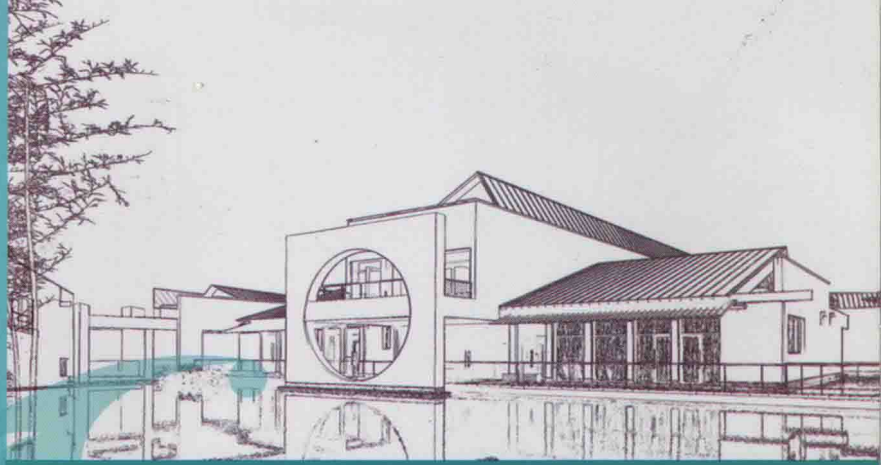

建筑工程专业英语

主编　郭　楠　王海鹏
主审　左宏亮

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前　言

在编写一本教材以前，一定要回答这样一个问题——这本教材到底有什么用？它的特点在哪？否则这本教材就会失去它存在的意义。

专业英语作为土木工程专业（建筑工程方向）的一门专业课，在土木工程领域不断国际化的今天，越来越起到关键的作用。在实际工程方面，大型设计和施工单位往往有很多国际项目，需要用专业英语进行合作与交流；在学术研究方面，参加国际学术会议、发表学术文章以及阅读国外文献等，均需要相应的专业英语知识。正因为如此，很多高校在招收研究生时，都将专业英语作为一门复试课程，足见其重要性。

本书共分15个单元，每个单元包括课文、疑难句注释、词语辨析、重点词汇、应用5个部分，并在全书的最后给出了每篇课文的参考译文。在课文的选择方面，注重与建筑工程专业主干课程的结合，其中包括土木工程历史、建筑材料、荷载与结构设计方法、混凝土结构、高层建筑结构、钢结构（高层钢结构及大跨钢结构）、预应力、砌体结构、组合结构、基础、地震作用、桥梁工程和土木工程施工等，几乎每篇课文就是建筑工程专业的一门主干课。课文难度适中，并对疑难句进行了注释，同时对一些容易混淆的词汇进行了辨析。结合课文内容，每个单元给出了20个重点词汇，这些词汇都是在每个方向上精挑细选出来的，是学生应该掌握的词汇。同时结合重点词汇，介绍了相应的专业知识和结构概念，旨在学习专业英语的同时，提高学生的专业素养。本着学以致用的原则，每个单元加入了应用部分，包括科技文献检索、专业英语翻译技巧、英文摘要写作等内容，以便为学生今后的学习和工作打下良好基础。

本书可作为本科教材，授课学时建议为32学时，教师可根据实际情况进行增删。同时本书也可作为专业技术人员学习专业英语的参考书。

本书的课文、词汇及翻译部分由郭楠编写，专业英语应用部分由王海鹏编写，书中部分绘图和文字整理工作由学生赵婷婷、林宜营完成，最后全书

由郭楠统稿定稿。东北林业大学土木工程学院左宏亮教授对本书的编写十分关心，并进行了审阅，提出了很多宝贵意见，在此谨致以诚挚的谢意。

本书是作者在进行两轮教学实践后的一个阶段性成果，虽然在授课过程中得到了学生的广泛认可，但由于时间紧，水平有限，书中的错误和不当之处在所难免，希望广大读者批评指正。

作 者

2011 年 10 月

目　录

Unit 1 The History of Civil Engineering

Text

Civil engineering is one of the most diverse **branches** of engineering. The civil engineer **plans**, designs, **constructs**, and **maintains** a large variety of structures and **facilities** for public, **commercial**, and industrial use. These structures include **residential**, office, and factory building; **highway**, railroads, airports, **tunnels**, bridges, **harbors**, **channels**, and **pipelines**. They also include many other facilities that are a part of the **transportation** systems of most countries, as well as **sewage** and waste **disposal** systems that add to our **convenience** and **safeguard** our health.

