建筑工程专业英语

Specialized English for Civil Engineering

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前言

本书以提高读者的实践能力和职业素质为宗旨，针对高等教育的人才培养目标，围绕学生的特点，立足“学以致用、深入浅出、突出能力”的原则编写。学生在完成基础英语学习后，对建筑工程专业英语要进行后续学习，以期掌握一定量的专业英语词汇，培养建筑工程专业知识阅读的能力，并在工程建设活动中正确理解英文专业图纸和文献。

近年来，我国土木工程行业不断向国外拓展业务，对现场第一线工程技术人员专业英语方面的要求不断提高——需要其掌握听、说、读、写、译等综合技能。本书选用了建筑工程专业基础内容，深入浅出、图文并茂地给学生展现了专业知识的英语表达形式。全书内容新颖、实用性强、通俗易懂。

本书由杨云峰担任主编，董祥和刘洋担任副主编，许伟、王娜参与了本书部分章节的编写工作。全书由来弘鹏主审。

编者在编写过程中采用了许多网络资源、国内外文献、著作、教材及课程网站资料，汲取了相关理论、设计和施工等方面的规范、规程、标准和施工手册的内容，在此对相关作者和单位一并表示最诚挚的谢意。

由于时间仓促及编者水平有限，书中难免存在不足之处，恳请各位专家和广大读者批评指正。

编　者

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土木工程

In-class Reading

Civil Engineering

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What Does Civil Engineering Refer to?

Part One Preparation

（1）Work in groups to talk about what Civil Engineering is? Then write it down below.

What is Civil Engineering?

（2）Work in groups to talk about what the responsibilities of a civil engineer are? Then write them down below.

Part Two Reading-centered Activities

1. Text

Civil Engineering and Civil Engineer

Civil engineering, one of the oldest engineering disciplines in the world, is a professional engineering discipline that deals with design and construction, including works in buildings, roads, bridges, tunnels, canals and dams etc. Civil engineering takes place from municipalities to national governments in the public sector, and from individual homeowners to international companies in the private sector. Engineering as one of the oldest vocations in the history of human is a practical application of the findings of theoretical science, aiming to benefit people. Without the skills included in the field of engineering, our modern civilization could never have evolved.

Civil engineering focuses on design and construction of structures, such as buildings（world-famous projects shown in Fig.1-1-Fig.1-3） and houses, dams, tunnels, bridges, canals, sanitation systems and the stationary parts of transportation. Meanwhile, China's Three Gorges Dam, Jinghang Canal and FAST in Guizhou are shown in Fig.1-4-Fig.1-6 respectively.

