Traffic Analysis of I-270 Corridor:
Identifying Operational Bottlenecks

ATTAP Meeting
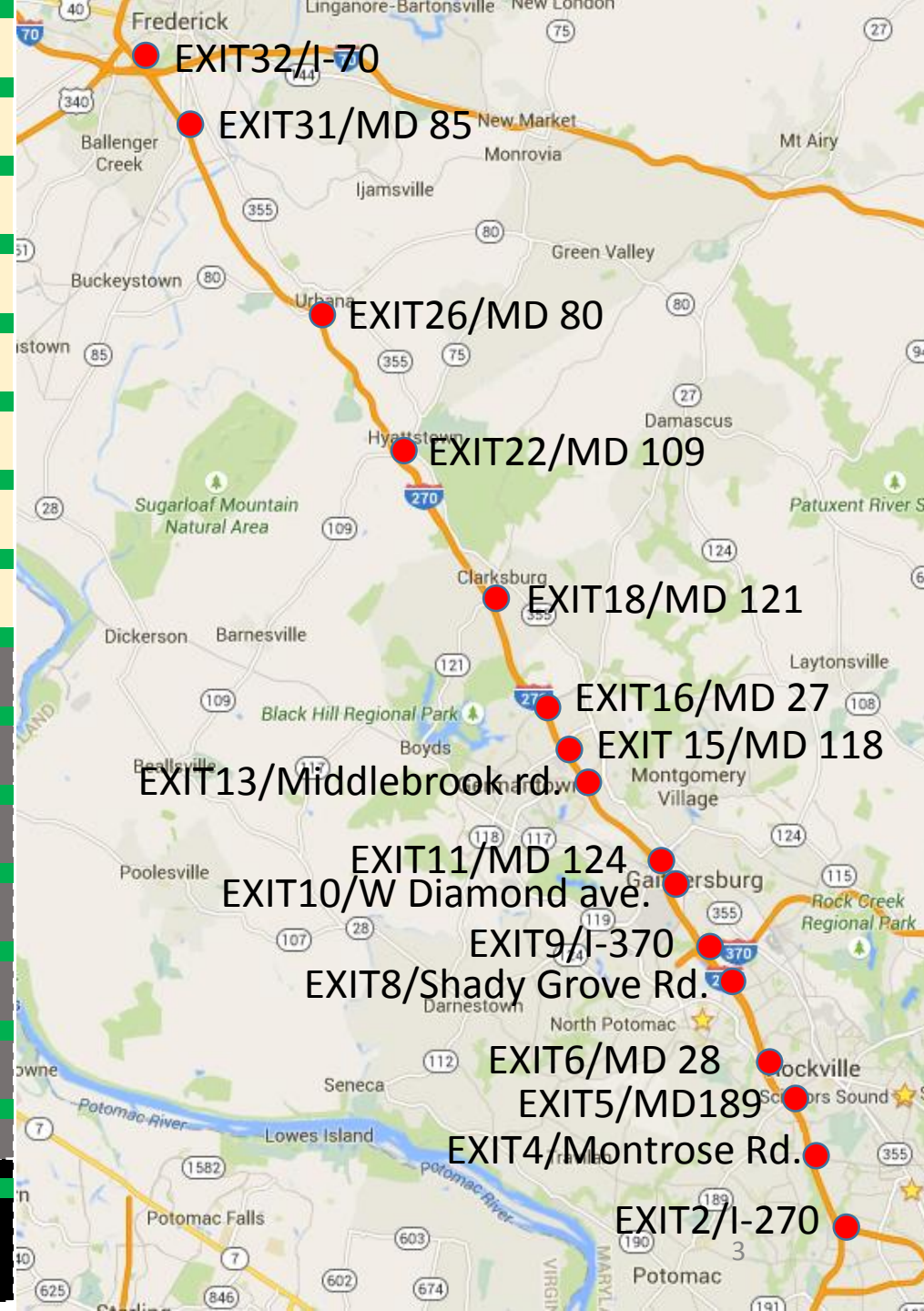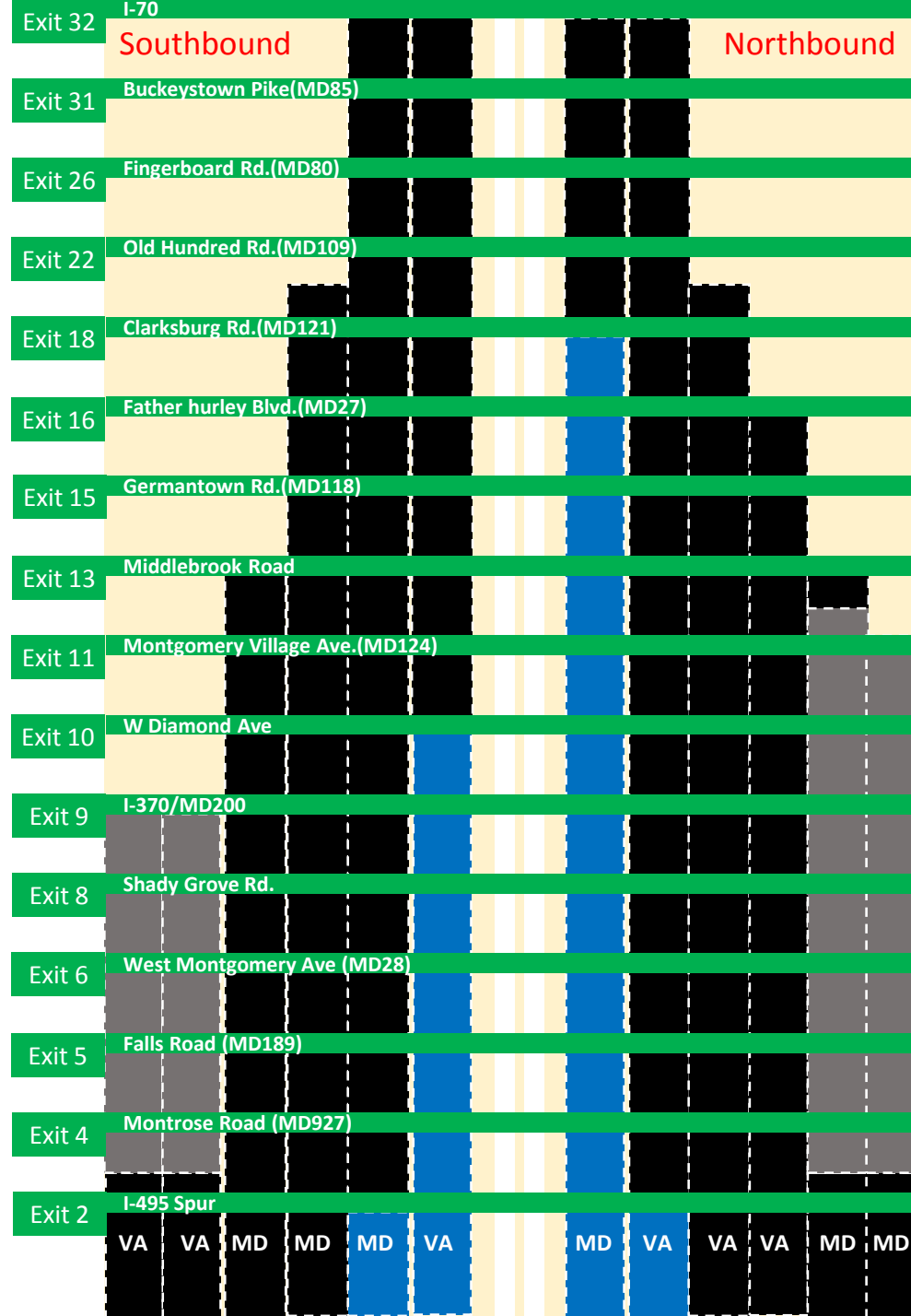
June, 25, 2015
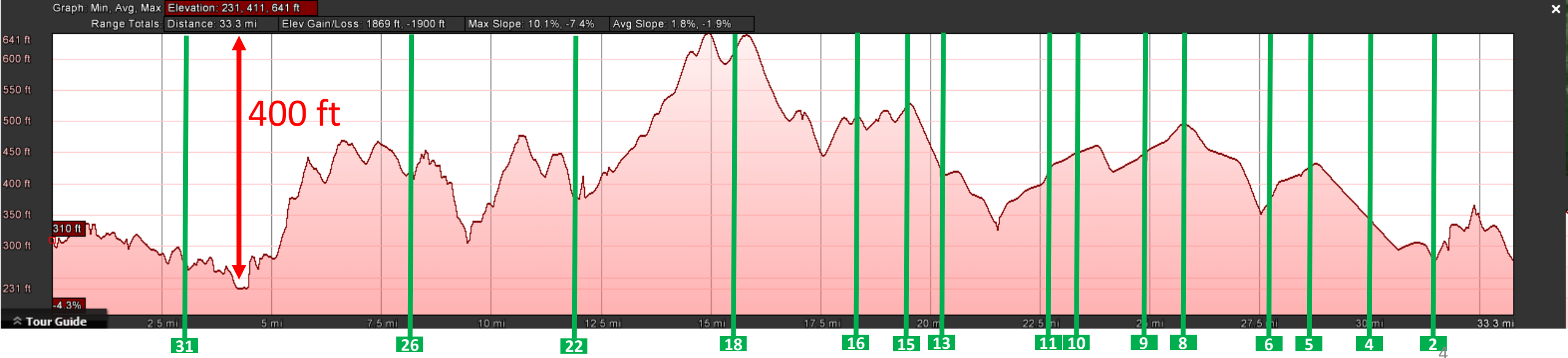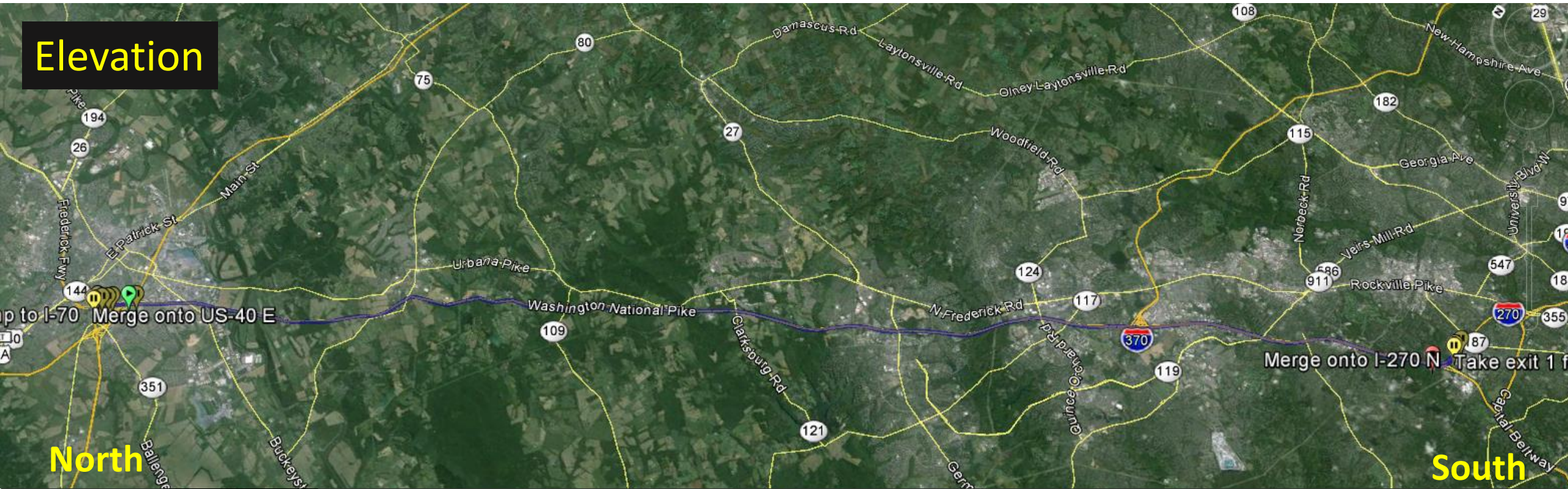
GENERAL INFORMATION

