

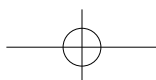


# Unit 1

## Introduction to civil engineering

### In this unit, you will learn:

- **Subject-related knowledge:** The mission of civil engineering  
Engineering wonders of the modern world
- **Academic skill:** Searching for information
- **Reading strategy:** Dealing with unknown words (Part I)





# Section A

## Pre-reading

Civil engineering helps people shape the world. Discuss the following questions in groups.

1. Can you name any civil engineering wonders, ancient or modern?
2. Can you name any of the most famous civil engineers the world has ever known?
3. How much do you know about the branches of civil engineering?

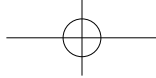


- <sup>1</sup> Civil engineering is arguably the oldest and broadest engineering discipline among all the engineering fields. It deals with the planning, designing, constructing and maintaining of buildings and various other structures. From huge dams to sky-high buildings, from suspension bridges to offshore drilling platforms, many physical concrete structures come under civil engineering.

### Civil engineering then and now

- <sup>2</sup> The history of civil engineering can be traced back to ancient times when the sole means of construction was human labor, lacking any sophisticated equipment. Ancient civil engineering projects include the Roman public baths, the Mayan ruins at Copan, Palenque and Tikal, and the cliff dwellings at Mesa Verde.





# What is civil engineering?

Text A

- 3 Many early civilizations built monuments to their rulers or gods. These may have been simple mounds or truly remarkable achievements, such as the Pyramids of Giza whose construction by pre-industrial societies remains mysterious. The names of the engineers who designed these wonders are lost in antiquity.
- 4 Nowadays, we often associate civil engineering with the world's most jaw-dropping structures. These include the Brooklyn Bridge, Hoover Dam, the Panama Canal, the Golden Gate Bridge, and the Eiffel Tower.
- 5 But civil engineering isn't all about designing fancy buildings – it's also about maintaining and adapting the infrastructure that we depend on every day, such as roads, railways and bridges, energy and water supply, waste networks and flood defenses. Civil engineers have to keep this infrastructure running effectively and adapt it to meet challenges, such as population growth, climate change and natural disasters. They literally shape the world we live in.





### **Branches of civil engineering**

- 6 Civil engineering is arguably the most diverse field of all the engineering branches. As the population of the world increases and the technology becomes more advanced, the need for better infrastructure increases around the world. In order to manage the construction process in each sector, the field of civil engineering has been divided into various sub-disciplines on the basis of applications. Some of the main branches are introduced below.
- 7 **Structural engineering:** It is the field of engineering particularly concerned with the design of load-bearing structures. The load acting on a structure is ultimately transferred to ground. In doing so, various components of the structure are subjected to internal stresses. For example, in a building, the load acting on a slab is transferred by the slab to ground through beams, columns and footings. Structural engineers identify the loads that act on the structures as well as stresses that are created by the loads, and then design structures that can withstand the loads. Structures should remain stable and secure throughout their use and at the same time, be economical and fulfill the desired functions.
- 8 **Geotechnical engineering:** Geotechnical engineering is the branch of engineering dealing with the analysis, design and construction of foundations, slopes, retaining structures and other systems that are made of or are supported by soil or rock. Technical information obtained from the sciences of geology, material testing, and hydraulics is applied in the design of foundations and structures to ensure safety and economy of construction.
- 9 **Water resources engineering:** This discipline involves the design and operation of systems to control and utilize water, the design of urban storm-sewer systems, dams and breakwaters, the management of water supplies and waterways, erosion and flood protection. The fields of hydrology, geology, and environmental science are included in this discipline of civil engineering.
- 10 **Transportation engineering:** It provides for the safe, efficient and convenient movement of people, goods and services by planning, constructing, and maintaining road, rail, air and public transit systems. The transportation



infrastructure should ensure mobility and accessibility for all segments of society while promoting socially desirable land use.

- 11 **Environmental engineering:** Environmental engineering aims to improve the environment and deals with constructing structures that have a low impact on the environment. Some of its applications include purifying the contaminated air and water, managing the waste, and protecting the marine environment.
- 12 **Other disciplines:** Some of the other disciplines included in civil engineering are coastal engineering, construction engineering, earthquake engineering, materials science, and surveying.

