

Highway Capacity Manual 6th Edition

A Guide for Multimodal Mobility
Analysis

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Presenter

Presented by:
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With Thanks To:

- § Paul Ryus, Kittelson & Associates
- § Bastian Schroeder, Kittelson & Associates
- § Lee Rodegerdts, Kittelson & Associates

HCM production team:



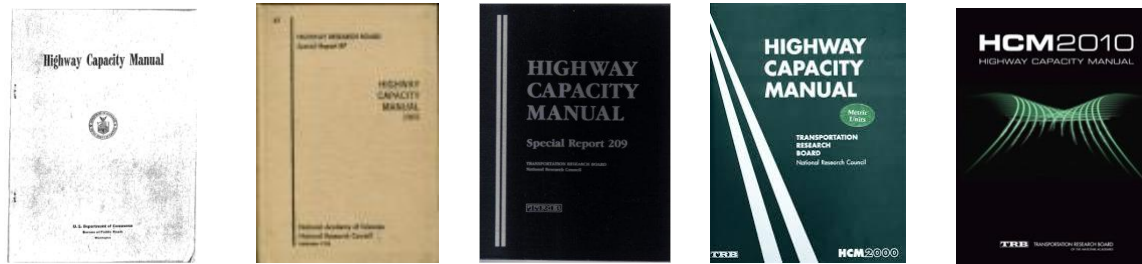
Dr. Roger Roess

Outline

- § Introduction and Overview
- § Volume 1: Concepts
- § Volume 2: Uninterrupted Flow
- § Volume 3: Interrupted Flow
- § Volume 4: Applications Guides
- § Planning & Preliminary Engineering
Applications Guide to the HCM
- § Questions

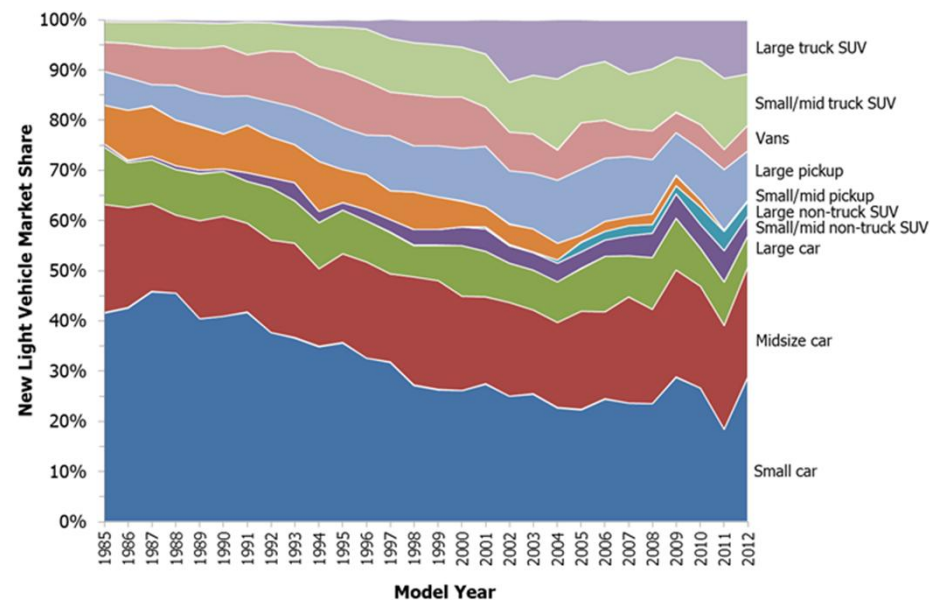
A Brief History of the HCM

- § 1950: focus on capacity
- § 1965: LOS concept, bus transit chapter
- § 1985: new research, pedestrians, bicycles
 - 1994 & 1997 updates
- § 2000: new research, multiple parts
- § 2010: new research, multimodal focus, four volumes



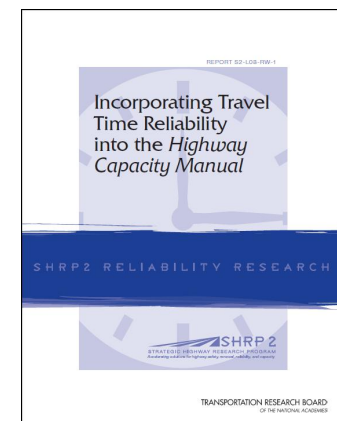
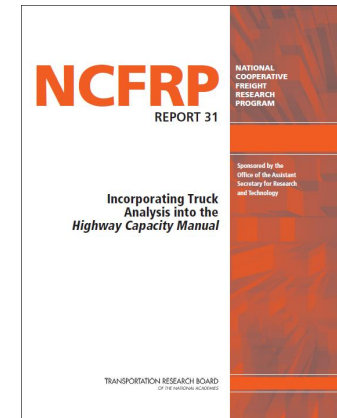
The Need for New Research

