Accessibility Evaluation of Managed Lanes and Transitways in the Twin Cities

Kristin Carlson
Researcher
Accessibility Observatory
Pooled-fund Overview

- Led by the Minnesota Department of Transportation (MnDOT)

- Pooled-fund partners receive:
  - Annual block-level accessibility data sets for:
    - Automobile
    - Transit
    - Bike
  - Individual reports based on their jurisdiction

- The Pooled-Fund study provides a forum for participants to share ideas and use cases
Image of Twin Cities Auto
Accessibility
Image of Twin Cities Transit
Accessibility
Accessibility Evaluation of Managed Lanes and Transitways in the Twin Cities

**Pooled-fund participant:** Metropolitan Council

**Jurisdiction:** Minneapolis-Saint Paul, Minnesota

**Process:** Long-term planning alternatives were selected for regional accessibility analyses.

- Project selection guided by the 2040 Transportation Policy Plan (TPP)
- Accessibility comparisons made between current and future transportation systems
Accessibility Evaluation of Managed Lanes

Current Revenue Scenario—Tier 1 MnPASS Lanes
Accessibility Evaluation of Managed Lanes (MnPASS)

**Mode:** Automobile

**Motivation:** What are the regional job accessibility impacts of adding HOV/HOT managed lanes to four freeway corridors in the Twin Cities?

**Network Modification:** Set managed lane corridor speeds to free flow based on time period.

**Time Periods:**
- Weekday (8:00 AM, 12:00 PM, 5:00 PM)
- Weekend (12:00 PM)
Tier 1 MnPASS Project Extents
Data

Spatial Resolution: Census block-level
Surface Transportation Network: TomTom, 2017
Speed Profiles: TomTom, 2017
Jobs and Workers: U.S. Census Bureau’s Longitudinal Employer-Household Dynamics (LEHD) program, 2015

*Consistent with National Accessibility Evaluation reports and data sets
Change in jobs within 30 minutes
(Driving, 8:00 AM)

- < -100%
- -100% - -50%
- -50% - -25%
- -25% - -10%
- -10% - -5%
- -5% - 0
- No Change
- 0 - +5%
- +5% - +10%
- +10% - +25%
- +25% - +50%
- +50% - +100%
> +100%

State border
MPO boundary
Existing
Tier 1
Worker-weighted accessibility for Metropolitan Council jurisdiction (number of jobs) during weekday morning peak (8:00 AM).

<table>
<thead>
<tr>
<th></th>
<th>30 min</th>
<th>60 min</th>
<th>90 min</th>
<th>Time-weighted</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing MnPASS</strong></td>
<td>1,112,357</td>
<td>1,820,428</td>
<td>2,175,837</td>
<td>238,586</td>
</tr>
<tr>
<td><strong>Tier 1 MnPASS</strong></td>
<td>1,146,049</td>
<td>1,824,136</td>
<td>2,179,574</td>
<td>244,459</td>
</tr>
<tr>
<td><strong>Absolute Change</strong></td>
<td>+33,692</td>
<td>+3,708</td>
<td>+3,737</td>
<td>+5,872</td>
</tr>
<tr>
<td><strong>Percent Change</strong></td>
<td>+4.51%</td>
<td>+0.22%</td>
<td>+0.18%</td>
<td>+3.20%</td>
</tr>
</tbody>
</table>
Top 20 Cities, Townships and Unorganized Territories (CTUs)

Worker-weighted accessibility change

Weekday morning peak (8:00 AM)

Ranked by time-weighted percent change.

