Integrating Livability Into Transit Planning: An Assessment of BRT Opportunities in Chicago

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Metropolitan Planning Council
What is BRT?

BRT is a flexible, rubber-tired rapid-transit mode that combines stations, vehicles, services, running ways, and Intelligent Transportation System (ITS) elements into an integrated system with a strong positive identity that evokes a unique image.

- Transportation Research Board

Curitiba, Brazil
Key Features of Bus Rapid Transit (BRT)

1. Pay-before-you-board stations
2. At-grade boarding
3. Dedicated bus lanes
4. Affordable infrastructure

Mexico City
Rouen, France
Bogota, Colombia: Transmilenio
Vancouver, Canada
Why Bus Rapid Transit (BRT)?

• Chicago’s Cost of Congestion = $7.3 billion/yr
  – 95% is cost of wasted travel time
  – BRT offers considerable travel time savings

• Cost effective and catalytic capital investment
  – Cheaper than rail, but spurs more community (re)development than bus.
Livability Principles

- Provide more transportation choices
- Promote equitable, affordable housing
- Enhance economic competitiveness
- Support existing communities
- Coordinate policies and leverage investment
- Value communities and neighborhoods
Our methodology

- Eliminate “special” routes
- Assess segments by right-of-way for BRT feasibility
- Assess segments for livability
- Build potential routes out of strong segments
- Fill in gaps to integrate with existing rail and provide connectivity
- Assess ridership demand and traffic impacts along routes
- Run livability scenarios
- Issue report
Why this methodology?

• Test whether livability and operational demands (width, ridership) could co-exist
• Use BRT network as a frame for future public and private investment
• Make Chicago more competitive for federal funding
• Better understand community redevelopment opportunities
Phase I – Initial screening and segments
Phase II – R.O.W.
Phase II – R.O.W.
## Phase II – Livability

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Rationale for Selection</th>
<th>Study Measure</th>
<th>Main Corresponding Livability Principles</th>
</tr>
</thead>
</table>
| 1) Connectivity to Community Services | BRT has the potential to help facilitate the movement of residents to community service destinations. | Number of community destinations within a half-mile of street segments. | 3) Enhance Economic Competiveness  
6) Value Communities and Neighborhoods |
| 2) Connectivity to Educational Institutions | BRT has the potential to help facilitate the movement of residents, students, tourist, and employees to educational institutions. | Number of educational institutions within a half-mile of street segments. | 3) Enhance Economic Competiveness  
6) Value Communities and Neighborhoods |
| 3) Connectivity to Entertainment | BRT has the potential to help facilitate the movement of residents, students, tourist, and employees to major entertainment destinations. | Number of entertainment destinations within a half-mile of street segments. | 6) Value Communities and Neighborhoods |
| 4) Connectivity to Food Stores | BRT has the potential to help facilitate the movement of residents, students, tourist, and employees to grocery, produce, and other types of food stores. | Total annual sales of food stores within a half-mile of street segments. | 6) Value Communities and Neighborhoods |
| 5) Connectivity to Major Medical Care | BRT has the potential to help facilitate the movement of residents, students, tourist, and employees to medical destinations. | Number of hospitals within a half-mile of street segments. | 3) Enhance Economic Competiveness  
6) Value Communities and Neighborhoods |
## Phase II – Livability

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</thead>
<tbody>
<tr>
<td>8) Employment/Job Access</td>
<td>Employees working in close proximity BRT lines are a major group of potential riders, and BRT would increase their ability to live near work or live and work near transit.</td>
<td>Total employment at all businesses within a half-mile of street segments.</td>
<td>1) Provide More Transportation Choices</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3) Enhance Economic Competiveness</td>
</tr>
<tr>
<td>9) Existing Transit Ridership</td>
<td>Current bus ridership demonstrates existing demand for transit along the study routes.</td>
<td>Average passenger flow by street segment (controlling for direction) during the a.m. peak period.</td>
<td>1) Provide More Transportation Choices</td>
</tr>
<tr>
<td>10) Existing Transit Travel Time</td>
<td>Travel time reduction for passengers is a main function of BRT. It is important to identify routes where this benefit will be maximized.</td>
<td>Average passenger speed by street segment (controlling for direction) during the a.m. peak period.</td>
<td>1) Provide More Transportation Choices</td>
</tr>
</tbody>
</table>
Phase II - Livability

