交通版高等学校交通工程专业规划教材
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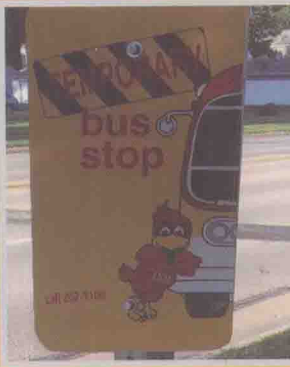
ENGLISH IN TRAFFIC ENGINEERING



交通工程专业英语

邬 岚 主 编
吴艳群 孙丽芳 林 丽 副主编
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人民交通出版社股份有限公司
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内 容 提 要

本书从交通运输类英语课程教学和研究的实际出发，将基础理论和专业英语的阅读、翻译以及专业论文的写作技巧相融合，分为三部分进行编写，第一部分为基础篇，介绍交通运输系统的功能、元素和主要问题；第二部分为专业篇，从现代交通工程所涉及的主要方面选编了热门题材且文字生动的文章；第三部分为技巧篇，从翻译技巧到专业论文的写作技巧进行了详细介绍。书后给出了练习的参考答案。

本书可作为高等院校交通工程专业、交通运输专业、土木工程专业及相关专业本科生的教材，也可作为科技工作者自学和科研的参考用书。

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编审委员会

前 言

从事技术工作的人常需要学习他人之所长，“借他山之石以攻玉”。英语这一全球工程技术界通用的语言可以帮助我们了解国内外同行的研究状态和技术水平，也有助于同行间的沟通与合作。中国城镇建设高速持续发展，国家对各类交通运输人才需求日增，对交通运输类高素质人才培养提出了新的要求，从而对交通运输类教材建设也提出了新的要求。本教材正是为了适应当今时代对高层次人才培养的需求而编写。

本教材从内容上体现出科学严谨性、理论实用性和工程技术创新性，以促进读者对现代交通工程的理解并获得启发，将所学的专业英语词汇和技术原理与原有的专业知识相互印证，启发新的技术方案，顺利查找英文技术资料，并开展课题的研究和论文的写作。

本书的编写体系有所创新。全书分为三篇，基础篇介绍背景知识，专业篇选取具有交通运输类特色的题材进行理论知识的加固，技巧篇介绍英语阅读时的翻译技巧并结合英语论文的写作结构、英文参考文献的写法及撰写规范等内容进行介绍。每章都围绕一个主题进行选材和编写，前两篇的基本内容包括2篇精读文章和1篇泛读课文，同时给出了专业词汇的释义以及相关的阅读理解和翻译的练习；第三篇在教学过程中，教师可依据需要选择文章进行精讲。本书题材选自国内外正式出版物，如学术专业著作、期刊等。参考了交通领域的相关时新内容，涵盖了交通工程专业各方面的基础理论，涉及交通流理论、交通控制、交通规划、交通安全、公共交通和智能交通技术等交通工程领域的内容。书后还提供了关于英文写作规范、常用的专业学术交流的网址，为读者检索查询国外资源以及进行规范的写作提供了平台。本书在编写过程中吸取了我国相近学科其他专业英语教材的优点和基础英语教学的经验，力求读者在有限学习时间中，了解现代交通工程专业的主要内容。

为帮助读者理解本书重点和难点内容，作者特制作了教学视频片段，读者可通过扫二维码“微课”下载学习。本书配套PPT课件，读者可登录人民交通出版社网站 http://www.ccpress.com.cn 或扫二维码“课件”免费下载。

微 课　　课 件

本书由南京林业大学邬岚主编，东南大学陈峻主审。编写人员如下：邬岚和兰州交通大学吴艳群编写第1、2章，东南大学叶智锐编写第3、6章，兰州交通大学孙丽芳编写第4、7章，其余章节由邬岚和林丽共同编写。本书编写过程中，研究生陈婷在整理资料与校对方面做了大量的工作，在此表示衷心的感谢！

限于编者的水平，书中不妥或错误之处在所难免，敬请读者不吝指正。

编 者

2015年10月

ENGLISH IN TRAFFIC ENGINEERING

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Part Ⅰ 基 础 篇

Part Ⅱ 专 业 篇

Part Ⅲ 技 巧 篇

Part I

基础篇

Chapter 1 Introduction to Traffic Engineering

Text A Transportation Systems and Their Function

Transportation systems are a major component of economy and have an enormous impact on the shape of the society and the efficiency of the economy in general.