Lane Configuration
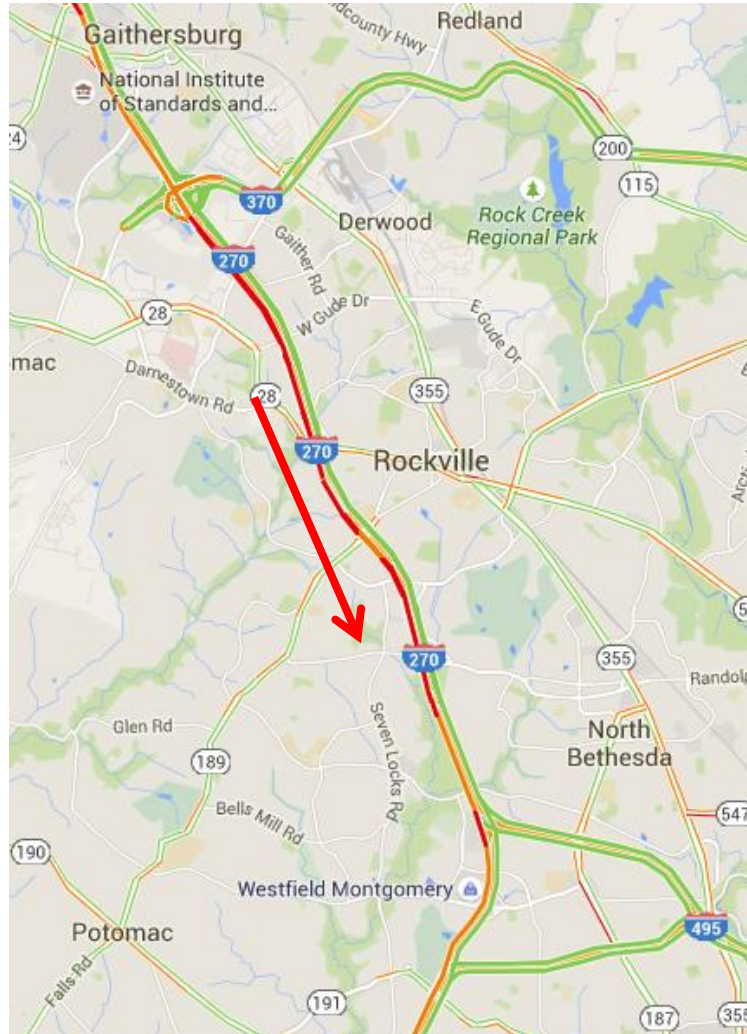
Exit	Road														
Exit 32	I-70 — Southbound / Northbound														
Exit 31	Buckeystown Pike (MD85)														
Exit 26	Fingerboard Rd. (MD80)														
Exit 22	Old Hundred Rd. (MD109)														
Exit 18	Clarksburg Rd. (MD121)														
Exit 16	Father hurley Blvd. (MD27)														
Exit 15	Germantown Rd. (MD118)														
Exit 13	Middlebrook Road														
Exit 11	Montgomery Village Ave. (MD124)														
Exit 10	W Diamond Ave														
Exit 9	I-370/MD200														
Exit 8	Shady Grove Rd.														
Exit 6	West Montgomery Ave (MD28)														
Exit 5	Falls Road (MD189)														
Exit 4	Montrose Road (MD927)														
Exit 2	I-495 Spur — VA VA MD MD MD VA / MD VA VA VA MD MD														

Local
HOV

Map exits (north to south):
- EXIT32/I-70
- EXIT31/MD 85
- EXIT26/MD 80
- EXIT22/MD 109
- EXIT18/MD 121
- EXIT16/MD 27
- EXIT 15/MD 118
- EXIT13/Middlebrook rd.
- EXIT11/MD 124
- EXIT10/W Diamond ave.
- EXIT9/I-370
- EXIT8/Shady Grove Rd.
- EXIT6/MD 28
- EXIT5/MD189
- EXIT4/Montrose Rd.
- EXIT2/I-270

Elevation

North

South

Graph: Min, Avg, Max | Elevation: 231, 411, 641 ft
Range Totals: Distance: 33.3 mi | Elev Gain/Loss: 1869 ft, -1900 ft | Max Slope: 10.1%, -7.4% | Avg Slope: 1.8%, -1.9%
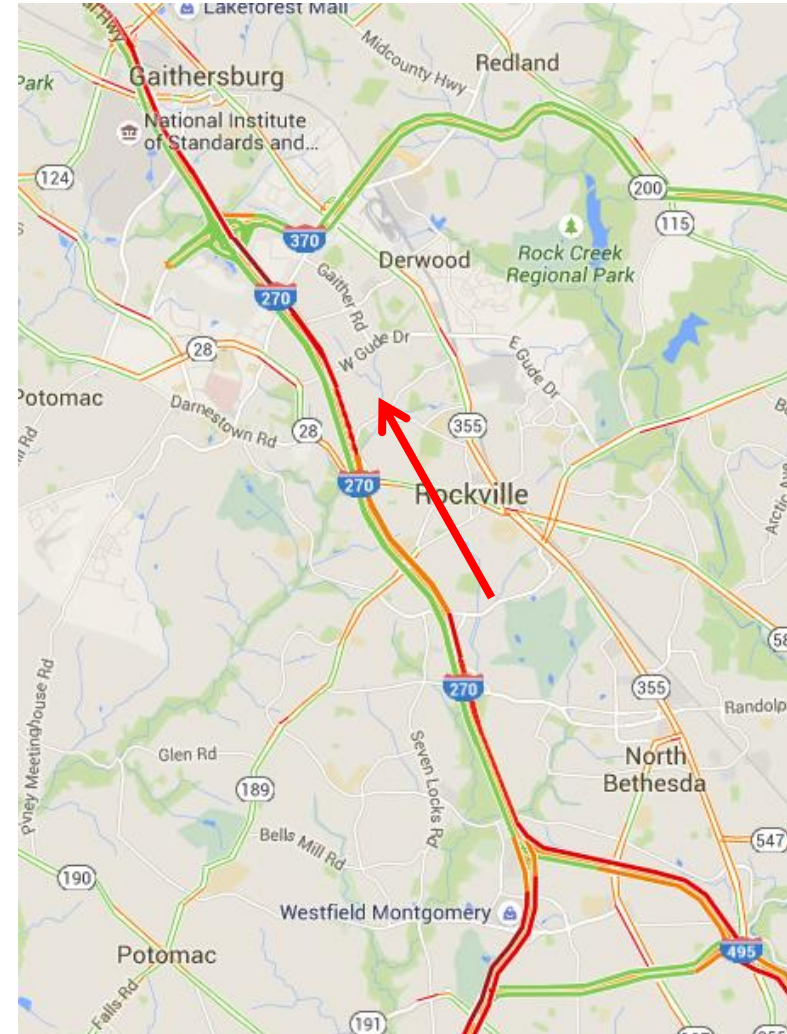
400 ft

Tour Guide

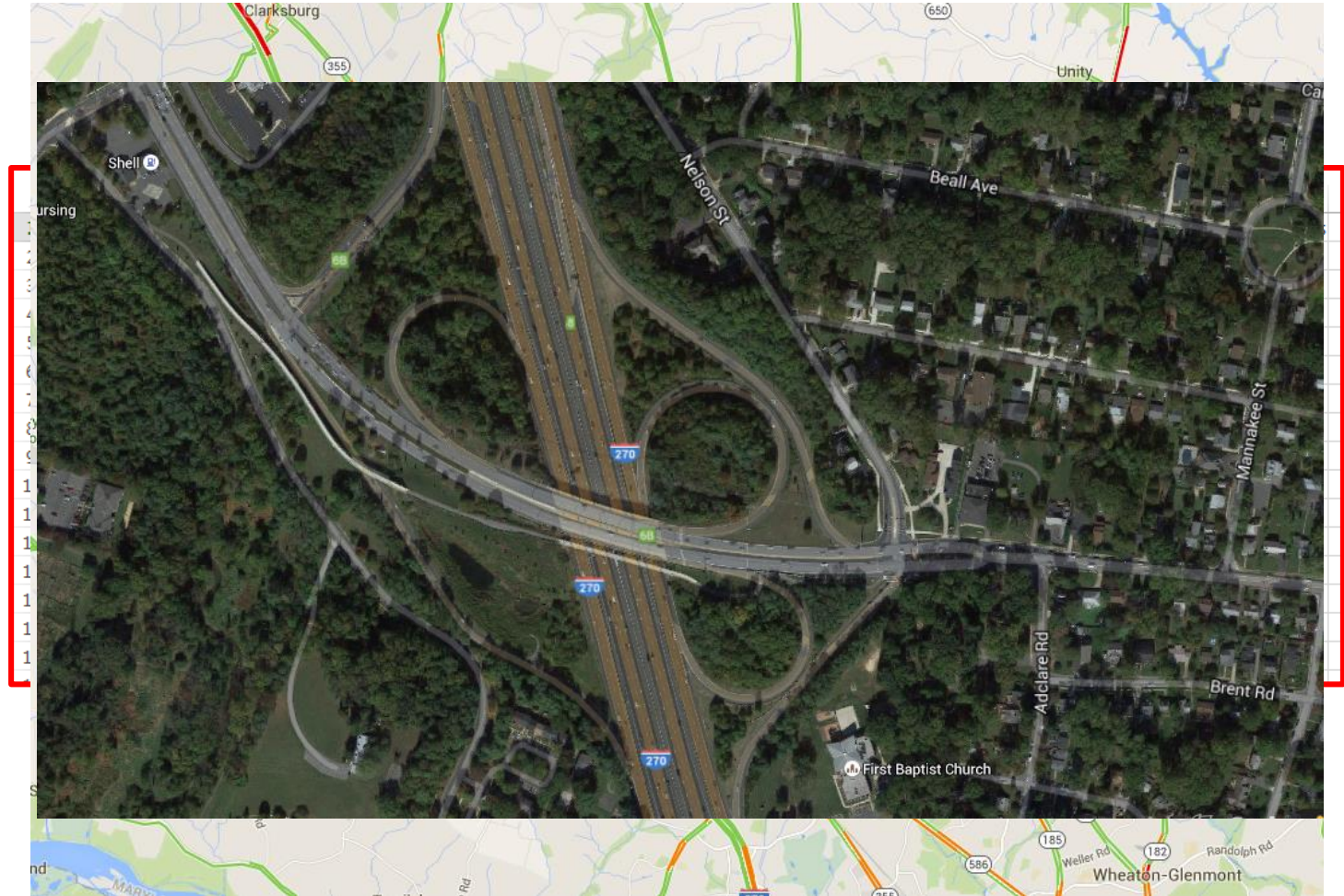31 26 22 18 16 15 13 11 10 9 8 6 5 4 2

PEAK-HOUR TRAFFIC PATTERNS

DATA COLLECTION AND ANALYSIS

- ❑ Google traffic maps during peak hours
- ❑ Congestion scan from RITIS
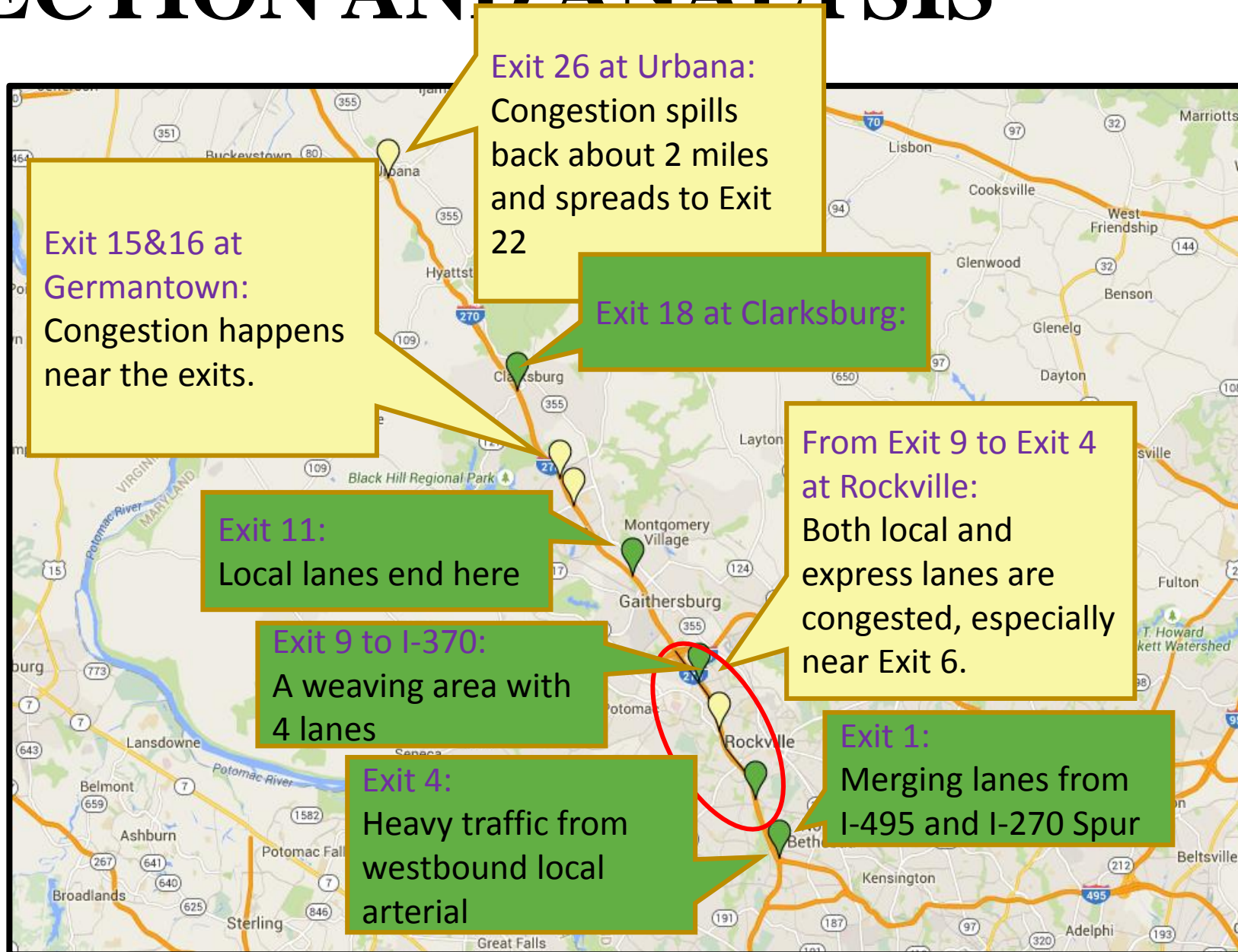- ❑ Bottleneck ranking from RITIS
- ❑ Satellite maps
- ❑ Field Survey

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:

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.