- § Changes in driver behavior
- § Changes in vehicle fleet mix & capabilities
- § Increasing use of certain roadway features in the U.S.
 - Roundabouts, alternative intersections, managed lanes
- § Greater methodological sensitivity to factors influencing roadway performance
- § Broader range of performance measures



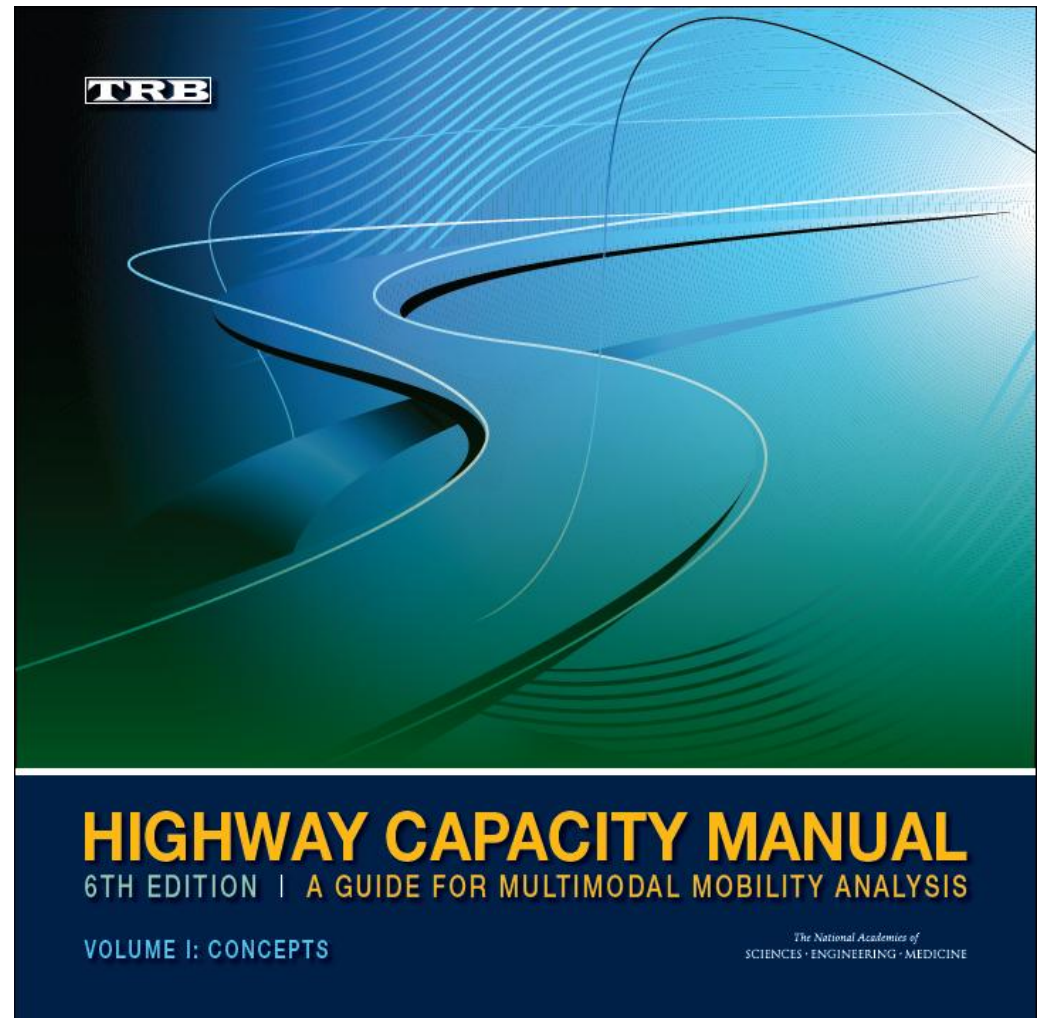
National Research Since HCM 2010

- § NCFRP 41: truck analysis
- § NCHRP 03-96: managed lanes
- § NCHRP 03-100: roundabouts in corridors
- § NCHRP 03-107: work zone capacity
- § NCHRP 03-115: HCM production
- § NCHRP 07-22: planning guide to HCM
- § SHRP 2 L08: travel time reliability
- § FHWA: ATDM, roundabouts, alternative intersections



HCM 6th Edition: A Guide to Multimodal Mobility Analysis

§ Arriving in late July



Not Much Different on the Outside...