The **term** "civil engineer" did not **come into use** until about 1750, when John Smeaton (约翰·史密顿), the builder of the famous Eddystone lighthouse (艾迪斯通灯塔) near Plymouth (普利茅斯), England, is said to have begun calling himself a "civil engineer" to **distinguish** himself from the military engineers of his time. However, the profession of civil engineering is actually as old as **civilization**. (Fig. 1 – 1 The famous Eddystone lighthouse)

Engineering in **ancient civilizations** included the **construction** of bridges, **highways**, **canals**, **tunnels**, **irrigation** and **drainage** systems, water supplies, **docks**, and **harbors.** Some of the best – known works of early engineers and **architects** are the Great **Pyramid** (大金字塔, 胡夫金字塔) in Egypt (3 000 B. C.); King Solomon's temple (所罗门神殿) in Jerusalem (耶路撒冷) (about 1 000 B. C.) the Parthenon (帕台农神庙) in Greece (432 B. C.); the Colosseum (罗马大剧场) in Rome (80 A. D.); and Roman bridges, aqueducts and roads.

Babylonia and Assyria (巴比伦尼亚和阿西里亚) There is evidence that the Babylonians and Assyrians **struggled** with problems of **hydraulic** engineering involving dams, **levees**, and canals. They solved problems concerning the sides of right **triangles**, and they also solved simple algebraic (代数的) **equa-**

Fig. 1 – 1 The famous Eddystone lighthouse

tions. They computed areas of land, volumes of **masonry**, and cubic **contents** of **excavation** necessary for **canals**. The first organized road building was done in the Assyrian Empire, and the first bridge of technical importance was constructed over the Euphrates River (幼发拉底河) in the 6th century B. C. (Fig. 1 – 2 The canal and hanging garden of Babylon)

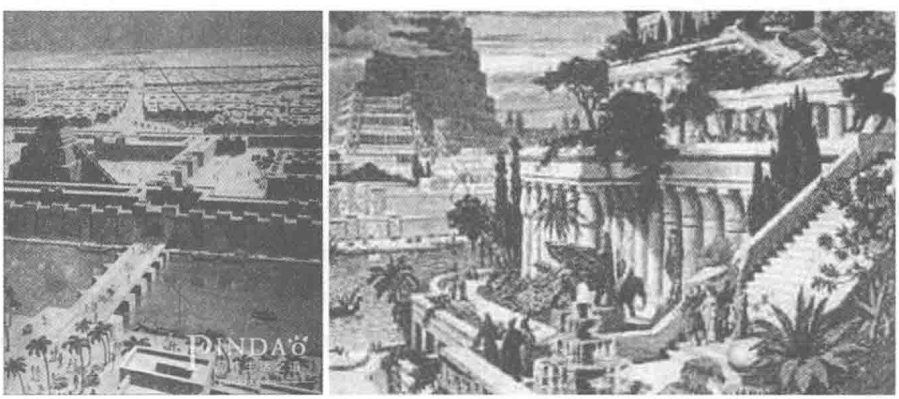

Fig. 1 – 2 The canal and hanging garden of Babylon

Egypt In ancient Egypt the simplest **mechanical principles** and **devices** were used to construct many temples and **pyramids** that are still standing,

including the Great **Pyramid** at Giza（吉萨，埃及北部城市）and the temple of Amon—ra（阿蒙—拉神庙，太阳神神庙）at Karnak（卡纳克）. The Great **Pyramid**, 146.6 meters high, is made of 2.25 million stone blocks having an average weight of more than 1.4 tons. Great numbers of men were used in the **construction** of such **monuments**. The Egyptians also made obelisks（方尖石塔）by cutting huge blocks of stone, some weighing as much as 900 tons. Cutting tools of hard bronze（青铜）were used. （Fig. 1－3 The Great Pyramid, the temple of Amon—ra and obelisk）

The Egyptians built causeways（堤道）and roads for transporting stone from the quarries（采石场）to the Nile（尼罗河）. The large blocks of stone that were **erected** by Egyptians were moved by using levers（杠杆）, inclined **planes**（斜坡）, rollers（辊子）, and sledges（雪橇）.

