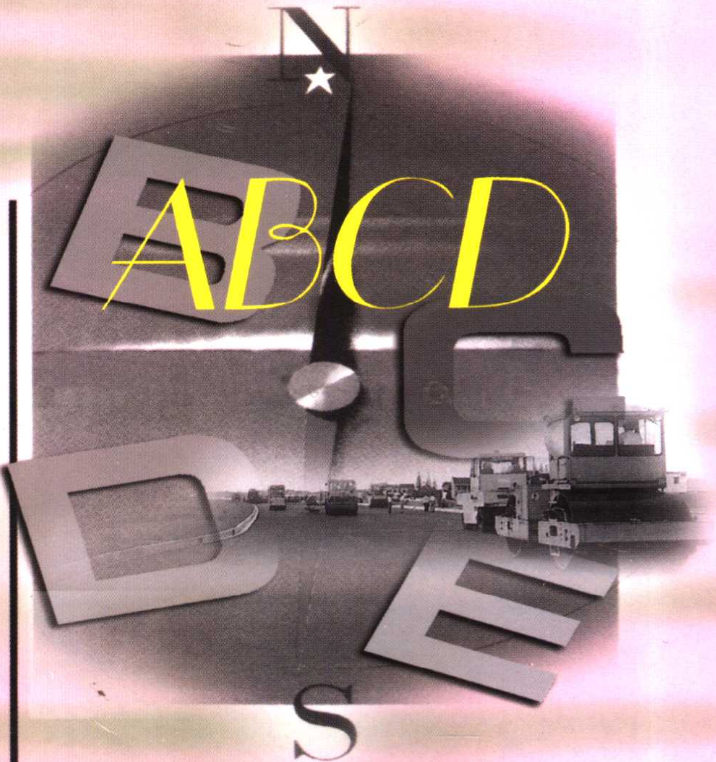
面向21世纪 交通版

交通高等职业技术教育教材

道路工程专业英语

薛廷河　主编
李　强　主审



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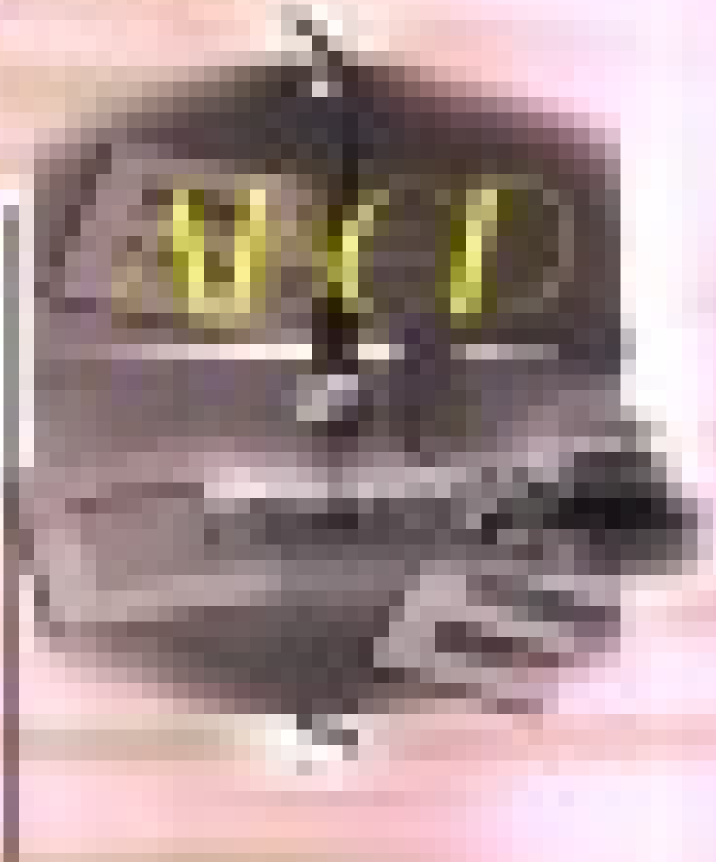

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Daolu Gongcheng Zhuanye Yingyu

