THE MHV TMA CONGESTION MANAGEMENT PROCESS

Applying the AVAIL Labs NPMRDS Tools

July 27, 2021
1. Mid-Hudson CMP Background
2. The AVAIL Platform
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4. Macro Screening Report
5. Micro Analysis Report
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MID-HUDSON CMP BACKGROUND

- TMA formed in 2002: DCTC, OCTC, & UCTC
- Unified CMS adopted in 2005
  - Used volume/capacity ratios
- “Step 2” report in 2006
- Travel Time Survey in 2011
- Federal Certification Review required an updated CMP
- Data has changed dramatically since earlier efforts
MID-HUDSON CMP BACKGROUND

Objectives:

1) analyze highway congestion
2) analyze highway travel time reliability
3) analyze freight congestion and reliability
4) analyze transit congestion and reliability
5) evaluate multi-modal accessibility

Process:

1. Macro-level: network screening
   Use performance measures to **identify** worst locations

2. Micro-level: location analysis
   **Analyze** worst locations, trying to understand the key issues.
THE AVAIL PLATFORM

• Variety of tools for analyzing bottlenecks, routes and networks

• Platform is constantly evolving

• For our macro analysis, we used the Macro tool

• For our micro analysis, we used the route creation tool and reports tool

• Coverage was limited to roughly the NHS; now broader
  • We have used the NHS for now

https://npmrds.availabs.org/
THE AVAIL PLATFORM – MACRO TOOL
THE AVAIL PLATFORM – NEW MAP TOOL
### PERFORMANCE MEASURES WE USED

**Highway Congestion and Reliability:**
- LOTTR, TTI, and TED/mile

**Regional Transit:**
- LOTTR, TTI, and TED/mile on regional transit routes
- Metro-North on time performance

**Freight Measures:**
- LOTTR, TTI, and TED/mile on State-designated freight routes
- TTTR (interstates only)

<table>
<thead>
<tr>
<th>Congestion Management Objectives</th>
<th>Performance Measures</th>
<th>Definition of Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyze highway congestion</td>
<td>Travel Time Index - TTI</td>
<td>The ratio of the average travel time during the worst peak period (weekdays, either 6-9 am or 4-7 pm) to the free-flow travel time. Free flow travel time is defined as the 15th percentile of off-peak travel times (weekdays 9 am-4 pm and 7 pm-10 pm and weekend 6 am-10 pm).</td>
</tr>
<tr>
<td>Total Excessive Delay per mile - TED/mile (harmonic mean-based free flow)</td>
<td></td>
<td>The amount of time spent traveling below a specified threshold speed (20 mph or 60 percent of the free flow speed, whichever is greater) during all hours (weekdays and weekends). The time spent below the threshold speed is multiplied by the estimated volume on the segment during that hour. The total is divided per mile of total segment length for comparison across the network.</td>
</tr>
<tr>
<td>Analyze highway travel time reliability</td>
<td>Level of Travel Time Reliability - LOTTR</td>
<td>The ratio of the 85th percentile travel time over the 50th percentile travel time for the worst period (weekdays 6-10 am, 10 am-4 pm, or 4-8 pm, or weekends 6 am-8 pm). This measures the extent of unreliable travel times.</td>
</tr>
<tr>
<td>Analyze freight congestion and reliability</td>
<td>TED/mile on State-designated Freight Routes</td>
<td>TED/mile (defined above) on freight routes as designated in the New York State Freight Transportation Plan.</td>
</tr>
<tr>
<td></td>
<td>LOTTR on State-designated Freight Routes</td>
<td>LOTTR (defined above) on freight routes as designated in the New York State Freight Transportation Plan.</td>
</tr>
<tr>
<td></td>
<td>Truck Time Travel Reliability - TTTR</td>
<td>The ratio of the 95th percentile travel time over the 50th percentile travel time for trucks only, during the worst period (weekdays 6-10 am, 10 am-4 pm, 4-8 pm, 8 pm-6 am, or weekends 6 am-8 pm). The TMA will only apply this measure to interstates, which have the truck volume necessary for reliable results.</td>
</tr>
<tr>
<td></td>
<td>TED/mile on bus transit routes</td>
<td>TED/mile (defined above) on transit routes (as feasible based on available data).</td>
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</tr>
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<td>Transit on-time performance</td>
<td>The percentage of stops that occur within a given time of the published schedule (often 1-5 minutes). Due to the limited data available for some providers, we focus on Metro-North and some local bus service.</td>
</tr>
</tbody>
</table>
Measure Definitions

