VISUALIZATIONS OF TRAVEL TIME PERFORMANCE BASED ON VEHICLE RE_IDENTIFICATION DATA

Stanley E. Young¹, Elham Sharifi², Christopher M. Day³ & Darcy M. Bullock³

1. Traffax Inc, College Park, MD
2. Center for Advanced Transportation Technology (CATT), University of Maryland, College Park, MD
3. Purdue University, West Lafayette, IN

Abstract
This paper provides a visual reference of the breadth of arterial performance phenomenon based on travel time measures obtained from re-identification technology that has proliferated in the past five years. These graphical performance measures are revealed through overlay charts and statistical distributions as revealed through cumulative frequency diagrams (CFDs).

Introduction
- Overlaying vehicle travel times from multiple days dominant traffic patterns are reinforced, revealing patterns induced by traffic control at signalized intersections.
- A cumulative frequency diagrams (CFDs) provides a compact visualization to compare traffic patterns from varying timeframes or locations, provides intuitive feedback on arterial performance.
- CFDs can be constructed for hourly, peak periods, or time periods corresponding to signal timing plans in effect.
- Overlay charts and CFDs assess the quality and consistency of traffic movement without sacrificing detail characteristic with numeric-based performance measures (i.e. LOS or TTI).
- Overlay charts and CFDs are effective for before/after comparisons, revealing both average travel times and travel time variation.

Diagnostics of Arterial Traffic Using Overlay and CFD Charts

Observing Trends with Overlay Charts
- Direct plot of travel times is difficult to interpret.
- Overlaying multiple days of data exhibits travel time trends and characteristic patterns. Trained observation reveals:
  - Anticipated travel time through the corridor at various hours of the day
  - Signal plan changes
  - Cycle lengths (distance between signalings)
  - Mismatched cycles lengths within the corridor
  - Quality of progression
  - Proportion of people stopping for services within the corridor as indicated by the propensity of outliers

Signal Timing Effectiveness / Quality of Progression
- Overlay plot reveals about ½ of all vehicles are required to stop in corridor

CDF exhibits classic bi-modal distribution related to poor progression in the corridor

Mismatched Cycle Lengths

Signal Timing Transitions

Multi-Cycle Failures (Severe Queuing)

Conclusion
- Travel time overlay charts and CFDs are useful to quickly diagnose the quality of traffic in a corridor showing the average travel time and travel time reliability quickly, and in full detail.
- Characteristic patterns in the data can reveal signal plan changes, cycle lengths, mismatched cycles lengths, cycle failures and proportion of people stopping for services within the corridor.
- Cumulative frequency diagrams (CFDs) complement overlay charts with the ability to summarize large amounts of data into a single graphic for before-after studies, long term traffic trends, and comparison of performance between different facilities.
- CFDs provide not only travel time, but also travel time reliability in a robust graphical format.

TRB Annual Meeting, Jan 8-12, 2017, Washington, D.C.