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内 容 提 要

本书为面向21世纪交通版高等职业技术教育教材分四大部分，共17个单元，两个附录。第一部分为专业基础内容，涉及建材、测量、公路CAD技术、工程管理(合同)等方面；第二部分为道路与交通工程方面的内容；第三部分为桥梁与隧道工程内容；第四部分为全书各单元课文和阅读材料的生词、短语汇总表及常用的路桥工程专业术语汇编。所选课文和阅读材料大部分取自近年来的英文书刊，内容基本涵盖了道路与桥梁施工、设计和管理等各环节；每单元包括课文和阅读材料两大部分，每篇课文后附有一定量的习题。

本书适合于高等职业技术教育路桥、检测、监理、养护和管理及其它土建类专业英语教材，同时可供交通中等职业教育土建类专业师生及各类干部培训学习，也可作为有关专业技术人员进一步提高专业英语阅读、翻译水平的参考读物。

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前　言

当代信息社会，科技人才应当具备以下基本素质：坚实的专业知识、熟练的计算机应用和良好的外（英）语水平。因此，学好外语，尤其与本专业相关的知识内容，对及时掌握学科发展动态、了解最新技术、加强国际间的信息和学术交流，是十分重要的。特别是中国加入 WTO 以后，社会对人才的需求发生了变化，既要有高层次的科技人才，又需要各类应用型的专业人材。英语作为世界上应用最广泛的语言，正在发挥着越来越重要的作用。今后，我国同世界各国之间的人员往来、学术交流、信息传播、经济活动以及工程承包等业务日益频繁，作为新形势下的高职高专学生，应具备专业英语阅读和文献翻译的初步能力，以提高阅读翻译文献资料的质量和速度。这本《道路工程专业英语》教材正是在这一形势下，根据 2001 年 7 月路桥工程学科委员会高职教材建设联络组昆明会议精神，针对目前路桥专业高职教材匮乏的现状，抱着科学性、先进性、实用性的原则而编写完成的。

《道路工程专业英语》教材主要体现高职高专的特色，力求课文内容丰富、条理清晰，难度适中，习题新颖。在选材上注重工程实际和具体应用性，同时以适当的篇幅简单介绍设计、科研与理论。这样既考虑了高职学生应用操作性强的特点，又适当的考虑了基本理论这一更高层次的学习，使高职学生能进一步的适应社会发展的需要。同时，内容大多取材于近年出版的英文原版刊物，既有相当的知识性，又有一定的趣味性，这样既培养了学生学习的积极性，又能帮助学生了解国外同类专业最新技术的应用和发展动态。本书可适用于 50～80 学时的教学安排，在使用时应根据教学计划及学时情况灵活掌握，选择其中部分内容进行教学。

本教材分四大部分，第一部分为专业基础内容，共六单元，涉及到建材、测量、公路 CAD 技术、工程管理（合同）等方面；第二部分为道路与交通工程方面的内容，共六单元；第三部分为桥梁与隧道工程内容，共五单元；第四部分为全书各单元生词、短语汇总表及路桥工程专业术语汇编。本书既有丰富的专业词汇，又注重了文章的实用性、生动性，内容基本覆盖了道路与桥梁施工、设计、管理等各环节，同时以适当的篇幅介绍一些国外的新技术、新工艺（大部分编排于阅读材料中）。

本书由安徽交通职业技术学院李强主审，参加审定的还有内蒙古大学职业技术学院柴金义、烟台师范学院交通学院牟爱鹏、吉林交通职业技术学院祝海燕等。

本书由浙江交通职业技术学院薛廷河主编。具体参加编写人员：浙江交通职业技术学院薛廷河（第 3、4、5、6、7、8、14、17 单元），吴颖峰（第 1、2、9、10 单元），张征文（第 13、15、16 单元），童跃帜（第 11、12 单元，Appendix II）。

本教材引用和参考了大量的专业文献资料，在此对其作者表示最诚挚的谢意。

本教材在编写过程中，还得到了人民交通出版社卢仲贤和浙江交通职业技术学院金仲秋的指导和帮助，谨致以衷心的感谢。同时感谢王霞编辑和梁仕华、张义和等在本书的编写与出版过程中对部分资料的整理和校对所付出的辛勤劳动。

由于编写时间仓促，难免有错误和不完善之处，恳请读者批评指正。

编　者

2002 年 4 月

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Part I

Unit 1

Text

Civil Engineering

Civil engineering, the oldest of the engineering specialties, is the planning, design, construction, and management of the built environment. This environment includes all structures built according to scientific principles, from irrigation and drainage systems to rocket-launching facilities.

