Highway Capacity Manual 1994

The repair, renovation and replacement of highway infrastructure, along with the provision of new highways, is a core element of civil engineering, so this book covers basic theory and practice in sufficient depth to provide a solid grounding to students of civil engineering and trainee practitioners. Moves in a logical sequence from the planning and economic justification for a highway, through the geometric design and traffic analysis of highway links and intersections, to the design and maintenance of both flexible and rigid pavements Covers geometric alignment of highways, junction and pavement design, structural design and pavement maintenance Includes detailed discussions of traffic analysis and the economic appraisal of projects Makes frequent reference to the Department of Transport’s Design Manual for Roads and Bridges Places the provision of roads and motorways in context by introducing the economic, political, social and administrative dimensions of the subject

Comparison of the 1994 Highway Capacity Manual's Ramp Analysis Procedures and the FRESIM Model

Status of the Nation's Highways, Bridges and Transit

US 101 Highway Aberdeen-Hoquiam Corridor Project, Grays Harbor County

Miller Highway Project Between West 59th Street to West 72nd Street, New York County
Driver Population Factors in Freeway Capacity

How passing cars affect the capacity of two-lane roads

Capitola Crossing

Planning the Built Environment

Unsignalized Intersection Analysis

VDOT's current policy is to use and accept from others the 1994 Highway Capacity Manual (HCM) as the basis for capacity analysis on Virginia's streets and highways. VDOT uses the latest version of the Highway Capacity Software (HCS). Software programs replicating the 1994 HCM may be used by others submitting work to VDOT for review; however, all input data and assumptions must be provided, and VDOT may use the HCS to check the submitted analysis. The analysis may be rejected if different results are obtained. To recommend appropriate revisions to this policy, this study evaluated computer software other than HCS that can be used in the analysis of signalized intersections, determining which programs provide acceptable results. The study then evaluated the results from simulation models to determine when and how to use this output in the analysis of signalized intersections. The study recommended that, in addition to HCS, VDOT use and accept from others SIGNAL94 and HCM/Cinema, or TRAF/NETSIM for capacity analysis at isolated intersections. CINCH, however, should not be used or accepted. For congested, oversaturated intersections, TRAF/NETSIM should be the preferred analysis type. Estimates of queue length at isolated signalized intersections should be derived from SIGNAL94, HCM/Cinema, or TRAF/NETSIM. For non-isolated intersections where queuing and spillback are a potential problem, simulation analysis with TRAF/NETSIM should be used instead of capacity analysis to determine the operational characteristics of the corridor.

Highway Capacity Manual

Congrès Géologique International 10e Session, Mexico, 1906

A number of methodologies have been employed to determine the operational performance, or level of service, of unsignalized intersections. The latest methodology embraced by the 1994 Highway Capacity Manual uses an average total delay measure as the determinant of level of service. This study compared field measures of delay to the values generated by the 1994 Highway Capacity Software to determine whether the new methodologies produced acceptable results for delay and level of service for two-way and all-way stop-controlled, unsignalized intersections. The relation of safety characteristics to operational performance levels at unsignalized intersections was also investigated. The objective was to create a relationship between accident rate and average total delay that determines the safety of the unsignalized intersection. Other variables were introduced, identified, and incorporated with delay into a predictive model for both two-way and all-way stop-controlled, unsignalized intersections. The findings of this study supported the statement that the unsignalized intersection module of the 1994 Highway Capacity Manual produced results comparable to manual field calculations. Although there was some slight difference between the two delays with regard to specific numbers, the values measured in the field fell within the correct ranges of level of service as determined by the two-way and all-way stop-controlled intersection 1994 Highway Capacity Manual methodologies. A relationship between safety and level of service was also determined. For the range of variables used, this model provided a basic framework for evaluating safety conditions based on the level of service and other selected characteristics at two-way stop-controlled, unsignalized intersections.
The majority of the current methods for measuring passenger car equivalent (PCE) for heavy vehicles at signalized intersections are based on headway concepts, and are mainly focused on adjusting the ideal saturation flow rate. They do not reflect the total effect of heavy vehicles on delay. The constant PCE value, which is independent of traffic volume and percentage of heavy vehicles, is inappropriate in capacity analysis when delay is considered. Among other analysis procedures, the 1985 Highway Capacity Manual (HCM) and the 1994 HCM were found to be deficient for estimating the effects of heavy vehicles. This research introduces a new method for measuring PCE for heavy vehicles at signalized intersections: Delay-Based PCE (D-PCE). Effects of heavy vehicles are examined based on their additional induced vehicular delay. Both field analysis and simulation analysis approaches for measuring Delay-Based PCE are presented. A new set of PCE values for two heavy vehicle types, single unit truck and combination truck, are recommended for use. Field analysis procedures are applied to the field data collected at seven separate signalized approaches. Delay effects of specific heavy vehicles in queue are examined in conjunction with their position in the queue and the number of vehicles queued behind them. A simulation model is presented to estimate D-PCE value under wide range of traffic volume and percentage of heavy vehicles. Signal settings, including cycle length and green time, are found to have no significant effect on Delay-Based PCE values when the traffic is undersaturated. D-PCE values are highly correlated with traffic volume and to some degree with the percentage of heavy vehicles. D-PCE values increase as the traffic volume gets heavier, and as the percentage of heavy vehicles gets greater. The general equation for estimating D-PCE values can be described as a linear relationship with the traffic volume and the reciprocal of percentage of heavy vehicles. Compared with the Delay-Based PCE, the use of 1.5 and 2.0 in HCM overestimates the capacity reduction for some traffic conditions, and underestimates it for other conditions, depending on the traffic volume and percentage of heavy vehicles.
Final Environmental Impact Statement for the Disposal and Reuse of Hunters Point Shipyard