Exit 11: Local lanes end here

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

Exit 1: Merging lanes from I-495 and I-270 Spur

Exit 4: Heavy traffic from westbound local arterial

OPERATIONAL BOTTLENECKS
Southbound (AM-Peak Hours)

Southbound

Time Range — Data Type: Congestion

Friday — **Thursday** — **Wednesday** — **Tuesday** — **Monday**

Hilly section
Reduced capacity

Heavy traffic volume from I-370 (entering local lanes)
Vehicle merge onto express lane immediately,
spillback from express lane

Spillback from I-495

Short weaving section
Reduced capacity

INTERSTATE 270

- I-70/US-40
- MD-85/EXIT 31
- 2 main lanes
- MD-80/EXIT 26
- MD-109/EXIT 22
- MD-121
- 3 main lanes
- FATHER HURLEY BLVD/...
- MIDDLEBROOK RD/EXI...
- 4 main lanes
- MD-124/QUINCE ORCH...
- 5 main lanes
- I-370/SAM EIG HWY/E...
- 4 main / 2CD → very complicated
- SHADY GROVE RD/EXIT 8
- 4 main / 2CD
- MD-28/MONTGOMERY ...
- main / 1 HOV / 2 CD
- MONTROSE RD/EXIT 4
- 5 main
- I-70

9

•Southbound (AM-Peak Hour)

Southbound bottlenecks (ampk)

Northbound bottlenecks (pmpk)

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.

1ˢᵗ Bottleneck (Southbound): Hilly section
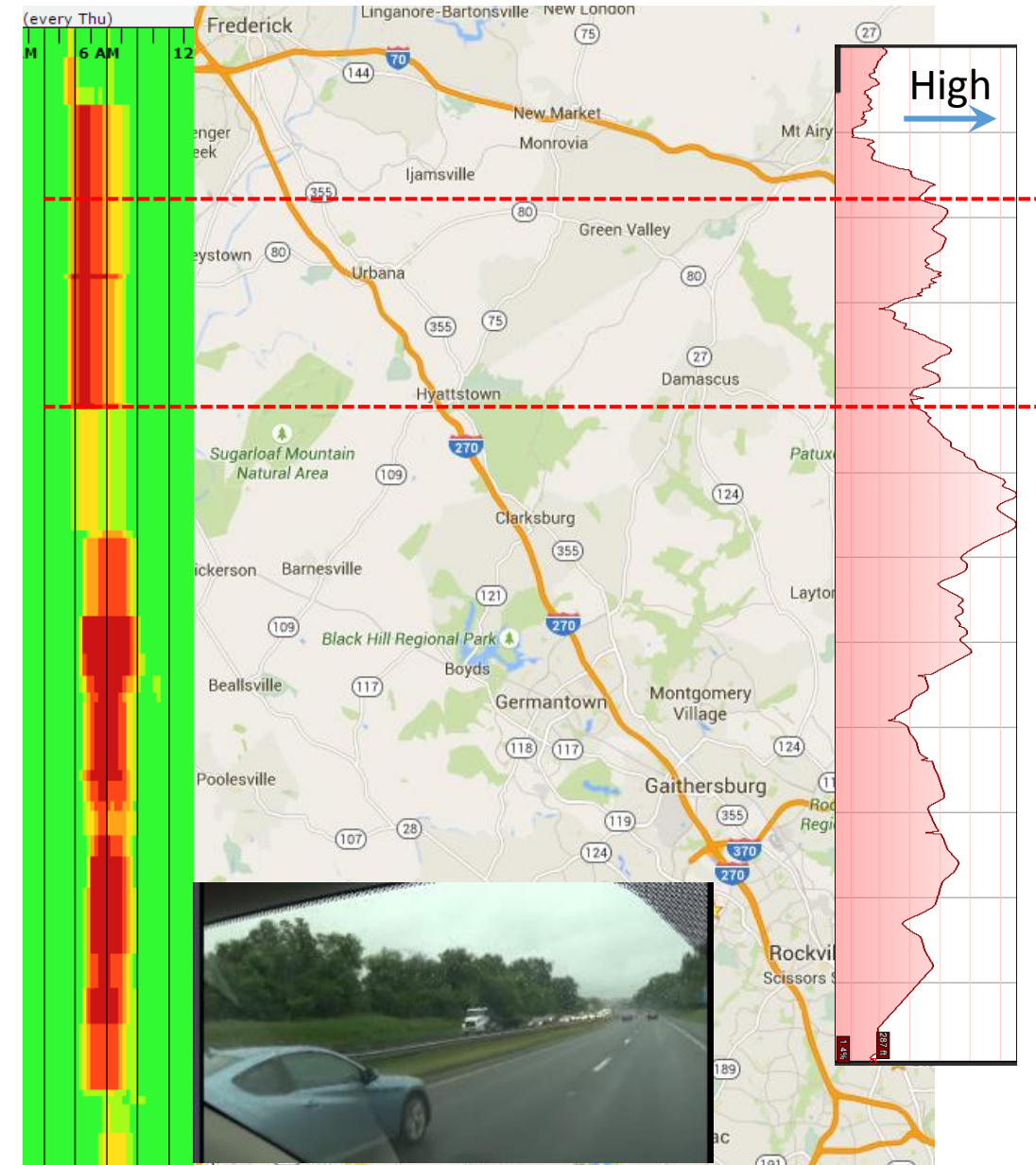
- Hilly & winding road sections have reduced capacities

- Heavy vehicles can cause moving bottlenecks.

- Congestion near Exit 26 may spread to the entire section

1st Bottleneck (Southbound): Exit 26
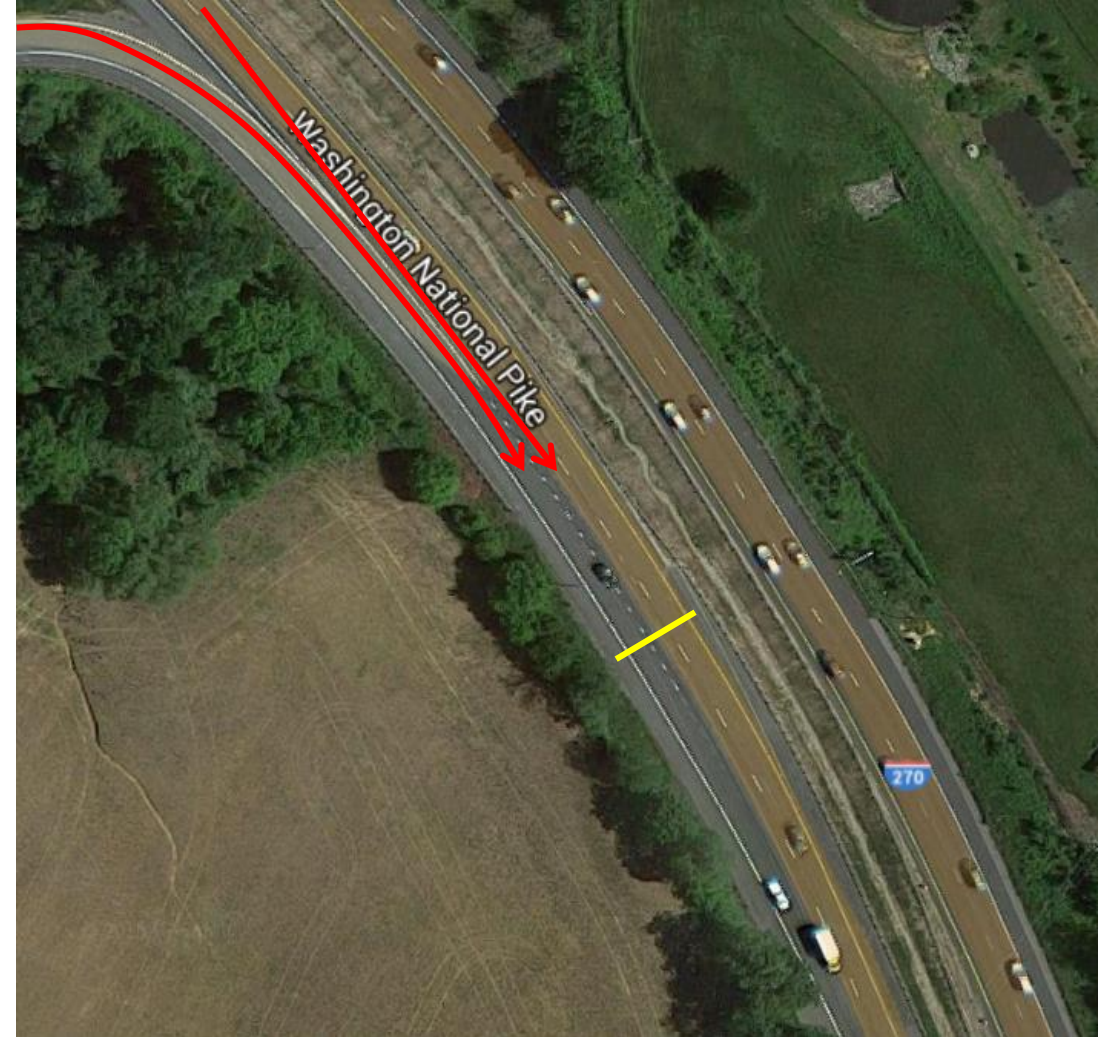
2nd Bottleneck (Southbound): Exit 9-Exit 4

CD Lanes start here.

