedure of the B-plan preparation. The design of the competition winner became the basis of the B-plan.



Fig. 5-13: New Town Center of Vaihingen

#### 2. Plan substantiation<sup>1</sup>

Based on the planning goal, the main content of substantiation (Begründung) was the analysis of important planning issues, such as the coordination between the B-plan and other relevant

<sup>1</sup> Landeshauptstadt Stuttgart Amt für Stadtplanung und Stadterneuerung: *Bebauungsplan mit Satzung über örtliche Bauvorschriften, Haupt-/Bachstraße (Brauereigelände) Vaihingen 234 Begründung*, 2003

valid plans, transportation infrastructure, garbage disposal and municipal utilities, public facilities, and environmental protection. The B-plan substantiation was intended to find and define the public interest in this project so that the justified conclusions could be embodied in the B-plan regulations.

The content and method of the B-plan “Haupt-/Bachstraße” substantiation (Begründung) were basically identical to those of the B-plan “Im Raiser.”

Due to the prospective development of a new urban center, the potential impact on the environment was carefully studied. On the basis of the environmental intrusion concept regulated in *The Federal Nature Protection Act (Bundesnaturschutzgesetz)*, the interaction between the anticipative development and the air, noise, soil, and water was examined and analyzed by professional agencies. Compensatory measures, such as the construction of green spaces and roof gardens, were proposed according to the conclusions of the environmental evaluation mentioned above.

#### **5.4.2.2 Analysis of Economic Control Factors of the B-plan “Haupt-/Bachstraße”**

##### **1. Type of building and land use**

The boundary of the planning area and the land use type (core area: MK) are designated in the B-plan map. The permissive building types and the land use compatibility are stipulated in the B-plan text.

##### **2. Degree of building and land use**

In the B-plan “Haupt-/Bachstraße,” the site occupancy index (GRZ) is regulated by mapping designations. Moreover, the maximum plot ratio (GFZ) and building height of each planning building are designated in the B-plan map, while relevant requirements are stipulated in the B-plan text.

##### **3. Plot areas which may be built on**

Through the building restriction line, the plot areas which may be built on are defined.

##### **4. Transportation**

A traffic area for specific purposes is regulated both in the map and in the text. It is an access



to the firehouse.

Normal traffic areas are designated in the map, including motor vehicle roads, pedestrian and bicycle lanes, parking spaces for motor vehicles, as well as entrances and exits of vehicles. The plan text stipulates the relevant requirement for vehicle entrances and exits. Different signs clarify different uses. For example,  $\text{\textcircled{P}}$  represents parking spaces for motor vehicles,  $\text{\textcircled{V}}$  represents traffic green spaces, “BUS” represents bus stations, and “TAXI” represents the taxi stand. The planting obligation is also applied to the traffic green spaces.

In the B-plan “Haupt-/Bachstraße,” parking spaces are allowed to be built only in regulated scopes with “St” symbols. The permission of developing an underground garage is given in the B-plan text.

Spaces to be encumbered with rights of passage in favor of the general public are also regulated both in the map and in the text. Different rights are regulated to control the passage of pedestrians, bicycles, and certain motor vehicles.

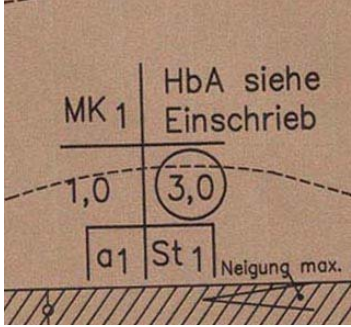

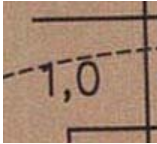
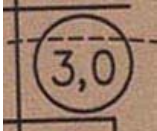
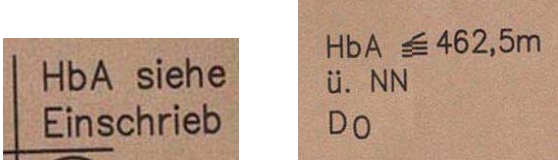


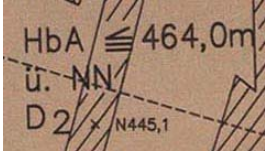
The spatial scopes of embankments and retaining walls, which are necessary to road development, are stipulated in the B-plan text.

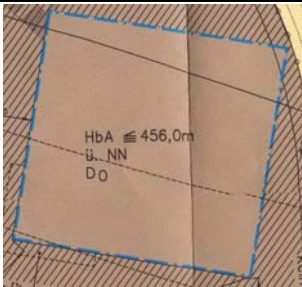




The coordinates of road control points and the maximum limits of road slopes are designated in the B-plan map.

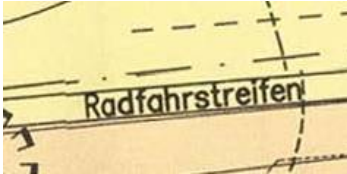

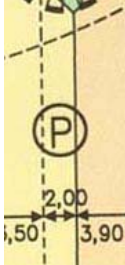

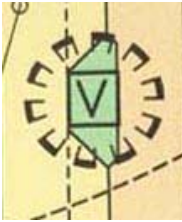

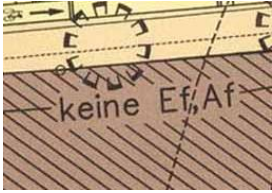

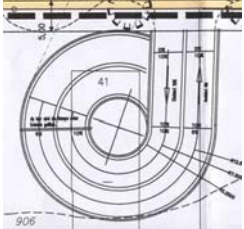

## **5. Municipal utilities**



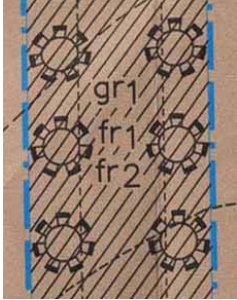



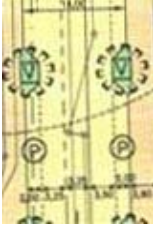
The general requirement for garbage cans is stipulated in the B-plan text. Locations of pipelines are designated in the plan map.

Tab. 5-28: Analysis of Economic Control Factors of the B-plan “Haupt-/Bachstraße”

TYPE OF BUILDING AND LAND USE		
	Mapping Designations & Textual provisions	Site Photos
<b>CORE AREA (MK<sub>1</sub>)</b>		
	<p>MK<sub>1</sub>: The development of gas stations pursuant to §7 (2)5 &amp; §7 (3)1, BauNVO, is not permitted. Recreational installations are not permitted. Recreational installations in the category A of the B-plan “Recreational Installations and Others” (1989/18) can only be permitted as exceptional cases. (§7, §1 para. 4-9, BauNVO)</p>	
DEGREE OF BUILDING AND LAND USE		
	Mapping Designations & Textual provisions	Site Photos
<b>SITE OCCUPANCY INDEX (GRZ)</b>		
<b>PLOT RATIO (GFZ)</b>		
	<p>In principle, except for garage buildings, garage stories are not calculated into the number of building floors. Therefore, floor areas of garage stories are not calculated into building floor areas. (§21a para. 4, BauNVO)</p>	
<b>BUILDING HEIGHT (HBA)</b>		 
		
	<p>HbA: Building height (see designations in the map). The house technical superstructure:</p>	

	<p>Once the superstructure coverage is less than 25% of the building coverage, and the superstructure sets back from the edge of the building, a maximum 4.0 m higher than the HbA limit can be permitted. The flat roof of the superstructure should be covered by an earth layer which should be at least 8cm thick, where grasses and shrubs can be planted and maintained.</p> <p>(§9 para. 1 No.1, para.2, BauGB; §16 para. 2,3, §18 para. 1, BauNVO)</p>	
<b>PLOT AREAS WHICH MAY BE BUILT ON</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>BUILDING RESTRICTION LINE (BAUGRENZE)</b>		
<b>TRANSPORTATION</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>GENERAL REGULATIONS ON TRAFFIC AREAS AND TRAFFIC GREEN SPACES</b>	<p>With regard to traffic areas and traffic green spaces which are regulated in the B-plan, if it is compatible with basic characteristics of plan regulations, the modification of the location may be permitted under the framework of the street construction program.</p> <p>Entrances and exits of vehicles which pass through traffic green spaces and parking belts can be permitted.</p>	
<b>TRAFFIC AREA FOR SPECIFIC PURPOSES</b>	 <p>The access to the parking spaces of the firehouse. (§9 para. 1No. 11, BauGB)</p>	
<b>MOTOR VEHICLES ROADS</b>		

<p><b>PEDESTRIAN AND BICYCLE LANES</b></p>		
<p><b>PARKING SPACES FOR MOTOR VEHICLES</b></p>		
<p><b>TRAFFIC GREEN SPACES</b></p>		
<p><b>ENTRANCES AND EXITS OF VEHICLES</b></p>	 <p><i>Keine Ef, Af:</i> Entrances and exits of vehicles are not permitted in the marking zone. This regulation doesn't apply to bicycles, freight vehicles, or vehicles of emergency services. (§9 para. 1 No. 4, 11, BauGB)</p>	
<p><b>EMBANKMENT S &amp; RETAINING WALLS</b></p>	<p>So long as the map contains no other regulations, corridors next to transportation areas are available for embankments, diggings, and retaining walls. The horizontal distance should be 3.0m from the street boundary line (Straßenbegrenzungslinie), while the vertical distance should be 2.0m from the road altitude. The regulation is also valid for underground retaining structures which are required for road construction (horizontal range 0.1m, vertical range 0.4m). (§9 para. 1 No. 26, BauGB)</p>	
<p><b>PARKING SPACES</b></p>	 <p>St<sub>1</sub>: Ground parking spaces are only permitted on "St" areas. (§9 para. 1 No.4, BauGB; §12 para. 6, §23 para. 5, BauNVO)</p>	
<p><b>UNDERGROUND GARAGE</b></p>		

	<p>A substructure for the underground garage, under plot areas which may not be built on and the main street, can be permitted to be built. (§23, §16 para. 5, BauNVO)</p>	
<p><b>SPACES TO BE ENCUMBERED WITH RIGHTS OF PASSAGE IN FAVOR OF THE GENERAL PUBLIC</b></p>	<div style="display: flex; justify-content: space-around;">   </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;">  </div> <p>Land use boundaries of these spaces can be adjusted up to 2.0 m.</p> <p>gr<sub>1</sub>: Spaces to be encumbered with walking and driving rights in favor of the general public.</p> <p>fr<sub>1</sub>: Spaces to be encumbered with bicycle riding rights in favor of the general public, with rights of passage in favor of freight vehicles, as well as vehicles of emergency services.</p> <p>fr<sub>2</sub>: spaces to be encumbered with rights of passage in favor of certain vehicles, such as taxis, freight vehicles, as well as vehicle of local residents.</p> <p>(§9 para. 1No. 21, BauGB)</p>	  
<b>MUNICIPAL UTILITIES</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<p><b>PLACES FOR GARBAGE CANS</b></p>	<p>The sight towards garbage cans should be shielded by proper measures (for example: the partition or the vegetation). Garbage cans should be shielded from direct sunlight. The location of a garbage can should be a maximum 1.5 m from the road edge. (§74 para. 1No. 3, LBO)</p>	
<p><b>PIPELINES</b></p>		

### **5.4.2.3 Analysis of Social Control Factors of the B-plan “Haupt-/Bachstraße”**

#### **1. Land use equality**

The preparation of the B-plan “Haupt-/Bachstraße” followed the regulations in the relevant acts and ordinances. The public participation was also implemented.

#### **2. Housing & public facilities**

In the planning area, public facilities, such as the public hall, music academy, and places for various associations were developed to provide public services. These public facilities meet the future needs of the residents in Vaihingen.

The potential needs for a kindergarten, a school, and housing were considered and analyzed in the plan substantiation. The conclusion was that the needs could be met in other locations near the planning area, like in the residential communities “Lauchäcker,” “Am Feldrand,” or “Endelbang.” Therefore, the kindergarten or school, as well as dwellings, were not regulated in the B-plan.

#### **3. Urban image and locality**

The roof form of each building as well as the requirements for roof gardens are stipulated in the B-plan text. The roof symbol of each building is designated in the B-plan map.

The requirement for building façade is stipulated in the B-plan text.

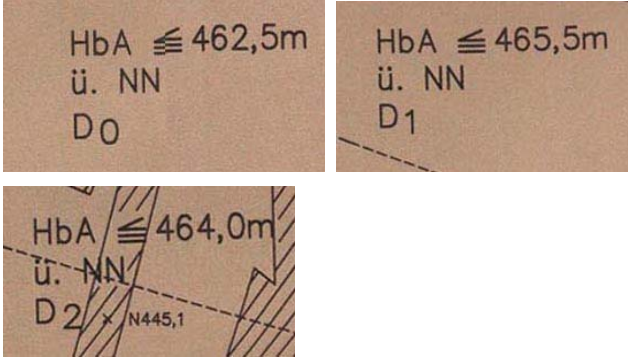





The the requirements for advertising installations, fence, and antenna are stipulated in the B-plan text.



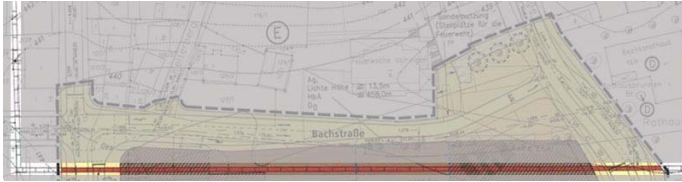
The general requirement for coverage type is stipulated in the B-plan text. Moreover, the coverage type symbol of each building is designated in the B-plan map.

#### **4. Heritages**

The boundary of the preservation zone is designated in the B-plan map, while the requirement for archaeological discovery is proposed in the B-plan hint.

Tab. 5-29: Analysis of Social Control Factors of the B-plan “Haupt-/Bachstraße”

<b>LAND USE EQUALITY</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>LEGAL SYSTEM</b>	See institutional factors.	
<b>PUBLIC PARTICIPATION</b>	See institutional factors.	
<b>URBAN IMAGE &amp; LOCALITY</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>ROOF FORMS</b>		
	<p>D<sub>0</sub>: Only the flat roof (0°—10°) is permitted.</p> <p>D<sub>1</sub>: The zigzag roof is permitted.</p> <p>D<sub>2</sub>: The glass flat roof (0°—10°) is permitted. (§74 para. 1No. 1, LBO)</p>	 
<b>BUILDING FACADE</b>	<p>Shining and reflecting surface materials, as well as glaring colors are not permitted. For secondary building parts, up to 20% of façade surface areas may be permitted to have the forbidden materials mentioned above as exceptional cases. The glass is not affected by the regulation above.</p> <p>(§74 para. 1 No.1, LBO)</p>	 
<b>ANTENNA</b>	<p>Each building permits 1 land and satellite antenna which can clearly be seen from the public street. If an antenna (together with the attached basis structure) sets back from the house edge and exceeds the permitted HbA no more than 10.0 m, it (for example: the radio antenna, etc.) may be permitted as an exceptional case. (§74 para. 1No. 4, LBO)</p>	

<b>FENCE</b>	The fence is not permitted in the planning area. (§74 para. 1No. 3, LBO)	
<b>ADVERTISING INSTALLATIONS</b>	Advertising installations on buildings are only permitted in locations under the maximum limit of the exterior wall. Advertising installations with changing and/or agitating lights are not permitted. The light and the illuminant, which may generate the blue spectrum, are not permitted. (§74 para. 1No. 2, LBO)	
<b>COVERAGE TYPE (BAUWEISE)</b>	 a1: Other development (abweichende Bauweise). The length limit (50 m) is canceled. (§22 para. 4, BauNVO)	
<b>HERITAGES</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>BOUNDARY OF THE PRESERVATION ZONE</b>		
<b>HINT</b>	In case of discovering archaeological heritages, it is required to report this to the heritage bureau or the police station (§20, DSchG).	

