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TRB TRANSPORTATION RESEARCH BOARD

TRB Webinar: What's New in the HCM7 and Why It Matters

June 7, 2022

11:30 am – 1:00 pm Eastern

PDH Certification Information

1.5 Professional Development Hours (PDH) – see follow-up email

You must attend the entire webinar.

Questions? Contact Beth Ewoldsen at Bewoldsen@nas.edu

The Transportation Research Board has met the standards and requirements of the Registered Continuing Education Providers Program. Credit earned on completion of this program will be reported to RCEP. A certificate of completion will be issued to participants that have registered and attended the entire session. As such, it does not include content that may be deemed or construed to be an approval or endorsement by RCEP.

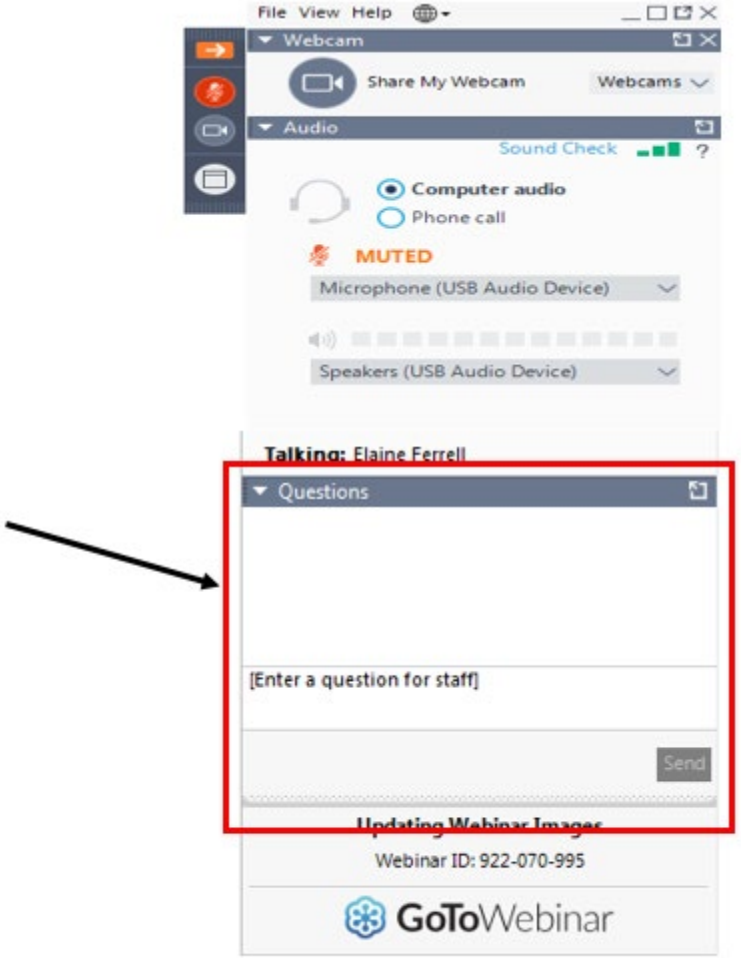
RCEP
REGISTERED CONTINUING EDUCATION PROGRAM

Learning Objectives

- Assess new materials and methods contained in HCM7 and understand the differences from prior versions of the manual
- Identify new facilities and systems that can be analyzed using HCM7 methods
- Utilize new and existing multimodal methods in HCM7
- Assess the potential impacts of on roadway capacity

Questions and Answers

- Please type your questions into your webinar control panel
- We will read your questions out loud, and answer as many as time allows



What is new in the

7th Edition of the Highway Capacity Manual

Bastian Schroeder, PhD, PE
Kittelson & Associates, Inc.

Tom Creasey, PhD, PE
Caliper Corporation

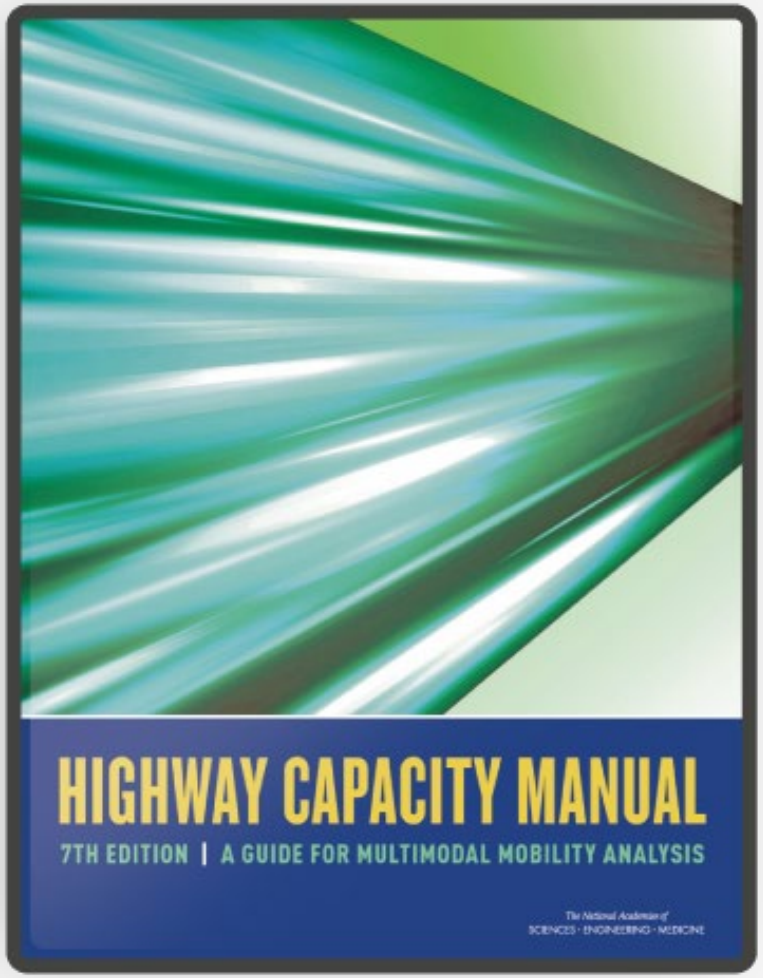
Behzad Aghdashi, PhD, PMP
McTrans Center, UFTI

Agenda

- Overview of Changes in HCM 7th Edition
- Other NCHRP Projects on the Horizon
- Where do we go from here?

About HCM

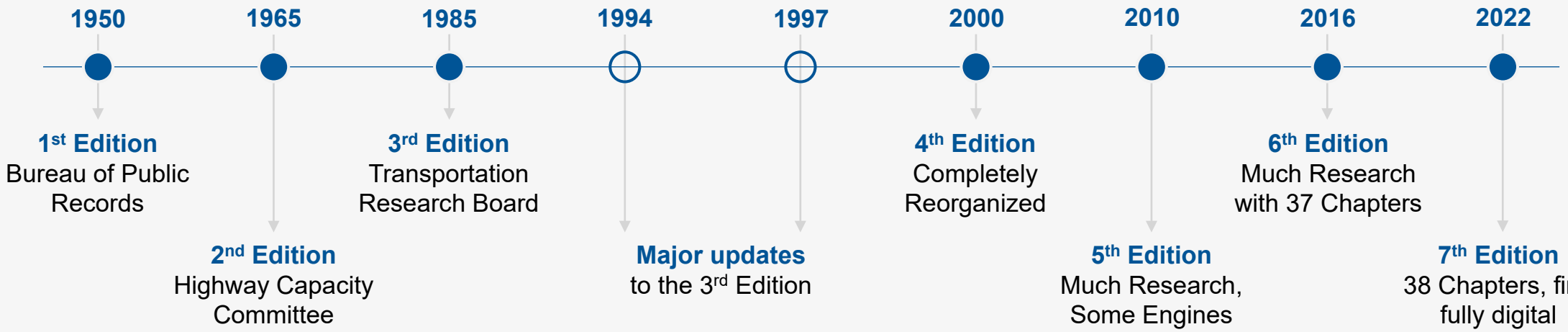
- Overseen by TRB[1] Committee on Highway Capacity and Quality of Service (hcqstrb.org)
- Most methods are developed via national-level projects such as NCHRPs[2].
- Four Volumes:
  - I. Concepts
  - II. Uninterrupted Flow
  - III. Interrupted Flow
  - IV. Applications Guide (Online only)



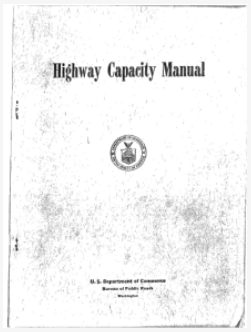
[1]TRB: Transportation Research Board
[2]NCHRP: National Cooperative Highway Research Program

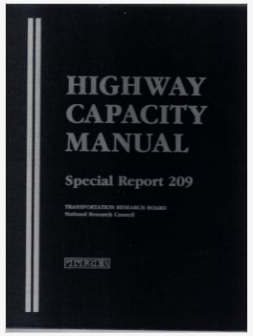
HCM History

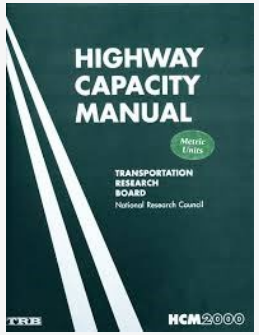
HCM Releases:

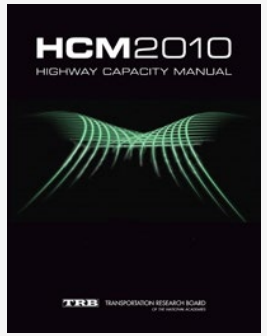


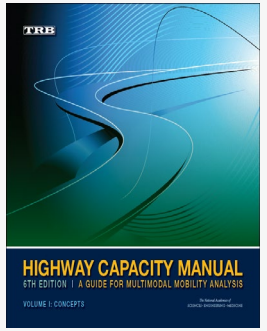
Growth in HCM Content

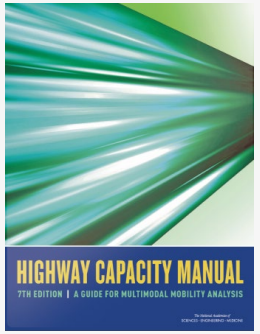




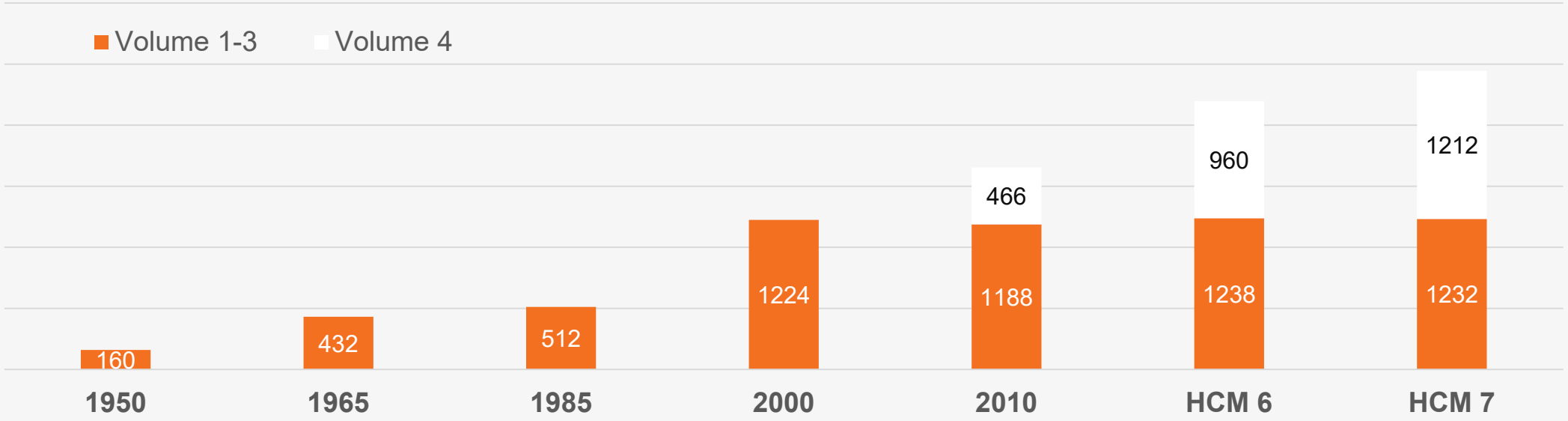






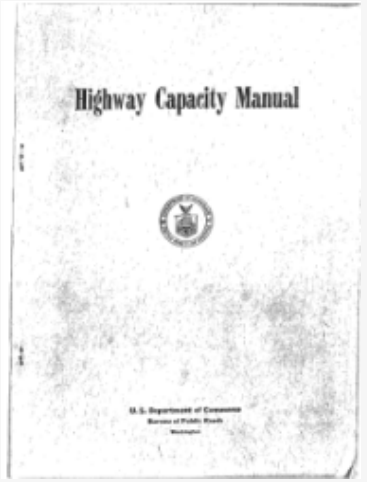


Number of Pages



History of Major Changes and Updates

- 1950: First document to quantify concept of capacity
- 1965: Introduce LOS concept, bus transit chapter
- 1985: Significant new research, pedestrians, bicycles
  - ✓ 1994 & 1997 updates
- 2000: Divided into multiple parts, new research
  - ✓ Multi-period analysis for freeway facilities
  - ✓ New and updated methodologies for two-lane highways, multilane highways, freeways, traffic signals, and transit
- 2010: Significant new research, four volumes
  - ✓ Multimodal methods integrated in chapters
  - ✓ New methods on ramp terminals, roundabouts, freeway weaving, urban street operations, shared-use paths, and active traffic management
  - ✓ Introduced electronic volume IV
- HCM 6th Edition: Released in 2016
  - ✓ New travel time reliability method
  - ✓ Active travel and demand management (ATDM) and Managed lanes
  - ✓ New methods for work zones, alternative intersections, roundabouts in corridors, and trucks