Intersection with I-370

Most congested area
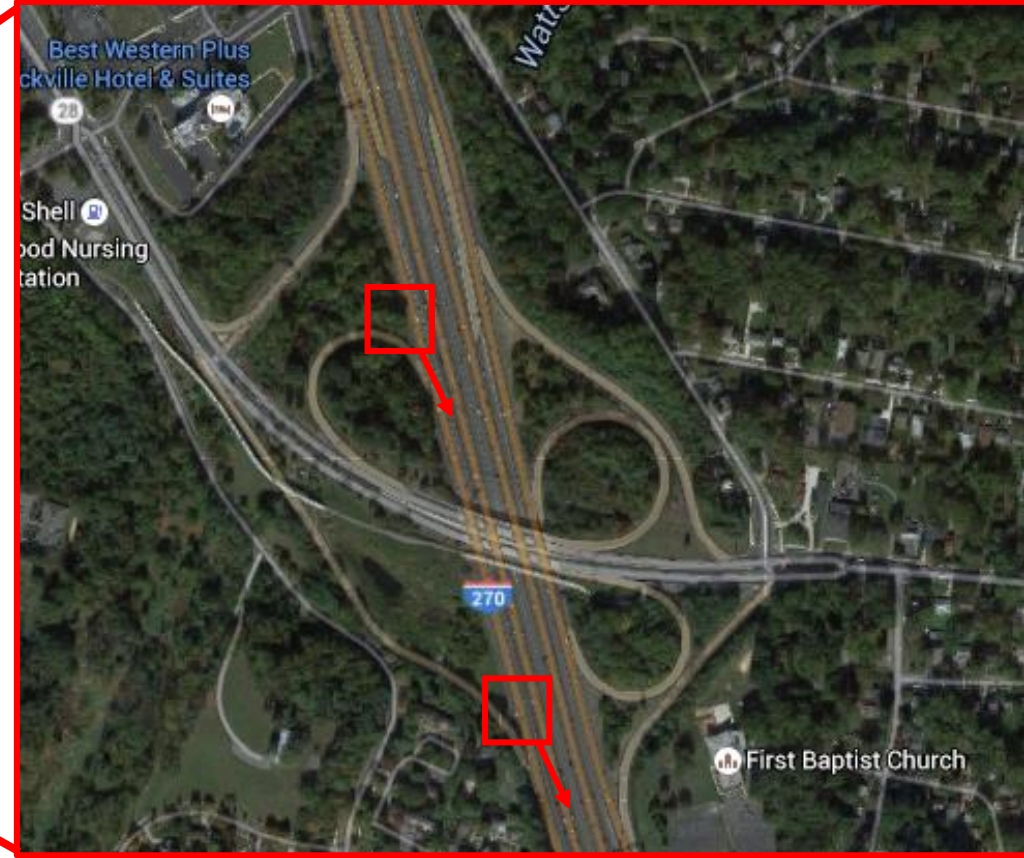
2nd Bottleneck (Southbound): I-370 / Start of Local roads (CD roads)

Spillback

Local

Express

To Local

To Express

Exit

Thursday 7:30 AM
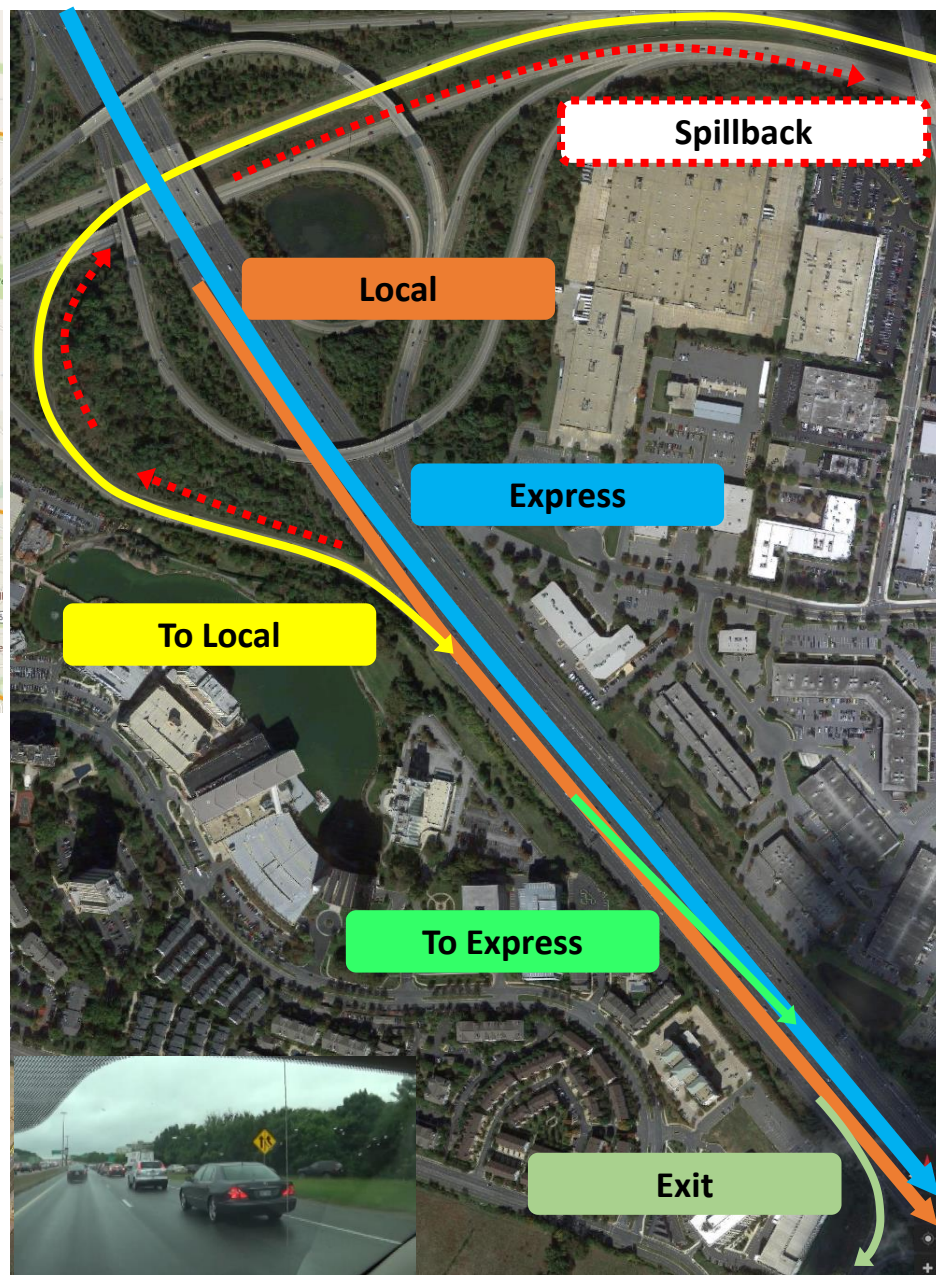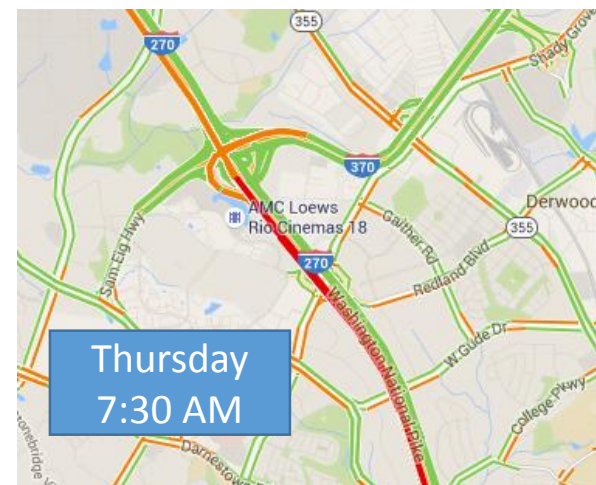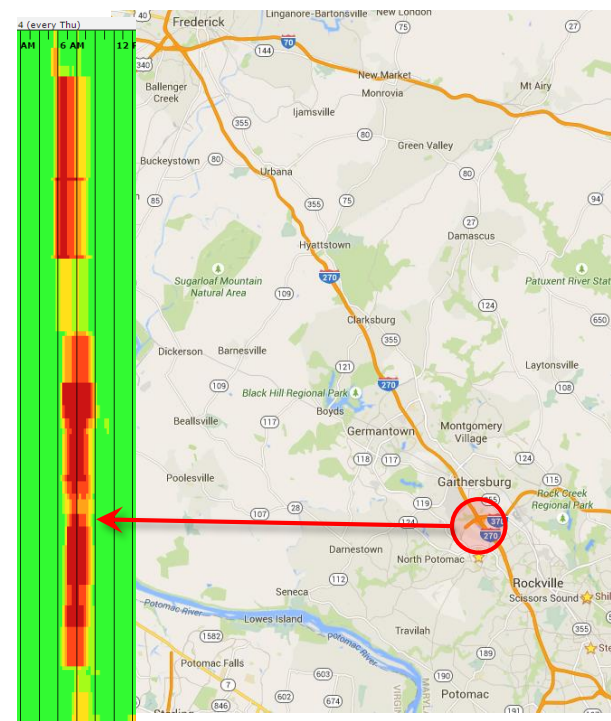
- Large volume coming from I-370 entering local road
  - They try to merge into express lanes
  - Length of weaving section: < 0.2 miles

- Heavy weaving reduce the capacity

3rd Bottleneck (Southbound): Short weaving area (EXIT 4)
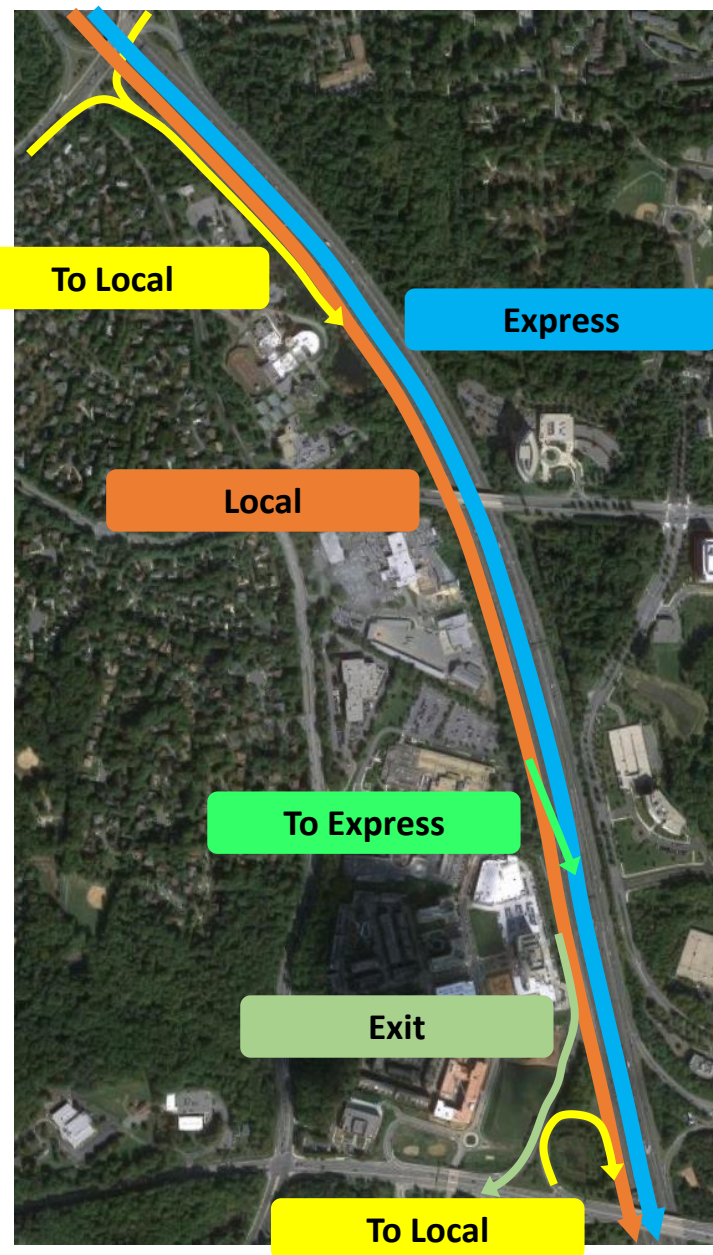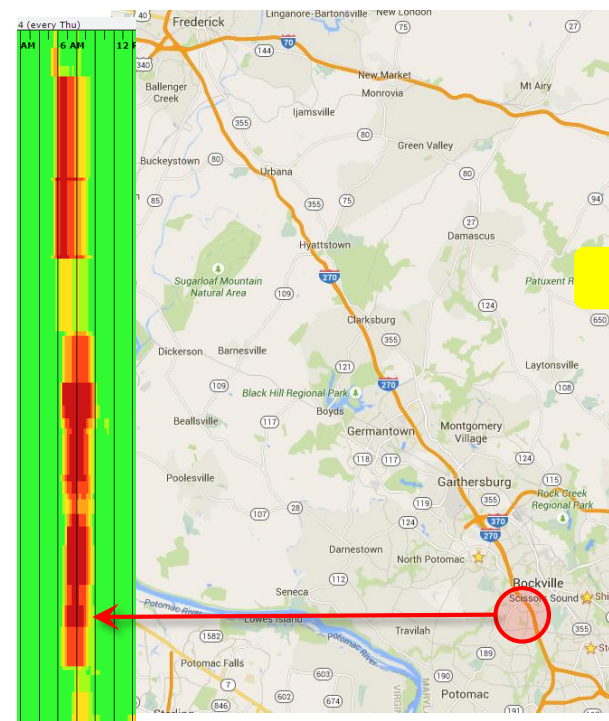
- Vehicles going off-ramp at exit
  - 4 (Montrose Rd.)
  - 5 (Falls Rd.)
  - 6 (West Montgomery Ave.)

