

Traffic Engineering

Fifth Edition

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Contents

Preface ix

Part I Basic Concepts and Characteristics 1

1 Introduction 2

- 1.1 Traffic Engineering as a Profession 2
- 1.2 Transportation Systems and Their Function 5
- 1.3 History of U.S. Highway Legislation 9
- 1.4 Elements of Traffic Engineering 13
- 1.5 Modern Problems for the Traffic Engineer 14
- 1.6 Standard References for the Traffic Engineer 15
- 1.7 Metric versus U.S. Units 16
- 1.8 Closing Comments 16
- References 16

2 Transportation Modes and Characteristics 17

- 2.1 Classifying Transportation Modes 17
- 2.2 The Transportation Infrastructure and Its Use 18
- 2.3 Modal Attributes 19
- 2.4 The Capacity of Transportation Modes 22
- 2.5 Multimodal Focus 25
- References 25
- Problems 26

3 Road-User, Vehicle, and Roadway Characteristics 27

- 3.1 Dealing with Diversity 27
- 3.2 Road Users and Their Characteristics 28

- 3.3 Vehicle Characteristics 37
- 3.4 Roadway Characteristics 47
- 3.5 Traffic Control Systems and Characteristics 51
- 3.6 Closing Comments 51
- References 51
- Problems 52

4 Communicating with Drivers: Traffic Control Devices 53

- 4.1 The Manual on Uniform Traffic Control Devices 53
- 4.2 Traffic Markings 57
- 4.3 Traffic Signs 63
- 4.4 Traffic Signals 75
- 4.5 Special Types of Control 81
- 4.6 Closing Comments 81
- References 82
- Problems 82

5 Traffic Stream Characteristics 83

- 5.1 Types of Facilities 83
- 5.2 Traffic Stream Parameters 84
- 5.3 Relationships among Flow Rate, Speed, and Density 92
- 5.4 A Brief History of Mathematical Models of Freeway Flow—Traffic Flow Theory 94
- 5.5 Characteristics of Interrupted Flow 100
- 5.6 Closing Comments 100
- References 100
- Problems 100

- 6 The Concepts of Demand, Volume, and Capacity 102**
- 6.1 When Capacity Constrains Demand 102
 - 6.2 Relationships among Demand, Volume (or Rate of Flow), and Capacity 103
 - 6.3 The Formation of Queues and Their Impacts 107
 - 6.4 Bottlenecks, Hidden Bottlenecks, and Demand Starvation 109
 - 6.5 Capacity versus Queue Discharge 110
 - 6.6 Closing Comments 112
- Problems 112
- 7 Level of Service and the *Highway Capacity Manual: History and Fundamental Concepts* 114**
- 7.1 Uninterrupted and Interrupted Flow Facilities 115
 - 7.2 A Brief Chronology of the *Highway Capacity Manual* 115
 - 7.3 The Concept of Capacity 118
 - 7.4 The Concept of Level of Service 119
 - 7.5 Service Volumes and Service Flow Rates 123
 - 7.6 The v/c Ratio and Its Use in Capacity Analysis 124
 - 7.7 Closing Comments 125
- References 125
Problems 125
- 8 Intelligent Transportation Systems 126**
- 8.1 An Overview 127
 - 8.2 ITS Standards 128
 - 8.3 ITS Systems Engineering Process 129
 - 8.4 ITS-Related Commercial Routing and Delivery 131
 - 8.5 Sensing Traffic by Virtual and Other Detectors 131
 - 8.6 Connected Vehicle Pilot Studies 132
 - 8.7 Variable Pricing 134
 - 8.8 Closing Comments 135
- References 135
Problems 135
- Part II Traffic Studies and Programs 137**
- 9 Traffic Data Collection and Reduction Methodologies 138**
- 9.1 Sources of Data 139
 - 9.2 The Connected Vehicle 144
 - 9.3 Applications of Traffic Data 144
 - 9.4 Types of Studies 145
 - 9.5 Manual Data Collection Methodologies 146
 - 9.6 Semi-Automated Studies Using Pneumatic Road Tubes and Similar Devices 150
 - 9.7 Permanent Detectors and Their Use 151
 - 9.8 Closing Comments 152
- References 152
Problems 152
- 10 Traffic Volume Studies and Characteristics 155**
- 10.1 Volume Characteristics 155
 - 10.2 Intersection Volume Studies 163
 - 10.3 Limited Network Volume Studies 165
 - 10.4 Statewide Counting Programs 172
 - 10.5 Specialized Counting Studies 177
 - 10.6 Closing Comments 184
- References 184
Problems 184
- 11 Speed, Travel Time, and Delay Studies 186**
- 11.1 Introduction 186
 - 11.2 Spot Speed Studies 187
 - 11.3 Travel-Time Studies 205
 - 11.4 Intersection Delay Studies 211
 - 11.5 Closing Comments 216
- References 216
Problems 216
- 12 Highway Traffic Safety: An Overview 218**
- 12.1 Introduction 218
 - 12.2 Current and Emerging Priorities 220
 - 12.3 The Highway Safety Manual 227
 - 12.4 Historical Crash Data and Regression to the Mean 238
 - 12.5 Effective Crash Countermeasures 238
 - 12.6 Approaches to Highway Safety 240

