



Big Beam Weekend – Closing the I-495 Inner Loop in Tysons for an Entire Weekend

June 17, 2025



Dewberry

VOLKERT

vasite

Presenters



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Agenda

1. The Project
2. The Challenge
3. Temporary Traffic Control (TTC) Solution
4. Traffic Analysis
5. Public Outreach and Results
6. Questions and Answers

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The Project

The Project

- I-495 Express Lanes Northern Extension (495 NEXT)
- Located in Fairfax County, VA
- Extending the 495 Express Lanes north by 2.5 miles from the Dulles Toll Road to the George Washington Memorial Parkway interchanges near the American Legion Bridge
- Public-Private Partnership (P3) between the Commonwealth of Virginia and Transurban

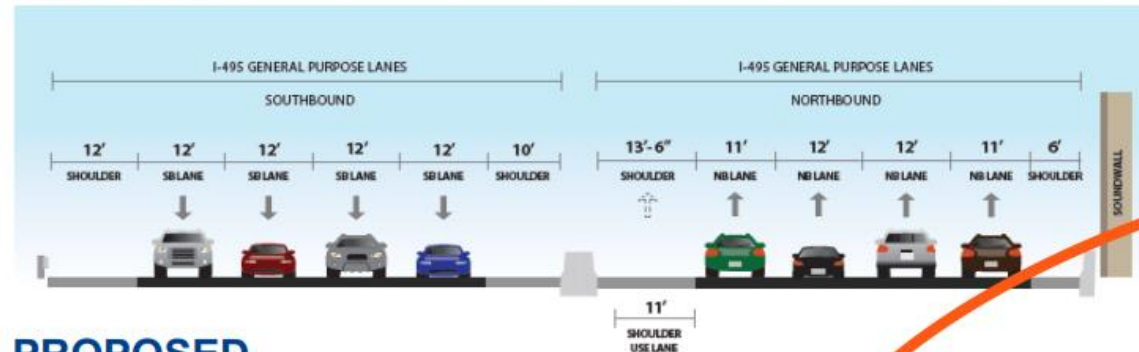


Photo Credit - VDOT

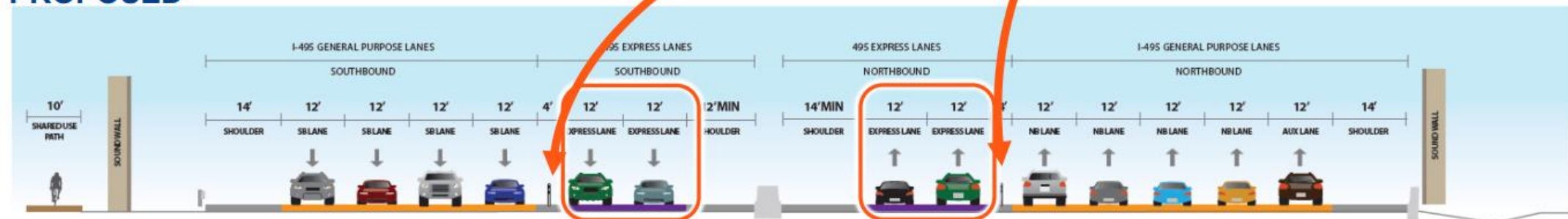
The Project

- Adds two Express Lanes in each direction
- Dynamic tolling, HOV 3+ no charge
- Project goals include increased mobility and safety

EXISTING



PROPOSED



The Project

- \$660 Million Project
- Design-Build Delivery
 - Design-Builder: Lane Construction (Shirley Contracting major sub)
 - Designer: Rinker Design Associates (Dewberry major sub)



Photo Credit - VDOT



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The Challenge

The Challenge

- Required construction of a high-angle, long span flyover bridge without fracture-critical member
- Bridge located over another bridge (I-495 NB over Dulles Toll Rd)
- Extended weekend closure necessary to construct bridge
- ADT of 120,000+ VPD on affected roadways



Photo Credit - VDOT

The Challenge

- In single operation, install:
 - 5 girder lines
 - 4 pieces per girder
 - 295' long, 11' tall, 3' wide
 - Weighed between 70-80 tons
- 500-ton capacity cranes



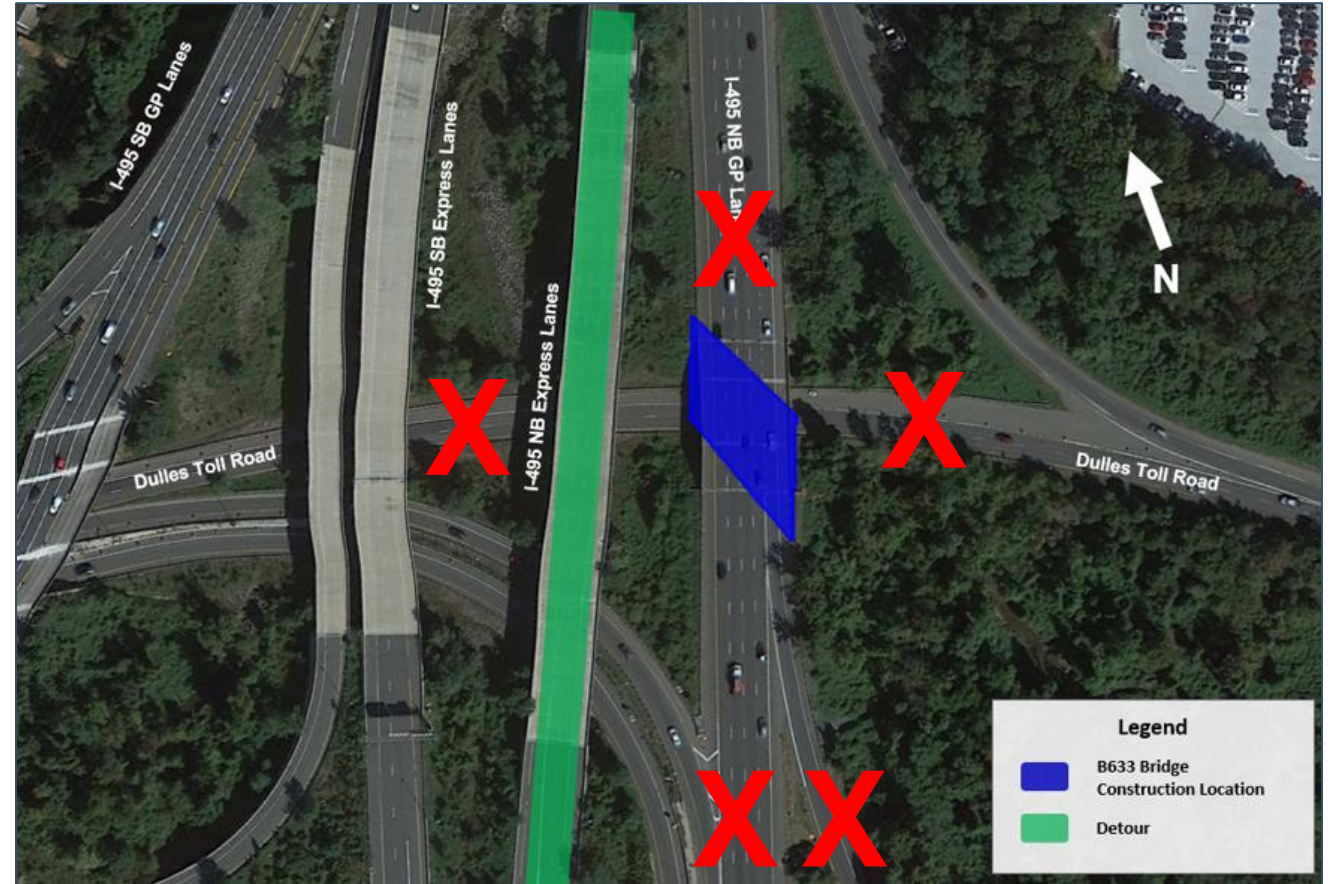
Photo Credit – Shirley Contracting Company, LLC

