普通高等学校土建类“十三五”规划教材

JIANZHU YU TUMU GONGCHENG ZHUANYE YINGYU

建筑与土木工程专业英语

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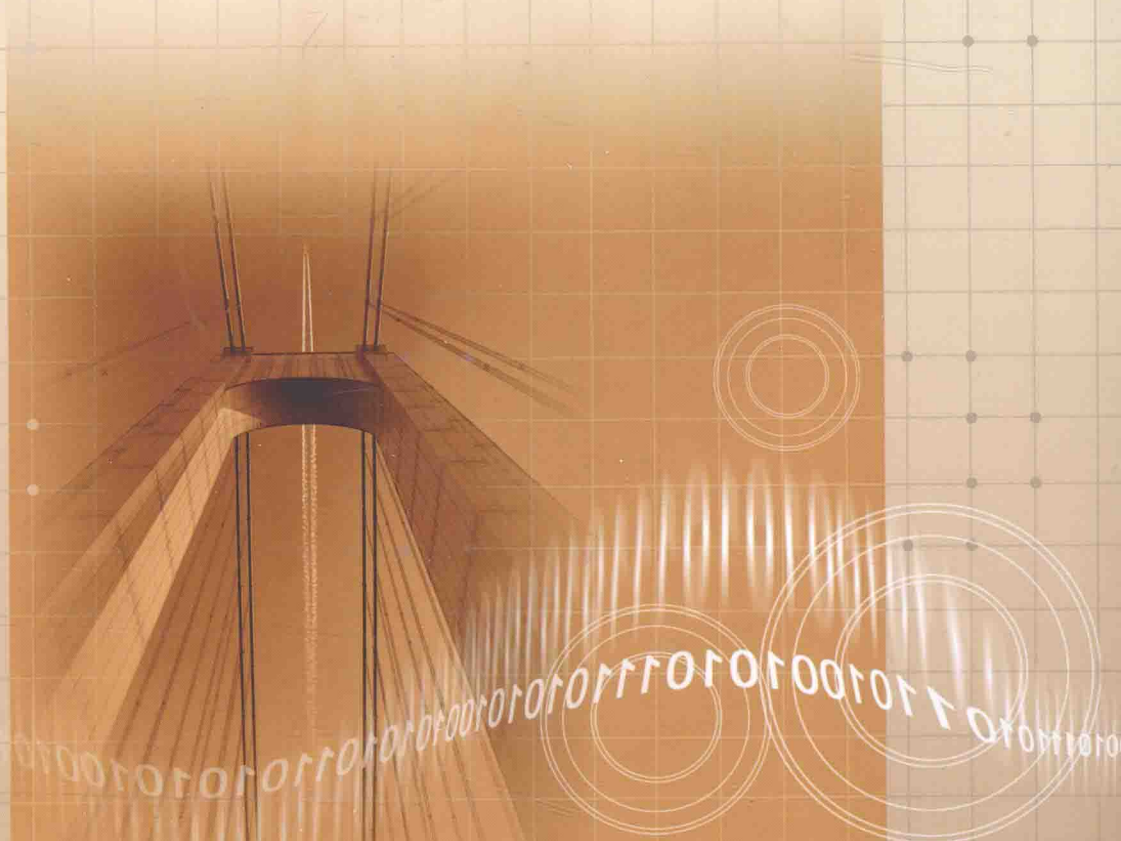

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内 容 提 要

本书是根据大学英语教学大纲的要求，面向建筑学与土木工程专业编写的。本书分为建筑学与土木工程两大部分，共十一个单元，每单元包含四篇文章和一篇语法知识，主要内容包括城市规划设计、建筑学概述、建筑历史、建筑技术、建筑结构、土木工程、材料力学、结构、材料、建设、液压结构等。

本书可供建筑学与土木工程专业教学使用，也可供相关专业工程技术人员学习参考。

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前 言

本书是根据大学英语教学大纲的要求，面向建筑学与土木工程专业编写的。本书从整体上考虑了建筑学与土木工程的专业相关性，将两个专业内容统一安排协调，有利于拓宽学生的专业知识、增加专业词汇量。本书可供当代建筑学和土木工程专业的学生学习使用，也可供工程技术人员参考、阅读。