A practical guide by which the engineer, having determined the essential facts, can design a new highway or revamp an old one with assurance that the resulting capacity will be as calculated.

New Research Resulting in 7th Edition of HCM

Research Project	Project Title	HCM Chapter(s) Updated
NCHRP 17-87	Enhancing Pedestrian Volume Estimation and Developing HCM Pedestrian Methodologies for Safe and Sustainable Communities	Updated Chapters 18, 19, 20, 30, 31 & 32
FHWA Pooled Fund TPF-5(371)	Capacity Adjustment Factors for Connected and Automated Vehicles (CAV) in the Highway Capacity Manual	Updated Chapter 26, 31 & 33
NCHRP 17-65	Improved Analysis of Two-Lane Highway Capacity and Operational Performance	New Chapter 15
FHWA (FHWA-HOP-16-088)	Active Transportation and Demand Management (ATDM) Analytical Methods for Urban Streets	Updated Chapters 17 & 37
NCHRP 15-57	Highway Capacity Manual Methodologies for Corridors Involving Freeways and Surface Streets	New Chapter 38

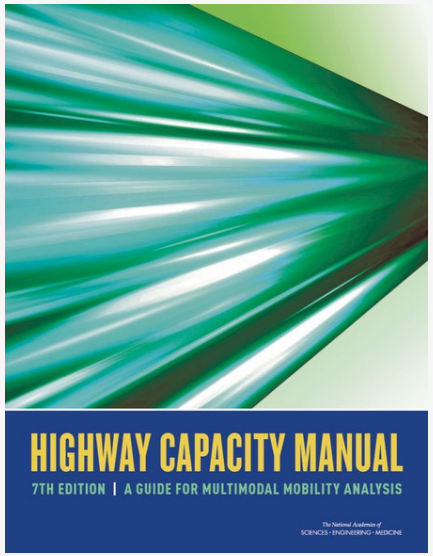
Various errata changes and interpretations

Ongoing/Active Research Impacting Future Releases of HCM

NCHRP 03-133	Traffic Signal Design and Operations Strategies for Non-Motorized Users
NCHRP 07-26	Update to HCM Merge, Diverge, and Weaving Methods
NCHRP 15-66	Arterial Weaving Methodology
NCHRP 03-130	Guide for Roundabouts
NCHRP 08-135	Reliability and Quality of Service Evaluation Methods for Rural Highways
NCHRP 17-98	Guide for Intersection Control Evaluation

7th Edition of HCM Structure and Organization

Printed HCM

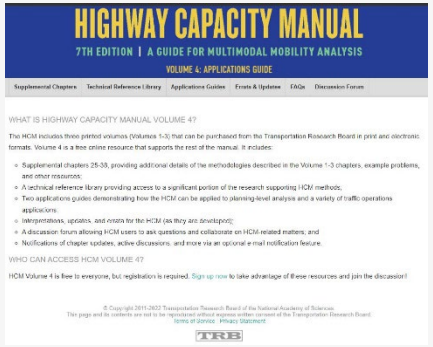


Volume 1:
Concepts

Volume 2:
Uninterrupted Flow

Volume 3:
Interrupted Flow

Online

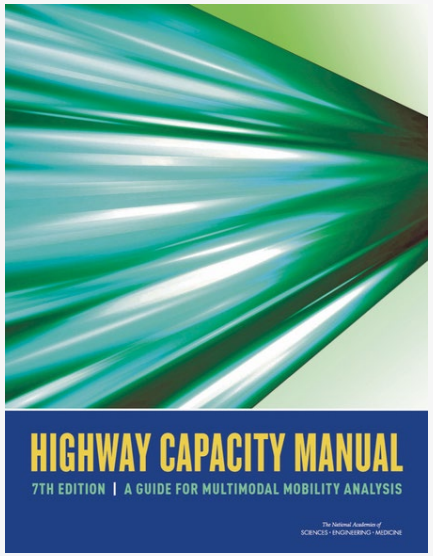


Volume 4:
Applications Guide

The HCM7 is available in a digital version

7th Edition of HCM Structure and Organization

Printed HCM/e-book



Volume 1:
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Volume 2:
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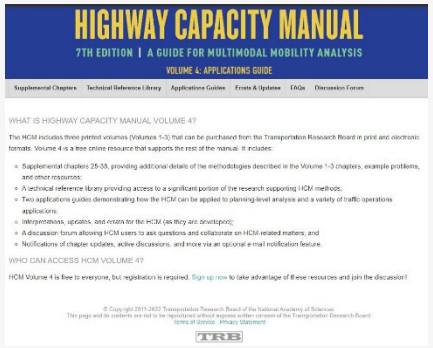
Volume 3:
Interrupted Flow

Online/e-book*



Volume 4:
Applications Guide

* Supplemental chapters only

Volume 1: basic grounding in concepts

Volumes 2 and **Volume 3**: information to apply and interpret results of an operations-level analysis

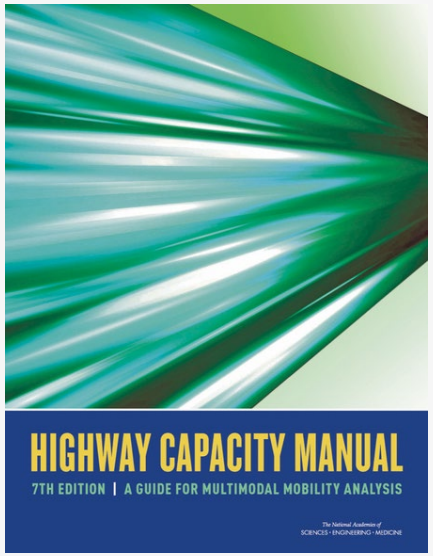
- Input data requirements
- Calculation steps
- Sensitivity of results to inputs

Volume 4: resources

- Example problems
- Details of complex methods
- Planning-level methods

7th Edition of HCM Structure and Organization

Printed HCM



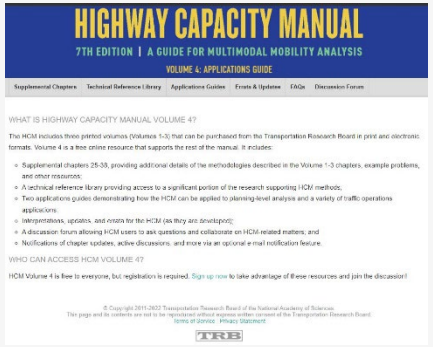
Volume 1: Concepts

1. HCM User's Guide
2. Applications
3. Modal Characteristics
4. Traffic Operations and Capacity Concepts
5. Quality-of-Service Concepts
6. HCM and Alternative Analysis Tools
7. Interpreting HCM and Alternative Tool Results
8. HCM Primer
9. Glossary and Symbols

Volume 2: Uninterrupted Flow

Volume 3: Interrupted Flow

Online

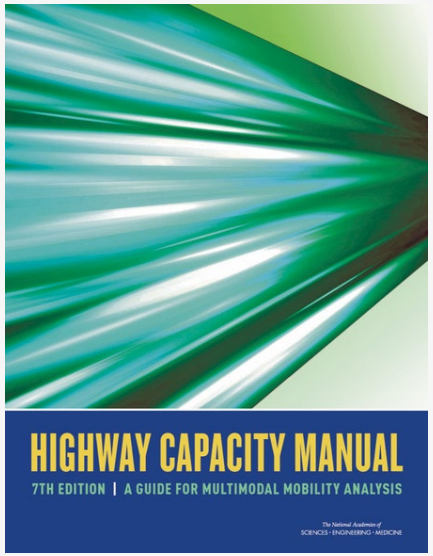


Volume 4: Applications Guide

36. Concepts: Supplemental
37. ATDM: Supplemental

7th Edition of HCM Structure and Organization

Printed HCM



Volume 1:
Concepts

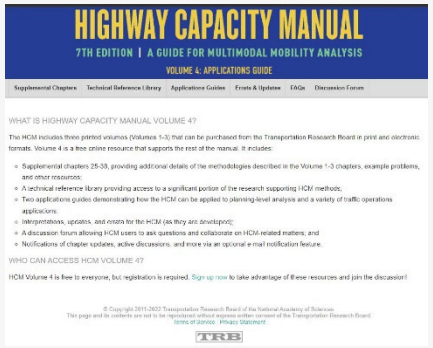
Volume 2:
Uninterrupted Flow

10. Freeway Facilities Core Methodology
11. Freeway Reliability Analysis
12. Basic Freeway and Multilane Highway Segments
13. Freeway Weaving Segments
14. Freeway Merge and Diverge Segments
15. Two-Lane Highways

Volume 3:
Interrupted Flow

25. Freeway Facilities: Supplemental
26. Freeway and Highway Segments: Supplemental
27. Freeway Weaving: Supplemental
28. Freeway Merges and Diverges: Supplemental
38. Network Analysis

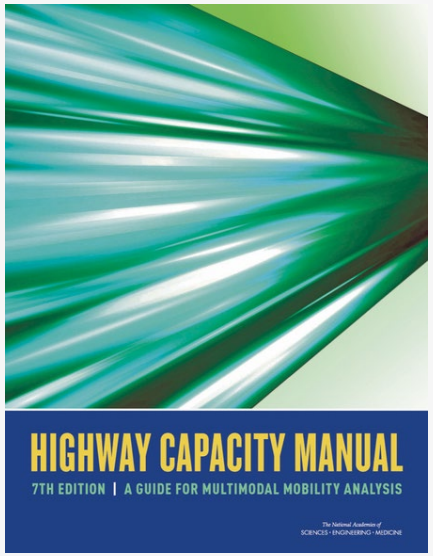
Online



Volume 4:
Applications Guide

7th Edition of HCM Structure and Organization

Printed HCM



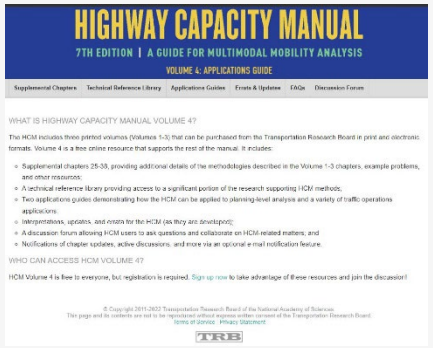
Volume 1:
Concepts

Volume 2:
Uninterrupted Flow

Volume 3:
Interrupted Flow

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

Online



Volume 4:
Applications Guide

29. Urban Street Facilities: Supplemental
30. Urban Street Segments: Supplemental
31. Signalized Intersections: Supplemental
32. Stop-Controlled Intersections: Supplemental
33. Roundabouts: Supplemental
34. Interchange Ramp Terminals: Supplemental
35. Pedestrians and Bicycles: Supplemental