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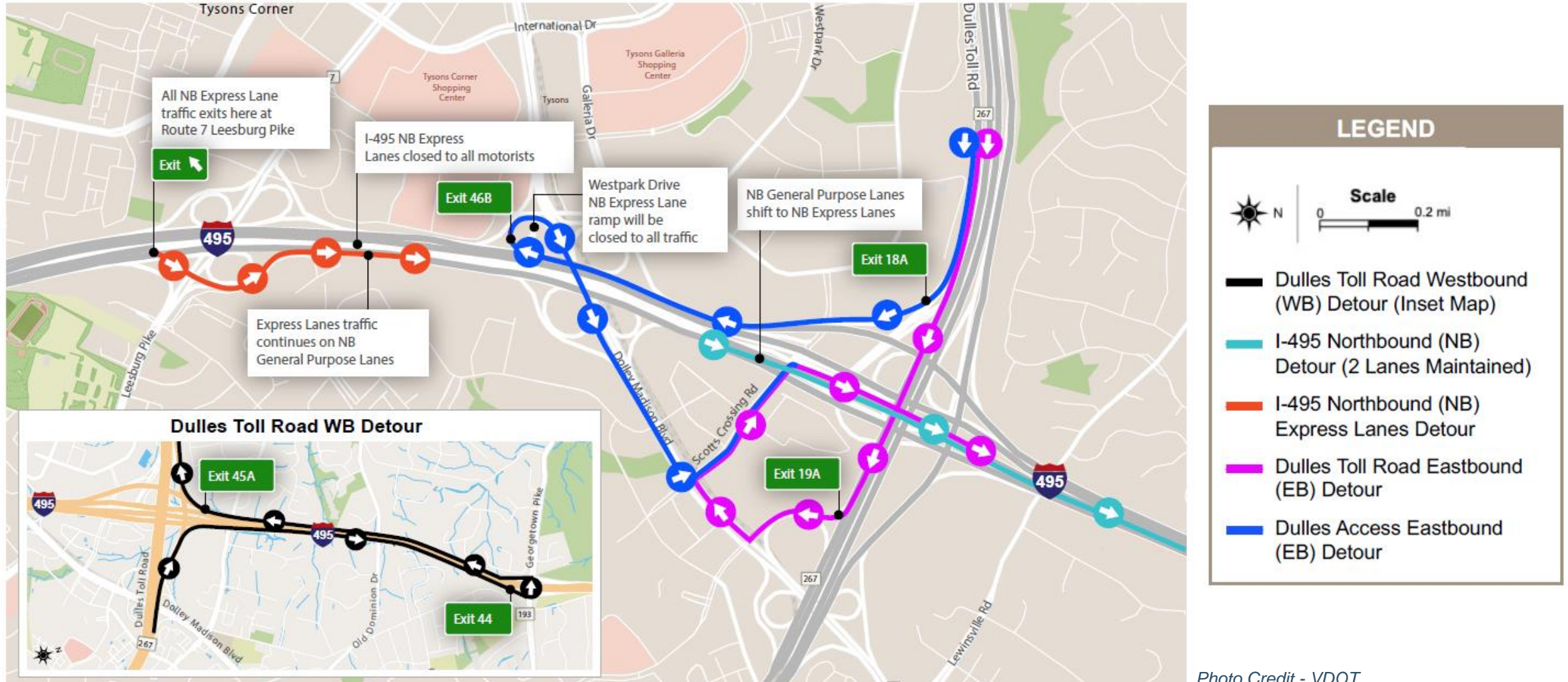
Temporary Traffic Control (TTC) Solution

Leveraging Existing Express Lanes

- Existing Express Lanes presented an opportunity as a detour route, in an area with no parallel primary routes
- TTC concept developed to:
 - Remove traffic from Express Lanes
 - Divert all general purpose lane traffic to Express Lanes