This growth pattern is one of the fundamental problems to be faced by traffic engineers. Given the relative maturity of our highway systems and the difficulty faced in trying to add system capacity, particularly in urban areas, the continued growth in vehicle-miles traveled leads directly to increased congestion on our highways. The inability to simply build additional capacity to meet the growing demand creates the need to address alternative modes, fundamental alterations in demand patterns, and management of the system to produce optimal results.

The Nature of Transportation Demand

Transportation demand is directly related to land-use patterns and to available transportation systems and facilities. Figure1.1 illustrates the fundamental relationship, which is circular and ongoing. Transportation demand is generated by the types, amounts, and intensity of land use, as well as its location. The daily journey to work, for example, is dictated by the locations of the worker's residence and employer and the times that the worker is on duty.

Transportation planners and traffic engineers attempt to provide capacity for observed or predicted travel demand by building transportation systems. The improvement of transportation systems, however, makes the adjacent and nearby lands more accessible and, therefore, more attractive for development. Thus, building new transportation facilities leads to further increases in land-use development, which (in turn) results in even higher transportation demands. This circular, self-reinforcing characteristic of traffic demand creates a central dilemma: build-

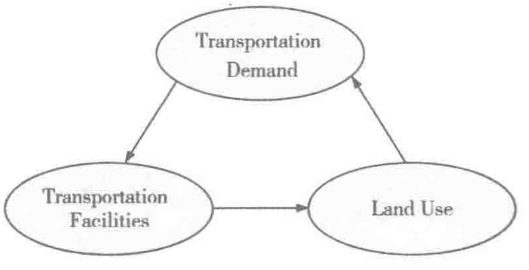

Figure 1.1 The Nature of Transportation Demand

ing additional transportation capacity invariably leads to incrementally increased travel demands.

On the other hand, demand is not constrained by capacity in all cities, and the normal process of attempting to accommodate demand as it increases is feasible in these areas. At the same time, the circular nature of the travel demand relationship will lead to congestion if care is not taken to manage both capacity and demand to keep them within tolerable limits.

If anything, we still tend to underestimate the impact of transportation facilities on land-use development. Often, the increase in demand is hastened by development occurring simply as a result of the planning of a new facility.

Concepts of Mobility and Accessibility

Transportation systems provide the nation's population with both mobility and accessibility. The two concepts are strongly interrelated but have distinctly different elements. Mobility refers to the ability to travel to many different destinations, while accessibility refers to the ability to gain entry to a particular site or area.

Mobility gives travelers a wide range of choices as to where to go to satisfy particular needs. Mobility allows shoppers to choose from among many competing shopping centers and stores. Similarly, mobility provides the traveler with many choices for all kinds of trip purposes, including recreational trips, medical trips, educational trips, and even the commute to work. The range of available choices is enabled by having an effective transportation network that connects to many alternative trip destinations within a reasonable time, with relative ease, and at reasonable cost.

Accessibility is a major factor in the value of land. When land can be accessed by many travelers from many potential origins, it is more desirable for development and, therefor, more valuable. Thus, proximity of land to major highways and public transportation facilities is a major factor determining its value.

Mobility and accessibility may also refer to different portions of a typical trip. Mobility focuses on the through portion of trips and is most affected by the effectiveness of through facilities that take a traveler from one general area to another. Accessibility requires the ability to make a transfer from the transportation system to the particular land parcel on which the desired activity is taking place. Accessibility, therefore, relies heavily on transfer facilities, which include parking for vehicles, public transit stops, and loading zones.

A good transportation system must provide for both mobility and accessibility and should be designed to separate the functions to the extent possible to ensure both safety and efficiency.