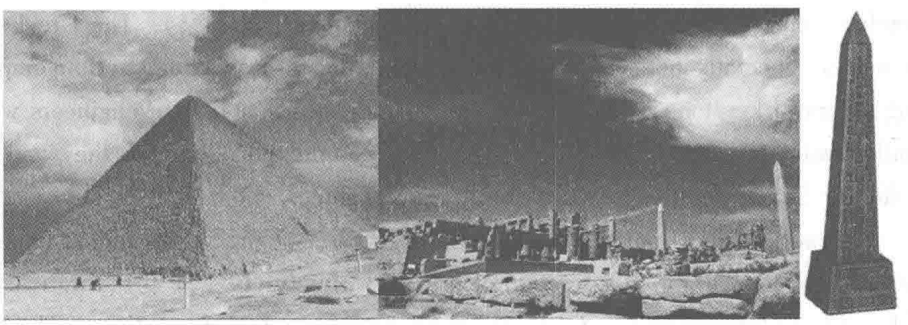

Fig. 1－3 The Great Pyramid, the temple of Amon－ra and obelisk

Greece The Egyptians were primarily interested in the know－how of **construction; they had very little interest in the theory of the why** －for of use. In contrast, the Greeks made great strides in introducing theory into engineering problems during the 6th to the 3rd centuries B. C. They developed an abstract knowledge of lines, angles, surfaces, and solids rather than referring to specific objects. The **geometric** base of Greek building construction included figures such as the **square**, **rectangle**, and **triangle.**

The Greek architekton（工长，希腊文）, was usually the designer, as well as the builder, of **architectural** and engineering masterpieces（杰作）. He was an **architect** and engineer. Craftsmen（工匠）, masons（泥瓦匠）, and sculptors（雕刻家）, worked under his supervision. In the classical period of Greece all important buildings were built of limestone（石灰石）or marble（大理石）; the Parthenon（Fig. 1－4 The Parthenon）, for example, was built of marble.

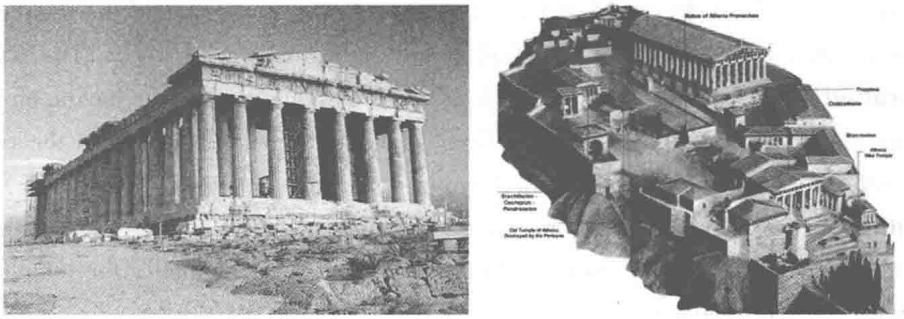

Fig. 1 - 4 The Parthenon

Rome In its heyday（全盛期）in the 2nd century A. D., Rome ruled the world from Scotland to Persia（波斯）. As the Romans **conquered** other nations, they borrowed their captives' ideas and practices, and the engineers of Rome are therefore considered developers rather than originators（发明家）. The Greek influence is especially noticeable. However, the Roman arch **construction** employing a central keystone（拱顶石）at the top indicates that Roman engineers were familiar with **masonry**（砌体，石块）under compression although they had no written or formal knowledge about equilibrium of forces.

