Mapping Pedestrian Networks and Density to Improve Transit

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A vision for the region’s multimodal transportation system

THE METROPOLITAN TRANSPORTATION PLAN FOR NORTH CENTRAL TEXAS
Sustainable Development

Support alternative modes of transportation (walking, biking, transit)

- Walking-friendly development
- Bicycle/pedestrian infrastructure
- Transit-Oriented Development
## MEANS OF TRANSPORTATION TO WORK

<table>
<thead>
<tr>
<th>Method</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drove alone</td>
<td>80.80%</td>
</tr>
<tr>
<td>Carpoled</td>
<td>10.10%</td>
</tr>
<tr>
<td>Public transportation (excluding taxicab)</td>
<td>1.50%</td>
</tr>
<tr>
<td>Walked</td>
<td>1.20%</td>
</tr>
<tr>
<td>Bicycled</td>
<td>0.20%</td>
</tr>
<tr>
<td>Taxicab, motorcycle, or other means</td>
<td>1.40%</td>
</tr>
<tr>
<td>Worked at home</td>
<td>4.80%</td>
</tr>
</tbody>
</table>

Source:
2011-2015 American Community Survey 5-Year Estimates (DFW MSA)
Improving Mass Transit in North Texas

Transit Service

Development Design

Land Use & Density
Designed For Mass Transit?
Rail Stations

77 stations (2017)
84 stations (2019)
Routes to Rail
Measuring Access

North Central Texas Council of Governments
**Goal:** Identify public rights of way needing sidewalks and sidewalk improvements

1. Digitizing Sidewalks
2. Network Analysis
3. Prioritizing Projects

*Routes to Rail*
1. Digitizing Sidewalks
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- RailStations
- IllinoisStation_HalfMile_Sidewalk_Clip
- Crosswalk
- Driveway
- Other
- Sidewalk
- sidewalk_arc
- RailLines_mergeCopy
- Roads
  - <all other values>
  - Class
    - Primary Highway
    - Secondary Highway
    - Major Arterial
    - Access Ramp
2. ArcGIS Network Analysis

New Network Dataset
- Connectivity = Vertices
- Length of line (miles) = cost

Network Analyst
- Rail Stations = Facilities
2. ArcGIS Network Analysis

Conceptual Product from Network Analyst

Rail Station

Gap in the network

Destination

Half-mile walk distance

Beyond half-mile actual walk distance

Disconnected pedestrian facility
2. ArcGIS Network Analysis

Default Break: 0.5 miles
2. ArcGIS Network Analysis

Default Break: 2 miles
2. ArcGIS Network Analysis

Select all segments that are not in the other two categories
Routes To Rail Maps 2013

74 stations
3. Prioritizing Projects

300+ Miles missing sidewalk in the 0.5 mile radius around rail stations

Where to start?
3. Prioritizing Projects

http://www.pedbikeinfo.org/planning/tools_apt.cfm
3. Prioritizing Projects

Variables:
- Demographics
- Crashes
- Distance to station
- Density
3. Prioritizing Projects

Detailed Population density

- Appraisal district parcel data (Dallas, Collin, Denton, Tarrant)
- Edits/Quality control in 0.5 mile rail station buffer: SQFT, land use, and parcel geometry
- Calculate parcel population e.g. 300 SQFT office = 1 person
### 3. Prioritizing Projects

<table>
<thead>
<tr>
<th>COG LU</th>
<th>Description</th>
<th>Housing Units</th>
<th>SQFT</th>
<th>People</th>
<th>SQFT/ person</th>
</tr>
</thead>
<tbody>
<tr>
<td>111</td>
<td>Single family</td>
<td>1</td>
<td>--</td>
<td>2.5</td>
<td>--</td>
</tr>
<tr>
<td>112</td>
<td>Multi-family</td>
<td>1</td>
<td>--</td>
<td>1.8</td>
<td>--</td>
</tr>
<tr>
<td>120</td>
<td>Commercial</td>
<td>--</td>
<td>1,000</td>
<td>3.5</td>
<td>286</td>
</tr>
<tr>
<td>121</td>
<td>Office</td>
<td>--</td>
<td>1,000</td>
<td>3</td>
<td>333</td>
</tr>
<tr>
<td>122</td>
<td>Retail</td>
<td>--</td>
<td>1,000</td>
<td>8</td>
<td>125</td>
</tr>
<tr>
<td>125</td>
<td>Institutional/semi public</td>
<td>--</td>
<td>1,000</td>
<td>6</td>
<td>167</td>
</tr>
<tr>
<td>126</td>
<td>Education</td>
<td>--</td>
<td>1,000</td>
<td>12</td>
<td>83</td>
</tr>
<tr>
<td>131</td>
<td>Industrial</td>
<td>--</td>
<td>1,000</td>
<td>1</td>
<td>1,000</td>
</tr>
<tr>
<td>143</td>
<td>Utilities</td>
<td>--</td>
<td>--</td>
<td>0</td>
<td>--</td>
</tr>
<tr>
<td>148</td>
<td>Rail road</td>
<td>--</td>
<td>--</td>
<td>0</td>
<td>--</td>
</tr>
<tr>
<td>160</td>
<td>Mixed use</td>
<td>--</td>
<td>1,000</td>
<td>4</td>
<td>250</td>
</tr>
<tr>
<td>170</td>
<td>Parks/recreation</td>
<td>--</td>
<td>--</td>
<td>1</td>
<td>--</td>
</tr>
<tr>
<td>301</td>
<td>Vacant</td>
<td>--</td>
<td>--</td>
<td>0</td>
<td>--</td>
</tr>
<tr>
<td>401</td>
<td>Parking</td>
<td>--</td>
<td>--</td>
<td>0</td>
<td>--</td>
</tr>
</tbody>
</table>
3. Prioritizing Projects

Square Feet / People - Sources

- International Building Code – Section 1004 – Max floor Area Allowance per occupant

- US Census - Housing occupancy report

- Methods used in NCTCOG 2040 Demographic forecast
3. Prioritizing Projects

Population

<table>
<thead>
<tr>
<th>Range</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 1</td>
<td>Light yellow</td>
</tr>
<tr>
<td>2 - 15</td>
<td>Light yellow to light orange</td>
</tr>
<tr>
<td>16 - 50</td>
<td>Light orange to orange</td>
</tr>
<tr>
<td>51 - 100</td>
<td>Orange to dark orange</td>
</tr>
<tr>
<td>101 - 324</td>
<td>Dark orange</td>
</tr>
<tr>
<td>325 - 476</td>
<td>Dark red to dark orange</td>
</tr>
<tr>
<td>477 - 700</td>
<td>Dark red</td>
</tr>
<tr>
<td>701 - 1,030</td>
<td>Dark red to dark purple</td>
</tr>
<tr>
<td>1,031 - 1,771</td>
<td>Dark purple</td>
</tr>
<tr>
<td>1,772 - 4,104</td>
<td>Light purple</td>
</tr>
<tr>
<td>4,105 - 14,000</td>
<td>Light purple</td>
</tr>
</tbody>
</table>

Park Lane Station
3. Prioritizing Projects

- Sidewalk Gaps
- Existing Sidewalk
- Route
- Density Zone
FTA Grant
Spatial data can assist with identifying infrastructure needs, prioritizing implementation, and demonstrating the potential benefit of first/last mile pedestrian improvements

Next steps

- Expand parcel population estimate
- Continue to update sidewalk data
- Model pedestrian flow via shortest route