<table>
<thead>
<tr>
<th>CTU</th>
<th>30 min</th>
<th>60 min</th>
<th>90 min</th>
<th>Time-weighted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Columbus</td>
<td>+164,113 (+46.17%)</td>
<td>+39,320 (+2.35%)</td>
<td>+9,327 (+0.46%)</td>
<td>+24.71%</td>
</tr>
<tr>
<td>Lexington</td>
<td>+218,093 (+20.54%)</td>
<td>+17,505 (+0.97%)</td>
<td>+22,639 (+1.05%)</td>
<td>+24.68%</td>
</tr>
<tr>
<td>Circle Pines</td>
<td>+207,057 (+20.31%)</td>
<td>+15,349 (+0.85%)</td>
<td>+17,821 (+0.83%)</td>
<td>+22.62%</td>
</tr>
<tr>
<td>Forest Lake</td>
<td>+155,858 (+45.55%)</td>
<td>+32,531 (+1.91%)</td>
<td>+7,349 (+0.36%)</td>
<td>+21.81%</td>
</tr>
<tr>
<td>Ham Lake</td>
<td>+220,644 (+58.7%)</td>
<td>+15,594 (+0.9%)</td>
<td>+18,914 (+0.94%)</td>
<td>+19.29%</td>
</tr>
<tr>
<td>Lino Lakes</td>
<td>+209,255 (+27.48%)</td>
<td>+13,121 (+0.74%)</td>
<td>+21,757 (+1.04%)</td>
<td>+19.13%</td>
</tr>
<tr>
<td>Scandia</td>
<td>+12,931 (+10.42%)</td>
<td>+126,200 (+8.36%)</td>
<td>+19,154 (+0.97%)</td>
<td>+19.06%</td>
</tr>
<tr>
<td>Linwood</td>
<td>+20,321 (+15.69%)</td>
<td>+94,971 (+6%)</td>
<td>+7,188 (+0.36%)</td>
<td>+18.59%</td>
</tr>
<tr>
<td>Blaine</td>
<td>+168,253 (+20.43%)</td>
<td>+11,345 (+0.63%)</td>
<td>+23,397 (+1.12%)</td>
<td>+16.47%</td>
</tr>
<tr>
<td>East Bethel</td>
<td>+25,014 (+12.8%)</td>
<td>+38,834 (+2.36%)</td>
<td>+11,629 (+0.59%)</td>
<td>+12.76%</td>
</tr>
<tr>
<td>Coon Rapids</td>
<td>+142,044 (+16.95%)</td>
<td>+6,007 (+0.33%)</td>
<td>+11,358 (+0.55%)</td>
<td>+12.11%</td>
</tr>
<tr>
<td>Andover</td>
<td>+159,040 (+36.74%)</td>
<td>+8,566 (+0.48%)</td>
<td>+9,844 (+0.49%)</td>
<td>+10.83%</td>
</tr>
<tr>
<td>Bethel</td>
<td>+229 (+0.16%)</td>
<td>+61,669 (+3.93%)</td>
<td>+9,147 (+0.47%)</td>
<td>+9.94%</td>
</tr>
<tr>
<td>Oak Grove</td>
<td>+7,625 (+3.56%)</td>
<td>+38,932 (+2.39%)</td>
<td>+7,907 (+0.4%)</td>
<td>+9.85%</td>
</tr>
<tr>
<td>Mounds View</td>
<td>+76,790 (+5.7%)</td>
<td>+8,022 (+0.44%)</td>
<td>+23,483 (+1.07%)</td>
<td>+9.61%</td>
</tr>
<tr>
<td>Anoka</td>
<td>+200,221 (+32.45%)</td>
<td>+2,792 (+0.15%)</td>
<td>+3,548 (+0.17%)</td>
<td>+9.31%</td>
</tr>
<tr>
<td>Saint Francis</td>
<td>+192 (+0.14%)</td>
<td>+71,880 (+4.83%)</td>
<td>+9,111 (+0.47%)</td>
<td>+9.19%</td>
</tr>
<tr>
<td>Ramsey</td>
<td>+46,932 (+14.62%)</td>
<td>+11,204 (+0.63%)</td>
<td>+10,559 (+0.53%)</td>
<td>+8.96%</td>
</tr>
<tr>
<td>Nowthen</td>
<td>+2,739 (+1.28%)</td>
<td>+40,013 (+2.45%)</td>
<td>+6,603 (+0.33%)</td>
<td>+8.24%</td>
</tr>
<tr>
<td>Marine on Saint Croix</td>
<td>0 (0%)</td>
<td>+96,851 (+6.55%)</td>
<td>+14,497 (+0.73%)</td>
<td>+7.42%</td>
</tr>
</tbody>
</table>
Managed Lane Results

- The Tier 1 MnPASS corridors impact regional job accessibility more at shorter travel durations than at longer durations.
  - Example: The average worker using Tier 1 MnPASS corridors gains access to 33,692 jobs within a 30-minute commute, and 3,708 jobs within a 60-minute commute.