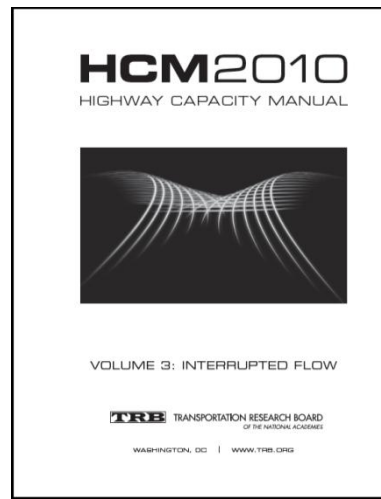
Printed HCM



Volume 1:
Concepts

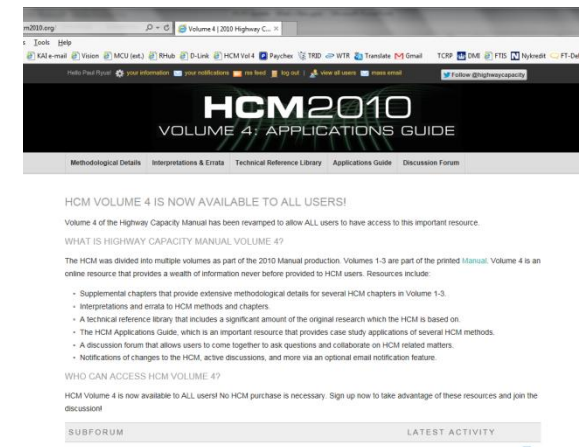


Volume 2:
Uninterrupted
Flow



Volume 3:
Interrupted
Flow

Online



Volume 4:
Applications
Guide

...But Significant Changes on the Inside

- § New Chapters 11 and 17 on travel time reliability
- § Basic freeway segment and multilane highway methods combined
- § Many new and updated methods
 - Managed lanes, work zones, alternative intersections and interchanges, urban street queue spillback, truck effects on freeway operations, and more
- § Greater focus on providing the information users need to apply HCM methods in software and interpret the results

HCM 6th Edition – Uninterrupted Flow Chapters

- § Chapter 10: Freeway Facilities
- § Chapter 11: Freeway Reliability Analysis
- § Chapter 12: Basic Freeway and Multilane Highway Segments
- § Chapter 13: Freeway Weaving Segments
- § Chapter 14: Freeway Merge and Diverge Segments
- § Chapter 25: Freeway Facilities Supplemental
- § Chapter 26: Freeway and Highway Segments Supplemental
- § Chapter 27: Freeway Weaving Supplemental
- § Chapter 28: Freeway Merges and Diverges Supplemental

Chapter 10 - Freeway Facility Methodology

- § Revised presentation of method and computational steps (NCHRP 03-115)
- § Improved segmentation guidance for freeway facilities (NCHRP 03-115)
- § New generic speed-flow models (NCHRP 03-115)
- § New heavy vehicle impact estimation methods (NCFRP 41)
- § Integration of materials on manages lanes (NCHRP 3-96)
- § Integration of materials on work zones (NCHRP 03-107)
- § Planning methodology for freeway facilities (NCHRP 07-22)
- § New guidance for method calibration and validation (NCHRP 03-115)
- § FREEVAL Computational Engine Updated in JAVA code (NCHRP 03-115)

Chapter 11 – Freeway Reliability Analysis

- § Standalone, new chapter in HCM 6th Edition
- § Updates the freeway travel time reliability materials from former Chap 36 & 37 in HCM2010 (SHRP-2, L08)
- § Description of the computational steps has been revised to more clearly present individual steps
- § Scenario generation process for freeway reliability analysis has been revised
 - Reduce number of scenarios and runtime
 - Improve modeling and using a Java Platform for computational engine

Volume 3: Interrupted Flow Chapters

Printed Chapters

16. Urban Street Facilities
17. Urban Street Reliability and ATDM
18. Urban Street Segments
19. Signalized Intersections
20. Two-Way Stop-Controlled Intersections
21. All-Way Stop-Controlled Intersections
22. Roundabouts
23. Ramp Terminals and Alternative Intersections
24. Off-Street Pedestrian and Bicycle Facilities