#### 5.4.2.4 Analysis of Environmental Control Factors of the B-plan “Haupt-/Bachstraße”

##### 1. Air pollution

It is stipulated in the B-plan text that the special precaution be taken in order to provide protection against traffic pollution.

The requirements for roof gardens are stipulated in the B-plan text. The relevant roof symbol of each building is designated in the B-plan map.

##### 2. Noise



Passive protection measures, which should be taken to counter the noise pollution, are stipulated in the B-plan text.

### **3. Soil**

The requirements for soil exploitation, potential industrial waste, and building foundations are proposed in the B-plan hint.

### **4. Water**

The requirement for water exploitation is proposed in the B-plan hint.

### **5. Biodiversity**

The locations of planting obligations are designated in the B-plan map, while relevant requirements are stipulated in the B-plan text.

### **6. Energies & Minerals**

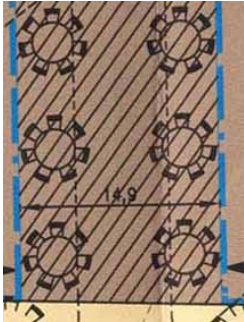
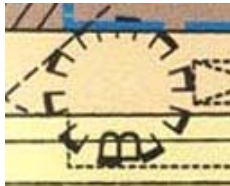


The privilege of renewable energy exploitation is stipulated in the B-plan text.

### **7. Landscape & Tourism**

In the B-plan “Haupt-/Bachstraße,” the landscape and tourism control is realized by the control of the planting obligation.

Tab. 5-30: Analysis of Environmental Control Factors of the B-plan “Haupt-/Bachstraße”

<b>AIR POLLUTION</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>INDICATION</b>	In the indicated area, special physical precautions should be taken to counter the traffic pollution. (§9 para. 5 No. 1, BauGB)	
<b>REGULATIONS ON ROOF GARDENS</b>	Roof gardens should be built on D <sub>0</sub> roofs. Cover layers on those roofs should be at least 12cm thick, where grasses and shrubs can be planted and maintained.	
<b>NOISE</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>NOISE PREVENTION</b>	Measures should be taken in this area to provide protection against the outdoor noise (for example: the installation of sound insulating windows, the arrangement of bedrooms). (§9 para. 1No. 24, BauGB)	
<b>SOIL</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>HINT</b>	<p>Protection of the soil: Regulations in <i>The Federal Soil Protection Act</i> and <i>The Soil Protection Act of Baden-Württemberg</i> (BBodSchG und BodSchG BW) should be noted.</p> <p>Waste: The potential industrial waste may exist in the soil of the planning area. It is recommended to check this situation before the architectural design by using the Waste Information System (ISAS) or consulting with the Environmental Protection Bureau.</p> <p>Building foundations: With regard to new large-scale developments, especially the planning underground garage, it is recommended to implement a geological and hydrological examination.</p>	
<b>WATER</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>HINT</b>	Protection of water resources: Regulations on the water right in <i>The Water Management Act (WHG)</i> , especially those on “the official permission of the water exploitation, the exploitation and preservation of the underground water, the drainage and loop way (detour), and water pollutants” should be noted.	
<b>BIODIVERSITY</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>

<p><b>PLANTING OBLIGATIONS</b></p>	<div style="display: flex; justify-content: space-around;">   </div> <p>So long as they are not essential entrances and exits and accesses, plot areas which may not be built on should be built as gardens or green spaces and be maintained.</p> <p>Trees: Trees with small and middle crowns should be planted in proper locations. At the time of planting, at the location of 1 m from the ground, the trunk perimeter of the tree should be at least 20 cm. Moreover, shrubs and grasses should also be planted and maintained. The area of the scarification around the tree root must be reserved as at least 12 m<sup>2</sup>.</p>	 
<p><b>ENERGIES &amp; MINERALS</b></p>		
	<p><b>Mapping Designations &amp; Textual provisions</b></p>	<p><b>Site Photos</b></p>
<p><b>PRIVILEGE OF RENEWABLE ENERGY EXPLOITATION</b></p>	<p>With regard to the building height, energy saving structures, especially solar energy structures, may be permitted to be built as exceptional cases (see antenna). (§9 para. 1, BauGB; §16 para. 2, BauNVO)</p>	
<p><b>LANDSCAPE &amp; TOURISM</b></p>		
	<p><b>Mapping Designations &amp; Textual provisions</b></p>	<p><b>Site Photos</b></p>
	<p>See the planting obligations.</p>	

### 5.4.3 Analysis of the Spatial Control System of the Regulatory Plan Case “Zhongguancun West”

#### 5.4.3.1 Analysis of Institutional Factors of the Regulatory Plan “Zhongguancun West”

##### 1. Preparation of the regulatory plan “Zhongguancun West”

Commissioned by the Development and Administrative Office of Zhongguancun West, *The Regulatory Plan of Zhongguancun West* was prepared by the Beijing Municipal Institute of City Planning and Design (BMICPD). The regulatory planning followed the former conventional procedure, which included steps of the preparation of working instruction, initial preparation of project, data collection, draft plan design, formation of regulatory plan, as well as the approval procedure.



Fig. 5-14: New Town Center of Northwest Beijing

## 2. Plan substantiation

The preparation of the regulatory plan “Zhongguancun West” was based on *The Urban Planning Act of the P. R. China (1989)*, *The Preparation Criteria of Urban Planning (1991)*, *The Standard for Urban Land Use Classification, Building and Land Use(GBJ 137-90)*, as well as other relevant standards and norms.

The **planning principles** were explained as follows:<sup>1</sup>

The regulatory plan should be able to integrate the land uses and enhance the local attractiveness;

A reasonable development scale should be controlled so that the sustainable development could be realized;

A convenient and safe transportation system should be developed;

The physical construction in the planning area should be coordinated with surroundings so that an integral urban morphology may be developed;

The historic and cultural tradition of the planning area should be embodied by the urban design, especially the urban design of public spaces and open spaces;

The flexibility for site planning and architectural design should be reserved;

The requirement for airport clearance should be met.

Based on the planning goal, the plan substantiation analyzed the important planning issues, such as the urban morphology and landscape, heritage preservation, and transportation. The justified conclusions were embodied in the regulatory plan.

The planning area consists of ten groups of zones (from N-1 to N-4, from S-1 to S-6). These groups are separated by local streets.<sup>2</sup> The intersection of the Haidian North Street and the Haidian Central Street, where an open public square is located, is the core of the planning area. Other zone groups are located around this core.

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<sup>1</sup> Beijing Municipal Institute of City Planning and Design (BMICPD): *The Regulatory Plan of the Zhongguancun West in Beijing*, 1999, p. 4

<sup>2</sup> Jiansu Institute of Urban Planning & Design (as the chief editor): *Urban Planning Database (Vol. 4): the Regulatory Planning*, China Architecture & Building Press, Beijing, 2002, p. 189

The Oblique Street of Haidian town has a strong local identity and an interesting historical origin. Therefore, the regulatory plan defines the Oblique Street as a pedestrian area and preserves the original direction of the street. Now, it is the landscape axis of the modern commercial center in Zhongguancun.

#### **5.4.3.2 Analysis of Economic Factors of the Regulatory Plan “Zhongguancun West”**

The commercial and cultural center (S-6 zones) is located in the southeast corner of the planning area. It has the most modern public facilities and infrastructures that may serve the residents in northwest Beijing. In order to optimize the comparative study, it was selected as the comparative object for the German B-plan “Haupt-/Bachstraße,” since the spatial scale of it (5.46 ha) is at the same level with that of the German case (3.75 ha). The commercial and cultural center (S-6 zones) consists of six zones, which are S-6-1, S-6-2, S-6-3, S-6-4, S-6-5, and S-6-6.

##### **1. Type of building and land use**

The number, boundary, and land use type of each zone are designated in the plan maps. Moreover, the land use type and area of each zone are also regulated in the control indicator table. The land use compatibility of each zone may refer to the relevant regulations in *The Standard for Urban Land Use Classification, Building and Land Use (GBJ 137-90)*.

##### **2. Degree of building and land use**

Maximum plot ratios, building densities, and building heights of the S-6-1, S-6-2, S-6-3, S-6-4, and S-6-5 zones are stipulated in the control indicator table as quantitative indicators. In addition, in order to develop the pedestrian area of the Oblique Street, minimum building heights of the S-6-1, S-6-2, S-6-4, and S-6-5 zones are also stipulated. Meanwhile, the building height control map illustrates the building height of each zone regulated in the control indicator table.

##### **3. Plot areas which may be built on**

Plot areas which may be built on are limited by building lines in the plan maps.

##### **4. Transportation**

In the regulatory plan “Zhongguancun West,” land use boundaries of roads are limited by road

boundary lines in the plan maps. In this case, the building lines are situated directly above road boundary lines. the road boundary lines. With regard to the commercial and cultural center (S-6 zones), the Zhongguancun Street, Haidian South Street, main streets of the Zhongguancun West, as well as pedestrian streets are controlled.

For parking facilities, land use boundaries of parking spaces and underground garages are designated in the land use map, zoning map, and transportation system map. The greening rate of each parking facility is stipulated in the control indicator table as a quantitative indicator. There is a large underground garage regulated in the commercial and cultural center (S-6 zones).

The width of each road is stipulated in the plan text.<sup>1</sup>

## **5. Municipal utilities**








There is a specific *Comprehensive Municipal Engineering Program of Zhongguancun West*,<sup>2</sup> which regulates the development of both infrastructure networks, including spatial structures of underground pipelines, and municipal utility buildings.

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<sup>1</sup> Beijing Municipal Institute of City Planning and Design (BMICPD): *The Regulatory Plan of the Zhongguancun West in Beijing*, 1999, p. 5

<sup>2</sup> Ibid, p. 6

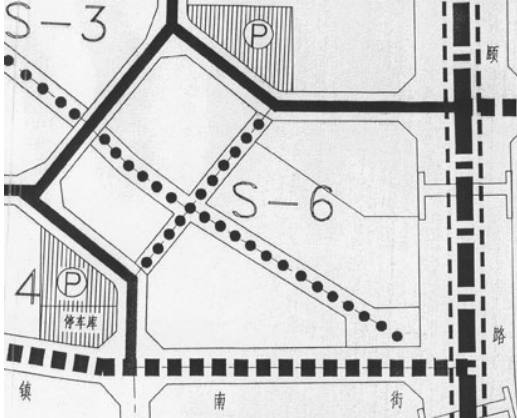

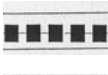






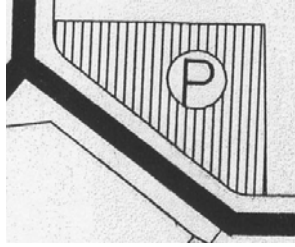

Tab. 5-31: Analysis of Economic Control Factors of the Commercial & Cultural Center in the Regulatory Plan “Zhongguancun West”

<b>TYPE OF BUILDING AND LAND USE</b>		
	Mapping Designations & Textual provisions	Site Photos
<b>COMMERCIAL, TRADING &amp; CULTURAL FACILITIES</b>	 <p>  : Commercial area (C21)   : Trading area (C23)   : Cultural &amp; entertainment area (C3)   : Pedestrian streets                 </p>	   
	<p>Quantitative indicators:</p> <p>S-6-1 (C21): 0.84ha                      S-6-2 (C21): 0.47ha                      S-6-3 (C23): 0.79ha                      S-6-4 (C21): 1.22ha                      S-6-5 (C3): 1.18ha</p>	
<b>DEGREE OF BUILDING AND LAND USE</b>		
	Mapping Designations & Textual provisions	Site Photos
<b>PLOT RATIO</b>	<p>Quantitative indicators: Maximum limits</p> <p>S-6-1 (C21): 3.0; S-6-2 (C21): 3.0;                      S-6-3 (C23): 5.0; S-6-4 (C21): 3.0; S-6-5 (C3): 3.5</p>	



<p><b>BUILDING DENSITY</b></p>	<p>Quantitative indicators: Maximum limits</p> <p>S-6-1 (C21): 40%</p> <p>S-6-2 (C21): 40%</p> <p>S-6-3 (C23): 35%</p> <p>S-6-4 (C21): 40%</p> <p>S-6-5 (C3): 40%</p>	
<p><b>BUILDING HEIGHT</b></p>	 <p>Quantitative indicators: Maximum limits</p> <p>S-6-1 (C21): 12m/30m</p> <p>S-6-2 (C21): 12m/30m</p> <p>S-6-3 (C23): 60m</p> <p>S-6-4 (C21): 12m/45m</p> <p>S-6-5 (C3): 12m/45m</p>	
<p><b>PLOT AREAS WHICH MAY BE BUILT ON</b></p>		
	<p><b>Mapping Designations &amp; Textual provisions</b></p>	<p><b>Site Photos</b></p>
<p><b>BUILDING LINE</b></p>		

# TRANSPORTATION

	Mapping Designations & Textual provisions	Site Photos
<b>ROAD CONTROL</b>	  : Urban arterial road  : Urban branch road  : Main streets of the Zhongguancun West  : Pedestrian streets	   
<b>GARAGE</b>		

### **5.4.3.3 Analysis of Social Factors of the Regulatory Plan “Zhongguancun West”**

#### **1. Land use equality**

Since it was only a technical document for building permission of the urban planning authority, the regulatory plan “Zhongguancun West” did not have complete legal status.

The preparation of the regulatory plan “Zhongguancun West” followed the former conventional procedure. Therefore, the implementation of the public participation stayed at the basic level.

#### **2. Housing & public facilities**

The planning goal of the regulatory plan “Zhongguancun West” was to develop a civic commercial and cultural center for Beijing, in order to meet the needs for large-scale public facilities in northwest Beijing. The commercial and cultural center (S-6 zones) was one of the most important projects in the plan.

Since the housing need could be met in other locations, dwellings were not regulated.

#### **3. Urban image and locality**

In the planning process, the delicate urban design was implemented to:<sup>1</sup>

- a. Create a modern urban image;
- b. Create a pleasant pedestrian system;
- c. Design public spaces, such as parks, green spaces, open squares, and pedestrian streets;
- d. Locate landmark buildings or structures.

With regard to the roof form, the roof form of each planned building is designated in the general layout map. However, this control is only a guidance.

There is no regulation on the building façade or building color in the regulatory plan case.

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<sup>1</sup> Jiansu Institute of Urban Planning & Design (as the chief editor): *Urban Planning Database (Vol. 4): the Regulatory Planning*, China Architecture & Building Press, Beijing, 2002, p. 188

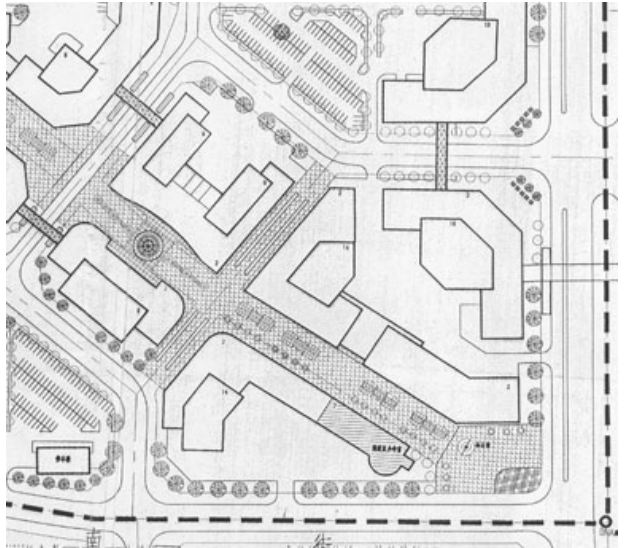

With regard to miscellaneous building installations, guiding locations of landscape structures are designated in the general layout map and the landscape analysis map. The requirements for pedestrian streets are stipulated in the plan text.