Two-lane highways are the most predominant systems worldwide. They make up approximately 85% of Latin America's main road network which carries 76% of its traffic. A large proportion of its traffic volume (about 80%) consists of heavy vehicles and 45% of it is built on mountain or rough terrain. Parameters, such as the percentage passing delay time or average travel speed, set out in widely-used TRB-1994 Highway Capacity Manual do not correspond to conditions in Latin American countries and do not take into account other elements such as passing and distance which affect the capacity of this type of highway. In addition, the HCM's directional distribution factors for traffic need rethinking because they were determined analytically with little detail. The paper will explain the differences between the HCM and actual conditions, it will also establish the effect on passing manoeuvres and two-lane highway capacity. For the covering abstract of this conference see IRRD number 872978.

Review and Evaluation of Methods for Analyzing Capacity at Signalized Intersections

Norman H. Bangerter Highway (formerly West Valley Highway) 12600 South St to I-15, Cities of Bluffdale, Riverton, and Draper, Salt Lake County

Extent of Highway Capacity Manual Use in Planning

Highway Engineering


"This new edition of the HCM adds a subtitle: A Guide for Multimodal Mobility Analysis. This underscores the HCM's focus on evaluating the operational performance of several modes, including pedestrians and bicycles, and their interactions. It is called the 6th Edition, with no year attached, and each chapter indicates a version number, to allow for updates."--PageVI-1.

Marine Corps Air Station El Toro, Disposal and Reuse

Revised Draft Environmental Impact Statement/environmental Impact Report for the Disposal and Reuse of Hunters Point Shipyard

TRB's National Cooperative Highway Research Program (NCHRP) Synthesis 427: Extent of Highway Capacity Manual Use in Planning assesses how state departments of transportation, small and large metropolitan planning organizations, and local governments are using or might use the Highway Capacity Manual for planning analyses, or more specifically, for performance monitoring, problem identification, project prioritization, programming, and decision-making.
processes.

The Highway Capacity Manual: A Conceptual and Research History Volume 2

Dr Goh Keng Swee was Singapore’s first Minister for Finance from 1959 to 1965 who initiated Singapore’s first industrial estate now known as Jurong Town. He was also the first and longest serving Defence Minister after Singapore became independent in 1965, responsible for building up the Singapore Armed Forces from scratch. Later he became Minister for Education in 1981 and revamped the education system to what it is today. Dr Goh was also concurrently Deputy Prime Minister from 1973 to 1984 during which time he set up the Monetary Authority of Singapore. While Dr Goh’s public career and achievements are well documented in press reports and archival records as well as in photographs and speeches, what is missing is an insight and exposition of Dr Goh as an individual in his various roles. Goh Keng Swee: A Public Career Remembered seeks to provide this missing dimension of Dr Goh as a person to work for. Thirty-eight persons who had the opportunity of closely observing or working with Dr Goh have contributed their reflections and recollections of Dr Goh as a person, colleague and “boss”, to this book. They have given candid and personal pen portraits of an unusual leader and minister, revealing a glimpse of the working habits of Dr Goh not known to most people. Drawn from oral histories and recent interviews, these reminiscences have been chronologically arranged, from those who recalled what it was like to work alongside Dr Goh on the Malayan Forum in London in the early 1950s, through his various ministerial positions, to travelling with Dr Goh after he “retired” from politics in 1984. What emerges from these anecdotes of Dr Goh is that he could be an extremely demanding “boss”, who could also be very supportive of his subordinates. They show him to be a person with a very inquisitive and creative mind capable of making great leaps of lateral thinking, able to connect disparate ideas and data to propose new and innovative solutions to intractable policy problems. He was truly a Singaporean for all seasons.

