Developing Dedicated Bus Lane Screening Criteria in Baltimore, MD
Overview

- Background
- Peer Agency Review
- Literature Review
- Selected Screening Criteria
- Preliminary and Detailed Screening
- Full Analysis
- Results
- Lessons Learned
BaltimoreLink –
Overhaul of MDOT MTA Bus Network

- **Improve** service quality and reliability
- **Maximize** access to high-frequency transit
- **Strengthen** connections between the MTA’s bus and rail routes
- **Align** the network with existing and emerging job centers
- **Involve** riders, employees, communities, and elected officials in the planning process
BaltimoreLink Includes Transitways

- BaltimoreLink was announced by Gov. Hogan in October 2015
- Project included $6M for Dedicated Bus Lanes as one component of the $135M budget
- Baltimore City installed bus/bike lanes on Pratt and Lombard Streets in 2009 with limited marking and enforcement
Peer Agency Review

Boston – Washington Street

NYC – 1st Avenue

Seattle – Wall Street

Washington, D.C. – Georgia Ave. NW

San Francisco – O'Farrell Street

Chicago – Clinton Street

massDOT
Massachusetts Department of Transportation
Literature Review

- Performance measures to assess mobility, accessibility, and design adequacy
- No clear consensus on priority screening measures for corridor selection
- Clear screening considerations
  - Frequency of bus service
  - Person throughput
  - Average speed and reliability
  - Automobile delay
Selected Screening Criteria

• Mobility
  • Person throughput
  • Person delay
  • Volume/frequency
  • Passengers per hour
  • Average speed
  • Auto delay and v/c

• Access
  • Parking and Loading Impacts
  • Population near routes
  • Transit dependent population near routes
  • Job Accessibility
  • Connectivity/Transfers
  • Emergency Routes
  • Freight Routes

• Design Adequacy
  • Lane width
  • Right turns at intersections
Study Corridors

- 25 Streets
  - High frequency
  - Higher levels of delay
  - 14 operate as one-way couplets in downtown
Preliminary Screening

- **Bus Frequency**
  - Number of buses per hour
  - Includes
    - Updated BaltimoreLink Network
    - MTA Regional Commuter
    - Charm City Circulator
    - Local University Shuttles (UMB, UB, JHU, MICA, Collegetown)
Preliminary Screening

• Bus Frequency
  – At least 18 buses/hour in peak periods
  – Some downtown streets experience 40+ buses per hour
Detailed Screening

- Person Throughput
  - Number of people per lane per hour
  - **Auto**: Average regional occupancy per vehicle x turning movement count volumes, distributed across lanes
  - **Bus**: average peak period ridership x frequency in single lane
Detailed Screening

• Person Throughput
  – **Number of people traveling in dedicated bus lane must carry ≥80% of adjacent auto lane**
  – Most downtown streets carried significantly more people per lane by bus than car
  – Several downtown streets included peak-period parking restrictions
Detailed Screening

- Corridors Recommended for Full Analysis
- 9 streets
Full Analysis
(i.e., How do we make this work?)

- Remaining 9 streets (4 corridors) evaluated using ALL original measures
- Key measures
  - Existing Curbside Parking Restrictions
  - Traffic Delay and volume-to-capacity ratio
  - Design constraints
  - Other
Full Analysis
(i.e., How do we make this work?)

• Parking
  – AM and PM parking restrictions
  – AM parking restrictions
  – PM parking restrictions
  – Full-time parking
  – Loading and unloading
  – Special event parking
Full Analysis
(i.e., How do we make this work?)

• Traffic operations
  – Queuing impacts on intersections
  – Accommodating heavy right-turning volumes
  – Minimizing delay
  – Traffic diversion
  – Signal timing
Full Analysis
(i.e., How do we make this work?)

• Design constraints
  – Available lane widths
  – Overlap with bicycle network
  – Pavement conditions
Segments Recommended for Design

- Full-time segments largely confined to the CBD
- Portions of Pratt & Lombard Streets implemented early by City in July/August 2016
- Other segments cut based on traffic operations & lane transitions
Final Implementation

- **Charles St**: PM peak period only (no red paint)
- **St. Paul St**: Combination of peak period, curbside, and offset based on several factors
- **Baltimore St**: Two blocks of Peak-Only Lanes based on existing permits
- **Curbside parking modifications throughout**
Before/After Evaluation

- Measuring impacts on:
  - Transit reliability, speed, on-time performance
  - Traffic congestion
  - Bus operators
  - Public perception
  - Enforcement
## Before/After Evaluation

<table>
<thead>
<tr>
<th>Key Performance Indicator</th>
<th>Unit of Measure</th>
<th>Data Source</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus On-time Performance</td>
<td>Percentage of buses on time as defined in MTA service standards</td>
<td>MTA APC reports</td>
<td></td>
</tr>
<tr>
<td>Bus travel time</td>
<td>Average miles per hour</td>
<td>MTA APC reports</td>
<td></td>
</tr>
<tr>
<td>General purpose travel time</td>
<td>Average miles per hour</td>
<td>Data Collection</td>
<td>Travel time runs along each corridor during peak periods</td>
</tr>
<tr>
<td>Ridership</td>
<td>Total daily passenger boardings at selected stops</td>
<td>MTA APC reports</td>
<td>Select stops with reasonably similar LOS before and after BaltimoreLink route changes</td>
</tr>
<tr>
<td>Illegal motor vehicle travel within dedicated bus lanes</td>
<td>Total number of private vehicles issued notices for violating lane restrictions during reporting period</td>
<td>Baltimore Police Department and MTA Police reports</td>
<td>Only after data Obtain from select locations, one or two blocks along each corridor</td>
</tr>
<tr>
<td>Crashes</td>
<td>Total number of crashes of all types occurring in dedicated lane during reporting period</td>
<td>Baltimore City Police reports</td>
<td>Side swipes, rear ends, etc.</td>
</tr>
<tr>
<td>Traffic volumes</td>
<td>Vehicles per hour</td>
<td>Data Collection</td>
<td>Traffic counts by video at select mid-block locations, one or two blocks along each corridor. This provides necessary count data but also allows for video review of a corridor so that enforcement, lane usage, etc. can be observed.</td>
</tr>
<tr>
<td>Illegal parking</td>
<td>Total number of parking infractions in select locations during reporting period</td>
<td>Baltimore City Department of Transportation</td>
<td>Only after data Obtain from select locations, one or two blocks along each corridor</td>
</tr>
</tbody>
</table>
Lessons Learned

• Data-driven decision making can work
• Ongoing coordination between City DOT and State Transit Agency was ESSENTIAL
• Person throughput is extremely valuable to change typical narratives and bridge divides
Opportunities for Future Research

• Effectiveness of Red Dedicated Bus Lanes
• Bicycle Utilization of Dedicated Bus Lanes and Impacts on Bus Operations
• Strategies for Effective Enforcement
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