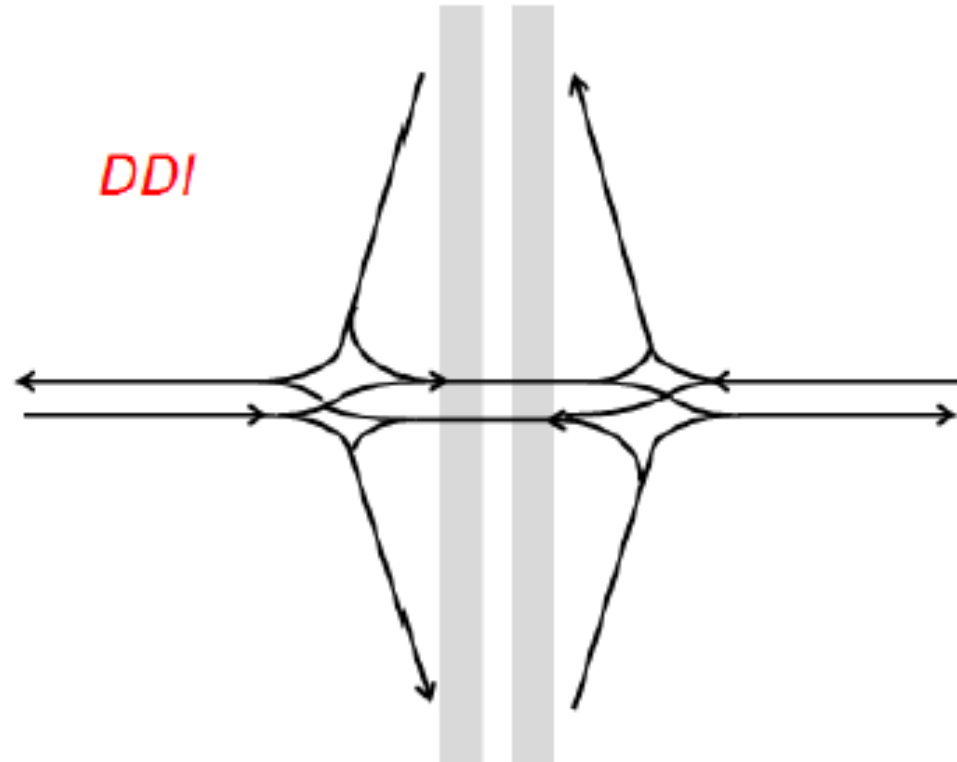
Signalized Intersections: Planning Application Comparison

- § Quick Estimation Method (QEM) (HCM 2010)
 - Requires calculation of delay to complete evaluation
- § Planning-Level Analysis Application (HCM 6th Edition)
 - Two-part procedure
 - First part produces estimate of “sufficiency”
 - § “Under”, “Near”, or “Over” capacity
 - Second part produces delay estimate and LOS
 - § This part is used if delay and LOS are desired

Ramp Terminals

§ New Interchange Configuration

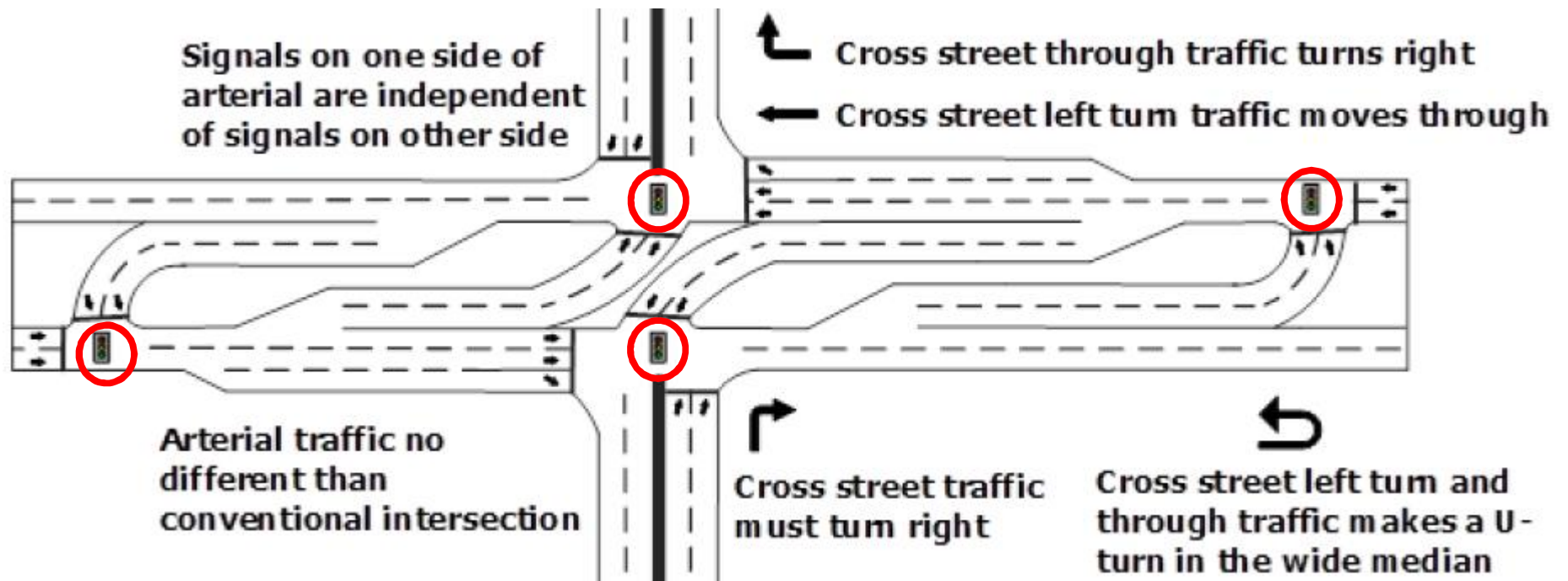
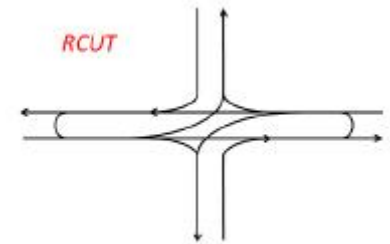
- Diverging diamond interchange (DDI)
 - § Crossover at each terminal