Civil engineers build roads, bridges, tunnels, dams, harbors, power plants, water and sewage systems, hospitals, schools, mass transit, and other public facilities essential to modern society and large population concentrations. They also build privately owned facilities such as airports, railroads, pipelines, skyscrapers, and other large structures designed for industrial, commercial, or residential use. In addition, civil engineers plan, design, and build complete cities and towns, and more recently have been planning and designing space platforms to house self-contained communities.

The word civil derives from the Latin for citizen. In 1782, Englishman John Smeaton used the term to differentiate his nonmilitary engineering work from that of the military engineers who predominated at the time. Since then, the term civil engineering has often been used to refer to engineers who build public facilities, although the field is much broader.

Scope. Because it is so broad, civil engineering is subdivided into a number of technical specialties. Depending on the type of project, the skills of many kinds of civil engineer specialists may be needed. When a project begins, the site is surveyed and mapped by civil engineers who locate utility placement-water, sewer, and power lines. Geotechnical specialists perform soil experiments to determine if the earth can bear the weight of the project. Environmental specialists study the project's impact on the local area: the potential for air and groundwater pollution, the project's impact on local animal and plant life, and how the project can be designed to meet government requirements aimed at protecting the environment. Transportation specialists determine what kind of facilities are needed to ease the burden on local roads and other transportation networks that will result from the completed project. Meanwhile, structural specialists use preliminary data to make detailed designs, plans, and specifications for the project. Supervising and coordinating the work of these civil engineer specialists, from beginning to end of the project, are the construction management specialists. Based on information supplied by the other specialists, construction management civil engineers estimate quantities and costs of materials and labor, schedule all work, order materials and equipment for the job, hire contractors and subcontractors, and perform other supervisory work to ensure the project is completed on time and as specified.

Throughout any given project, civil engineers make extensive use of computers. Computers are used to design the project's various elements (computer-aided design, or CAD) and to manage it. Computers are a necessity for the modern civil engineer because they permit the engineer to efficiently handle the large quantities of data needed in determining the best way to construct a project.

Structural engineering. In this speciality, civil engineers plan and design structures of all types, including bridges, dams, power plants, supports for equipment, special structures for offshore projects, the United States space program, transmission towers, giant astronomical and radio telescopes, and many other kinds of projects. Using computers, structural engineers determine the forces a structure must resist: its own weight, wind and hurricane forces, temperature changes that expand or contract construction materials, and earthquakes. They also determine the combination of appropriate materials: steel, concrete, plastic, stone, asphalt, brick, aluminum, or other construction materials.

Water resources engineering. Civil engineers in this specialty deal with all aspects of the physical control of water. Their projects help prevent floods, supply water for cities and for irrigation, manage and control rivers and water runoff, and maintain beaches and other waterfront facilities. In addition, they design and maintain harbors, canals, and locks, build huge hydroelectric dams and smaller dams and water impoundments of all kinds, help design offshore structures, and determine the location of structures affecting navigation.

Geotechnical engineering. Civil engineers who specialize in this field analyze the properties of soils and rocks that support structures and affect structural behavior. They evaluate and work to minimize the potential settlement of buildings and other structures that stems from the pressure of their weight on the earth. These engineers also evaluate and determine how to strengthen the stability of slopes and fills and how to protect structures against earthquakes and the effects of groundwater.

Environmental engineering. In this branch of engineering, civil engineers design, build, and supervise systems to provide safe drinking water and to prevent and control pollution of water supplies, both on the surface and underground. They also design, build, and supervise projects to control or eliminate pollution of the land and air. These engineers build water and wastewater treatment plants, and design air scrubbers and other devices to minimize or eliminate air pollution caused by industrial processes, incineration, or other smoke-producing activities. They also work to control toxic and hazardous wastes through the construction of special dump sites or the neutralizing of toxic and hazardous substances. In addition, the engineers design and manage sanitary landfills to prevent pollution of surrouding land.

Transportation engineering. Civil engineers working in this specialty build facilities to ensure safe and efficient movement of both people and goods. They specialize in designing and maintaining all types of transportation facilities, highways and streets, mass transit systems, railroads and airfields, ports and harbors. Transportation engineers apply technological knowledge as well as consideration of the economic, political, and social factors in designing each project. They work closely with urban planners, since the quality of the community is directly related to the quality of the transportation system.

