Registrar of Regulations	Date/Time filed with Registrar of Regulations
AUTHORIZATION TO FILE DOCUMENTS INCORPORATED BY REFERENCE BY DESCRIPTION	

❶ Agency: *Virginia Department of Transportation*

❷ Regulation Numbers: *N/A* *24 VAC 30-155*

Title of Regulation: *Traffic Impact Analysis Regulations*

❸ Effective Date of Regulation: *December 2011*

❹ Name of Document Incorporated by Reference:

Highway Capacity Manual, 2010

❺ Attach a summary of the document incorporated by reference, including publication date and a copy of the cover page.

See attachments

❻ Document available for inspection at the following location:

Va. Dept. of Transportation
Transportation and Mobility Planning Division
1401 E. Broad St.
Richmond, Va. 23219

❼ Copy of referenced document may be procured from:

Transportation Research Board. 500 Fifth St. NW, Washington, D.C. 20001

http://books.trbbookstore.org/hcm10.aspx

❽ Exemptions Claimed (Specific Reference):

Administrative Process Act *N/A*

Virginia Register Act *N/A*

Virginia Code Commission Regulations *§ 3.3 (B) (1) - exceeds 500 pages in length; generally available to the public and 3.3 (B)(5)- material is copyrighted or otherwise the property of an organization other than state government*

Request submitted by: *Jo Anne P. Maxwell*

Agency Regulatory Coordinator — Title

11/28/11 — Date

Approved: _____ _____

Jane D. Chaffin, Registrar of Regulations — Date

SUMMARY OF DOCUMENT INCORPORATED BY REFERENCE

Highway Capacity Manual 2010

The Transportation Research Board publishes the *Highway Capacity Manual 2010* (HCM2010), which is the fifth edition of the volume. The *HCM2010* incorporates more than $5 million of funded research that has occurred since publication of the *HCM2000*. This latest edition will significantly update how engineers and planners assess the traffic and environmental effects of highway projects:

- It is the first HCM to provide an integrated multimodal approach to the analysis and evaluation of urban streets from the points of view of automobile drivers, transit passengers, bicyclists, and pedestrians;
- It is the first to address the proper application of micro-simulation analysis and the evaluation of those results;
- It is the first to discuss active traffic management in relation to both demand and capacity; and
- It is the first to provide specific tools and generalized service volume tables, to assist planners in quickly sizing future facilities.

The 1,650-page HCM 2010 has been split into four volumes:

Volume 1 - Concepts;

Volume 2 - Uninterrupted Flow;

Volume 3 - Interrupted Flow; and

Volume 4 - Applications Guide (electronic only)