Alternative Intersections

§ Restricted Crossing U-Turn

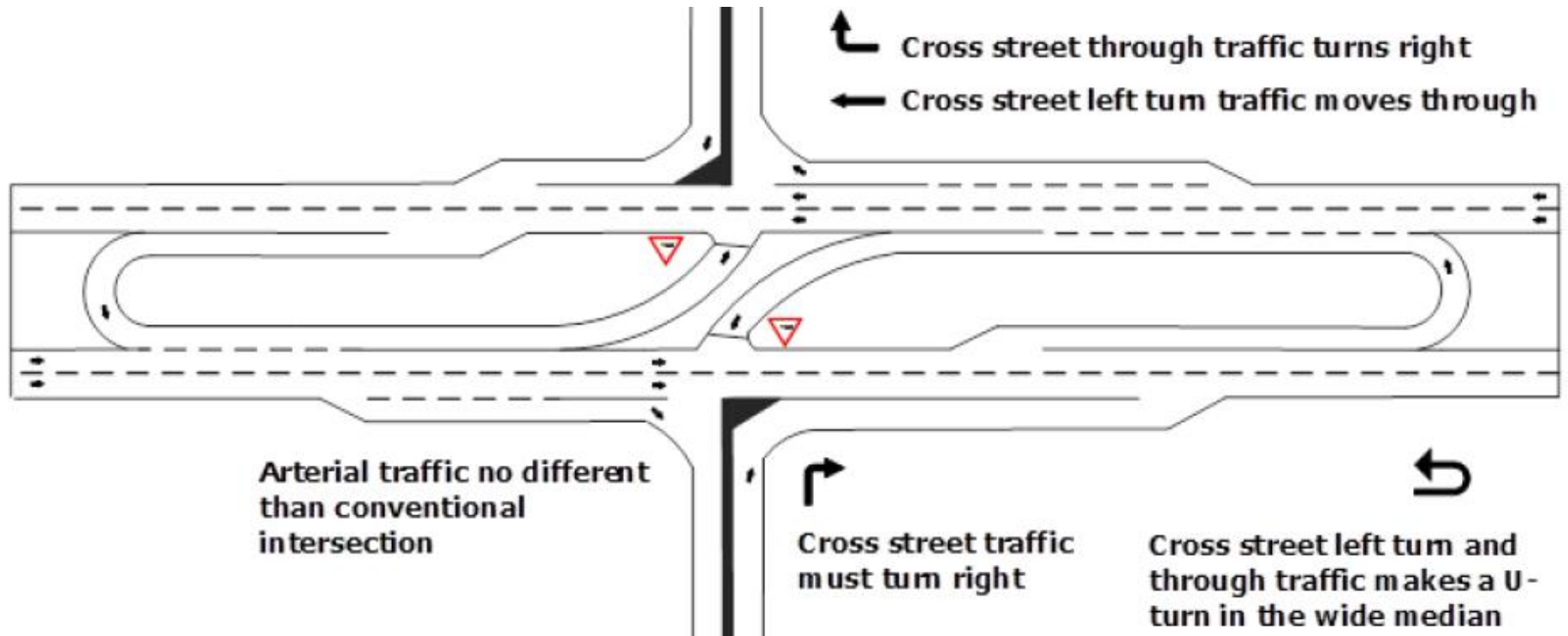
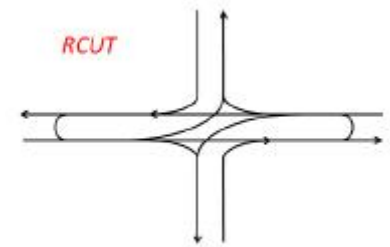
- Four-legged RCUT with signals