本书分为两大部分，即建筑学和土木工程，共十一个单元，每单元包含四篇文章和一篇语法知识，主要内容包括城市规划设计、建筑学概述、建筑历史、建筑技术、建筑结构、土木工程、材料力学、结构、材料、建设、液压结构等。学生通过阅读文章掌握数百个核心专业词汇，再配合专业语法的学习，可以提高专业技术英语阅读能力，同时促进专业课的学习，实为两得之举。

本书编写人员及编写分工如下：郭丽娟（内蒙古农业大学）负责编写第一、六单元，吴迪（内蒙古工业大学）负责编写第二、十单元，贾文亮（内蒙古农业大学）负责编写第三、五单元，方旭艳（内蒙古工业大学）负责编写第四、九单元，邹春霞（内蒙古农业大学）负责编写第七、十一单元，张玉清（沈阳农业大学）负责编写第八单元，张琴（内蒙古农业大学）负责编写各单元语法知识部分。全书由张琴、邹春霞担任主编，并负责全书统稿，由贾文亮、张玉清、方旭艳、吴迪和郭丽娟担任副主编。

本书的编写是对对口专业阅读教材的一次尝试，由于编者水平有限，教材中不足之处在所难免，敬请广大读者批评指正。

编 者

2015 年 7 月

Content

UNIT 1 Urban Planning and Design

Section 1 Urban Planning and Design

Introduction

The pace of change in cities around the world increases the importance and urgency of thoughtful urban planning. Urban designers create new ideas and borrow old ones from the city planning of the past in the effort to replace unhealthy urban environments with modern work and housing facilities. People living in poor and moderate-income communities often find themselves in precarious environments prone to natural disasters and subject to hazardous conditions because of nearby mines, large industrial plants, or waste sites. The eagerness of urban planners to improve people's lives, however, needs to be tempered by the cultural integrity and variety of human communities as they are.

Urban Planning and Design

People have been trying to plan and design cities since cities began, but the task of shaping growth and change in the modern metropolis is very different from the planning and design of pre-industrial cities. Cities changed relatively little until about 1600. Even in Europe, where modern urbanization began, the pace of change remained slow until the late eighteenth century. Over the two succeeding centuries, the city changed so rapidly that planners and designers had difficulty keeping up with development, much less defining it in advance. The scope to modern urbanization also has forced planners and designers to cope with many serious environmental issues.

Pre-industrial Cities

Despite significant local variations, pre-industrial technology was similar from culture to culture throughout most of history.[1] Given this similarity, particularly in transportation and building materials, cities survived and prospered in similar locations: often at a natural harbor a ford, or the meeting of two rivers, and in places that could be made healthy, were well supplied with food and water, and could be effectively defended.

The first new technology to modify European city design was gunpowder, beginning in the late 1300s. Straight walls of stone that could be broken down by cannon fire were replaced by sloping ramparts that ultimately evolved into triangular bastions. The regular geometry of these fortifications gave cities the symmetrical star shapes that were a Renaissance ideal of city form. The rediscovery of Roman and Greek architecture and a new understanding of visual perspective contributed to the reshaping of cities during the Renaissance. The major themes of Renaissance

design were symmetrical plazas and squares and long straight streets. The long vistas and circles associated with French garden design were used in cities.

The unprotected suburbs outside walled cities were originally the shantytowns of the poor. After the rise of the nation-state made it unnecessary to live behind walls, the suburbs became an attractive alternative to the crowded, noisy, polluted city. By the mid-nineteenth century, the greater accuracy and range of modern firepower made city walls completely obsolete. That left cities more vulnerable, but it also removed limits to their expansion just when the effects of industrialization set off unprecedented urban growth. [2]

The Nineteenth Century

The Industrial Revolution increased trade, which created bigger dock installations on waterfronts and new districts of elegant houses. The rapid development of urban districts for the newly wealthy permitted designers to arrange houses in squares and crescents based on models used earlier for aristocrats.