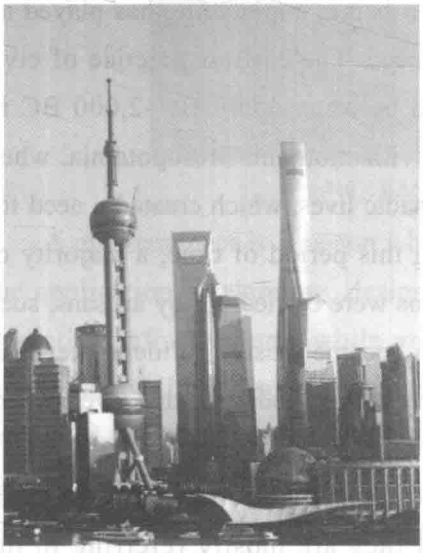

Fig.1-1 Aerial view of Lujiazui

Fig.1-2 The Burj Khalifa

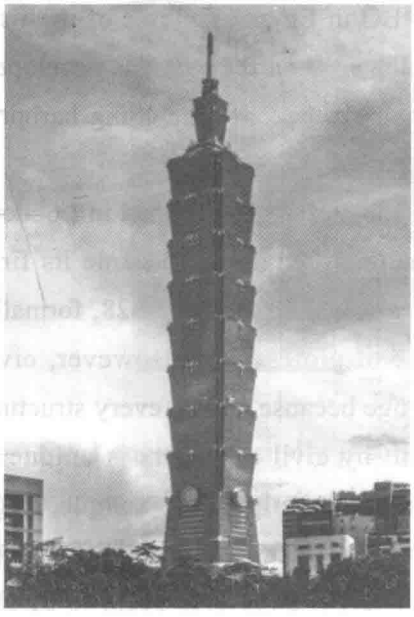

Fig.1-3 Taipei 101

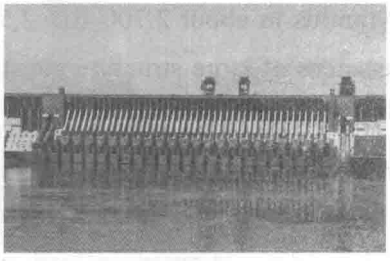

Fig.1-4 China's Three Gorges Dam

Fig.1-5 Jinghang Canal

As a comprehensive discipline, civil engineering includes several specialized sub-disciplines connected to knowledge in many fields, such as structures, materials science, geography, geology, soils, hydrology, environment, mechanics, and so on. The application of its physical and scientific principles is to solve social problems, and its phylogency is linked to development in all directions.

Reviewing the history of human being, engineering has played an important role since human existence. The earliest practice of civil engineering may have commenced between 4,000 BC–2,000 BC in Ancient Egypt, the Indus Valley Civilization and Mesopotamia, when humans started to abandon their nomadic lives, which created a need for the construction of shelter. During this period of time, a majority of architectural designs and constructions were carried out by artisans, such as stonemasons and carpenters who became master builders later, and transportation became increasingly important, leading to the development of wheels and boats.

Until now, there has been no clear distinction between civil engineering and architecture, and they are mostly referring to the same occupation and often used interchangeably. The construction of Pyramids in about 2,700 BC–2,500 BC in Egypt was one of the first instances of large structure constructions. And the Romans developed civil structures throughout their empire, especially including harbors, bridges, dams and roads.

In 1818, the Institution of Civil Engineers was founded in London, and in 1820, Thomas Telford, an eminent engineer, became its first president. The institution received a Royal Charter in 1828, formally recognizing civil engineering as one of professions. However, civil engineering faces a particular challenge because almost every structure or system that is designed and built by civil engineers is unique—One structure rarely copies another one exactly. For example, large structures like buildings, dams, bridges, or tunnels may differ from previous structures substantially. Thus, if structures seem to be the same completely, site requirements or other factors generally result in

modification.

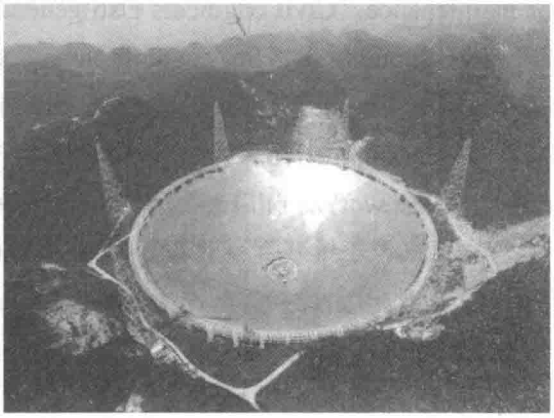

Fig.1-6 FAST in Guizhou

A civil engineer is a person who practices civil engineering work—the application of planning, designing, constructing, maintaining and operating infrastructures while protecting public and environmental health, as well as improving existing infrastructures that have been neglected. In some places, civil engineers may perform land surveying as well; however, in others, the surveying is limited to construction surveying, unless an additional qualification is obtained. Fig.1-7 shows engineers in a site.

Fig.1-7 Engineers in a site

Civil engineers usually practice in a particular specialty, such as construction engineering, geotechnical engineering, structural engineering, land development, transportation engineering, hydraulic engineering and environmental engineering. However, some civil engineers, particularly those working for government agencies, may practice across multiple

specialties, especially when the work is involved in critical infrastructure development or maintenance. Civil engineers also generally work in a variety of locations and conditions. For example, many of them spend time outdoors at construction sites, so as to monitor operations or solve problems on sites. Therefore, the job is typically a blend of in-office and on-location work, and most work is full-time.

注：文章内容主要来源于维基百科和邓贤贵主编的《建筑工程英语》. 武汉: 华中理工大学出版社, 1997.