Pipeline engineering. In this branch of civil engineering, engineers build pipelines and related facilities which transport liquids, gases, or solids ranging from coal slurries (mixed coal and water) and semiliquid wastes, to water, oil, and various types of highly combustible and noncombustible gases. The engineers determine pipeline design, the economic and environmental impact of a project on regions it must traverse, the type of materials to be used-steel, concrete, plastic, or combinations of various materials-installation techniques, methods for testing pipeline strength, and controls for maintaining proper pressure and rate of flow of materials being transported. When hazardous materials are being carried, safety is a major consideration as well.

Construction engineering. Civil engineers in this field oversee the construction of a project from beginning to end. Sometimes called project engineers, they apply both technical and managerial skills, including knowledge of construction methods, planning, organizing, financing, and operating construction projects. They coordinate the activities of virtually everyone engaged in the work: the surveyors; workers who lay out and construct the temporary roads and ramps, excavate for the foundation, build the forms and pour the concrete; and workers who build the steel framework. These engineers also make regular progress reports to the owners of the structure.

Community and urban planning. Those engaged in this area of civil engineering may plan and develop communities within a city, or entire cities. Such planning involves far more than engineering consideration; environmental, social, and economic factors in the use and development of land and natural resources are also key elements. These civil engineers coordinate planning of public works along with private development. They evaluate the kinds of facilities needed, including streets and highways, public transportation systems, airports, port facilities, water-supply and wastewater-disposal systems, public buildings, parks, and recreational and other facilities to ensure social and economic as well as environmental well-being.

Photogrametry, surveying, and mapping. The civil engineers in this specialty precisely measure the Earth's surface to obtain reliable information for locating and designing engineering projects. This practice often involves high-technology methods such as satellite and aerial surveying, and computer-processing of photographic imagery. Radio signals from satellites, scans by laser and sonic beams, are converted to maps to provide far more accurate measurements for boring tunnels, building highways and dams, plotting flood control and irrigation projects, locating subsurface geologic formations that may affect a construction project, and a host of other building uses.

New Words and Expressions

term[tə:m]　　*n.* 术语

predominate [priˈdɔmineit]	v. 居支配地位,(数量上)占优势
geotechnical[ˌdʒi(:)əuˈteknikəl]	a. 岩土工程的
specification [ˌspesifiˈkeiʃən]	n. 技术规范,说明书
supervise [ˈsju:pəvaiz]	v. 监督,管理,控制
subcontractor [ˌsʌbkənˈtræktə]	n. 转包合同,转包商,次承包者
hurricane [ˈhʌrikən]	n. 飓风
asphalt [ˈæsfælt]	n. 地沥青
aluminum [əˈlju:minəm]	n. 铝
lock [lɔk]	n. 水闸,闸门
fill [fil]	n. 填土,填方
scrubber [ˈskrʌbə]	n. 洗涤器,涤气器,滤清器
incineration [inˌsinəˈreiʃən]	n. 烧尽,焚化
toxic [ˈtɔksik]	a. 有毒(性)的,中毒的
combustible [kəmˈbʌstəbl]	a. 易燃的,可燃的
ramp [ræmp]	n. 斜坡,斜面,滑行台
excavate [ˈekskəveit]	v. 挖掘,开凿,挖出,挖空
precisely [priˈsaisli]	ad. 精确地,正好
aerial [ˈɛəriəl]	a. 空气的,航空的,架空的
sonic [ˈsɔnik]	a. 声音的,音速的,利用音波的
plotting [ˈplɔtiŋ]	n. 测绘,标图
municipal [mju(:)ˈnisipəl]	a. 市政的,市立的,地方自治的
commission [kəˈmiʃən]	n. 委任,委托(事项),委员会
runoff [ˈrʌnˌɔf]	n. 雨量,流量,超高缓和段
drainage system	排水系统

Exercises

Ⅰ. Answer the following questions in English.

1. What is the main idea of the seventh paragraph?
2. What is the oldest of the engineering specialities?
3. Why is civil engineering subdivided into a number of technical specialties?
4. In which specialty,civil engineers deal with all aspects of the physical control of water?
5. When does safety become a major consideration?