Safety and Level of Service

Comparison of the 1994 Highway Capacity Manual’s Ramp Analysis Procedures and the FRESIM Model

Expansion of the Centers for Disease Control and Prevention, Clifton Road Campus

Phase 1 Regional Rail System, Durham and Wake Counties

Planning the Built Environment takes a systematic, technical approach to describing how urban infrastructures work. Accompanied by detailed diagrams, illustrations, tables, and reference lists, the book begins with landforms and progresses to essential utilities that manage drainage, wastewater, power, and water supply. A section on streets, highways, and transit systems is highly detailed and practical. Once firmly grounded in these “macro” systems, Planning the Built Environment examines the physical environments of cities and suburbs, including a discussion of critical elements such as street and subdivision planning, density, and siting of community facilities. Each chapter includes essential definitions, illustrations and diagrams, and an annotated list of references. This timely book explains new physical planning methods and current thinking on cluster development, new urbanism, and innovative transit planning and development. Planners, architects, engineers, and anyone who designs or manages the physical components of urban areas will find this book both an authoritative reference and an exhaustive, understandable technical manual of facts and best practices. Instructors in planning and allied fields will appreciate the practical exercises that conclude each chapter: valuable learning tools for students and professionals alike.

Hunters Point (Former) Naval Shipyard Disposal and Reuse

Since 1950, the Highway Capacity Manual has been a standard used in the planning, design, analysis, and operation of virtually any highway traffic facility in the United States. It has also been widely used abroad, and has spurred the development of similar manuals in other countries. The twin concepts of capacity and level of service have been developed in the manual, and methodologies have been presented that allow highway traffic facilities to be designed on a common basis, and
allow for the analysis of operational quality under various traffic demand scenarios. The manual also addresses related pedestrian, bicycle, and transit issues. This book details the fundamental development of the concepts of capacity and level of service, and of the specific methodologies developed to describe them over a wide range of facility types. The book is comprised of two volumes. Volume 1 (this book) focuses on the development of basic principles, and their application to uninterrupted flow facilities: freeways, multilane highways, and two-lane highways. Weaving, merging, and diverging segments on freeways and multilane highways are also discussed in detail. Volume 2 focuses on interrupted flow facilities: signalized and unsignalized intersections, urban streets and arterials. It is intended to help users of the manual understand how concepts, approaches, and specific methodologies were developed, and to understand the underlying principles that each embodies. It is also intended to act as a basic reference for current and future researchers who will continue to develop new and improved capacity analysis methodologies for many years to come.

**Stopped and Control Delay at Signalized Intersections**

Since 1950, the Highway Capacity Manual has been a standard used in the planning, design, analysis, and operation of virtually any highway traffic facility in the United States. It has also been widely used around the globe and has inspired the development of similar manuals in other countries. This book is Volume II of a series on the conceptual and research origins of the methodologies found in the Highway Capacity Manual. It focuses on the most complex points in a traffic system: signalized and unsignalized intersections, and the concepts and methodologies developed over the years to model their operations. It also includes an overview of the fundamental concepts of capacity and level of service, particularly as applied to intersections. The historical roots of the manual and its contents are important to understanding current methodologies, and improving them in the future. As such, this book is a valuable resource for current and future users of the Highway Capacity Manual, as well as researchers and developers involved in advancing the state-of-the-art in the field.

**Session 10**

**Route 37 Highway Transportation Improvement, Construction from VA-37/I-81/US 11 (south) to VA-37/US-11 (north), Frederick County**

**Development of a Methodology for Measuring Delay-based Passenger Car Equivalent for Heavy Vehicles at Signalized Intersections**

**USH-12, Lake Delton to Sauk City (IH 90/94 to Ski Hi Road), Sauk County**

**Traffic And Granular Flow**

**Comparison of the 1994 Highway Capacity Manual's Ramp Analysis Procedures and the FRESIM Model**

**The Highway Capacity Manual: A Conceptual and Research History**

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