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

- Create weaving sections

To Local

Express

Local

To Express

Exit

To Local

OPERATIONAL BOTTLENECKS
Northbound (PM Peak-Hours)

Data Type
Congestion

Color Thresholds
0 — 50
50% 60% 70% 80% 90%

Display options
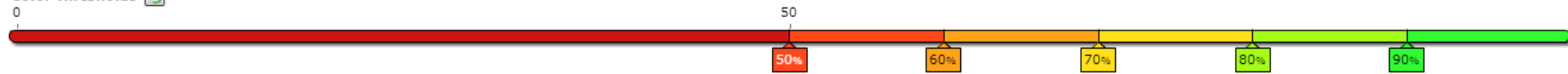
I-270

Monday   Tuesday   Northbound   Thursday   Friday

Wednesday
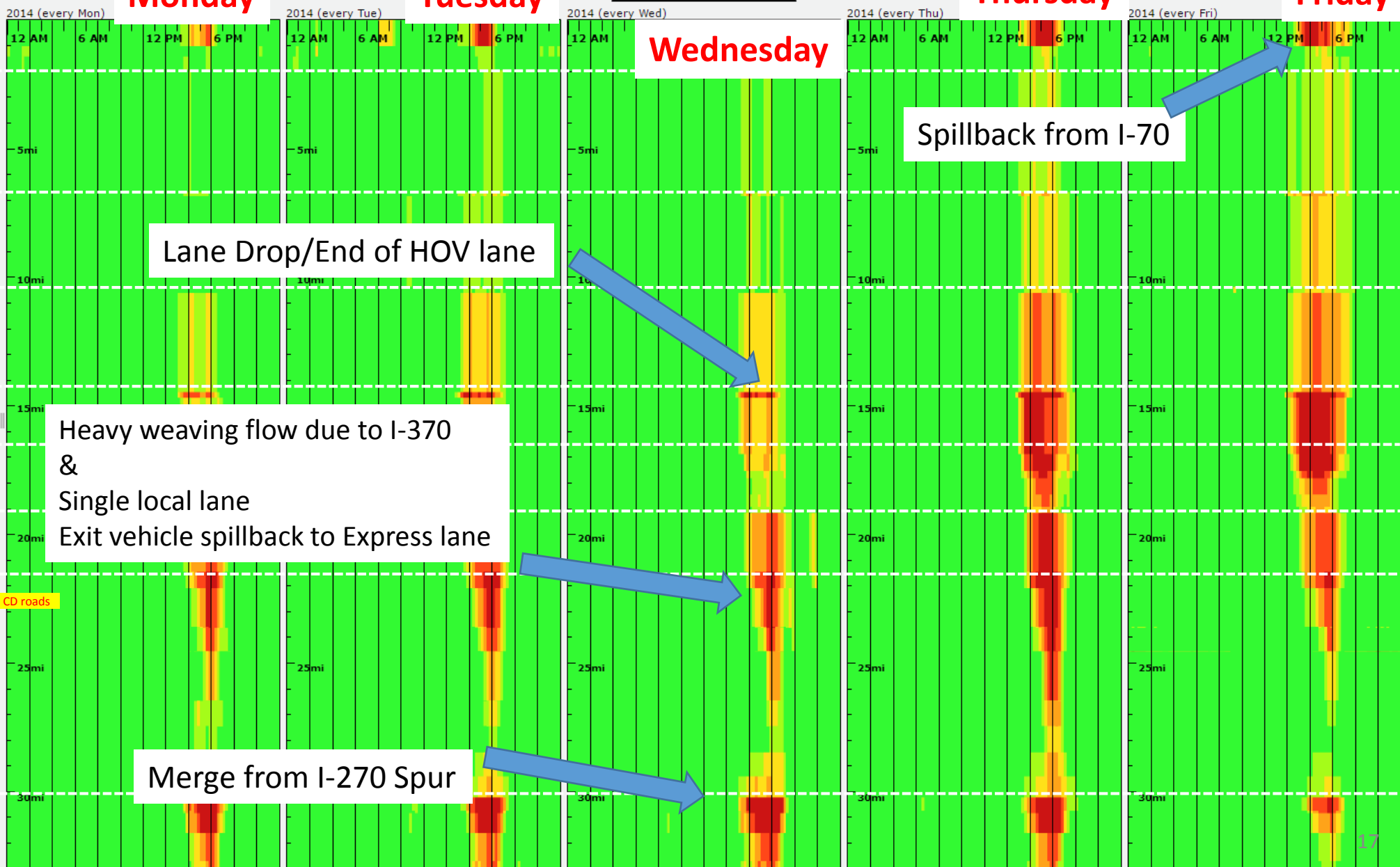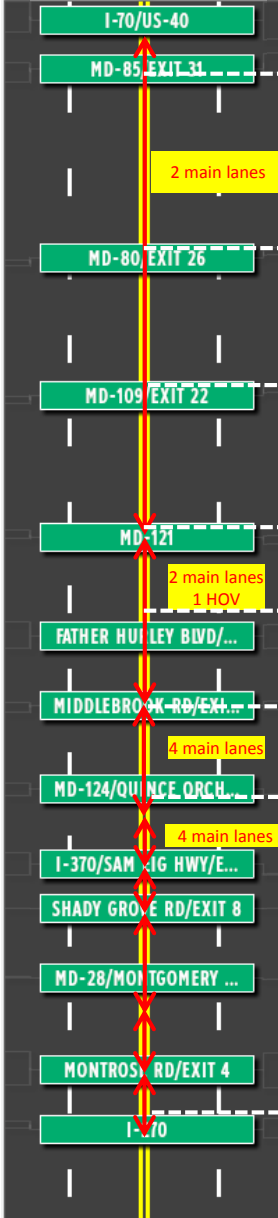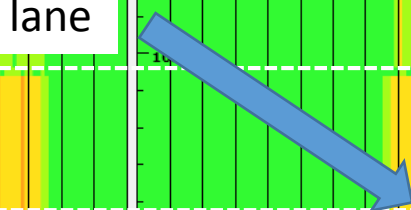
Spillback from I-70

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

I-70/US-40
MD-85, EXIT 31
2 main lanes
MD-80, EXIT 26
MD-109 EXIT 22
MD-121
2 main lanes 1 HOV
FATHER HURLEY BLVD/...
MIDDLEBROOK RD/EX...
4 main lanes
MD-124/QUINCE ORCH...
4 main lanes 2 CD roads
I-370/SAM ... G HWY/E...
SHADY GROVE RD/EXIT 8
MD-28/MONTGOMERY ...
MONTROSE RD/EXIT 4
I-70

2014 (every Mon)   2014 (every Tue)   2014 (every Wed)   2014 (every Thu)   2014 (every Fri)

12 AM 6 AM 12 PM 6 PM

5mi
10mi
15mi
20mi
25mi
30mi

17

Northbound (PM Peak-Hour)

Southbound bottlenecks (ampk)

Northbound bottlenecks (pmpk)

Exit 18 at Clarksburg:

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 2:
Merging lanes from
I-270 Spur

1st Bottleneck (Northbound): I-270 / I-270 SPUR

Weaving area

I-270 (From MD)

HOV (From MD)

I-270 Spur + HOV (From VA)

I-270-TUCKERMAN LANE S

North

I-270 S OF SPLIT
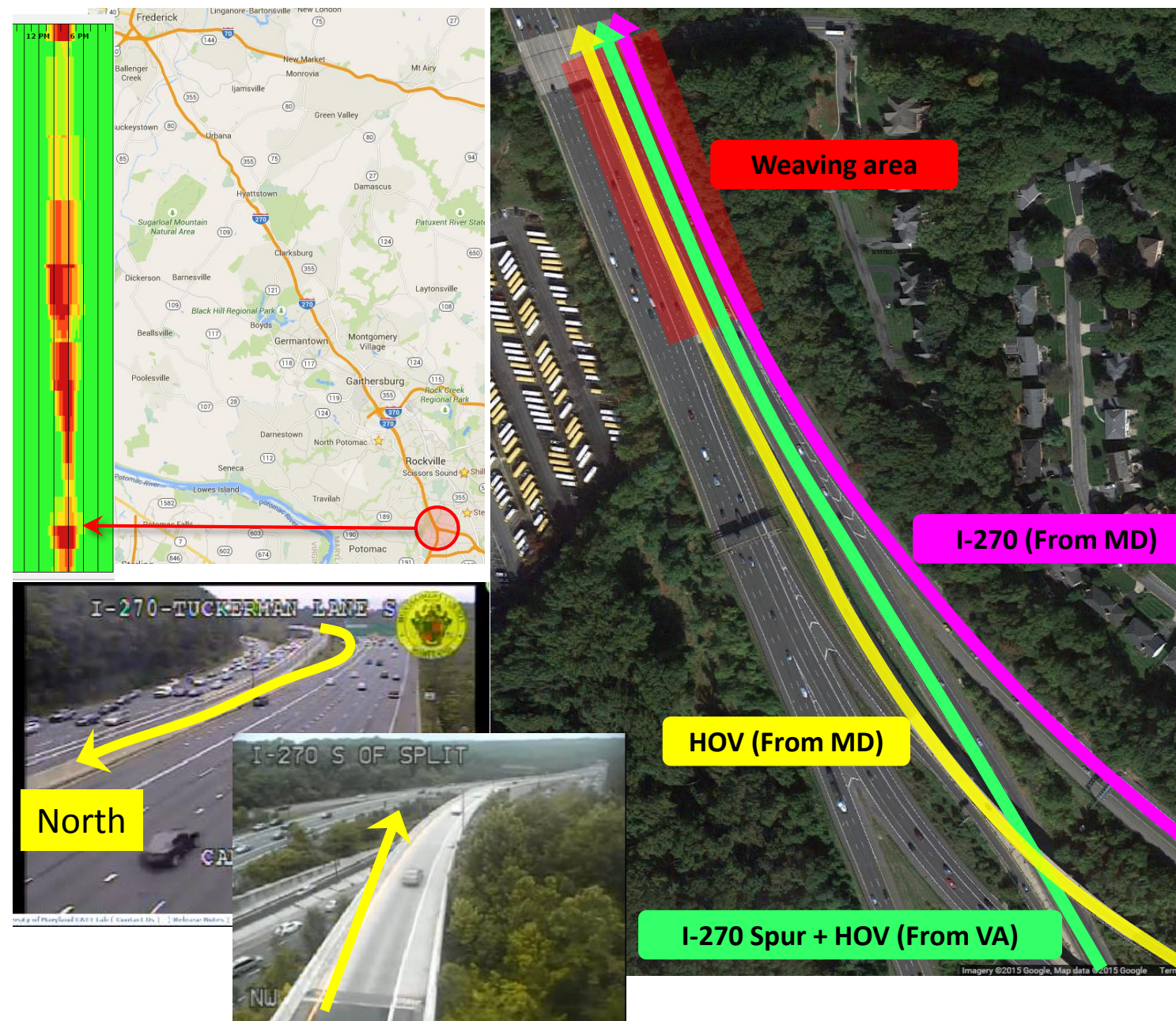
- Heaving weaving section
  - Traffic coming from MD targeting express lanes
 - Traffic coming from VA targeting local lanes

- Low HOV lane utilization rate

2ⁿᵈ Bottleneck (Northbound): Shady Groove & I-370 / EXIT 8 & 9

To Express

Local (2 lanes)

Express

On-ramp (1 lane)

Exit from express (2 lanes)

Exit (2 lanes)

