ALTERNATIVE INTERSECTION ANALYSIS AND DESIGN REPORT

for the

ROUTE 7 CORRIDOR IMPROVEMENT PROJECT

Fairfax County, Virginia

Prepared for:

VDOT Virginia Department of Transportation

Prepared by:

JOHNSON, MIRMIRAN & THOMPSON
Engineering A Brighter Future®

13921 Park Center Road, Suite 140

Herndon, VA 20171

November 2016

Table of Contents

List of Figures

List of Tables

List of Appendices

Executive Summary

Route 7 is proposed to be widened from 4 to 6 lanes between just west of Reston Parkway and the Dulles Toll Road Westbound Off-Ramp/Jarrett Valley Drive intersection in Fairfax County. The widening will impact nine signalized and fifteen unsignalized intersections within the project area. The objective of this study is to analyze and assess the operations of the intersection configuration alternatives and to recommend the preferred alternative for each intersection in the project corridor. The conceptual layout of individual intersection configurations that provide the most benefits to traffic operations for the corridor were selected and outlined. The construction impacts, design applicability and feasibility, and stakeholder inputs were considered in the selection of the final alternatives.

VISSIM, a microsimulation traffic software package, was used to model the existing traffic conditions of the study area to reflect current traffic operations using VDOT provided 2011 traffic volumes and existing signal cycle lengths, splits and offsets. Two models were created; one for the AM peak hour and another for the PM peak hour. After verifying the reliability of the model outputs and the output of the model to the field collected data, future 2040 AM and PM Conventional and Build models were developed. The Conventional model includes only conventional intersection designs for both signalized and unsignalized intersections. Each signalized intersection was then evaluated for several alternative intersection configurations under the guidance of the *FHWA Alternative Intersection Selection Tool*. Five out of the nine signalized intersections were found to be eligible for alternative intersection design options. These intersections included Reston Parkway, Utterback Store Road, Baron Cameron Avenue/Springvale Road, Carpers Farm Way/Colvin Run Road, and Lewinsville Road. Initial analysis was conducted to develop a preferred alternative design for each of the five intersections. The corridor design and the associated models were modified as the design process progressed to incorporate access management concerns, context sensitivity, constructability, and stakeholder input.

The recommended corridor design developed from the analyses completed for this study includes conventional intersection designs at Reston Parkway, Utterback Store Road, both Colvin Run Road intersections, Beulah Road, Towlston Road, and Jarrett Valley Drive. Alternative intersection designs are proposed for the Baron Cameron Avenue/Springvale Road and Lewinsville Road intersections. The Eastbound Flyover at Baron Cameron Avenue/Springvale Road was chosen as part of the Build design due to its overall traffic operational improvements and its ability to incorporate future improvements to the intersection/interchange. Additionally, the Eastbound Flyover conforms to the County's

comprehensive plan for the intersection. The Displaced Left alternative design was chosen for the Lewinsville Road intersection due to its significant improvements in the throughput, queue lengths, delay and level of service compared to the conventional intersection configuration.

Median modifications at several unsignalized intersections are also recommended. The modifications include completely closing the existing median cross-over, implementing left in/right in/right out configurations, or right in/right out configurations.

The following table summarizes the recommended intersection configurations for the intersections in the study corridor.

Signalized Intersection	Recommended Design
• Reston Parkway • Utterback Store Road • Delta Glen Court/Colvin Run Road (West) • Carpers Farm Way/Colvin Run Road (East) • Beulah Road/Forestville Drive • Towlston Road • Dulles Toll Road Westbound Off-Ramp/ Jarrett Valley Drive	Conventional Configuration
• Baron Cameron Avenue/Springvale Road	Eastbound Flyover
• Lewinsville Road	Displaced Left

Unsignalized Intersection	Recommended Design
• Trotting Horse Lane • Lyons Street • Stokley Way • Trap Road	Right-in/right-out

Unsignalized Intersection	Recommended Design
• Bishopsgate Way • Faulkner Drive • Middleton Ridge Road • Atwood Road	Right-in/left-in and right-out
• Amanda Drive/Markell Court	• Right-in/right-out for Markell Court • Right-in/left-in and right-out for Amanda Drive
• Lucky Estates Drive/Wolftrap Run Road	• Access for Wolftrap Run Road will be relocated to Lucky Estates Drive access and a service road will be added to connect to the western access to the McLean Bible Church to allow movements through a signalized intersection. • Right-in/left-in and right-out access modification
• Great Passage Boulevard • Riva Ridge Drive • Colvin Forest Drive • Newcombs Farm Road • Laurel Hill Road	To remain unchanged as a right-in/right-out

The overall corridor was analyzed to compare the travel time, delay and level of service between the Conventional model and the Build model for all signalized and unsignalized intersections. The recommended intersection designs presented above successfully maximized the corridor throughput, decreased the overall corridor travel times and mitigated expected queue lengths.

1. Introduction

Route 7 (Leesburg Pike) is proposed to be widened from 4 to 6 lanes between just west of Reston Parkway and the Dulles Toll Road Westbound Off-Ramp/Jarrett Valley Drive in Fairfax County. This project has been previously justified through VDOT and Fairfax County processes and is included in the Fairfax County Comprehensive Transportation Plan. This study was commissioned as part of the corridor improvement project to evaluate various intersection configuration alternatives to develop the conceptual design of the corridor with additional guidance from additional studies as well as community and stakeholder input. JMT completed the evaluation of the corridor which included the intersections along Route 7 between Reston Parkway and Dulles Toll Road Westbound Off-Ramp/Jarrett Valley Drive.

Alternative intersection designs were considered for each signalized intersection with guidance from the FHWA *Alternative Intersection Selection Tool*. After considering community input, access management criteria, constructability, and the currently adopted Fairfax County Comprehensive Transportation Plan, several alternative designs were modeled in VISSIM for a preliminary analysis. A final conceptual design for each intersection was then selected and modeled for both AM and PM peak hours using VISSIM 5.40 and Synchro 8. The main objective of this study is to document the analyses used to generate the recommendations for the configurations of individual intersections within the project area.

2. Data Collection

Traffic data was collected by the VDOT along Route 7 at all major intersections from Reston Parkway to Dulles Toll Road Westbound Off-Ramp/Jarrett Valley Drive in September and October of 2011. The turning movement counts were collected from 7:00 AM to 7:00 PM at the following intersections:

1. Reston Parkway
2. Utterback Store Road
3. Bishopsgate Way
4. Great Passage Boulevard
5. Amanda Drive/Markell Court
6. Riva Ridge Drive
7. Baron Cameron Avenue/Springvale Road
8. Delta Glen Court/Colvin Run Road (West)

9. Colvin Forest Drive
10. Carpers Farm Way/Colvin Run Road (East)
11. Faulkner Drive
12. Middleton Ridge Road
13. Newcombs Farm Road
14. Trotting Horse Lane
15. Beulah Road/Forestville Drive
16. Atwood Road
17. Stokley Way
18. Towlston Road
19. Trap Road
20. Wolftrap Run Road
21. Lewinsville Road
22. Laurel Hill Road
23. Dulles Toll Road Westbound Off-Ramp/Jarrett Valley Drive

The existing (2011) peak hour turning movement volumes and average daily traffic volumes (ADT) are shown in Figures 1 through 5. The existing turning movement count data and ADT data can be found in Appendix A of this report.

The project has been progressing since 2001. Phase 1, which included the segment between just west of Rolling Holly Drive to just east of Reston Avenue, recently completed construction. Phase 2, which connects to the east end of Phase 1 just east of Reston Avenue to Jarrett Valley Drive, began with the volume data collection in 2011.

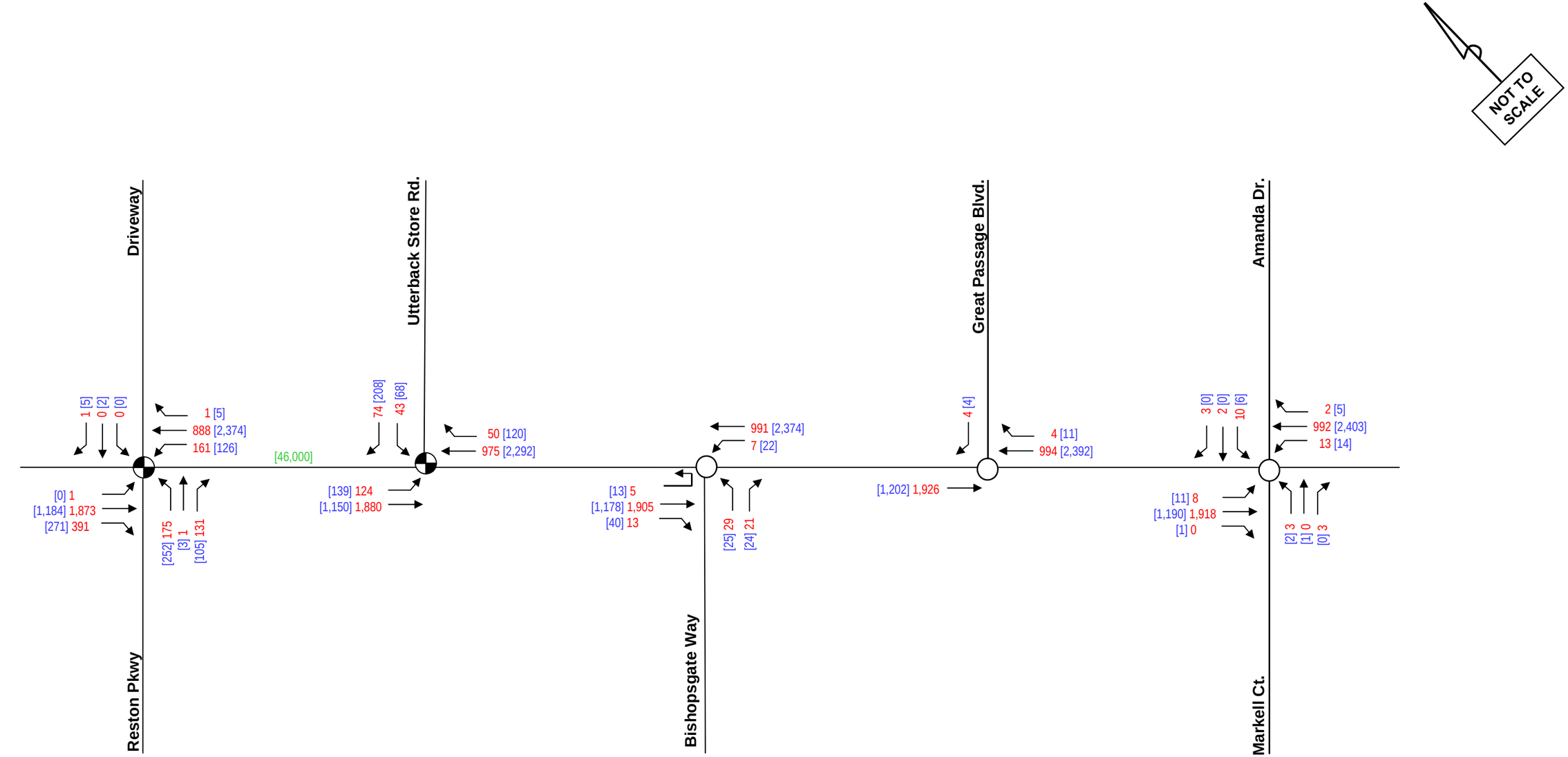
Due to funding constraints and other issues, five years have passed since this data was collected at the date of publishing this final report. VDOT requested JMT to verify that the traffic volumes and patterns along Route 7 were comparable to 2011 in 2016. JMT obtained recent (2015 and 2016) count data at select intersections from VDOT for the comparison. Appendix M of this report contains the published memorandum that confirms that the use of 2011 data for this report is justified.