People, Goods, and Vehicles

The most common unit used by the traffic engineer is "vehicles." Highway systems are planned, designed, and operated to more vehicles safely and efficiently from place to place. Yet the movement of vehicles is not the objective, the goal is the movement of the people and goods that occupy vehicles.

Modern traffic engineering now focuses more on people and goods . While lanes must be added to a freeway to increase its capacity to carry vehicles, its person-capacity can be increased by increasing the average vehicle occupancy.

The efficient movement of goods is also vital to the general economy of the nation . The benefits of centralized and specialized production of various products are possible only if raw materials can be efficiently shipped to manufacturing sites and finished products can be efficiently distributed throughout the nation and the world for consumption. While long-distance shipment of goods and raw materials is often accomplished by water , rail , or air transportation , the final leg of the trip to deliver a good to the local store or the home of an individual consumer generally takes place on a truck using the highway system, part of the accessibility function is the provision of facilities that allow trucks to be loaded and unloaded with minimal disruption to through traffic and the accessibility of people to a given site.

The medium of all highway transportation is the vehicle . The design, operation, and control of highway systems relies heavily on the characteristics of the vehicle and of the driver. In the final analysis, however, the objective is to move people and goods , not vehicles.

Transportation Modes

While the traffic engineer deals primarily with highways and highway vehicles, there are other important transportation systems that must be integrated into a cohesive national, regional, and local transportation network.

The traffic engineer deals with all of these modes in a number of ways . All over-the-road modes-automobile, bus transit, trucking—are principal users of highway systems. Highway access to rail and air terminals is critical to their effectiveness, as is the design of specific transfer facilities for both people and freight. General access, internal circulation, parking, pedestrian areas, and terminals for both people and freight are all projects requiring the expertise of the traffic engineer.

Moreover, the effective integration of multimodal transportation systems is a major goal in maximizing efficiency and minimizing costs associated with all forms of travel.

Text B Elements of Traffic Engineering

Transportation engineering is the application of technology and scientific principles to the planning, functional design, operation, and management of facilities for any mode of transportation in order to provide for the safe, rapid, comfortable, convenient, economical, and environmentally compatible movement of people and goods.

Traffic engineering is that phase of transportation engineering which deals with the planning, geometric design and traffic operations of roads, streets, and highways, their networks, terminals, abutting lands, and relationships with other modes of transportation.

The objective of this course is to introduce traffic engineering fundamentals for highways and freeways to students.

The principal goal of the traffic engineer remains the provision of a safe system for highway traffic.

The objective of safe travelling comes the first and is never finished for the traffic engineer.

While speed of travel is much to be desired, it is limited by transportation technology, human characteristics, and the need to provide safety.

Comfort and convenience are generic terms and perceived differently by passengers. Comfort involves the physical characteristics of vehicles and roadways, and is influenced by our perception of safety. Convenience relates more to the ease with which trips are made and the ability of transport systems to accommodate all of our travel needs at appropriate times.

Cost is also relative. There is little in modern transportation systems that can be termed "cheap". Highway and other transportation systems involve massive construction, maintenance, and operating expenditures, most of which are provided through general and user taxes and fees. Nevertheless, every engineer, regardless of discipline, is called upon to provide the better systems at less cost.

Harmony with the environment is a complex issue that has become more important over time. All transportation systems have some negative impacts on the environment. All produce air and noise pollution in some forms, and all utilize valuable land resources.

There are a number of key elements of traffic engineering:

1. Traffic studies and characteristics;
2. Performance evaluation;
3. Facility design;
4. Traffic control;
5. Traffic operations;
6. Transportation systems management;
7. Integration of intelligent transportation system technologies.

Traffic studies and characteristics involve measuring and quantifying various aspect of highway traffic . Studies focus on data collection and analysis that is used to characterize traffic ,including (but not limited to) traffic volumes and demands, speed and travel time, delay, accidents, origins and destinations, modal use, and other variables.