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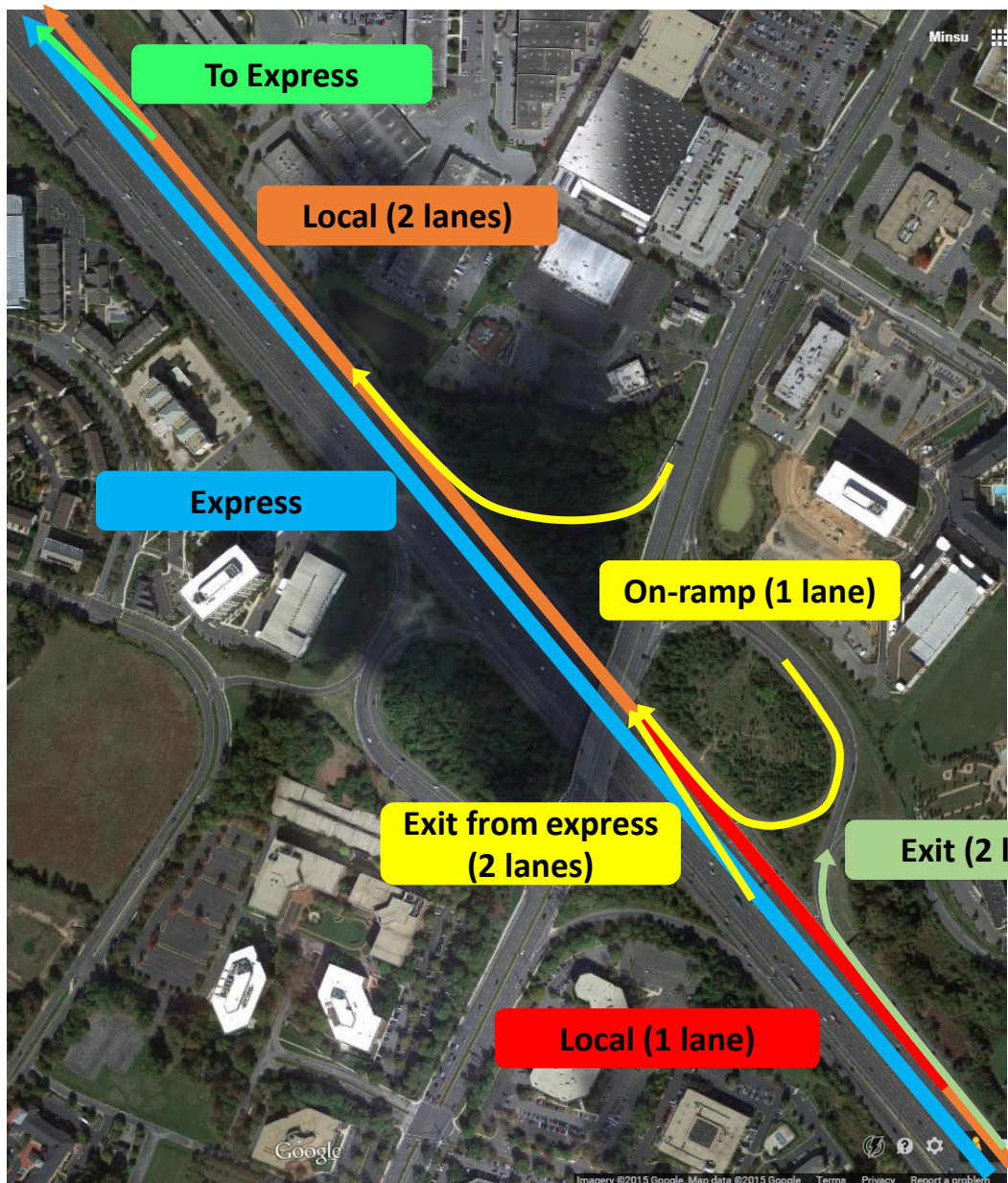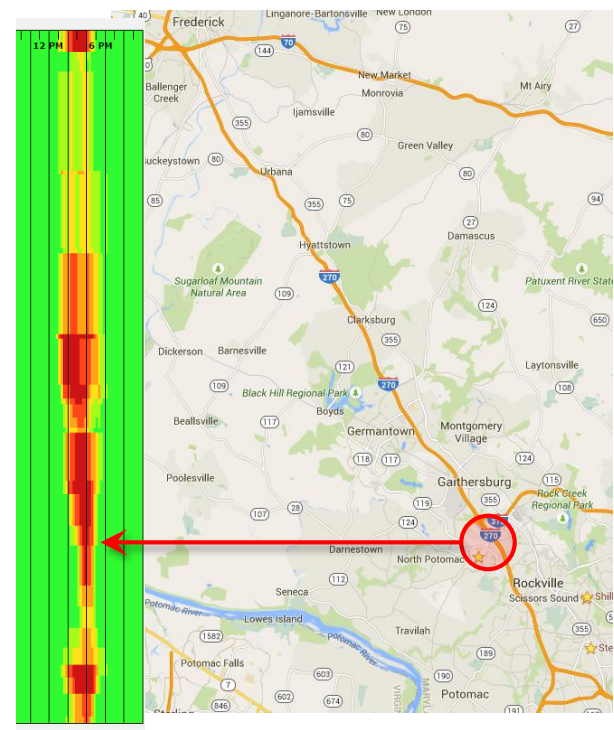
- Single local lane (reduced from 2 lanes)
  - Lane drop on local lanes
- 2 Exit lanes from express lanes
  - Heavy exit volume
- 1 on-ramp from local

- 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)

Uphill

End of Local

Local (1 lane)

On-ramp

Express

On-ramp
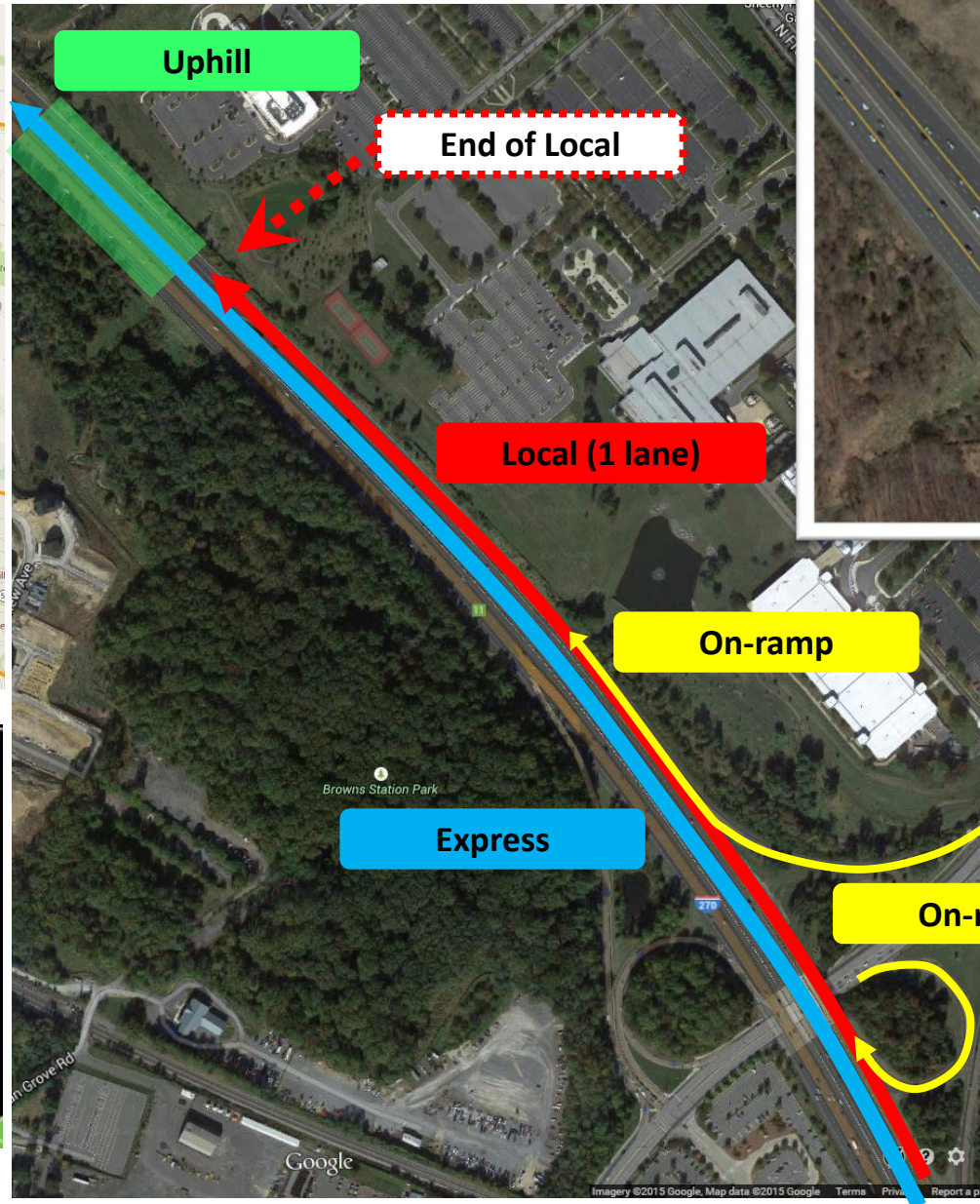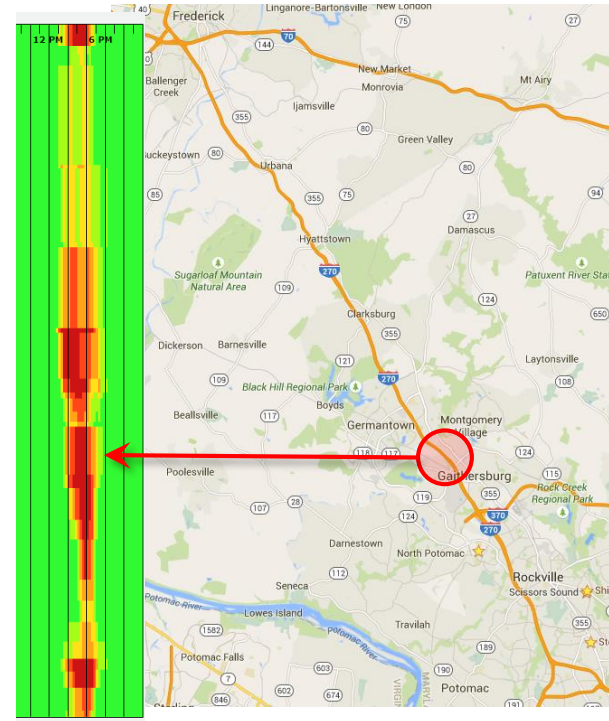
North