3. Future Traffic Volumes

The design year for the roadway widening project has been established to be 2040 by VDOT. Appendix B shows the 2040 traffic volumes figures that were extracted from the *Route 7, Leesburg Pike Widening*

from Reston Avenue to Dulles Toll Road technical memorandum which was completed in December 2011 by VDOT's Northern Virginia District Office planning group. The volume figures include 2040 traffic volumes for eight intersections along Route 7; including Reston Parkway, Baron Cameron Avenue/Springvale Road, Delta Glen Court/Colvin Run Road (West), Carpers Farm Way/Colvin Run Road (East), Beulah Road/Forestville Drive, Towlston Road, Lewinsville Road, and Dulles Toll Road Westbound Off-Ramp/Jarrett Valley Drive. It should be noted that in 2015 the 2040 traffic volumes for Lewinsville Road were updated by VDOT and accordingly the final analysis in the Report was updated. JMT used the same methodology VDOT used for the aforementioned intersections in order to calculate 2040 traffic volumes for the remaining intersections; Utterback Store Road, Bishopsgate Way, Great Passage Boulevard, Amanda Drive/Markell Court, Riva Ridge Drive, Colvin Forest Drive, Faulkner Drive, Middleton Ridge Road, Newcombs Farm Road, Trotting Horse Lane, Atwood Road, Lyons Street, Stokley Way, Trap Road, Wolftrap Run Road, and Laurel Hill Road. Both the methodology and the final developed 2040 volumes were discussed with and agreed upon by VDOT prior to beginning the evaluation process. The 2040 design year traffic volumes are shown in Figures 6 through 10.

The project schedule has been modified since the original data collection and projection activities due to funding constraints and public involvement activities. The schedule modification is such that the advertisement date is now in the 2020 timeframe which would technically make the design year 2042. To account for the schedule change, VDOT requested JMT to evaluate if the design year should be changed to 2042. However, the traffic volume projections were based on the Metropolitan Washington Council of Governments (MWCOG) regional transportation model from 2011 which was based on the 2040-time horizon. The most current COG regional model is still based on the same 2040-time horizon. The volume differences from 2040 to 2042 show relatively low increases which will not have a significant impact on any analysis results and would not change the design. The time and cost involved in developing new design year volumes at this point in the project would have no benefit to the overall project and would not change the design. This effort also would further delay the delivery of the project as well as further increase the project development costs for a project that has historically suffered from the lack of adequate funding. Therefore, the use of 2040 projected traffic data is recommended by JMT for the project as it stands today. A memorandum, included in Appendix N of this report, was developed to provide justification for maintaining the use of the year 2040 as the design year for the project.



Legend

- → - Turning Movement
- ◐ - Signalized Intersection
- ○ - Unsignalized Intersection
- XX [XX] - AM [PM] Peak Hour Turning Movement Volumes
- [XXXX] - Average Daily Traffic

* Count Date Fall 2011

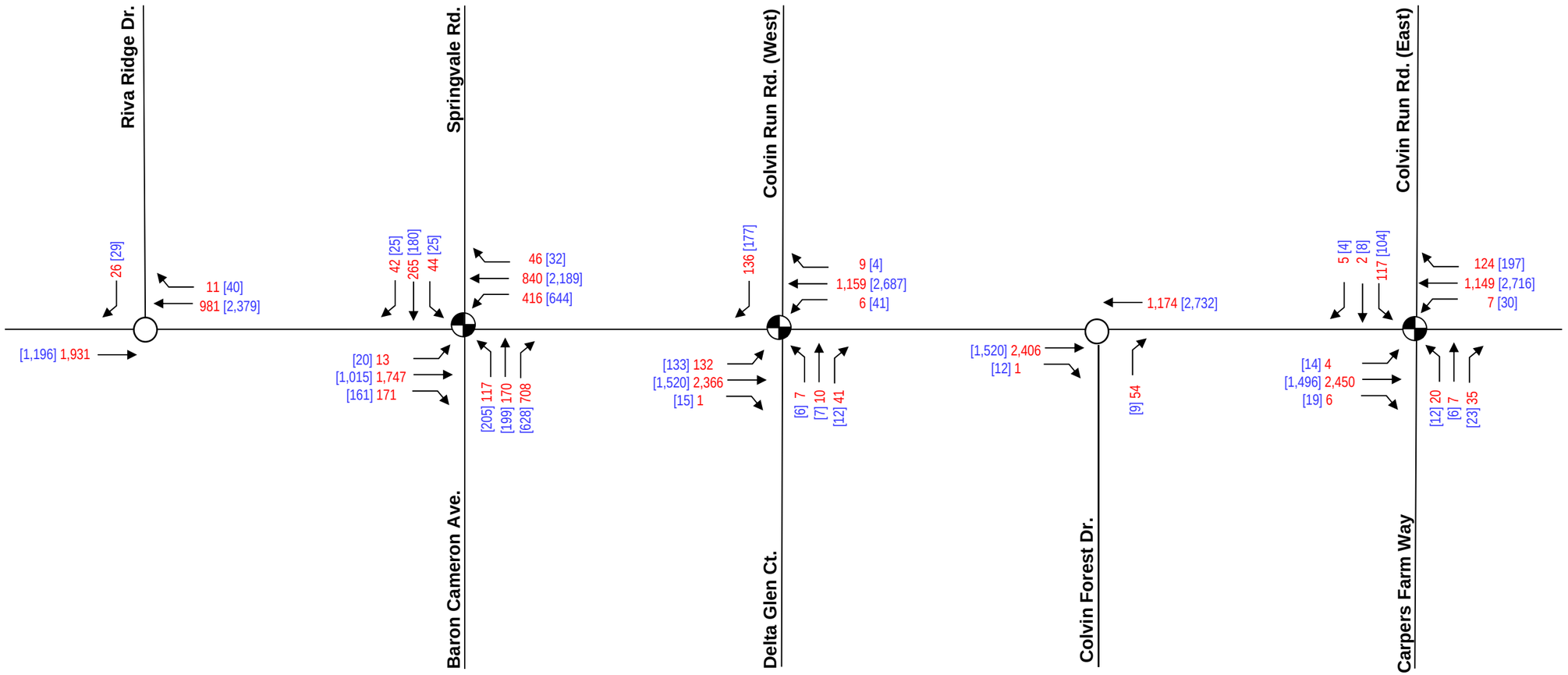
JMT Johnson, Mirmiran & Thompson — Engineering A Brighter Future®

Route 7 (Leesburg Pike) – UPC#52328
Fairfax, Virginia

Existing (2011) Peak Hour Traffic Volumes

FIGURE 1

NOT TO SCALE



Legend

- → - Turning Movement
- ◓ - Signalized Intersection
- ○ - Unsignalized Intersection
- XX [XX] - AM [PM] Peak Hour Turning Movement Volumes
- [XXXX] - Average Daily Traffic

* Count Date Fall 2011

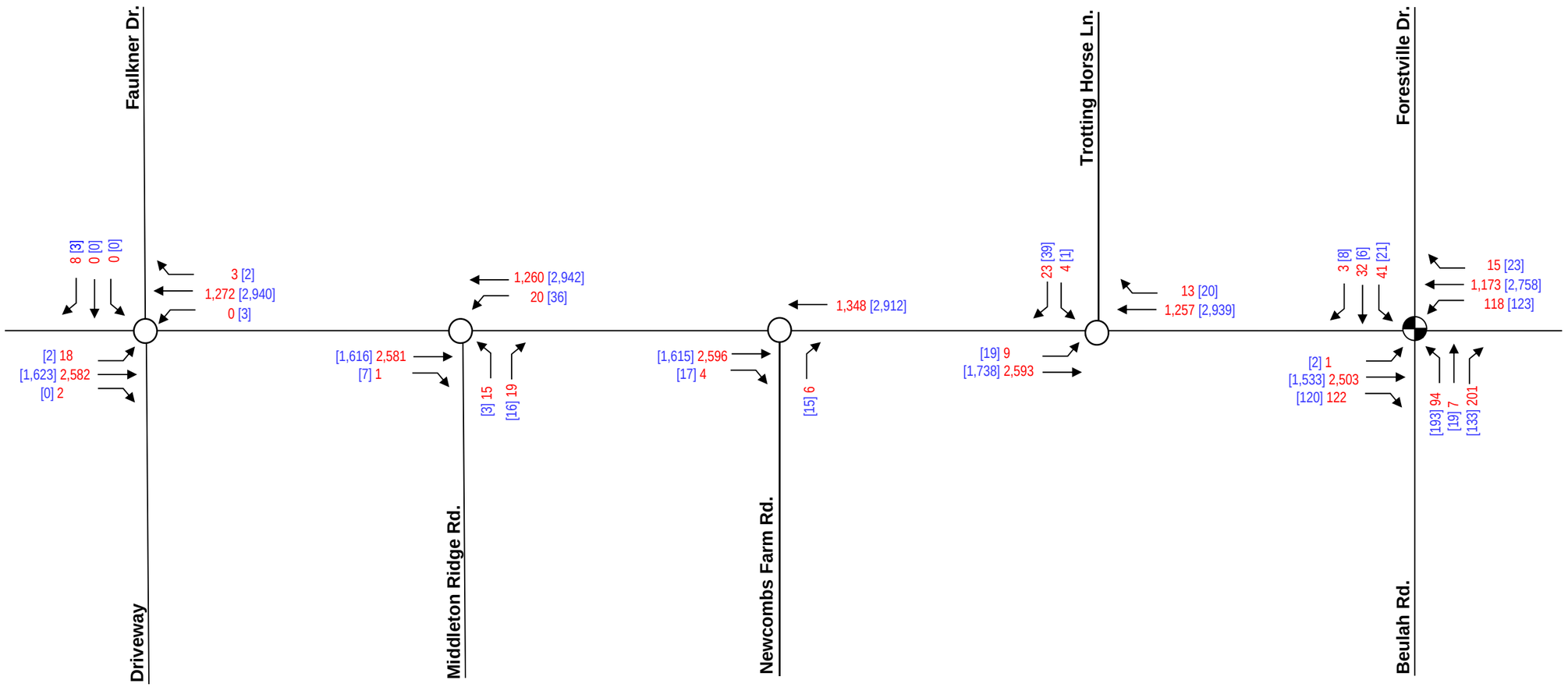
JMT Johnson, Mirmiran & Thompson — Engineering A Brighter Future®

