TUMU GONGCHENG ZHUANYE YINGYU

高等学校省级规划教材

——土木工程专业系列教材

土木工程专业英语

TUMU GONGCHENG ZHUANYE YINGYU

王顶堂 主编

合肥工业大学出版社

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编 委 会

前　言

为了适应高等教育教学的改革与发展，配合《大学英语课程教学要求（教学大纲）》（2006年修订本）的实施，满足土木工程类专业英语教学的需要，培养具有扎实的英语语言基础并能熟练地从事翻译、教学研究、工程管理、涉外工程领域的合作与交流等工作的复合型英语人才，特编写本书。

本书是编者结合在国内外从事土木工程专业英语教学实践的经验和体会编撰而成的。为突出专业英语专业性比较强的特点，以土木工程为主线，按照工程项目建造顺序，由浅入深，较为系统地选编了建筑工程、道路和桥梁工程以及工程项目管理等方面的英文文献共计42篇，其中的21篇作为课文，其内容涵盖了土木工程施工技术与施工组织、测量、新型建筑材料、砌体结构、钢筋混凝土结构、预应力混凝土结构、钢结构、建筑防水与装饰工程、建筑抗震设计、绿色节能建筑、道路和桥梁工程、工程招投标与合同以及项目管理等内容。每篇课文后特地穿插科技英语翻译与写作指南，以培养和提高读者的阅读、翻译和写作的能力与技巧，同时还附有注释和英汉互译、完形填空、专题讨论的练习，以促进读者学习兴趣，巩固所学知识，便于课堂互动式教学，提高听说表达能力。为了进一步拓宽知识面，加深专业英语知识，每篇课文后安排1篇与课文知识相近的阅读材料，有些具有一定难度，可供读者课后阅读，也可供涉外工程技术人员、教师、研究生和英语爱好者作为提高专业英语能力的参考读物。

本书选材广泛，内容新颖，图文并茂，实用性强。使用时建议安排约90～120学时的教学，也可根据实际情况和专业方向灵活掌握。

全书由安徽建筑工业学院土木工程学院王顶堂主编。陕西理工学院土建系张波老师参加了部分内容的编写。本书大部分题材选自英文原版文献（为方便教学稍加修改），部分内容根据编者在国外教学时的讲义编著而成。在编写过程中得到安徽建筑工业学院孙强教授和合肥工业大学陈淮民责任编辑的具体指导和悉心帮助。在此，对文献的原作者及以上人员表示衷心感谢！

由于编者水平有限，书中缺点和错误在所难免，恳请读者和专家不吝批评指正，本人将不胜感激。

编　者

2011年1月

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科技英语翻译与写作指南

Lesson 1 Working Drawings

Working drawings for residential or industrial buildings are usually made on the basis of the approved project. Often, working drawing consists of the general architectural and building construction drawings including details of the site plan, building plans, roof, floor and foundations, front, rear and end elevations, sections of foundations, stairs, floor slabs, and sections taken from the roof through foundations. A good working drawing includes electrical and plumbing details, together with relevant explanatory notes for any of drawing[1].

1 Site Plan

A site is a parcel of land which is made up of one, two or more plots. A site plan (see Fig. 1), therefore, is a drawing showing various properties in terms of their owners, locations, elevations, states of development and features such as roads, utility supply lines, etc.

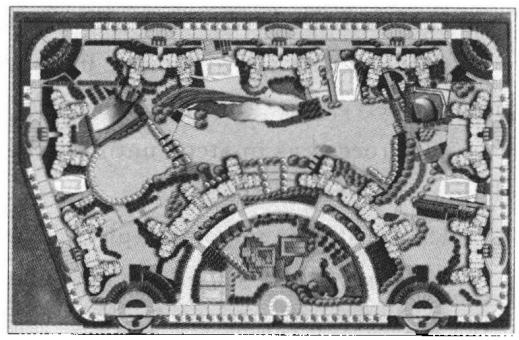

Fig. 1 A site plan

1.1 Components of a Site Plan

Components of a site plan include survey beacons, contour lines, orientation symbols, physical features, access roads and utilities.