Alternative Intersections

§ Restricted Crossing U-Turn

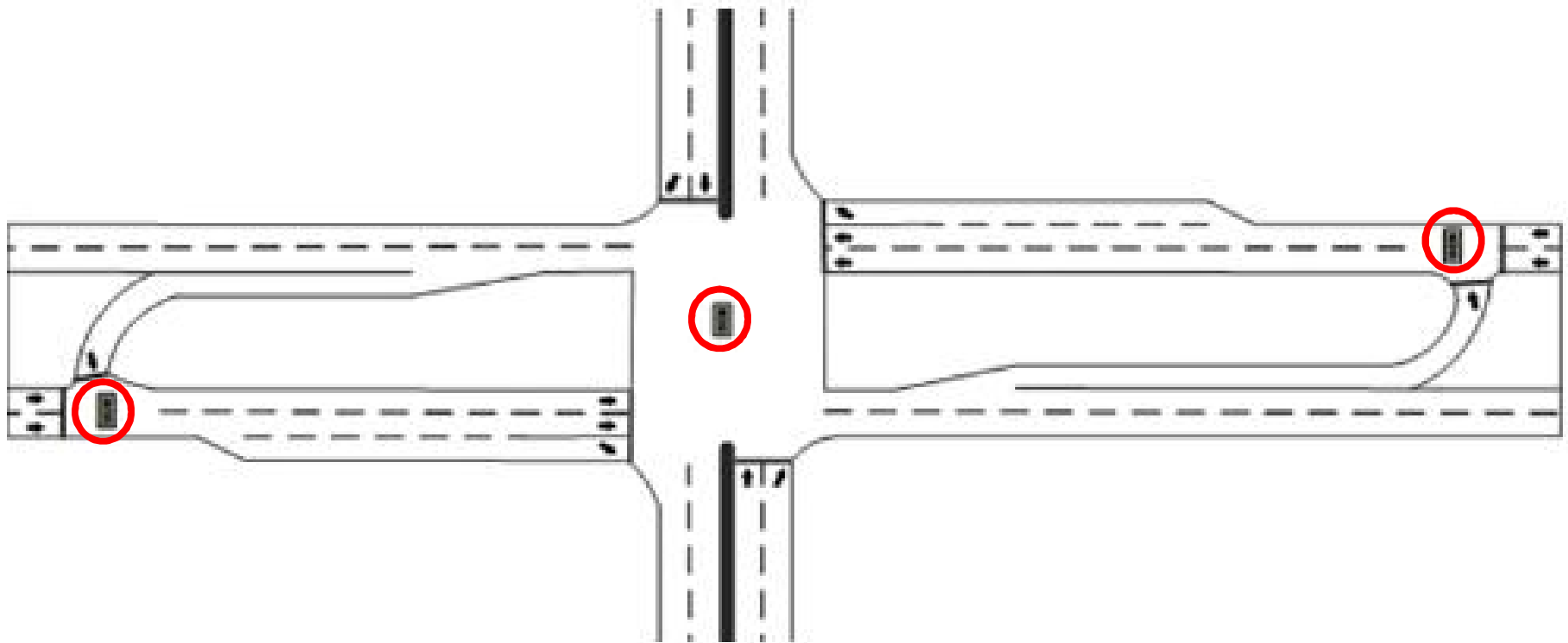
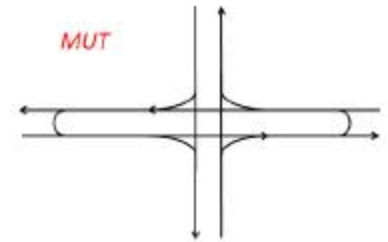
- Four-legged RCUT w/merges and diverges