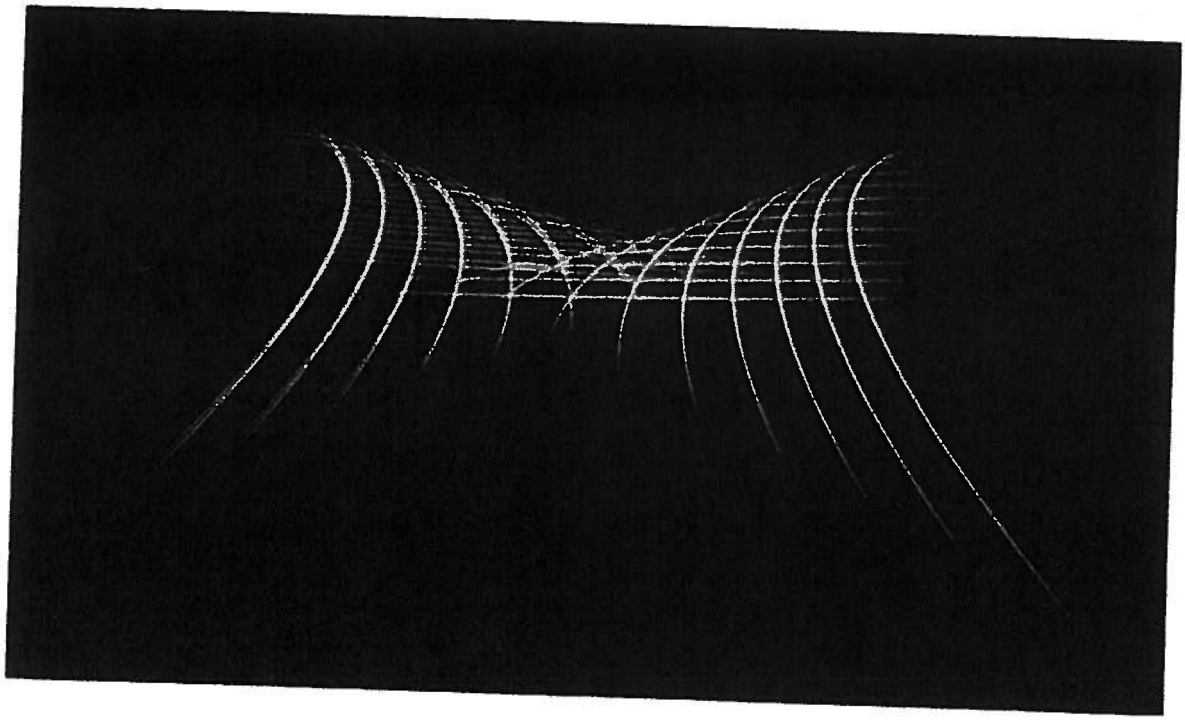
This four-volume format was developed to provide information at several levels of detail, to help HCM users more easily apply and understand the concepts, methodologies, and potential applications presented in the manual.

Volume 4 is an electronic-only volume that registered HCM users will be able to access over the Internet. This volume includes four types of content: supplemental chapters on methodological details and emerging issues; interpretations, clarifications, and corrections; comprehensive case studies; and a technical reference library.

HCM 2010 is produced in U.S. customary units only. There is no CD-ROM or other electronic versions of the contents of Volumes 1 through 3.

HCM2010

HIGHWAY CAPACITY MANUAL



VOLUME 1: CONCEPTS

TRB TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

WASHINGTON, DC | WWW.TRB.ORG

FOREWORD

This fifth edition of the *Highway Capacity Manual* breaks a great deal of new ground.

- It is the first *Highway Capacity Manual* to provide an **integrated multimodal approach** to the analysis and evaluation of urban streets from the points of view of automobile drivers, transit passengers, bicyclists, and pedestrians. This is the first manual to take into account the effects of cars on bicyclists and pedestrians.
- It is the first to address the proper **application of microsimulation analysis** and the evaluation of those results.
- It is the first to discuss **active traffic management** in relation to both demand and capacity.
- It is the first to include **example applications of its procedures implemented in software code and executables** to assist users and software developers in understanding the subtleties of the methodologies.
- It is also the first to provide tools, **generalized service volume tables**, to assist planners in quickly sizing future facilities.

While this edition of the *Highway Capacity Manual* has many firsts, it also builds on more than 60 years of work by many dedicated experts in the field.[1]

The first *Highway Capacity Manual* was published in 1950 as a joint venture between the Highway Research Board's Committee on Highway Capacity and the Bureau of Public Roads. That effort was led by O. K. Normann, committee chair, and William Walker, committee secretary. The manual was the first international document on the broad subject of capacity and provided definitions of key terms, a compilation of maximum observed flows, and the initial fundamentals of capacity.

The second edition was published in 1965 by the Highway Research Board and authored by the Committee on Highway Capacity. O. K. Normann led much of this effort until his untimely death in 1964. Carl C. Saal continued the work as the new committee chair with Arthur A. Carter, Jr., as secretary. The Bureau of Public Roads was again a significant contributor to the project. The 1965 manual was a significant extension of the 1950 edition and introduced the concept of level of service.