2. Words and phrases

Remember the words and phrases before class. You will benefit from your preview when you read the passage in class.

application [ˌæplɪˈkeɪʃn]

n. 适用，应用，运用

architectural [ˌɑːrkɪˈtektʃərəl]

adj. 建筑学的；建筑上的；有关建筑的；符合建筑法的

artisans ['ɑːrtəznz]

n. 技工，工匠（artisan的名词复数）

bridge [brɪdʒ]

n. 桥；桥牌；鼻梁；起联系作用的东西

vt. 在……建桥，架桥于……之上；通过桥横跨

canal [kəˈnæl]

n. 运河，沟渠；管道；气管；食道

vt. 建运河；疏导

carpenter ['kɑːrpəntər]

n. 木工，木匠

v. 当木匠；做木工活

civilization [ˌsɪvələˈzeɪʃn]

n. 文明社会；文明，文化

civil engineering

n. 土木工程

construction [kənˈstrʌkʃn]

n. 建造；建筑物；解释；建造物

construction engineering

建筑工程，建设工程

dam [dæm]

n. 水库；水坝，堰；（牙科用的）橡皮障；〈比喻〉障碍

vt. 用水坝阻止；阻塞，抑制

differ ['dɪfər]

vi. 不同，相异；不同意

discipline ['dɪsəplɪn]

n. 纪律；学科；训练；符合行为准则的行为（或举止）

evolve [i'vɔ:lv]

vt. 使发展；使进化

vi. 发展；［生］通过进化进程发展或发生

environment [ɪn'vaɪrənmənt]

n. 环境，外界；

FAST（Five-hundred-meter Aperture Spherical radio Telescope）

五百米口径球面射电望远镜

geography [dʒi'ɔ:grəfi]

n. 地理（学）；地形，地势；布局

geology [dʒi'ɔ:lədʒi]

n. 地质学；（某地区的）地质情况；地质学的著作

geotechnical engineering

岩土工程

hydrology [haɪ'drɔ:lədʒi]

n. 水文学，水文地理学

institution [ˌɪnstɪ'tju:ʃn]

n. （大学、银行等规模大的）机构；惯例，制度，规定，建立；社会事业机构；<口>名人，名物

infrastructure ['ɪnfrəstrʌktʃər]

n. 基础设施；基础建设

instance ['ɪnstəns]

n. 情况；例子，实例；要求，建议；［法］诉讼手续

vt. 举……为例

maintenance ['meɪntənəns]

n. 维护；保养；维修

mason ['meɪsn]

n. 石匠，砖瓦匠

The ancient Iraq

古代伊拉克

mechanics [mə'kænɪks]

n. 力学；机械学

municipality [mjuːˌnɪsɪ'pæləti]

n. 自治市；市政当局

modification [ˌmɔːdɪfɪ'keɪʃn]

n. 修改，修正，变更，改良，改进，缓和，减轻，限制；[生] 诱发变异，变态，变体，变型

public sector [ˌpʌblɪk 'sektər]

公共部门，公共成分

practical ['præktɪkl]

adj. 实践的，实际的；可实现的，实用的；注重实际的；可用的

qualification [ˌkwɔːlɪfɪ'keɪʃn]

n. 资格，授权；条件，限制；合格证书

refer to [rɪ'fəːr tu]

参考；指的是；涉及；适用于

site [saɪt]

n. 遗址；地点，位置，场所，工地现场

vt. 使坐落在；安放，为……提供场所

structure ['strʌktʃər]

n. 结构；构造；建筑物；体系

structural engineering

结构工程

stationary ['steɪʃəneri]

adj. 不动的，固定的；静止的，不变的；常备军的；定居的

n. 不动的人；驻军；固定物

sub-discipline ['sʌb'disiplin]