#### **The role of civil engineers**

- 13 Civil engineers can be involved in nearly every stage of a construction project, which includes site selection, writing specifications for processes and materials, reviewing bids from subcontractors, ensuring compliance with building codes, supervising all phases of construction from grading and earthmoving to painting and finishing, as well as the maintenance of the finished projects.
- 14 All civil engineers are required to be innovative and logical individuals. Other essential attributes civil engineers need include: creativity, versatility, a problem-solving mind, and the ability to understand the bigger picture and to collaborate with a number of other professionals.

#### **The future of civil engineering**

- 15 From the ancient simple mounds to the skyscrapers today, the world has witnessed immense advancement in the field of civil engineering. The future of civil engineering is expected to be further revolutionized by the new technologies including design software, GPS, GIS and other latest technical expertise in varied fields.





## New words and expressions

**sophisticated** /sə'fɪstɪkətɪd/ *adj.*  
complicated and refined 精良的

**mound** /maʊnd/ *n.*  
a structure consisting of an artificial heap usually of earth or stones 土(石)堆

**antiquity** /æn'tɪkwətɪ/ *n.*  
the state of being very old 年代久远

**jaw-dropping** /'dʒɔːdrɒpɪŋ/ *adj.*  
extremely surprising 极度令人惊讶的

**load-bearing** /'ləʊd'beərɪŋ/ *adj.* 承重的

**slab** /slæb/ *n.*  
a thick flat piece of a hard material 厚板

**beam** /bi:m/ *n.*  
a long heavy piece of wood or metal used in building houses, bridges, etc. 梁

**column** /'kɒləm/ *n.*  
a tall solid upright stone post used to support a building or as a decoration 柱

**footing** /'fʊtɪŋ/ *n.*  
(usually plural) the solid base of bricks, stone, etc. that is under a building to support it and fasten it to the ground (一般用复数) 地基; 底脚

**geotechnical** /,dʒiːəʊ'teknɪkəl/ *adj.* 土地工程学的

**geology** /dʒɪ'ɒlədʒɪ/ *n.*  
a science that deals with rock, soil, etc. and the way they have changed since the Earth was formed 地质学

**hydraulics** /haɪ'drɔːlɪks/ *n.* 水力学

**breakwater** /'breɪk,wɔːtə(r)/ *n.* 防波堤

**waterway** /'wɔːtəweɪ/ *n.*  
a river or canal that boats travel on 水路; 航道

**hydrology** /haɪ'drɒlədʒɪ/ *n.* 水文学

**transit** /'trænsɪt/ *n.*  
the process of moving passengers or goods 运输

**accessibility** /ək,sesə'bɪlətɪ/ *n.*  
the quality of being at hand when needed 可达性

**segment** /'segmənt/ *n.*  
one of several parts or pieces that fit with others to constitute a whole object 部分

**specification** /,spesɪfɪ'keɪʃən/ *n.*  
(usually plural) a detailed description of how something should be made (一般用复数) 规格说明; 明细规范

**bid** /bɪd/ *n.*  
an offer to do work or provide services for a specific price 投标

**compliance** /kəm'plaɪəns/ *n.*  
action in accordance with certain accepted standards 遵守

**grading** /'greɪdɪŋ/ *n.* 级配

**attribute** /ə'trɪbjʊ:t/ *n.*  
a quality regarded as a natural or typical part of sb. / sth. 特质

**versatility** /,vɜːsə'tɪlətɪ/ *n.*  
the state of having a wide variety of skills 多才多艺

**expertise** /,ekspɜː'tiːz/ *n.*  
special skills or knowledge that you get from experience, training, or study 专门知识或技能

**suspension bridge** 悬索桥

**flood defense** 防洪设施

**storm sewer** 雨水道

**building code** 建筑规范

**GIS (Geographic Information System)** 地理信息系统



## Reading comprehension

Fill in the blanks based on the information from Text A.

Civil engineering has a long history, and can be 1) \_\_\_\_\_ back to the ancient times when human beings lacked the 2) \_\_\_\_\_ equipment for construction. Civil engineering is not only about designing and constructing, but also about 3) \_\_\_\_\_ and 4) \_\_\_\_\_ the infrastructure. As a 5) \_\_\_\_\_ field of the engineering branches, civil engineering can be divided into various sub-disciplines: 6) \_\_\_\_\_ engineering is a civil engineering branch focusing on the framework of structures. 7) \_\_\_\_\_ engineering is a branch of civil engineering concerned with the engineering behavior of earth materials. And water resources engineering deals with the design and operation of systems to control and 8) \_\_\_\_\_ water. Civil engineers 9) \_\_\_\_\_ all phases of construction and the 10) \_\_\_\_\_ of the finished projects.