Detours



Leveraging Existing Express Lanes

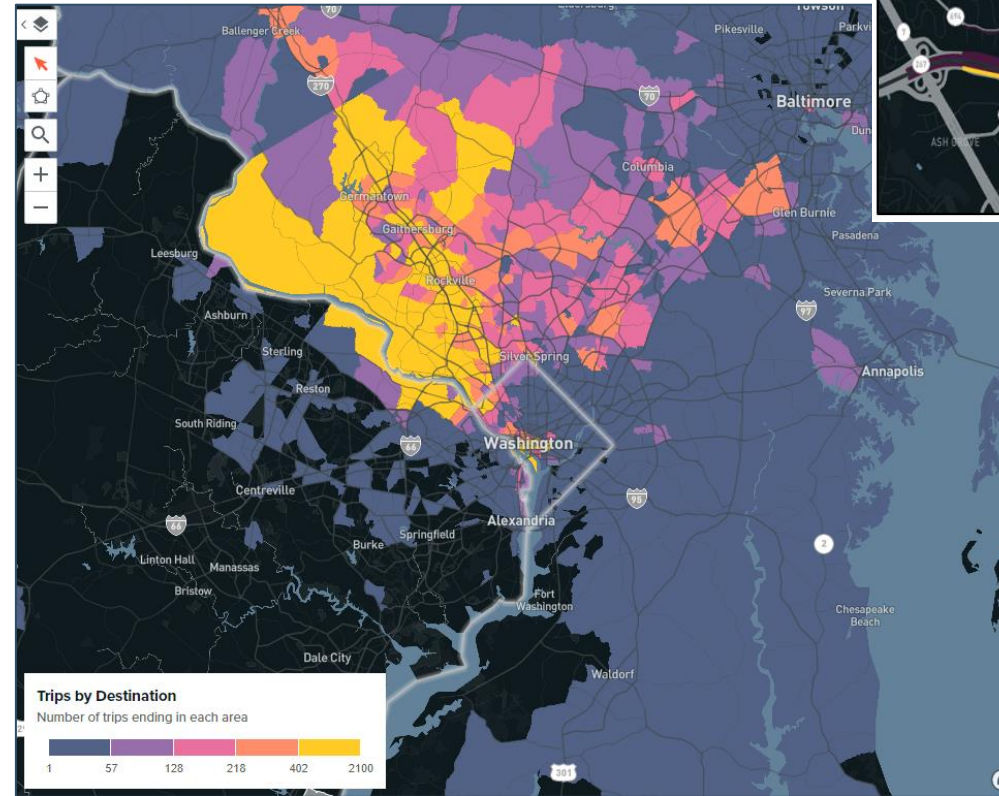
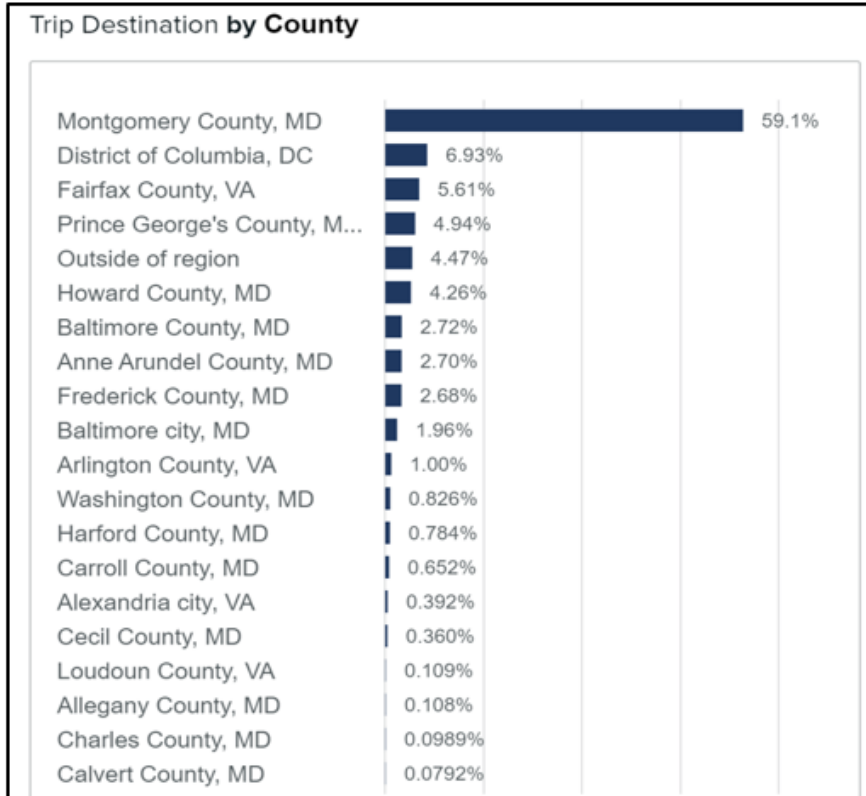


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Traffic Analysis

Traffic Analysis

- Replica used for traffic diversion



Trip Destination by County for the Selected Link on I-495 Northbound (Source: Replica)

Traffic Analysis

Trip Destination By County	Percent of Volume	Percent Diverted (Assumption)	Percent of Volume Diverted	Percent of Trips Not Taken (Assumption)	Volume Percent of Trips Not Taken	Total Percent of Trips Not Occurring (Diverted + Trips Not Taken)
Montgomery County, MD	59.08%	10%	5.91%	5%	2.95%	8.86%
District of Columbia, DC	6.93%	80%	5.55%	5%	0.35%	5.89%
Fairfax County, VA	5.61%	0%	0.00%	10%	0.56%	0.56%
Prince George's County, MD	4.94%	80%	3.95%	0%	0.00%	3.95%
Outside of region	4.47%	90%	4.02%	0%	0.00%	4.02%
Howard County, MD	4.26%	80%	3.41%	0%	0.00%	3.41%
Baltimore County, MD	2.72%	80%	2.18%	0%	0.00%	2.18%
Anne Arundel County, MD	2.70%	80%	2.16%	0%	0.00%	2.16%
Frederick County, MD	2.68%	50%	1.34%	0%	0.00%	1.34%
Baltimore city, MD	1.96%	80%	1.56%	0%	0.00%	1.56%
Arlington County, VA	1.00%	90%	0.90%	5%	0.05%	0.95%
Washington County, MD	0.83%	50%	0.41%	0%	0.00%	0.41%
Harford County, MD	0.78%	80%	0.63%	0%	0.00%	0.63%
Carroll County, MD	0.65%	50%	0.33%	0%	0.00%	0.33%
Alexandria city, VA	0.39%	90%	0.35%	5%	0.02%	0.37%
Cecil County, MD	0.36%	80%	0.29%	0%	0.00%	0.29%
Loudoun County, VA	0.11%	90%	0.10%	5%	0.01%	0.10%
Allegany County, MD	0.11%	50%	0.05%	0%	0.00%	0.05%
Charles County, MD	0.10%	90%	0.09%	0%	0.00%	0.09%
Calvert County, MD	0.08%	90%	0.07%	0%	0.00%	0.07%
Total			33%		4%	37%