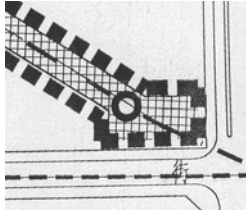

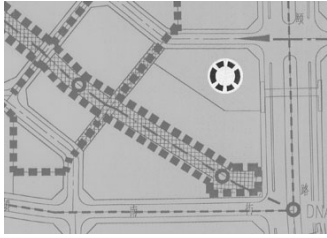

With regard to the spatial organization of buildings, the indicative layout of prospective buildings in the planning area, including their spatial locations and spatial organization, is designated in the general layout map.

**5. Heritages**

Locations of heritage buildings are illustrated in the landscape analysis map. These heritage buildings have been protected, preserved, and integrated into the urban design concept.

Tab. 5-32: Analysis of Social Control Factors of the Commercial & Cultural Center in the Regulatory Plan “Zhongguancun West”

<b>LAND USE EQUALITY</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>LEGAL SYSTEM</b>	See institutional factors.	
<b>PUBLIC PARTICIPATION</b>	See institutional factors.	
<b>URBAN IMAGE &amp; LOCALITY</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>ROOF FORMS</b>		

MISCELLANEOUS BUILDING INSTALLATIONS		
	Textual provision: Ground materials and patterns, miscellaneous building installations, as well as plants in the pedestrian streets should be harmoniously designed and implemented.	
SPATIAL ORGANIZATION OF BUILDINGS	See the roof forms	
<b>HERITAGES</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
HISTORIC ARCHITECTURE		

#### 5.4.3.4 Analysis of Environmental Factors of the Regulatory Plan “Zhongguancun West”

There was no environmental evaluation or assessment for air pollution, noise, soil, water, biodiversity, and natural resources implemented in the planning process.


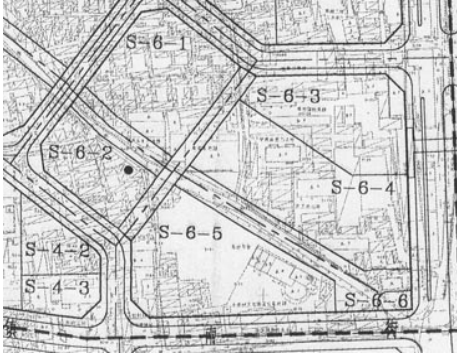

There are three environmental control factors in the regulatory plan “Zhongguancun West,” which are the control of public green spaces, the control of the greening rate, as well as the preservation of historical trees.

Spatial scopes of public green spaces are designated in the plan maps, while corresponding control indicators are stipulated in the control indicator table.

The minimum greening rate of each zone is regulated in the control indicator table as an important quantitative indicator.

Moreover, there is a distribution map of historical trees which illustrates locations of valuable historical trees in the planning area. The historical trees must be preserved in the development.

Tab. 5-33: Analysis of Environmental Control Factors of the Commercial & Cultural Center in the Regulatory Plan “Zhongguancun West”

<b>ENVIRONMENTAL CONTROL FACTORS</b>		
	<b>Mapping Designations &amp; Textual provisions</b>	<b>Site Photos</b>
<b>GREENING RATE</b>	Quantitative indicators: Minimum limits S-6-1: 30% S-6-2: 30% S-6-3: 30% S-6-4: 30% S-6-5: 30% S-6-6: 25%	
<b>PRESERVATION OF HISTORICAL TREES AND FAMOUS WOOD SPECIES</b>		

## 5.4.4 Comparison of Spatial Control of Town Center Cases

### 5.4.4.1 Comparison of Economic Control Factors

#### 1. Comparison of the land use type control

With regard to the land use type control, the spatial control approach of the B-plan case “Haupt-/Bachstraße” is similar to that of the regulatory plan case “Zhongguancun West.” In both plan cases, land use types and land use compatibilities are all regulated by mapping designations and textual provisions.

The land use type control factors in both plan cases are mandatory factors with important functions that achieve the planning goal. Therefore, they should be defined as the spatial control capability level 1 (1 pm).

#### 2. Comparison of the land use degree control

The maximum site occupancy index (GRZ) is controlled by mapping designations in the B-plan “Haupt-/Bachstraße.” On the other hand, in the regulatory plan case “Zhongguancun West,” the maximum building density of each zone in the commercial and cultural center is controlled by quantitative indicators in the plan text. The control approach of the Chinese building density is identical to that of the German site occupancy index (GRZ).

The maximum plot ratio (GFZ) is controlled by mapping designations in the B-plan “Haupt-/Bachstraße.” Meanwhile, the regulation on garage stories are stipulated in the B-plan text. In the regulatory plan “Zhongguancun West,” the maximum plot ratio of each zone is regulated by quantitative indicators in the plan text. The control approach of the Chinese plot ratio is identical to that of the German GFZ. However, there is no regulation on garage stories in the regulatory plan case.

With regard to the building height control, absolute building heights, which are calculated from the elevation of the German benchmark, are regulated in the B-plan “Haupt-/Bachstraße.” In the regulatory plan case “Zhongguancun West,” both maximum and minimum building heights are controlled. However, the building heights are defined as relative building heights, which are calculated from the elevation of the ground.

In the B-plan case “Haupt-/Bachstraße,” there is also a control approach for the building superstructure, which refers to engineering structures on the building roof such as chimneys.

The building superstructure is controlled by a small but flexible building window, which can limit the building scope of superstructures. Moreover, besides this small building window control, the maximum height of superstructures is also available. In the regulatory plan case “Zhongguancun West,” there is no specific regulation for this. However, in principle, the relevant provisions in *The Planning and Design Criteria of Building Projects in Beijing Region (Version of Probation)* should be referred to.<sup>1</sup>

Both German and Chinese land use degree control factors are vital mandatory statutory constraints which should be defined as the spatial control capability level 1 (1 pm).

### **3. Comparison of the control of plot areas which may be built on**

The B-plan case “Haupt-/Bachstraße” defines building restriction lines to control plot areas which may be built on (building windows). In the regulatory plan case “Zhongguancun West,” plot areas which may be built on are controlled by defining building lines.

In both plan cases, the control factors of plot areas which may be built on are vital mandatory statutory constraints. The building restriction line in the B-plan case should be defined as the spatial control capability level 1 (1 pm). However, in the regulatory plan case, the building lines are situated directly above road boundary lines. Thus, there is actually no specific control of building scopes. In this case, the building line in the regulatory plan case can only be defined as the spatial control capability level 2 (0.75 pm).

### **4. Comparison of the transportation control**

The transportation control of the B-plan case “Haupt-/Bachstraße” is a complete positioning control, which designates the detailed structure of each road, such as motor vehicle roads, pedestrian and bicycle lanes, parking spaces for motor vehicles, traffic green spaces, and coordinates of road control points. Moreover, planting obligations are applied to control traffic green spaces.

The transportation control of the regulatory plan “Zhongguancun West” is similar to that of the B-plan “Haupt-/Bachstraße.” However, in the regulatory plan case, only the land use boundary of each road is controlled. Thus, the transportation control of the regulatory plan is not a complete positioning control.

In the B-plan “Haupt-/Bachstraße,” the traffic area for specific purposes is controlled to

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<sup>1</sup> See 5.3.4.1



secure the access to the firehouse. Moreover, boundaries of spaces to be encumbered with rights of passage in favor of the general public are designated in the B-plan map, while relevant requirements are stipulated in the B-plan text. In the regulatory plan “Zhongguancun West,” the control of the pedestrian area is equivalent to the control approaches mentioned above.

In the B-plan “Haupt-/Bachstraße,” entrances and exits of vehicles are controlled by mapping designations and the textual provision. In the regulatory plan “Changgou Town,” there is no relative regulation.

The parking spaces and underground garage are controlled by mapping designations and textual provisions in the B-plan “Haupt-/Bachstraße.” Permissible building scopes are designated in the plan map, while relevant requirements are stipulated in the B-plan text. In the regulatory plan case “Zhongguancun West,” land use boundaries of parking spaces and garages are designated in the plan maps.

Most of the transportation control factors in both plan cases are vital mandatory statutory constraints, which should be defined as the spatial control capability level 1 (1 pm). However, in the regulatory plan “Zhongguancun West,” the land use boundary control of each road cannot completely realize the intention of the transportation control, which is extremely important to the general concept of planning. Therefore, it should be defined as the spatial control capability level 2 (0.75 pm).

## **5. Comparison of the municipal utility control**

With regard to the municipal utility control, there are two control approaches in the B-plan case “Haupt-/Bachstraße,” which are the municipal utility control and the pipeline control. The municipal utility control regulates land use scopes of municipal utilities, which should be developed on different plots, as well as their building requirements. The pipeline control designates the type, location, and direction of each pipeline in the road space.

Based on the specific *Comprehensive Municipal Engineering Program of Zhongguancun West*, the regulatory plan “Zhongguancun West” can also control the development of municipal utility buildings and various pipelines in the planning area.

In both plan cases, the municipal utility control factors are vital mandatory statutory constraints, which should be defined as the spatial control capability level 1 (1 pm).

Tab. 5-34: Comparison of Economic Control Factors of Town Center Cases

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
Type of Building and Land Use	Land use area and boundary (1)	Land use area and boundary (1)
	Land use type (1)	Land use type (1)
	Land use compatibility (1)	Land use compatibility (1)
Degree of Building and Land Use	Site occupancy index (GRZ) (1)	Building density (1)
	Plot ratio (GFZ) (1)	Plot ratio (1)
	Building height (1)	Building height (1)
Plot Areas Which may be Built on	Building restriction line (Baugrenze) (1)	Building line (0.75)
Transportation	Street boundary lines (1)	Road boundary lines (1)
	Control of land use scopes of motor vehicle lanes, non-motorized vehicle lanes, and sidewalks, as well as parking spaces for motor vehicles and non-motorized vehicle within road scopes (1)	Control of the land use boundary and of each road (0.75)
	Control of coordinates and elevations of control points, as well as road slopes (1)	
	Control of the traffic area for specific purpose (1)	Control of the pedestrian area (1)
	Control of spaces to be encumbered with walking and driving rights and rights of passage in favor of the general public (1)	Control of the pedestrian area (1)
	Control of entrances and exits of vehicles (1)	
	Control of parking spaces and garages (1)	Control of parking spaces and garages (1)
	Control of spaces for embankments, diggings, and retaining walls, which are required for road construction (1)	
Municipal Utilities	Control of municipal secondary structures on the plots (1)	Control of municipal utility buildings (specific municipal program) (1)
	Control of types and locations of ground/underground pipelines (1)	Control of pipelines (specific municipal program) (1)

The arithmetic average of each economic theme can be calculated and compared according to the five economic themes of sustainable development. The result is shown in the following figure.

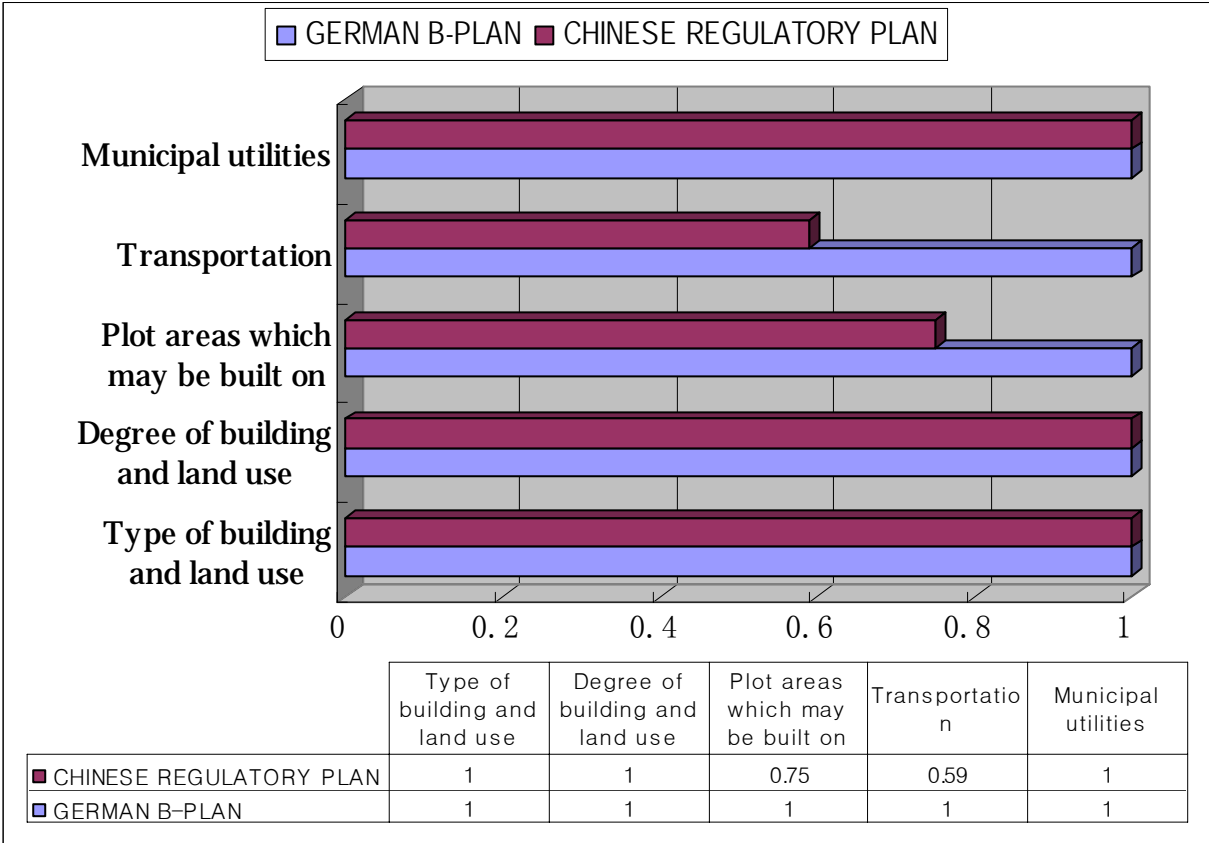


Fig. 5-15: Comparison of Economic Spatial Control Capabilities of Town Center Development Cases

The figure shows that the spatial control capabilities of the regulatory plan case “Zhongguancun West” are equivalent to those of the B-plan case “Haupt-/Bachstraße” in terms of type and degree of building and land use as well as municipal utilities. In the theme of plot areas which may be built on, the regulatory plan is short of the practical building control line which can effectively and flexibly regulate the building construction.

Moreover, with regard to the transportation control, the spatial control capability of the B-plan case is much more powerful than that of the regulatory plan case. The distinction is that the transportation control in the regulatory plan “Zhongguancun West” is not a complete positioning control and has no regulation on the inner structures of roads.

#### **5.4.4.2 Comparison of Social Control Factors**

##### **1. Comparison of the land use equality control**

The preparation of the B-plan “Haupt-/Bachstraße” followed the conventional procedure. The B-plan contains systematic legally binding constraints which effectively reflect the objective of sustainable development. The B-plan was approved as a local statute through a rigid statutory procedure with legally binding public participation. Therefore, the planning legal system and the public participation of the B-plan case “Haupt-/Bachstraße” should be defined as the spatial control capability level 1 (1 pm).

The regulatory plan case “Zhongguancun West” was a technical document without a clear legal status. It had an relatively comprehensive consideration on economic and social issues. However, the environmental concept focused only on the urban design and landscape, which did not really reflect the idea of sustainable development. Therefore, from the perspective of the planning legal system, the regulatory plan case “Zhongguancun West” should be defined as the spatial control capability level 4 (0.25 pm). On the other hand, the preparation of the regulatory plan case followed the former procedure which had no statutory mechanism of public participation. In this case, with regard to the public participation, the regulatory plan case “Zhongguancun West” should be defined as the spatial control capability level 4 (0.25 pm).

##### **2. Comparison of the housing & public facility control**

The B-plan “Haupt-/Bachstraße” was intended to develop a new town center of Vaihingen, a satellite city of Stuttgart. The regulatory plan “Zhongguancun West” was intended to develop a new civic center for Beijing that could meet the needs of large-scale public facilities in northwest Beijing. In fact, both projects were planned to provide spaces for new public service facilities which could serve the local residents.