(1) Survey beacons: These are concrete pillars, about 750mm long, which are buried in the ground leaving about 75mm above ground level. Survey beacons are located at principal corners of the site and at every change in the direction of boundaries. They usually bear on their tops the distance and orientation of property corners or boundaries. Survey beacons define the boundary and area of the site.

(2) Elevations: These are the different heights on the surface of the site in relation to a standard reference point known as the bench mark (BM). The elevations of points within a site are always expressed in units above or below sea level. Locations which have equal elevations are joined together using contour lines. These lines help to define the topography of the land within a site.

(3) Site orientation: This refers to a system of defining the site in terms of its direction to the north, south, east and west. Orientation is important in planning the building area to make into consideration such factors as the direction of rain, wind and sun within the site.

(4) Physical features: These are permanent objects of features existing within the site

or adjoining sites which are used for referencing or identification of the site[2]. Such physical features may include existing buildings, trees, hills, roads, fences, etc.

(5) Access road: A site chosen for building purposes requires an access road. Therefore the site plan shows the means of reaching the site, whether such means is an expressway, a dual carriage way or a foot path.

(6) Utilities: A site plan shows utility supply lines such as for water, electricity and gas. These features are shown on the site plan to indicate how they would be supplied to buildings within site.

1.2 Procedure for Drawing a Site Plan

(1)Choose an appropriate scale that will contain the site drawing on available drawing paper. For small sites a scale of 1 : 200 is appropriate. However, for large sites scales of 1 : 500, 1 : 1000 or 1 : 2500 may be used.

(2)Fasten your paper onto a drawing board and draw the boarder lines.

(3)Draw the first property line in the correct bearings and scale [3].

(4)Draw the next property line, working in a clockwise direction. Be sure that this next property line is in the correct bearing and scale.

(5)Proceed as in steps until all the property lines have been drawn and closed up to define the shape of the site.

(6)Locate the important physical features on the site, using standard symbols.

(7)Draw lines to connect equal elevations on the site using information obtained from the site survey.

(8) Determine the portions of the site to be developed or built upon, taking into account such factors as topography of the land, vegetation, permanent physical features on the site and orientation.

(9)Allow at least 3m between the building and other building or property boundaries.

(10) Indicate important features around the building. These include drive ways, footpaths, septic tanks, etc.

2 Floor Plan

The most important step in building drawing is the floor plan (see Fig. 2). It contains more information than all the other working drawings.

Essentially, the floor plan of a building is a horizontal section through the window openings and door ways of the building taken about 150cm above the field line. This is done of course to cut through the majority of openings in the walls and to provide a view of the equipment installed inside.

The working drawing enables the workman to know how many rooms a building should contain, the size of the rooms and the overall dimensions of the building. In multistory building drawing, each floor has its own plan and these are designated as ground floor plan, first floor plan, second floor plan, standard floor plan, roof plan etc.