Traffic Diversions Destined for I-495 Northbound General Purpose Lanes

Traffic Analysis

- StreetLight Data - September and October 2022
- Applied 37% reduction:
 - I-495 NB GPL
 - Ramp G3 (Dulles Toll Rd EB and Dulles Airport Access Rd EB to I-495 NB GPL) since the study segment is north of this merge point where the road will be closed
 - I-495 NB EXPL volumes reduced by 37%, as volume originating from the EXPL is within the selected study link

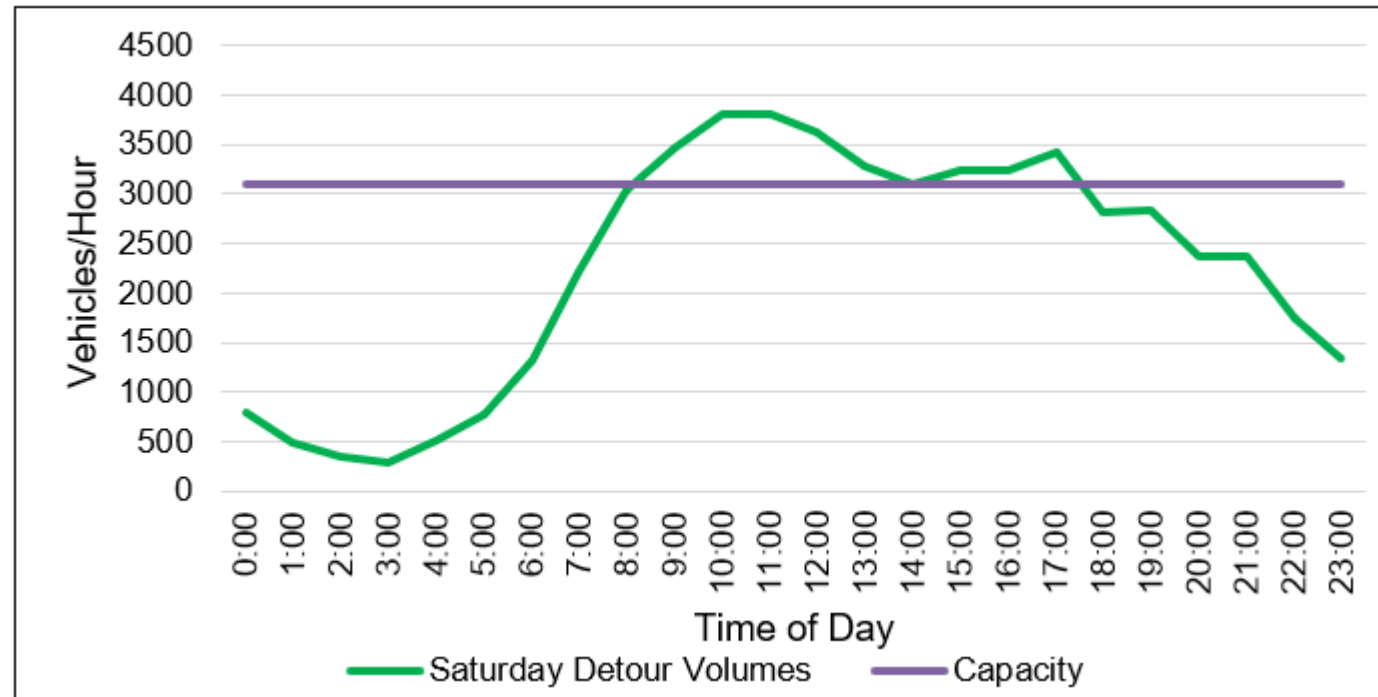
	G3: DTR/DAAR EB On-Ramp to I-495 NB GPL		I-495 NB GPL Volumes Prior to G3 Merge	
	Volumes prior to 37% Reduction	Volumes Reduced by 37%	Volumes prior to 37% Reduction	Volumes Reduced by 37%
12:00 AM	363	229	875	551
1:00 AM	346	218	500	315
2:00 AM	130	82	399	251
3:00 AM	124	78	365	230
4:00 AM	152	96	575	362
5:00 AM	238	150	808	509
6:00 AM	433	273	1550	977
7:00 AM	887	559	2161	1361
8:00 AM	1151	725	2859	1801
9:00 AM	1152	726	3293	2075
10:00 AM	1270	800	3748	2361
11:00 AM	1245	784	3378	2128
12:00 PM	1330	838	2983	1879
1:00 PM	1050	662	2704	1704
2:00 PM	958	604	2757	1737
3:00 PM	794	500	2432	1532
4:00 PM	832	524	2355	1484
5:00 PM	1026	646	2859	1801
6:00 PM	984	620	2535	1597
7:00 PM	881	555	2789	1757
8:00 PM	851	536	2523	1589
9:00 PM	839	529	2580	1625
10:00 PM	520	328	2106	1327
11:00 PM	351	221	1589	1001

Reduced Traffic Volumes based on Traffic Diversion Analysis

Traffic Analysis

- Capacity of the work zone calculated based on Chapter 22 of the Highway Capacity Manual 2000 (Short Term Work Zones)

$$\begin{aligned}C_a &= (1,600 + I - R) * f_{HV} * N \\C_a &= (1,600 + 0 - 0) * 0.9709 * 2 \\C_a &= 3,107 \text{ veh/hr} \\C_a &= 1,553 \text{ veh/hr/ln}\end{aligned}$$