Each plan case had analyzed the potential housing needs in the plan substantiation and proposed a housing solution near the planning area.

##### **3. Comparison of the urban image and locality control**

With regard to the urban image and locality control, the roof form, building façade, building color, coverage type, as well as miscellaneous building installations are considered and regulated in the B-plan case “Haupt-/Bachstraße.” The roof form control regulates roof forms

of buildings and their superstructures. In practice, the urban image and locality control was effectively implemented and the satisfactory control outcome was achieved. These control factors in the B-plan case “Haupt-/Bachstraße” are all legally binding constraints which should be defined as the spatial control capability level 1 (1 pm).

In the regulatory plan case “Zhongguancun West,” the roof form, spatial organization of buildings, as well as miscellaneous building installations, are considered and regulated. The control factors of the urban image and locality in the regulatory plan case work as guiding indicators. However, since these important control factors are able to realize the urban design concept, they should be defined as the spatial control capability level 3 (0.5 pm).

#### **4. Comparison of the heritage control**

Besides the hint, which proposes the requirement for archaeological discovery with the spatial control capability level 3 (0.5 pm), the boundary of the preservation zone is also designated in the B-plan “Haupt-/Bachstraße.” This preservation zone is regulated to clarify the protection scope of the historical city. However, the boundary is located on the northern edge of the planning area so that there is nearly no impact on the planning concept. The boundary of the preservation zone is a legally binding constraint which should be defined as the spatial control capability level 1 (1 pm).

The regulatory planning area “Zhongguancun West” belongs to the former Haidian town, which is located south of the famous Old Summer Palace (Yuan Ming Yuan). There are many architectural heritages in this area. Therefore, the important architectural heritages in the planning area, which should be preserved, protected, and integrated into the urban design concept, are designated in the landscape analysis map. This control is the implementation of *The Historic Heritage Protection Act of the P. R. C.*, which should be defined as the spatial control capability level 1 (1 pm).

Tab. 5-35: Comparison of Social Control Factors of Town Center Cases

	GERMAN B-PLAN	CHINESE REGULATORY PLAN
Land Use Equality	Planning legal system (1)	Planning legal system (0.25)
	Public participation (1)	Public participation (0.25)
Urban Image and Locality	Roof form (1)	Roof form (0.5)
	Building façade (1)	
	Building color (1)	
	Miscellaneous building installations (1)	Miscellaneous building installations (0.5)
	Coverage type (1)	Spatial organization of buildings (0.5)
Heritages	Boundary of the preservation zone (1)	Preservation of the historic architecture (1)
	Hint: The requirement for archaeological discovery (0.5)	

The arithmetic average of each social theme can be calculated and compared according to the three social themes of sustainable development. The result is shown in the following figure.

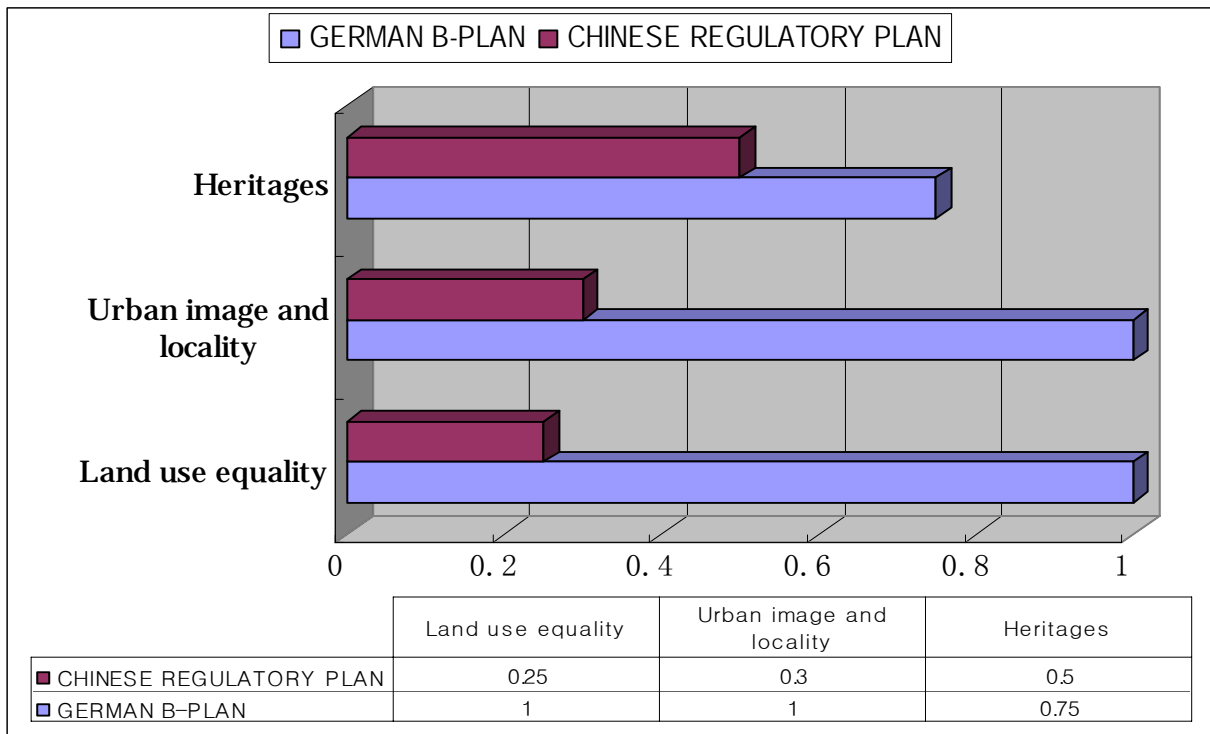


Fig. 5-16: Comparison of Social Spatial Control Capabilities of Town Center Development Cases

The figure shows that the planning legal system and the public participation of the Chinese regulatory planning should be further improved to provide equitable access to land resources.

With regard to the urban image and locality control, the regulatory plan case has certain spatial control capability based on the comprehensive analysis of the urban morphology. However, since the urban design guideline has no mandatory effect, the actual control capability remains inadequate.

With regard to the heritage control, the control of architectural heritages works quite well. But there is still no regulation on potential archaeological discoveries.

#### **5.4.4.3 Comparison of Environmental Control Factors**

##### **1. Comparison of the air pollution control**

In the B-plan “Haupt-/Bachstraße,” the air pollution control includes regulation on the special precaution against traffic pollution, and the control of roof gardens. These control factors are vital mandatory statutory constraints which should be defined as the spatial control capability level 1 (1 pm). The regulatory plan “Zhongguancun West” has no regulation on this theme.

##### **2. Comparison of the noise control**

With regard to the noise control, the idea of the passive noise protection is applied in the B-plan “Haupt-/Bachstraße.” It is a vital mandatory statutory constraint which should be defined as the spatial control capability level 1 (1 pm). The regulatory plan “Zhongguancun West” has no regulation on this theme.

##### **3. Comparison of the soil control**

In the B-plan “Haupt-/Bachstraße,” the requirement for soil exploitation, potential industrial waste, and building foundations are proposed in the plan hint. They are the important guiding constraints which should be defined as the spatial control capability level 3 (0.5 pm). The regulatory plan “Zhongguancun West” has no regulation on this theme.

##### **4. Comparison of the water control**

In the B-plan “Haupt-/Bachstraße,” the requirement for water exploitation is proposed in the plan hint. It is an important guiding constraint which should be defined as the spatial control capability level 3 (0.5 pm). The regulatory plan “Zhongguancun West” has no regulation on this theme.

## **5. Comparison of the biodiversity control**

In the B-plan “Haupt-/Bachstraße,” the planting obligations are able to realize greening requirements. Such provisions are complete positioning controls with entirely legally binding effects. Therefore, they should be defined as the spatial control capability level 1 (1 pm).

In the regulatory plan “Zhongguancun West,” the greening rate is regulated to realize the planting obligations. The greening rate control is a mandatory non-positioning control. Since the greening rate cannot completely reflect the ecological control goal, it should be defined as the spatial control capability level 2 (0.75 pm). However, the regulation on the preservation of historical trees is the implementation of *The Historic Heritage Protection Act of the P. R. C.*, which should be defined as the spatial control capability level 1 (1 pm).

## **6. Comparison of the energy and mineral control**

In the B-plan “Haupt-/Bachstraße,” the privilege of renewable energy exploitation is stipulated in the plan text. It is a practical statutory constraint which should be defined as the spatial control capability level 1 (1 pm). The regulatory plan “Zhongguancun West” has no regulation on this theme.

## **7. Comparison of the landscape and tourism control**

In the regulatory plan “Zhongguancun West,” the greening rate and the preservation of historical trees are also intended to build the landscape. They correspond to the planting obligations in the B-plan “Haupt-/Bachstraße.”



Tab. 5-36: Comparison of Environmental Control Factors of Town Center Cases

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
Air pollution	Indication of the special precaution (1)	
	Roof garden (1)	
Noise	Passive protection (1)	
Soil	Hint: Protection of the soil (0.5)	
	Hint: Waste (0.5)	
	Hint: Building foundations (0.5)	
Water	Hint: Permission of the underground water exploitation (0.5)	
Biodiversity	Planting obligations (1)	Greening rate (0.75)
	Planting obligations (1)	Preservation of historical trees (1)
Energies & Minerals	Renewable energy exploitation (1)	
Landscape & Tourism	Planting obligations (1)	Greening rate (0.75)
	Planting obligations (1)	Preservation of historical trees (1)

The arithmetic average of each environmental theme can be calculated and compared according to the seven environmental themes of sustainable development. The result is shown in the following figure.

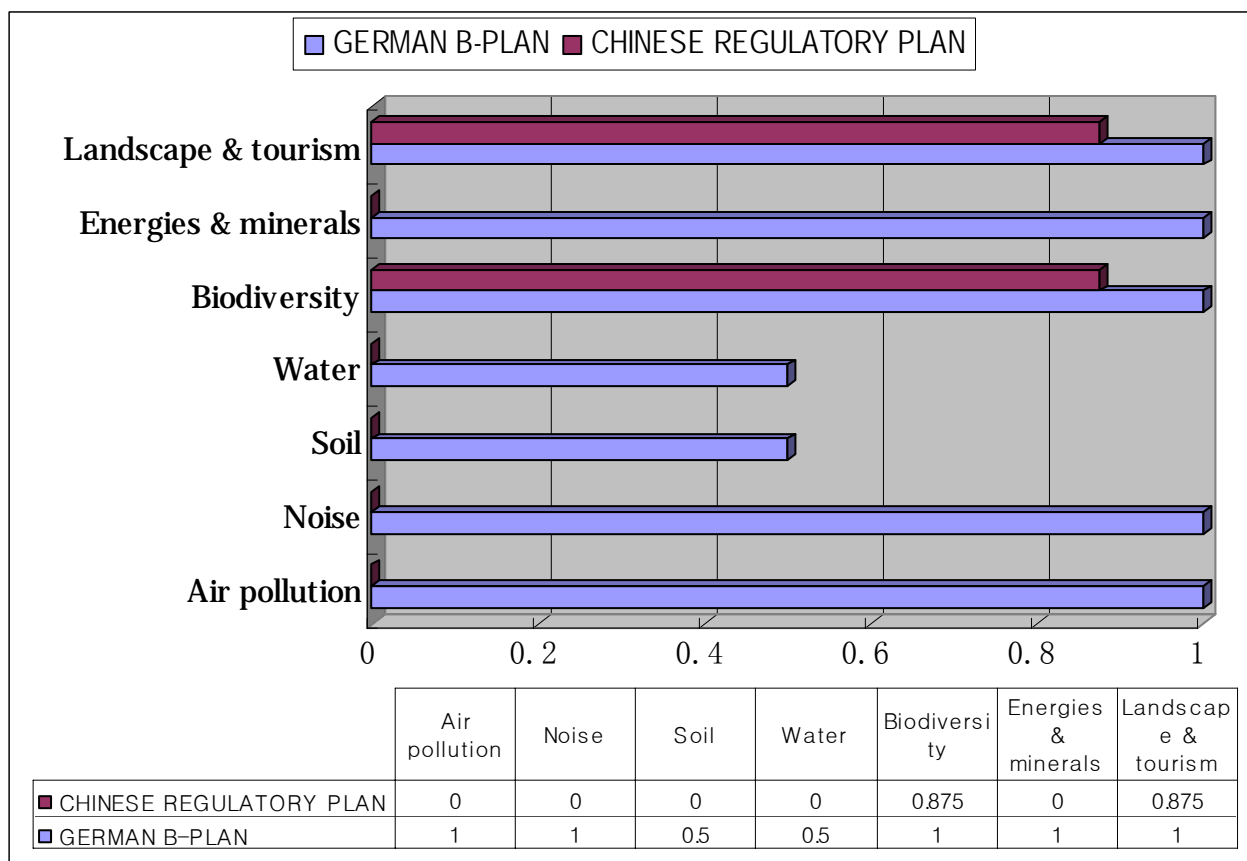


Fig. 5-17: Comparison of Environmental Spatial Control Capabilities of Town Center Development Cases

The figure shows that the spatial control capabilities of the regulatory plan case “Zhongguancun West” are close to those of the B-plan case “Haupt-/Bachstraße” in terms of the biodiversity and the landscape and tourism. However, with regard to the regulatory plan case, the spatial control capabilities of other environmental themes do not exist.

## 5.5 Summary

From the perspective of planning practice, the chapter has selected both German and Chinese residential, industrial, and town center plan cases. Based on these plan cases, the case studies for spatial control in urban detailed planning in both China and Germany have been accomplished.

With regard to the case study, first of all, according to each land use type, the spatial control goals of both cases have been analyzed and compared. Secondly, in order to identify and compare the capability of realizing the sustainable development, it is necessary to define the spatial control capabilities of each plan case. Therefore, on the basis of each land use type, the qualitative comparative studies on institutional factors, as well as the qualitative and quantitative comparative studies on economic, social, and environmental spatial control factors have been implemented.

### **1. The comparative study on residential development cases shows that:**

In general, the overall spatial control capability of the regulatory plan “Shuangjing” is weaker than that of the B-plan “Im Raiser.”

With regard to economic control factors, the type and degree of building and land use of the regulatory plan “Shuangjing” have the same spatial control capabilities as those in the B-plan “Im Raiser.” However, regarding other economic themes, the spatial control capabilities of the regulatory plan “Shuangjing” are much weaker than those of the B-plan “Im Raiser.” The regulatory plan “Shuangjing” is short of the practical building control line which can effectively and flexibly regulate the building construction. There is only a general control of land use boundaries, without other detailed regulations on road spaces. Moreover, the regulatory plan case has no spatial control capability to regulate pipelines on the building plots.

With regard to social control factors, the spatial control capabilities of the regulatory plan “Shuangjing” are equivalent to those of the B-plan case “Im Raiser” in terms of housing and public facilities. However, regarding other social themes, the spatial control capabilities of the regulatory plan “Shuangjing” are far weaker than those of the B-plan “Im Raiser.” The planning legal system and the public participation of the Chinese regulatory planning should be further improved to provide equitable access to land resources. There are few control factors for urban design, and the landscape axis control is not a mandatory constraint.

Moreover, there is no heritage control measure in the regulatory plan case.

With regard to environmental control factors, the environmental spatial control of the regulatory plan “Shuangjing” has very limited possibilities in comparison to that of the B-plan “Im Raiser.” The environmental spatial control capability of the regulatory plan case is extremely weak. The greening rate control does not completely fulfill the requirements for sustainable development.

## **2. The comparative study on industrial development cases shows that:**

In general, the overall spatial control capability of the regulatory plan “Changgou Town” is weaker than that of the B-plan “Zuse-/Curiestraße.”