The first factories were located near waterpower and natural resources, usually far from established cities. The steam railway, which could bring resources anywhere, and the stationary steam engine, which could replace waterpower, brought industry to the cities, beginning in the 1830s. The resulting noise and pollution, and the influx of factory workers along with the squalid housing built for them by cynical speculators, created disastrous environmental effects that continue to this day. [3]

The initial efforts at modern city planning were attempts to engineer water and sewer services to replace disease-breeding cesspools and wells. New roads were also needed to support increased traffic. Some attempts were also made to improve the dwellings of the poor through charity housing and building regulations.

The elegant uniform architecture parks, boulevards, sewers, and other public works created in Paris by Georges-Eugene Haussmann after 1850 became models for cities everywhere. The image of Paris was enormously influential in the United States, where the City Beautiful movement that began in the 1890s produced park and boulevard plans for many American cities.

Meanwhile, the railroad had permitted the creation of garden suburbs away from the outskirts of the city, such as Llewellyn Park in what is now West Orange, New Jersey, and Riverside outside Chicago. Model company towns such as Port Sunlight, near Liverpool, England, were also planned communities. Ebenezer Howard became the theorist of a complete escape from the polluted and congested nineteenth-century city, advocating self-contained garden cities connected by railways and separated from the others by stretches of natural and agricultural landscape, or green belts. [4]

The Early Twentieth Century

The beginning of the twentieth century also saw the first government subsidized urban housing and much stricter building regulations. The first zoning regulations, separating land

uses in cities such as Rotterdam and Frankfurt, also date from this time. New York's 1916 zoning ordinance was used to separate incompatible land uses and shape tall buildings. They could rise to a height that was in proportion to the width of the street and then had to be set back. Around 1910, when the modern city planning profession was created , it looked as if cities could be perfected by replanting their central districts with parks and boulevards, replacing slums with government-subsidized housing, and surrounding the city with a green belt that let to garden suburbs, garden cities, and model company towns, what undermined this vision was the continued presence of slums and industry in the city center; tall buildings located in a more scattered pattern that those lining Haussmann style boulevards; and the automobile, which made urbanization possible almost anywhere, not just around Howard's railway stations.

The New York Regional Plan of 1929 was an attempt to combine earlier concepts of subsidized housing, parks, boulevards, and garden suburbs and relate them to tall buildings and new highways. The plan included Clarence Stein and Henry Wright's design for Raeburn, in Fairlawn, New Jersey, which was to have been a garden city on Howard's model but redesigned to accept the automobile. However, the Great Depression of the 1930s prevented its completion. In Europe, theorists such as the architect who called himself Le Corbusier were advocating more sweeping urban changes, namely running highways through congested and outmoded streets and blocks; replacing old unsanitary neighborhoods with apartment towers surrounded by parks; and substituting modern skyscrapers for the old business center.

The Great Depression, World War Ⅱ, and the Postwar Era

The Depression impeded sweeping changes, but made subsidized housing and inventive government regulation more necessary. In the United States new highways for automobiles and trucks were constructed. The New Deal funded public works, experimented with the creation of green belt towns according to Ebenezer Howard's theories, provided subsidies for publicly aided housing, and through the Tennessee Valley Authority engaged in regional planning and development on an unprecedented scale.

The destruction of European cities during World War Ⅱ make possible experiments in city planning and design along the lines that Le Colousier and other modernists had advocated. Central city districts were reconstructed, usually with modern interpolations where old buildings had been destroyed, and many new districts of modernist housing were built along with the new highways to support them.

In the end, suburbanization, automobile traffic, and postwar population movements were more devastating to existing cities than the war. In the 1950s cities and their suburbs still retained patterns of development that had been created over the previous century. Because of the Depression and World War Ⅱ, they had been essentially frozen for a generation. Although until the 1950s planning and city design had gained only isolated successes, it was still possible to believe that cities could be perfected according to an established model like Haussmann's Paris or Howard's garden cities. In the 1950s the vast effects of televisions, computers, intercontinental

jet travel, and worldwide industrialization and mechanized agriculture were just beginning to be felt. Also, the world population was just one-third what it became by century's end.