分支学科

stonemasons ['stoʊnmeɪsnz]

n. 石工，石匠（stonemason的名词复数）

substantially [səb'stænʃəli]

adv. 大体上；本质上，实质上；充分地；相当多地

surveying ['sə:rveɪŋ]

n. 测量

v. 测量；调查

suspension [sə'spenʃn]

n. 悬浮；悬架；悬浮液

sanitation [ˌsænɪ'teɪʃn]

n. 卫生系统或设备

stationary ['steɪʃəneri]

adj. 不动的，固定的；静止的，不变的；常备军的；定居的

n. 不动的人；驻军；固定物

transportation [ˌtrænspɔ:r'teɪʃn]

n. 运送，运输；运输系统；运输工具；流放

theoretical [ˌθi:ə'retɪkl]

adj. 理论的；推想的，假设的；空论的

tunnel ['tʌnl]

n. 隧道；地道；烟道

vi. 打通隧道；挖掘隧道

vt. 在……挖掘隧道；在……打开通道

vocation [voʊ'keɪʃn]

n. 职业，使命

Part Three After-class Reading

1. Text

What Does Civil Engineering Refer to?

In general, civil engineering refers to an overall interface of fixed projects created by human for the greater world. General civil engineering is also referred to as site engineering, a branch of civil

engineering that primarily focuses on converting a tract of land from one usage to another. Therefore, general civil engineers work closely with surveyors and specialized civil engineers to design grading, drainage, pavements, water supply, sewer services, dams, electric and communication supply, during which they need to apply principles of geotechnical engineering, structural engineering, environmental engineering, transportation engineering and construction engineering to residential, commercial, industrial and public works projects of all sizes and levels of construction. Site engineers spend time visiting project sites, meeting with stakeholders, and preparing construction plans.

Coastal engineering refers to the management of coastal areas. In some jurisdictions, the terms like sea defense and coastal protection mean defense against flooding and erosion. Coastal defense is more traditional, but coastal management has become more popular as the field has involved techniques that allow erosion to scour land. Fig.1a-1 shows a photo of beach nourishment.

Fig.1a-1 Beach nourishment

Because construction engineering involves planning and execution, transportation of materials and site development based on hydraulic, environmental, structural and geotechnical engineering, construction firms tend to have higher business risk than other types of civil engineering firms. Thus, construction engineers often engage in more business-like transactions, such as drafting and reviewing contracts, evaluating

logistical operations, and monitoring prices of supplies. Fig.1a-2 shows a photo of students using measuring instruments.

Control engineering, a branch of civil engineering discipline that applies control theory to the expected design systems, uses sensors to measure the output performance of the device being controlled, so as to provide feedbacks for input actuators called automatic control (such as cruise control for regulating a car's speed) —a device designed to perform corrections without the need of manual inputs—to do correction for desired performance. Multidiscipline in nature, engineering activities of control systems focus on implementation of control systems which are mainly derived from mathematical modeling of a diverse range of systems. Fig.1a-3 shows a photo of the damper of control engineering in structure and Fig.1a-4 shows a photo of vibrating table test in XAUAT.