With regard to economic control factors, the spatial control capabilities of the regulatory plan “Changgou Town” are equivalent to those of the B-plan “Zuse-/Curiestraße” in terms of type and degree of building and land use, as well as plot areas which may be built on. Moreover, in terms of transportation and municipal utilities, the spatial control capabilities of the regulatory plan case are close to those of the B-plan case. However, the open space bonus is an important but not mandatory control factor in the regulatory plan case. In addition, there is no spatial control capability to regulate pipelines on the building plots in the regulatory plan case.

With regard to social control factors, in all social themes, the spatial control capabilities of the regulatory plan “Changgou Town” are much weaker than those of the B-plan “Zuse-/Curiestraße.” The planning legal system and the public participation of the Chinese regulatory planning should be further improved to provide equitable access to land resources. The spatial control capability of the urban image and locality is extremely weak, but the spatial organization of buildings can fulfill the basic requirements for sanitation and safety. In addition, there is no heritage control measure in the regulatory plan case.

With regard to environmental control factors, the noise control capability of the regulatory plan “Changgou Town” is equivalent to that of the B-plan “Zuse-/Curiestraße.” However, other spatial control capabilities of the regulatory plan case are weaker than those of the B-plan case.

## **3. The comparative study on town center development cases shows that:**

In general, the overall spatial control capability of the regulatory plan “Zhongguancun West” is weaker than that of the B-plan “Haupt-/Bachstraße.”

With regard to economic control factors, the spatial control capabilities of the regulatory plan “Zhongguancun West” are equivalent to those of the B-plan “Haupt-/Bachstraße” in terms of type and degree of building and land use, as well as municipal utilities. Following the theme of plot areas which may be built on, the regulatory plan is short of the practical building control line which can effectively and flexibly regulate the building construction. Moreover, the transportation control capability of the B-plan case is much more powerful than that of the regulatory plan case. There is only a general control of land use boundaries, without other detailed regulations on road spaces.

With regard to social control factors, the heritage control capability of the regulatory plan “Zhongguancun West” is close to that of the B-plan “Haupt-/Bachstraße.” Regarding other social themes, the spatial control capabilities of the regulatory plan case are much weaker than those of the B-plan case. The planning legal system and the public participation of the Chinese regulatory planning should be further improved to provide equitable access to land resources. In the regulatory plan case, the urban design guideline cannot cover all necessary architectural topics and has no mandatory effect. Moreover, there is still no regulation on potential archaeological discoveries.

With regard to environmental control factors, the spatial control capabilities of the regulatory plan “Zhongguancun West” are similar to those of the B-plan “Haupt-/Bachstraße” in terms of biodiversity, landscape and tourism. However, in the regulatory plan case, the spatial control capabilities of other environmental themes do not exist. In addition, the greening rate control does not completely fulfill the requirements for sustainable development.

# **Chapter 6 INNOVATIVE PROPOSALS FOR IMPROVEMENT OF THE CHINESE REGULATORY PLANNING**

## **6.1 Limitations of Spatial Control in Regulatory Planning**

### **6.1.1 Nature of Regulatory Planning Limitations**

The research conclusions show that the Chinese regulatory planning has the same spatial control goals as the German B-planning. Both are intended to establish a spatial control framework to regulate the urban development so that the objectives of sustainable development can be achieved. However, when the regulatory planning develops the spatial control factors based on the planning goals, many original control objectives cannot be realized. That is to say, regarding the planning goals, the regulatory planning may reach the basic international standards, which covers the economic, social, and environmental objectives of sustainable development. But, in practice, although both planning types focus on similar spatial control goals, the German B-plan has balanced spatial control capabilities so as to realize the sustainable development, while the spatial control capabilities of the Chinese regulatory plan are only able to completely realize the economic and some social objectives of sustainable development. Some social control capabilities of the regulatory plan are relatively weak, and the environmental control capabilities of the regulatory plan are extremely weak.

Therefore, in general, the spatial control capabilities of the regulatory plan can be sorted as follows:

Economic control capability > Social control capability > Environmental control capability

The problem seems to be the absence of certain spatial control factors. However, the nature of regulatory planning limitations is the mechanism problem in spatial control. The regulatory planning is intended to establish a relatively flexible planning control system in order to fulfill the requirements of the market economy. However, until now, the regulatory planning has no consummate mechanism to safeguard the public interest and reflect the theoretical planning goals.

## 6.1.2 Institutional Limitations of Spatial Control in Regulatory Planning

### 6.1.2.1 Limitation of the Legal System

The successful spatial control of the German B-plan directly benefits from the developed German planning legal system. The Chinese regulatory plan has a relatively shorter history, and it is in a transitional period now. The regulatory plan, as the direct basis of building permission, is becoming a statutory plan with a legally binding nature. However, it is not a local statute.

The German *Land Utilization Ordinance (Baunutzungsverordnung)* provides the technical requirements for the B-planning and regulates the maximum limits of the building density (GRZ), plot ratio (GFZ), and cubic density (BMZ). From the macro point of view, those regulations can control the maximum national land use scale and prevent the over-exploitation of land resources. In China, at the national level, there are no legally binding maximum limits of land use degrees. Therefore, regarding the regulatory planning, in many cases, values of quantitative indicators have been defined by subjective decision-making methods. As a result, these quantitative indicators have frequently been violated.

### 6.1.2.2 Limitation of the Plan Substantiation

The basic model of the regulatory plan substantiation is to anticipate the population scale, land use scale, and development projects in order to confirm the maximum limits of land use degrees and minimum limits of the greening rate. Normally, the transportation, public facilities, and municipal utilities are well analyzed and planned.

In the regulatory plan substantiation, there is no systematical analysis and assessment of the potential negative effect on the environment, such that the correct and necessary control system cannot be established. The research shows that the regulatory planning follows the acts and ordinances of the Ministry of Construction quite well, but its coordination with other departments, such as the departments of environment, agriculture, and water management, is not so ideal. Therefore, issues of public interest, such as environmental, agricultural, and water issues have not been involved in the regulatory plan regulations.

The legally binding procedure of public participation regulated in *The Town and Country Planning Act (2007)* enables the general public and public bodies to evaluate the draft plan. However, there is still no opportunity to participate the decision-making. In this case, the effect of public participation cannot be ensured.

In the regulatory planning, the urban landscape and urban image are considered and analyzed with a certain degree of attention. However, in many cases, the relevant control measures are not systemized, and are only non-mandatory urban design guidelines that are not able to realize the planning intention.

### **6.1.2.3 Limitation of the Planning Control System**

Based on the zoning mode, the control system of the regulatory plan generally consists of quantitative indicators regulated in *The Preparation Criteria of Urban Planning*. In practice, however, the regulatory plan often adopts an indiscriminative planning control system without the adaptability of different land use areas. Moreover, in this stringent planning control system, the economic growth is much more valued than environmental or cultural issues.

In addition, in the control system of the regulatory planning, there are no comprehensive ecological control methods, as well as the control indicator for the building volume.

Normally, it is necessary for the regulatory planning to build the control indicator table, which may regulate the minimum or maximum limit of each control indicator. However, in practice, these control limits usually follow fixed values that have no scientific substantiation.

### **6.1.2.4 Limitation of the Plan Structure**

According to the theoretical comparative research and case studies, it can be found that the structure of regulatory plan maps is not an efficient model. In order to control developments of large spatial scales, a regulatory plan consists of a set of maps. However, each general control map, such as the zoning map or the building height control map, contains only very simple information. Theoretically, plot control maps should have the function of detailed control, but in practice, positioning regulations in plot control maps are very limited. In many cases, a plot control map is only the decomposition and enlargement of a certain part in the general control map.



### 6.1.3 Limitations of Economic Control Factors in Regulatory Planning

In addition to the residential areas, there are no other regulations on land use compatibilities in the regulatory planning. In practice, there is often the need for compatible urban development, which can only be controlled by the land use compatibility table regulated in the regulatory plan. In order to meet the needs of the market economy, it is necessary to improve the Chinese land use classification and formulate a universal standard.

There is no indicator of cubic density in the regulatory planning. Though the integration of the building density control and the building height control may regulate the building volume, however, with regards to the industrial and commercial buildings with huge interior spaces, the regulatory plan still adopts the plot ratio to regulate the degree of building and land use. This control method is both theoretically and practically unreasonable.

The regulatory planning adopts the relative height to control the maximum heights of buildings. Since there is no rigorous benchmark, this control method has no absolute authority.

In the regulatory plan, the building lines are often situated directly above road boundary lines, so there is actually no difference between the building line and the road boundary line. The intensive land use is the most important approach to realize the sustainable land use, especially for China, a large country with a high population density. However, in the regulatory planning practice, the controls of building line and set-back depth still follow an extensive mode.

In the German B-planning, the control of spaces to be encumbered with rights of passage in favour of the general public and the provision of public infrastructure are intended to ensure equitable access to land resources as well as to fulfill the requirements for infrastructure development. As there is no strict definition for this kind of land use in the regulatory plan, the public rights of passage or the provision of public infrastructure may be affected or damaged in the urban development.

### 6.1.4 Limitations of Social Control Factors in Regulatory Planning

Normally, the regulatory planning will pay attention to the urban design and integrate the urban design concepts into the plan regulations. However, the study shows that there are no precise definitions for urban design factors in the regulatory planning, thus it is impossible to

develop concise control measures comparable to those of the B-planning, such as the coverage types or roof forms. Moreover, the urban design guideline in the regulatory planning has no mandatory spatial control sanction.

Another defect is that the physical control of the regulatory plan concentrates only on physical structures themselves without integrating the objectives of an environmentally sustainable development.

### 6.1.5 Limitations of Environmental Control Factors in Regulatory Planning

In the regulatory planning, the theoretical regulations on environmental protection, such as the permissible maximum values of emissions cannot be implemented. The reason is that these controls cannot be regulated as spatial control measures, and the urban planning authorities in China have no authority to supervise the environmental pollution.

The absence of environmental assessments disables the procedure of acquiring the specific environmental control targets, such that the environmental control in the regulatory plan is futile.

Moreover, even though there are experienced environmental assessments being implemented in the regulatory planning, the specific environmental control targets cannot be completely regulated by the existing control measures, such as the land use control and the greening rate control. As the most common environmental control factor in the regulatory plan, the control of the greening rate doesn't completely reflect the idea of sustainable development. It is intended to preserve a portion of plot to build the green space. On one hand, the greening rate is not a positioning control and cannot realize the preservation or development of a certain green space. On the other hand, the greening rate is a two-dimensional concept that cannot really safeguard the development of a high-quality environment. According to a greening rate without a positioning control, it is possible to build a valid green space but destroy the ecological environment.

In addition to the greening rate and the direct land use control of green spaces, there is no mandatory spatial control measure that may regulate ecological or environmental issues.

In summary, with regard to either the mechanism or the methodology, the environmental control of the regulatory plan is not in order. It should definitely be improved.

## **6.2 Innovative Proposals for the Improvement of the Chinese Regulatory Planning**

### **6.2.1 Optimizing the Regulatory Planning System**

#### **6.2.1.1 Optimizing the Legal Basis of the Regulatory Plan**

##### **1. Optimizing *The Town and Country Planning Act of P. R. China***

The following points are recommended to supplement *The Town and Country Planning Act* for the next amendment.

First of all, in order to completely establish the legal authority of the regulatory plan, it is necessary that the approved regulatory plan be adopted by the relevant local People's Congress as a statute.

Secondly, based on the existing provisions of the planning goals, the specific control goals of the regulatory planning should be clarified in detail. See 6.2.2.

Thirdly, based on the existing provisions of the plan preparation, regulations of procedures for early public participation and environmental assessment should be supplemented. See 6.2.1.3.

Finally, regarding the so-called “full coverage” issue<sup>1</sup>, since the building permission is determined by the relevant regulatory plan and the planning conditions, it seems that normally the “full coverage” is necessary. However, the German practice of building permission within built up areas without a B-plan in effect is still useful. It is helpful to develop a principle of “compatible development” for Chinese building administration, which means that in built up areas with important architectural, cultural, historic, or landscape values, a new development project must be compatible with the existing physical environment.

##### **2. Optimizing *The Standard for Basic Terminology of Urban Planning***

###### **a. Renewing the definition of the building line**

Originally, there was a definition for the building line. However, in practice, the control of building lines has no practical function. Therefore, in the regulatory planning, the definition of the building line should be renewed in *The Standard for Basic Terminology of Urban*

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<sup>1</sup> The “full coverage” means that regulatory plans of a city should cover the complete municipal territory of development.

*Planning.* The new definition of the building line would have either limitary function or control function. The limitary function means that the building should not exceed the building line. Here, the function of the building line is similar to that of the building restriction line (Baugrenze) in the B-planning. The control function means that the building must be implemented along the building line. Here, the function of the building line is similar to that of the building line (Baulinie) in the B-planning.

Moreover, the professional planning lines in the regulatory planning, such as boundary lines of urban green spaces in green, boundary lines of rivers and lakes in blue, boundary lines of high tension corridors in purple, and boundary lines of microwave channels in orange, could also follow the concept mentioned above.

#### b. Supplementing the control factor of the cubic density

The definition of the cubic density should be supplemented in *The Standard for Basic Terminology of Urban Planning*. According to the standard Chinese definition of the plot ratio, the new cubic density could be defined as follows:

The cubic density indicates how much stere of building volume is permissible per square meter of zone area. The calculation formula is:

$$\text{Cubic density} = (\text{Permissible building cubage}) / (\text{Total zone area})$$

The national norms and departmental standards of the Ministry of Construction could make detailed regulations on the calculation of cubic density, such as components of the building cubage, the calculation of the underground building cubage, and bonuses.

The introduction of cubic density could optimize the control system of the regulatory planning and provide new possibilities for ecological and environment control.

### **3. Optimizing *The Standard for Urban Land Use Classification, Building and Land Use***

Based on Chinese scientific research on the land use classification and compatibility, new regulations on land use compatibilities should be supplemented in *The Standard for Urban Land Use Classification, Building and Land Use*. Besides the land use compatibilities of the residential areas and the specially-designated land that are already regulated, land use compatibilities of other land use types, especially those of the public facilities (C), industrial land (M), warehouse land (W), and municipal utilities (U), should be explicitly regulated in the national technical standard in order to avoid random regulations on land use

compatibilities in the regulatory planning.

Moreover, based on the existing regulations on the two-dimensional control of land use degree in *The Standard for Urban Land Use Classification, Building and Land Use*, regulations on the three-dimensional control of building and land use degree should be supplemented as national standards. For example, standardized maximum limits of the building density, plot ratio, building height, and cubic density of various land use types should be supplemented. In addition, bonuses of building and land use degree could also be regulated so that it would be possible to promote positive developments, such as exploitations of wind energy, solar energy, and other recycling resources.

Thirdly, the definition of spaces to be encumbered with rights of passage in favour of the general public or the provision of public infrastructure, should be supplemented in *The Standard for Urban Land Use Classification, Building and Land Use*. As specific land use types, these spaces could be integrated into various subdivisions of general land use types. With regard to the rights of passage in favour of the general public, the spaces could be divided into three types, which are public access A (the access of motor vehicles), public access B (motor vehicles are not allowed to enter), and public access C (pedestrian areas). With regard to the provision of public infrastructure, the spaces that are necessary for infrastructures could be integrated with the three types mentioned above or defined separately.

#### **4. Amending *The Preparation Criteria of Urban Planning***

The mandatory control factors regulated in *The Preparation Criteria of Urban Planning* should be amended to strengthen the spatial control capabilities of the regulatory plan. The new mandatory control factors could be listed as follows:

- a. Land use boundary and type;
- b. Degree of building and land use, such as the building density, plot ratio, cubic density, and building height;
- c. Plot areas which may be built on;
- d. Spatial structures of transportation facilities and relevant requirements;
- e. Spatial structures of public facilities and relevant requirements;
- f. Spatial structures of municipal utilities and relevant requirements;

- g. Requirements for urban design;
- h. Requirements for heritage preservation;
- i. Greening rate and other ecological and environment control measures.

## **5. Other relevant planning norms and standards**

Other relevant planning norms and standards should be adjusted according to the proposals mentioned above.