The Late Twentieth Century

By the 1990s, cities everywhere were transformed, and the techniques for planning and designing needed to be transformed as well. Old ideas about what cities should be had not become invalid, but the process of urbanization speeded up so that these old ideas became a way to manage change, not to define an end result. It has also become more and more difficult to separate city planning and design from environmental conservation, historic preservation, economic development, social service delivery, education, and all the other techniques for managing the continued transformation of the modern metropolis. With urbanization and industrialization threatening to make the planet unlivable for people, planning and design assume a new urgency.

The changes of the late twentieth century were least apparent in Europe, where everything has a history and attachment to the past is high. Change has come, however, in the form of far more diverse populations, an information-based society and the adaptation of historic villages and towns to suburban functions. Many planning and design decisions are made centrally, and the government has the power to direct major investments in industry and underlying support systems (roads, transportation, sewers, and so on).

The state of planning and design in developing countries is radically different. Since these nations went from a preindustrial, rural stage to the modernism of the late twentieth century in one generation, their cities have no previous infrastructure and industry to rely upon and no precedent for managing new development and integrating people into a workforce. People may draw water from wells and come home to movies on a VCR. With little or no public transit, the automobile is the primary means of transportation, resulting in severe traffic congestion and air pollution.

In countries such as the United States, Canada and Australia, which industrialized early and has plenty of undeveloped land, the principal issue is the urbanization of formerly suburban and rural areas. Modern highway construction opened up huge new areas of land to development. Bigger houses on cheaper land (and, in the United States, subsidies for homeowners), plus a desire to escape urban problems, drew people to the new suburbs. Stores, then office jobs and industry, followed them. By the mid-1970s, more urban development was taken place in what used to be suburbs than in the old central cities. New clusters of urban development, with shopping centers, office towers, hotels, and apartment buildings, formed miles from established centers on the edge of open fields.

In the United States, many older cities are fighting for their lives. Some, such as Camden, New Jersey; Gary, Indiana; and East St. Louis, Illinois; have been almost totally bypassed by new investment. Others, such as Boston, Minneapolis, and Portland have done much better, but almost every city has its deteriorated areas, and every metropolitan area has

its new edge cities. Planners and designers have evolved complex ways for renewing older cities, although they have not been able to do much about difficult problems of joblessness, crime, deteriorating schools, and crumbling inner-city neighborhoods.

In the new suburban centers, zoning and subdivision based on models devised in the 1930s have proved totally inadequate for safeguarding the environment and channeling new investment into livable patterns. This new development is wasteful. Between 1960 and 1995 the amount of urbanized land in the New York metropolitan region increased by two-thirds, without any increase in population. State-wide planning, which exists in some form in about a quarter of the U. S. states, can require growth limits at the urban fringe, strong measures to safeguard the natural environment, and policies to redirect development toward areas with already-existing infrastructure, offering the possibility of a better future. [5]

Communities, Poor and Moderate-Income

Throughout most of the industrial regions of the world, people with limited economic resources usually bear the added burden of living under dangerous environmental conditions. Residents of poor communities tend to suffer disproportionately from industrial accidents and the effects of ecocide (degradation and destruction environments). Poor communities may reside precariously on floodplains, steep mine faces and other unstable landscapes. The poor and marginal working classes are thus frequent victims of avoidable ecological disasters-dam ruptures, mudslides, flash floods, as well other disasters caused by lack of environmental planning.

Urban Development

The last half of the twentieth century was marked by the explosive growth of cities and metropolitan regions with enormous energy budgets. However, the hazards of poor environmental planning and control end up being shared among communities of all income levels. Residents of moderate-income communities are routinely located near nuclear energy installations. Urban landfills, and toxic waste sites; vacation colonies are crowded onto unstable ecological zones like barrier islands. All these communities are increasingly harmed by what could have been avoidable ecological disasters. Increasingly suburban developments place moderate-income communities near such undesirable locations as airports. The Love Canal in northern New York State is one of the most notable examples of a community that was located near a chemical sluiceway.