Enhanced Pedestrian Evaluation Methods

NCHRP 17-87

Existing HCM Pedestrian Methods

Many pedestrian methods (and metrics) already in HCM

- Urban streets
- Signalized intersections
- TWSC intersections and midblock crossings
- Off-street paths (pedestrian-only and multi-use)

What's New: Uncontrolled Crossings (TWSC & Midblock)

HCM6: Current method

- LOS based on pedestrian delay
- LOS sensitive to:
  - Hourly traffic flow rate
  - Motorist yielding rate

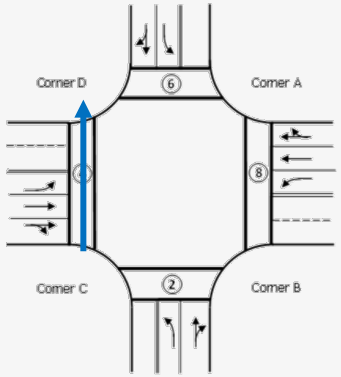
HCM7: New method

- LOS based on percentage (dis)satisfied pedestrians
- LOS sensitive to:
  - Hourly traffic flow rate
  - AADT
  - Motorist yielding rate
  - Specific crossing treatments (marked crosswalk, median island, RRFB)
- Delay is still calculated and is sensitive to the design pedestrian (assumed pedestrian speed)
- Corrections to the HCM6 motorist yielding procedure

What's New: Signalized Crossing Delay

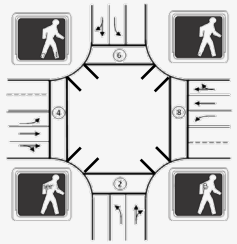
HCM6: Current method

- Delay estimated for single-leg, single-stage crossings
- Guidance to sum delay results for multiple-leg crossings
- LOS based on "pedestrian LOS score" (uses multiple factors relating to crossing experience)
- Corner and crosswalk circulation area calculated before delay & LOS

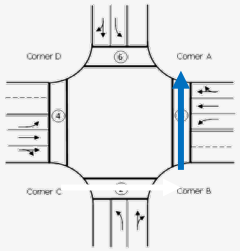


HCM7: New method

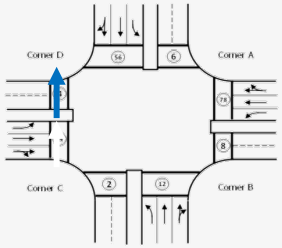
- Delay also estimated for multiple-leg and multiple-stage crossings
- Delay calculation recognizes that second stage/leg arrival is not random
- LOS continues to be based on pedestrian LOS score
- Corner and crosswalk circulation area become optional calculation steps



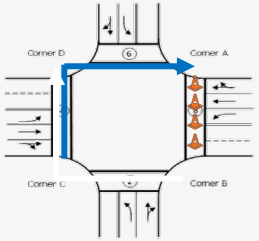
Barnes dance / pedestrian scramble



Two-leg crossing



Two-stage crossing with median refuge

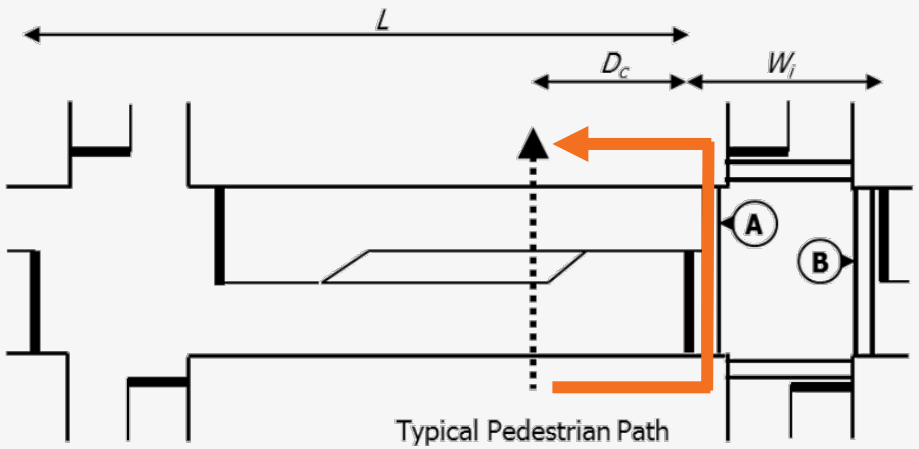


Crosswalk closure (three-leg crossing)

Urban Street Pedestrian LOS Method

HCM6: Current method

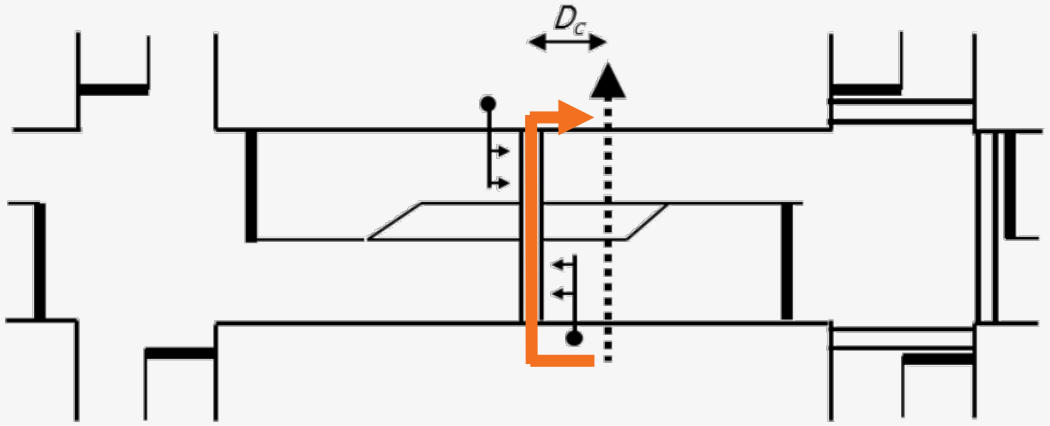
- Segment pedestrian LOS influenced by ease of crossing the street between signalized intersections
- Method has little sensitivity to diversion length



(a) Divert to Nearest Boundary Intersection

HCM7: New method

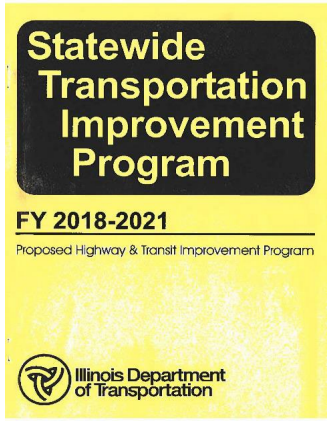
- Increased sensitivity to diversion length

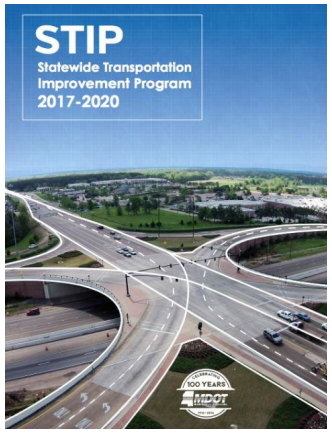


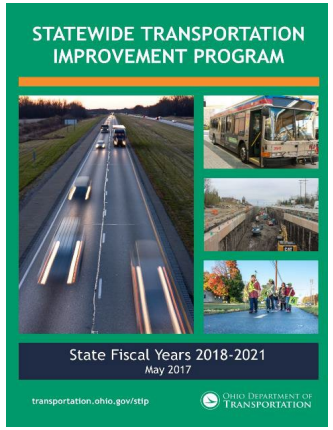
(b) Divert to Midsegment Signalized Crosswalk

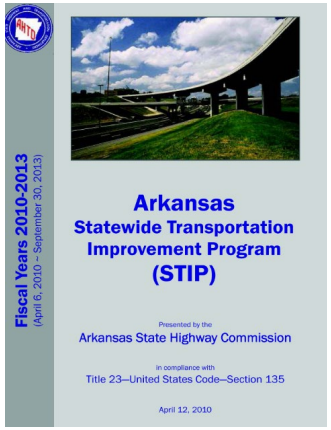
Capacity Impact for Connected and Automated Vehicles

Supported Agency Decision Making









State Transportation Improvement Program (STIP)

Multi-year capital improvement document which denotes the scheduling and funding of construction projects

Typical planning horizon of 25 years

Funding decisions made for traffic in 2045-2050!

Automated Vehicles (AV) vs Connected and Automated Vehicles (CAV)