Ⅱ. Fill in the blanks with phrases and expressions from the list,changing forms when necessary.

survey	technological	preliminary	asphalt
aluminum	subdivide	oversee	high-technology

1. When a project begins,the site is ________ and mapped by civil engineers who locate utility placement-water,sewer,and power lines.
2. Transportation engineers apply ________ knowledge as well as consideration of the

economic, political, and social factors in designing each project.

3. This practice often involves ________ methods such as satellite and aerial surveying, and computer-processing of photographic imagery.
4. Because it is so broad, civil engineering is ________ into a number of technical specialties.
5. Structural specialists use ________ data to make detailed designs, plans, and specifications for the project.
6. Civil engineers in this field ________ the construction of a project from beginning to end.
7. They also determine the combination of appropriate materials: steel, concrete, plastic, stone, ________, brick, ________, or other construction materials.

Ⅲ. Translate the following sentences into Chinese.

Many civil engineers choose careers that eventually lead to management. Others are able to start their careers in management positions. The civil engineer-manager combines technical knowledge with an ability to organize and coordinate worker power, materials, machinery, and money. These engineers may work in government-municipal, county, state, or federal.

Ⅳ. Translate the following sentences into English.

1. 单词“civil”来源于拉丁语中的公民一词。
2. 在所有工程项目的设计过程中，计算机得到了广泛的应用。
3. 环境工程师对工程进行设计、施工、监理，以控制或消除对大地与空气的污染。

Reading Material

Design Strategies and Traffic Control

For years, the design team grappled with the same constraints that the contractors are now facing. The dilemma: how to build a wider roadway while avoiding side-hill cuts and fills that, in many cases, were impossible anyway because of the steep terrain (There are places where the cliffs actually overhang the bottom of the canyon).

The answer was a terraced arrangement with the westbound roadway higher than the eastbound. Just for good measure, a concrete bikeway had to be installed along the entire length. In places, this is cantilevered from the lower retaining walls.

Typically, the pavement slabs in both directions overhang the face of the retaining wall by 6 ft. Precast double-tee retaining wall segments, 10 ft wide, are placed onto a continuous reinforced footing. After being leveled and bolted into place, they are post-tensioned by means of threaded rods that had been cast into the footing and inserted through ducts cast into the stems of the tees.

Pavement slabs are constructed in 200 ft lengths with diagonal joints. Ducts for post-tensioning strands or rods are then placed parallel to the joints in a crisscross pattern. This allows two-way post-tensioning with all stressing taking place along one edge of the slab. The advantage is the adjacent slab can be poured before the previous one is post-tensioned. This design has performed well under traffic in a section that was completed several years ago, and people seem to like the way it looks.

There are places, however, that do require excavation on the uphill side. Retaining walls here are concrete panels held in place by soil anchors. Unsuitable geologic conditions have presented other problems. These vary from unstable talus with large voids to deep clay deposits where embankments have settled about 2 ft.

Because the precast systems could not tolerate differential settlement, the designers began a program of experimental and phased construction that has evolved into a standard two-phase operation. Various types of flexible retaining walls-fabric, wire mesh and earth reinforced systems-have been installed. After primary consolidation, most settled just as predicted.

Constructing bridge piers and abutments on loose talus was quite another matter. Voids could collapse when superstructure loads were transferred to the foundation. Since deep foundations had been ruled out by economic and ecology considerations, the talus was stabilized so that spread footings could be used. This was done by injecting a cement grout mixture at high pressure into the talus at the bridge foundation locations to create a homogenous concrete mass.

This method also proved effective in an emergency at a spot where no such settlement had been expected. The abutment of a cast in place box girder bridge settled soon after the falsework was removed, and the superstructure had to be jacked in order to relieve supercritical stresses. Immediate grouting stopped the subsidence, all settlement ceased and no further problems were encountered with the structure.

The 39 bridges vary from less than 100 ft to more than 7,000 ft for a total of some 6 miles. Where there is sufficient space to stockpile materials, cast-in-place box girder bridges are built. Space is a luxury, however, so the emphasis is on prefabricated superstructures. Several segmental box girder bridges are already carrying traffic, and one steel box girder bridge is now under construction. Future bridges are being designed as steel and concrete alternates.