These communities suffer the more insidious and initially hidden effects of pollution. Segregated communities exist on the fringes of cities in the industrializing world and inside the older cities of North America. These communities' host populations of poor and moderate-income people who suffer from excessive mortality due to interpersonal violence linked particularly with illegal drug traffic. They also suffer from the adverse effects of poor housing and lack of pollution controls. The incidence of respiratory diseases is far higher in central city ghetto communities than anywhere else in the United States. These diseases include

tuberculosis, asthma, and emphysema, among others. Poor communities—whether they are central city ghettos or elsewhere—suffer from multiple failures of government. These include lack of basic goods and services, such as low-cost housing, health and educational resources, as well as parks and open space. These problems are better alleviated in the social democratic nations of Europe. France, for example, provides over 25 percent of its citizens with affordable housing. These dwellings are built by non-profit agencies with some public subsidy. In the United States less than 5 percent of the population lives in subsidized housing and those dwellings are generally over occupied. Such experiences point to the urgent need for more democratic planning and less hasty destruction of what seem to be environmentally unsound communities. [6]

Vocabulary and Expressions

congested	拥挤的
crescent	新月,月牙;新月形的,逐渐增加
dam	水坝,障碍;控制,筑坝
deteriorate	(使)恶化
devastating	破坏性的,全然的
disproportionately	不成比例
ecocide	生态灭绝
emphysema	气肿,肺气肿
ford	浅滩;徒涉
fortification	防御工事,要塞,筑城术
fringe	边缘,须边,刘海;边缘的,额外的;在…上加以缘饰,成为…的边缘
geometry	几何学
hazard	冒险,危险,冒险的事;冒…的危险,赌运气,使遭危险
impede	阻止
influx	流入
infrastructure	下部构造,基础下部组织,基础设施
interpolation	篡改,填写,插补
invalid	病人,残废者;有病的,残废的
landfill	垃圾掩埋场,垃圾
metropolis	首都,主要都市,都会,大主教教区,大城市
mortality	死亡率
outskirt	外边,郊区
ordinance	法令,训令,布告,条例,圣餐礼,传统的风俗习惯
prosper	成功,兴隆,昌盛;(指上帝)使成功,使昌隆,繁荣

rampart	垒,壁垒,城墙;口,用壁垒围绕,防卫
respiratory	呼吸的
rupture	破裂,裂开,断绝,割裂;破裂,决裂,敌对,割裂
renaissance	复兴,复活,新生,文艺复兴,文艺复兴时期
segregate	隔离
sewer	下水道,缝具,缝纫者
skyscraper	摩天楼,高耸的烟囱
sluiceway	闸沟,人造水道
slum	贫民窟;访问贫民区
speculator	投机者
subsidize	资助,津贴
symmetrical	对称的,均匀的
urbanization	都市化,文雅化
unsanitary	不卫生的
vista	长的景色,街景,展望,回想
cope with	与…竞争,应付

Notes

1. Despite significant local variations, pre-industrial technology was similar from culture to culture throughout most of history.

尽管存在着明显的地方性差异,但从大部分历史时期看,工业化前的技术在不同文化中差异不大。

2. That left cities more vulnerable, but it also removed limits to their expansion just when the effects of industrialization set off unprecedented urban growth.

该句中"left cities more vulnerable"意思是"put cities in a position more easily to be attacked"。

虽然城市更容易被攻陷,但同时也在工业化推动城市空前发展时解除了对扩展的禁锢。

3. The resulting noise and pollution, and the influx of factory workers along with the squalid housing built for them by cynical speculators, created disastrous environmental effects that continue to this day.

该句的主语实际上是由三个名词短语组成的,"along with"的意思相当于"and"或"together with"。

工业带来的噪声和污染、大量工厂工人的涌入以及精明的投机商为工人们建造的肮脏的房屋,一起带来了持续至今的严重的环境问题。

4. Ebenezer Howard became the theorist of a complete escape from the polluted and congested nineteenth-century city, advocating self-contained garden cities connected by railways and separated from the others by stretches of natural and agricultural landscape, or green belts.

