Traffic Analysis of I-270 Corridor: Identifying Operational Bottlenecks

ATTAP Meeting
June, 25, 2015
GENERAL INFORMATION
PEAK-HOUR TRAFFIC PATTERNS

AM Peak Hour

PM Peak Hour
DATA COLLECTION AND ANALYSIS

- Google traffic maps during peak hours
- Congestion scan from RITIS
- Bottleneck ranking from RITIS
- Satellite maps
- Field Survey
DATA COLLECTION AND ANALYSIS

Southbound bottlenecks (AMPK)

Northbound bottlenecks (PMPK)

Exit 26 at Urbana: Congestion spills back about 2 miles and spreads to Exit 22

Exit 18 at Clarksburg:
From Exit 9 to Exit 4 at Rockville: Both local and express lanes are congested, especially near Exit 6.

Exit 15&16 at Germantown: Congestion happens near the exits.

Exit 11: Local lanes end here

Exit 9 to I-370: A weaving area with 4 lanes

Exit 4: Heavy traffic from westbound local arterial

Exit 1: Merging lanes from I-495 and I-270 Spur
OPERATIONAL BOTTLENECKS
Southbound (AM-Peak Hours)
Heavy traffic volume from I-370 (entering local lanes)
Vehicle merge onto express lane immediately, spillback from express lane

Spillback from I-495

Hilly section
Reduced capacity

Short weaving section
Reduced capacity
Southbound bottlenecks (ampk)

- Exit 26 at Urbana: Congestion spills back about 2 miles and spreads to Exit 22
- Exit 15&16 at Germantown: Congestion happens near the exits.
- From Exit 9 to Exit 4 at Rockville: Both local and express lanes are congested, especially near Exit 6.

Northbound bottlenecks (pmpk)
1st Bottleneck (Southbound): Hilly section

- Hilly & winding road sections have reduced capacities
- Heavy vehicles can cause moving bottlenecks.
- Congestion near Exit 26 may spread to the entire section
1st Bottleneck (Southbound): Exit 26
2\textsuperscript{nd} Bottleneck (Southbound): Exit 9-Exit 4
2nd Bottleneck (Southbound): I-370 / Start of Local roads (CD roads)

- Large volume coming from I-370 entering local road
  - They try to merge into express lanes
  - Length of weaving section: < 0.2 miles

- Heavy weaving reduce the capacity
3rd Bottleneck (Southbound): Short weaving area (EXIT 4)

- Vehicles going off-ramp at exit
  - 4 (Montrose Rd.)
  - 5 (Falls Rd.)
  - 6 (West Montgomery Ave.)

- Vehicles coming from on-ramp try to enter express lanes at the nearest possible access point

- Create weaving sections
OPERATIONAL BOTTLENECKS
Northbound (PM Peak-Hours)
Lane Drop/End of HOV lane

Heavy weaving flow due to I-370
& Single local lane
Exit vehicle spillback to Express lane

Merge from I-270 Spur

Spillback from I-70
Northbound (PM Peak-Hour)

- Southbound bottlenecks (ampk)
- Northbound bottlenecks (pmpk)

Exit 18 at Clarksburg:
- Exit 11: Local lanes end here
- Exit 4: Heavy traffic from westbound local arterial
- Exit 9 to I-370: A weaving area with 4 lanes
- Exit 2: Merging lanes from I-270 Spur
1st Bottleneck (Northbound): I-270 / I-270 SPUR

- Heaving weaving section
- Traffic coming from MD targeting express lanes
- Traffic coming from VA targeting local lanes
- Low HOV lane utilization rate
2nd Bottleneck (Northbound): Shady Groove & I-370 / EXIT 8 & 9

- Single local lane (reduced from 2 lanes)
  - Lane drop on local lanes
- 2 Exit lanes from express lanes
  - Heavy exit volume
- 1 on-ramp from local

- Short weaving section (measure distance)
  - Shady Groove on-ramp → access point to express lanes
    - 0.2 miles
  - Express lanes → I-370
    - 0.6 miles
3rd Bottleneck (Northbound): End of Local roads (MD124 ~ Middlebrook Rd)

- Single local lane
  - Both on-ramps have merging section for < 0.1 miles
- End of local lanes
  - Slow moving vehicles due to 2 on-ramps
  - Merging with express lanes
  - Uphill section

Increase the length of merging/weaving section
4th Bottleneck (Northbound): Clarksburg Rd. (Exit 18) Lane Drop

- Lane drop at a uphill section
- Slow moving vehicles require more distance to recover
Suggestions

Northbound and Southbound
1st Suggestion (Northbound): Mitigate weaving by moving merging points.
2\textsuperscript{nd} Suggestion (Northbound and Southbound): Improving short merging areas

1. Strategical placement of the access points between express and local lanes

2. Demand responsive access control

3. Demand lane use control / shoulder
### 3rd Suggestion: Control of Heavy vehicles with Time-Window

Data source: SHA

<table>
<thead>
<tr>
<th>Time Window</th>
<th>Truck percentage</th>
<th>AADT</th>
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<tr>
<td>0-1(MD)</td>
<td>6.61</td>
<td>50000</td>
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<tr>
<td>1-4(Before spur)</td>
<td>7.36</td>
<td>100000</td>
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<tr>
<td>1-4(After spur)</td>
<td>5.7</td>
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<td>22-24</td>
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</tbody>
</table>

AADT_2014

Data source: SHA

![Graph showing truck percentage and AADT with time windows](chart.png)
4th Suggestion: Reversible Lanes

- **Reason:** Strong Directional Congestion;
- **Limits:** I-270 mainline (south of Father Hurley Blvd) & both spurs (approximately 18 miles)

**PROS:**
- Additional capacity would result in operational improvement in peak direction of travel;

**CONS:**
- Possible long duration to deploy moveable barriers;
- High operation cost
5th Suggestion: Demand Management (Multi-Modal)

- **Segment 1: VA to I-270 Y**
  - 3.5 miles
  - 4-5 lanes per direction
  - 220,800 AADT*

- **Segment 2: I-270 West Spur**
  - 2.1 miles
  - Existing HOV
  - 3 lanes per direction
  - 136,400 AADT*

- **Segment 3: I-270 Y to I-370**
  - 6.9 miles
  - Existing HOV
  - 5-7 lanes per direction
  - Existing CD
  - 238,000 AADT*

- **Segment 4: I-370 to MD 80**
  - 16.7 miles
  - Existing HOV (to MD 121)
  - 2-5 lanes per direction
  - Existing CD (to MD 124)
  - 90,000 to 170,000 AADT*

*Source: [http://shagbhisdadl.mdot.state.md.us/AADT_Locator_Public/default.aspx](http://shagbhisdadl.mdot.state.md.us/AADT_Locator_Public/default.aspx)
Thanks & Questions?