The work of the Roman **architectus**（建筑师，拉丁语），technical expert, included the design and construction of bridges, **aqueducts**（沟渠），**highways**, and buildings for public use. Under the Romans the art of road building reached its highest level until modern times. Besides the Via Appia（阿皮亚大道），Romans also built **tunnels** for roadways, **aqueducts** and stone arch bridges that are still standing, and **harbors**, **docks**, and lighthouse.（Fig. 1 - 5 The Via Appia）

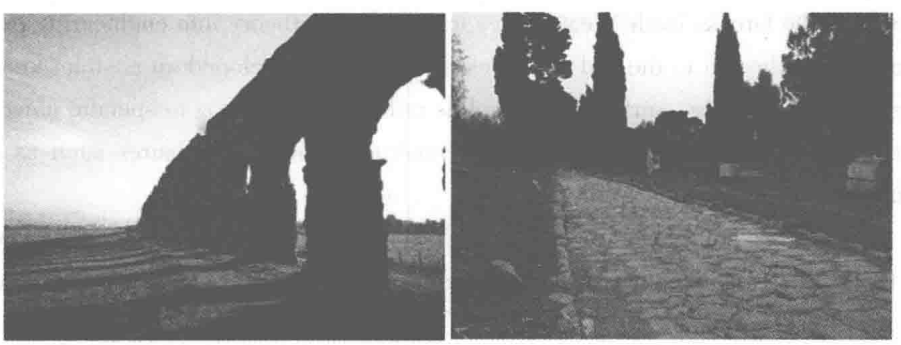

Fig. 1 - 5 The Via Appia

Medieval（中世纪的）and Renaissance（文艺复兴时期的）Europe

Bridges, cathedrals (大教堂), and castles were outstanding among the engineering works built during medieval times. **For the most part**, bridge building continued in the Roman **tradition**, using stone arches. Benezet (贝内泽) built the famous Pont St - Benezet (圣贝内泽桥) at Avignon (阿维尼翁, 法国东南部城市) on the Rhone River (罗纳河) during the period 1178 ~ 1188, and the Old London Bridge was built across the Thames (泰晤士河) in 1209. During the Renaissance, which began in the 15th century, there was little civil engineering because of the lack of demand for public works. (Fig. 1 - 6 The Pont St - Benezet at Avignon)

France The demands for public works, such as bridges, **canals**, roads, and water supplies, gradually became very great in Europe, particularly in France and England, as strong nations with centralized governments developed during the 17th and 18th centuries. The transition (转变) of the military engineer to **civilian pursuits** to satisfy these. Demands brought the engineer, and particularly the civil engineer, great **opportunities**. During this period, France was the leader in the development of engineering.

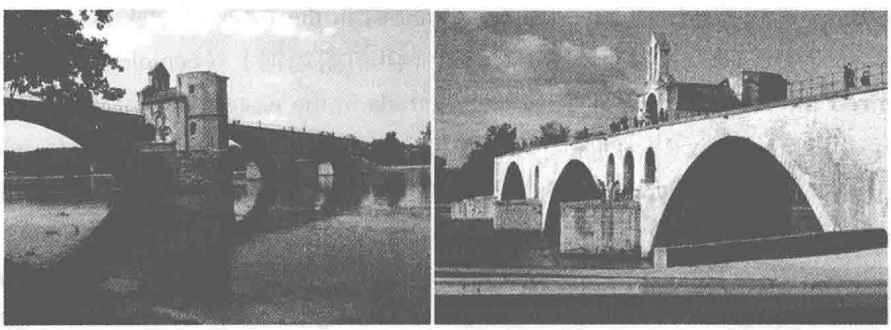

Fig. 1 - 6 The Pont St - Benezet at Avignon

Britain After the Napoleonic Wars (拿破仑战争), engineering leadership developed in Britain. The first **engineering technical** society, the **Institution** of Civil Engineers (土木工程师学会), was established in Britain in 1818, but it was not incorporated (纳入) by royal charter (皇家宪章) until 1828.