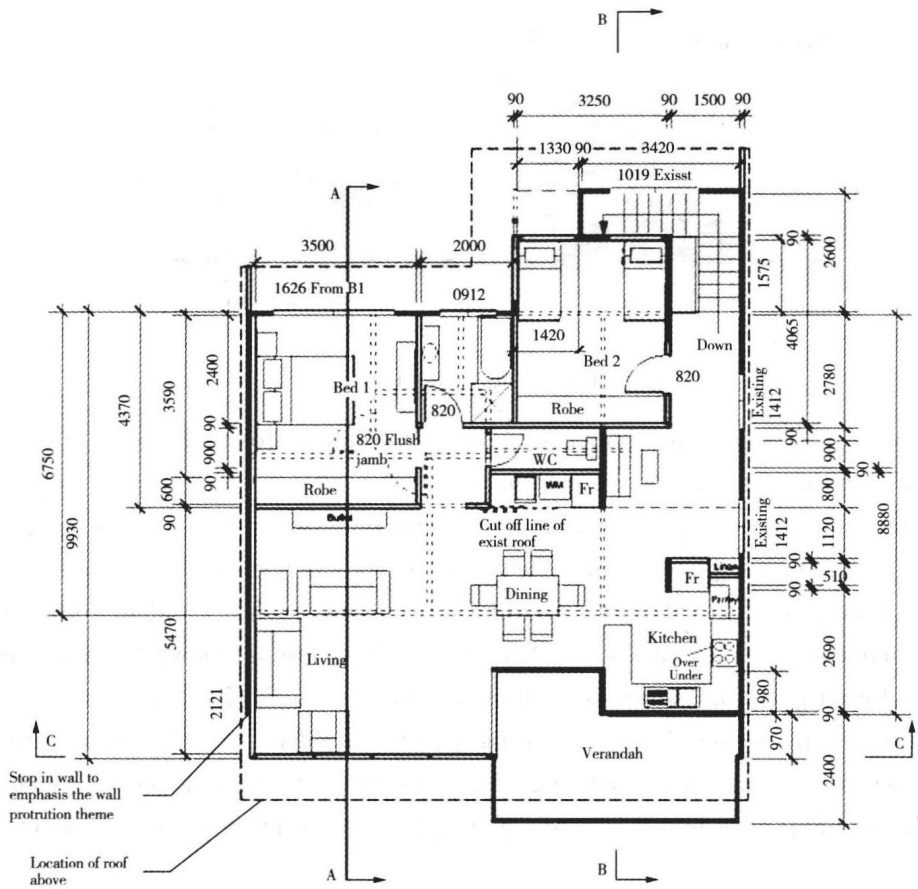

Fig. 2 First floor plan

3 Foundation Plan

Different types of foundations are designed for different buildings depending on the nature of the soil on which the building is to be erected.

Foundation plan shows the width of foundation, setting out of foundation trench, centre line of the trench for foundation of wall and column footing, etc. Foundation plan may be presented in a scale of 1 : 50 and its details in a scale of 1 : 5 and 1 : 20.

4 Elevation Drawing

Elevation drawing shows the width, the height of structure, the exterior materials found on the structure and the exterior design elements (see Fig. 3).

Front and side views are drawn to give frontal and side look of the structure. The shapes and styles of windows, doors, verandah openings, sun shades, railing, parapets etc. can be shown clearly on elevation drawings for a house.

5 Sectional Drawing

Sections of a building, obtained with the aid of vertical cutting plane, serve to show

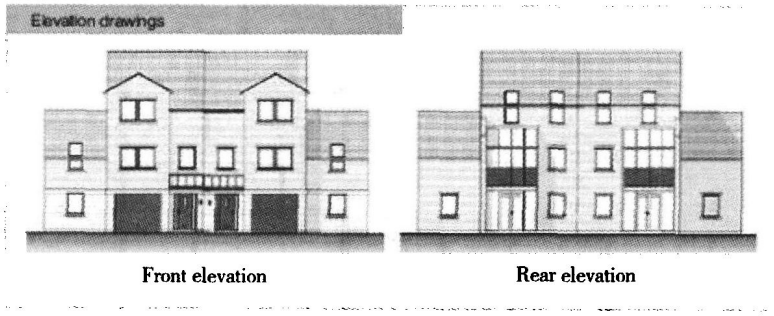

Fig. 3　Elevation drawing

the construction of certain elements of the building, for example: floor heights, elevations, landings, windows, doors, etc.

Imagine a house cut by a vertical plane, and one side removed, the remaining side projected to the profile plane then reflects the sectional view of the house [4]. Cutting planes are indicated on the plan of a building by interrupted cutting plane lines with arrow heads at their ends which indicate the direction of the sectional view. Sections are usually designated by letters, for example: section A—A, section B—B, etc.