I-495 Northbound Saturday Detour Volumes vs. Capacity

Saturday detour volumes exceed capacity from 9 AM to 2 PM and from 3 PM to 6 PM

Traffic Analysis

Time	Capacity per HCM (veh/hr)	Capacity per HCM (veh/hr/ln)	Saturday Detour Volumes (veh/hr)	Over Capacity (Yes/No)	Saturday Detour Volumes per Lane	Net Capacity per Lane	Net Over Capacity per Lane
12:00 AM	3,107	1,553	798	No	399	-1,155	0
1:00 AM	3,107	1,553	500	No	250	-1,304	0
2:00 AM	3,107	1,553	357	No	178	-1,375	0
3:00 AM	3,107	1,553	292	No	146	-1,408	0
4:00 AM	3,107	1,553	505	No	252	-1,301	0
5:00 AM	3,107	1,553	776	No	388	-1,166	0
6:00 AM	3,107	1,553	1,326	No	663	-890	0
7:00 AM	3,107	1,553	2,213	No	1,106	-447	0
8:00 AM	3,107	1,553	3,046	No	1,523	-31	0
9:00 AM	3,107	1,553	3,461	Yes	1,731	177	177
10:00 AM	3,107	1,553	3,816	Yes	1,908	354	532
11:00 AM	3,107	1,553	3,799	Yes	1,900	346	878
12:00 PM	3,107	1,553	3,621	Yes	1,810	257	1,135
1:00 PM	3,107	1,553	3,277	Yes	1,639	85	1,220
2:00 PM	3,107	1,553	3,102	No	1,551	-2	1,217
3:00 PM	3,107	1,553	3,236	Yes	1,618	64	1,282
4:00 PM	3,107	1,553	3,232	Yes	1,616	62	1,344
5:00 PM	3,107	1,553	3,425	Yes	1,713	159	1,504
6:00 PM	3,107	1,553	2,815	No	1,408	-146	1,358
7:00 PM	3,107	1,553	2,836	No	1,418	-136	1,222
8:00 PM	3,107	1,553	2,363	No	1,181	-372	850
9:00 PM	3,107	1,553	2,364	No	1,182	-371	479
10:00 PM	3,107	1,553	1,742	No	871	-682	-204
11:00 PM	3,107	1,553	1342	No	671	-883	0

Saturday Queue Length Analysis for B633 Closure

Traffic Analysis

Time	Net Over Capacity per Lane*	Volume from I-495 NB	Queue Length (ft.)	Volume from Scotts Crossing Road On-Ramp	Queue Length (ft.)
12:00 AM	0	-	-	-	-
1:00 AM	0	-	-	-	-
2:00 AM	0	-	-	-	-
3:00 AM	0	-	-	-	-
4:00 AM	0	-	-	-	-
5:00 AM	0	-	-	-	-
6:00 AM	0	-	-	-	-
7:00 AM	0	-	-	-	-
8:00 AM	0	-	-	-	-
9:00 AM	177	148	4,790	29	1,022
10:00 AM	532	444	10,447	88	3,094
11:00 AM	878	733	15,504	145	5,088
12:00 PM	1,135	906	18,547	229	7,998
1:00 PM	1,220	981	19,851	239	8,365
2:00 PM	1,217	984	19,896	233	8,170
3:00 PM	1,282	1048	21,021	234	8,195
4:00 PM	1,344	1078	21,546	266	9,315
5:00 PM	1,504	1188	23,478	316	11,051
6:00 PM	1,358	1088	21,721	270	9,455
7:00 PM	1,222	1032	20,736	190	6,666
8:00 PM	850	707	15,053	143	5,011
9:00 PM	479	394	9,573	85	2,986
10:00 PM	-204	-173	-	-31	-
11:00 PM	0	0	-	0	-

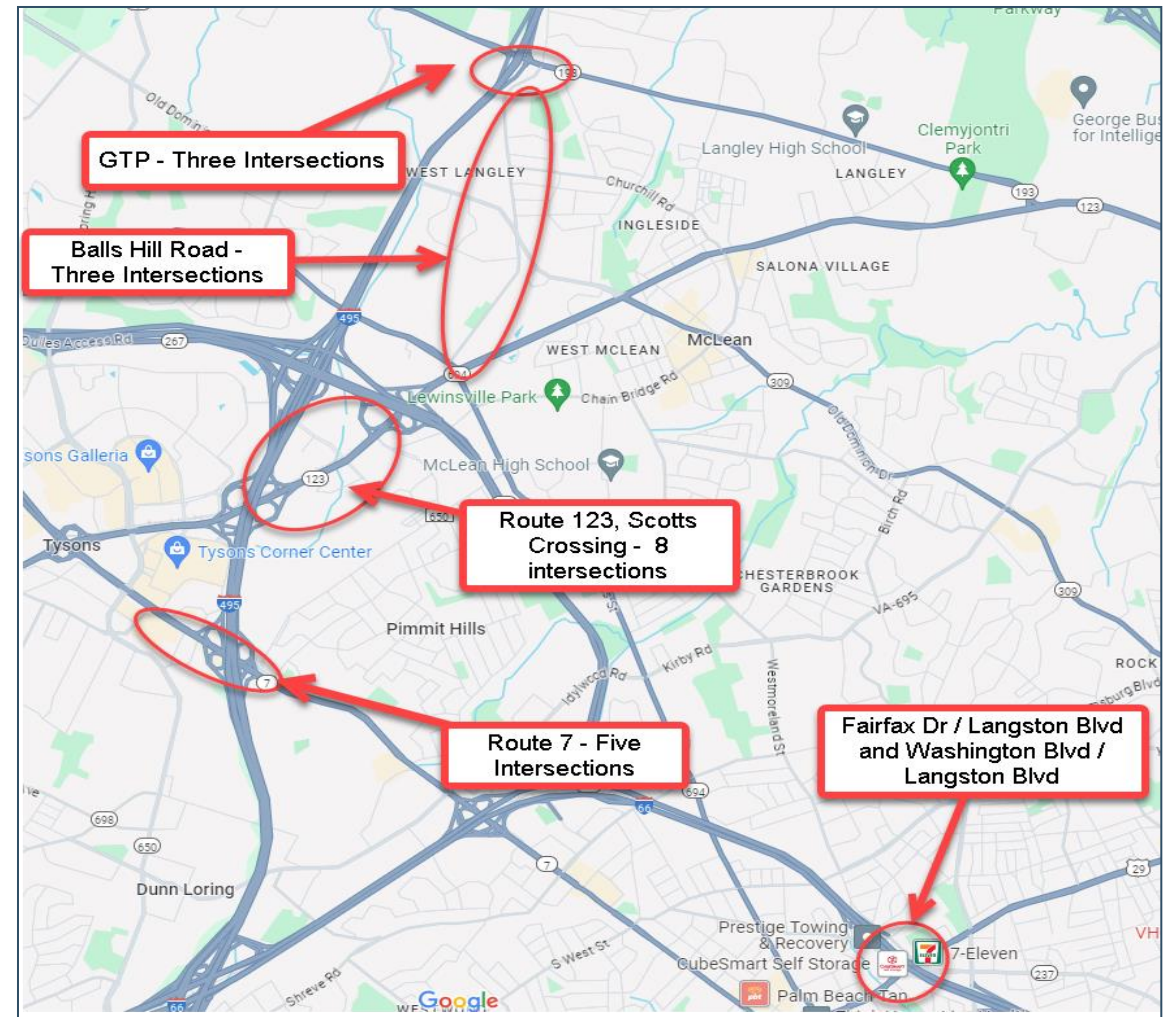
Saturday Queue Length Analysis for Volume from I-495 Northbound and Scotts Crossing Rd On-Ramp