- 12.7 Commonly Used Crash Statistics and Analyses 243
- 12.8 Site Analysis 247
- 12.9 Closing Comments 250
- References 250
- Problems 251
- 13 Parking: Characteristics, Studies, Programs, and Design 254**
 - 13.1 Parking Demand 255
 - 13.2 Parking Studies and Characteristics 263
 - 13.3 Design Aspects of Parking Facilities 271
 - 13.4 Parking Programs, Policy, and Management 282
 - 13.5 Closing Comments 284
 - References 284
 - Problems 284
- 14 Traffic Impact Studies and Analyses 286**
 - 14.1 Scope of This Chapter 287
 - 14.2 An Overview of the Process 287
 - 14.3 Tools, Methods, and Metrics 292
 - 14.4 Case Study 1: Driveway Location 293
 - 14.5 Case Study 2: Most Segments of a Traffic Impact Analysis 296
 - 14.6 Closing Comments 307
 - References 307
 - Problems 308
- Part III Interrupted Flow Facilities: Design, Control, and Level of Service 309**
- 15 The Hierarchy of Intersection Control 310**
 - 15.1 Level I Control: Basic Rules of the Road 311
 - 15.2 Level II Control: YIELD and STOP Control 313
 - 15.3 Level III Control: Traffic Control Signals 317
 - 15.4 Closing Comments 333
 - References 333
 - Problems 333
- 16 Traffic Signal Hardware 338**
 - 16.1 Functional Layouts at a Signalized Intersection 338
 - 16.2 Some History 340
 - 16.3 Controller and Other Standards 343
 - 16.4 Common Terminology 344
 - 16.5 Convention for Numbering Movements and Phases 346
 - 16.6 Ring-and-Barrier Diagram 347
 - 16.7 Preferential Treatment 350
 - 16.8 ASCT System Objectives 351
 - 16.9 Sensors and Data Feeds 351
 - 16.10 Traffic Signal Display Hardware 354
 - 16.11 Traffic Signal Maintenance 355
 - 16.12 Closing Comments 356
 - References 356
 - Problems 356
- 17 Fundamentals of Intersection Design and Layout 358**
 - 17.1 Intersection Design Objectives and Considerations 358
 - 17.2 A Basic Starting Point: Sizing the Intersection 359
 - 17.3 Intersection Channelization 362
 - 17.4 Special Situations at Intersections 364
 - 17.5 Closing Comments 373
 - References 373
 - Problems 373
- 18 Principles of Intersection Signalization 374**
 - 18.1 Terms and Definitions 374
 - 18.2 Discharge Headways, Saturation Flow, Lost Times, and Capacity 377
 - 18.3 The Critical-Lane and Time-Budget Concepts 382
 - 18.4 The Concept of Left-Turn (and Right-Turn) Equivalency 387
 - 18.5 Delay as a Measure of Effectiveness 389
 - 18.6 Closing Comments 400
 - References 400
 - Problems 400
- 19 Fundamentals of Signal Timing and Design: Pre-timed Signals 403**
 - 19.1 Introduction 403
 - 19.2 Development of a Signal Phase Plan 404
 - 19.3 Determining Vehicular Requirements for Signal Design and Timing 419
 - 19.4 Determining Pedestrian Signal Requirements 426