Performance evaluation is a means by which traffic engineers can rate the operating characteristics of individual sections of facilities and facilities as a whole in relative terms . Such evaluation relies on measures of performance quality and is often stated in terms of "levels of service". Levels of service are letter grades ,from A to F, describing how well a facility is operating using specified performance criteria . Like grades in a course, A is very good, while F connotes failure (on some level). As part of performance evaluation, the capacity of highway facilities must be determined.

Facility design involves in the functional and geometric design of highways and other traffic facilities . Traffic engineers ,per se, are not involved in the structural design of highway facilities but should have some appreciation for structural characteristics of their facilities.

Traffic control is a central function of traffic engineers and involve the establishment of traffic regulations and their communication to the driver through the use of traffic control devices, such as signs, markings, and signals.

Traffic operations involve measures that influence overall operation of traffic facilities ,such as one-way street systems, transit operations, curb management, and surveillance and network control systems.

Transportation systems management (TSM) involves virtually all aspects of traffic engineering in a focus on optimizing system capacity and operations. Specific aspects of TSM include high-occupancy vehicle priority systems, car-pooling programs, pricing strategies to manage demand, and similar functions.

Intelligent transportation systems (ITS) refers to the application of modern telecommunications technology to the operation and control of transportation systems. Such systems include automated highways, automated toll-collection systems, vehicle-tracking systems, in-vehicle GPS and mapping systems, automated enforcement of traffic lights and speed laws, smart control devices, and others. This is a rapidly emerging family of technologies with the potential to radically alter the way we travel as well as the way in which transportation professionals gather information and control facilities . While the technology continues to expand, society will grapple with the substantial "big brother" issues that such systems invariably create.

This text contains material related to all of these components of the broad and complex profession of traffic engineering.

Vocabulary and Glossary

1. accessibility *n*. ①可及性②可达性;易接近;可亲

2. commute *vi*. 通勤

3. dilemma *n*. ①(进退两难的)困境,(左右为难的)窘境,进退维谷②任何一种窘境(或困境),(似乎无法解决的)难题③[逻辑学]两刀论法,二难推理,假言选言推理

4. freight *vt*. 运送;装货;使充满 *n*. 货运;运费;船货

5. highway *n*. 公路的统称,既可指高速公路,也可指一般道路

6. incrementally *adv*. 递增地;增值地

7. maturity *n*. ①成熟,完善,准备好②(票据的)到期,到期日,期限③[地质学]壮年(期)④[生物学]成熟期,发身期

8. mobility *n*. 移动性;机动性

9. per se *adv*. 本身;自身

10. proximity *n*. 亲近,接近

11. air terminal 航空集散站
12. automated toll-collection systems 自动收费系统
13. average vehicle occupancy 平均车辆占有率
14. facility design 设施设计
15. geometric design 几何设计;线形设计
16. highway system 公路系统
17. intelligent transportation systems (ITS) 智能交通系统
18. in-vehicle GPS and mapping systems 车载全球定位和地图系统
19. land parcel 地块;一块土地
20. land-use patterns 土地利用模式
21. levels of service 服务水平,简称 LOS
22. multimodal transportation systems 多方式交通运输系统
23. one-way street 单行道
24. pedestrian area 行人专区;步行街
25. raw materials 原料;原材料
26. self-reinforcing 自我强化;自我加强;自增强
27. structural design 结构设计
28. traffic and transportation (微观的)交通和(宏观的)交通
29. traffic control 交通控制
30. traffic regulations 交通规则
31. traffic volume 交通量
32. transit stops 公共交通车站
33. transportation demand 交通需求
34. transportation facilities 运输设备;运输设施;运输工具
35. transportation mode 运输方式;交通方式
36. transportation planner 交通规划师
37. transportation systems management(TSM) 交通系统管理
38. vehicle-tracking systems 车辆追踪系统

Exercises

Ⅰ. True or false.

1. Transportation demand is directly related to land-use patterns and to available transportation systems and facilities. ( )

2. Transportation systems provide the nation's population with both mobility and inaccessibility. ( )

3. The most common unit used by the traffic engineer is "vehicles". ( )

4. Highways access to rail and air terminals is critical to their effectiveness, as is the design of specific transfer facilities for both people and freight. ( )

5. Intelligent transportation system (ITS) refers to the application of modern telecommunications technology to the management and control of transportation systems. ( )

Ⅱ. Choose the best word or phrase to complete each statement.