The third edition of the manual was published in 1985 by the Transportation Research Board (TRB) and authored by the Committee on Highway Capacity and Quality of Service, chaired by Carlton C. Robinson, with Charles W. Dale as secretary. Credit is also due to Robert C. Blumenthal and James H. Kell, who served as committee chairs between the publication of the 1965 and 1985 editions. The 1985 edition extended capacity analysis to additional facility types,

[1] Thanks are extended to Adolf D. May for this short history of the *Highway Capacity Manual*, which was first provided in his Foreword to the 1994 edition.

incorporated driver perceptions into level of service, and was the first to have the analysis procedures implemented in computer software.

An update to the third edition of the manual was published in 1994 with Adolf D. May as chair of the committee and Wayne K. Kittelson as secretary. The 1994 edition of the manual is noted for new procedures for the analysis of freeway ramp junctions, all-way and two-way STOP-controlled intersections, and two-lane rural highways.

The fourth edition of the manual was published in 2000 with John D. Zegeer as chair of the committee and Richard G. Dowling as secretary. That manual was the first to go to a multivolume format (with one volume dedicated to concepts for policy makers) and was the first to test novel electronic formats for the manual using hyperlinked text and narrated self-guided tutorials for some of the example problems.

The *Highway Capacity Manual* has grown over the decades, and it has long since ceased to be the product of a few highly competent experts or even that of a single committee. This edition of the *Highway Capacity Manual* has benefited from the most extensive involvement of the professional community—far surpassing that of all the previous editions. More than 300 professionals, many of them entirely new to TRB, the Committee on Highway Capacity and Quality of Service, and the manual development process itself, contributed in the year-long chapter review process, which has culminated in the publication of this fifth edition.

This edition is the first to involve other TRB committees in its development. The following committees from the Operations Section (AHB00) of the Technical Activities Council of TRB provided reviewers or comments directly on the drafts of the manual:

- AHB20, Freeway Operations;
- AHB25, Traffic Signal Systems;
- AHB35, Committee on High-Occupancy Vehicle, High-Occupancy Toll, and Managed Lanes; and
- AHB45, Traffic Flow Theory and Characteristics.

The members of the Committee on Highway Capacity and Quality of Service thank these committees for their assistance and thank the chairs of the Operations Section, Daniel S. Turner and then Peter M. Briglia, Jr., for their support and encouragement of the multicommittee involvement in the development of the *Highway Capacity Manual.*

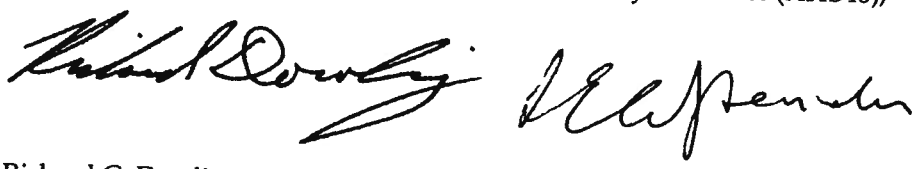
We are also grateful for the support we have received from the members and staff of the Institute of Transportation Engineers (ITE). Our joint summer meetings with local ITE sections throughout the manual development process were particularly informative and productive.

Throughout this effort, the advice and support of Richard Cunard, Engineer of Traffic and Operations of TRB, was extremely valuable in helping the committee anticipate, address, and overcome the obstacles that arise every time a major new document is published.

The *Highway Capacity Manual 2010* would never have become a reality without the hard work of the National Cooperative Highway Research Program (NCHRP) 3-92 panel, chaired by Barbara Ostrom, with Ray Derr as Senior Program Officer for the project. The committee thanks the NCHRP 3-92 panel, its staff, and its contractor, Kittelson & Associates, Inc. for delivering a high-quality manual that will greatly improve transportation engineering and planning practice in the years to come.

The committee invites those interested in improving the profession's understanding of capacity and quality of service analysis to contact us at www.AHB40.org and become involved.