- Level of Travel Time Reliability (LOTTR): \(80^{th}\%\) travel time / \(50^{th}\%\) travel time for the worst period
  - weekdays 6-10 am, 10 am-4 pm, 4-8 pm, or weekends 6 am-8 pm

- Truck Travel Time Reliability (TTTR): \(95^{th}\%\) travel time / \(50^{th}\%\) travel time for the worst period
  - weekdays 6-10 am, 10 am-4 pm, 4-8 pm, weekday overnight 8 pm-6am, or weekends 6 am-8 pm
  - Uses truck data only
  - Recommended only on Interstates

--> Reliability within a specific time period
Measure Definitions

• TTI: **average travel time** during the worst peak period (weekdays, 6-9 am or 4-7 pm) / free-flow travel time
  • Free flow travel time: 15\textsuperscript{th} percentile of off-peak (weekdays 9 am-4 pm & 7 pm–10 pm; weekend 6 am-10 pm)

--> Overall congestion (worst peak compared to free flow)
Measure Definitions

- TED/mile: **amount of time spent traveling below a threshold speed** (20 mph or 60% of the free flow speed, whichever is greater) during all hours (including weekends).
  - That time is **multiplied by the estimated volume** on the segment during that hour and the vehicle occupancy factor.
  - The total is **divided by the segment length** (in miles) for comparison across the network.

--> Overall congestion, accounting for volume
## PERFORMANCE MEASURES WE USED - Thresholds

<table>
<thead>
<tr>
<th>Measure</th>
<th>Threshold</th>
<th>% of Segments Passing</th>
<th>% of Roadway Miles Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTI – peak period congestion</td>
<td>2.0</td>
<td>94%</td>
<td>97%</td>
</tr>
<tr>
<td>TED/mile – total congestion</td>
<td>40,000</td>
<td>90%</td>
<td>96%</td>
</tr>
<tr>
<td>LOTTR – reliability</td>
<td>1.5</td>
<td>89%</td>
<td>94%</td>
</tr>
<tr>
<td>TTTR – freight reliability (interstates only)</td>
<td>3.99</td>
<td>95%</td>
<td>98%</td>
</tr>
</tbody>
</table>
MACRO SCREENING TECH MEMO

- Ranked TMCs in the three counties by each performance measure

- Screened up to 10 for each measure:
  - All TMCs
  - TMCs on regional transit routes
  - TMCs on state-designated freight routes

- Combined results to develop a list of our most congested locations
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MICRO ANALYSIS TECH MEMO

The Goal:
• Determine causes of congestion
• Develop high-level recommendations

The Deliverable:
• Summary of each location
• More detailed snapshot of each location with map, key statistics, and charts
Route 55 near the Taconic State Parkway

Key statistics:
- AADT, % heavy vehicles
- Speed limit, 85% speed
- Transit route?
- Freight route?
- Macro screening results
Daily pattern: School-day peaks
Monthly pattern: summer is best

Recommendations:
• Field observations
• Collect volume, speed, & class data near the congested segment
• Incident management – VMS
• Evaluate alternate routes & road connections
• Access management: connect parking lots and consolidate driveways
• School District: consider adjusting transportation policies
MULTI-MODAL ACCESSIBILITY TECH MEMO - MEASURES

• Park & Ride availability
  • Total spaces; occupancy

• Transit availability
  • Population within ¼ and ½ mile of transit hubs and bus routes

• Bicycling networks
  • Mileage of shared-use paths

• Bicycle parking
  • # and % of intermodal hubs with bike parking

• Bicycle racks on buses
  • % of public buses with bike racks

• Walking networks
  • Sidewalk coverage within ¼ and ½ mile of transit hubs
Lessons Learned

• There are many ways to measure congestion/reliability  
  • You may need to use several

• AVAIL platform & measures continue to evolve  
  • Work directly with the AVAIL team to develop your analysis methods

• Screen data for quality/completeness

• TMC geometry is limiting—segments are pre-defined

• Save your reports & templates in ‘My Stuff’ folders  
  • Can repeat analyses and share with other users

• Check results against your local knowledge, incidents and projects

• AVAIL tool enables sharing data & analyses  
  • Can also be used to evaluate pre/post effects of a project
Questions?

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CMP reports:
https://www.dutchessny.gov/Departments/Transportation-Council/Regional-Transportation-Planning.htm