## Language focus

**1** Match the English words with their Chinese equivalents in Column B and C. Compare the general and specialized meanings of the words, and then choose the appropriate words to complete the following sentences. Change the form if necessary.

Column A	Column B	Column C
___ 1. process	A. 出价	a. 级配
___ 2. discipline	B. 专栏	b. 地基
___ 3. column	C. 过程	c. 投标
___ 4. beam	D. 光线	d. 荷载
___ 5. foundation	E. 基础	e. 工序
___ 6. bid	F. 纪律	f. 学科
___ 7. grading	G. 负担	g. 支柱
___ 8. load	H. 分级	h. 横梁



1. Without a construction \_\_\_\_\_ proposal, there would be no way to establish the overall cost of a project, which would throw the project and the contractor-client relationship into chaos.
2. The effort spent on careful \_\_\_\_\_, mixing and compaction of concrete will be largely wasted if the concrete is badly cured (养护).
3. Every construction \_\_\_\_\_ is unique and depends on the scope and complexity of the project.
4. Engineers in the \_\_\_\_\_ of water resources engineering are concerned with sustainable water resources management, systems of water supply and distribution, water quality, etc.
5. A \_\_\_\_\_ or pillar in architecture and structural engineering is a structural element that transmits, through compression, the weight of the structure above to other structural elements below.
6. There are different types of \_\_\_\_\_ for building construction and their uses depend on soil condition and loads from the structure.
7. The primary function of a bridge is to carry traffic \_\_\_\_\_: heavy trucks, cars, and trains.
8. The condition of this major supporting \_\_\_\_\_ put the top four floors of the building at risk.

**2** Study the meaning of the underlined words in the following sentences and choose their synonyms from the words in brackets.

1. The history of civil engineering can be traced back to ancient times when the sole means of construction was human labor, lacking any sophisticated (prominent, advanced, significant, elegant) equipment.
2. Ancient civil engineering projects include the Roman public baths, the Mayan ruins (exhaust, remains, surplus, allowances) at Copan, Palenque and Tikal, and the cliff dwellings at Mesa Verde.
3. The names of the engineers who designed these wonders are lost in antiquity (exhibition, transportation, ancientness, exploration).
4. Nowadays, we often associate civil engineering with the world's most jaw-dropping (surprising, elegant, luxurious, glorious) structures.
5. Civil engineering is arguably the most diverse (prosperous, distinctive, diplomatic, varied) field of all the engineering branches.





6. The transportation infrastructure should ensure mobility and accessibility for all segments (parts, proportions, criteria, phases) of society while promoting socially desirable land use.
7. Other essential attributes (qualities, contributions, inspirations, talents) civil engineers need include: creativity, versatility, a problem-solving mind, and the ability to understand the bigger picture and to collaborate with a number of other professionals.
8. Environmental engineering is related to the science of waste management of all types: purification of water, cleaning of contaminated (congested, contagious, polluted, epidemic) areas, and reduction of pollution.

**3** Match the English expressions in the field of civil engineering listed in Column A with their definitions in Column B, and then translate the expressions into Chinese in Column C.

Column A	Column B	Column C
___ 1. building code	A. a structure that bears a load resting upon it by transferring its weight to a foundation structure	_____
___ 2. earth moving	B. a professional discipline dealing with the designing, planning, constructing, and managing of facilities and infrastructures	_____
___ 3. construction project	C. a set of rules that specify the standards for constructing objects such as buildings and non-building structures	_____
___ 4. load-bearing structure	D. the process of excavating, transporting, or pushing earth	_____
___ 5. construction engineering	E. a bridge that has no supports under it, but is hung from strong steel ropes fixed to towers	_____
___ 6. suspension bridge	F. the project of constructing a building or infrastructure	_____