Route 7 (Leesburg Pike) – UPC#52328
Fairfax, Virginia

Existing (2011) Peak Hour Traffic Volumes

FIGURE **2**

NOT TO SCALE



Legend

- → - Turning Movement
- ⊕ - Signalized Intersection
- ○ - Unsignalized Intersection
- XX [XX] - AM [PM] Peak Hour Turning Movement Volumes
- [XXXX] - Average Daily Traffic

* Count Date Fall 2011

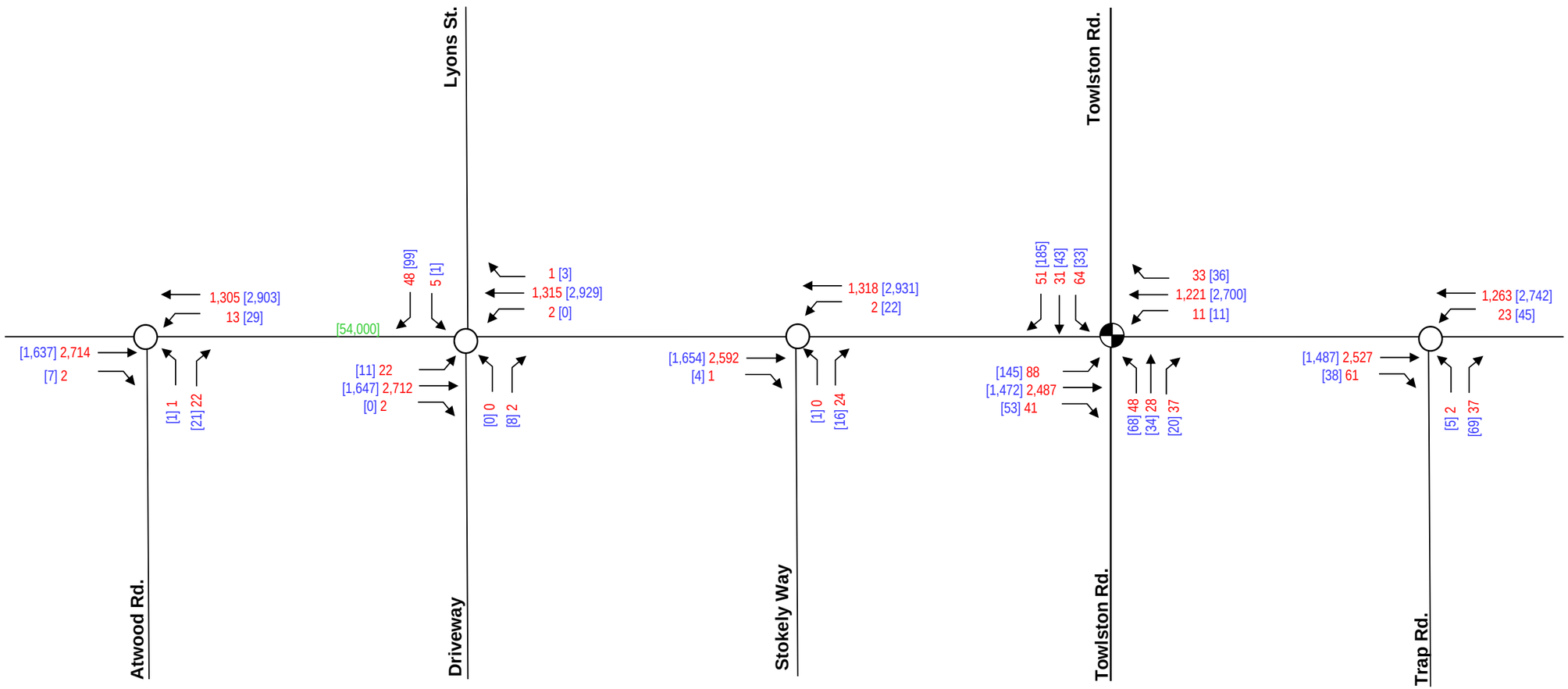
JMT Johnson, Mirmiran & Thompson
Engineering A Brighter Future®

Route 7 (Leesburg Pike) – UPC#52328
Fairfax, Virginia

Existing (2011) Peak Hour Traffic Volumes

FIGURE
3

NOT TO SCALE



Legend

- → - Turning Movement
- ⊕ - Signalized Intersection
- ○ - Unsignalized Intersection
- XX [XX] - AM [PM] Peak Hour Turning Movement Volumes
- [XXXX] - Average Daily Traffic

* Count Date Fall 2011

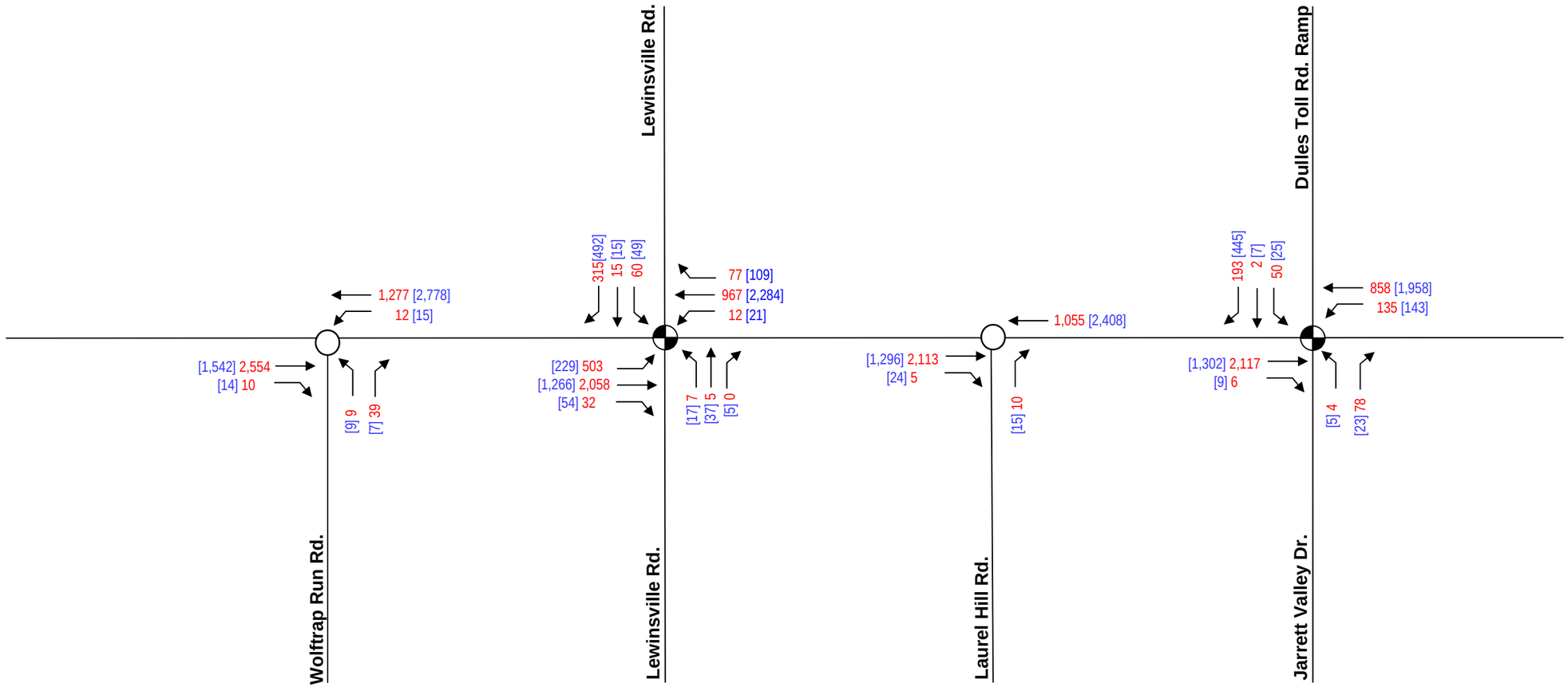
JMT
JOHNSON, MIRMIRAN & THOMPSON
Engineering A Brighter Future®

Route 7 (Leesburg Pike) – UPC#52328
Fairfax, Virginia

Existing (2011) Peak Hour Traffic Volumes

FIGURE
4

NOT TO SCALE



Legend

- → - Turning Movement
- ⊕ - Signalized Intersection
- ○ - Unsignalized Intersection
- XX [XX] - AM [PM] Peak Hour Turning Movement Volumes
- [XXXX] - Average Daily Traffic

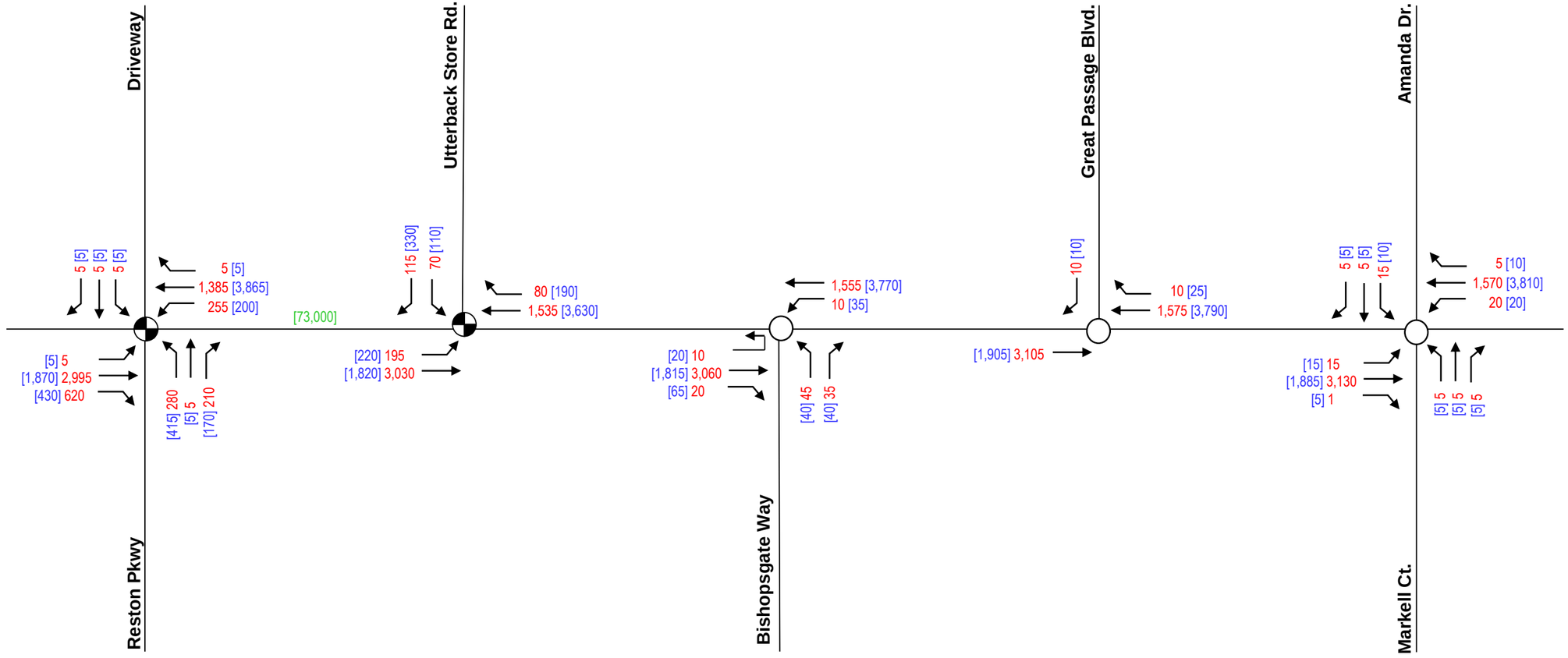
* Count Date Fall 2011

JMT JOHNSON, MIRMIRAN & THOMPSON
Engineering A Brighter Future®

Route 7 (Leesburg Pike) – UPC#52328
Fairfax, Virginia

Existing (2011) Peak Hour Traffic Volumes

FIGURE
5



Legend

- → - Turning Movement
- ◐ - Signalized Intersection
- ○ - Unsignalized Intersection
- XX [XX] - AM [PM] Peak Hour Turning Movement Volumes
- [XXXX] - Average Daily Traffic