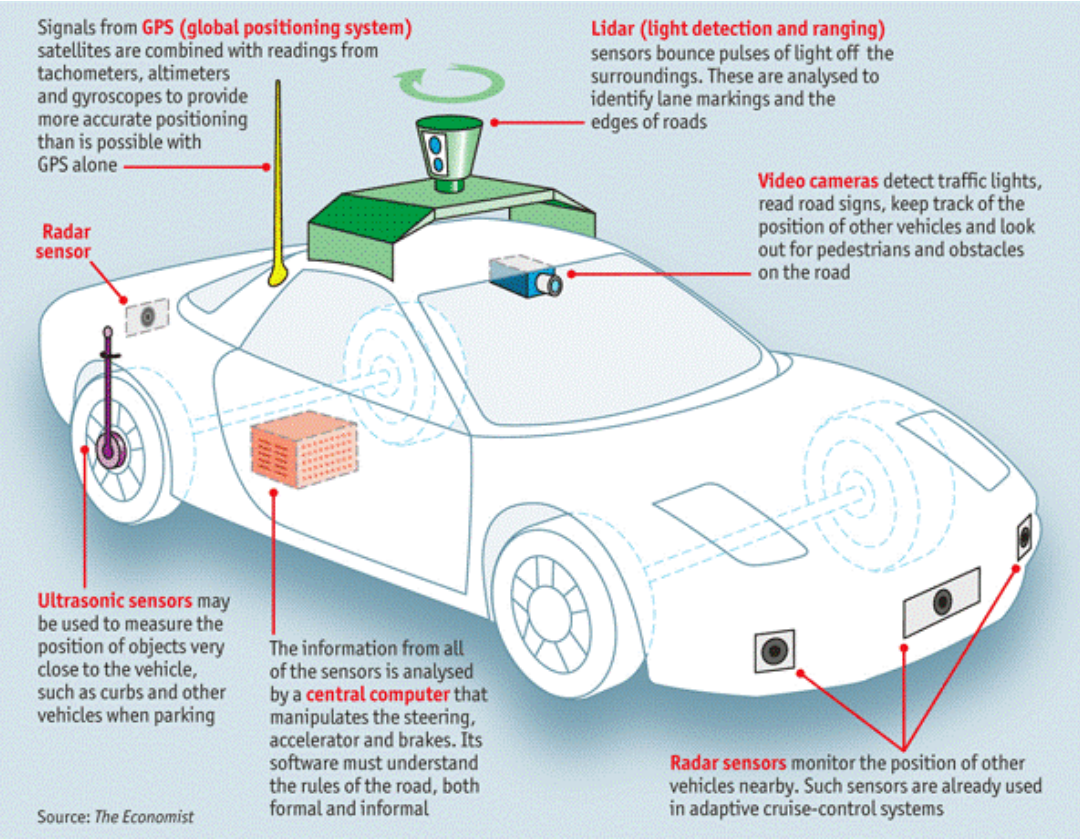


Image Credit: The Economist

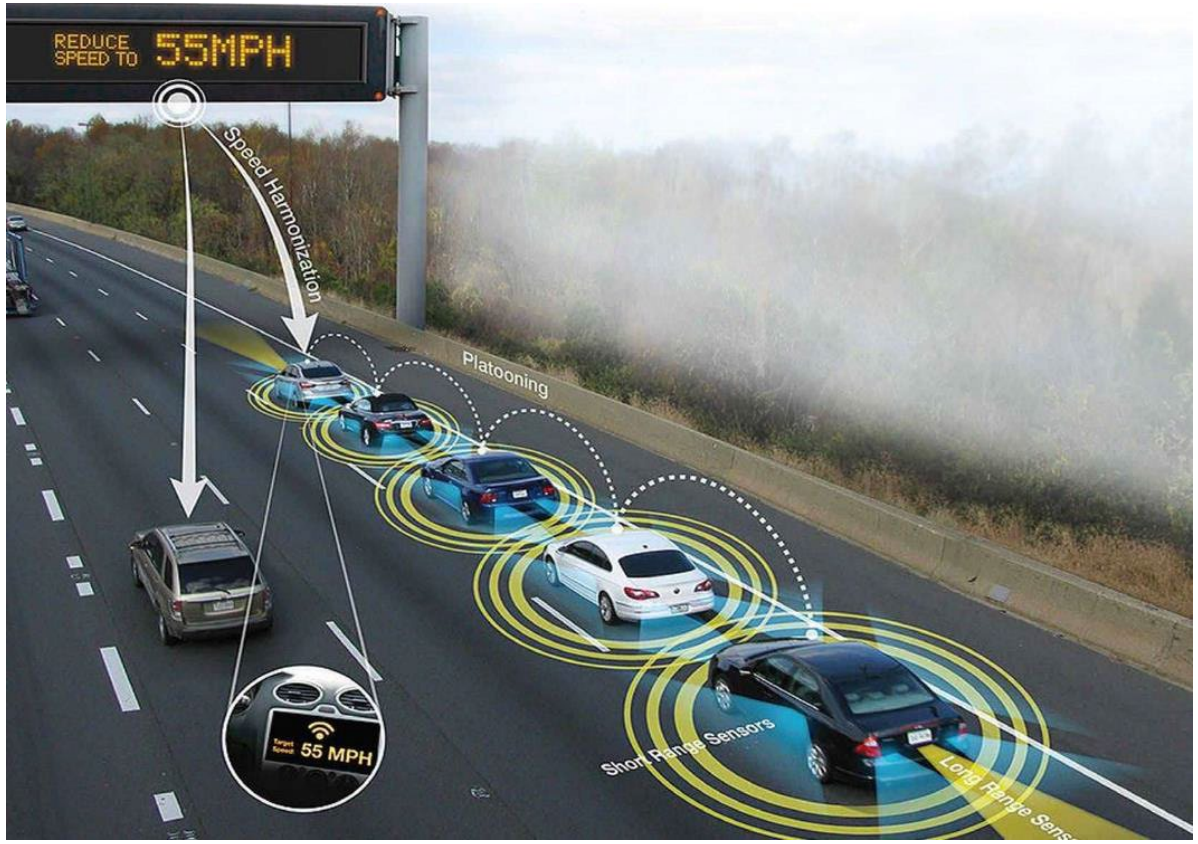


Image Credit: PCQuest

Updates in HCM7

Chapter 26

Freeway Facility Supplemental

Chapter 31

Signalized Intersections Supplemental

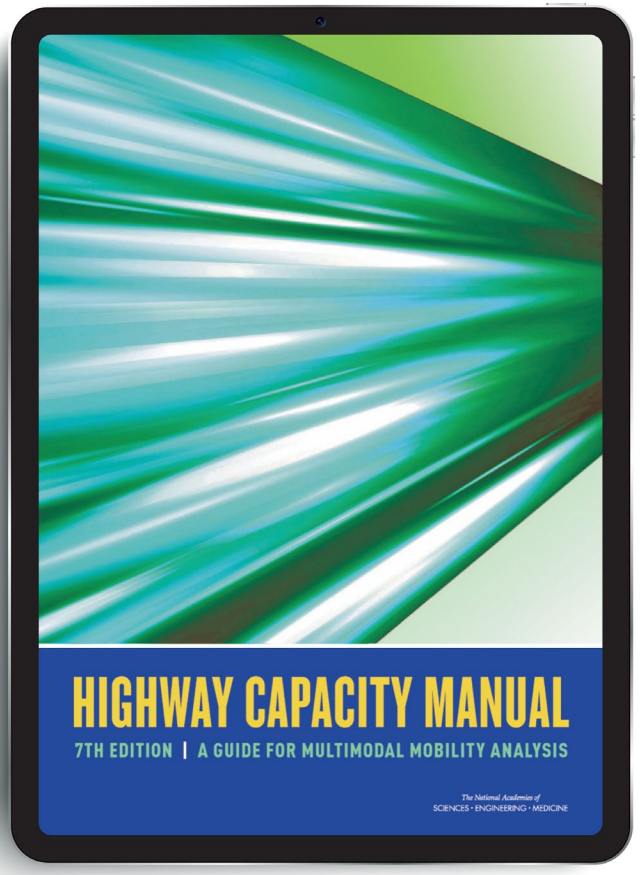
Chapter 33

Roundabouts Supplemental

CHAPTER 26
FREEWAY AND HIGHWAY SEGMENTS: SUPPLEMENTAL

CONTENTS

Changes in HCM 7



Capacity Adjustment Factors (CAFs) for CAVs

Given a market penetration rate of CAVs, what percent increase in capacity can be expected?

Service Volume Tables for CAVs

Given a market penetration rate of CAVs, what hourly and/or daily service volumes are achievable for planning applications?

CAV Capacity Adjustment - Freeways

Capacity Adjustment Factor (CAF_{CAV}) with a multiplicative effect

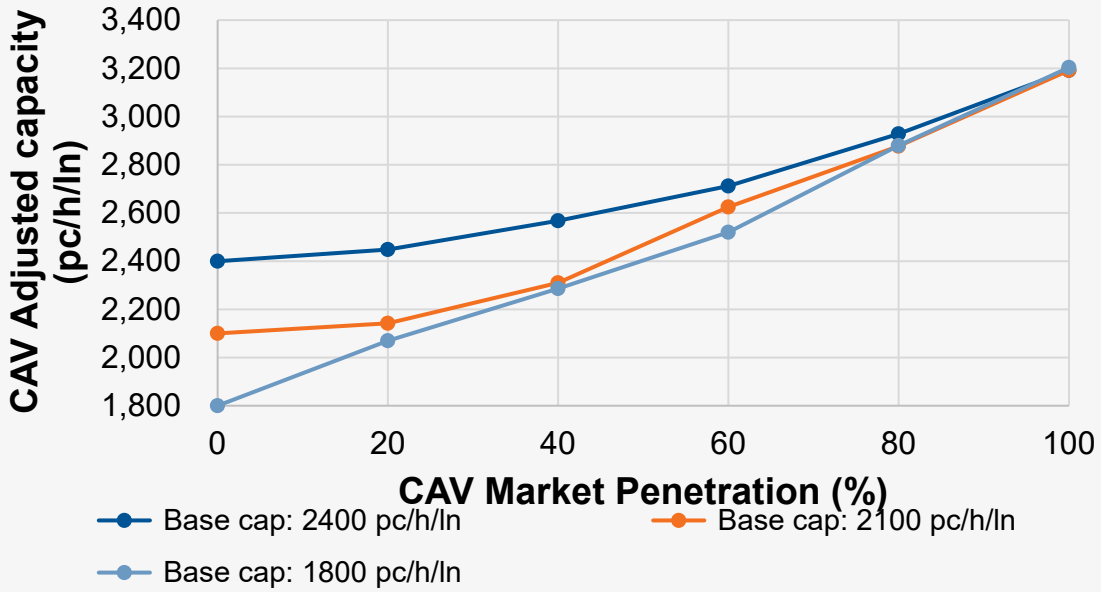
Main user input: **% Market Penetration (0 to 100%)**

- What percentage of the traffic stream is comprised of CAVs?

Intended for planning-level applications

Does not consider:

- Oversaturated conditions
- CAVs on Managed Lanes
- Truck platooning / connected and autonomous trucks



Proportion of CAVs in Traffic Stream	Adjusted Segment Capacity		
	2,400 pc/h/ln	2,100 pc/h/ln	1,800 pc/h/ln
0	1.00	1.00	1.00
20	1.02	1.02	1.15
40	1.07	1.10	1.27
60	1.13	1.25	1.40
80	1.22	1.37	1.60
100	1.33	1.52	1.78

Capacity adjustments – Basic Segments

CAV Service Volume Tables - Freeways

Area Type	Terrain	Proportion of CAVs in Traffic Stream 0%	20%	40%	60%	80%	100%
Urban	Level	19,900	20,500	21,800	24,600	26,800	29,700
Urban	Rolling	19,000	19,900	21,400	24,500	26,800	29,700
Rural	Level	16,800	17,900	19,300	22,000	24,400	26,800
Rural	Rolling	15,200	17,200	19,100	21,600	24,400	26,800

Notes: CAV = connected and automated vehicle, defined here as a vehicle with an operating cooperative adaptive cruise control system.
Values represent the maximum annual average daily traffic per lane at LOS E.
Urban assumptions: Free-flow speed = 70 mph, 5% trucks, PHF = 0.94, *K*-factor = 0.09, *D*-factor = 0.60.
Rural assumptions: Free-flow speed = 70 mph, 12% trucks, PHF = 0.94, *K*-factor = 0.10, *D*-factor = 0.60.
CAV assumptions: Average intervehicle gap within CAV platoons = 0.71 s based on a distribution (see text), CAV interplatoon gap = 2.0 s, maximum CAV platoon size = 10 pc, human-driven vehicles operate with average gaps calibrated to 2,400 pc/h/ln.

Exhibit 26-18
Daily Maximum Service Volumes for Basic Freeway Segments with CAV Presence (2-way veh/day/ln)

CAV Capacity Adjustment: Signalized Intersections

Adjustment to Saturation Flow Rate

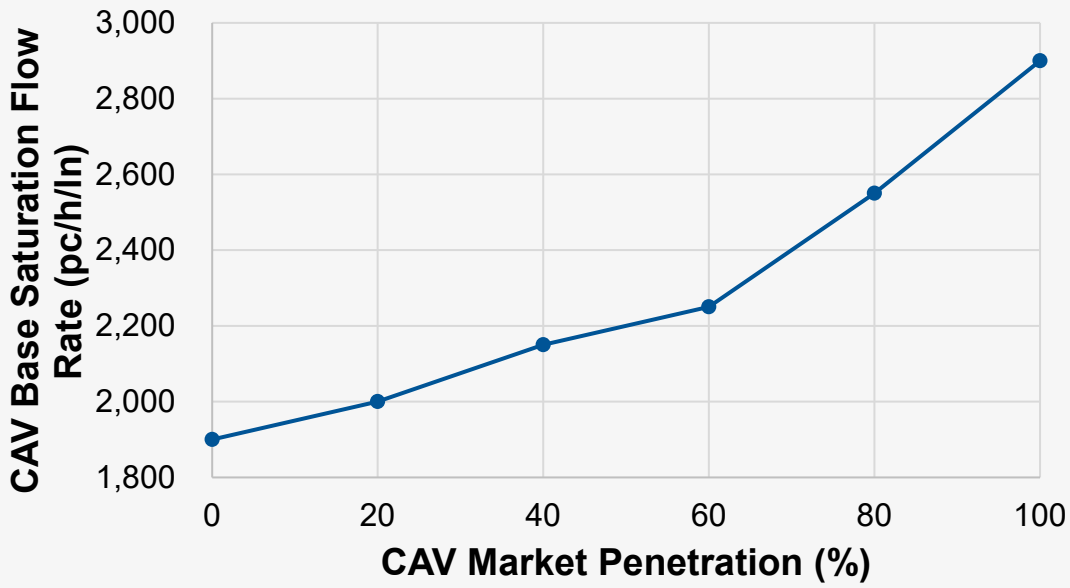
Main user input: **% Market Penetration (0 to 100%)**

- What percentage of the traffic stream is comprised of CAVs?