Sometimes all the details of a building which should be revealed in a sectional view don't fall within the line of one cutting plane. In such situations a section is obtained by cutting the building with more than one plane. Such a section is called an offset section.

6　Detail Drawing

Detail drawings are enlarged drawings that provide essential specific information and often enlarged segment of another section. The purpose of detail drawing is to describe and define specific points which are too small using accurate measurements.

In almost every set of drawings, for buildings of any size, detail drawings are necessary for complete and finished project. Details may be presented in section, plan, and elevation in a scale of 1 : 5, 1 : 10 and 1 : 20.

New Words and Expressions

plumbing ['plʌmiŋ]	n. 管道工程,水暖设备
beacon ['bilkən]	n. 标杆
topography[tə'pɔgrəfi]	n. 地形学
septic tank	化粪池
verandah[və'rændə]	n. 阳台，走廊
railing['reiliŋ]	n. 栏杆，扶手
parapet ['pærəpit]	n. 女儿墙

Notes

[1] plumbing details 意为“水暖设备详图”。此句可译为:一套好的施工图包括水暖设备和电气详图,以及图中任何相关的注释。

[2] physical features 意为:“自然特征物(地貌)”。该句可译为:这些(自然地貌)是一些本场地或相邻场地内的用于场地参照或辨识的现存特征物。

[3] property line 意为:“地界线,建筑红线”。bearing 意为:“方位,方向”。该句可译为:用正确的方位和比例画出第一条地界线。

[4] profile plane 意为:“剖切面”。全句可译为:假设一幢房屋被一个竖向平面所切,移去一边,剩下凸向剖切面的部分便显示出房屋的剖面形状。

Exercises

Ⅰ. Translate the following phrases into English /Chinese.

(1)plumbing
(2)septic tank
(3)existing building
(4)verandah
(5)parapet
(6)sun shade
(7)测量标杆
(8)多层建筑
(9)现场平面图
(10)剖面图
(11)建筑施工图
(12)装饰工程

Ⅱ. Complete the following sentences with the proper form of the words given in brackets.

site plan *bench mark* *floor plan* *plumbing* *section*
elevation *work* *architecture* *explanatory* *sea level*

1. Working drawing consists of the general _____ and building construction drawings including details of the _____, building plans, roof, floor and foundations, front, rear and end _____, sections of foundations, stairs, floor slabs, and _____ taken from the roof through foundations.
2. A good working drawing includes electrical and _____ details, together with relevant _____ notes for any of drawing.
3. These are the different heights on the surface of the site in relation to a standard reference point known as the _____.
4. The elevations of points within a site are always expressed in units above or below _____.
5. The most important step in building drawing is the _____. It contains more information than all the other _____ drawings.

Ⅲ. Translate the following sentences into English.

1. 测量控制桩立在场地的拐角和边界方位变化处。

2. 把高度相等的地方用等高线连接起来。

3. 现场平面图显示出公用供给管线，例如水、电、气等。

4. 根据建筑物下土的性质，对于不同的建筑物，其基础的设计形式各异。

5. 绘制详图到目的是用精确的尺寸描绘出微小的细部。

Ⅳ. Translate the following sentences into Chinese.

1. A good working drawing includes electrical and plumbing details, together with relevant explanatory notes for any of drawing.

2. Physical features may include existing buildings, trees, hills, roads, fences, etc.

3. A site plan is a drawing showing various properties in terms of their owners, locations, elevations, states of development and features such as roads, utility supply lines, etc.

4. Orientation is important in planning the building area to make into consideration such factors as the direction of rain, wind and sun within the site.

5. The shapes and styles of windows, doors, verandah openings, sun shades, railing, parapets etc. can be shown clearly on elevation drawings for a house.

Ⅴ. Questions for discussion or oral report.

Do you think which contents a set of complete working drawing should include?

