Using Big Data and IOT (Internet of Transit) to Improve Transit Performance

TSP Corridor Selection Methodology

Cole Greene
Manager of Data Analytics
Office of Performance Management
May 5th, 2020
Overview

• What is Transit Signal Priority?
• Phase 1 – BaltimoreLink
• Phase 2 Corridor Selection
• Transit Data
• Transit Rider Benefit Calculation Methodology
• Transit Rider Benefit Results
• Other Selection Considerations
What is Transit Signal Priority (TSP)?

Transit signal priority (TSP) is when buses and other transit vehicles communicate with traffic signals and get preference to move through traffic lights more quickly.

How Does it Work?

**TSP works in two ways:**
- A green light can be extended a couple seconds so a bus makes it through.
- A red light can be shortened a few seconds so a bus doesn’t have to wait as long.
TSP In Baltimore – BaltimoreLink

BaltimoreLink TSP Pilot Improvements

<table>
<thead>
<tr>
<th>Time Period</th>
<th>CityLink Green</th>
<th>CityLink Red</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM (7-9)</td>
<td>6.1</td>
<td>11.1</td>
</tr>
<tr>
<td>Midday (11-2)</td>
<td>2.4</td>
<td>1.8</td>
</tr>
<tr>
<td>PM (4-6)</td>
<td>3.1</td>
<td>3.1</td>
</tr>
</tbody>
</table>

Transit Signal Priority Pilot Corridors

York Road Corridor (route of CityLink Red)
Loch Raven Boulevard Corridor (route of CityLink Green)
TSP Intersections (subject to change)
TSP in Baltimore

Pre-Existing TSP
• Howard Street (Light Rail)
• Loch Raven
• York/Greenmount

North Avenue Rising

Phase 2 Corridor Selection Criteria
1. Within Baltimore City Limits
2. Frequent CityLink service.
3. Does not pass through Baltimore’s Central Business District.
4. Corridor has at least 10 intersections with traffic signals that are candidates for TSP.
Big Data and IOT(ransit) Data

1. Ridership by stop
2. Open door time by stop
Turning GPS Location Data Into Dwell Time
Calculating Transit Rider Benefit

Average Person-Minute Delay per Trip from Signal

\[
\text{Average Person-Minute Delay per Trip from Signal} = \left( \frac{\text{Total Time Stopped at Intersection}}{\text{Number of Trips during Study Period}} \right) \times \text{Average Boarding/Alighting Delay from Nearside Stops} \times \text{Average Passenger Load per Trip}
\]
# TSP Rider Benefit Rankings

<table>
<thead>
<tr>
<th>Corridor</th>
<th>Estimated Total Daily Transit Rider Minutes Saved</th>
<th>Minutes Saved Per Intersection</th>
<th># Intersections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange</td>
<td>936</td>
<td>29</td>
<td>32</td>
</tr>
<tr>
<td>Brown</td>
<td>702</td>
<td>28</td>
<td>25</td>
</tr>
<tr>
<td>Lime</td>
<td>372</td>
<td>22</td>
<td>17</td>
</tr>
<tr>
<td>Blue</td>
<td>292</td>
<td>18</td>
<td>16</td>
</tr>
<tr>
<td>Navy</td>
<td>688</td>
<td>18</td>
<td>39</td>
</tr>
<tr>
<td>Pink</td>
<td>153</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>Purple</td>
<td>364</td>
<td>14</td>
<td>26</td>
</tr>
<tr>
<td>Yellow</td>
<td>214</td>
<td>13</td>
<td>17</td>
</tr>
<tr>
<td>Silver</td>
<td>165</td>
<td>9</td>
<td>18</td>
</tr>
</tbody>
</table>
Other Traffic Engineering Considerations

• Crossing Bus Service
• Nearside Bus Stops
• Vehicle/Pedestrian Detection on Side Streets
• Poor Level of Service on Side Streets
• Adequate “Slack” Time
• Baltimore City DOT Projects