* Modified volumes as a result of forecasting or intersection balancing.

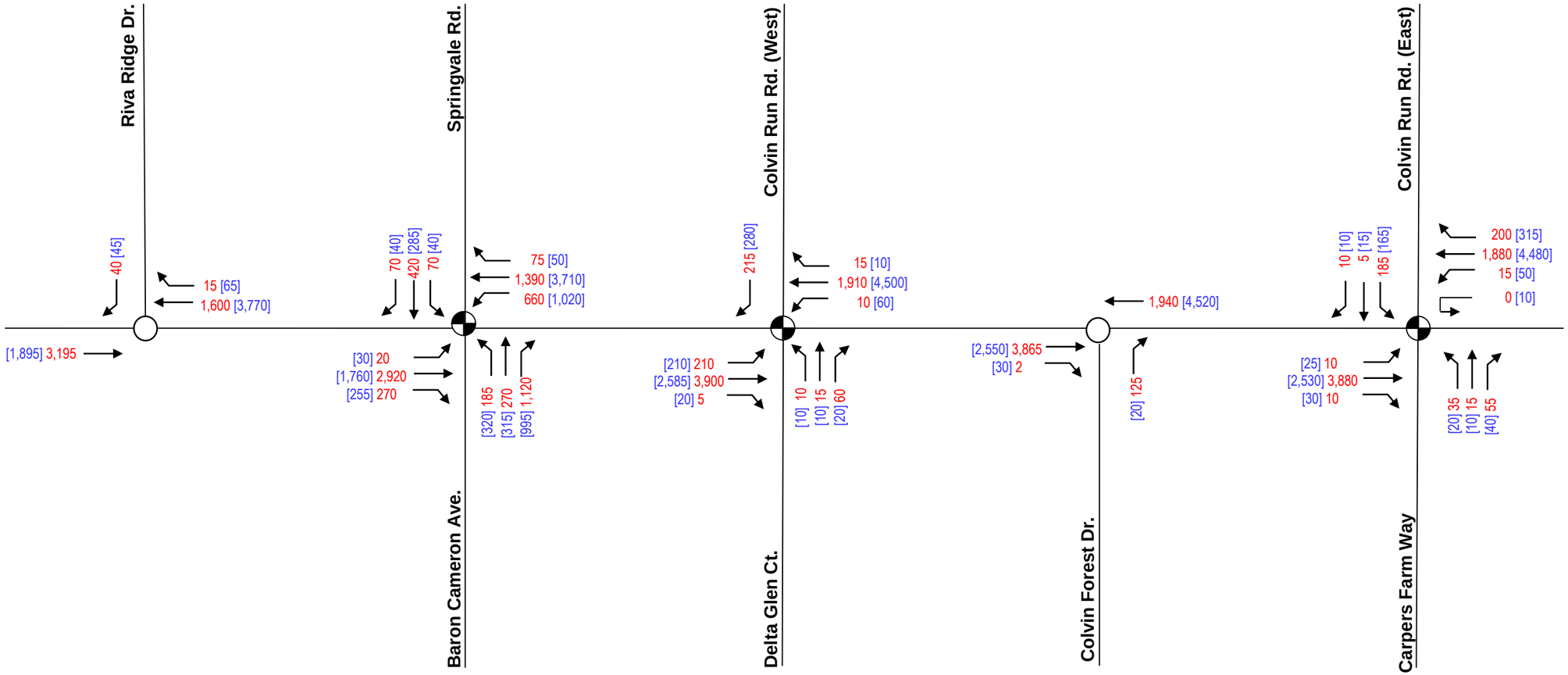
JOHNSON, MIRMIRAN & THOMPSON
Engineering A Brighter Future®

Route 7 (Leesburg Pike) – UPC#52328
Fairfax, Virginia

Future 2040 (Design Year) Peak Hour Traffic Volumes

FIGURE
6

NOT TO SCALE



Legend

- → - Turning Movement
- ◐ - Signalized Intersection
- ○ - Unsignalized Intersection
- XX [XX] - AM [PM] Peak Hour Turning Movement Volumes
- [XXXX] - Average Daily Traffic

* Modified volumes as a result of forecasting or intersection balancing.

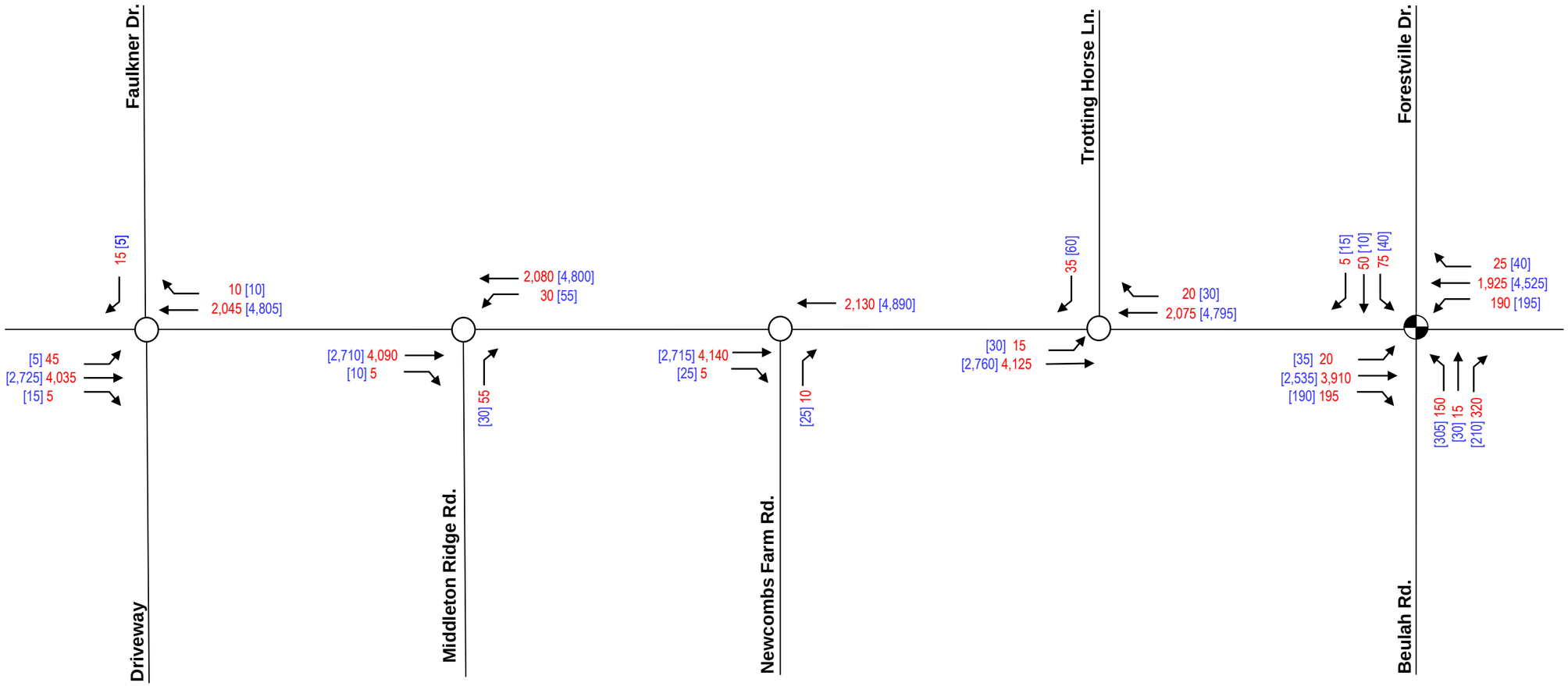
JOHNSON, MIRMIRAN & THOMPSON
Engineering A Brighter Future®

Route 7 (Leesburg Pike) – UPC#52328
Fairfax, Virginia

Future 2040 (Design Year) Peak Hour Traffic Volumes

FIGURE
7

NOT TO SCALE



Legend

- → - Turning Movement
- ◐ - Signalized Intersection
- ○ - Unsignalized Intersection
- XX [XX] - AM [PM] Peak Hour Turning Movement Volumes
- [XXXX] - Average Daily Traffic

* Modified volumes as a result of forecasting or intersection balancing.