Reading Material

An Overview of Surveying

1 Introduction

Surveying is a science that deals with the determination of the relative positions of points on or near the earth's surface. These points may be needed to locate or lay out roads, airfields, and structures of all kinds; they may be needed for cultural, hydrographic, or terrain features for mapping; and, in the military, these points may be targets for artillery and mortar fires. The relative horizontal positions of these points are determined from distances and directions measured in the field, while their vertical positions are computed from the differences in elevations, which are measured directly or indirectly from an established point of reference or datum.

The earliest applications of surveying were for the purpose of establishing the boundaries of land. Although many surveyors are still preoccupied with establishing or subdividing boundaries of landed properties, the purposes of surveys have branched out to many areas that parallel the advancement of various engineering fields and other areas of civilization. Surveyors may be called upon in court to substantiate definite locations of various objects, such as those involving major traffic accidents, maritime disasters, or even murder cases, in which direction and distance have a bearing.

Surveying continues to play an extremely important role in many branches of engineering. The results of today's surveys are being used to map the earth above and below; for navigational charts for use in the air, on land, and at sea; and for other major survey operations for related tasks in geology, forestry, archeology, and landscape architecture. As a surveyor in the Naval Construction Force, you will be required to submit survey results before, during, and after planning and construction of advanced base structures, bridges, roads, drainage works, pipelines, and other types of conventional ground systems.

Again, though these surveys are for various purposes, still the basic operations are the same—they involve measurements and computations or, basically, fieldwork and office work.

2 Classification of Surveying

Generally, surveying is divided into two major categories: plane and geodetic surveying.

2.1 Plane Surveying

Plane Surveying is a process of surveying in which the portion of the earth being

surveyed is considered a plane. The term is used to designate survey work in which the distances or areas involved are small enough that the curvature of the earth can be disregarded without significant error. For small areas, precise results may be obtained with plane surveying methods, but the accuracy and precision of such results will decrease as the area surveyed increases in size. To make computations in plane surveying, you will use formulas of plane trigonometry, algebra, and analytical geometry.

A great number of surveys are of the plane surveying type. Surveys for the location and construction of highways and roads, canals, landing fields, and railroads are classified under plane surveying. When it is realized that an arc of10 mi is only 0.04 greater that its subtended chord; that a plane surface tangent to the spherical arc has departed only about 8 in. at 1 mi from the point of tangency; and that the sum of the angles of a spherical triangle is only 1 sec greater than the sum of the angles of a plane triangle for a triangle having an area of approximately 75 sq mi on the earth's surface, it is just reasonable that the errors caused by the earth's curvature be considered only in precise surveys of large areas.

2.2 Geodetic Surveying

Geodetic Surveying is a process of surveying in which the shape and size of the earth are considered. This type of survey is suited for large areas and long lines and is used to find the precise location of basic points needed for establishing control for other surveys. In geodetic surveys, the stations are normally long distances apart, and more precise instruments and surveying methods are required for this type of surveying than for plane surveying.

The shape of the earth is thought of as a spheroid, although in a technical sense, it is not really a spheroid. In 1924, the convention of the International Geodetic and Geophysical Union adopted 41,852,960 ft as the diameter of the earth at the equator and 41,711,940 ft as the diameter at its polar axis. The equatorial diameter was computed on the assumption that the flattening of the earth caused by gravitational attraction is exactly 1/297. Therefore, distances measured on or near the surface of the earth are not along straight lines or planes, but on a curved surface.

Hence, in the computation of distances in geodetic surveys, allowances are made for the earth's minor and major diameters from which a spheroid of reference is developed. The position of each geodetic station is related to this spheroid. The positions are expressed as latitudes (angles north or south of the Equator) and longitudes (angles east or west of a prime meridian)

3 Types of Surveying

Generally, surveys can be classified by names descriptive of their functions. Functionally, surveys are classed as construction, topographic, route, and special. Special surveys, such as photogrammetry, hydrography, and property surveys, are conducted

either with special equipment or for a special purpose. Some of the types of surveys that you may perform are discussed in the following paragraphs.