Civil engineering and **architecture** became **identified as** separate professions in about the middle of the 19th century. The **architect** was recognized for the **emphasis** he **placed on** aesthetic (美学的) aspects of design, while the civil engineer was developing more rationalized (合理化), scientific designs. **Tradition**, **intuition**, and **appearance**, which controlled the work of the **architect**, were of

secondary consideration to the engineer. (Fig. 1-7 The Old London Bridge)

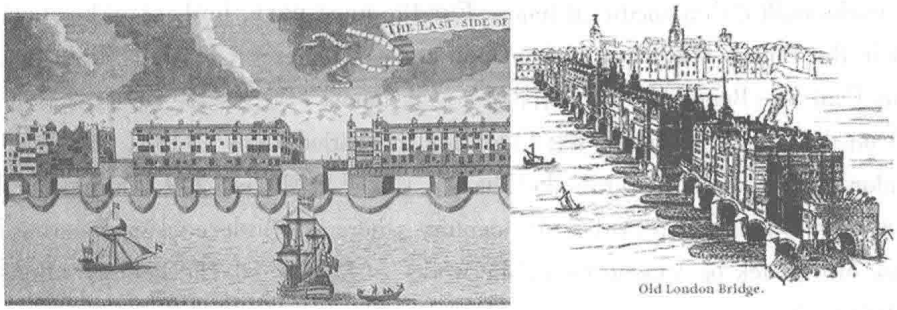

Fig. 1-7 The Old London Bridge

United States The age of engineering in the United States is considered to have begun with the founding of the **American Society of Civil Engineers** in 1852. It was the time of the opening of the West, and there was **tremendous activity** in surveying new region, developing water power, and building railroads and **canals**. Also, the discovery of rich mineral deposits (矿床) caused mining to become an important **activity**.

Many of the early engineering opportunities in the United States were for civil engineers. The success of the Erie **Canal** (伊利湖运河) (completed in 1825) **inspired** the **construction** of many other **canals** in the eastern part of the country. After a brief heyday (繁荣期), **canals** were largely displaced by railroads, starting with the completion of the Baltimore (巴尔的摩, 美国大西洋沿岸海港城市) and Ohio (俄亥俄州) Railroad in 1830. (Fig. 1-8 The Erie Canal)

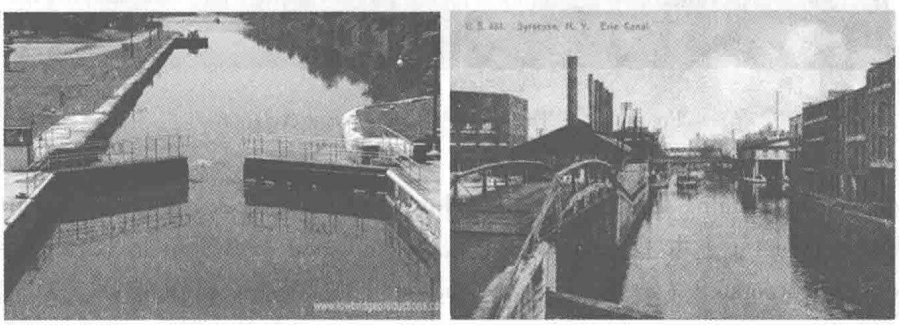

Fig. 1-8 The Erie Canal

The building of railroads employed the major portion of the trained civil engineers in the 19th century. However, it was not long until the demands of urban communities in need of water supplies, sanitation (卫生设施), and improved

roads and streets required much of the attention of civil engineers. Consulting firms of civil engineers organized to design municipal facilities (市政设施) throughout the fast - developing country.