Addresses protected and permitted phases

Does not consider:

- Interactions with pedestrians and other modes
- Driveways or access points impacting saturation flow rates



Proportion of CAVs in Traffic Stream	Base Saturation Flow Rate (pc/h/ln)
0	1,900
20	2,000
40	2,150
60	2,250
80	2,550
100	2,900

Saturation Flow Rate adjustments – Through movements

CAV Service Volume Tables - Signals

Exhibit 31-67
Illustrative Generalized Service Volumes LOS=E Thresholds for Signalized Intersections with CAV presence (veh/h)

Through Movement g/C Ratio	No of Through Lanes	Proportion of CACC-Capable Vehicles in Traffic Stream					
		0	20	40	60	80	100
0.40	1	800	840	910	950	1,070	1,220
	2	1,550	1,630	1,750	1,840	2,080	2,370
	3	2,000	2,110	2,260	2,370	2,680	3,050
0.45	1	910	960	1,030	1,080	1,220	1,390
	2	1,740	1,830	1,970	2,060	2,340	2,660
	3	2,250	2,370	2,550	2,660	3,020	3,430
0.50	1	1,020	1,070	1,150	1,210	1,370	1,560
	2	1,930	2,030	2,180	2,290	2,590	2,950
	3	2,500	2,630	2,830	2,960	3,360	3,820

Notes: LOS E threshold is defined by control delay greater than 80 s/veh or volume-to-capacity ratio >1.0.
CAV = connected and autonomous vehicle, CACC = cooperative adaptive cruise control.
Assumes no interaction with non-motorized road users, no adverse weather impacts, and a facility without driveways or access points impacting saturation flow rates.
Interpolate for other CACC proportions
Assumed values for all entries:
- Heavy vehicles: 0%
- Peak hour factor: 0.92
- Lane width: 12 ft
- Grade: 0%
- Separate left-turn lane: yes
- Separate right-turn lane: no
- Pretimed control
- Cycle length: 90 s
- Lost time: 4 s/phase
- Protected left-turn phasing: yes
- g/C ratio for left-turn movement: 0.10
- Parking maneuvers per hour: 0
- Buses stopping per hour: 0
- Percentage left turns: 10%
- Percentage right turns: 10%

CAV Capacity Adjustment - Roundabouts

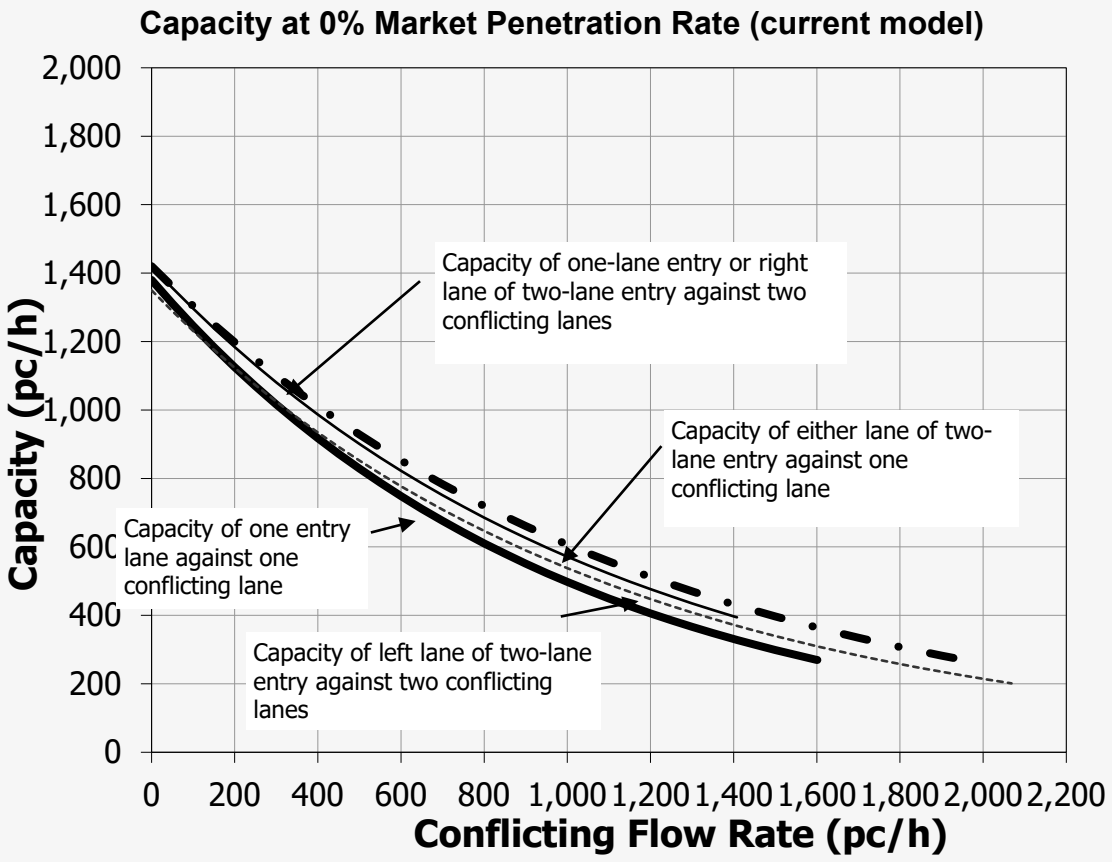
Adjustment to Follow-up Headway and Critical-Headway

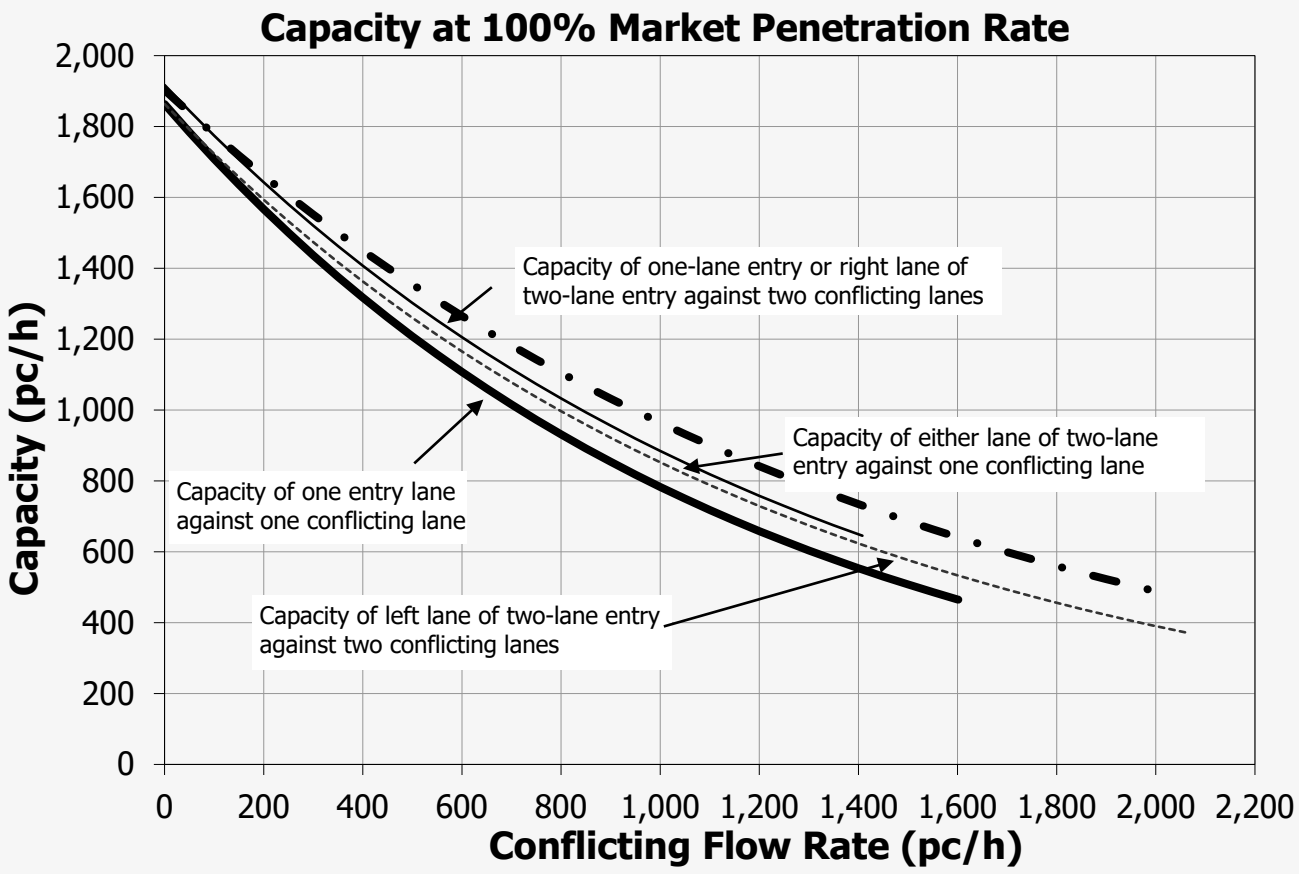
Main user input: **% Market Penetration (0 to 100%)**

- What percentage of the traffic stream is comprised of CAVs?

Proportion of CAVs in Traffic Stream	1-Lane Entry				2-Lane Entry					
	1 Circulating Lane		2 Circulating Lanes[a]		1 Circulating Lane, Both Lanes[a]		2 Circulating Lanes, Left Lane		2 Circulating Lanes, Right Lane	
	f_A	f_B	f_A	f_B	f_A	f_B	f_A	f_B	f_A	f_B
0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.05	0.99	1.03	0.99	1.05	0.99	1.03	0.99	1.05	0.96
40	1.12	0.97	1.08	0.96	1.12	0.97	1.08	0.96	1.12	0.93
60	1.22	0.94	1.18	0.92	1.22	0.94	1.18	0.92	1.20	0.87
80	1.29	0.90	1.28	0.89	1.29	0.90	1.28	0.89	1.27	0.84
100	1.35	0.85	1.38	0.85	1.35	0.85	1.38	0.85	1.34	0.80

CAV Capacity Adjustment - Roundabout Capacity Curves





New Two-Lane Highways Method

Revised Chapter 15: Two-Lane Highways

	HCM6 Methodology	HCM7 Methodology
Classification	• Class I, Class II, Class III	• Two different sets of service measure thresholds based on posted speed limit
Service Measure(s)	• Average Travel Speed • Percent Time Spent Following • Percent of Free-Flow Speed	• Follower Density (followers/mi) • A function of Density and Percent Followers

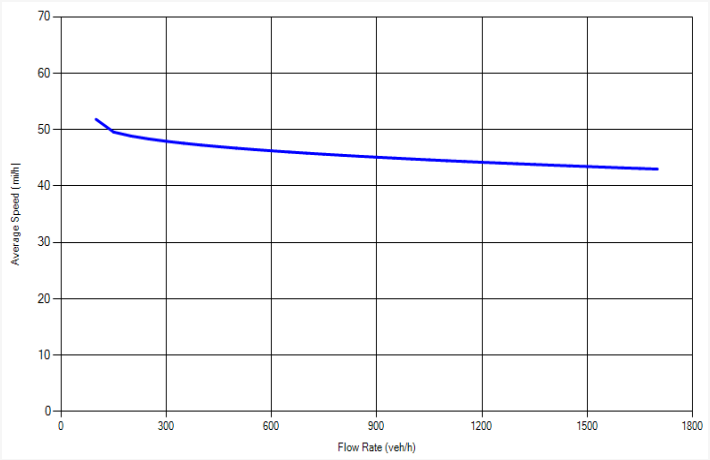
LOS	Class I Highways ATS (mi/h)	Class I Highways PTSF (%)	Class II Highways PTSF (%)	Class III Highways PFFS (%)
A	>55	≤35	≤40	>91.7
B	>50–55	>35–50	>40–55	>83.3–91.7
C	>45–50	>50–65	>55–70	>75.0–83.3
D	>40–45	>65–80	>70–85	>66.7–75.0
E	≤40	>80	>85	≤66.7
F	Demand exceeds capacity			

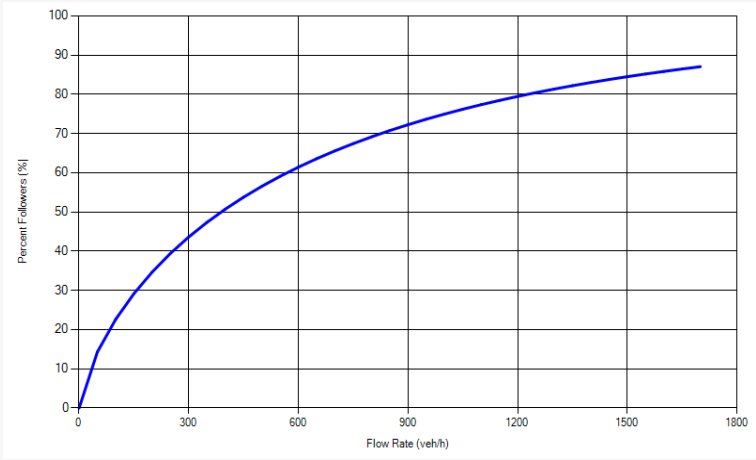
Note: For Class I highways, LOS is determined by the worse of ATS-based LOS and PTSF-based LOS.