3.1 Construction Surveys

Construction Surveys (sometimes called engineering surveys) are conducted to obtain data essential for planning, estimating, locating, and layout for the various phases of construction activities or projects. This type of survey includes reconnaissance, preliminary, location, and layout surveys.

The objectives of engineering or construction surveying include the following:

(1) The obtaining of reconnaissance information and preliminary data required by engineers for selecting suitable routes and sites and for preparing structural designs.

(2) The defining of selected locations by establishing a system of reference points.

(3) The guidance of construction forces by setting stakes or otherwise marking lines, grades, and principal points and by giving technical assistance.

(4) The measuring of construction items in place for the purpose of preparing progress reports.

(5) The dimensioning of structures for preparation of as-built plans.

All of the above objectives are called engineering surveys by the American Society of Civil Engineers (ASCE), and the term generally applies the term to all of the objectives listed above.

Engineering and/or construction surveys, then, form part of a series of activities leading to the construction of a man-made structure. The term structure is usually confined to something that is built of structural members, such as a building or a bridge. It is used here in a broader sense, however, to include all man-made features, such as graded areas; sewer, power, and water lines; roads and highways; and waterfront structures. Construction surveys normally cover areas considered small enough to use the plane surveying methods and techniques.

3.2 Topographic Surveys

The purpose of a topographic survey is to gather survey data about the natural and man-made features of the land, as well as its elevations. From this information a three-dimensional map may be prepared. You may prepare the topographic map in the office after collecting the field data or prepare it right away in the field by plane table. The work usually consists of the following:

(1) Establishing horizontal and vertical control that will serve as the framework of the survey.

(2) Determining enough horizontal location and elevation (usually called side shots) of ground points to provide enough data for plotting when the map is prepared.

(3) Locating natural and man-made features that may be required by the purpose of the survey.

(4) Computing distances, angles, and elevations.

(5)Drawing the topographic map.

Topographic surveys are commonly identified with horizontal and/or vertical control of third-and lower-order accuracies.

3.3 Route Surveys

The term route survey refers to surveys necessary for the location and construction of lines of transportation or communication that continue across country for some distance, such as highways, railroads, open-conduit systems, pipelines, and power lines. Generally, the preliminary survey for this work takes the form of a topographic survey. In the final stage, the work may consist of the following:

(1) Locating the center line, usually marked by stakes at 100ft intervals called stations.

(2) Determining elevations along and across the center line for plotting profile and cross sections.

(3)Plotting the profile and cross sections and fixing the grades.

(4)Computing the volumes of earthwork and preparing a mass diagram.

(5)Staking out the extremities for cuts and fills.

(6)Determining drainage areas to be used in the design of ditches and culverts.

(7)Laying out structures, such as bridges and culverts.

(8)Locating right-of-way boundaries, as well as staking out fence lines, if necessary.

3.4 Special Surveys

Special Surveys are conducted for a specific purpose and with a special type of surveying equipment and methods. A brief discussion of some of the special surveys familiar to you follows.

(1)Land surveys

Land surveys (sometimes called cadastral or property surveys) are conducted to establish the exact location, boundaries, or subdivision of a tract of land in any specified area. This type of survey requires professional registration in all states. Presently, land surveys generally consist of the following chores:

• Establishing markers or monuments to define and thereby preserve the boundaries of land belonging to a private concern, a corporation, or the government;

• Relocating markers or monuments legally established by original surveys. This requires examining previous survey records and retracing what was done. When some markers or monuments are missing, they are reestablished following recognized procedures, using whatever information is available;

• Rerunning old land survey lines to determine their lengths and directions. As a result of the high cost of land, old lines are remeasured to get more precise measurements;

• Subdividing landed estates into parcels of predetermined sizes and shapes;

• Calculating areas, distances, and directions and preparing the land map to portray the survey data so that it can be used as a permanent record;