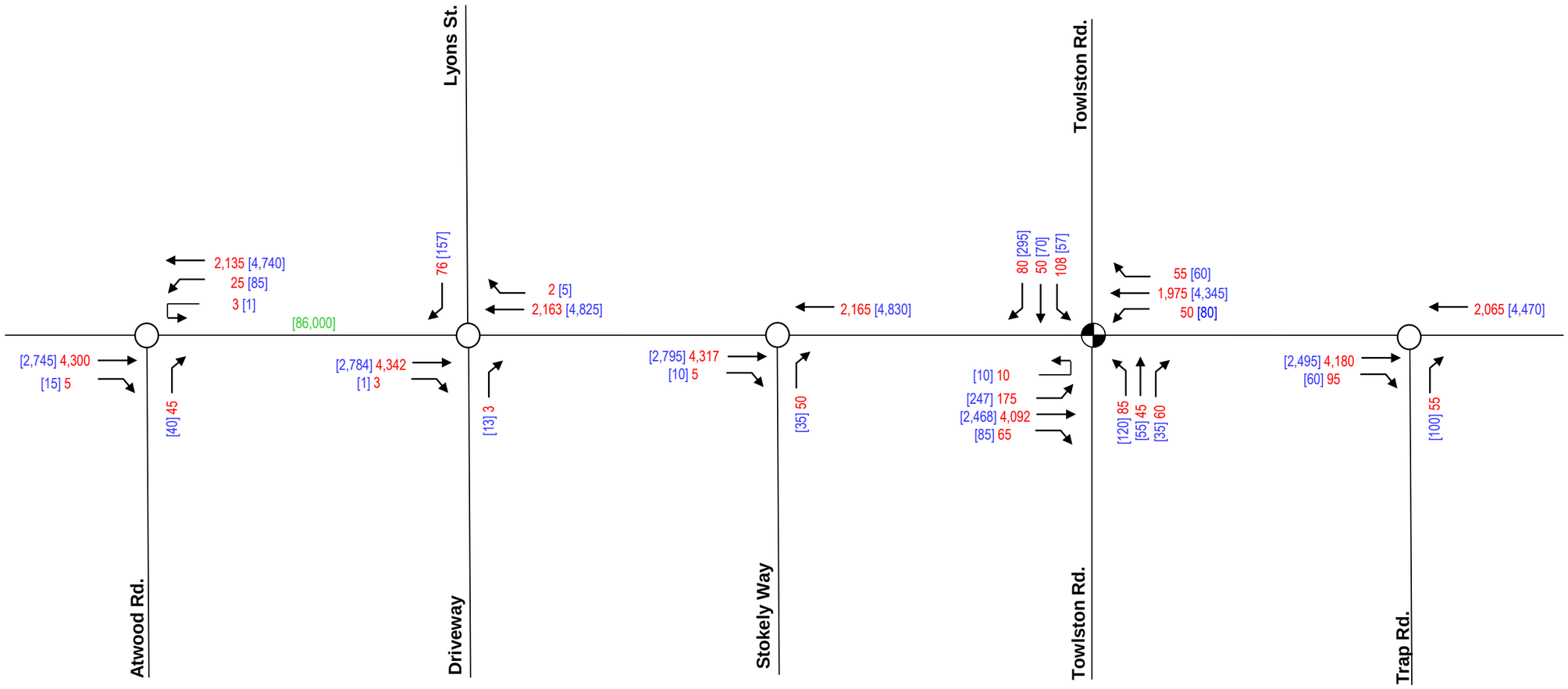
JOHNSON, MIRMIRAN & THOMPSON
Engineering A Brighter Future®

Route 7 (Leesburg Pike) – UPC#52328
Fairfax, Virginia

Future 2040 (Design Year) Peak Hour Traffic Volumes

FIGURE
8

NOT TO SCALE



Legend

- → - Turning Movement
- ◐ - Signalized Intersection
- ○ - Unsignalized Intersection
- XX [XX] - AM [PM] Peak Hour Turning Movement Volumes
- [XXXX] - Average Daily Traffic

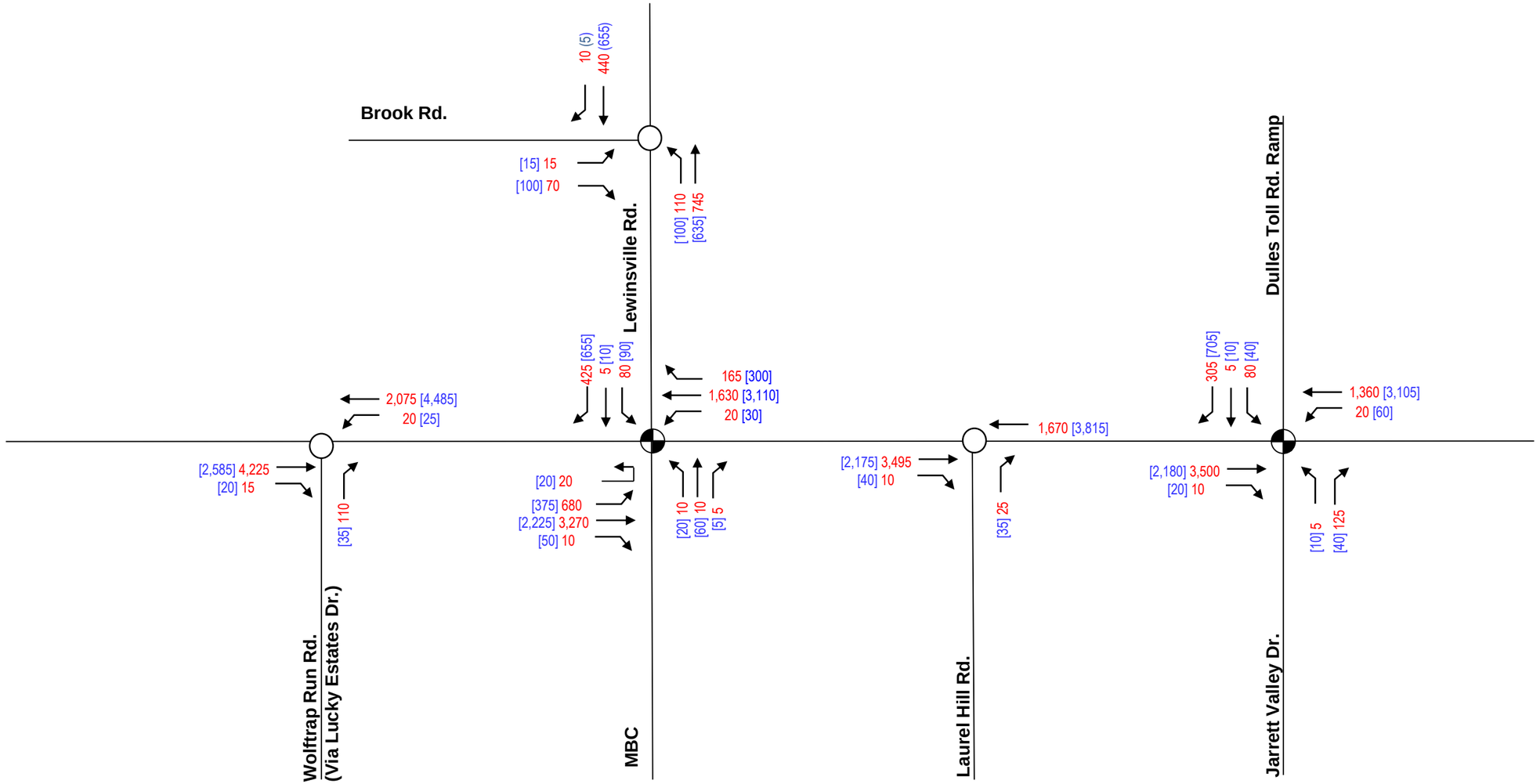
* Modified volumes as a result of forecasting or intersection balancing.

JOHNSON, MIRMIRAN & THOMPSON
Engineering A Brighter Future®

Route 7 (Leesburg Pike) – UPC#52328
Fairfax, Virginia

Future 2040 (Design Year) Peak Hour Traffic Volumes

FIGURE
9



Legend

- → - Turning Movement
- ⊕ - Signalized Intersection
- ○ - Unsignalized Intersection
- XX [XX] - AM [PM] Peak Hour Turning Movement Volumes
- [XXXX] - Average Daily Traffic

* Modified volumes as a result of forecasting or intersection balancing.

JOHNSON, MIRMIRAN & THOMPSON
Engineering A Brighter Future®

Route 7 (Leesburg Pike) – UPC#52328
Fairfax, Virginia

Future 2040 (Design Year) Peak Hour Traffic Volumes

FIGURE
10

4. Existing Corridor Simulation and Analysis

An existing model of the corridor was created using VISSIM 5.40, a traffic flow microsimulation program. This served as a basis to evaluate the alternative intersection configuration options. The model was based on both the vehicle volumes and the Synchro 8 model provided by VDOT. A seeding period of 30 minutes was used to populate the network and the peak hour data was recorded after the seeding. The seeding time was determined based on the maximum travel time of a vehicle to traverse the entire corridor. The AM existing model and the PM existing model were calibrated using existing signal cycle lengths, splits, and offsets to reflect current traffic operations with the signals being coordinated and actuated. The "*Traffic Operations Analysis Tool Guidebook*" *(TOATG)* was the reference guide used for selecting the parameters for calibrating the VISSIM models. Desired speed, signal timings, connector lane change and emergency stop distances were modified for calibration purpose. Modifications to the signal splits and desired speed for model calibration can be found in Appendix L.

The two existing models were simulated ten times with a different random seed values to produce the results using the existing traffic volumes for the AM and PM peak hour. The AM and PM volume throughput and travel times obtained from VISSIM output were compared to the volume input and the travel time collected from the field in order to calibrate and validate the model. Tables 1 and 2 present the eastbound and westbound AM and PM peak hour total travel time from the field data collection and the VISSIM output, respectively. The average field travel time was obtained from six travel time runs collected in November 2012 and February 2013. The VISSIM model average travel time was calculated based on ten simulation runs, based on the *Sample Size Determination Tool* of the *VDOT Traffic Operations Analysis Tool Guidebook*. The standard deviation for both the field data and the ten simulation runs was calculated to quantify the variation of the travel times among the different runs.

It is to be noted that queuing was considered for calibration; however, rolling queues were observed through multiple intersections during the travel time runs. Queuing calibration was a less reliable metric for calibrating the model due to these rolling, multi-intersection queues. As such, travel times were the main metric used in the model calibration.

Table 1: Eastbound and Westbound AM and PM Peak Hour Field Travel Time (Times Shown in Minutes)

Field Travel Time	EB AM	WB AM	EB PM	WB PM
Run 1	17.62	8.53	9.47	12.33
Run 2	20.87	9.50	10.17	19.75
Run 3	21.80	8.72	9.67	29.32
Run 4	24.67	8.98	10.63	13.03
Run 5	24.83	8.17	9.08	16.42
Run 6	20.88	9.53	10.72	19.12
Mean	**21.78**	**8.91**	**9.96**	**18.33**
Max	**24.83**	**9.53**	**10.72**	**29.32**
Min	**17.62**	**8.17**	**9.08**	**12.33**
Standard Deviation	**2.71**	**0.54**	**0.66**	**6.18**

Table 2: Eastbound and Westbound AM and PM Peak Hour VISSIM Travel Time (Times Shown in Minutes)

VISSIM Travel Time	EB AM	WB AM	EB PM	WB PM
Run 1	19.30	8.99	9.30	16.30
Run 2	19.72	9.09	9.36	16.46
Run 3	20.52	9.14	9.56	17.12
Run 4	20.41	9.05	9.45	16.97
Run 5	19.91	9.26	9.57	17.36
Run 6	20.09	9.20	10.06	19.04
Run 7	21.89	9.12	9.35	17.56
Run 8	18.42	9.07	9.94	16.00
Run 9	19.69	9.37	9.64	16.35
Run 10	19.75	9.07	9.80	17.36
Mean	**19.97**	**9.14**	**9.60**	**17.05**
Max	**21.89**	**9.37**	**10.06**	**19.04**
Min	**18.42**	**8.99**	**9.30**	**16.00**
Standard Deviation	**0.90**	**0.11**	**0.26**	**0.88**

The eastbound travel time was measured through three sections of the study corridor; Reston Parkway to Baron Cameron Avenue/Springvale Road, Baron Cameron Avenue/Springvale Road to Beulah

Road/Forestville Drive and from Beulah Road/Forestville Drive to Dulles Toll Road Westbound Off-Ramp/Jarrett Valley Drive. The total eastbound travel time from the Reston Parkway intersection to the Dulles Toll Road Westbound Off-Ramp/Jarrett Valley Drive intersection was also measured. The difference in percentage between field collected and simulated travel time data for the eastbound direction of the three sections as well as the total eastbound travel time are shown in Table 3. As shown in this table, the average field and simulated travel times have less than a 10% difference. Table 4 shows the travel times for westbound Route 7 in the study area. Similar to the eastbound travel times, the westbound travel times were measured for the same three major sections of the corridor. The total average travel time was also measured from the Dulles Toll Road Westbound Off-Ramp/Jarrett Valley Drive intersection to the Reston Parkway intersection. The average field and simulated travel times for the westbound corridor have less than 10% difference in the AM and PM models.

