

HCM 2010 WORKSHOP



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WORKSHOP OUTLINE

- ◆ **Introductions**
- ◆ **Your workshop instructors**
- ◆ **Introduction to Highway Capacity Manual**
- ◆ **Overview of changes since 2000 edition**
- ◆ **Workshop Topics**
 - ◆ Part 1: Basic Concepts, Applications, Freeway Facilities
 - ◆ 15-min break
 - ◆ Part 2: Work Zones, Roundabouts, Two Lane Highways
- ◆ **Housekeeping**
 - ◆ PDH Forms
 - ◆ Facilities



WORKSHOP INSTRUCTORS

Praveen Edara, P.E., Ph.D., PTOE.

- ◆ **Faculty at University of Missouri**

- ◆ Teach and conduct research in traffic operations, safety, simulation, ITS, and alternative designs
- ◆ Using HCM for over 10 years

- ◆ **Worked at Virginia DOT and Federal Highway Administration's Turner Fairbanks Highway Research Center**

Dan Smith, P.E.

- ◆ **Traffic Management and Operations Engineer at Missouri DOT**

- ◆ Experience using HCM on several work zone projects

- ◆ **Technical monitor for traffic research projects**

Attendee Introductions

SCOPE OF THE WORKSHOP

- ❑ HCM is a comprehensive reference document
- ❑ List of workshop topics generated through brainstorming with MoDOT and consultants
- ❑ Slides/handouts prepared for following topics
 - ❑ Basic concepts, applications, freeway facilities, work zones, roundabouts, two-lane highways
- ❑ We'll follow a reasonable pace and cover as many of these topics as possible



INTRODUCTION TO HCM

- ◆ **Fifth edition published in 2010**
- ◆ **What does it include?**
 - ◆ Guidelines based on latest research on highway capacity and quality of service
- ◆ **First edition in 1950**
 - ◆ First document to quantify concept of capacity
 - ◆ Rapid expansion of the US roadway system after World War II
 - ◆ Need to determine lane requirements
 - ◆ Designed to be *"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."*

HISTORY OF HCM

◆ Second edition in 1965

- ◆ Focus on design remained
- ◆ Level of service (LOS) concept introduced
- ◆ HCM permitted “*determination of the capacity, service volume or level of service which will be provided by either a new highway design, or an existing highway under specified conditions.*”

◆ Third edition in 1985

- ◆ Refined LOS concept
- ◆ Pedestrians and Bikes added

HISTORY OF HCM

◆ Fourth edition in 2000

- ◆ Increase in volume and depth of topics
- ◆ The intent was “*to provide a systematic and consistent basis for assessing the capacity and level of service for elements of the surface transportation system and also for systems that involve a series or a combination of individual facilities.*”



FIFTH EDITION IN 2010

- ◆ **Purpose:** *“To provide a set of methodologies, and associated application procedures, for evaluating the multimodal performance of highway and street facilities in terms of operational measures and one or more quality of service indicators.”*



HCM 2010 OBJECTIVES

1. Define performance measures and describe survey methods for key traffic characteristics,
2. Provide methodologies for estimating and predicting performance measures, and
3. Explain methodologies at a level of detail that allows readers to understand the factors affecting multimodal operation.

Not a legal standard unlike MUTCD

HCM is a best techniques guide



INTENDED USE OF HCM

- ◆ Levels of analysis: operations, design, preliminary engineering, and planning.
- ◆ Travel modes: automobile (and other motorized vehicles), pedestrian, and bicycle, plus transit when it is part of a multimodal urban street facility.
- ◆ Spatial coverage: points, segments, and facilities.
- ◆ Temporal coverage: undersaturated and oversaturated conditions.

TARGET USERS OF HCM

- ◆ Engineers in traffic operations or geometric design
- ◆ Transportation planners
- ◆ Management personnel
- ◆ Educators
- ◆ Air quality specialists
- ◆ Noise specialists
- ◆ Elected officials
- ◆ Land use planners
- ◆ Interest groups for special users

◆ How do you use HCM?