#### 4 Translate the following paragraph into English.

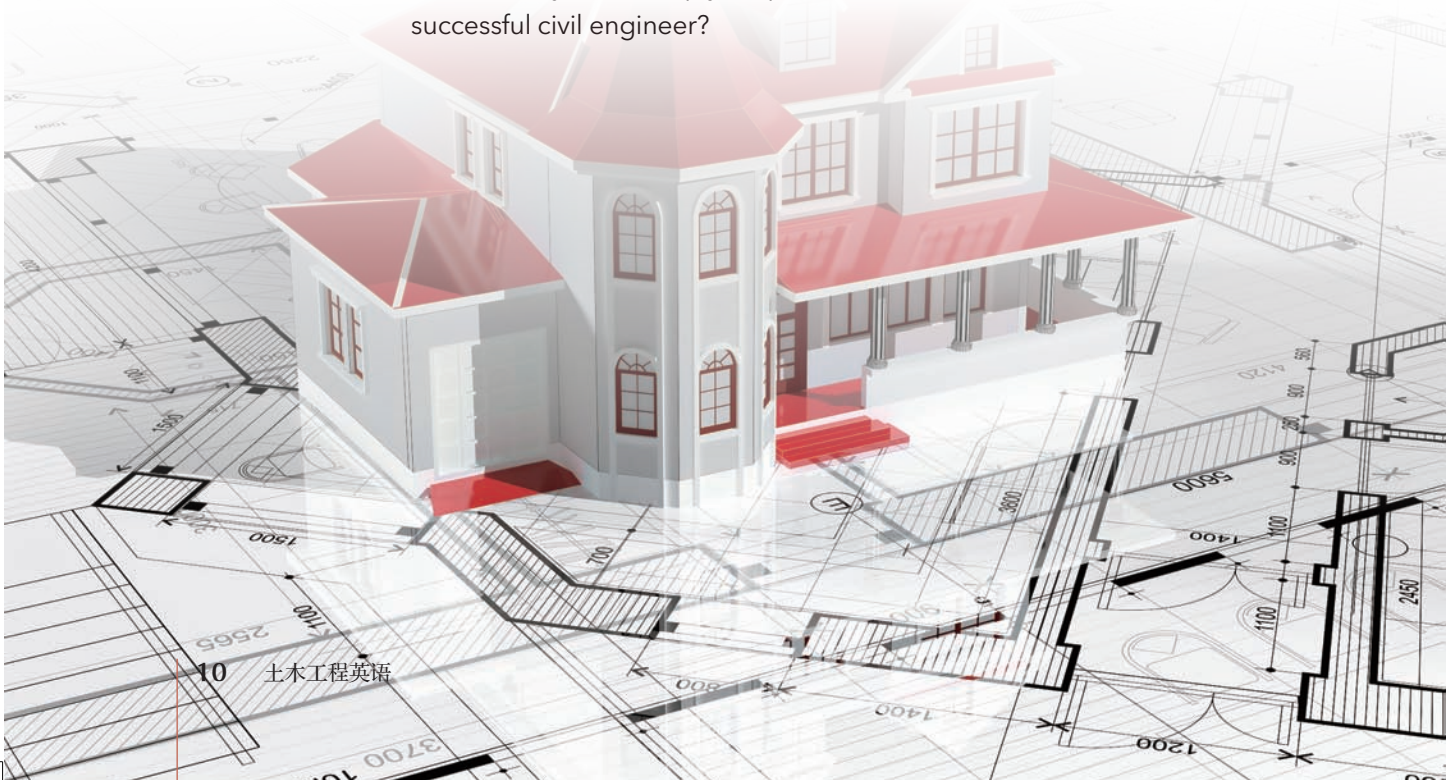
土木工程是工程学的一个分支，主要研究建筑物的设计和建造。根据工程的类型，土木工程被细分（subdivide）为许多技术专业。它们是结构工程、水资源工程、岩土工程、环境工程、运输工程等。每个专业都有特殊的用途。但是为了完成一项工程，必须把它们协调在一起。土木工程学科特别具有挑战性，这是由于工程师设计和建造的每一幢建筑物或每一个系统几乎都是独一无二的，一种结构几乎不可能与另一种结构完全相同。

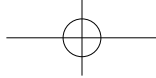
## Critical thinking

As is mentioned in Text A, civil engineers play different roles and shoulder many duties from the inception of a project right to its completion. Civil engineers are required to be knowledgeable, logical, creative and versatile. And they also need to have a problem-solving mind, and the ability to understand a big picture and to collaborate with a number of other professionals.