0.1 miles

Increase the length of merging/weaving section

- 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

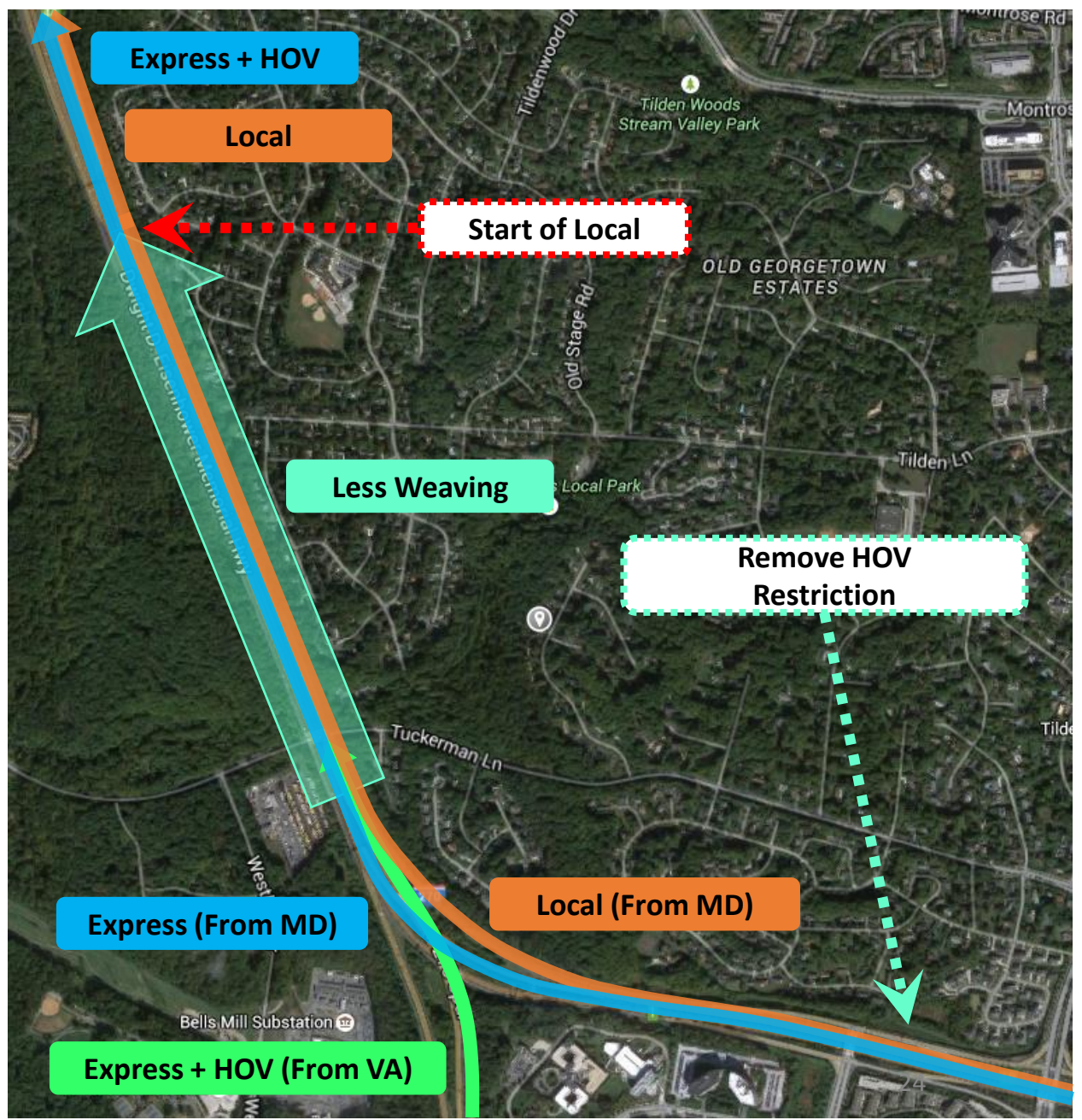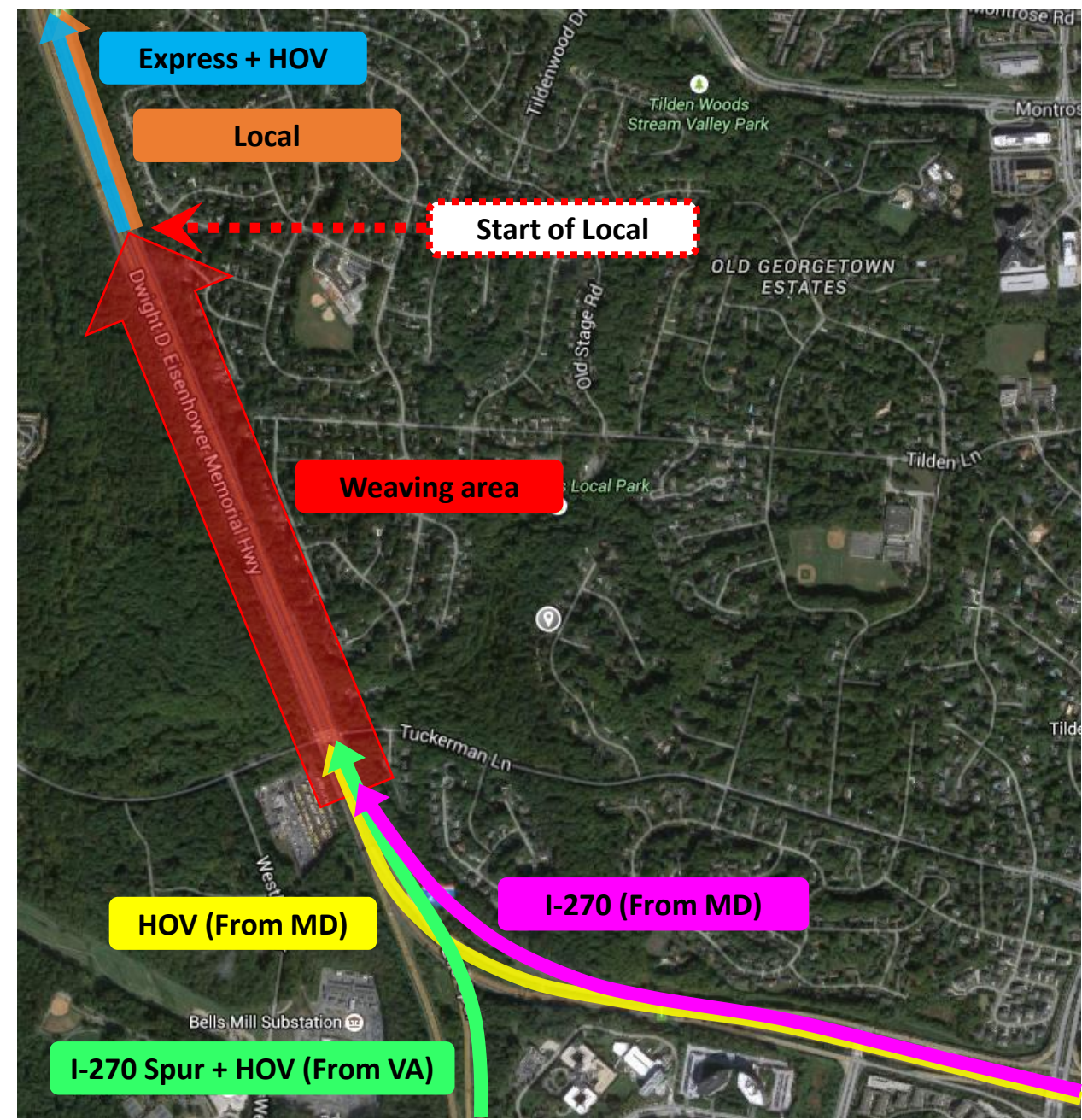# 4th Bottleneck (Northbound): Clarksburg Rd. (Exit 18) Lane Drop

Express (2 lanes)

Lane Drop (3→2)

Uphill

Express (3 lanes)

On-ramp
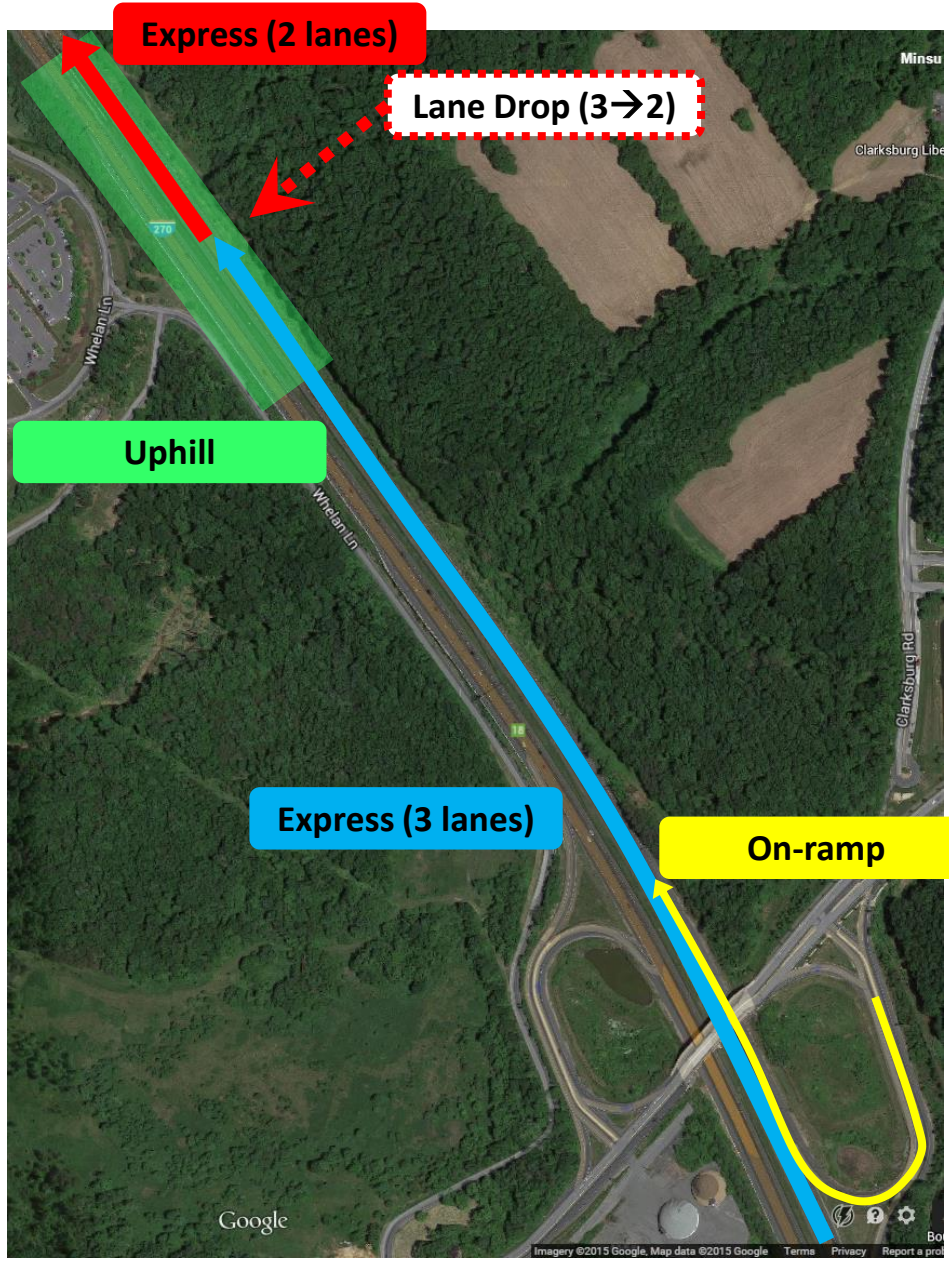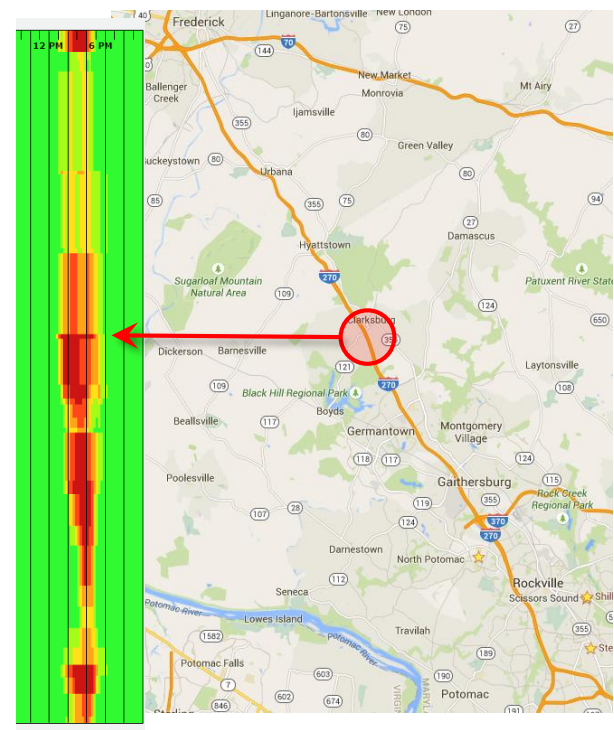
- Lane drop at a uphill section

- Slow moving vehicles require more distance to recover

Suggestions

Northbound and Southbound

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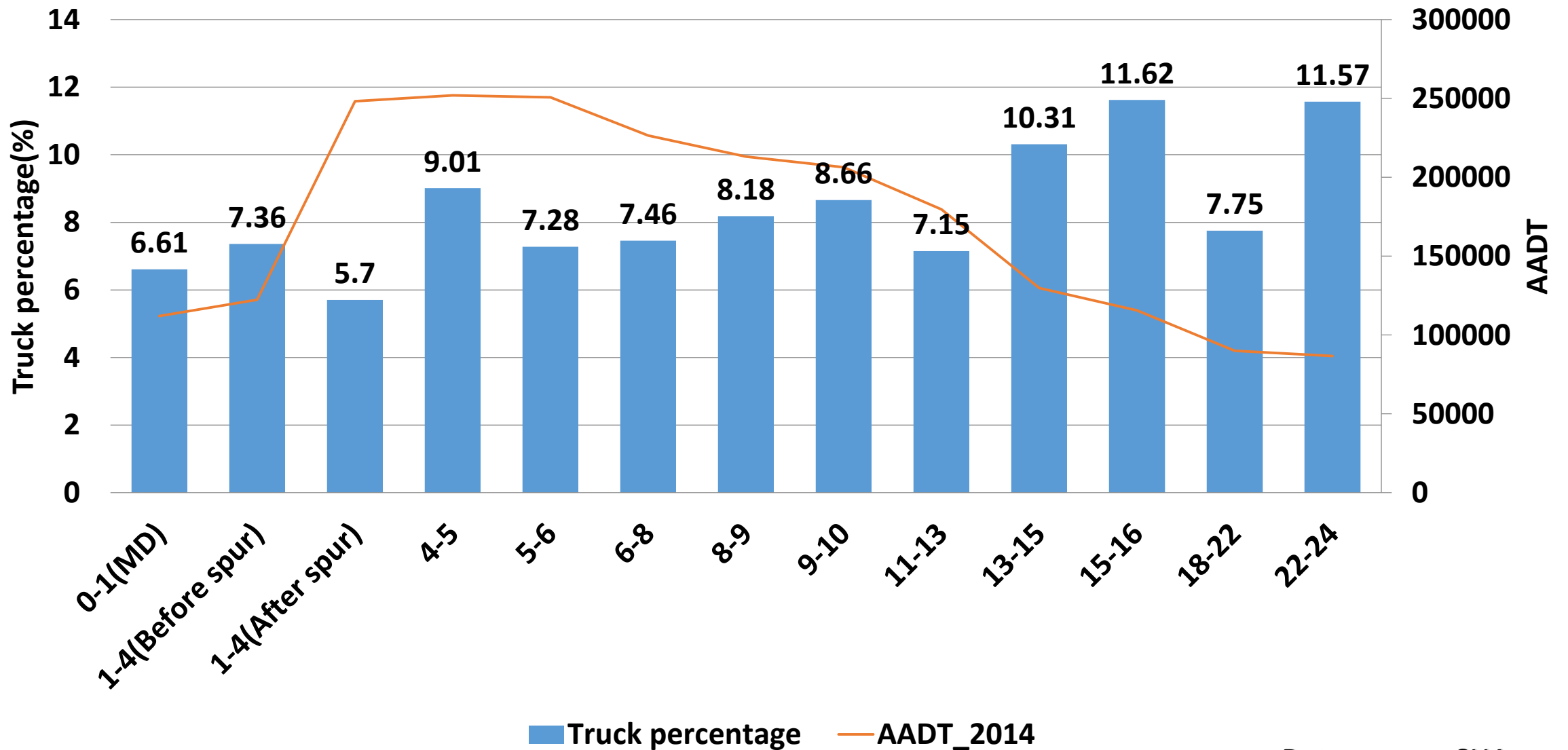
2nd Suggestion (Northbound and Southbound): Improving short merging areas