Table 3: AM and PM Peak Hour Eastbound Travel Time Comparison

Travel Time section	Eastbound Travel Times					
	Field AM (min)	**VISSIM AM (min)**	**AM Difference (%)**	**Field PM (min)**	**VISSIM PM (min)**	**PM Difference (%)**
Section 1 (Reston Parkway to Baron Cameron Ave/Springvale Rd)	5.28	5.20	1.46%	2.71	2.54	6.28%
Section 2 (Baron Cameron Ave/Springvale Rd to Beulah Rd/Forestville Dr)	10.20	10.02	1.78%	3.91	3.72	4.87%
Section 3 (Beulah Rd/Forestville Dr to Dulles Toll Rd WB Off-Ramp/Jarrett Valley Dr)	6.30	6.28	0.38%	3.34	3.38	-1.29%
Total Eastbound Travel Time (Reston Parkway to Dulles Toll Rd WB Off-Ramp/Jarrett Valley Dr)	21.78	19.97	8.30%	9.96	9.60	3.55%

Table 4: AM and PM Peak Hour Westbound Travel Time Comparison

Travel Time section	Westbound Travel Times					
	Field AM (min)	**VISSIM AM (min)**	**AM Difference (%)**	**Field PM (min)**	**VISSIM PM (min)**	**PM Difference (%)**
Section 1 (Dulles Toll Rd WB Off-Ramp/Jarrett Valley Dr to Beulah Road/Forestville Dr)	3.67	3.72	-1.51%	5.01	4.81	3.99%
Section 2 (Beulah Rd/Forestville Dr to Baron Cameron Ave/Springvale Rd)	3.39	3.49	-2.90%	9.14	9.20	-0.62%
Section 3 Baron (Cameron Ave/Springvale Rd to Reston Parkway)	1.85	1.91	-3.13%	4.17	4.14	0.74%
Total Westbound Travel Time (Dulles Toll Rd WB Off-Ramp/Jarrett Valley Dr to Reston Parkway)	8.91	9.14	-2.58%	18.33	17.05	6.97%

The resulting throughput from the ten runs for the major intersections along the study corridor for the AM and PM models were compared to the volume input as shown in Table 5 and 6, respectively. The VISSIM modeled throughput values are comparable to the volume inputs for most intersection movements for both AM and PM models. However, some movements have higher differences between the input and output volumes. This is attributed to the fact that the travel time measured from the field had different traffic volumes than the input volumes provided by VDOT. In order to match the field travel times and associated delays, some increased delay resulted at some intersection movements. This resulted in less volume output than input at some of these movements. Nevertheless, the overall network output is still comparable as indicated in the tables, where the difference between the VISSIM input and output volumes is only 5% for the AM model and 8% for the PM model. In addition, the standard deviation, minimum and maximum values of the VISSIM output volumes among the ten simulation runs are calculated to quantify the variation of the volume output between the different runs.

Table 5: AM Existing Input and Output Volume Comparison

Intersection	Approach	Movement	AM VISSIM Existing Input Volume (vph)	AM VISSIM Existing Output Volume (vph)	Absolute Difference (vph)	Percentage Difference	Standard Deviation (vph)	Min (vph)	Max (vph)
Reston Parkway	Reston Pkwy (NB)	Left	175	167	9	5%	11	150	181
		Through	1	1	0	0%	1	0	4
		Right	131	132	1	1%	11	109	145
	Driveway (SB)	Left	0	0	-	-	-	-	-
		Through	0	0	-	-	-	-	-
		Right	1	1	0	0%	0	0	1
	Route 7 (WB)	Left	161	167	6	4%	17	151	205
		Through	888	949	61	7%	23	914	990
		Right	1	1	0	0%	1	0	3
	Route 7 (EB)	Left	1	1	0	0%	1	0	3
		Through	1,873	1,919	46	2%	33	1864	1966
		Right	391	383	8	2%	16	365	415
Utterback Store Rd	NB	Left	-	-	-	-	-	-	-
		Through	-	-	-	-	-	-	-
		Right	-	-	-	-	-	-	-
	Uttterback Store Rd (SB)	Left	43	67	24	56%	6	57	80
		Through	-	-	-	-	-	-	-
		Right	74	115	41	55%	13	92	135
	Route 7 (WB)	Left	-	-	-	-	-	-	-
		Through	975	1,010	35	4%	35	966	1066
		Right	50	52	2	4%	9	35	63
	Route 7 (EB)	Left	124	122	2	2%	7	107	130
		Through	1,880	1,933	53	3%	34	1879	1991
		Right	-	-	-	-	-	-	-
Baron Cameron Ave/Springvale Rd	Baron Cameron Ave (NB)	Left	117	129	12	10%	13	106	149
		Through	170	173	3	2%	11	156	193
		Right	708	715	7	1%	23	674	759
	Springvale Rd (SB)	Left	44	46	2	5%	8	31	58
		Through	265	298	33	12%	12	282	320
		Right	42	49	7	17%	6	40	60
	Route 7 (WB)	Left	416	407	9	2%	26	366	440
		Through	840	817	23	3%	30	775	870
		Right	45	46	1	2%	9	26	59
	Route 7 (EB)	Left	13	14	1	8%	5	8	23
		Through	1,747	1,698	49	3%	35	1622	1744
		Right	171	165	6	4%	17	135	197
Delta Glen Court/Colvin Run Rd (West)	Delta Glen Ct (NB)	Left	7	7	1	14%	2	4	9
		Through	10	9	1	10%	3	5	14
		Right	41	41	0	0%	5	32	51
	Colvin Run Rd (SB)	Left	-	-	-	-	-	-	-
		Through	-	-	-	-	-	-	-
		Right	136	141	5	4%	8	132	150
	Route 7 (WB)	Left	6	1	5	83%	1	0	3
		Through	1,159	1,157	2	0%	22	1122	1185
		Right	9	10	1	11%	2	6	13
	Route 7 (EB)	Left	132	134	2	2%	12	113	148
		Through	2,366	2,239	127	5%	27	2184	2274
		Right	1	1	0	0%	1	0	3
Carpers Farm Way/Colvin Run Rd (East)	Carpers Farm Way (NB)	Left	20	18	2	10%	4	14	26
		Through	7	6	1	14%	3	2	12
		Right	35	35	0	0%	4	27	40
	Colvin Run Rd (SB)	Left	117	118	1	1%	8	101	130
		Through	2	2	0	0%	1	1	3
		Right	5	4	1	20%	1	2	6
	Route 7 (WB)	Left	7	7	0	0%	2	4	9
		Through	1,149	1,149	0	0%	24	1106	1180
		Right	124	119	5	4%	7	108	129
	Route 7 (EB)	Left	4	4	0	0%	1	2	6
		Through	2,450	2,111	339	14%	35	2040	2150
		Right	6	4	2	33%	2	2	6

Table 5: AM Existing Input and Output Volume Comparison

Intersection	Approach	Movement	AM VISSIM Existing Input Volume (vph)	AM VISSIM Existing Output Volume (vph)	Absolute Difference (vph)	Percentage Difference	Standard Deviation (vph)	Min (vph)	Max (vph)
Beulah Rd/Forestville Dr	Beulah Rd (NB)	Left	94	93	1	1%	7	84	102
		Through	7	9	2	29%	3	6	18
		Right	201	198	3	1%	9	183	211
	Forestville Dr (SB)	Left	41	38	3	7%	6	25	47
		Through	32	35	3	9%	4	28	42
		Right	3	3	0	0%	1	1	4
	Route 7 (WB)	Left	118	121	3	3%	12	105	146
		Through	1,173	1,170	3	0%	25	1130	1218
		Right	15	13	2	13%	4	7	20
	Route 7 (EB)	Left	1	1	0	0%	1	0	2
		Through	2,474	2,107	367	15%	36	2059	2150
		Right	122	100	22	18%	10	85	115
Towlston Rd	Towlston Rd (NB)	Left	48	49	1	2%	5	37	54
		Through	28	29	1	4%	4	23	34
		Right	37	34	3	8%	5	26	42
	Towlston Rd (SB)	Left	64	65	1	2%	4	59	73
		Through	31	33	2	6%	5	24	39
		Right	51	47	4	8%	8	29	60
	Route 7 (WB)	Left	11	11	0	0%	4	6	17
		Through	1,221	1,228	7	1%	19	1213	1274
		Right	33	32	1	3%	4	24	36
	Route 7 (EB)	Left	88	78	10	11%	12	63	103
		Through	2,487	2,148	339	14%	35	2092	2192
		Right	41	36	5	12%	9	23	56
Lewinsville Rd	Lewinsville Rd (NB)	Left	7	8	1	14%	1	5	10
		Through	5	4	1	20%	1	2	6
		Right	0	0	0	-	0	0	0
	Lewinsville Rd (SB)	Left	60	57	3	5%	6	49	65
		Through	15	16	1	7%	2	12	19
		Right	315	314	1	0%	7	306	332
	Route 7 (WB)	Left	12	11	1	8%	3	7	16
		Through	967	974	7	1%	13	955	994
		Right	77	78	1	1%	11	61	92
	Route 7 (EB)	Left	503	441	62	12%	22	410	477
		Through	2,058	1,781	277	13%	34	1721	1844
		Right	32	33	1	3%	6	24	41
Dulles Toll Rd WB Off-Ramp/Jarrett Valley Dr	Jarrett Valley Dr (NB)	Left	4	5	1	25%	2	1	8
		Through	-	-	-	-	-	-	-
		Right	78	79	1	1%	7	64	90
	Dulles Toll Rd Ramp (SB)	Left	50	48	2	4%	6	39	60
		Through	2	2	0	0%	2	1	6
		Right	193	196	3	2%	9	182	208
	Route 7 (WB)	Left	135	138	3	2%	9	120	151
		Through	858	860	2	0%	17	831	896
		Right	-	-	-	-	-	-	-
	Route 7 (EB)	Left	-	-	-	-	-	-	-
		Through	2,117	1,748	369	17%	24	1717	1792
		Right	6	6	0	0%	2	3	8
	Total Volume		**35,055**	**33,368**	**1,687**	**5%**			