Alternative Intersections

§ Median U-Turn

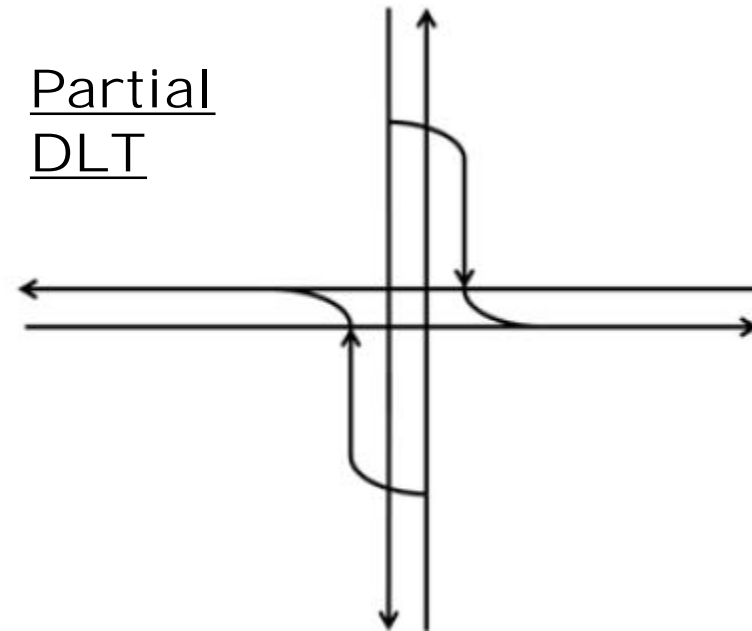
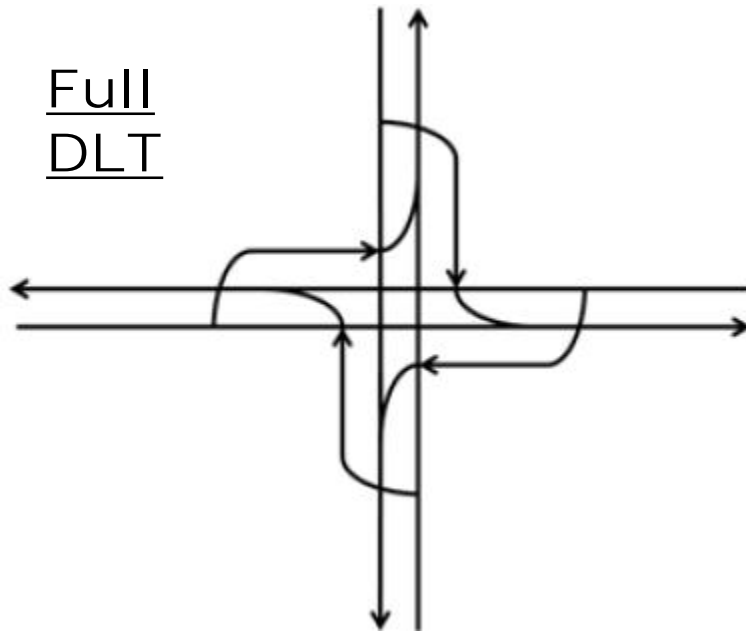
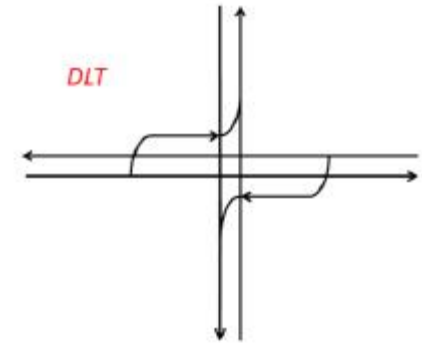
- Four-legged MUT with signals
- § Can also have stop signs



Alternative Intersections

§ Displaced Left Turn

- Configurations
 - § Partial DLT
 - § Full DLT



Roundabout Methodology

§ Modified Capacity Equations

- New coefficients for existing equations
- Calibrated to recently collected data
- Predicted capacity tends to be higher

Entry Lanes	Opposing Lanes	Capacity by HCM Version and Conflicting Volume, veh/h			
		HCM 2010		HCM 6 th Edition	
		$V_c = 0$ vph	$V_c = 1000$ vph	$V_c = 0$ vph	$V_c = 1000$ vph
1	2	1130	561	1420	607
Right	2	1130	561	1420	607
Left	2	1130	534	1350	538
1	1	1130	416	1380	498
R or L	1	1130	416	1420	572

Segment Methodology

§ Roundabout Segment



- New addition to the HCM 6th Edition
- Based largely on NCHRP Report 772, Evaluating the Performance of Corridors with Roundabouts
- Objective
 - § Evaluate the operation of vehicles traveling along a segment bounded by roundabouts