### **6.2.1.2 Establishing the Coordination Mechanism**

A mechanism of coordination should be established so that the regulatory plan may fulfill necessary control requirements stipulated in other relevant acts and ordinances.

First of all, based on the provisions in *The Environmental Protection Act of the P.R.C.*, a new set of ecological and environmental control factors should be developed in order to implement the objectives of environmental protection.

Secondly, based on the provisions in *The Surveying & Mapping Act of the P.R.C.*, the standard coordinate system and elevation system should be applied to the regulatory planning so that the absolute height control and the accurate topographical control could be realized.

Thirdly, based on the provisions in *The Land Management Act of the P.R.C.* and *The Real Estate Management Act of the P.R.C.*, the rights of land use and property rights should be respected in the zoning process as well as in the process of defining the plot areas which may be built on. Boundaries of these rights should be illustrated by mapping designations.

Fourthly, based on the provisions in *The Water Act of the P.R.C.*, in addition to the land use control of green spaces and the control of the greening rate, the requirements for planting and preservation should also be regulated in order to realize advanced control objectives.

Besides the acts mentioned above, in practice, the regulatory planning should coordinate with other relevant acts or ordinances if necessary.

### **6.2.1.3 Optimizing the Preparation of the Regulatory Plan**

Based on the existing provisions of the plan preparation regulated in *The Town and Country Planning Act (2007)* and *The Preparation Criteria of Urban Planning (version 2005)*, procedures of early public participation, environmental assessment, and legislation should be supplemented as legally binding steps of the plan preparation.

The new procedure of the regulatory planning should be divided into 12 stages, which are shown as follows:

Preparation of working instruction → initial preparation of project → data collection → environmental assessment → early public participation → preparation of draft plan → public participation → finalization of the regulatory plan → approval procedure → legislation → publication → supervision.

In comparison to the legally binding planning procedure regulated in *The Town and Country Planning Act (2007)*, the new procedure proposed by the research comprises three additional stages, which are the environmental assessment, early public participation, and legislation.

1. The environmental assessment identifies the expected impact on the environment, such that a correct and necessary control system can be established. It should be implemented by professional agencies based on the data collected by the planners;
2. The early public participation enables the general public and public bodies to participate in decision-making. Individuals and public bodies whose activities may be affected by the planning measure should be informed about the general purposes and concepts of the planning, as well as the results of environmental assessment. Opportunities should be given to them for comment and discussion. Their suggestions should be carefully examined and be the basis for the preparation of the draft plan;
3. The legislation procedure is required for an approved regulatory to be adopted by the relevant People's Congress as a statute.

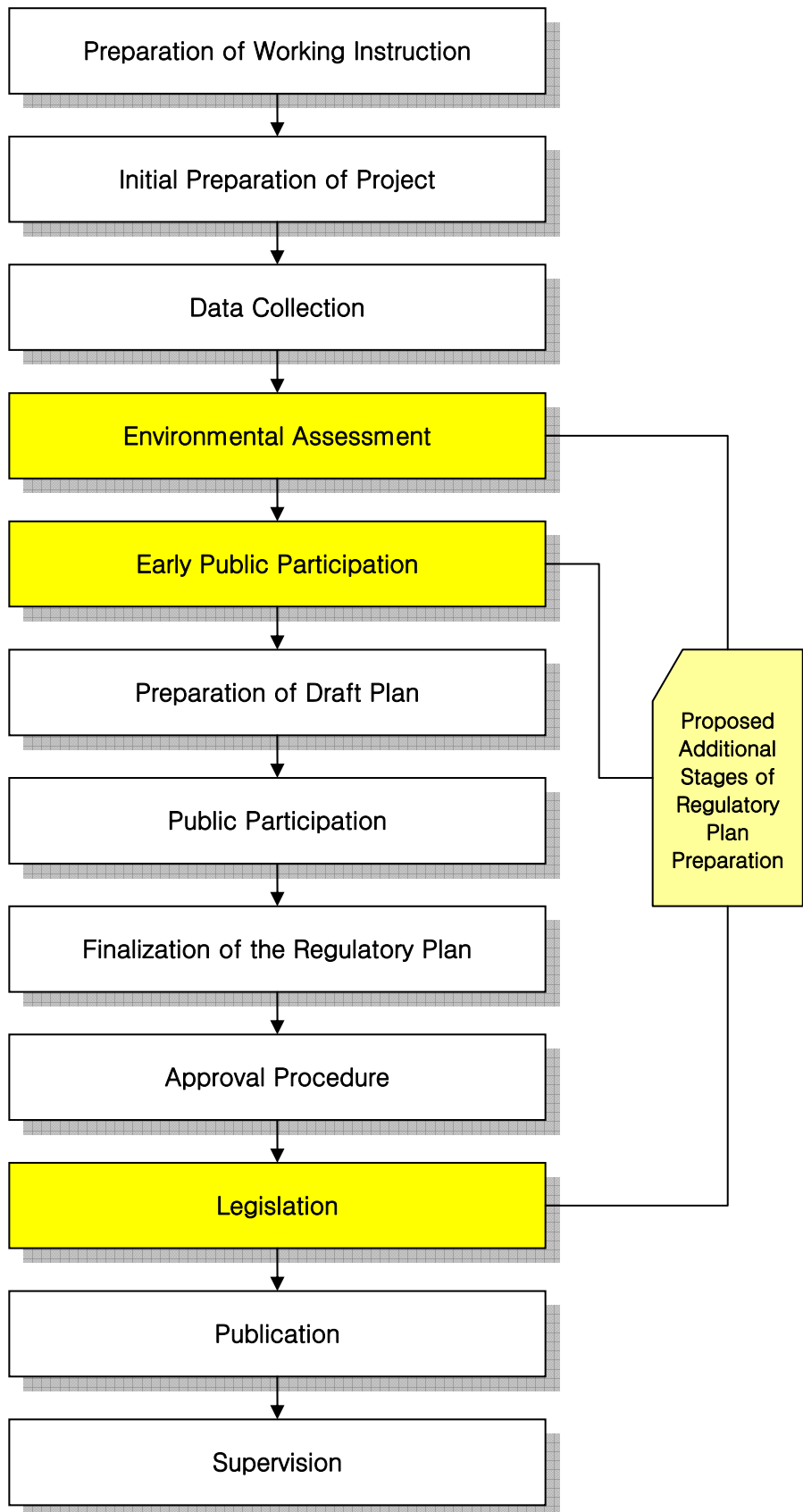


Fig. 6-1: Proposed Preparation Procedure of the Regulatory Plan



Tab. 6-1: Interactive Mechanism among the Stakeholders in the New Procedure of the Regulatory planning

	Town & Country Planning Authority	Planners	General Public	Public Bodies	(Standing Committee of) the People's Congress
Preparation of Working Instruction	●				
Initial Preparation of Project		●			
Data Collection	○	●		○	
Environmental Assessment		Being implemented by professional agencies			
Early Public Participation	●		○	○	
Preparation of Draft Plan		●			
Public Participation	●		○	○	
Finalization of the Regulatory Plan		●			
Approval Procedure	Approval of the relevant municipalities				
Legislation					●
Publication	●				
Supervision	●		○	○	●

● to undertake ○ to participate

## 6.2.2 Reconstructing the Control Goals of the Regulatory Planning

In order to embody the objectives of sustainable development, it is necessary to reconstruct the spatial control goals of the regulatory planning.

Based on the existing provisions of the fundamental planning objective regulated in *The Town and Country Planning Act (2007)* and *The Preparation Criteria of Urban Planning (2005)*, the specific economic, social, and environmental goals of the regulatory planning should be stipulated as follows.

### **6.2.2.1 Specific Economic Goal of Regulatory Planning**

The specific economic goal of the regulatory planning should be:

1. To ensure the healthy urbanization, and the intensive and compact land use structure;
2. To meet the needs for agriculture and forestry;
3. To meet the needs for transportation and municipal utilities of the population;
4. To create and maintain healthy working conditions;
5. To create and preserve working places.

### **6.2.2.2 Specific Social Goal of Regulatory Planning**

The specific social goal of the regulatory planning should be:

1. To safeguard a socially equitable utilization of land, especially the rights of low-income people and vulnerable groups;
2. To create and maintain healthy living conditions, and fulfill the housing requirements of the population, in particular, the need for affordable housing;
3. To provide and maintain public facilities to meet the social and cultural needs of the population;
4. To meet the needs for defense, civil defense, as well as disaster prevention and mitigation;

5. To preserve local characteristics by inheriting and developing the architectural and urban planning traditions of all Chinese nationalities, and to preserve ground and underground cultural relics and historical heritages.

### **6.2.2.3 Specific Environmental Goal of Regulatory Planning**

The specific environmental goal of the regulatory planning should be:

1. To verify potential impacts of urban developments on the environment and the cultural resources;
2. To realize the intensive land use, protect the arable land and prevent soil contamination;
3. To prevent water resources from being polluted, and protect forests, the biodiversity, and species in order to safeguard the continuity of ecological systems;
4. To control emissions and improve the air quality, and prevent the global climate variability;
5. To ensure and promote the sustainable use of natural resources, especially the use of renewable energies;
6. To preserve and rationally make use of natural landscapes, and promote the tourism development;
7. To prevent other environmental and ecological hazards.

## 6.2.3 Establishing the New Control System of the Regulatory Planning

### 6.2.3.1 Composition of the New Control System

The new control system of the regulatory planning is shown in the following table:

Tab. 6-2: New Control System of the Regulatory Planning

Land Use Type Control	Land use area and boundary control
	Land use type control
	Land use compatibility control
Land Use Degree Control	Building density control
	Plot ratio control
	Cubic density control
	Building height control
Control of Plot Areas which may be built on	Building line with limitary function
	Building line with control function
	Set-back depth control
	Building interval control
Transportation Control	Road boundary line
	Control of spatial structure of roads
	Control of coordinates and elevations of road control points, as well as road slopes
	Control of entrances and exits of vehicles
	Control of spaces to be encumbered with rights of passage in favor of the general public
	Control of parking spaces and/or garages on the plots
	Control of parking berth numbers
	Control of special traffic areas, such as squares and pedestrian areas
Control of Municipal Utilities	Control of pipelines
	Control of municipal secondary structures on the plots
	Control of spaces to be encumbered with the provision of public infrastructure
	Land use control of municipal structures
Urban Design Control	Control of building organization forms
	Roof form control
	Building façade control
	Control of miscellaneous building installations
Heritage Control	Preservation zone
	Preservation of building groups
	Preservation of individual buildings

Tab. 6-2: New Control System of the Regulatory Planning (Part II)

<b>Ecological &amp; Environmental Control</b>	Air pollution control (land use control; control of renewable energy exploitation)
	Noise control (active and passive noise protection)
	Soil control (land use control)
	Water control (land use control; control of the rainwater collection)
	Biodiversity control (greening rate control; control of green spaces; greening control; control of the species protection)
	Resource control (land use control; control of renewable energy exploitation)
	Landscape and tourism control (greening rate control; control of green spaces; greening control)

Based on the reconstructed spatial control goals, the new control system of the regulatory planning is more scientific and effective than the original.

The new spatial control factors of the regulatory planning would be clarified according to the general topics.

### **6.2.3.2 Land Use Type Control**

The new land use type control should be a conceptual continuation of the original. In addition to residential areas, industrial areas and warehouses, public facilities, green spaces, specially designated areas, waters, and miscellaneous areas could also be controlled as certain land use types.

### **6.2.3.3 Land Use Degree Control**

The new land use degree control should be coordinated with the land use type control to regulate the degree of building and land use. In contrast to the original approaches, the cubic density would be adopted as a new control indicator. Meanwhile, the quantitative indicator control of the regulatory plan would be more flexible. Instead of the simple control of maximum limits, minimum limits or fixed values could be regulated based on actual need. Moreover, the land use degree control should be restricted by building lines.

With regard to the building height control, absolute building heights, which are calculated from the elevation of the benchmark, should be regulated to ensure the plan authority. Regarding the the building superstructure control, both vertical and horizontal building requirements should be regulated in the plan.

#### **6.2.3.4 Control of Plot Areas which may be built on**

**Chinese building windows** could be constructed with improved building lines. Meanwhile, the set-back depth control should be retained. Since the building interval control is extremely important to the healthy working and living conditions of the population, it must be regulated as a mandatory statutory constraint.

#### **6.2.3.5 Transportation Control**

The control of the spatial structure of roads should be improved and standardized. The control of cross-sectional road forms should be integrated with the control of road types and details, in order to enable the complete positioning control of roads. Regarding the road topographical control, the absolute elevation should be adopted. Moreover, the control of spaces to be encumbered with rights of passage in favor of the general public should be designated in the regulatory plan.

#### **6.2.3.6 Control of Municipal Utilities**

With regard to the control of municipal utilities, the spatial control capabilities of the infrastructure development on plots should be improved. In practice, the control of municipal secondary structures on the plots may be an accurate positioning control. Moreover, spaces to be encumbered with the provision of public infrastructure should be controlled in the regulatory plan.

#### **6.2.3.7 Urban Design Control**

First of all, a systematic classification of the urban design control should be established, which may include four parts: the control of spatial organization of buildings, the roof form control, the building façade control, as well as the control of miscellaneous building installations.

##### **1. Control of spatial organization of buildings**

According to the coverage type control in the B-planning as well as the actual need of the regulatory planning, the building organization forms in the regulatory planning could be tentatively defined as four types, which would be the **closed organization**, the **open organization**, the **semi-open organization**, and **other forms**. The regulation on the length restriction should be further studied.

Since the traditional Chinese dwellings or communities are normally closed courtyards, the classification of building organization forms would be of great importance to the preservation of the traditional Chinese architectural spaces. For instance, in order to preserve a traditional neighborhood, it would be possible to designate streets as spaces to be encumbered with rights of passage in favor of the general public, and courtyard houses as building windows. In this case, the building organization form in those building windows could be stipulated as the **closed organization**, so that the objective of traditional neighborhood preservation may be achieved.

## **2. Roof form control**

The roof form control should consider forms, materials, and colors for roofs.

Roof forms could be divided into two broad categories which include: the **general roof forms** and the **special roof forms**.

The general roof forms would be the roof forms without national or cultural characteristics, such as flat roofs, gable roofs, and shed roofs.

The special roof forms would be the roof forms with national or cultural characteristics. In the Chinese urban planning, the special roof forms could be divided into two parts: the Chinese traditional roof forms and the international traditional roof forms.

The Chinese traditional roof forms could be the traditional roof forms of all Chinese nationalities, such as the Wu-dian, Xie-shan, Ying-shan, Xuan-shan, Cuan-jian of Han nationality, the Tibetan flat roof, the Mongolian dome-style yurt, the vault etc.

The international traditional roof forms could be the roof forms of foreign traditional architectures, such as the Roman dome, the German mansard, or the Russian onion roof etc.

In the regulatory planning practice, the roof form in each building window could be designated in the plot control maps. One or more roof forms could be regulated in a building window. Moreover, the relevant roof materials and colors could be stipulated in the plan text.

## **3. Building façade control**

The building façade control should include the information of both façade colors and façade materials. The building façade control could regulate the materials and colors that should or should not be used and exceptional cases. The control of façade materials could also be

integrated with the control of vertical greening.

#### **4. Control of miscellaneous building installations**

Miscellaneous building installations include advertising installations, various municipal secondary structures, small structures of ecological and environmental protection, garden installations, as well as other small installations.

##### **6.2.3.8 Heritage Control**

The original heritage control measures should be maintained. It is recommended that heritage control requirements should be designated in the plot control maps of the regulatory plan.

##### **6.2.3.9 Ecological & Environmental Control**

The shortage and disorder of ecological control factors is the main problem of the regulatory planning. Therefore, it is necessary to construct a new set of ecological and environmental control factors based on the objectives of sustainable development, as well as the conclusions from the comparative research.

