Signal System Performance Measures based on Conventional Travel Run Data

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Outline

- Beyond the automated Signal Performance Measures (SPMs)
- UNR Research on travel-run-based SPMs
- Case Examples
- Q&A
Automated SPMs

- The good – You have mostly heard!
- Limitations and beyond
  - Thresholds – what is considered good or bad?
  - Link-based performance ≠ arterial performance

Better link performance
Better arterial performance
Automated SPMs

- The good – You have mostly heard!

- Limitations and beyond
  - Thresholds – what is considered good or bad?
  - Link-based performance ≠ arterial performance
  - Still need solution/alternative to improve operations
  - Cost?
Case Example
Sahara Ave, Las Vegas

*Offsets at all other intersections use EndGreen of Phase 4, except for Durango which uses phase 8.
Initial MD Plan in Naztec NEMA

% Arrival on Red (11/10/15)

EB-66; WB-52
EB-16; WB-17
EB-47; WB-73
EB-32; WB-NA
EB-68; WB-33
FAST Adjusted MD Plan

% Arrival on Red (12/8/15)

EB-61; WB-52
EB-15; WB-16
EB-49; WB-59
EB-26; WB-NA
EB-60; WB-40
MOE Comparison

EB-66; WB-52
EB-16; WB-17
EB-47; WB-73
EB-32; WB-NA
EB-68; WB-33

EB-61; WB-52
EB-15; WB-16
EB-49; WB-59
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Orange County’s Performance Index

- Measures of Effectiveness (MOEs)
  - Average Speed (S)
  - Green per Red (GpR)
  - Stops per Mile (SpM)

- Performance index (PI)

\[
PI = 1.5(S - 10) + GpR \times 8 + 40 - SpM \times 10
\]

\[
= 1.5(30 - 10) + 4 \times 8 + 40 - 1 \times 10
\]

\[
= 92
\]
What are Missing?

- **Speed limit or free-flow speed** - Higher speed limit likely results in higher actual speed

- **Cycle length** - Longer cycle length likely results in better arterial travel runs

- **Spacing** – shorter spacing makes progression more difficult

- **Volume level** – higher volume makes progression more difficult
**UNR Methodology**

- One score based on %Speed

- One score based %Stop – a standard stop is 25% of cycle length

- Weighted score based on both (30% and 70%)
  - Adjustment based on cycle
  - Adjustment based on spacing
  - Adjustment based on V/C

- Final score (100 scale) to determine QOS
## Case Study - Before
Highway 74 – Caltrans District 8

### Corridor Synchronization Performance Index

#### Summary

<table>
<thead>
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Highway 74 – Caltrans District 8
TranSync Demo

Caltrans D8 – LT Gap out

Caltrans D8 – Transition
How Travel Runs Should Be Collected?
Summary

- Automated SPMs is a future trend and will change the way we do signal timing.
- Much needs to be done beyond SPMs and improving signal operations is the goal.
- The SPMs can be enhanced with traditional travel-run-based SPMs and with adequate signal timing tools.
- Signal timing plans must be adequately implemented and operated.
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