For the Committee on Highway Capacity and Quality of Service (AHB40),



Richard G. Dowling
Committee Chair
October 1, 2010

Lily Elefteriadou
Committee Secretary

CHAPTER 1
HCM USER'S GUIDE

CONTENTS

CHAPTER 2
APPLICATIONS

CONTENTS

CHAPTER 3
MODAL CHARACTERISTICS

CONTENTS

CHAPTER 4
TRAFFIC FLOW AND CAPACITY CONCEPTS

CONTENTS

CHAPTER 5
QUALITY AND LEVEL-OF-SERVICE CONCEPTS

CONTENTS

CHAPTER 6
HCM AND ALTERNATIVE ANALYSIS TOOLS

CONTENTS

CHAPTER 7
INTERPRETING HCM AND ALTERNATIVE TOOL RESULTS

CONTENTS

CHAPTER 8
HCM PRIMER

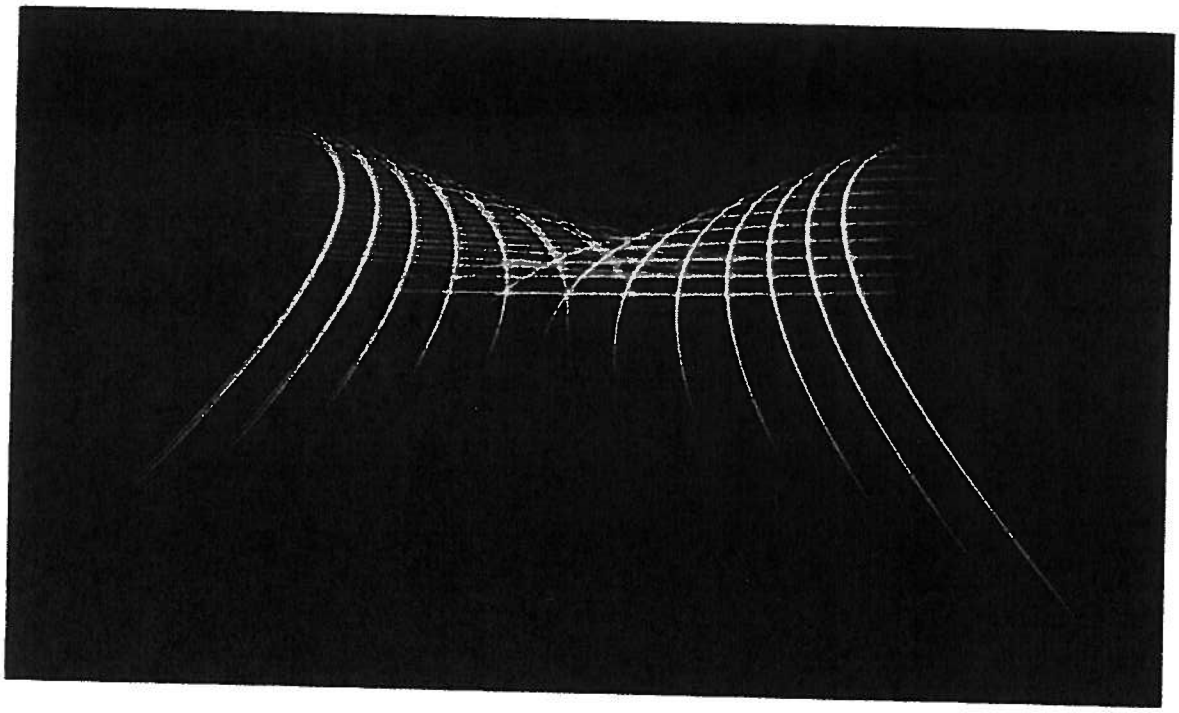
CONTENTS

CHAPTER 9
GLOSSARY AND SYMBOLS

CONTENTS

HCM2010

HIGHWAY CAPACITY MANUAL



VOLUME 2: UNINTERRUPTED FLOW

TRB TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

WASHINGTON, DC | WWW.TRB.ORG

CHAPTER 10
FREEWAY FACILITIES

CONTENTS