该句中的现在分词短语“advocating…”作定语，修饰“Ebenezer Howard became the theorist”，而“connected by railways and separated from…”这两个过去分词短语则是作“self-contained garden cities”的后置定语。

理论家埃比尼泽·霍华德主张彻底远离19世纪污染和拥挤的城市，倡导建立自给自足的花园城市，有铁路与外界相连，城市内是自然风光和农业带或绿化带。

5. State-wide planning, which exists in some form in about a quarter of the U. S. states, can require growth limits at the urban fringe, strong measures to safeguard the natural environment, and policies to redirect development toward areas with already-existing infrastructure, offering the possibility of a better future.

该句中“which”引导的是一个非限定性定语从句，修饰“State-wide planning”，谓语是“can require”，其后带三个名词短语作宾语，它们分别是“growth limits”“strong measures”和“policies”。句末“offering”引导的现在分词短语作全句的结果状语。

在美国，有将近四分之一的州采取了各种形式的规划，可限制城市边缘的发展，采取有力措施保护自然环境，并制定政策引导城市向已有基础设施的地区发展，使城市拥有更好的未来。

6. Such experiences point to the urgent need for more democratic planning and less hasty destruction of what seem to be environmentally unsound communities.

这些实例表明，社区规划亟待民主化，并应尽量减少对环境恶劣的社区的盲目破坏。

Section 2　The Planning Process

Any community consists of a wide variety of geographic, social, political, economic and cultural patterns which both act and interact to form the nature and condition of society. The relationship between these various patterns is constantly changing, giving rise to new and different conditions, some beneficial to the community, some deleterious. It is the planner's function to comprehend this tangled web of relationships, and where necessary guide, control and change their composition.

To achieve this, planning is concerned with prediction, not only of population size and land use in isolation, but also of human and other activities as well. These activities are connected by channels of communication, such as rivers, roads, footpaths, pipelines and cables. These activities and their respective connections occur within 'space', not just on land, but between areas of land and also through time. This dynamic nature of varying components the city, town or other urban environment has requires an understanding of the guidance and control of change in terms of a system. Systems analysis can operate with changing circumstances in the relevant quantities rates and quality concerned. In this way the development plan for an area can be made pertinent at all times, not just now, or at some remote date in the future.

Allied with the emergence of the idea of a systems approach towards town planning there

has occurred an examination of the way in which plans and policies are decided, and an investigation regarding the extent to which these decisions are rational. A rational decision is one where all the various alternative courses of action are considered, the consequences resulting from them are identified and compared, and the preferred alternatives selected in the light of the most valued ends. In addition, the various courses of action that present themselves should reflect the overall aims for the community.

Because of its intricate nature, and the delicate balance that exists between the various related component parts, the process of planning should be continuative. Because planning is a continuous process, and therefore is almost wholly future-oriented, an essential requirement in making the necessary and best decisions is the ability to forecast. In essence, forecasting is estimating, which involves understanding a process well enough to be able to describe its important relationships and to gauge the values of its variables. It is neither guesswork nor the slavish application of over-simple rules. As conditions change and circumstances vary each new decision requires fresh evaluation. The constituent variables that comprise the plan, which might be population, employment and communications, for example, will require repeated analysis to check their performance and identify any departures from the original strategy. It cannot be emphasized enough that, because reality is immensely complicated, town planning is not a 'once and for all time'[1] but a recurrent decision making process requiring constant review and revision. The aim should not be to specify in great detail the nature, size and condition of things to come, but rather to establish a procedure or framework that facilitates the manipulation of events in the desired direction. To achieve this it is always necessary to clarify at first instance[2] the principal aims of the plan; in other words, specify what the desired social, economic, political and physical directions are. This will not only provide standards by which the performance of the plan can be judged, but also supply a method for selecting from alternative plans in the first place.