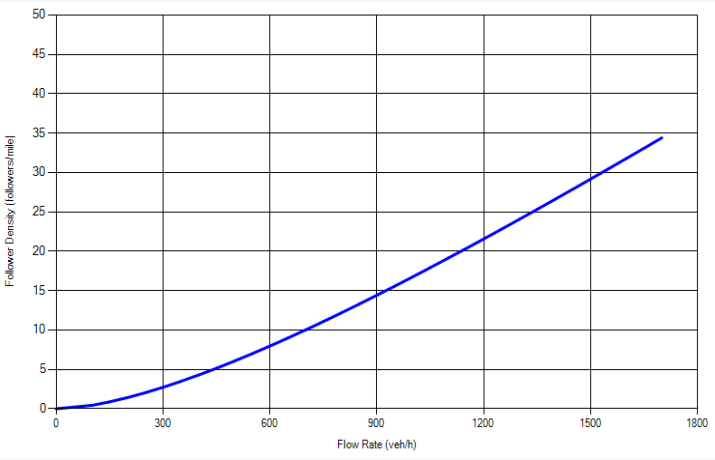
LOS	Follower Density (followers/mi/ln) Higher-Speed Highways Posted Speed Limit ≥ 50 mi/h	Follower Density (followers/mi/ln) Lower-Speed Highways Posted Speed Limit < 50 mi/h
A	≤ 2.0	≤ 2.5
B	> 2.0 – 4.0	> 2.5 – 5.0
C	> 4.0 – 8.0	> 5.0 – 10.0
D	> 8.0 – 12.0	> 10.0 – 15.0
E	> 12.0	> 15.0
F	Demand exceeds capacity	

Revised Chapter 15: Two-Lane Highways

	HCM6 Methodology	HCM7 Methodology
Performance Measures	Average Speed • Linear • Slope is not affected by FFS PTSF • Very difficult to measure in field Link-averaged measures	• Average Speed • Curvilinear relationship – better match with field data • PTSF removed • % Followers and follower density added







Revised Chapter 15: Two-Lane Highways

	HCM6 Methodology	HCM7 Methodology
Segmentation	• None - % of passing zones and length of passing lanes are provided	• Segment types: Passing Constrained, Passing Zone, Passing lane

Revised Chapter 15: Two-Lane Highways

	HCM6 Methodology	HCM7 Methodology
Heavy Vehicles	• Passenger Car Equivalents (PCEs); thus, flow rate in pc/h • PCEs differ by service measure (Speed, PTSF) • Not a function of % trucks • Originally iterative approach due to units • Do not properly account for moderate to steep grades	• % HV as a direct input for performance measures • Flow rate as veh/h

Revised Chapter 15: Two-Lane Highways

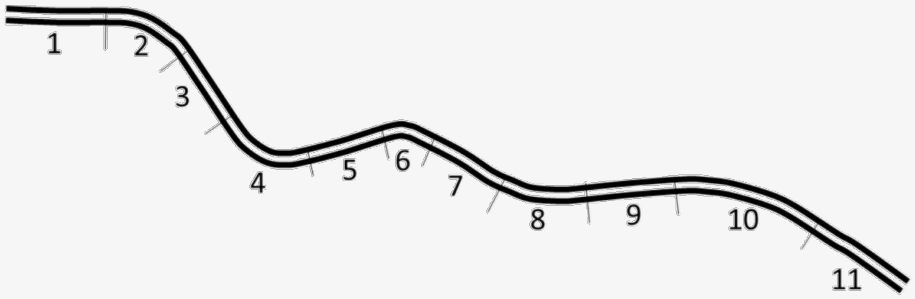
	HCM6 Methodology	HCM7 Methodology

Capacity	• 1,700 pc/h	• Passing zone and passing constrained segments
		  • 1700 veh/h
		• Passing lane segment, merge point
		  • Lower values due to merging friction
		  • Function of %HV and vertical classification

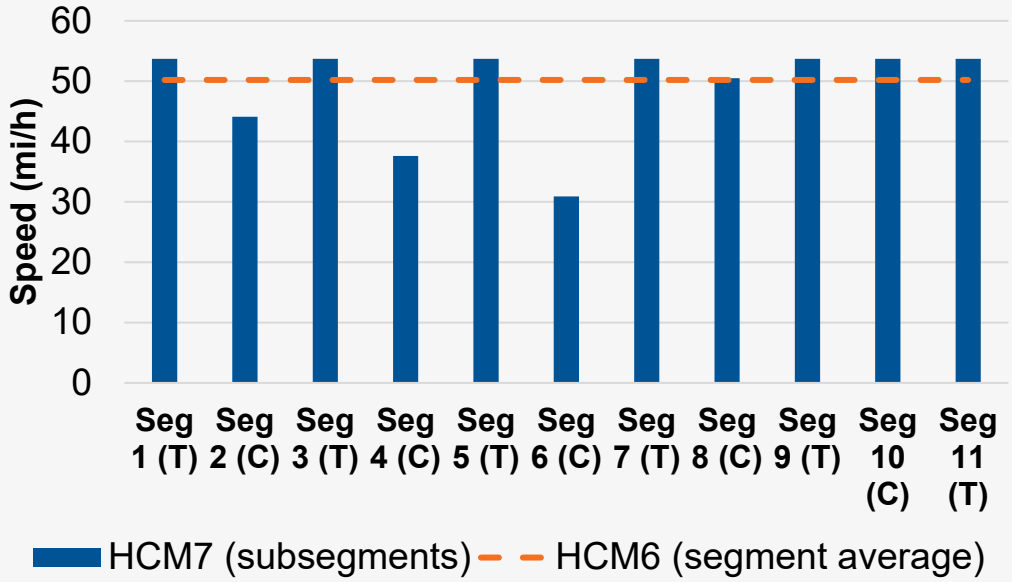
Sensitivity to Horizontal Curvature

Estimated speeds – new method x old method

Speeds can change significantly in curve segments

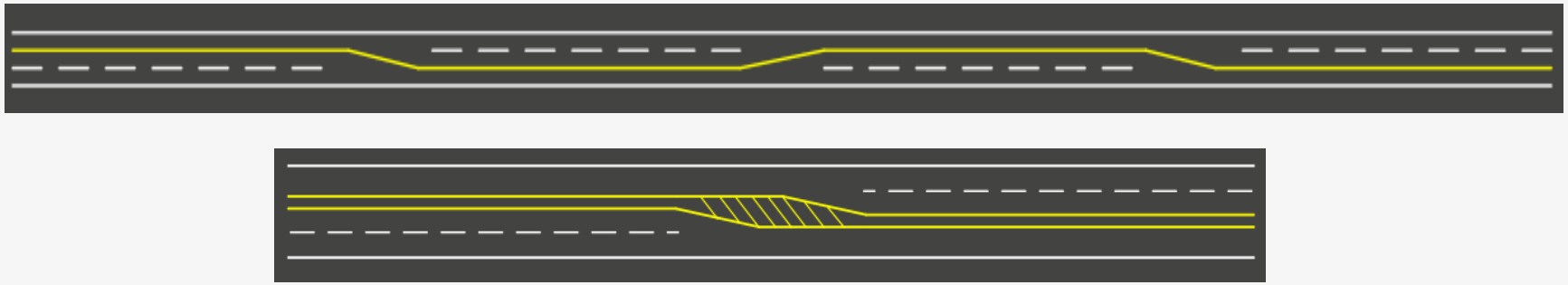


Subsegment	Type	Length (ft)[a]	Super-elevation (%)	Radius (ft)	Central Angle (deg)	Horizontal Class[b]
1	Tangent	280	--	--	--	--
2	Horizontal curve	432	3	450	55	3
3	Tangent	260	--	--	--	--
4	Horizontal curve	366.5	2	300	70	4
5	Tangent	250	--	--	--	--
6	Horizontal curve	216	5	275	45	5
7	Tangent	275.6	--	--	--	--
8	Horizontal curve	458	0	750	35	2
9	Tangent	285	--	--	--	--
10	Horizontal curve	767.9	4	1,100	40	1
11	Tangent	369	--	--	--	--
Total		3,960				



Revised Chapter 15: Two-Lane Highways

	HCM6 Methodology	HCM7 Methodology
Base Free-Flow Speed	• No specific guidance for estimating	• Can be estimated based on posted speed limit
2+1 Configuration	• Not considered	• Initial material for estimating performance
Facility Scope	• Not considered • Essentially single segment analysis, but with additional step for adjusting performance due to upstream passing lane	• Facility LOS based on length-weighted aggregation of segment follower density values • Includes adjustment for downstream segments based on upstream passing lane segment



New ATDM Method for Arterials

HCM 7 - Chapter 17 & 37

Arterial's ATDM

Augments HCM materials on Active Traffic and Demand Management (ATDM) that was previously limited to freeways.

Primarily focuses on these three strategies:

- Dynamic Lane Assignments
- Reversible Lanes
- Dynamic Turn Restrictions

Uses the travel time reliability as the basis of analysis which can include the effects of non-recurring sources of congestion.

How an ATDM analysis could look like? Adding a reversible center lane

Single Day Analysis (HCM6)

Scope:

Single day/period

Typical Operational Condition

MOE	Before	After
Travel Time (EB)	214 Sec	141 Sec
LOS (EB)	E	C

ATDM Analysis (HCM7)

Scope:

Multiple days (up to a year)

Includes recurring & non-recurring congestion

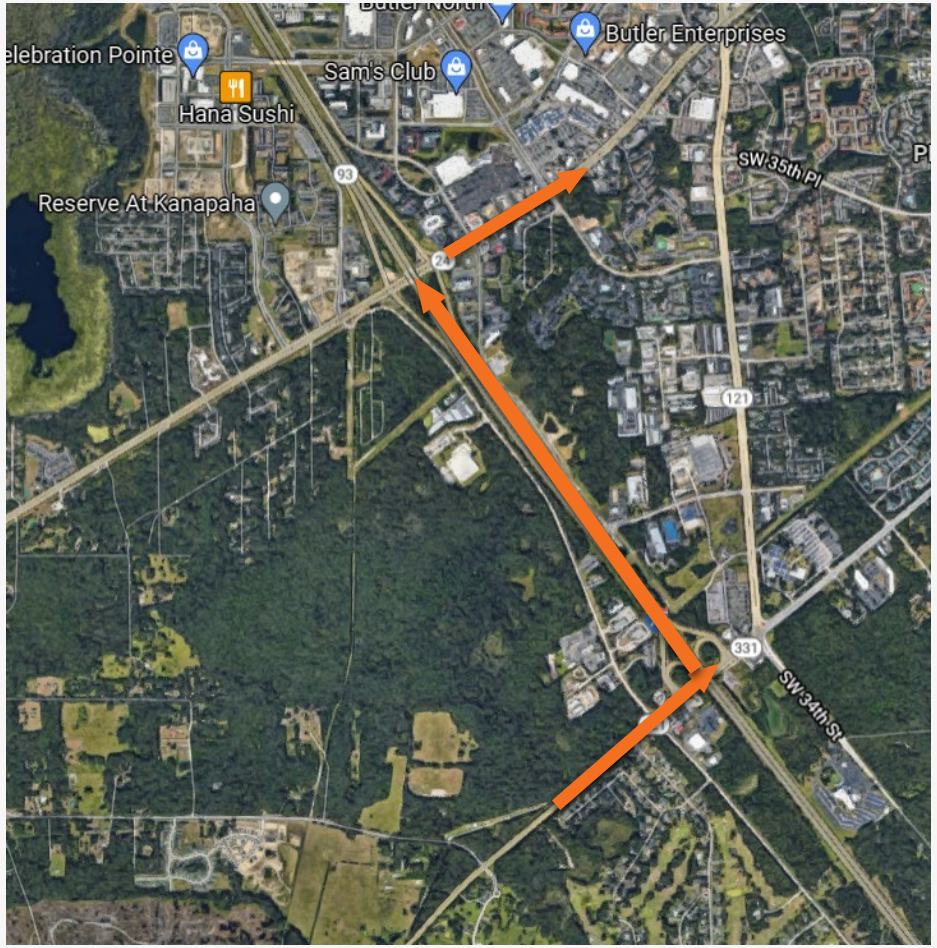
- Traffic demand fluctuation
- Weather Conditions, Incidents, etc.