1. Transportation systems are a major ______ of economy and have an enormous impact on the shape of the society and the efficiency of the economy in general.

A. parts B. unit C. component D. assembly

2. Transportation demand is generated by the types, amounts, and ______ of land use , as well as its location.

A. strength B. intensity C. intension D. superiority

3. Mobility refers to the ability to travel to many different ______, while accessibility refers to the ability to gain entry to a particular site or area.

A. destinations B. goals C. fields D. targets

4. Modern traffic engineering now ______ more on people and goods.

A. emphasizes B. focuses C. stress D. underlines

5. While the technology continues to expand , society will ______ with the substantial "big brother" issues that such systems invariably create.

A. grasp B. capture C. collect D. grapple

Ⅲ. Translate the following sentences into Chinese.

1. Similarly, mobility provides the traveler with many choices for all kinds of trip purposes, including recreational trips, medical trips , educational trips, and even the commute to work.

2. Yet the movement of vehicles is not the objective, the goal is the movement of the people and goods that occupy vehicles.

3. Studies focus on data collection and analysis that is used to characterize traffic, including (but not limited to) traffic volumes and demands, speed and travel time, delay, accidents, origins and destinations , modal use, and other variables.

4. Moreover , the effective integration of multimodal transportation systems is a major goal in maximizing efficiency and minimizing costs associated with all forms of travel.

5. Specific aspects of TSM include high-occupancy vehicle priority systems, car-pooling programs, pricing strategies to manage demand, and similar functions.

Ⅳ. Discussions.

1. What is the difference between mobility and accessibility?

2. Intelligent Traffic System (ITS) is the developing trend of future traffic. What is ITS?

Reading Material: Traffic Engineering's Role and Objectives

Introduction

Multi Protocol Label Switching (MPLS) is today mostly used for traffic engineering therefore we start by describing what traffic engineering is and why traffic engineering is needed.

Traffic engineering and fast reroute are the two major applications of constraint based routing. Traffic engineering is the process of controlling how traffic flows through a service provider's network so as to optimize resource utilization and network performance. Traffic engineering is needed in the Internet mainly because the shortest path is used in current intra-domain routing protocols (e. g., OSPF, IS-IS) to forward traffic. The shortest path routing may give rise to two problems.

First, the shortest paths from different sources overlap at some links, resulting in congestion at those links.

Second, at some time, the traffic volume from a source to a destination could exceed the capacity of the shortest path, while a longer path between these two nodes remains under-utilized. The reason why conventional IP routing cannot provide traffic engineering is that it does not take into account the available bandwidth on individual links. For the purpose of traffic engineering, constraint based routing is used to route traffic trunk, which is defined as a collection of individual transmission control protocol (TCP), or user datagram protocol (UDP) flows, called "microflows" that share two common properties.

The first property is that all microflows are forwarded along the same common path.

The second property is that they all share the same class of service. By routing at the granularity traffic trunks, traffic trunks have better scaling properties than routing at the granularity of individual microflows with respect to the amount of forwarding state and the volume of control traffic.

In a sense, IP networks manage themselves. A host using the Transmission Control Protocol (TCP) adjusts its sending rate according to the available bandwidth on the path to the receiver. If the network topology should change, routers react to changes and calculate new paths to the destination. This has made the TCP/IP Internet a robust communication network. But robustness does not implicate that the network runs efficiently. The interior gateway protocols used today like OSPF and ISIS compute the shortest way to the destination and routers forward traffic according to the routing tables build from those calculations. This means that traffic from different sources passing through a router with the same destination will be aggregated and sent through the same path. Therefore a link may be congested despite the presence of under-utilized link in the network. And delay sensitive traffic like voice-over-IP calls may travel over a path with high propagation delay because this is the shortest path while a low latency path is available.

As illustrated in the above Figure 1.2 the shortest path from router 1 to 5 is the path (1-3-5).