Discuss the following questions in groups:

1. Why do you think civil engineers should possess the above-mentioned attributes?
2. How would you develop your personal attributes in order to be a successful civil engineer?





# Research task

## Academic skill: Searching for information

Information can come from virtually anywhere – media, blogs, personal experiences, books, journal and magazine articles, expert opinions, encyclopedias, and web pages, etc.

### 1. Types of information

Type	Use
Magazine	<ul style="list-style-type: none"> <li>To find information or opinions about popular culture.</li> <li>To find up-to-date information about current events.</li> <li>To find non-scholarly articles about topics of interest within the subject of the magazine.</li> </ul>
Academic journal	<ul style="list-style-type: none"> <li>To get help for your scholarly research.</li> <li>To find out what has been studied on your topic.</li> <li>To find bibliographies that point to other relevant research.</li> </ul>
Database	<ul style="list-style-type: none"> <li>To find articles on specific topics.</li> <li>To find online journals or news articles.</li> </ul>
Newspaper	<ul style="list-style-type: none"> <li>To find editorials, commentaries, expert or popular opinions.</li> <li>To find current local, national or world news.</li> </ul>
Library catalog	<ul style="list-style-type: none"> <li>To find virtually any topic.</li> <li>To find hard copies of current or back issue of journals, books, newspapers or magazines.</li> </ul>
Website	<ul style="list-style-type: none"> <li>To find information from all levels of government – central to local.</li> <li>To find expert or popular opinions.</li> <li>To find information of various types of media, e.g. illustrations, audio and video information.</li> </ul>

### 2. Searching for information

#### Author / Title search

Searching by author and / or title obviously assumes that you are searching for a particular author, book or article, probably in either a database or a library catalog. Here are some tips:

- When searching by author, put the author’s last name first, e.g. “Kotler, Philip”, not “Philip Kotler”, if he is from an English-speaking country. Search the author’s full name in Chinese order if he is a Chinese. Sometimes, the



author could be an organization, so give the full name of the organization as it commonly appears, e.g. "World Bank".

- When searching by title, it helps if you enter the title as precisely as possible.

### Keyword search

It is basically a way of searching through subject or topic. Most library catalogs and databases will include an option to search by keyword as an alternative to author and title. The first step of keyword search is to decide the key word(s) or phrase(s). Normally, the word(s) or phrase(s) which can cover the topic you search can be selected as keyword(s). A good research topic usually contains two or three concepts. For example, you need to write a paper on "The Impact of Cognitive Styles on Design Students' Spatial Knowledge". We can break the topic into concepts, like "cognitive styles" and "spatial knowledge", which can be used as keywords. Then type them in a search bar in a database, EBSCOhost for instance. In a database, there are usually two ways of search, i.e. basic search and advanced search.

Basic search (see Fig. 1) generates a large number of sources for you to differentiate, which is an exhausting task. But advanced search (see Fig. 2), which provides more choices for further conditioning, can make the work lighter. There are many variables that can be chosen to refine the search. And you can define the relationship between the keywords by choosing "and", "or" or "not" based on the results you intend to obtain.

正在检索: [Academic Search Complete](#), [显示全部](#) | [选择数据库](#)

Fig. 1 Basic search

正在检索: [Academic Search Complete](#), [显示全部](#) | [选择数据库](#)

Fig. 2 Advanced search

As "cognitive styles" is a broader topic and "spatial knowledge" is more specific, they can be typed in the upper and middle search bars respectively. More relevant results will appear. You can then refine the search by selecting a specific variable. In



this case, “subject” (主题语) can be chosen to filter the results (See Fig. 3).

正在检索: Academic Search Complete, [显示全部](#) | [选择数据库](#)

Cognitive Styles SU 主题语

AND Spatial Knowledge 选择一个字段 (可选)

AND  选择一个字段 (可选)

[基本检索](#) [高级检索](#) [搜索历史纪录](#)

<b>精确搜索结果</b>	<b>检索结果: 1-9 (共 9 个)</b>
当前检索 <input type="button" value="v"/>	1. The Impact of Cognitive Styles on Design Students' Spatial Knowledge from Virtual Environments
布尔逻辑词组: SU cognitive styles AND spatial knowledge	

Fig. 3

### Snowball search

It is a good way if your topic has a key work or author. You can trace the citations of that author using a specialized citation database, such as the Social Science Citation Index to obtain other key works or authors. You will follow the stream of research up to the near present and see the way in which the work or the author has influenced the subsequent studies.