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

2. Demand responsive access control

3. Demand lane use control / shoulder

Express

Local
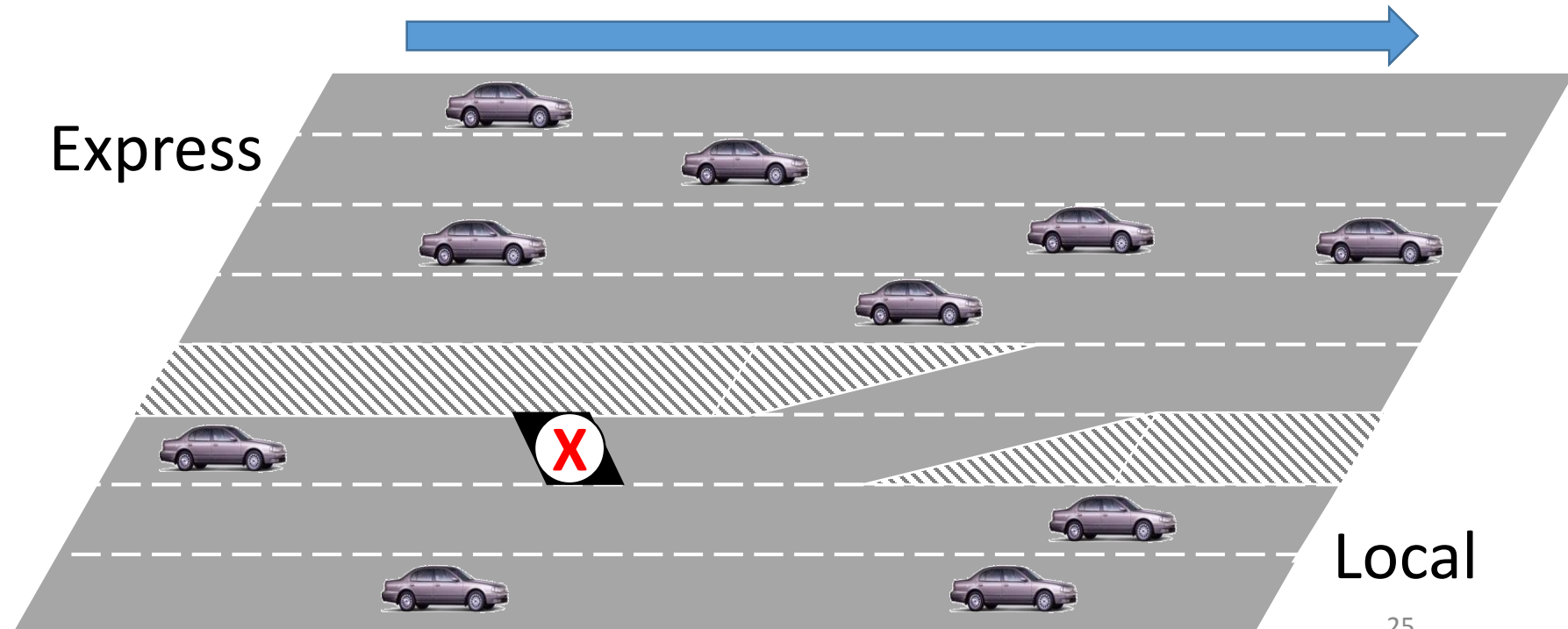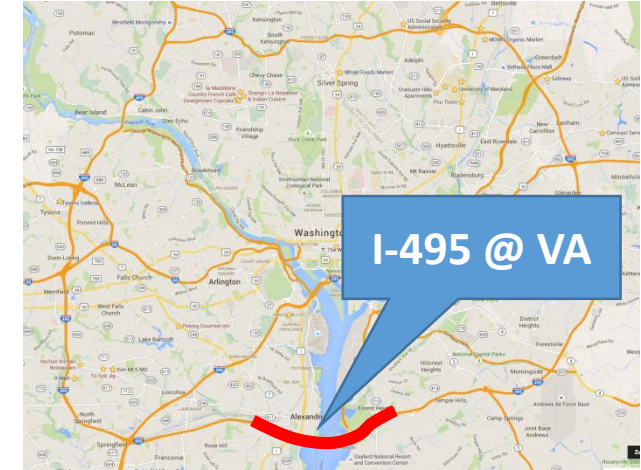
3rd Suggestion: Control of Heavy vehicles with Time-Window

Data source: SHA

4th Suggestion: Reversible Lanes
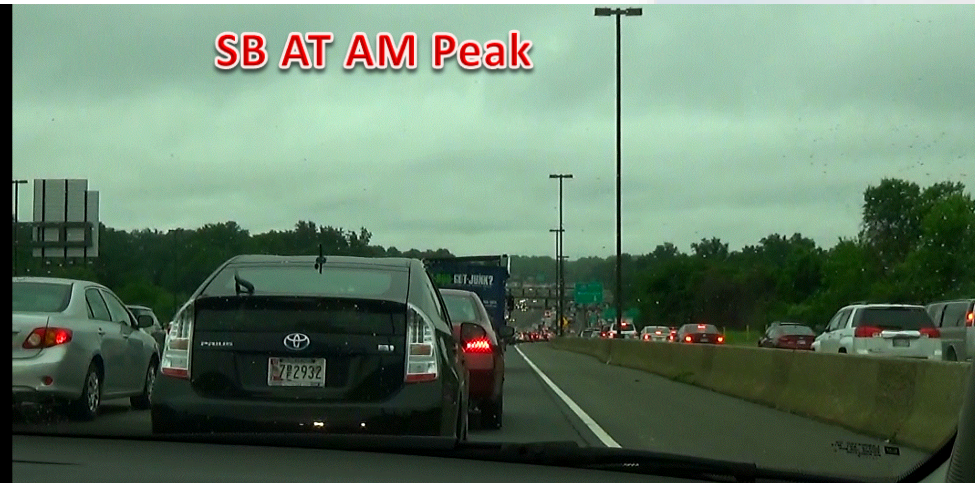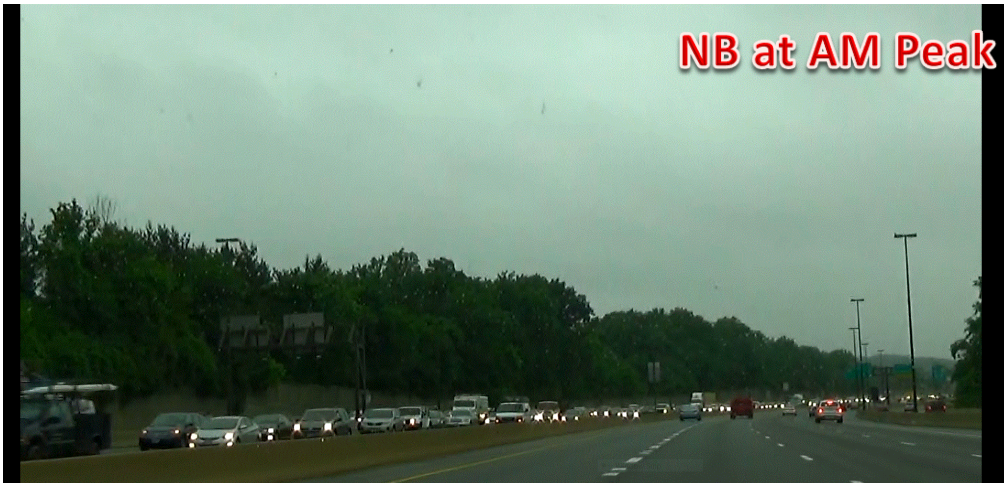
■ **Reason:** Strong Directional Congestion;

■ **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;

-

Movable Barrier

NB at AM Peak

SB AT AM Peak

Overhead Signal Display

5th Suggestion: Demand Management (Multi-Modal) Segment 4

- **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   -
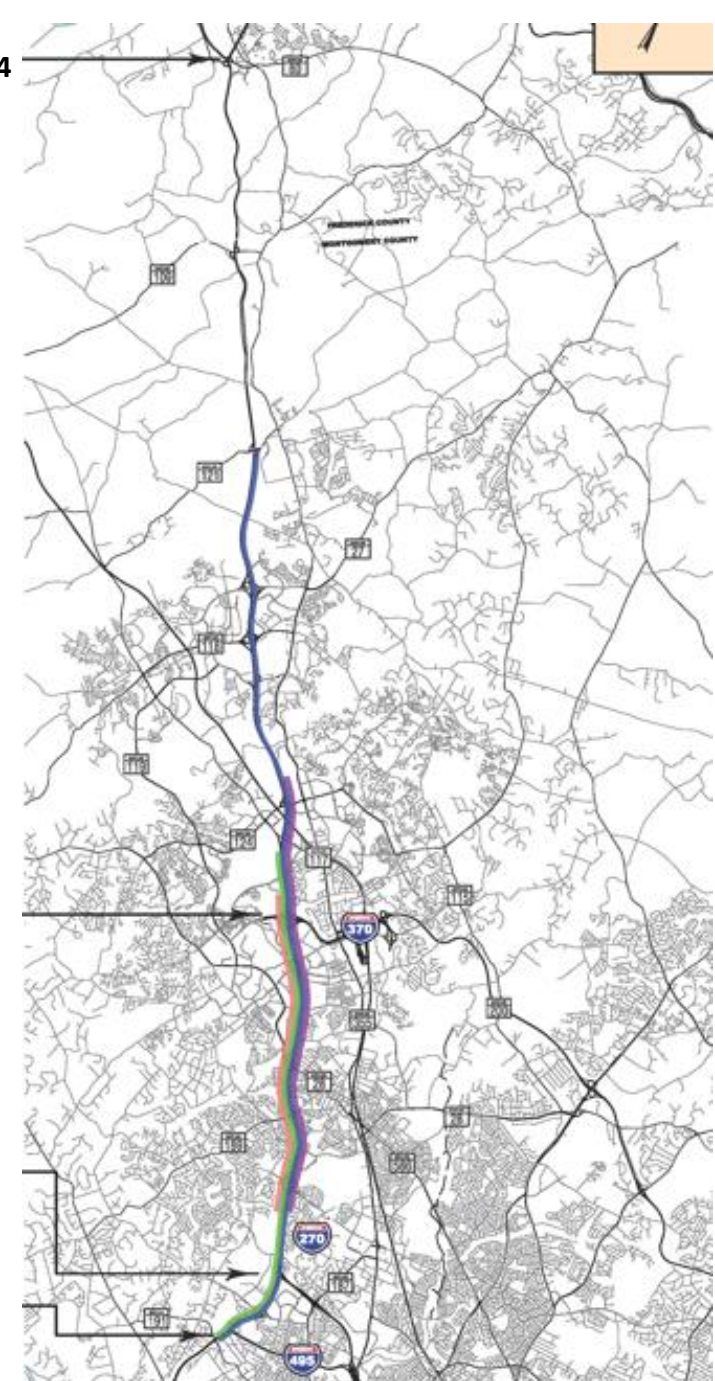
Existing CD

-    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*

Segment 3

Segment 2

Segment 1

Thanks & Questions ?