Words and expressions

branch	分支	architect	建筑师
plan	规划,计划	aqueduct	沟渠
construction	施工,建造,建筑物	struggle	努力,奋斗
maintain	维修,维护	hydraulic	水利的
facility	设备,设施	levee	大堤
commercial	商业的	residential	住宅的
highway	公路	triangle	三角形
tunnel	隧道	equation	方程
harbor	海港	masonry	砌体,砌块,砌体结构
channel	海峡,水渠	content	容量
pipeline	(输油)管道,管线	excavation	挖掘,开挖
transportation	运输	mechanical	力学的,机械的
sewage	污水	principle	原则
disposal	处理	device	装置,设备
convenience	便利,方便	monument	纪念碑,标志性建筑
safeguard	保护,捍卫	erect	使……直立,安装,建立
term	术语,学期	geometric	几何学的
come into use	开始被使用	square	正方形
distinguish	区分,辨别	rectangle	矩形,长方形
civilization	文明,文化	conquer	攻克,征服
ancient	古老的,古代的	captive	战俘,囚徒
canal	运河	indicate	表明,显示出
irrigation	灌溉	for the most part	通常,大部分地
drainage	排水,污水	civilian	民用的,平民的

dock	码头	opportunity	机会
Pyramid	金字塔	engineering technical society	工程技术协会
institution	机构	appearance	外观,外表
identify as	把……看成	American Society of Civil Engineer	美国土木工程师学会
place emphasis on	注重,强调	tremendous	极大的,非常多的
tradition	传统,风俗	activity	活动,活力,热情
intuition	直觉	inspire	激励,激发
castle	城堡		

Notes

Sentence analysis

1. The term "civil engineer" did not come into use until about 1750, when John Smeaton, the builder of the famous Eddystone lighthouse near Plymouth, England, is said to have begun calling himself a "civil engineer" to distinguish himself from the military engineers of his time. 土木工程一词直至1750年才开始被使用，从那时起，著名的艾迪斯通灯塔的建造者约翰·史密顿称自己为一个"民用工程师"，以把自己从军事工程师的职业时期中区分出来。

这个句子是when引导的时间状语从句，the builder是John Smeaton的同位语，of the famous Eddystone lighthouse near Plymouth修饰the builder。

词组：come into use，得到使用；distinguish ...from ...区别于……

2. However, the Roman arch construction employing a central keystone at the top indicates that Roman engineers were familiar with masonry under compression although they had no written or formal knowledge about equilibrium of forces. 然而，罗马人在砌拱时设置拱顶石，表明罗马的工程师已经熟知砌体受压的事实，尽管他们没有书面或正式的关于力平衡的知识。

这个句子是that引导的宾语从句，that后面的成分是indicates的宾语。employing现在分词，所在的句子是indicates的主语。

词组：be familiar with ...对……熟悉。

Words analysis

1. road, street, highway 和 expressway 的区别

road 泛指公路；

street 城市中的街道；

highway 一级公路，国道 101；

expressway 高速公路，express 有表达、陈述的意思，但是也有快递的意思，做形容词还有特快的、高速的意思。

2. harbor, port 和 dock

harbor, port 和 dock 都有港口、码头的意思，区别如下。

harbor：天然的港湾或人工造的港，主要为渔业服务，着重于掩护船只，躲避风浪的作用。

port：通常指人工造的港，注重于船靠岸或航行终了卸货的地方，而且在背后有都市，特指商业港口。

dock 是指港口中的船坞：两个码头之间的或沿码头的水域用来容船装卸或修理等。

3. dam, levee

dam, levee 都有堤坝的意思，区别如下。

dam 指垂直于河流方向所建的堤坝，主要是为了控制水位、发电等。

levee 指沿着河两岸修建的堤坝，主要起防洪作用。

Key vocabulary

1. civil engineering 土木工程
2. geotechnical engineering 岩土工程
3. hydraulic engineering 水利工程
4. registered structural engineer, 1st grade 一级注册结构工程师
5. cost engineer 造价师
6. architecture 建筑学
7. registered architect 注册建筑师
8. urban planning 城市规划
9. traffic engineering (transportation engineering) 交通工程
10. environmental engineering 环境工程
11. engineering management 工程管理
12. survey 测量 v&n surveyor 测量员
13. tunnel 隧道
14. parking garage 停车场
15. retaining wall 挡土墙
16. residence 住宅
17. aqueduct 沟渠
18. supervision 监理
19. construction 施工，建筑，工程
20. project 项目