CHAPTER 11
BASIC FREEWAY SEGMENTS

CONTENTS

CHAPTER 12
FREEWAY WEAVING SEGMENTS

CONTENTS

CHAPTER 13
FREEWAY MERGE AND DIVERGE SEGMENTS

CONTENTS

CHAPTER 14
MULTILANE HIGHWAYS

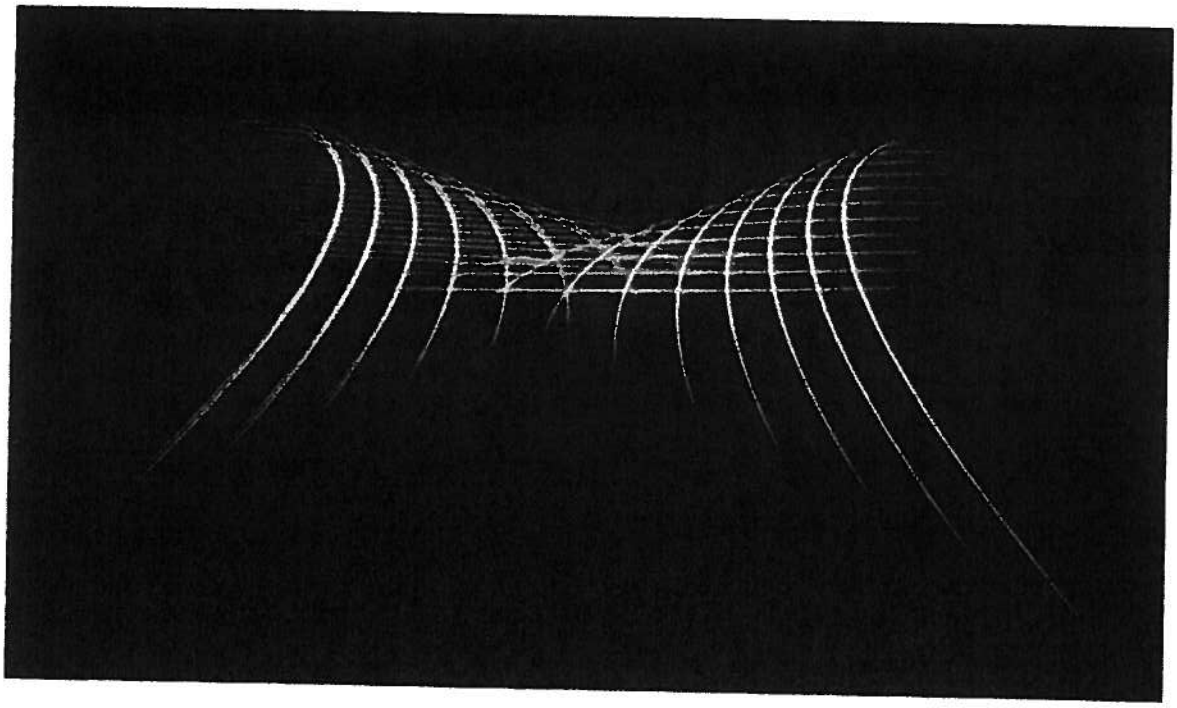
CONTENTS

CHAPTER 15
TWO-LANE HIGHWAYS

CONTENTS

HCM2010

HIGHWAY CAPACITY MANUAL



VOLUME 3: INTERRUPTED FLOW

TRB TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

WASHINGTON, DC | WWW.TRB.ORG

CHAPTER 16
URBAN STREET FACILITIES

CONTENTS

CHAPTER 17
URBAN STREET SEGMENTS

CONTENTS

CHAPTER 18
SIGNALIZED INTERSECTIONS

CONTENTS

CHAPTER 19
TWO-WAY STOP-CONTROLLED INTERSECTIONS

CONTENTS

CHAPTER 20
ALL-WAY STOP-CONTROLLED INTERSECTIONS

CONTENTS

CHAPTER 21
ROUNDABOUTS

CONTENTS

CHAPTER 22
INTERCHANGE RAMP TERMINALS

CONTENTS

CHAPTER 23
OFF-STREET PEDESTRIAN AND BICYCLE FACILITIES

CONTENTS