The traffic control solution is also an innovative milestone. From the start, state officials knew that with many contractors strung along the cramped, narrow site and travelers with no other route west or east, traffic coordination and management were a prime concern. The worst crunch came in 1984, when the high runoff threatened to flood the canyon. Temporary flood controls had to be constructed, and even under these emergency conditions it took more than 1.5 hours to clear all vehicles from the canyon.

This incident prompted the state to put all traffic control in the hands of its management consultant, DMJM, which devised a coordinated program of flagging, radio communication and having a one-way pilot car leading cars through the intensive construction activity.

"Our concern was to create an overall traffic control system rather than leaving it up to the individual contractors," Trapani says. "We call the pilot car drivers 'traffic controllers' because they have to make minute by minute decisions about moving equipment on and off lanes. They also have to deal with emergencies."

The pilot car traffic operation was tested successfully early in 1985 on a 3.6 mile segment. It minimized the number of stoppages, gave contractors predictable times during which they were free to use the entire roadway platform, virtually eliminated random stopping or parking, and reduced the possibility of conflicts between motorists and contractors. During the summer, the one-lane pilot car queue became so efficient that even during peak traffic periods the roadway never had to be opened to two-lane traffic during periods designated for one-lane operation.

A radio communication network (using RM high band as well as CB frequencies) linked the pilot cars, all traffic control supervisors, CDOH construction field offices and key district personnel, plus operators of the Shoshone Power Plant, whose personnel commuted through the construction site, and the State Highway Patrol.

At first, planners expected that contractors' vehicles and equipment would join the one-way traffic queue. But the new control system allows contractors to use the free lane adjacent to the waiting queue and also the single auto travel lane between queues. This requires close coordination by well trained traffic controllers who, in effect, make contract administration decisions constantly on behalf of the state.

The fact that these controllers are hired and managed by DMJM instead of by the individual contractors is what makes the operation unique. For 1986, the full traffic control management plan will be directed by a traffic coordinator and an assistant who, while direct employees of DMJM, will act as extended staff of CDOH. They will recruit, train and manage all personnel.

Traffic management support personnel, while not direct employees of DMJM, will be managed by the firm but supplied by a lease-labor service organization.

Advantages of the plan are clear delineation of responsibilities between the state and individual contractors, and reduced contractor claims, more professional personnel, and lower costs. By including the professional services under the DMJM management consultant contract, the state is protected by the firm's insurance policies and other protective terms of the existing contract. The state, on the other hand, has well trained support personnel (flaggers, etc.) who earn the same salaries as they did before but at considerably reduced overheads.

Construction of I-70 through Glenwood Canyon is now 24% complete. More than 35 separate construction contracts will have been awarded before the entire project is completed in 1993, and costs are expected to be about $330 million.

New Words and Expressions

grapple ['græpl] *v.* 格斗

contractor [kən'træktə] *n.* 订约人，承包人

overhang ['əuvə'hæŋ] *v.* 悬于…之上，悬垂

canyon ['kænjən] *n.* 峡谷，溪谷

cantilever ['kæntiliːvə] *v.* 使…伸出悬臂

n. 悬臂

duct [dʌkt] n. 管,输送管

diagonal [dai'ægənl] a. 斜的,斜纹的,对角线的

geologic [dʒiə'lɔdʒik] a. 地质(学)的

ecology [i(:)'kɔlədʒi] n. 生态学,环境适应学,均衡系统

homogenous [hə'mɔdʒinəs] a. 同质的,纯系的

abutment [ə'bʌtmənt] n. 桥台;拱座

falsework ['fɔ:lswə:k] n. 脚手架,工作架,临时支架

superstructure ['sju:pəˌstrʌktʃə] n. 上部构造,上层建筑

grout [graut] n. 水泥浆

vt. 用薄泥浆填塞

subsidence ['sʌbsidəns] n. 沉降,沉陷

prefabricate ['pri:'fæbrikeit] v. 预制

innovative ['inəuveitiv] a. 创新的,革新(主义)的

milestone ['mailstəun] n. 里程碑,转折点

cramp [kræmp] v. 限制在狭窄的范围内

designate ['dezigneit] v. 指定,指明,任命

patrol [pə'trəul] n. 巡逻

side-hill 山坡,山边,山侧

westbound 向西行进的

eastbound 向东行进的

double-tee 双 T 形

post-tension 后张

crisscross pattern 十字形

retaining wall 挡土墙