Outcome Assessment using Connected Vehicle Data to Justify Signal Investments to Decision Makers

Drake Krohn¹, Lou Rymarcusk¹, Jijo Mathew¹, Christopher Day¹, Howell Li², Ashwin Patel², Daniel Farley², Darcy M. Bullock¹

1: Purdue University; 2: Pennsylvania Department of Transportation

Abstract
This paper describes the use of connected vehicle data to perform corridor travel time outcome assessment along five corridors in the greater Philadelphia, Pennsylvania area. These corridors are comprised of a total of 2,184 signals and are considered five of the most critical corridors in this region, experiencing a high volume of traffic with ADT greater than 30,000 vehicles. These corridors were evaluated for six weeks before and after the installation of adaptive controls and signal retiming using private-sector segment speed data. Medians and interquartile ranges of travel times were used to assess the impact on arterial progression. Various graphs, charts, and figures produced through web tools and traditional metrics provide a user-interactive component to the dashboards. In addition, user cost reductions and CO2 emission impacts were also determined. Four out of the five corridors had substantial reductions of arterial travel times that amounted to approximately $32 million in annualized user benefits.

Study Corridors

<table>
<thead>
<tr>
<th>Corridor ID</th>
<th>Corridor Name</th>
<th>AADT (m)</th>
<th>Length (mi)</th>
<th>Average Speed Limit (mph)</th>
<th>Signal Count (Adaptive Signals)</th>
<th>Before Date Range</th>
<th>Alter Date Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>A3</td>
<td>US 13 (State Rd/ Township Line Rd/City Ave)</td>
<td>35,266</td>
<td>10.0</td>
<td>36</td>
<td>40 (4)</td>
<td>10/12/2015-11/12/2015</td>
<td>8/7/2016-8/18/2016</td>
</tr>
</tbody>
</table>

Weekday Median and IQR Evaluation

Weekend Median and IQR Evaluation

Evaluation Methodology

IQR vs Ideal Travel Time

Weekday Median & IQR by hour

II. Weekend Median and IQR by hour

Weekday Median Travel Times and Interquartile Ranges by Hour

Weekend Median Travel Times and Interquartile Ranges by Hour

A3 and A5 Weekday Trends Plot

Westbound A3 Before/After Travel Time Plot

Cumulative Frequency

After

Before

Corridor Name

Weekday Median Travel Times and Interquartile Ranges by Hour

IQR Normalization

Calculation

Weekday Median and IQR Evaluation

Weekend Median and IQR Evaluation

Jijo Darcy M. Bullock

Daniel Farley