RTDM Consultant Task 5
DTA Subarea Model Development

RRTPRO TECHNICAL ADVISORY COMMITTEE MEETING

August 13, 2019

Presentation by:
Sulabh Aryal, AICP
Transportation Planning Manager
Objectives of the Study

• To develop a mesoscopic DTA application for scenario testing
• Explore the use of Big Data like Streetlight OD data/ HERE Data in the corridor-level model development
• To have a deeper look of one of the major chokepoints in the region
• Test applications such as freeway bottleneck analysis
Dynamic Traffic Assignment (DTA) Principles

• Method of system-level assignment analysis which seeks to track the progress of a trip through the network over time
• Accounts for formation and propagation of queues due to congestion.
• A bridge between traditional regional-level static assignment models and corridor-level models (micro-simulation)
• Within a model period, shorter time segments are assumed in DTA.
Major Chokepoints in the Richmond Region

- VA-288 South
  Tuckahoe Creek Pkwy to VA-6

- I-95 South
  US 1 to VA-161

- I-64 East
  US-250 to US-33

- I-64/I-95/I-195

- VA-288 North
  US-60 to VA-711

- VA-76 N
  US-60 to VA-150
DTA Study Area
Tools Selection and Development

- Streetlight OD data and Expansion
  - LBS and GPS Navigation OD data within the subarea
  - Provides traffic flows (corridor subarea OD) using “Pass-through” zones
  - Expand using ODME (IPF) process, with a feedback loop within highway assignment

- Develop DTA Subarea Application
  - Peak period specific routine
  - AM (7 AM – 9 AM)
  - PM (5 PM – 7 PM)
  - Time slice OD expanded data to 15 minute interval
  - Validated the model using counts and observed speed at 15 minutes interval
Model Calibration

- Congested Speed Calibration
- Vehicle flows Vs Counts
- Visual checks, Animation, Queues

### I-95 NB Observed Speeds

<table>
<thead>
<tr>
<th>Location</th>
<th>I-95 NB Observed Speeds</th>
<th>I-95 NB DTA Estimated Speeds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I-95 South End</td>
<td>I-95 South of I-64</td>
</tr>
<tr>
<td>DIR</td>
<td>NBO1</td>
<td>NBO2</td>
</tr>
<tr>
<td>7:00</td>
<td>56</td>
<td>56</td>
</tr>
<tr>
<td>7:15</td>
<td>54</td>
<td>54</td>
</tr>
<tr>
<td>7:30</td>
<td>49</td>
<td>48</td>
</tr>
<tr>
<td>7:45</td>
<td>41</td>
<td>37</td>
</tr>
<tr>
<td>8:00</td>
<td>40</td>
<td>36</td>
</tr>
<tr>
<td>8:15</td>
<td>39</td>
<td>35</td>
</tr>
<tr>
<td>8:30</td>
<td>41</td>
<td>38</td>
</tr>
<tr>
<td>8:45</td>
<td>45</td>
<td>42</td>
</tr>
</tbody>
</table>

### Volume Group Calibration

<table>
<thead>
<tr>
<th>Volume Group</th>
<th>Count Range</th>
<th>Allow RMSE</th>
<th>No of Links</th>
<th>After RMSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1-5,000</td>
<td>45-55%</td>
<td>93</td>
<td>29.70%</td>
</tr>
<tr>
<td>2</td>
<td>5,000-10,000</td>
<td>35-45%</td>
<td>16</td>
<td>17.20%</td>
</tr>
<tr>
<td>3</td>
<td>10,000-20,000</td>
<td>27-35%</td>
<td>5</td>
<td>14.30%</td>
</tr>
<tr>
<td>13</td>
<td>1-500,000</td>
<td>32-39%</td>
<td>114</td>
<td>25.30%</td>
</tr>
</tbody>
</table>
Scenarios Testing

1. No-Build/Existing Conditions
2. Scenario 1: 1 Additional Lane on I-95 NB/SB
3. Scenario 2: 1+1 Additional Lane on I-95/I-64 Ramps
4. Scenario 3: Stress Test- Closure of I-95 SB, South of I-64 Interchange
Scenario 1 (1 Additional Lane on I-95)

AM Period Subarea Systemwide Impacts

8L Scenario

Existing Conditions

> 20 mph
10-20 mph
<10 mph
Scenario 2 (1+1 Additional Lane on I-95/ I-64 Ramps)

AM Results- System wide: No-Build Vs. Scenario 2
Scenario 2 (1+1 Additional Lane on I-95/ I-64 Ramps)

AM Results- I-95/I-64 Interchange: No-Build Vs. Scenario 2
Scenario 3: Closure of I-95 SB, South of I-64 Interchange

AM Results- System wide: No-Build Vs. Scenario 3
Conclusion

- Streetlight data was effectively used in developing the subarea demand, with careful OD expansion methods.
- DTA calibration replicates the bottleneck conditions at the I-95/I-64 interchange
  - Merges of major roadways and movements
  - Short ramp segments
  - Heavy AM/PM loads
- The DTA Model provides RRTPO with capabilities to analyze bottlenecks.
- This approach minimized the needs for expensive data collection
  - Use of already available traffic count data, OD and speed data from Big data sources- Streetlight/HERE
- Mesoscopic DTA model requires extensive calibration and sensitivity analysis
  - Delicate compromise between volume/count and congested speed calibration
  - Observed data should be carefully chosen for the calibration
Questions?

Sulabh Aryal,  
Transportation Planning Manager  
saryal@PlanRVA.org

PlanRVA  
THE REGIONAL COMMISSION

Richmond Regional Transportation Planning Organization

9211 Forest Hill Ave., Suite 200  
Richmond, VA 23235  
Phone: (804) 323-2033  
www.PlanRVA.org