- 19.5 Compound Signal Phasing 429
 19.6 Sample Signal Timing Problems 430
 References 442
 Problems 443
- 20 Fundamentals of Signal Timing and Design: Actuated Signals 447**
- 20.1 Types of Actuated Control 448
 20.2 Detectors and Detection 449
 20.3 Actuated Control Features and Operation 450
 20.4 Actuated Signal Timing and Design 453
 20.5 Sample Problems in Actuated Signal Design and Timing 458
 References 464
 Problems 464
- 21 Signal Coordination for Arterials and Networks 467**
- 21.1 A Key Requirement: A Common Cycle Length 467
 21.2 The Time-Space Diagram 467
 21.3 Ideal Offsets 469
 21.4 Signal Progression on One-Way Streets 469
 21.5 Signal Progression for Two-Way Streets and Networks 475
 21.6 Types of Progression 481
 21.7 Software for Signal Progression Design 485
 21.8 Coordination of Signals for Oversaturated Networks 486
 References 495
 Problems 495
- 22 Capacity and Level of Service Analysis: Signalized Intersections—The HCM Method 499**
- Part I: Analysis of Pre-timed Signalized Intersections 500*
- 22.1 Fundamental Concepts 500
 22.2 Model Structure for Pre-timed Signals 505
 22.3 Computational Steps in the Model 505
 22.4 Interpreting the Results of Signalized Intersection Analysis 528
 22.5 Methodological Complexities 529
- Part II: Analysis of Actuated Signals 536*
- Part III: Calibration Issues 536*
- 22.6 Measuring Prevailing Saturation Flow Rates 537
 22.7 Measuring Base Saturation Flow Rates 537
 22.8 Measuring Start-Up Lost Time 537
 22.9 Calibrating Adjustment Factors 539
 22.10 Normalizing Signalized Intersection Analysis 541
- Part IV: Closing Comments 542*
- References 542
 Problems 542
- 23 Planning-Level Analysis of Signalized Intersections 545**
- 23.1 The TRB Circular 212 Methodology 545
 23.2 The 2016 HCM Planning Methodology 546
 23.3 Closing Comments 556
 References 556
 Problems 557
- 24 Urban Streets and Arterials: Complete Streets and Level of Service 559**
- 24.1 Designing Urban Streets 560
 24.2 Level of Service Analysis of a Multimodal Street Segment 563
 24.3 Facility Level of Service Analysis 570
 24.4 Closing Comments 570
 References 570
 Problems 571
- 25 Unsignalized Intersections and Roundabouts 572**
- Part I: Two Way Stop-Controlled Intersections 573*
- 25.1 TWSC Intersection Operation: A Fundamental Modeling Approach 573
 25.2 Computational Steps in TWSC Intersection Analysis 574
 25.3 Interpreting Results 584
- Part II: All-Way STOP-Controlled Intersections 589*
- 25.4 Computational Steps 591
 25.5 Comment 598

- Part III: Roundabouts 602**
- 25.6 Types of Roundabouts and General Characteristics 603
 - 25.7 Signing and Marking for Roundabouts 603
 - 25.8 Capacity and Level of Service Analysis of Roundabouts 608
 - 25.9 Closing Comments 615
 - References 615
 - Problems 616
- 26 Interchanges and Alternative Intersections 618**
- 26.1 Interchanges 619
 - 26.2 Alternative Intersections 625
 - 26.3 Level of Service Analysis 630
 - 26.4 Closing Comments 638
 - References 639
 - Problems 639
- Part IV Uninterrupted Flow Facilities: Design, Control, and Level of Service 643**
- 27 An Overview of Geometric Design of Roadways 644**
- 27.1 Introduction to Highway Design Elements 644
 - 27.2 Horizontal Alignment of Highways 646
 - 27.3 Vertical Alignment of Highways 659
 - 27.4 Cross-Sectional Elements of Highways 665
 - 27.5 Closing Comments 669
 - References 669
 - Problems 669
- 28 Capacity and Level of Service Analysis: Basic Freeway and Multilane Highway Segments 671**
- 28.1 Facility Types Included 671
 - 28.2 Segment Types on Freeways and Some Multilane Highways 672
 - 28.3 Generic Speed-Flow Characteristics on Freeways and Multilane Highways 672
 - 28.4 Levels of Service for Freeways and Multilane Highways 674
 - 28.5 Base Speed-Flow Curves 676
 - 28.6 Applications of Base Curves to Capacity and LOS Analysis of Freeways and Multilane Highways 687
 - 28.7 The Heavy Vehicle Adjustment Factor and Related Issues 689
 - 28.8 Sample Problems 694
 - 28.9 Closing Comments 700
 - References 700
 - Problems 701
- 29 Capacity and Level of Service Analysis: Weaving Segments on Freeways and Multilane Highways 703**
- 29.1 Level of Service Criteria for Weaving Segments 704
 - 29.2 Converting Demand Volumes to Flow Rates in pc/h 705
 - 29.3 A Brief History of the Development of Weaving Segment Methodologies 705
 - 29.4 Component Flows in a Weaving Area 706
 - 29.5 Critical Geometric Variables Describing a Weaving Segment 707
 - 29.6 Computational Procedures for Weaving Area Analysis 711
 - 29.7 Sample Problems in Weaving Segment Analysis 720
 - References 725
 - Problems 726
- 30 Capacity and Level of Service Analysis: Merge and Diverge Segments on Freeways and Multilane Highways 728**
- 30.1 Level-of-Service Criteria 729
 - 30.2 Converting Demand Volumes 729
 - 30.3 Fundamental Variables Involved in Merge and Diverge Segment Analysis 730
 - 30.4 Computational Procedures for Merge and Diverge Segments 731
 - 30.5 Special Applications in Merge and Diverge Analysis 741
 - 30.6 Closing Comments 745
 - 30.7 Sample Problems in Merging and Diverging Analysis 745
 - References 751
 - Problems 751