In the planning practice, *The Environmental Protection Act of the P. R. China* and the local acts and ordinances of environmental protection, should be strictly followed. On the basis of this principle, according to the conclusions of the environmental evaluation or assessment, specific ecological and environmental control measures could be chosen to realize the energy saving and environmentally friendly development.<sup>1</sup>

The new set of ecological and environmental control factors would include the following seven aspects: air pollution control, noise control, soil control, water control, biodiversity control, resource control, as well as landscape and tourism control.

#### **1. Air pollution control**

In order to control the air pollution, certain areas, where relevant control measures would be valid, could be regulated in the regulatory plan. Moreover, various incentives should be stipulated to encourage the exploitation of renewable energy. Structures of renewable energy could be regulated as privileged developments.

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<sup>1</sup> For the energy saving and environmentally friendly development, see *The 11th Five-Year Plan of the National Economy & Social Development of the People's Republic of China*, People's Press, 2006.



## **2. Noise control**

Based on noise monitoring, active or passive noise protection measures could be regulated in the regulatory plan to reduce or eliminate the negative effects of noise.

## **3. Soil control**

Plot areas which may be built on would be controlled by the new-defined building window so that the sealed soil surface could be restricted in a reasonable proportion. The objective of soil control is to ensure the ecological interaction between the soil and the environment as long as possible, and to prevent the natural soil from being polluted. In practice, in addition to the biodiversity control measures, ground materials could also be regulated.

## **4. Water control**

The water control should include two control types, which would be the land use control and the rainwater collection control.

The land use control should be a continuity of the existing control measures. Water bodies (E1), water supply utilities (U11), and sewerage & sewage treatment utilities (U41) can be regulated as land use types in the regulatory plan.

The rainwater collection control should restrict the proportion or scope of the sealed soil, or regulate ground materials to enable the rainwater to penetrate the soil.

## **5. Biodiversity control**

In addition to the existing controls of green spaces and greening rate, the greening control and the species protection control should be supplemented in order to achieve the objectives of sustainable ecological development.

Referring to the German planting and preservation obligations, the new greening control could be defined as two kinds of greening obligations, which would be the planting obligation and the preservation obligation. Locations of trees or shrubs, which should be planted and preserved, could be designated in plan maps, while relevant requirements could be stipulated in the text. The planting and preservation obligations could be applied not only to given zones or parts of zones, where the intensive and/or extensive greening should be implemented, but also to roof gardens or vertical greening areas.

Historic trees and famous wood species could be protected by the preservation obligation. Moreover, if necessary, spaces for the construction of structures for the protecting of animal species should also be regulated in the regulatory plan.

## **6. Resource control**

In addition to the existing land use control measures in the regulatory planning, incentives should be proposed to encourage the exploitation of renewable energy. Structures exploiting renewable energy could be regulated as privileged developments.

## **7. Landscape and tourism control**

The greening control should be integrated with the existing land use control of green spaces and the greening rate control. Thus, local landscape characteristics could be preserved and developed.

The tourism control could be realized with the combination of urban design control, heritage control, and landscape control.

## 6.2.4 Establishing the New Regulatory Plan Structure

In order to improve the inefficient original structure of the regulatory plan, a new plan structure should be established. The new structure would also include both general control maps and plot control maps. However, the structure of general control maps should be simplified, and the structure of plot control maps should be specified.

### 6.2.4.1 General Control Maps

Normally the new structure for general control maps should include the land status map, general land use plan, as well as technical plans of municipal infrastructures. The original location map and zoning map should be integrated with the general land use plan. The scale of general control maps should be 1:5000.

#### 1. Land status map

The land status map should illustrate the existing situation of the planning area. Land use types of all plots (specific land use types), existing buildings, and infrastructures should be illustrated in the land status map.

#### 2. General land use plan

In the general land use plan, the indication of site location could be a small illustration located above the legend with any scales. Integrating the information of the original zoning map and land use map, the general land use plan should designate the location, boundary, and number of each zone, as well as the location and boundary of each traffic infrastructure.

#### 3. Technical plans of municipal infrastructures

The technical plans of municipal infrastructures should designate frameworks and details of municipal utilities, including boundary lines, spatial locations and diameters of pipelines, and requirements for underground development.

#### 4. General text

The general text should be one part of the general control maps, stipulating the general requirements for land use in the form of legal provisions. The general text could also include a general control indicator table.

#### **6.2.4.2 Plot Control Maps**

The plot control maps should be the direct basis of building permission. Each plot control map would include a plan map and a relevant text.

##### **1. Plot control map**

The mapping scale of plot control maps should be 1:500 or 1:1000. The plot control maps may make designations regarding:

- a. The land use type and boundary of each zone;
- b. The building density, plot ratio/cubic density, and building height of each zone;
- c. Plot areas which may be built on (building windows);
- d. The boundary, layout and cross-sectional form of each road, entrances and exits of vehicles, coordinates and elevations of control points, as well as road slopes;
- e. Squares, parking spaces and garages, spaces to be encumbered with rights of passage in favor of the general public, as well as boundaries and types of other traffic facilities;
- f. Spaces for municipal utilities, spaces to be encumbered with the provision of public infrastructure;
- g. Symbols of building organization forms and roof forms;
- h. Symbols and/or locations of miscellaneous building installations;
- i. locations of heritage buildings or building groups;
- j. Symbols of planting and preservation obligations.

##### **2. Text**

The text in each plot control map would stipulate relevant requirements for building and land use. The regulations should not repeat the provisions in the general text. The text may make stipulations regarding:

- a. The land use compatibility of each zone;
- b. Supplementary requirements for building density, plot ratio/cubic density, and building height;
- c. Requirements for building interval;
- d. Supplementary regulations on spatial structure of roads, entrances and exits of vehicles, squares, parking spaces and garages, and spaces to be encumbered with rights of passage in favor of the general public;
- e. Supplementary regulations on municipal utilities, spaces to be encumbered with the provision of public infrastructure;
- f. Supplementary requirements for building organization forms, roof forms, building façades, and miscellaneous building installations;
- g. Regulations on heritages;
- h. Requirements for emissions;
- i. Regulations on construction of renewable energy structures;
- j. Requirements for noise control;
- k. Requirements for soil contamination control;
- l. Requirements for rainwater collection;
- m. Requirements for greening and species protection;
- n. Other relevant supplementary provisions.

## 6.2.5 Test

In order to test the spatial control capabilities of the optimized regulatory plan model, the new spatial control factors in the optimized regulatory plan should be tested by the comparative study model. The results are shown in the following tables.

Tab. 6-3: Spatial Control Capabilities of the New Social Control Factors for the Regulatory Plan

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
Land Use Equality	Planning legal system (1)	Planning legal system (1)
	Public participation (1)	Public participation (1)
Housing	Plot ratio (GFZ) (1)	Plot ratio (1)
Public Facilities	Land use type, boundary, and compatibility (1)	Land use type, boundary, and compatibility (1)
	Site occupancy index (GRZ) (1)	Building density (1)
	Plot ratio (GFZ) (1)	Plot ratio (1)
	Cubic density (BMZ) (1)	Cubic density (1)
	Number of floors, Building height (1)	Building height (1)
	Building restriction line (Baugrenze), building line (Baulinie) (1)	Building line (1)
	Distance between building (restriction) line and street (1)	Set-back depth (1)
	Distance space (1)	Building interval (1)
Urban Image and Locality	Coverage type (1)	Building organization form (1)
	Roof form (1)	Roof form (1)
	Building façade (1)	Building façade (1)
	Miscellaneous building installations (1)	Miscellaneous building installations(1)
Heritages	Preservation zone (1)	Preservation zone (1)
	Preservation of building groups (1)	Preservation of building groups (1)
	Preservation of individual buildings (1)	Preservation of individual buildings (1)

Tab. 6-4: Spatial Control Capabilities of the New Economic Control Factors for the Regulatory Plan

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
Type of Building and Land Use	Land use area and boundary (1)	Land use area and boundary (1)
	Land use type (1)	Land use type (1)
	Land use compatibility (1)	Land use compatibility (1)
Degree of Building and Land Use	Site occupancy index (GRZ) (1)	Building density (1)
	Plot ratio (GFZ) (1)	Plot ratio (1)
	Cubic density (BMZ) (1)	Cubic density (1)
	Number of floors; building height (1)	Building height (1)
Plot Areas Which may be Built on	Building restriction line (Baugrenze), building line (Baulinie) (1)	Building line (1)
	Distance between building (restriction) line and street (1)	Set-back depth (1)
	Distance space (1)	Building interval (1)
Transportation	Street boundary lines (1)	Road boundary lines (1)
	Control of land use scopes of motor vehicle lanes, non-motorized vehicle lanes, and sidewalks (1)	Control of road forms and structures (1)
	Control of coordinates and elevations of control points, as well as road slopes (1)	Control of coordinates and elevations of control points, as well as road slopes (1)
	Control of entrances and exits (1)	Control of entrances and exits (1)
	Control of spaces to be encumbered with walking and driving rights and rights of passage in favor of the general public (1)	Control of spaces to be encumbered with rights of passage in favor of the general public (1)
	Control of stops of public transportations (1)	Control of stops of public transportations (1)
	Control of parking spaces and/or garages on the plots and their entrances (1)	Control of public parking spaces and/or garages; control of capacities of parking spaces and/or garages (1)
	Control of traffic areas for specific purposes (1)	Land use control of squares (1)
	Control of spaces for embankments, diggings, and retaining walls, which are required for road construction (1)	Vertical planning (topographical planning) (1)
Municipal Utilities	Control of spaces for power supply, water supply, heating, waste disposal, and sewerage, etc (1)	Control of spaces for municipal utilities as specific land use types (1)
	Control of spaces to be encumbered with the provision of public infrastructure (1)	Control of spaces to be encumbered with the provision of public infrastructure (1)
	Control of municipal secondary structures on the plots (1)	Control of municipal secondary structures on the plots (1)
	Control of ground/underground pipelines (1)	Spatial control of pipelines (1)

Tab. 6-5: Spatial Control Capabilities of the New Environmental Control Factors for the Regulatory Plan

	<b>GERMAN B-PLAN</b>	<b>CHINESE REGULATORY PLAN</b>
Air pollution	Control of the Emissions of greenhouse gases and harmful gases (1)	Emission control (1)
	Protected areas (1)	Green buffers (1)
	Control of renewable energy exploitation (1)	Control of renewable energy exploitation (1)
Noise	Active protection (1)	Active protection (1)
	Passive protection (1)	Passive protection (1)
Soil	Building restriction line (Baugrenze), building line (Baulinie) (1)	Building line (1)
	Distance between building (restriction) line and street (1)	Set-back depth (1)
	Measures for the protection, conservation, and development of topsoil (1)	Control of ground materials (1)
	Spaces where the ground has been severely contaminated by hazardous materials (1)	Land use control in order to prevent the natural soil from being polluted (1)
Water	Water bodies and spaces for water supply and distribution, for installations for flood control, and for the control of drainage (1)	Water bodies, water supply utilities, sewerage & sewage treatment utilities (1)
	Spaces for waste disposal and drainage, including rainwater retention and seepage, and for tipping (1)	Rainwater collection control (1)
Biodiversity	Public and private green spaces (1)	Public green spaces, productive plantation areas & green buffers (1)
	Planting and preservation obligations (1)	Greening rate and greening control (1)
	Structures for small domestic animals (1)	Spaces for the construction of structures for protecting animal species (1)
Energies & Minerals	Spaces for earth deposits, excavation, and for quarrying of stone, earth, and other minerals (1)	Open-pit mine site (1)
	Control of renewable energy exploitation (1)	Control of renewable energy exploitation (1)
Landscape & Tourism	Spaces for measures for the protection, conservation, and development of the natural environment and the landscape (1)	Parks (1)
	Public and private green spaces (1)	Public green spaces, productive plantation areas & green buffers (1)
	Planting and preservation obligations (1)	Greening rate and greening control (1)



The test results show that the optimized regulatory plan model has the same spatial control capabilities as those of the German B-plan, such that the objectives of sustainable development could be achieved.

### **6.3 Summary**

This chapter has discussed the innovative proposals for the improvement of the Chinese regulatory planning.

Based on the research conclusions of the theoretical comparative research and the case studies, the chapter has summarized the limitations of spatial control in the regulatory planning. According to these limitations, the innovative proposals, which include optimizing the regulatory planning system, reconstructing the spatial control goals, establishing a new control system, as well as establishing the new plan structure, have been developed. Finally, the chapter has tested the spatial control capabilities of the new spatial control factors in the optimized regulatory plan based on the comparative study model. The test results show that the spatial control capabilities of the optimized regulatory plan model are equivalent to those of the B-plan.

# Chapter 7 CONCLUSIONS

## 7.1 Conclusions of the Dissertation

**Conclusion one:** Although the descriptions of the economic and environmental control goals in the Chinese planning system are not as detailed as those in the German system, the spatial control goals of the Chinese urban planning are similar to those of the German urban planning. Both are intended to realize the sustainable urban development.

**Conclusion two:** Regarding environmental control, both theoretical research and case studies show that although there is a comprehensive definition for sustainable development in the Chinese planning system, in practice, only general greening requirements, such as the minimum limits of greening rates, are regulated.

**Conclusion three:** The theoretical spatial control factors of the B-planning are completely applied to the planning practice, while the theoretical spatial control factors of the regulatory planning are only partially applied to the planning practice.

**Conclusion four:** In general, both in theory and in practice, the overall spatial control capability of the regulatory plan is weaker than that of the B-plan. The distinctions concentrate particularly on the gaps in urban design control, and ecological and environmental control.

Therefore, the first and second hypotheses of the dissertation have been proven. Regarding the spatial control in the urban detailed planning in China and Germany, there are remarkable distinctions in spatial control capabilities. With regard to the regulatory planning, these distinctions can impair the achievement of sustainable development objectives

**Conclusion five:** The fundamental problem of the regulatory planning is that there is no developed mechanism that can safeguard the public interest and reflect the theoretical planning goals. The limitations of the regulatory planning control system and relevant measures reflect this fundamental problem. According to the limitations, the innovative proposals, which include optimizing the regulatory planning system, reconstructing the control goals, establishing a new control system, as well as establishing the new plan structure, have been developed. The test results show that the spatial control capabilities of the optimized regulatory plan model are equivalent to those of the B-plan.

Thus, the third hypothesis of the dissertation has been proven. It is possible to enable the regulatory plan to achieve the objectives of sustainable development by eliminating or minimizing the distinctions.

## **7.2 Prospect**

The innovative proposals presented in the dissertation should be tested in practice. These innovative proposals are only a framework. They reflect large economic, social, and cultural differences between China and Germany. China has many complicated problems that do not exist in Germany. Therefore, it is necessary to consistently accumulate experiences based on the planning practice in order to find solutions to China's problems.