Table 6: PM Existing Input and Output Volume Comparison

Intersection	Approach	Movement	PM VISSIM Existing Input Volume (vph)	PM VISSIM Existing Output Volume (vph)	Absolute Difference (vph)	Percentage Difference	Standard Deviation (vph)	Min (vph)	Max (vph)
Reston Parkway	Reston Pkwy (NB)	Left	252	218	34	13%	11	204	248
		Through	3	3	0	0%	1	1	5
		Right	105	101	4	4%	11	75	117
	Driveway (SB)	Left	0	0	-	-	-	-	-
		Through	2	2	0	0%	-	-	-
		Right	5	4	1	20%	0	2	6
	Route 7 (WB)	Left	126	90	36	29%	17	79	108
		Through	2,374	1,854	520	22%	23	1802	1931
		Right	5	5	0	0%	1	2	10
	Route 7 (EB)	Left	0	0	0	-	1	0	0
		Through	1,184	1,196	12	1%	33	1135	1228
		Right	271	264	7	3%	16	247	294
Utterback Store Rd	NB	Left	-	-	-	-	-	-	-
		Through	-	-	-	-	-	-	-
		Right	-	-	-	-	-	-	-
	Uttterback Store Rd (SB)	Left	68	76	8	12%	6	44	92
		Through	-	-	-	-	-	-	-
		Right	208	167	41	20%	13	83	218
	Route 7 (WB)	Left	-	-	-	-	-	-	-
		Through	2,292	1,834	459	20%	35	1656	1954
		Right	120	90	30	25%	9	69	105
	Route 7 (EB)	Left	139	145	6	4%	7	131	155
		Through	1,150	1,175	25	2%	34	1116	1225
		Right	-	-	-	-	-	-	-
Baron Cameron Ave/Springvale Rd	Baron Cameron Ave (NB)	Left	205	215	10	5%	13	191	234
		Through	199	209	10	5%	11	189	234
		Right	628	628	0	0%	23	588	675
	Springvale Rd (SB)	Left	25	22	3	12%	8	13	31
		Through	180	175	5	3%	12	152	194
		Right	25	26	1	4%	6	16	36
	Route 7 (WB)	Left	644	492	153	24%	26	468	519
		Through	2,189	1,706	483	22%	30	1505	1843
		Right	32	24	8	25%	9	17	37
	Route 7 (EB)	Left	20	21	1	5%	5	17	27
		Through	1,015	994	21	2%	35	968	1043
		Right	161	160	2	1%	17	137	184
Delta Glen Court/Colvin Run Rd (West)	Delta Glen Ct (NB)	Left	6	5	1	17%	2	3	9
		Through	7	8	1	14%	3	4	11
		Right	12	11	1	8%	5	7	16
	Colvin Run Rd (SB)	Left	-	-	-	-	-	-	-
		Through	-	-	-	-	-	-	-
		Right	177	150	27	15%	8	135	165
	Route 7 (WB)	Left	41	14	27	66%	1	9	20
		Through	2,687	2,151	536	20%	22	1918	2366
		Right	4	4	1	25%	2	0	8
	Route 7 (EB)	Left	133	133	0	0%	12	119	151
		Through	1,520	1,523	3	0%	27	1470	1626
		Right	15	14	1	7%	1	9	20
Carpers Farm Way/Colvin Run Rd (East)	Carpers Farm Way (NB)	Left	12	11	1	8%	4	5	15
		Through	6	7	1	17%	3	2	12
		Right	23	23	0	0%	4	17	28
	Colvin Run Rd (SB)	Left	104	104	0	0%	8	89	113
		Through	8	8	0	0%	1	5	11
		Right	4	3	1	25%	1	0	5
	Route 7 (WB)	Left	30	25	5	17%	2	18	36
		Through	2,716	2,343	373	14%	24	2109	2577
		Right	197	176	21	11%	7	154	193
	Route 7 (EB)	Left	14	15	1	7%	1	9	19
		Through	1,496	1,500	4	0%	35	1421	1602
		Right	19	17	2	11%	2	11	24

Table 6: PM Existing Input and Output Volume Comparison

Intersection	Approach	Movement	PM VISSIM Existing Input Volume (vph)	PM VISSIM Existing Output Volume (vph)	Absolute Difference (vph)	Percentage Difference	Standard Deviation (vph)	Min (vph)	Max (vph)
Beulah Rd/Forestville Dr	Beulah Rd (NB)	Left	193	195	2	1%	7	184	207
		Through	19	19	0	0%	3	12	25
		Right	133	133	0	0%	9	117	153
	Forestville Dr (SB)	Left	21	21	0	0%	6	14	27
		Through	6	6	0	0%	4	1	10
		Right	8	8	0	0%	1	5	12
	Route 7 (WB)	Left	123	117	6	5%	12	88	136
		Through	2,758	2,505	253	9%	25	2330	2653
		Right	23	21	2	9%	4	16	26
	Route 7 (EB)	Left	2	2	0	0%	1	0	4
		Through	1,490	1,477	13	1%	36	1394	1581
		Right	120	120	0	0%	10	102	141
Towlston Rd	Towlston Rd (NB)	Left	68	70	2	3%	5	61	82
		Through	34	35	1	3%	4	25	44
		Right	20	19	1	5%	5	15	25
	Towlston Rd (SB)	Left	33	34	1	3%	4	23	41
		Through	43	42	1	2%	5	32	52
		Right	185	178	8	4%	8	148	201
	Route 7 (WB)	Left	11	11	0	0%	4	5	15
		Through	2,700	2,532	168	6%	19	2364	2658
		Right	36	33	3	8%	4	24	43
	Route 7 (EB)	Left	145	150	5	3%	12	137	174
		Through	1,472	1,461	11	1%	35	1373	1545
		Right	53	54	1	2%	9	39	63
Lewinsville Rd	Lewinsville Rd (NB)	Left	17	16	1	6%	5	8	22
		Through	37	33	4	11%	5	24	41
		Right	5	5	0	0	2	3	7
	Lewinsville Rd (SB)	Left	49	42	7	14%	8	30	56
		Through	15	13	2	13%	6	6	25
		Right	492	428	64	13%	11	406	445
	Route 7 (WB)	Left	21	23	2	10%	3	14	31
		Through	2,284	2,275	9	0%	13	2203	2330
		Right	109	111	2	2%	11	98	125
	Route 7 (EB)	Left	229	212	17	7%	22	193	227
		Through	1,266	1,273	7	1%	34	1231	1333
		Right	54	55	1	2%	6	46	72
Dulles Toll Rd WB Off-Ramp/Jarrett Valley Dr	Jarrett Valley Dr (NB)	Left	5	5	0	0%	2	2	7
		Through	-	-	-	-	-	-	-
		Right	23	24	1	4%	7	16	31
	Dulles Toll Rd Ramp (SB)	Left	25	28	3	12%	6	21	37
		Through	7	6	1	14%	2	3	9
		Right	445	443	3	1%	9	410	468
	Route 7 (WB)	Left	143	147	4	3%	9	124	167
		Through	1,958	1,958	0	0%	17	1910	1988
		Right	-	-	-	-	-	-	-
	Route 7 (EB)	Left	-	-	-	-	-	-	-
		Through	1,302	1,287	15	1%	24	1240	1341
		Right	9	9	0	0%	2	4	15
	Total Volume		**41,049**	**37,772**	**3,277**	**8%**			

The delay and LOS for the same nine signalized intersections for the AM and PM models are presented in Table 7. The delay was calculated based on the average of the 10 runs resulting from the *.kna output file generated from the node evaluation in VISSIM. After the average delay is calculated, the HCM 2010 Exhibit 18-4 was used to calculate the LOS for the signalized intersections and Exhibit 19-1 to calculate

the LOS for the unsignalized intersection. The delay and LOS for the AM peak hour are generally better than those for the PM peak hour, except for Carpers Farm Way/Colvin Run Road (East) and Jarrett Valley/Dulles Toll Road Westbound Off-Ramp intersections. The LOS for all intersections ranges between A and D, except for Baron Cameron Avenue/Springvale Road which is LOS E for AM and LOS F for PM peak hour. In addition, Reston Parkway has a LOS F in the PM peak hour.

Table 7: AM and PM Existing Intersections Level of Service and Delay

Intersection	AM Inter. Delay (s/veh)	AM Inter. LOS	PM Inter. Delay (s/veh)	PM Inter. LOS
Reston Parkway	17.0	B	99.0	F
Utterback Store Rd	16.3	B	35.8	D
Baron Cameron Ave/Springvale Rd	78.9	E	82.0	F
Delta Glen Court/Colvin Run Rd (West)	21.3	C	47.0	D
Carpers Farm Way/Colvin Run Road (East)	46.8	D	29.8	C
Beulah Rd/Forestville Dr	31.9	C	22.9	C
Towlston Rd	18.0	B	19.4	B
Lewinsville Rd	28.2	C	32.0	C
Dulles Toll Rd WB Off-Ramp/Jarrett Valley Dr	51.5	D	8.4	A

The proximity of the throughput and travel time values from the simulated output and the field data for the existing AM and PM models confirms the reliability of the VISSIM model output for the future conditions. In general, all of the above results by VISSIM existing models helped to determine which intersections required additional analysis.

5. Alternative Intersection Concepts

The FHWA *Alternative Intersections/Interchanges Report (FHWA-HRT-09-060)*, dated April 2010, was used as a basis for generating the various alternatives to be evaluated in this study. The main goal in this evaluation was to optimize the throughput of the Route 7 corridor traffic in the project area. The alternative intersections outlined in the FHWA document differ from conventional intersections by reducing the impact of left turning movements, reducing or eliminating vehicle conflict points, and reducing the number of required signal phases to enhance vehicle progression along the corridor.

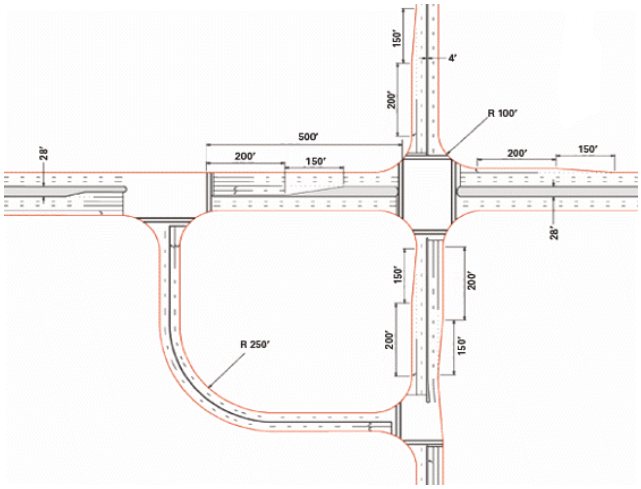
The *FHWA Alternative Intersection Selection Tool* spreadsheet was used as a guide in the selection of conventional and alternative intersection configurations for determining a starting point in the evaluation. The spreadsheet takes turning movement volumes into account and summarizes the potential feasibility of each alternative intersection option based on the volume inputs.