Maximum queue length expected:

- 4.5 miles at 5PM on I-495 NB
- 2.1 miles at 5PM on the Scotts Crossing Rd on-ramp extending back on Scotts Crossing Rd

Traffic Analysis - Signals

- 20 intersections were analyzed for potential timing adjustments
- Complex urban system sensitive to adjustments

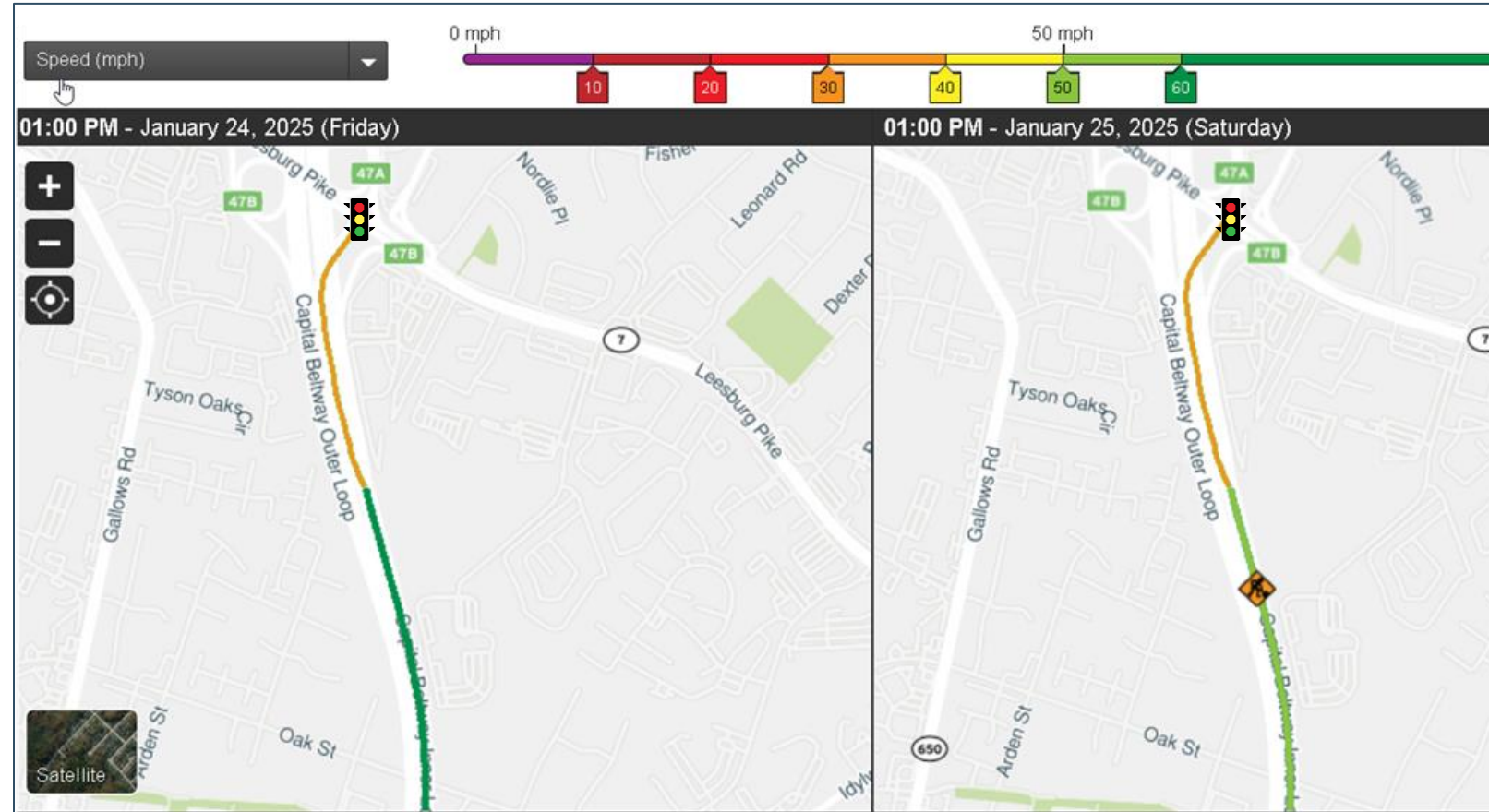


Study Area

Traffic Analysis - Signals

Route 7:

- The temporary terminus to the EXPL at Route 7 added 800 vph thru movement
- High volumes on the weekends - Signal timing had to be carefully balanced to prevent large queues on Route 7 or on the EXPL
- EXPL did not back up significantly and congestion on Route 7 was moderate