MOE	Before	After
EB - Mean TTI	1.41	1.38
EB - 80th TTI	2.7	1.9
EB - 90th TTI	3.5	2.1
EB - LOTTR (80th/50th TTI)	1.9	1.3

New Network Method

NCHRP 15-57

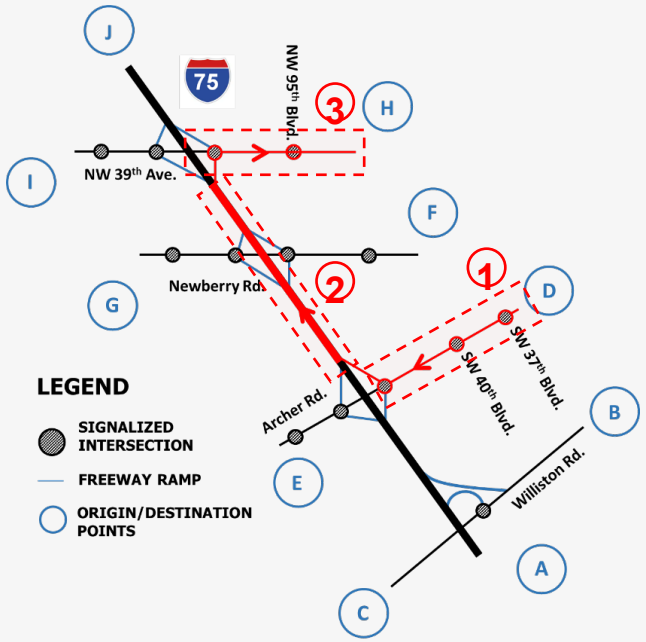
New HCM Chapter 38 on Network Analysis



- Evaluate spillback between arterials and freeways
- Estimate travel time across facilities
- Conduct lane-by-lane analysis for freeways

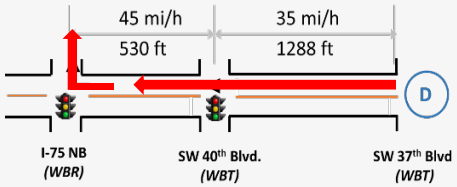
Analyzing Corridors with Freeways and Streets

How to analyze a trip from D to H?

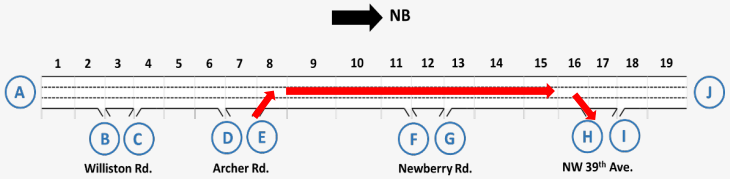


HCM Current methods – analyze three different facilities:

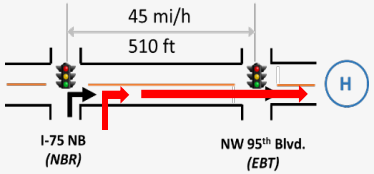
Facility 1 (Urban Street):



Facility 2 (Freeway):



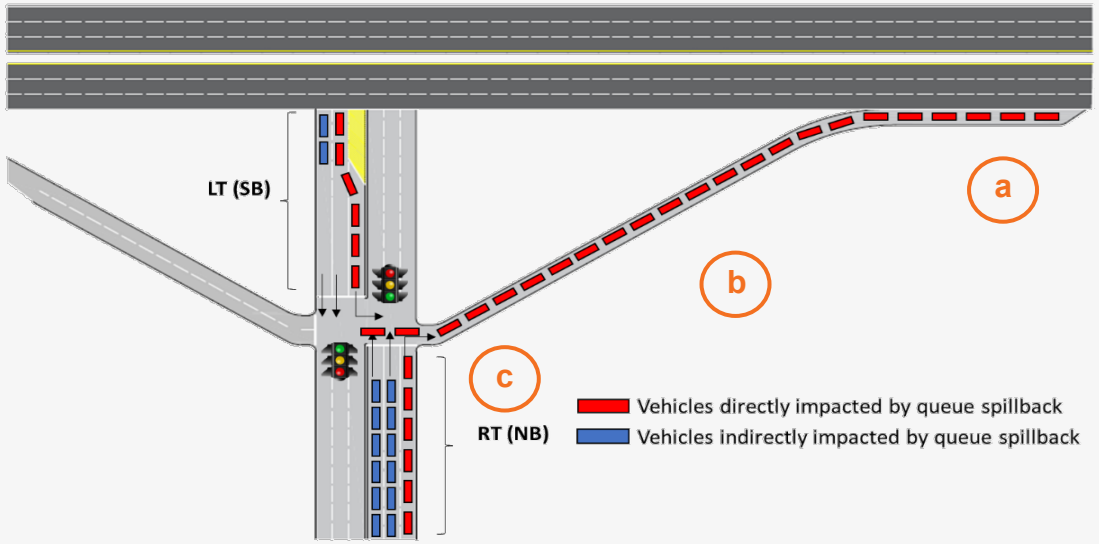
Facility 3 (Urban Street):



HCM New methods – integrates analyses and overcomes limitations:

- Travel time as common performance measure
- Congestion propagation at interchanges (queue spillback)
- Lane selection at freeway depending on O-D
- Travel time at freeway ramps

Queue Spillback Analysis – Freeway On-ramps



User Inputs

- Available queue storage at the on-ramp (ft)
- Ramp metering rate, if applicable (veh/h)
- Intersection and Freeway inputs per current HCM

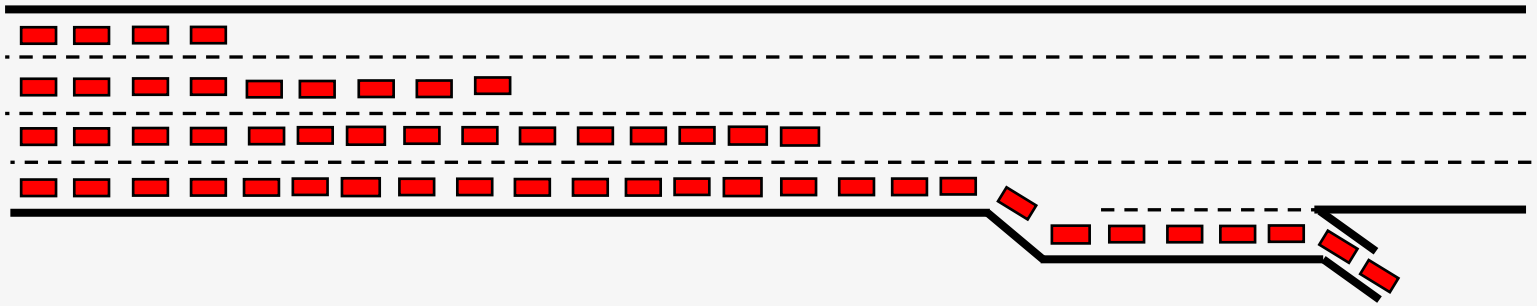
On-Ramp Queue Spillback

Occurs when:

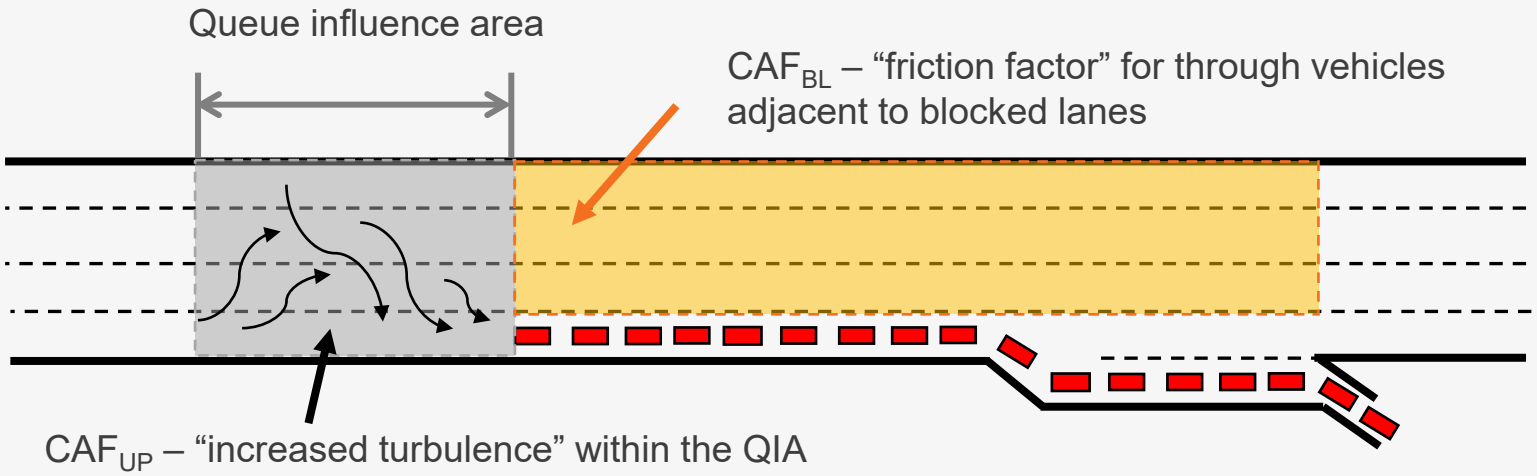
- Insufficient capacity at:
    1. freeway merge
    2. ramp meter or
    3. ramp roadway
- Insufficient storage length at the on-ramp

Queue Spillback Analysis – Freeway Off-ramps

Freeway impact is more localized close to exit and spreads further upstream:



Capacity Adjustment Factors - Modeling framework:



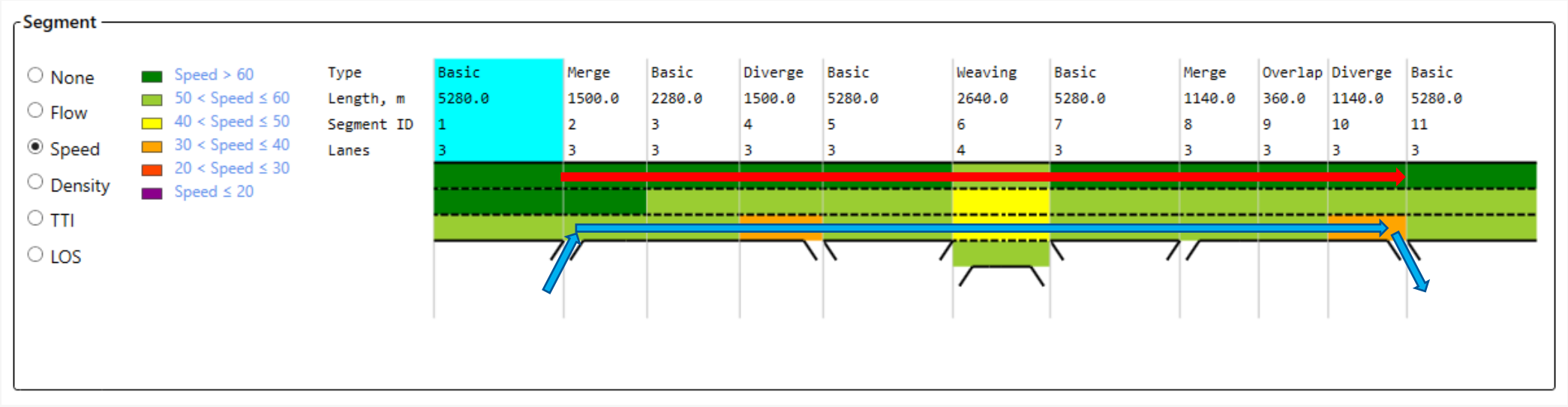
Freeway Lane-by-Lane Performance

Instrumental to analyze O-D based travel times – affects lane choice

Estimation of capacity and speeds for individual lanes

Flow distribution for individual lanes as function of:

- Segment and ramp flow rate; % grade; nearby ramps; number of lanes



How do travel times between these two O-D pairs differ?