Owing to the need for continuity, adaptability, and revision, all geared towards the task of producing the best planning decision all the time, a procedure somewhat vulgarly called "optimization", urban and regional planning has been described as a cyclic process. This can be demonstrated by setting out an example of the interrelated steps involved, one among many, for there exists various opinions regarding the exact nature of the process and number of steps:

decision to adopt planning
formulation of goals
identification of objectives
preparation of alternative strategies
evaluation
implementation
monitoring and review

This description is by no means exhaustive or authoritative but it does serve to illustrate the

departure from traditional land use planning. It should, however, be emphasized that no matter how sophisticated the process (and there is no merit in complexity), any plan or policy will only be as good as the data available and the people who prepare it.

Vocabulary and Expressions

interact	相互作用,相互影响
give rise to	引起,使发生
tangled	纠缠的,紊乱的
isolation	孤立,单独,绝缘
pertinent	有关的,相干的,恰当的
ally	与…关联,联合,结合
continuative	连续,持续的
manipulation	操纵,应付,处理
guesswork	推测,猜想,假设
slavish	盲从,缺乏独创性
departure from	偏离,违反
recurrent	循环的,周期的,经常的
continuity	连贯,连续性
vulgarly	粗俗地,通俗地,一般地
optimization	最优化
cyclic	周期的,循环的
formulation	简要订出,系统阐述,公式化
evaluation	评价,估价
implementation	贯彻,实现
exhaustive	彻底的,详尽无遗的,会耗尽的
authoritative	有权威的,可信的,官方的
complexity	复杂(性),复杂的事物

Notes

1. "once and for all time"短语放在名词前作定语,一般用连字符连接各部分;此处用引号表示这个短语起形容词作用,也可作"once-and-for-all-time"。

2. "at first instance"此为不规范用法,一般应用 in the first instance。

Section 3 The Domain of Urban Design

We can start identifying the elements of urban design by defining the domain of urban design. Urban design is that part of the planning process that deals with the physical quality of the environment. That is to say, it is the physical and spatial design of the environment.

However, it should be quite clear to us that in designing the environment, planners and designers cannot design all elements and components; they cannot in every instance design entire buildings. It might be possible to do this in new towns or planned residential communities, but in an existing community, such complete design is quite difficult.

In addition, the domain of urban design extends from the exterior of individual buildings outward, with consideration of positive and negative effects of individual buildings on each other's interiors.[1] "Designing cities without designing buildings" we may, therefore, say that the spaces between the buildings are the domain of urban design. But how do we design these spaces?

Using the nomenclature of the Urban Design Plan of San Francisco, we can distinguish among the purposes of four interrelated groups of spaces: (1) internal pattern and image, (2) external form and image, (3) circulation and parking, and (4) quality of environment. Internal pattern and image describe the purpose of spaces between urban structures at the micro level, that is, key physical features of the city's organization—focal points, viewpoints, landmarks and movement patterns. External form and image focus on the city's skyline and its overall image and identity. Circulation and parking look at street and road characteristics—quality of maintenance, spaciousness, order, monotony, clarity of route, orientation to destination, safety and ease of movement, and parking requirements and locations.[2] Finally, quality of environment includes eight factors: compatibility of uses, presence of natural elements, distance to open space, visual interest of the street facade, quality of view, and quality of maintenance, noise, and microclimate.

The domain of urban design as just set forth does not pinpoint very specific physical elements (plaza, mall, seating areas, trees, lamp posts), but it is a reasonable way of grouping them and gives direction to study and identification of the more specific elements that are unique or important to a community.[3] Since every community has different physical characteristics, the range of specific elements may vary extensively from one community to another, from one downtown to another, from one city to another.

In the past, most planners and designers have emphasized the first two groups of elements—internal pattern and image and external form and image—probably because these two groups are strongly oriented toward the form-making aspects of urban design. Yet when we also consider these elements from the standpoint of function and environmental quality, the spaces created for people (both those who are walking in the streets and those who are living inside the buildings) are potentially more pleasant.

For example, we might observe a beautifully designed plaza that very few people use, simply because it does not have any direct sunlight or it is windswept. On the other hand, there are plazas that have been designed only tolerably well, and crowds of people use them. It is undoubtedly true that there might be a number of factors involved (location, support for activity, and so on), but such environmental considerations as wind, noise, sun, view, and natural elements always contribute significantly to successful urban design.