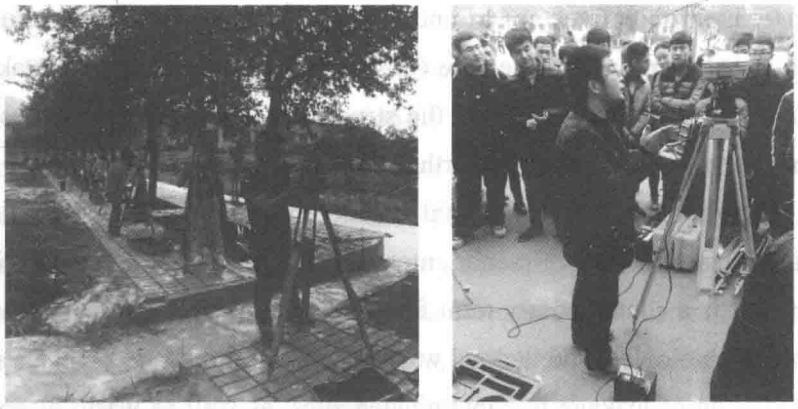

Fig.1a-2 Students are using measuring instruments

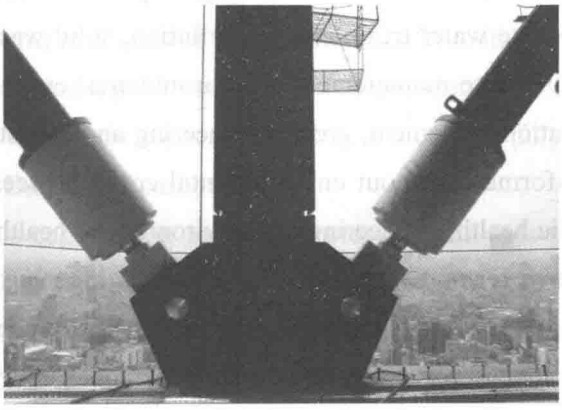

Fig.1a-3 Damper of control engineering in structure

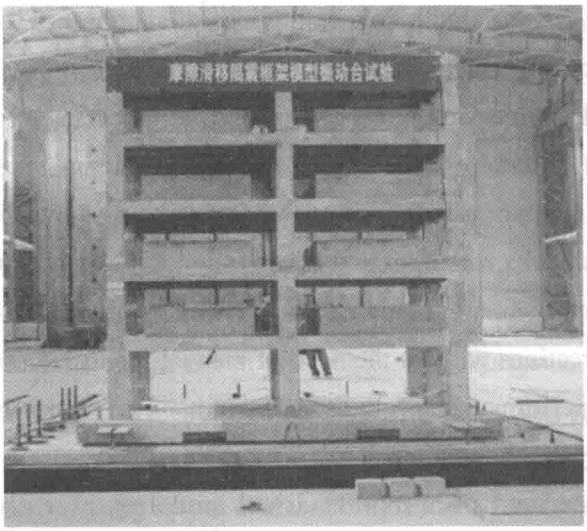

Fig.1a-4 Test on vibrating table in XAUAT

Earthquake engineering involves designing structures to resist hazardous earthquakes, and is a sub-discipline of structural engineering, whose main objectives are to understand the interaction of structures on the shaky ground, foresee the consequences of possible earthquakes, design, construct and maintain the structures as per building codes to stand the test of time when an earthquake takes place.

Traditionally, environmental engineering had not included much of the hazardous waste management and environmental remediation work. It is a contemporary term for sanitary engineering, dealing with chemical, biological and thermal wastes, purification of water and air and remediation of leakage in contaminated sites, as well as waste disposal and accidental contamination, and focusing on pollutant transport, water purification, waste water treatment, air pollution, solid waste treatment, and hazardous waste management. Environmental engineers need to consider pollution abatement, green engineering and industrial ecology, compiling information about environmental consequences of planned actions. Public health engineering and environmental health engineering are another two terms being used. Forensic engineering involves an investigation into materials, products, structures and components that fail to operate or function as expected, or cause personal injury or damage to property, as well as intellectual property claims, especially patents.

Generally, the purpose of the investigation is to locate the causes of failures, improve the performance or service life of components or assist a court in determining the facts of an accident. Meanwhile, forensic engineering conducts retracing processes and procedures leading to accidents during operation of vehicles or machinery for the resulting consequences which should be dealt with by the law of product liability, most commonly applied in civil law cases, although they may be used in criminal law cases.

Geotechnical engineering studies rock and soil, playing a supporting role in civil engineering systems, and its knowledge from the field of soil science, materials science, mechanics and hydraulics is applied to the designs of safe and economical foundations, retaining walls and other structures. In the meantime, geoenvironmental engineering has emerged by environmental efforts to protect groundwater and maintain landfills safely.

Boundary conditions are often well defined in other branches of civil engineering, but identification of soil properties is a challenge to geotechnical engineers. Unlike steel or concrete, the material properties and behaviors of soil are difficult to be predicted, due to its variability and limitation on investigation. Furthermore, soil shows nonlinear (stress-dependent) strength, rigidity and dilatability (volume change associated with the application of shear stress), which makes a comprehensive study of soil mechanics more difficult.

Materials science, closely related to civil engineering, studies fundamental characteristics of materials, and deals with ceramics such as concrete and mixed asphalt concrete and strong metals such as aluminum and steel, as well as thermosetting polymers including poly methyl meth acrylate (PMMA) and carbon fibers.

Materials engineering involves protection and prevention (paints and finishes). For example, alloying combines two types of metals to produce another metal with desired properties, incorporating elements of applied physics and chemistry. With recent media attention on nanotechnology, materials engineering as an important part of forensic