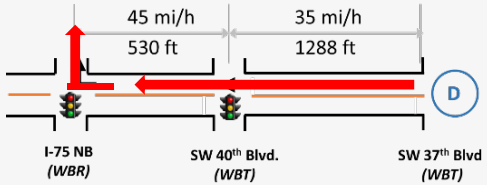
Addressing Long Routes (TT>15mins)

			HCM6 Current methods			HCM7 Network methods		
Facility		Segment ID	Segment Travel time (s)		Cumulative travel time (s)	Segment Travel time (s)		Cumulative travel time (s)
Type	Name		Analysis Period 1	Analysis Period 2		Analysis Period 1	Analysis Period 2	
Urban Street	Archer Rd. WB	SW 37th - SW 40th	34	28	34	34	28	34
		SW 40th - I-75 WB	26	29	60	26	29	60
Freeway	I-75 NB	On-ramp	73	86	133	73	86	133
		8	245	341	378	245	341	378
		9	185	189	563	185	189	563
		10	60	65	623	60	65	623
		11	122	116	745	122	116	745
		12	130	137	875	130	137	875
		13	55	52	930	55	52	930
		14	185	178	1115	185	178	1108
		15	70	68	1185	70	68	1176
		16	50	46	1235	50	46	1222
		Off-ramp	26	29	1261	26	29	1251
Urban Street	NW 39th Ave. EB	I-75 NB - NW 95th	45	55	1316	45	55	1306
		Total travel time (s):			**1217**			**1306**

Numerical Example

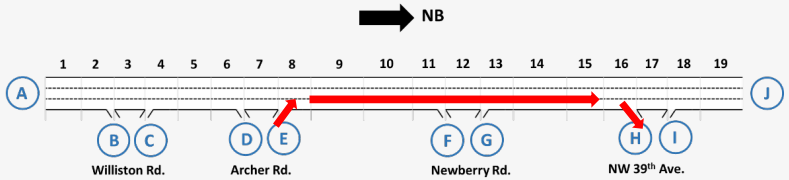
HCM6 - Current methods

Facility 1 (Urban Street):



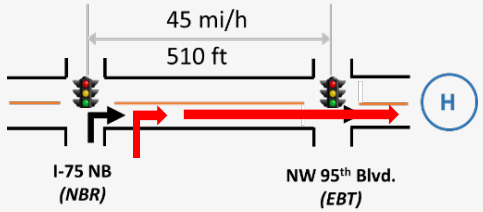
LOS=F
TT=478 s

Facility 2 (Freeway):



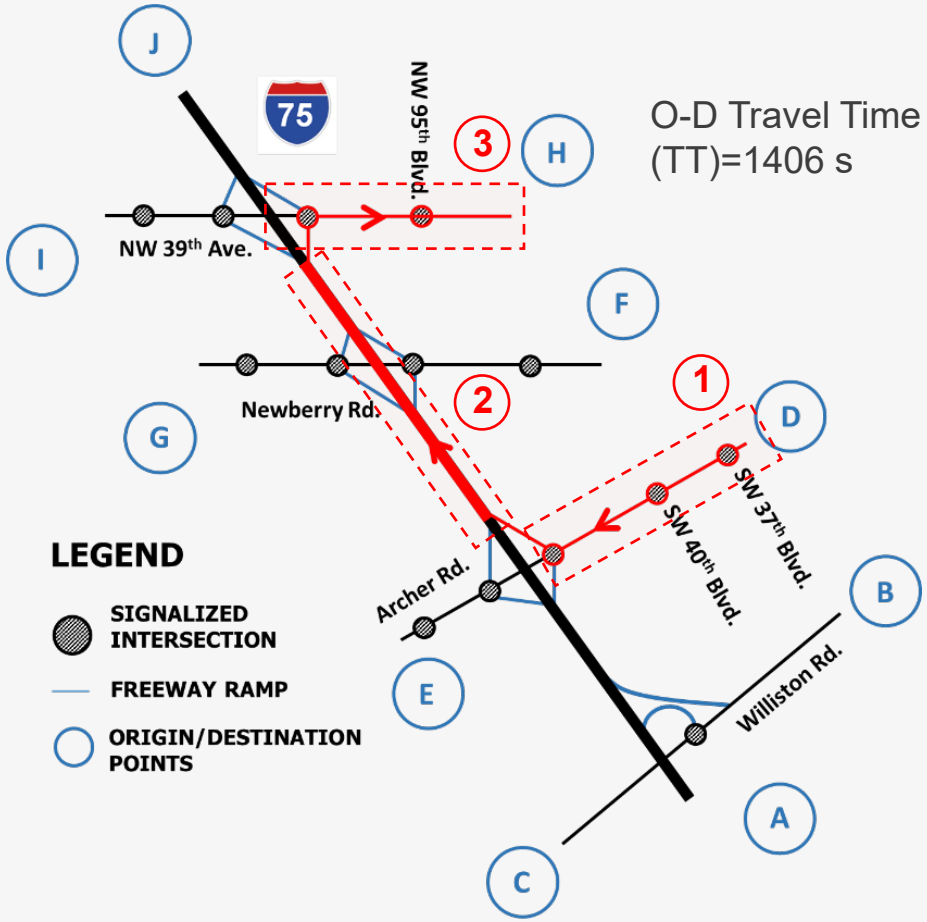
LOS=D
TT=735 s

Facility 3 (Urban Street):



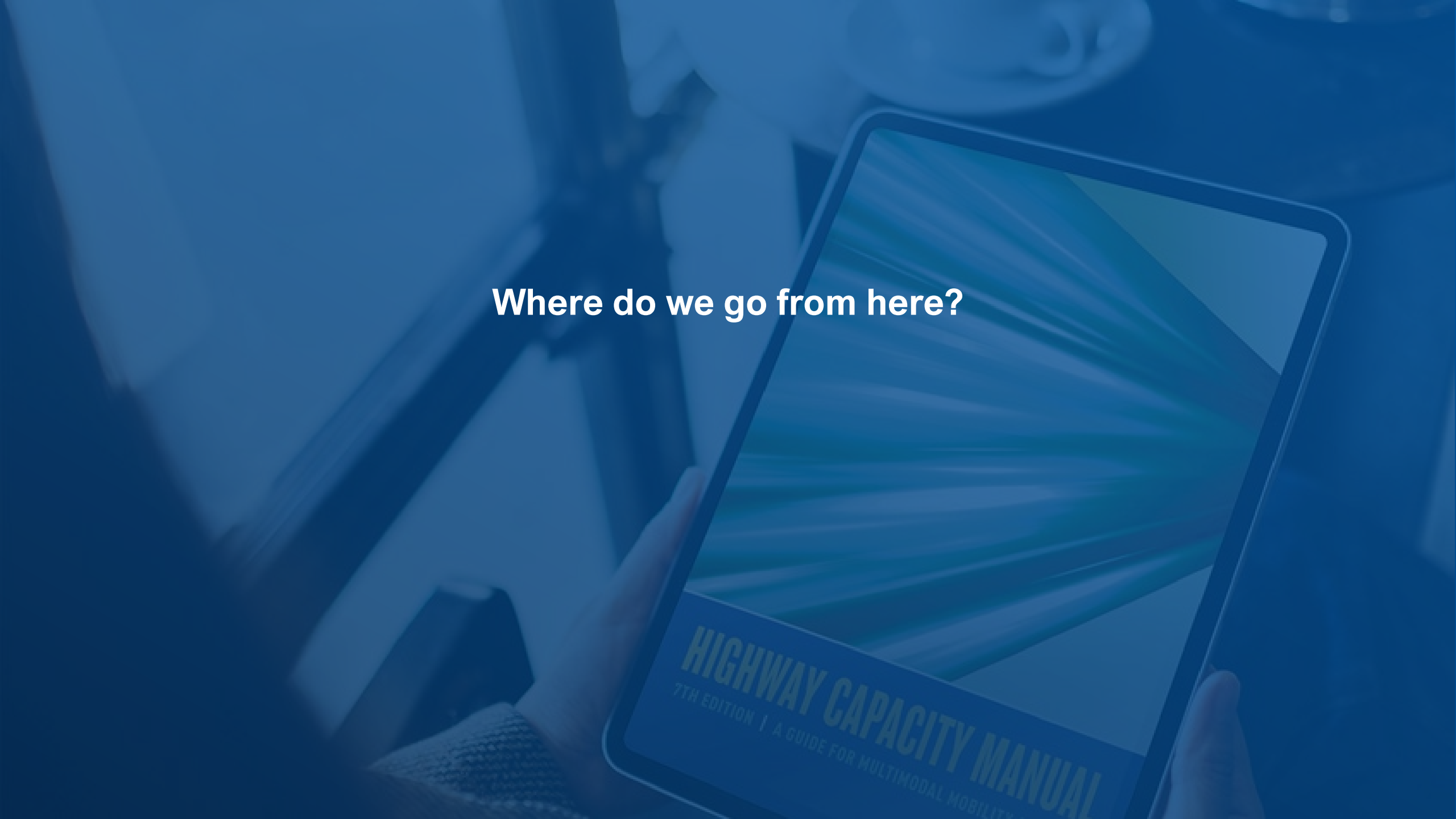
LOS=E
TT=193 Sec

HCM7 - New methods



O-D Travel Time (TT)=1406 s

Where do we go from here?



Now that the 7th Edition of HCM is here, what's next?

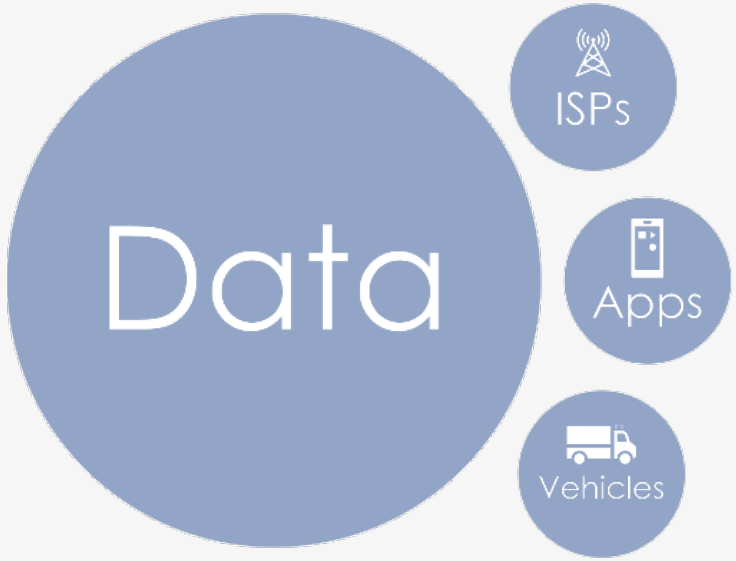
- ✓ Digital version
- ✓ Revamped committee structure
- • How do we keep the HCM relevant?
- • What changes do we make?

Focus on Applications

- Have some methods become too complex to apply in practice?
- How is HCM being used and by whom?
- Limited success of companion applications guides
  - HCM Applications Guidebook (NCHRP Project 3-64, 2006)
  - Planning and Preliminary Engineering Applications Guide to the HCM (NCHRP Report 825, 2016)
- More real-world, case study examples needed plus outreach focused on application

Incorporating "Big Data" into HCM Analyses

- Free-flow speed and congested speed are parameters of several HCM methods for which "big data" are available.
- O-D demand volumes are needed for some methods
- Role of big data in reliability analyses
- **Question:** *How do we take advantage of available big data and in what ways?*



Back-to-Basics Approach

- Forget about competing with simulation
- Back-of-the-napkin approach still has a place
- Increase focus on foundational information like that in Volume 1
- Re-visit some of the fundamental concepts like capacity, delay, Level of Service
- Task force has begun examining this issue

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