Development of Subarea/Corridor Analysis Guideline & Tool for TRM V6

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1. Subarea Analysis

Why Subarea Analysis:
- To study a particular sub-region or corridor in great detail
- Sub-region Examples: Downtowns, Airports, Large scale development projects
- Corridors along Major Facilities: NC-54
1. Subarea Analysis

- Why Subarea Analysis:
  - Limitation to large models (sparse networks and large zones)
1. Subarea Analysis

- What does it include?
- Highway Analysis in detail (as see previously)

- Transit Analysis?
  - NO Transit subarea analysis
  - Challenges in defining transit external stations
  - Most transit lines start and/or end outside the subarea
  - Origins and destinations that involve in transfers to other modes outside the corridor.
  - Transit investments require more detailed studies due to FTA and EPA requirements
1. Subarea Analysis: Before Mechanics

- What important questions to be addressed before the mechanics
  - How to validate subarea
  - What assignment type and closure criteria to use
  - How to compute and transfer the adjustment factors (base vs future)

- Procedures to develop Subarea network and sub-zones.
  - A detailed localized subarea network or regional network with additional streets
  - Sub zones: Same as in the regional model or should contain more smaller zones

- Procedures to develop sub-zonal matrices.
2. Subarea Approach

Three common approaches

1. Regional Model with link level adjustments
2. A Subarea Model within Regional Model
   1. With minor adjustments
   2. With OD adjustments
3. A Subarea Model with ODME
2. Subarea Approach– Link level adjustment

Process:
- Compute link level difference (count vs volume)
- Adjust future year link volumes

Limitations:
- Assignments results between any two horizons vary significantly
- The links volumes from the two different scenarios
2. Subarea Approach—Subarea Model within Regional Model

Regional Model

Regional Model w/Subarea Details

Subarea Model w/Details

TAZ Split

Multi-Point Assignment

TAZ Split

Multi-Point Assignment

Suggested OD Adjustment Approaches

Suggested Small Adjustment Approaches

Regional Model with Subarea:
- Small zone system
- Detailed network

Subarea Model:
- Small zone system with TAZ split
- Detailed network
2. Subarea Approach—ODME

Subarea Model:
- Same zone system
- Subarea assignment
- ODME procedure
- Adjustment factors

What is a ODME Process
2. Subarea Approach– ODME

1. Counts in the subarea corridor
   • Daily vs time period specific (AM, PM)
   • Vary by vehicle classes vs all traffic

2. ODME Process
   • Should it compute differently by facility types
   • What’s should be the assignment convergence

3. ODME Adjustments:
   • Peak period vs peak hour
   • Absolute differences (trip gains)
   • Percent differences ranging between (0.1 and 2.0)
ODME Adjustments

Initial Subarea OD Table

Final ODME Table

<table>
<thead>
<tr>
<th>OD Flow</th>
<th>Initial</th>
<th>Final</th>
<th>Adjustment</th>
<th>Constraints</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.03</td>
<td>0.53</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difference</td>
<td>0.5</td>
<td>&gt; 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ratio (% Difference)</td>
<td>17.67</td>
<td>0.1 to 2.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3. Subarea Guidelines

- Refine subarea networks
- Define Subarea
  - Avoid cutting centroid connectors while defining subarea
  - Avoid concave shapes that can lead to excessive crossings of subarea links
- Update counts
- Modify network (move existing and add new centroids connectors)
- Code Screenlines
4. TRM Subarea Tool

- Model directory integration
- Subarea GUI
- Facilitates easy integration (when desired)
4. TRM Subarea Tool

- Separate source code for each step

User controllable settings file
4. TRM Subarea Tool

- User defined subarea
- Subarea is a new polygon layer

Guidance:

- Don’t cut through one way links – creates external stations with directional volumes
- Make sure there are enough counts
- Make sure there are sufficient counts locations for all ranges of volume counts
- Make sure there are some screenlines
- Avoid too small or too large areas to accurately capture the OD flows
6. TRM Subarea Tool

- Browse for settings file
- Runs Subarea Selections
- Creates Subarea OD Matrices
- Add Subarea Counts
- Runs Subarea ODME
- Computes Subarea RMSE Stats
- Computes Future Year Subarea OD Table
- Runs All Checked Steps
6. TRM Subarea Tool

- Computed on the fly
  - Subarea External Stations
  - Subarea Internal Zones
  - Subarea Crosslinks
6. TRM Subarea Tool

- **User settings in CSV format**
- **Recommendations**
  - Use TRM assignment settings for Subarea assignment (ensures the same output as TRM model)
  - Use tighter ODME closure criteria
  - Run for only peak PM hour (PM2)
  - Make sure counts exist for that hour
- **Current model: ODME for all vehicle classes**
  - Can be refined to do ODME for each class if peak hour counts by vehicle classes are available

<table>
<thead>
<tr>
<th>I/O Files</th>
<th>Key</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>workDir</td>
<td>C:|projects|TRM-V6</td>
</tr>
<tr>
<td>Input</td>
<td>tazFile</td>
<td>Args.workDir +</td>
</tr>
<tr>
<td>Input</td>
<td>hwyFile</td>
<td>Args.workDir +</td>
</tr>
<tr>
<td>Input</td>
<td>turnFile</td>
<td>Args.workDir +</td>
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<tr>
<td>Input</td>
<td>odFile</td>
<td>Args.workDir +</td>
</tr>
<tr>
<td>Input</td>
<td>netFile</td>
<td>Args.workDir +</td>
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<td>Input</td>
<td>Modified_Conical_VDF</td>
<td>Args.workDir+</td>
</tr>
<tr>
<td>Input</td>
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<td>test_subarea</td>
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<tr>
<td>Input</td>
<td>tod</td>
<td>PM</td>
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<td>Input</td>
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<td>Input</td>
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<td>0.2</td>
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<tr>
<td>Input</td>
<td>HOV VOT</td>
<td>0.3</td>
</tr>
<tr>
<td>Input</td>
<td>SUT VOT</td>
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<tr>
<td>Input</td>
<td>MUT VOT</td>
<td>0.5</td>
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<tr>
<td>Input</td>
<td>Time-Dist Trade-off Factor</td>
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<tr>
<td>Output</td>
<td>subFlow</td>
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</tr>
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<td>Output</td>
<td>ODME_OD</td>
<td>Args.workDir +</td>
</tr>
</tbody>
</table>
Most of the subarea links are under 5000
Additional Thoughts!!

- What should be the size of a subarea? (# of zones? Area? Pop?)
- How much buffer is need to studied a corridor? (2 Mile?)
- How many minimum counts / locations are required for a good validation?
- What type of adjustment factors (difference or ratio) should be used for future?
Thank You

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Origin Destination Matrix Estimation (ODME)

- Reverse process to highway assignment
- Complex iterative process to estimate OD table that matches to counts when assigned