HCM STRUCTURE

- ◆ Four main volumes
 - ◆ Concepts
 - ◆ Uninterrupted Flow
 - ◆ Interrupted Flow
 - ◆ Applications Guide
- ◆ HCM 2010 uses US Customary units
 - ◆ Unlike HCM 2000 that was published both Metric (SI) and US Customary units



VOLUME 1: CONCEPTS

- ◆ Modal characteristics
- ◆ Traffic flow
- ◆ Capacity
- ◆ Quality of service
- ◆ Tools available for analysis
- ◆ Guidance on interpretation of results

VOLUME 2: UNINTERRUPTED FLOW

“Uninterrupted-flow system elements, such as freeways, have no fixed causes of delay or interruption external to the traffic stream.”

- ◆ Freeway Facilities
- ◆ Basic Freeway Segments
- ◆ Freeway Weaving Segments
- ◆ Freeway Merge and Diverge Segments
- ◆ Multilane Highways
- ◆ Two-Lane Highways





VOLUME 3: INTERRUPTED FLOW

“Interrupted-flow system elements, such as urban streets, have traffic control devices such as traffic signals and STOP signs that periodically interrupt the traffic stream”

- ◆ Urban Street Facilities
- ◆ Urban Street Segments
- ◆ Signalized Intersections
- ◆ TWSC Intersections
- ◆ AWSC Intersections
- ◆ Roundabouts
- ◆ Interchange Ramp Terminals
- ◆ Off-Street Pedestrian and
- ◆ Bicycle Facilities

VOLUME 4: APPLICATIONS GUIDE

- ◆ Electronic only volume
- ◆ Supplemental chapters
- ◆ Methodological interpretations
- ◆ Case studies
- ◆ Technical reference library

UPDATES SINCE HCM 2000

- ◆ Extensive research results incorporated
 - ◆ NCHRP studies, FHWA studies
- ◆ Focus groups since 2000 edition was released
 - ◆ Organized by TRB Committee on HCQS
 - ◆ Feedback on HCM and desired improvements
 - ◆ ITE did a web survey on HCM use/desired improvements
- ◆ Reorganization for clarity
- ◆ Multimodal approach
 - ◆ HCM 2010 integrates motorized and nonmotorized modes
 - ◆ No standalone pedestrian, bicycle, and transit chapters
 - ◆ Incorporated into Urban Streets chapter, Signalized Intersections chapters, etc



UPDATES SINCE HCM 2000

- ◆ Traveler-perception models
 - ◆ Traditionally only one service measure used to determine LOS
 - ◆ Multiple factors of traveler perception included in
 - ◆ Multilane Highways, Two-lane Highways, Urban Streets, etc
- ◆ Generalized service volume tables
 - ◆ For facilities including a range of national default values
 - ◆ Useful for statewide performance reporting
 - ◆ Regional modeling
 - ◆ Long-range transportation planning



UPDATES SINCE HCM 2000

◆ Methodological Updates

◆ Freeway facilities

- ◆ Basic methodology same
- ◆ New weaving segment analysis procedure
- ◆ Changes in the addition of LOS thresholds for freeway facilities
- ◆ Updates to weather and work zone impacts on capacity
- ◆ Impact of active traffic management measures

◆ Basic Freeway Segments

- ◆ Basic methodology same
- ◆ Free flow speed prediction model improved



UPDATES SINCE HCM 2000

◆ Methodological Updates

◆ Freeway Weaving Segments

- ◆ Completely updated using new weaving dataset
- ◆ Algorithms for predicting weaving and nonweaving speeds
- ◆ Updated LOS F threshold

◆ Two-Lane Highways

- ◆ Two-direction analysis dropped, only one-direction method
- ◆ Key curves and tables updated using newer data
- ◆ Bicycle LOS added

◆ Unsignalized Intersections >>Roundabouts

- ◆ Updated based on new data and new methodologies
- ◆ LOS table newly added



UPDATES SINCE HCM 2000

◆ Other Methodological Updates

- ◆ Ramps and Ramp Junctions
- ◆ Urban Street Facilities (New chapter)
- ◆ Urban Street Segments
- ◆ Signalized Intersections
- ◆ Other Unsignalized Intersections (TWSC)
- ◆ Interchange Ramp Terminals (Significant changes)
- ◆ Bicycle Facilities