Chapter 2

HCM vs Microsimulation

John Hourdakis
Center for Transportation Studies, U of Mn
Hourd001@tc.umn.edu
Choices

Effort

Model Detail

FREEWAYS

Travel Demand

HCM Based

Micro Simulation

Effort

Model Detail

ARTERIALS

Travel Demand

Micro Simulation

Traffic Optimization
Travel Demand Tools

- Purpose is to Provide Forecasted Volumes For Modeling
- Assign Trips Based on Number of Lanes and Relative Capacity
- TDM Tools Do Not Explicitly Model Geometric Features or Traffic Controls
- Twin Cities Regional Model
  - EMME2
  - TP+ (TRANPLAN)
Traffic Optimization Tools

- Purpose is to Optimize Traffic Control and Determine Lane Assignments For Arterials
- Do Not Model Freeway, No Consideration of:
  - Geometric Features
  - Driving Behaviors
  - Interactions Between Intersection
- Examples:
  - SYNCHRO
  - TRANSYT
Highway Capacity Manual
Methodologies

• Based on Empirical Models
  • Well Tested With Field Validation Experience
  • Good For Analysis of Isolated Segments
  • Good For Moderate Congestion Levels

• Pre-study Tool
  • Project Scoping
  • Sizing the Improvements
HCM (Continued)

- HCM Does Not Directly Address Cases Where:
  - Queues Spill Back From One Freeway Segment to Another
  - Queues That Overflow or Block Turn Pockets
  - Queues From Arterials That Backup Into the Freeway
  - Queues From Freeway That Backup Into the Arterial
  - Two-way Left Turn Lanes
  - Roundabouts of More Than One Lane
Traffic Simulation

Macroscopic: FreeFlow, Kronos

Microscopic: CORSIM, AIMSUN, VISSIM

Data Requirements

Output Detail

All Can Handle Interaction Between Road Segments!

Examples Where Simulation is Required

• I-94 Eastbound
• The Big Mess of I-94/35W Commons
Speed on I-94

I-94 Eastbound PM Peak

Legend:
- 0-1 (Low) = 20
- 20-30
- 30-40
- 40-50
- 50-60
- 60-70
- 70-80

Highways:
- 129-Cayuga Bridge
- 127-Jackson St
- 123-Marion St
- 121-Victoria Ave
- 119-Hamlin Ave
- 117-Prior Ave
- 115-TH280
- 113-Huron
- 111-25th Ave
- 109-11th Ave
- 107-I35w
- 105-Hennepin
- 103-I394
- 101-TH55
Simulation of I-94
I-94/35W Commons Mess

Section A
Cedar Ave to 11th

Section B
11th to 35W

Section C
35W to Tunnel
General Simulation Issues

- Simplifies the Real World
- Requires Time to Learn
- Requires Current Data
- Calibration Can be Time Consuming
- Cannot Handle Every Situation
- Manage Large Amounts of Data
- Acceptance and Credibility
Simulation Shortcomings

• Shortcomings Include
  • Two-Way Left Turn Lanes
  • The Impacts of Raised Medians
  • The Impacts of On-Street Parking, Commercial Vehicle Loading and Double Parking
  • The Interference From Bicycles and Pedestrians

• Simulation Assumes 100% Safe Drivers
  • Nobody Violates the Safe Headway
  • Everyone Pays Attention
  • There Are No Collisions
Simulation Pitfalls

• Data Availability
  • Variability in Space and Time
  • Simultaneous Counts on All Boundaries
• Inaccurate Input Data
• Knowledge of How Model Parameters Work
• Understanding of MOE Definitions and Calculations
• Misunderstanding of Local Traffic Operations
Criteria for Selecting a Traffic Tool Category

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<th>Analysis Context: Planning, Design, or Operations/Construction</th>
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<th>Traveler Response</th>
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<th>Performance Measures</th>
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<th>Tool/Cost-Effectiveness</th>
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Source: FHWA Traffic Analysis Tools Primer
Conclusions
Choosing the Right Tool

• Have All Needed Features
• Requires Data You Have or Can Get
• Is an Established Model
• Has Good Documentation and Support
• Has Clear and Correct Definitions of Output
• Has Wide User Base Where You Can Draw Experience From