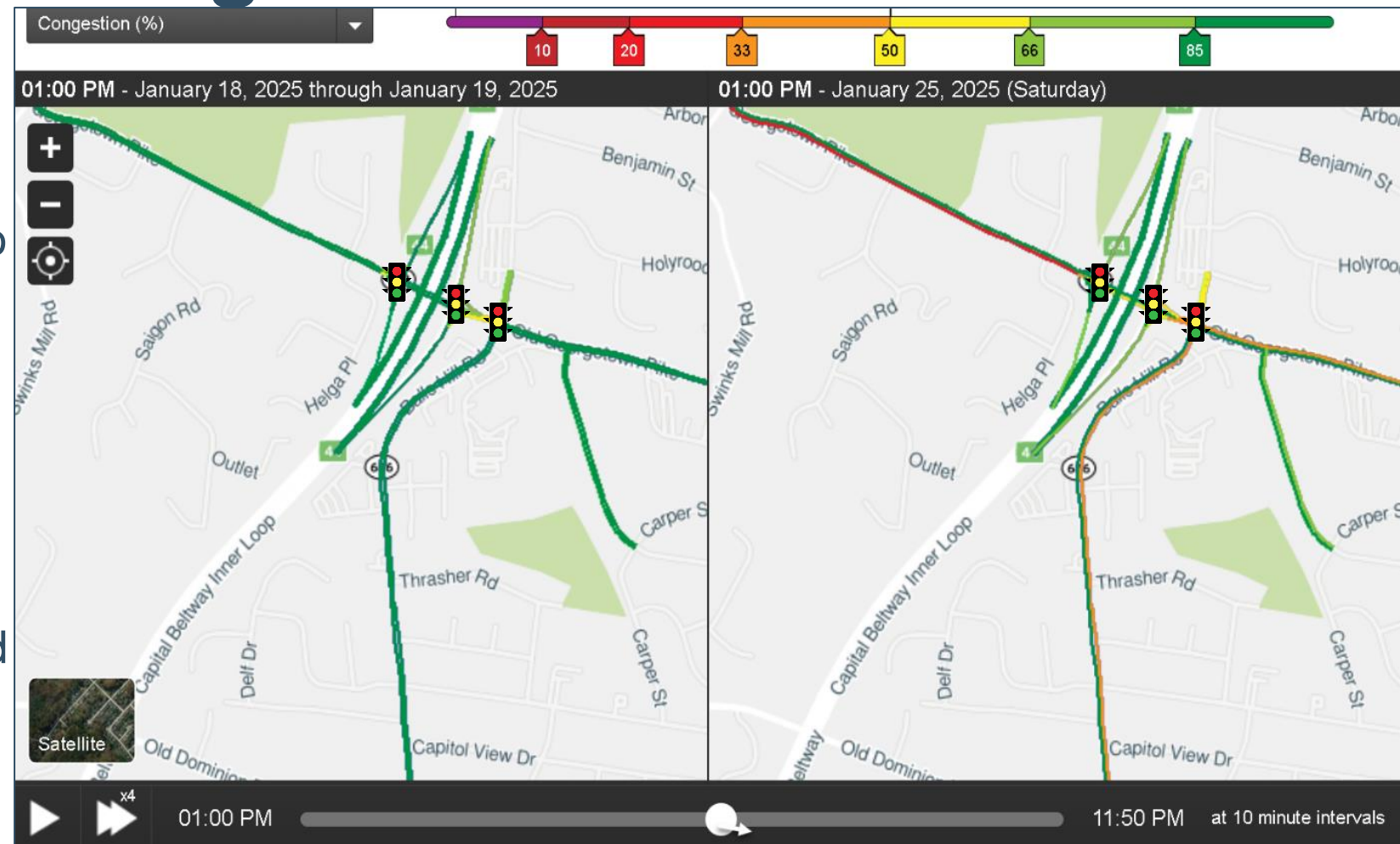


Congestion Conditions Comparison

Traffic Analysis - Signals

Georgetown Pike (GTP):

- WB Dulles Toll Rd was detoured to NB I-495 to GTP interchange to return to SB I-495
- Signal timing modifications were made to assist:
 - With the left-turn movements at the ramp
 - With additional weekend traffic on Balls Hill Rd
- Signal timing was effective and did not result in excessive queues