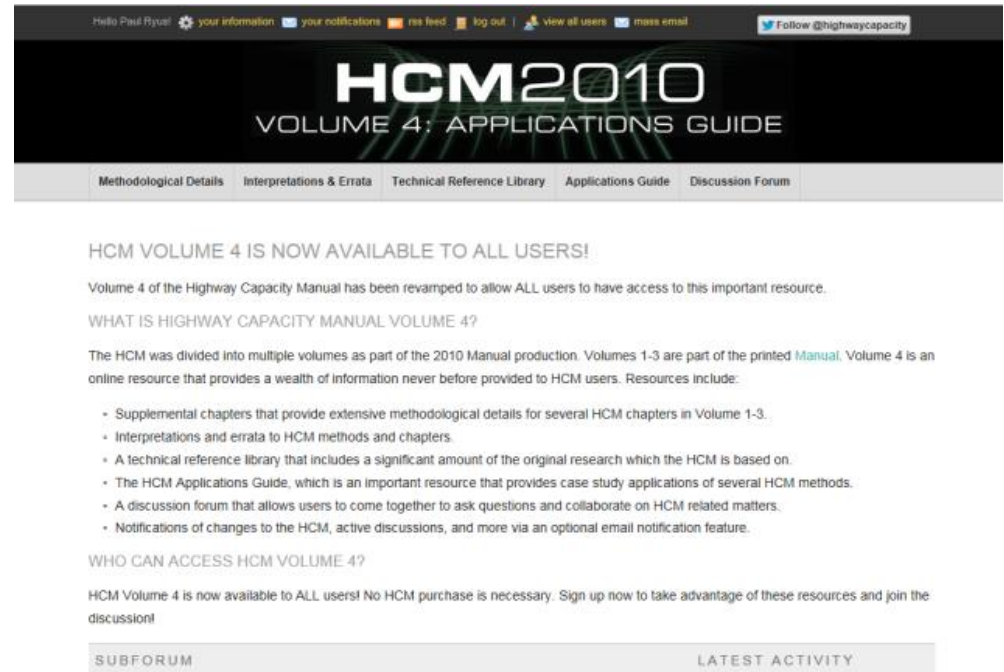
HCM Volume 4

§ Will be online at hcm.trb.org

§ Open to all, including those who don't have a personal copy of the HCM

- Must sign up for a free user account to get access

§ Until the 6th Edition is released, continue to access Volume 4 at www.hcm2010.org



The screenshot shows the top navigation bar of the HCM2010 website. It includes a user profile section with 'Hello Paul Ryan!', 'your information', 'your notifications', 'rss feed', 'log out', 'view all users', and 'mass email'. A social media link for 'Follow @highwaycapacity' is also present. The main header features the title 'HCM2010 VOLUME 4: APPLICATIONS GUIDE' in large, bold letters. Below the header is a navigation menu with tabs for 'Methodological Details', 'Interpretations & Errata', 'Technical Reference Library', 'Applications Guide', and 'Discussion Forum'. The main content area contains the following text:

HCM VOLUME 4 IS NOW AVAILABLE TO ALL USERS!

Volume 4 of the Highway Capacity Manual has been revamped to allow ALL users to have access to this important resource.

WHAT IS HIGHWAY CAPACITY MANUAL VOLUME 4?

The HCM was divided into multiple volumes as part of the 2010 Manual production. Volumes 1-3 are part of the printed [Manual](#). Volume 4 is an online resource that provides a wealth of information never before provided to HCM users. Resources include:

- Supplemental chapters that provide extensive methodological details for several HCM chapters in Volume 1-3.
- Interpretations and errata to HCM methods and chapters.
- A technical reference library that includes a significant amount of the original research which the HCM is based on.
- The HCM Applications Guide, which is an important resource that provides case study applications of several HCM methods.
- A discussion forum that allows users to come together to ask questions and collaborate on HCM related matters.
- Notifications of changes to the HCM, active discussions, and more via an optional email notification feature.

WHO CAN ACCESS HCM VOLUME 4?

HCM Volume 4 is now available to ALL users! No HCM purchase is necessary. Sign up now to take advantage of these resources and join the discussion!

At the bottom of the screenshot, there are two tabs: 'SUBFORUM' and 'LATEST ACTIVITY'.

Objectives for a Planning Guide

§ NCHRP Project 07-22 was funded to develop a planning counterpart to the HCMAG that would describe:

- Appropriate use of the HCM to a broad spectrum of planning applications
- Use of default values and other HCM tools
- Use of the HCM in scenario planning
- Coordinated use of HCM with planning models
- Use of the HCM in evaluating oversaturated conditions in a planning context

NCHRP Report 825: Planning & Preliminary Engineering Applications Guide

§ Arriving in late August