- Accessibility benefits are highest in the suburban and exurban areas of the Twin Cities
  - Suburbs in the North and East Twin Cities experience the greatest accessibility change. Speed increases along Tier 1 MnPASS corridors allow users to reach more jobs in the same travel time.
  - Improved job accessibility is one factor that can make these suburbs more appealing places to live.
  - The South and West metro experience little change to travel times by the addition of the Tier 1 MnPASS lanes.
Accessibility Evaluation of Planned Transitways

Bus Rapid Transit (BRT) & Light Rail Transit (LRT)
Accessibility Evaluation of Planned Transitways

Participants: Metropolitan Council and Metro Transit

Jurisdiction: Minneapolis-Saint Paul, Minnesota

Process: Engage the local MPO and transit authority to select existing and future transitways for an accessibility study.

- Guided by the Transportation Policy Plan (TPP)
- Mix of transitway types and funding stages
Methodology

Mode: Transit

Motivation: How does job accessibility change when service is added/modified to the existing transit network?

Network Modifications: Compare accessibility levels of the existing and planned transit networks.

Time Periods:
- Weekday (7:00 AM–9:00 AM, 11:00 AM–1:00 PM, 4:00 PM–6:00 PM)
- Weekend (11:00 AM–1:00 PM)
Worker-weighted accessibility for Metropolitan Council jurisdiction (number of jobs) during weekday morning peak (7:00–9:00 AM).

<table>
<thead>
<tr>
<th></th>
<th>30 min</th>
<th>45 min</th>
<th>60 min</th>
<th>90 min</th>
<th>Time-weighted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>5,798</td>
<td>20,980</td>
<td>45,576</td>
<td>47,916</td>
<td>1,761</td>
</tr>
<tr>
<td>Planned Network</td>
<td>5,945</td>
<td>21,783</td>
<td>47,714</td>
<td>50,231</td>
<td>1,821</td>
</tr>
<tr>
<td>Absolute Change—Metro</td>
<td>+147</td>
<td>+803</td>
<td>+2,138</td>
<td>+2,315</td>
<td>+60</td>
</tr>
<tr>
<td>Absolute Change—blocks within ½ mile of transit stops</td>
<td>+807</td>
<td>+4,377</td>
<td>+11,453</td>
<td>+12,374</td>
<td>+325</td>
</tr>
<tr>
<td>Percent Change—Metro</td>
<td>+0.35%</td>
<td>+0.66%</td>
<td>+1.06%</td>
<td>+1.1%</td>
<td>+0.65%</td>
</tr>
<tr>
<td>Percent Change—blocks within ½ mile of transit stops</td>
<td>+1.89%</td>
<td>+3.48%</td>
<td>+5.1%</td>
<td>+5.25%</td>
<td>+3.31%</td>
</tr>
</tbody>
</table>
Example Extract: Green Line LRT Extension

- Positive accessibility change where service previously did not exist
- Accessibility change isolated to station areas due to unincorporated local transit changes
Example Extract: C Line BRT

- Service frequency of C Line improves station area accessibility
- Decreased accessibility between station areas due to reduced frequency of complimentary local route
Example Extract: Orange Line BRT

- Positive accessibility change at BRT station areas
- Network effects visible along major transit intersections
- Results do not include upcoming changes to feeder routes
Concluding Remarks

• These evaluations showed us how different investment scenarios can play out in terms of providing access across the region and down to the neighborhood level.
• Collaboration with the local transit authority was critical to the success of the scenario evaluation process and improved data relevancy/accuracy.
• There are opportunities for MPOs to evaluate land use changes independently and in coordination with regional transportation planning.

National Accessibility Evaluation Pooled-Fund study: access.umn.edu/research/pooledfund

“The Metropolitan Council views accessibility as an important tool to measure and evaluate the regional transit network and land use patterns. Efforts to develop and implement appropriate measures of accessibility are ongoing.” —2040 TPP (2018 Update)
Accessibility Evaluation of Managed Lanes and Transitways in the Twin Cities

Kristin Carlson
Researcher
Accessibility Observatory
carl4498@umn.edu
(612)-626-4052

Andrew Owen
Director
Accessibility Observatory
aowen@umn.edu
(612) 624-7550