Congestion Conditions Comparison

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Public Outreach and Results

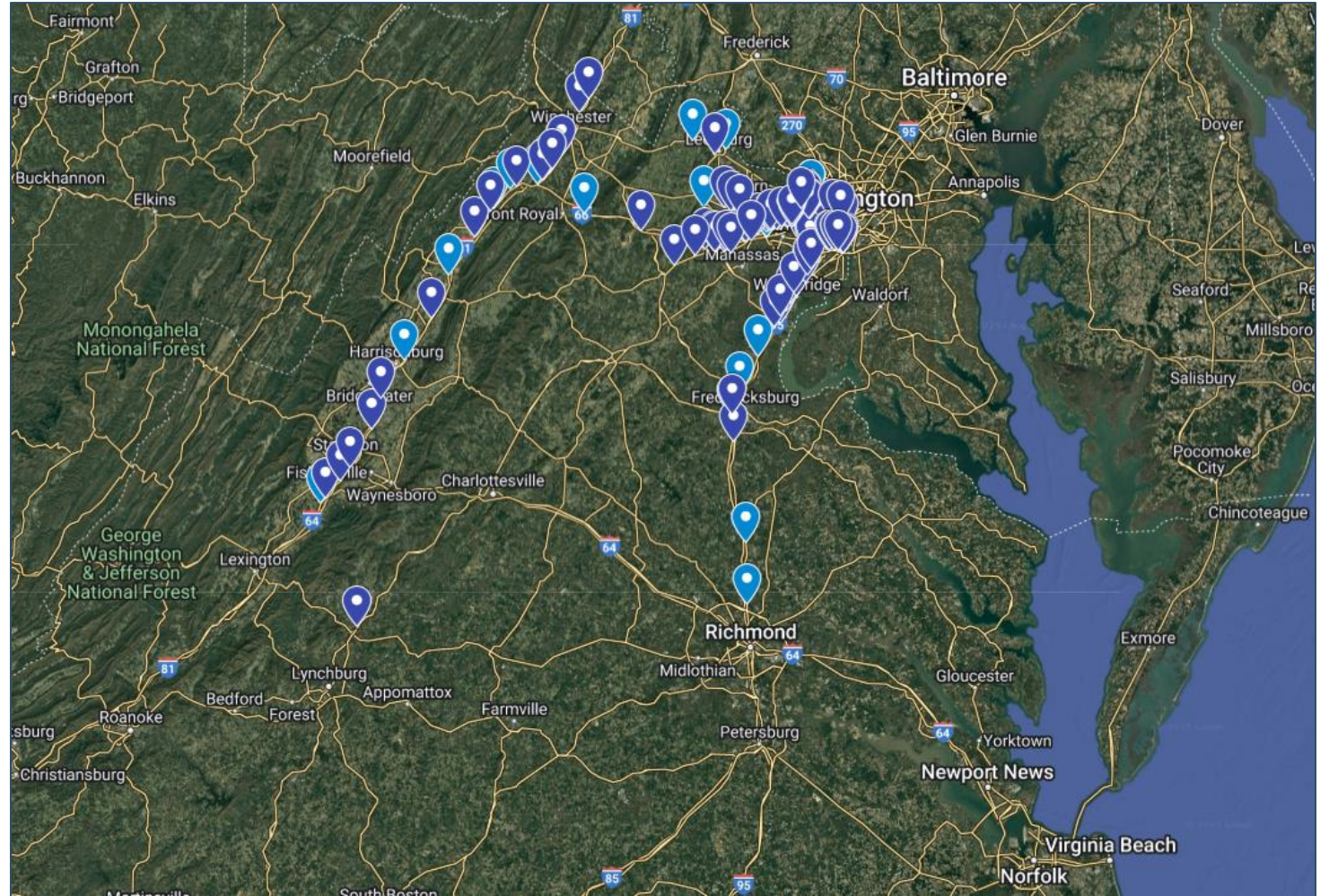
Public Outreach

- Intense public outreach campaign to achieve intended trip diversion and reduction
- Leveraged VDOT changeable message sign assets
- Used VDOT communication tools, other government tools, and paid media



Public Outreach

- DMS deployment throughout much of Virginia
- 7 VDOT Districts



Operation Underway – January 2025



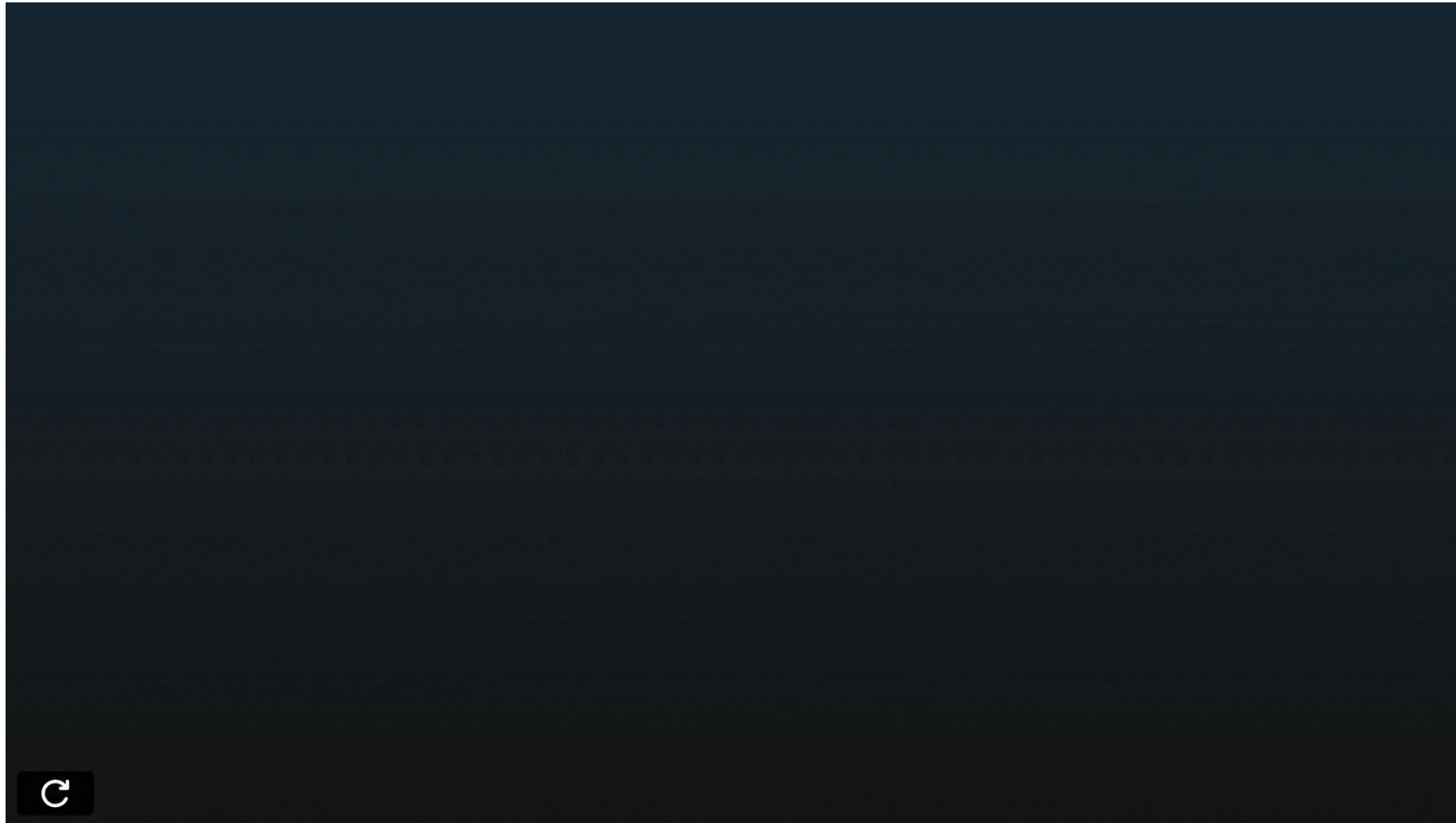
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Contracting Company, LLC

Operation Underway – January 2025



Photo Credit – Shirley
Contracting Company, LLC

Operation Underway – January 2025



*Video Credit – Shirley
Contracting Company, LLC
I-495 Big Beam Time-
Lapse on Vimeo*

Results

Metric	Projected	Actual
Queue Length: I-495 NB from the Lane Shift	4.5 miles	3.5 miles
Queue Length: Express Lanes from terminus at Route 7	3,500 feet	2,000 feet
Queue Length from Scotts Crossing along signed detour	2.1 Miles	1.3 Miles
Maximum Delay Northbound	35-40 Minutes	40 minutes at 9:00AM Jan. 25 th 27 minutes mid-day Jan. 25 th

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Questions & Answers
