Metropolitan sustainability and the Interstate System: A new professional paradigm

Eric Sundquist
Future of the Interstate Study
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Starting point

• Interstates imagined as inter-city facilities but greatly affect metro accessibility (for good and ill)
  – Siting and design for inter-city travel
  – Non-Interstate networks poorly connected
• Financing model serves rural needs but not metro needs
• Metro governance initially ignored and still underdeveloped
• Professional practice around construction

-- Adapted from Boarnet, 2014
Some more recent responses

- Anti-freeway movements
- Handful of freeway removals
- Undergrounding/capping, CSS
- Congestion pricing and other operational strategies
- Greater multimodalism

Still no new paradigm in practice
Opportunities for the future
Two tools to guide practice

• Accessibility = Ease of reaching destinations
• Trip-making = Actual use of the system to reach destinations

Both measures are empirical, multimodal and scalable
Why measure accessibility?

- Travel speed
- Level of service
- Vehicle throughput
- Person throughput
Why measure accessibility?
Not just for plans, but also for projects

SMART SCALE is about investing limited tax dollars in the right projects that meet the most critical transportation needs in Virginia.
Multiple modes with one metric

- Predict mode share
- Estimate VMT, transit ridership, bike-ped usage
- Estimate HH transportation costs

HBW Auto Mode Share =
0.083 + 1.38E-07(AccAuto) - 1.45E-06(AccTransit) - 6.71E-06(AccWalk)
Calculating accessibility

- Network
- Land uses
- Method to calculate times
Calculating accessibility

![Graph showing accessibility decay factors for different travel times and modes.](image-url)

- **Auto**
- **Transit**
- **Walk**
- **Other**
- **All modes**

Decay factor (Dane County, Wisconsin)

Travel time to work (minutes)
13 minute improvement (20 to 7)

Decay factor (Dane County, Wisconsin)

Travel time to work (minutes)

- Auto
- Transit
- Walk
- Other
- All modes
13-minute improvement (40 to 27)

Travel time to work (minutes) vs. Decay factor (Dane County, Wisconsin)

- Auto
- Transit
- Walk
- Other
- All modes
Two primary metrics

- **Work**: access to jobs or a subset of jobs
  - 20 percent of trips, 30 percent of VMT
  - Unit is jobs
- **Non-work**: access to groceries, parks, banks, restaurants and other non-work destinations
  - 80 percent of trips, 70 percent of VMT
  - Unit is a score up to 100
### Madison: Nonwork accessibility (walk)

<table>
<thead>
<tr>
<th>Destination Types</th>
<th>Target</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restaurants, coffee shops, bars, pubs, wineries, and night life</td>
<td>8</td>
<td>40</td>
</tr>
<tr>
<td>General retail, book stores, and department stores</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Groceries</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>Errands: Banks, pharmacies, and hardware stores</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Parks, recreational areas, campgrounds, and golf courses</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Schools</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Cultural attractions, entertainment, and museums</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

![Map of Madison showing nonwork accessibility (walking)](image)

**Nonwork accessibility (walking)**

- 0.0 - 12.5
- 12.5 - 25.0
- 25.0 - 37.5
- 37.5 - 50.0
- 50.0 - 67.5
- 67.5 - 75.0
- 75.0 - 87.5
- 87.5 - 100
Sacto: RR overpass + I-80B crossing
Walk accessibility (work): RR overpass + I-80B crossing

Total impact (3-mile radius)
- 2,688,457 household-jobs

Average
- Before: 4,785 jobs
- After: 4,832 jobs
- Change: 47 jobs
Transit accessibility (work, a.m.): RR overpass + I-80B crossing

Total impact
- 29,229,479 household-jobs

Average
- Before: 85,179 jobs
- After: 85,229 jobs
- Change: 50 jobs
Measuring trip-making

- Anonymous GPS data
- Precise information not in travel demand models or traffic counts

Summary

- More than 3 million trips per day in NOVA
  - 51% < 5 miles
  - 24% < 2 miles
  - 8% < 1 mile
- 44% of short trips are during peak periods
Denver: Short trips on freeways

Interstate trips under 5 miles as a percentage of PM peak period (3-7pm) weekday traffic
Denver: Short internal trips

Trips within the Greenwood Plaza area
Weekdays

- 24% of trips
- 46% of trips
- 47% of trips
- 29% of trips
- 52% of trips
- 25% of trips

0.25 Miles
0.5 Miles
1 Mile
Denver: Potential Light Rail Trips

Potential LRT Trips to/from the Downtown Core

- Washington Park: 3256
- Greenwood Village: 3444

Trips:
- Under 100
- 101 - 200
- 201 - 400
- 401 - 600
- 601 - 800
- 801 - 1,600
- Over 1,600
Van Dorn Street Metro

DEFICIENCY
Residents of Cameron Run live as close as 2,000 feet from the Metro Station, but are forced to walk over 1 mile due to limited accessibility.

Existing bike trail – connects to Holmes Run Trail

Underground pedestrian walkway runs from parking lots to station

Existing shared-use path that runs under I-95/495 – ends across from Metro Road; does not connect to Metro Station

Van Dorn Street Metro Station

Limited accessibility from areas south of I-95/495
Northern Virginia: Van Dorn Street Metro

Benefits

• Improve multimodal access to station
• Remove 152,000 vehicle trips per year (24,500 hours)
• Save $155,000 in traveler costs per year
• Eliminate 113 tons of carbon emissions per year

Costs

• $0.5 to 0.6 million (annualized)
  – New infrastructure
  – Modest increase in TDM
Northern Virginia: George Mason University

33% of trips

All trips to and from study area:
- 0 - 50
- 50 - 150
- 150 - 500
- 500 - 1,000
- 1,000 +
Opportunities

• Off campus connections by foot, biking and transit
• Parking management
• Walkable development in surrounding area
### Northern Virginia: George Mason University

#### Benefits
- Improve multimodal access to campus
- Remove 460,000 vehicle trips per year (82,000 hours)
- Save $500,000 in traveler costs per year
- Eliminate 390 tons of carbon emissions per year

#### Costs
- $0.9 to 1.0 million (annualized)
  - Bike and pedestrian improvements
  - Local shuttle/transit service
  - TDM and parking management
Eric Sundquist
SSTI Managing Director
608-265-6155
ericssstius