**31 Operation and Analysis of Freeways
and Highways 753**

- 31.1 Traffic Markings on Freeways and Rural
Highways 753
- 31.2 Signing for Freeways and Rural
Highways 758
- 31.3 Establishing and Posting of Speed Limits
on Rural Roads 771

- 31.4 Managed Lanes on Freeways 772
- 31.5 Active Transportation and Demand
Management Strategies 774
- 31.6 Analysis of Freeway Facilities 774
- References 776
- Problems 777

Index 778

Preface

The transportation system is the nation's lifeblood circulation system. Our complex system of roads and highways, railroads, airports and airlines, waterways, and urban transit systems provides for the movement of people and goods to and from the most remote outposts of the nation. It is the transportation network which allows for the concentrated production of food, goods, energy, and other material in an economically optimal manner, knowing that the systems needed to collect raw materials, and distribute final products throughout the nation are in place.

Traffic engineering deals with several critical elements of the transportation system: our streets and highways, and the transportation services they support. Because the transportation system is such a critical part of our infrastructure, the traffic engineer is involved in a wide range of issues, often in a very public setting, and must bring a broad range of skills to the table. Traffic engineers must have an appreciation for and understanding of planning, design, management, construction, operation, control, and system optimization. All of these functions involve traffic engineers at some level.

This text focuses on the key engineering skills required to practice traffic engineering in a broad setting. This is the fifth edition of the textbook, and it includes the latest standards and criteria of the *Manual on Uniform Traffic Control Devices* (2009, as updated through May 2012), the *Policy on Geometric Design of Highways and Streets* (2011), the *Highway Capacity Manual* (2016), the *Highway Safety Manual* (2010, with 2014 Supplement), and other critical documents. While this edition uses the latest versions of basic references, students must be aware that all of these are periodically updated, and (at some point), versions not available at this writing will become available, and should be used.

The text is organized into four major functional parts:

- Part I – Basic Concepts and Characteristics
- Part II – Traffic Studies and Programs
- Part III – Interrupted Flow Facilities: Design, Control, and Level of Service
- Part IV – Uninterrupted Flow Facilities: Design, Control, and Level of Service

The text is appropriate for an undergraduate survey course in traffic engineering, or for more detailed graduate (or undergraduate) courses focusing on specific aspects of the profession. A survey course might include all of Part I, a selection of chapters from Part II, and a few chapters focusing on signal design and/or capacity and level of service analysis. Over the years, the authors have used the text for graduate courses on Traffic Studies and Characteristics, Traffic Control and Operations, and Highway Capacity and Level of Service Analysis. Special courses on highway traffic safety and geometric design have also used this text.

Some chapters, particularly Traffic Impact and Mitigation Studies, are organized around case studies. These should only be used in a more advanced course with an instructor who is familiar with the many tools referenced.

What's New in This Edition

This edition of the textbook adds a significant amount of material, including, but not limited to:

1. More than 50% of the homework problems (and an available solutions manual) are new for most chapters.

2. New material on unsignalized intersections, roundabouts, alternative intersections, interchanges, operation and analysis of facilities, and more.
3. Material on signalized intersections, signal design and timing, and signal hardware has been updated and extended.
4. Material from the latest editions of key traffic engineering references is included, as noted previously.
5. Links to a number of new Web sites which students and instructors will find valuable.

There are some additional revisions. There is no overview chapter on statistics; undergraduate engineering degrees now require coursework in statistics. We have included supporting material on statistical analyses within the applications in which they are used. An overview chapter can't cover everything, and it should be expected

that modern engineering students have been exposed to this material. The text still provides details on a number of capacity and level of service applications. The *2016 HCM*, however, has over 3,000 pages of printed and electronic material, and many complicated analyses can only be presented in outline or overview form. There is material from the *Highway Safety Manual*, but complete analysis material is included for only one type of application. Again, there is simply too much material to include more than an example of its procedures and applications.

We hope that students and instructors will continue to find this text useful in learning about the profession of traffic engineering, and about many of its key components. As in the past, comments are always welcome.

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traffic engineering " traffic engineer. a branch of civil engineering concerned with the design and construction of streets and roads that will best facilitate traffic movement. [1930 35] * * * " Universalium. traffic engineering " noun Date: 1931 engineering dealing with the design of streets and control of traffic " traffic engineer noun " New Collegiate Dictionary. Traffic engineering is a method of optimizing the performance of a telecommunications network by dynamically analyzing, predicting and regulating the behavior of data transmitted over that network. Traffic engineering applies engineering principles that help solve transportation problems by considering the psychology and habits of the transportation system users. Many people still wonder why a traffic problem is so difficult that an engineer should be called upon for a solution. Why not just install a traffic signal, or raise/lower the speed limit, or erect more signs?