Mind the Gap: Transit Need Analysis

FOURSQUARE INTEGRATED TRANSPORTATION PLANNING
Introduction

- Transit Propensity – a measure of demographics that indicate the propensity for people in a given area to use transit
  - GIS: heat maps
  - Emphasizes the transit dependent

- Travel Demand Model Flows – projected origin-destination flows by mode and purpose

- Problem:
  - How to expand transit propensity to capture “choice” riders in addition to “dependent” riders
  - How to include generators in the mix
  - How to combine transit propensity and travel demand model flows to analyze transit demand comprehensively
Develop a New Model

- Develop Transit “Propensity” Indexes that include:
  - Transit-oriented population
  - All commuters
  - Places of work (generators)
  - Non-work generators (retail, entertainment, schools...)

- Prioritize Origin-Destination Flows

- Link the appropriate index with the appropriate flow type

- Compare to existing transit system to identify gaps
Mind the Gap – Transit Needs Analysis

Four Indexes

- Weight categories according to local transit passenger surveys
- Gather data by block group from ACS and LEHD for service area
- Look at proportions, densities, and raw totals for inputs
- Simple rank/weight in excel, join to Census block group shapefile
Transit-Oriented Pop./Commuter Indexes

Mind the Gap – Transit Needs Analysis
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Travel Demand Model Flows

- Transportation Analysis Zones (TAZ) pairs with projected flows between them by mode and purpose
  - TAZ typically close to census block group geography size

Origin & destination TAZs

Trip purpose_mode

Join OTAZ and DTAZ coordinates from TAZ shapefile

Concatenate OTAZ and DTAZ ID to create a new ID field

XY to Line function to create shapefile of flows

Join spreadsheet to shapefile using the new ID you created (i.e. 100_210)
If TAZs are too small (too many flows), you can group them and pivot in excel beforehand.
Group TAZs into neighborhoods to reduce total

Pivot by new neighborhood ID to get new totals

TAZ Grouping Example

- Group TAZs into neighborhoods to reduce total
- Pivot by new neighborhood ID to get new totals

<table>
<thead>
<tr>
<th>TAZ</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Midwood</td>
</tr>
<tr>
<td>101</td>
<td>Grier Heights</td>
</tr>
<tr>
<td>102</td>
<td>Elizabeth</td>
</tr>
<tr>
<td>103</td>
<td>Matthews</td>
</tr>
</tbody>
</table>
Model Development

- Linking indexes to flows
- **Peak Period Model:**
  - Combine commuter & work indexes into a “peak” index
  - Use home-based work flows
    - Can use all modes, or just transit
- **Off-Peak Period Model:**
  - Combine transit-oriented & non-work indexes into an “off-peak” index
  - Use sum of home-based other and non-home based flows
    - All modes or just transit

\[
\text{Model Development} = \max(!\text{commuter}!, !\text{work}!)
\]

\[
= \max(!\text{tranor}!, !\text{nonwork}!)
\]
Models

- **Peak Model:**
  - High flows connecting high peak index areas should have high quality, frequent transit service during peak periods

- **Off-Peak Model:**
  - High flows connecting high off-peak index areas should have high quality, frequent service all day

- **Overlap:**
  - High peak, high off-peak could have premium peak services (express, limited stop) in addition to frequent all-day service
Results

Mind the Gap – Transit Needs Analysis
Typically do analysis as part of an existing conditions analysis for a Transit Development Plan or other transit corridor study:

- Identify system gaps in both coverage and service levels
  - No service but needs service
  - Has peak service but needs all day service
  - Has service but at an inadequate service level

Used as a guide to service planning:

- Needs to be justified against existing ridership patterns
  - On/off by stop
  - Overcrowding
  - Productivity
  - Transfers
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