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## Appendix A: German B-plan Maps



Fig. A-1: B-plan Map “Im Raiser” (former grenadier barrack, Zu 212)

(Source: Landeshauptstadt Stuttgart Amt für Stadtplanung und Stadterneuerung: *Bebauungsplan Im Raiser (ehemalige Grenadierkaserne) Zuffenhausen (Zu 212)*, 2001)



Fig. A-2: B-plan Map “Zuse-/Curiestraße” (Unterer Grund, Vaihingen 236)

(Source: Landeshauptstadt Stuttgart Amt für Stadtplanung und Stadterneuerung: *Bebauungsplan Zuse-/Curiestraße (Unterer Grund) Vaihingen 236*, 2001)

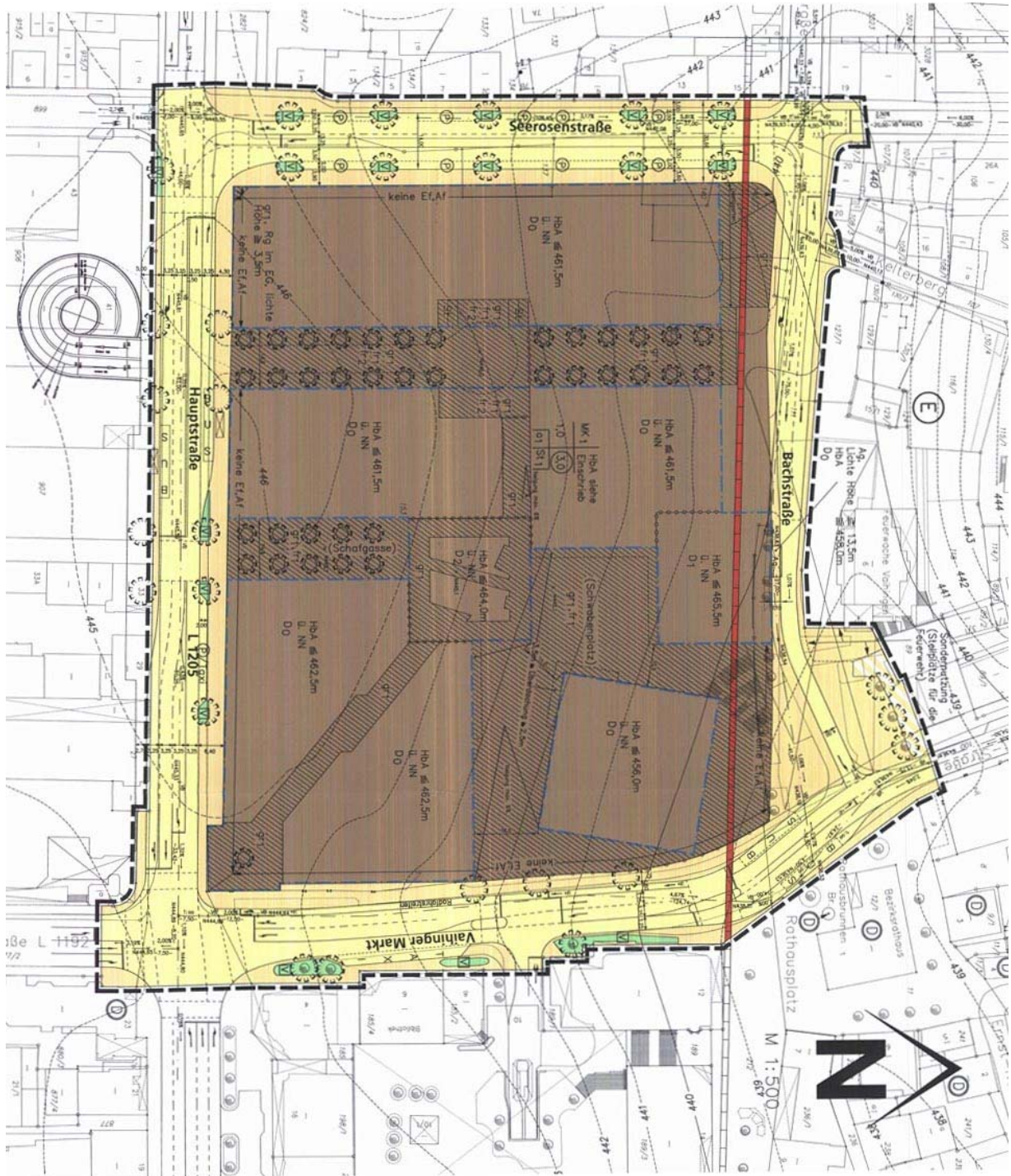


Fig. A-3: B-plan Map “ Haupt-/Bachstraße” (Brauereigelände, Vaihingen 234 )

(Source: Landeshauptstadt Stuttgart Amt für Stadtplanung und Stadterneuerung: *Bebauungsplan mit Satzung über örtliche Bauvorschriften, Haupt-/Bachstraße (Brauereigelände) Vaihingen 234*, 2003)

## Appendix B: Chinese Regulatory Plan Maps

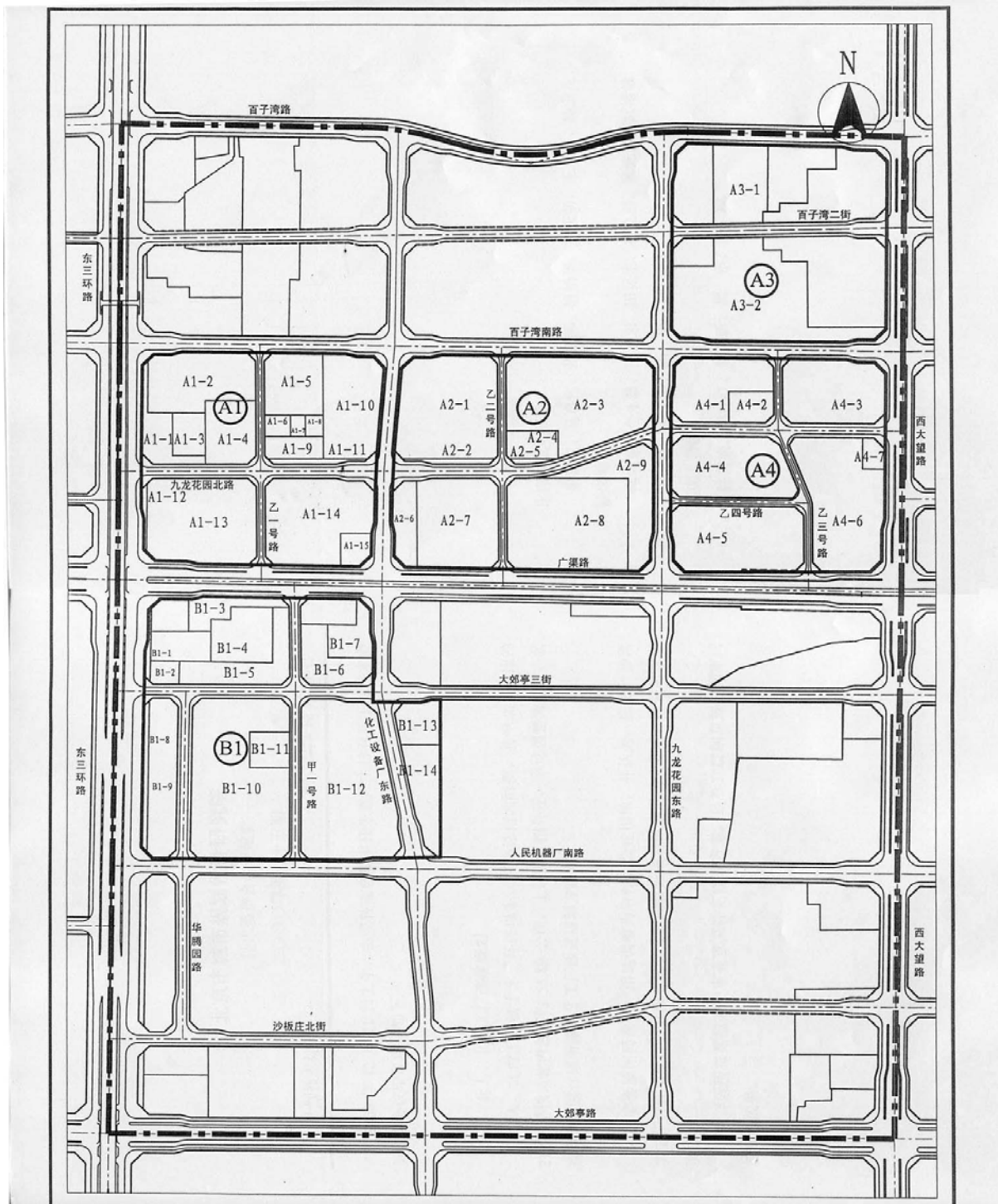


Fig. B-1: Zoning Map of the Regulatory Plan “Shuangjing”

(Source: Beijing Municipal Institute of City Planning and Design (BMICPD): *The Regulatory Plan of the Industrial Part of Shuangjing Area in Beijing*, 2000)

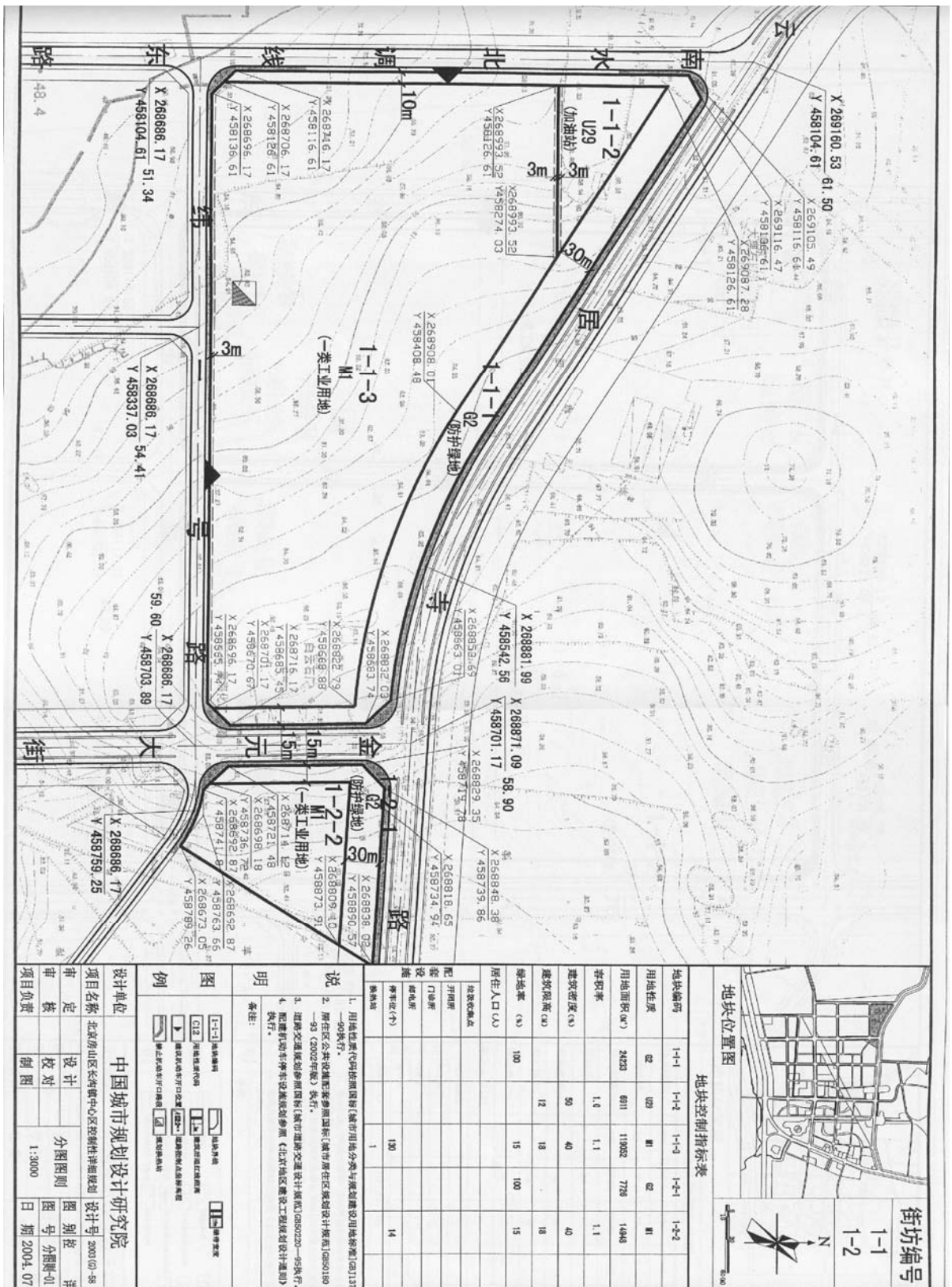


Fig. B-2: Plot Control Map-01 of the Regulatory Plan “Changgou Town” with the Control Indicator Table (Source: China Institute of Urban Planning and Design: *The Regulatory Plan of Changgou Town, Fangshan District, Beijing*, 2004)

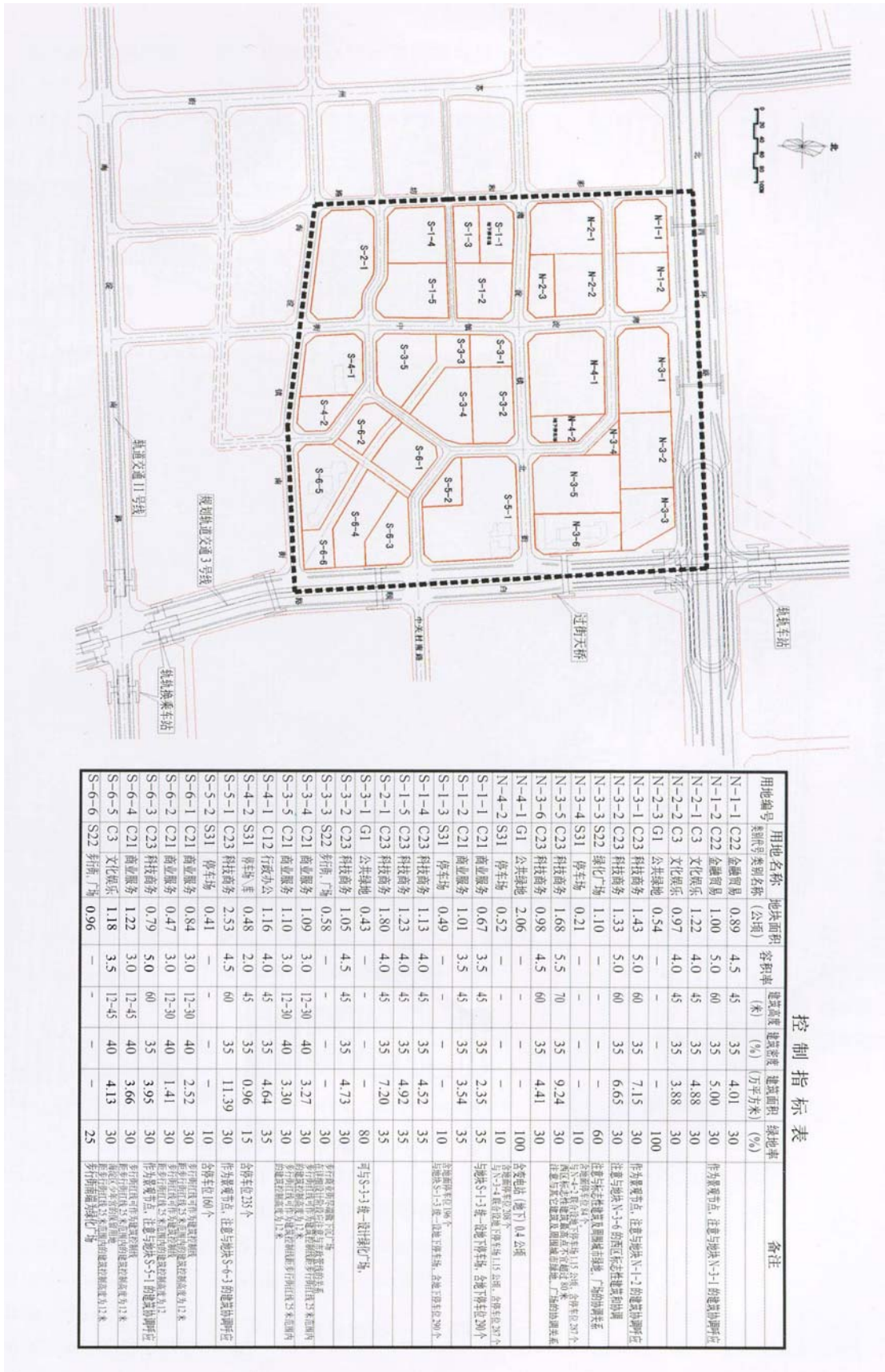


Fig. B-3: Zoning Map of the Regulatory Plan “Zhongguancun West” with the Control Indicator Table  
 (Source: Beijing Municipal Institute of City Planning and Design (BMICPD): *The Regulatory Plan of the Zhongguancun West in Beijing*, 1999)



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