### 3. Evaluating information

Once you have found information that satisfies the requirements of your research, you should evaluate it. Evaluating information encourages you to think critically about the reliability, validity, accuracy, authority, timeliness, point of view or bias of information.

When evaluating information, you can use the five criteria AAOCC, namely, Authority, Accuracy, Objectivity, Currency and Coverage. They can be applied to check all information.

- 1) Authority of information
  - Who published it?
  - What institution published it?
  - Does the publisher list his or her qualifications?
- 2) Accuracy of information
  - Who provided it, and can you contact him or her?
  - Does it provide enough details?
  - Has it been cited correctly?



- 3) Objectivity of information
  - What is the purpose of it, or why was it published?
  - Is it biased?
  - What opinions (if any) are expressed by the author?
- 4) Currency of information
  - When was it published?
  - When was it updated?
  - How up-to-date is it?
- 5) Coverage of information
  - Do citations in it complement the research?
  - Is it all text or a balance of text and image?
  - Is it free or is there a fee to obtain it?

## Task

Now you know what civil engineering is and what a civil engineer does. Work in groups and search some information on a famous civil engineering structure or a well-known architect. Evaluate the information using the AAOCC criteria. Then complete the following table and share the information in groups.

	Where you searched	How you searched	What you've found
1			
2			
3			
...			





# Section B

## Reading strategy

### Dealing with unknown words (Part I)

The ability to deal with unknown words is a key reading skill in the reading process. It is a vital skill because you are almost certain to find unknown or unfamiliar words in any text. The skill is not necessarily to “know” the words, but to guess the meaning of them so that you can read and understand the whole text. Here are several different ways that can help you guess the meaning of an unknown word.

#### Guessing by explanation

Sometimes, you will find that the meaning of an unfamiliar word is given to you in the text. Typically, the phrase or sentence immediately before or after the unfamiliar word may give you a hint about the word. In this case, what you need to do is keep on reading and do not stop at the moment when you find the unfamiliar word, and then guess the meaning from the context. For example:

*Transportation engineering: It provides for the safe, efficient and convenient movement of people, goods and services by planning, constructing, and maintaining road, rail, air and public transit systems. The transportation infrastructure should ensure mobility and accessibility for all segments of society while promoting socially desirable land use.*

“Transit” may be unfamiliar to you. However, if you read the rest of the paragraph, “It provides for the ... movement of people, goods and services by planning, constructing, and maintaining road, rail, air ... systems. The

transportation infrastructure should ensure mobility and accessibility for all segments of society ...”, it is obvious that “transit” should mean “the process of moving goods or people from one place to another”.

#### Guessing by synonym and antonym

This is a very useful skill to learn. What you should do here is look at other words which relate to that word and work out what it may mean. These words may be either synonyms (words with a similar meaning) or antonyms (words with an opposite meaning). For example:

*From the ancient simple mounds to the skyscrapers today, the world has witnessed immense advancement in the field of civil engineering.*

Here you can work out the meaning of “mounds” by its antonym “skyscrapers”. All you need to do is read the rest part of the sentence and think of the meaning of it.

Sometimes, when you come across an unknown word, besides guessing it, you can also ignore the word, especially when the word starts with a capital letter or is in italics, which means that it is in all probability a proper name or a loanword. In this case, you should waste no time in trying to understand the exact meaning of the word. For example:

*Many early civilizations built monuments to their rulers or gods. These may have been simple mounds or truly remarkable achievements, such as the Pyramids of*



Giza whose construction by pre-industrial societies remains mysterious.

Here the word "Giza" is a word that you should

learn to ignore because it starts with a capital letter and is therefore a word which may not influence the overall meaning of the sentence.

## Task

Read Text B and apply the skills above to guess the meaning of the underlined words.





## Text B

# Civil engineering wonders

<sup>1</sup> Civil engineering projects frequently dominate headlines across the world. From the world's tallest building to the biggest man-made islands, people everywhere are dependent upon civil engineering innovations. All of these innovations and constructions tie back to one main purpose – making life easier for humankind. Here are some civil engineering marvels, which can make anyone gasp in awe.

