



HCM Perspective on Arterial Performance Measures

Richard Dowling
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HCM Principles

- Principles of Quality of Service
 - Set in series of motions in 1995
 - Foundation for Year 2000 HCM

HCM Vocabulary

- Performance Measures
 - Measures of traffic operations
 - Speed, density, queue, delay, etc.
- Measures of Effectiveness
 - Used to compute level of service
- Level of Service
 - Letter grade of quality of service

Level of Service vs. MOE's

- (95-14) LOS A to E included will be defined by a single measure of effectiveness (MOE) for each facility type.
- (95-15) This single MOE will be related to the travelers' perception of the quality of service.
- (95-16) Los F shall be defined to occur when either the traveler perceived MOE exceeds some pre-defined threshold, or when demand exceeds capacity.

Desired MOE Characteristics

- (95-17) Ideally, these MOE's will have the following attributes:
 - Perceivable by the facility user (traveler)
 - Measurable (in the field) or can be derived using measurable factors
 - Well defined for HCM users
 - Sensitive to changes in traffic, roadway, and control conditions.

Beyond Level of Service

- (95-18) The chapter for each facility type should include as many additional performance measures as practical:
 - to provide additional information about highway operations and
 - to provide links to broader evaluation, such as environmental, economic, or safety analyses, and to demand forecasting.
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Time Based Measures

- (95-19) The MOE or at least one of the additional performance measures shall be a time-dimension related measure, such as travel time, speed, or delay.

System Analysis

- (95-21) It is desirable that some of the performance measures or MOE's will allow route, network or other combined performance assessment.

HCM 2000 Urban Street LOS

- Streets and Intersections
 - Streets:
 - Mean Speed of through traffic
 - LOS = Percent of Free-Flow Speed Without Signals
 - Missing: other system performance measures
 - Intersections
 - Delays and Queues by lane group
 - LOS = Mean Delay (averaged over all moves)
 - >80 secs/veh unacceptable at signal
 - Weak: system effects on intersection operation
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Research Urban Street Performance Measures

- NCHRP 3-70 –
 - Multimodal Level of Service for Urban Streets
- NCHRP 3-79 –
 - Measuring And Predicting The Performance Of Automobile Traffic On Urban Streets
 - Jim Bonneson - TTI

NCHRP 3-70

- Objective: To determine urban street quality of service for auto, transit, bicycle, and pedestrian modes.
- Approach:
 - Conduct surveys of auto drivers, transit riders, bicyclists, and pedestrians.
 - Build models of perceived QOS.

NCHRP 3-70 – Auto Drivers

- Aimee Flannery – GMU
- Top 6 Factors:
 - Average Speed **,
 - Median Presence,
 - Lane Width,
 - Stops **,
 - Landscaping,
 - Parking Lane Width.

NCHRP 3-70 – Transit Riders

- Paul Ryus – Kittelson Assoc.
- Top 6 Factors:
 - Average Speed **,
 - Frequency,
 - Reliability **,
 - Crowding,
 - Access (difficulty of accessing bus stop),
 - Span (Hours) of Service.

NCHRP 3-70 – Bicyclists

- Bruce Landis – Sprinkle
 - Top 8 Factors:
 - Separation from vehicle traffic
 - Motor vehicles volume next to bicyclist
 - Pavement condition of bike lane
 - Motor vehicle speeds **
 - Percent trucks
 - Widths of cross-streets at signals
 - Driveway density
 - Signal delay for bike **
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NCHRP 3-70 – Pedestrians

- Theo Petritsch – Sprinkle
 - Top 8 Factors:
 - Presence of a sidewalk
 - Separation from vehicle traffic
 - Motor vehicle speeds **
 - Motor vehicle volume next to pedestrian
 - Driveway density
 - Signal delay for pedestrians **
 - Average number of lanes crossed at signals
 - Pedestrian density
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Other Uses of the Street?

- Crossing the street
 - Auto
 - Bus
 - Bicycle
 - Pedestrians
- Non-Through Traffic
 - Lefts, Rights
 - Bus transfers

Conclusions

- HCM is silent (or weak) on many crucial signal system performance measures.
- HCM makes it easy to ignore many of the users of a street
- Research underway to address these weaknesses