1. **civil engineering** 土木工程

我们所在的学科，最早叫工民建 industrial and civil construction，也就是工业与民用建筑；后来建筑的范畴扩大了，许多特种结构 special structure（烟囱、水塔等）也需要设计，专业名称就改为建筑工程 building engineering（construction engineering）；再后来，人们认为仅仅掌握一些结构的设计方法还是不够的，还应该了解桥梁、隧道等其他的土建工程，所以专业名称就改为了土木工程 civil engineering。我国的本科的学科划分：首先是学科门类，建筑工程专业属于工科；然后是一级学科，建筑工程专业属于土木工程；最后一级是二级学科，我们属于建筑工程。我国研究生的二级学科包括 structural engineering 结构工程，geotechnical engineering 岩土工程，engineering mechanics 工程力学，disaster prevention mitigation and protection engineering 防灾减灾与防护工程和 hydraulic engineering 水利工程。

2. **registered structural engineer，1st grade** 一级注册结构工程师

基础部分：毕业后 1 年就可以参加考试。专业部分：毕业 4 年可以参加考试。（荷载、钢混、钢结构、抗震、高层、砌体、木结构、地基基础、桥梁），也可以考 Construction engineer 建造师。

3. **cost engineer** 造价师

supervision engineer 监理工程师。

4. **architecture** 建筑学

建筑学专业比较偏向艺术，主要负责房屋的外观和功能设计。

5. **registered architect**，注册建筑师

注册建筑师目前市场价值在 10 万元/年。

6. **urban planning** 城市规划

plan 是计划的意思，在土木工程专业英语中常表示“规划”。

7. **traffic engineering**（**transportation engineering**）交通工程

交通工程又包括 road engineering 道路工程和 bridge engineering 桥梁工程。

8. **environmental engineering** 环境工程

环境工程包括 water supply and drainage 给排水，HVAC：heating ventilation air conditioning 暖通空调，gas engineering 燃气工程。

9. **tunnel** 隧道

海底隧道 subsea tunnel，目前美国和俄罗斯打算在白令海峡建世界上最长的隧道，叫 **worldlink**，连接世界，隧道长 103 km，连接欧亚大陆和美洲大陆，途经 2 个小岛，包括 1 条高速铁路、1 条高速公路、多条输油管道，

预计耗资约660亿美元。这条海底隧道修好以后，人们就可选择坐火车从北京去纽约了。我国目前在建的最长的海底隧道是连接深圳和香港的狮子洋海底隧道，这段隧道属于广州、深圳、香港高速铁路的一部分，隧道全长10.8 km，预计造价是201亿港元。

10. **parking garage** 停车场

现在的停车场一般多建于地下，而且多采用板－柱结构。

11. **retaining wall** 挡土墙

是支持土体、保持土体稳定、使土体不致坍塌的构筑物。

12. **aqueduct** 沟渠，高架渠

设计用于从远地水源输水的管道或通道，通常通过重力（输送），高架渠是指输水道或水渠经河面或低地时起支撑作用的桥状结构物。channel 指海峡，水道，也有沟渠的意思；这两个词的区别是，aqueduct 主要用于灌溉，而且还有高架渠的意思，channel 主要指水道，强调运输方面。

13. **supervision** 监理

supervisor 监理员，supervision engineer 监理工程师。

14. **construction** 施工，建筑，工程

construction complete 建造完成，construction engineer 建造师。

Application part

专业英语特点

1. 语言和语法特点

专业英语和普通英语不是泾渭分明的，但是专业英语的表达有别于普通英语的表达。下面看几组句子，体会专业英语和普通英语在表达习惯上的差异。

①The first bridge of technical importance was constructed in the Assyrian Empire.

②The first bridge was constructed in the Assyrian Empire.

第一个句子更接近于专业英语的表达习惯。这句话应该这样翻译：亚述王国修建了第一座技术含量较高的桥梁。从这两个句子里我们可以看到专业英语应该是比较准确和严谨的。第一个句子用“technical importance”来修饰“the first bridge”，更为准确地说明了桥的情况。

①Our engineer will be sent to site when you need our help.

②Our engineer will be sent to site when needed.

第二个句子更接近于专业英语的表达习惯。这句话译为：如果需要，我