### **Akashi Kaikyo Bridge**

<sup>2</sup> Also known as the Pearl Bridge, it is a stunning sample of the modern civil engineering. Located in Japan, this bridge is the world's largest suspension bridge and there are no pillars for the supports. It has the longest central span of any suspension bridge in the world, at 1,991 meters. It was completed in 1998. The bridge links the city of Kobe on the mainland of Honshu to Iwaya on Awaji Island by crossing the busy Akashi Strait. It carries part of the Honshu-Shikoku Highway.

### **Delaware Aqueduct**

<sup>3</sup> New York City is a hub for tourism, business, and the arts, and it also is home to roughly 8.5 million people. Like all heavily populated areas, the issue of fresh water supply comes into question. The Delaware Aqueduct, while possibly one of the least identifiable projects on this list, is not lacking in its civil engineering wonder. Spanning a total of 170 km, this major aqueduct holds the title of longest continuous tunnel in the world. Almost 50,000,000 cubic meters of water is supplied through this tunnel each day to the U.S.'s largest city. This accounts for over half of the total water supply of the city, making this project vital to the lives of millions of American citizens.



### **Mubarak Pumping Station**

- <sup>4</sup> Like many other countries, Egypt has experienced exponential growth in recent years. Much of the country of Egypt is arid desert, and in an effort to expand usable land, engineers built a pumping station aimed at making up to 25% of Egypt's land habitable. Before this project, only 5% of the country's land was considered to be able to sustain human development and life. The Mubarak Pumping Station is part of a civil engineering plan called the Toshka Project. The station hub is designed much like an island with the structure positioned in the center of Lake Nasser. Twenty-four vertical pumps help channel the water to the surrounding desert areas from this central location.

### **Nord Stream Gas Pipeline**

- <sup>5</sup> Nord Stream Gas Pipeline is an offshore natural gas pipeline from Vyborg in Russia to Lubmin near Greifswald in Germany. With 1,224 kilometers in length, it is the longest subsea pipeline in the world, surpassing the Langeled pipeline. This project includes two parallel lines. The first line of the pipeline was laid by June 2011 and was inaugurated on 8 November 2011. The second line was laid in April 2012 and was inaugurated on 8 October 2012.

### **Beijing National Stadium**

- <sup>6</sup> As the world's largest-span steel structure, Beijing National Stadium is also known as the Bird's Nest. This astonishing structure looks more like a public work of art than an Olympic stadium. It is a joint venture among architects Jacques Herzog and Pierre de Meuron, project architect Stefan Marbach, artist Ai Weiwei, and China Architecture Design & Research Group which was led by Chief Architect Li Xinggang. The Stadium was for use throughout the 2008 Summer Olympics and Paralympics.

### **Venice Tide Barrier Project**

- <sup>7</sup> As one of the most picturesque cities in the world, Venice, Italy is shrouded in beauty, but the city faces major engineering problems. The city has been pummeled



in recent years by flooding from rain as well as rising sea levels. Seeking to keep the city safe, engineers devised a unique method of using rows of mobile gates to keep flood waters at bay. The barriers have the capability to seal off the city of Venice from the rising tides. This project, while not being tremendous in scale, captivates engineers with its unique design and importance to the protection of this famous city.

### **Palm Islands**

- <sup>8</sup> The Palm Islands is a series of artificial islands in Dubai, United Arab Emirates. They are the Palm Jumeirah, the Palm Jebel Ali and the Palm Deira. These islands are the world's biggest artificial islands. Each of them takes the form of a palm tree, topped by a crescent. There are a large number of residential, leisure and entertainment centers on the islands.



### **Eurotunnel**

- <sup>9</sup> The tunnel starts from the U.K. and ends in France. The interesting thing is that the tunnel is under the water. Completed and officially opened for travel in 1994, the Eurotunnel consists of three tunnels, two of which are full sized and accommodate rail traffic as well as transport passengers in their motor vehicles and even buses. The third tunnel, smaller and positioned in between the two rail shuttle tunnels, operates as a service tunnel and escape route. The length of this tunnel is about 50 kilometers and about 38 of which is under the sea. The construction of the tunnel was carried out by the engineering firm Transmanche Link and cost an estimated nine billion pounds. At the time of construction, it was the most expensive project ever undertaken in the world.