- Scoring results from three of the 14 livability criteria – access to education (left), population not within walking distance of rail (middle), and ridership by stop (right).
Phase II - Livability
Phase III – Transit integration and connectivity
Phase IV – Demand modeling

<table>
<thead>
<tr>
<th>Service Factor</th>
<th>Assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headway</td>
<td>5 – 10 minutes (peak)</td>
</tr>
<tr>
<td></td>
<td>12 – 15 minutes (off-peak)</td>
</tr>
<tr>
<td>Station Spacing</td>
<td>2 stations per mile</td>
</tr>
<tr>
<td>Speeds</td>
<td>20 mph for 20-second stop time</td>
</tr>
<tr>
<td></td>
<td>15 mph for 30-second stop time</td>
</tr>
<tr>
<td>Dwell Time</td>
<td>20 Seconds</td>
</tr>
<tr>
<td></td>
<td>30 Seconds</td>
</tr>
</tbody>
</table>
Phase IV – Demand modeling

- Conservative estimate of idealized scenario
  - A lane of traffic was removed in both directions or each of the 10 routes in the network
  - Three scenarios: no build, BRT plus .5 local service, BRT with no local service
  - Results include total trips and just transit trips, as well as impacts on traffic
  - The results do not tell us anything about property values or land use
  - The entire network was modeled as a whole, not each route separately.
Phase IV – Demand modeling

• Impact on **total** person trips:
  - Trips with both ends in the BRT network **increase by 33,000 daily** (1.3% bump)
  - Decreases in trips that begin in BRT and end outside it, and vice versa

• Impact on **transit** person trips:
  - Transit trips with both ends in the BRT network **increase by 41,000 daily** (14% bump)
  - Transit trips with either a beginning or end in BRT network **increase 6.5%**
  - Total regional transit trips **increase 3%**
Phase IV – Demand modeling

- 41,000 > 33,000
  - The modeled BRT network “converts” 8,000 drivers into transit riders
  - Transit mode share increases:
    - 12.0% to 13.5% within BRT network
    - 14.7% to 15.8% for trips with one end in BRT network
    - 9.7% to 10% regionally
**Phase IV – Demand modeling**

**Table 2: Roadway Impacts**

<table>
<thead>
<tr>
<th>Corridor</th>
<th>VMT (000’s)</th>
<th>C-VMT (000’s)</th>
<th>%CVMT</th>
<th>VHT (000’s)</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-Build</td>
<td>26,891</td>
<td>5,924</td>
<td>22%</td>
<td>1,575</td>
<td>17</td>
</tr>
<tr>
<td>BRT</td>
<td>26,432</td>
<td>6,931</td>
<td>26%</td>
<td>1,635</td>
<td>16</td>
</tr>
<tr>
<td>Change</td>
<td>(459)</td>
<td>1,007</td>
<td></td>
<td>60</td>
<td>-1</td>
</tr>
<tr>
<td>% Change</td>
<td>-2%</td>
<td>17%</td>
<td></td>
<td>4%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rest of Region</th>
<th>VMT</th>
<th>C-VMT</th>
<th>%CVMT</th>
<th>VHT</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-Build</td>
<td>242,145</td>
<td>16,797</td>
<td>7%</td>
<td>7,749</td>
<td>31</td>
</tr>
<tr>
<td>BRT</td>
<td>243,178</td>
<td>16,961</td>
<td>7%</td>
<td>7,785</td>
<td>31</td>
</tr>
<tr>
<td>Change</td>
<td>1,032</td>
<td>164</td>
<td></td>
<td>36</td>
<td>0</td>
</tr>
<tr>
<td>% Change</td>
<td>0%</td>
<td>1%</td>
<td></td>
<td>0%</td>
<td></td>
</tr>
</tbody>
</table>
Phase IV – Demand modeling

• AM demand
  – Width indicates volume of rides traveling in a given direction
Phase IV – Demand modeling

- AM demand
  - purple = boarding
  - orange = alighting
BRT Report and Next Steps

• Issue report
• Integrate livability scoring method into FTA New Starts process
• Western Corridor
  – Opportunity for community engagement in station area Placemaking and Corridor Development Initiative
  – Assess opportunities for public investment (CHA, CPS, Dept. of Water Management, CDOT, PBC, etc.)
  – Assess opportunities for private investment (zoning, infill development, stations, BRT itself, etc.)
  – Evaluate additional sources for funding operations
Thank You

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