It is important to note that the roundabout alternatives were evaluated at the beginning of the evaluation process. However, they were found not adequate for any intersections along the corridor due to the design speeds and number of lanes required along the corridor. Thus, they were excluded from further analysis for the mainline. Roundabouts will be considered for any side street intersections off the mainline that may warrant such as treatment.

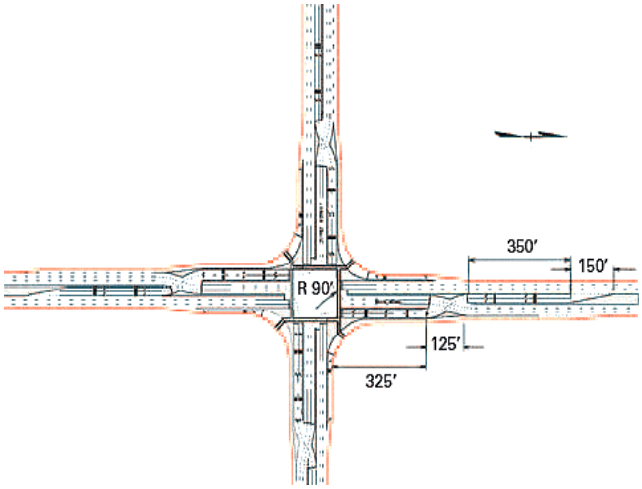
Five alternative intersection configuration options were identified by the spreadsheet to be applicable along the corridor.

1. Quadrant Roadway (QR) Intersection (Figure 11a)
2. Displaced Left Turn (DLT)/Continuous Flow Intersection (CFI) (Figure 11b)
3. Restricted Crossing U-Turn (RCUT) Intersection/Super Street Intersection (Figure 11c)
4. Median U-Turn (MUT) Intersection (Figure 11d)
5. Partial Median U-Turn (MUT) Intersection (Figure 11d)

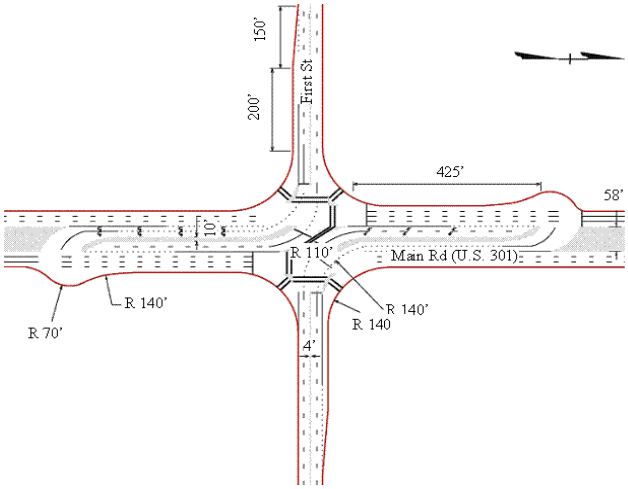
Figure 11: Schematic Diagram of the Alternative Intersection Configurations (*FHWA-HRT-09-060)*



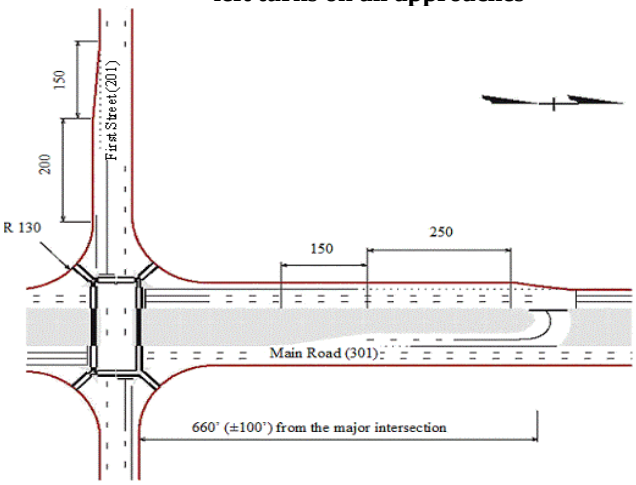
a) QR intersection geometry



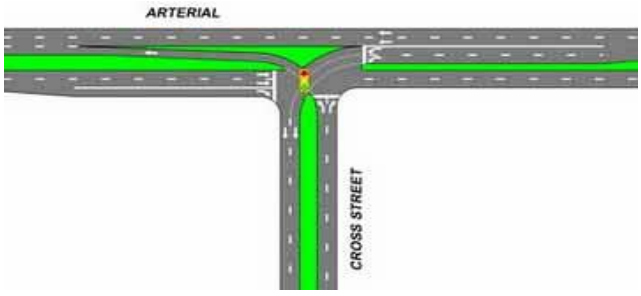
b) Typical full DLT intersection with displaced left turns on all approaches



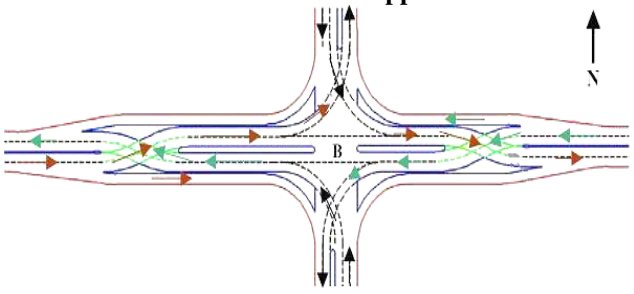
c) Typical RCUT plan view with crossovers on mainline approaches



d) Typical MUT intersection view with crossovers on mainline approaches



e) Typical geometry of a CGT intersection



f) Typical synchronized split-phase intersection movements

It is important to note that this does not cover all of the alternative intersection configurations outlined in the FHWA report. JMT considered the other configurations as well as hybrids of some configurations in the evaluation. The results are shown in the following sections of this report.

The PM peak hour was used for the preliminary alternative intersection evaluation since the PM peak hour exhibits the most significant volumes throughout the day. Also with the corridor area being mostly residential, the majority of turning movements from Route 7 are higher in the PM peak hour. The Reston Parkway and Utterback Store Road intersections were evaluated with both AM and PM peak hour volumes due to the nature of their intersection operations; the AM peak period had the most impact on the Utterback Store Road options. The specific peak hour volumes used for the evaluation at each individual intersection are indicated in the *Initial Analysis* sub-sections under the Intersection Analysis section of this report.

The study area intersections along the corridor that were analyzed were discussed with and agreed upon by VDOT. Table 8 summarizes the results of the major intersections along the corridor based on the FHWA alternative intersections spreadsheet.

Table 8: FHWA Intersection Alternative Spreadsheet Summary

Intersections	Signalized?	Conventional	Quadrant Roadway (QR)				Displaced Left Turn (DLT)			Restricted Crossing U-Turn (RCUT)		Median U-Turn (MUT)		Partial Median U-Turn (MUT)	
			SW	NE	SE	NW	NS	EW	FULL	NS	EW	NS	EW	NS	EW
Reston Parkway	Yes	*	*	-	*	-	*	*	-	-	*	-	-	-	-
Utterback Store Rd	Yes	*	*	*	*	*	*	*	*	-	-	*	-	*	*
Amanda Dr/ Markell Ct	No	*	*	*	*	*	*	*	*	-	*	*	*	*	*
Baron Cameron Ave/ Springvale Rd	Yes	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Delta Glen Ct/ Colvin Run Rd (West)	Yes	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carpers Farm Way/ Colvin Run Rd (East)	Yes	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Faulkner Dr	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Middleton Ridge Rd	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trotting Horse Ln	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beulah Rd/ Forestville Dr	Yes	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Towlston Rd	Yes	-	-	-	-	-	-	-	-	-	-		-	-	-
Trap Rd	No	*	*	*	*	*	*	*	*	-	*	*	-	*	*
Wolftrap Run Rd	No	*	*	*	*	*	*	*	*	-	*	*	*	*	*
Lewinsville Rd	Yes	-	-	-	-	-	*	*	-	-	-	-	-	-	-
Dulles Toll Rd WB Off-Ramp/Jarrett Valley Dr	Yes	*	*	*	*	*	*	*	*	-	*	*	*	*	*

- = Inadequate * = Adequate

As indicated in Table 8, many of the alternative intersection configurations were determined to be inadequate; particularly between Baron Cameron Avenue/Springvale Road and Towlston Road. The main reason for this is the high PM peak hour westbound through volumes in this segment. Also, many of these alternatives were eliminated due to right of way restrictions and the negative impacts the alternatives would have on the overall corridor. Additionally, many of the intersections have relatively low traffic on the minor streets, which do not warrant an alternative intersection configuration. Because of these traffic patterns and restrictions, only five intersections, including Reston Parkway, Utterback Store Road, Baron Cameron Avenue/Springvale Road, Carpers Farm Way/Colvin Run Road, and Lewinsville Road, were evaluated for alternative designs within the corridor. Route 7 is expected to experience saturated capacity conditions for the PM peak hour for the through movement in the design year even with the proposed widening.

The Carpers Farm Way/Colvin Run Road intersection was selected for alternative intersection analysis since it was determined that the alternative intersection configurations may enhance intersection operations overall and that the PM peak throughput may be optimized through the implementation of an alternative configuration.

The quadrant roadway intersection alternative was dismissed in the preliminary analysis due to the large impacts to surrounding properties. The affected quadrants would experience significant disruption and construction costs due to business and home relocations as well as impacts to existing or planned developments. In addition, the local communities would likely not accept such an alternative. This was discussed during a Route 7 Working Group session which focused on the alternative intersection evaluation and it was determined that the quadrant option was not desirable within the project area.

In addition to the alternatives identified in Table 8, other alternative configurations considered included a Continuous Green T (CGT) (Figure 11e), Synchronized Split Phasing (Figure 11f), a hybrid Median U-turn (not identified by FHWA), and an at-grade Diverging Diamond (not identified by FHWA).

FHWA completed a case study for an intersection alternative known as CGT to reduce severe angle crashes. According to the FHWA, this intersection alternative should be considered if the following exists:

- Intersection has three approaches (T Intersection)
- Intersection meets minimum signal warrants per the MUTCD requirements.
- The minor street has low to moderate left-turn volumes
- High arterial through movements

The other intersection designs described above do not currently exist or limited guidance was available from FHWA.

6. Intersection Analysis

Each intersection in the study area was modeled and analyzed in VISSIM for the conventional intersection design. Only the five selected intersections were modeled and analyzed further for the applicable alternative intersection configuration recommended by the FHWA selection tool, except for the intersection alternatives that were initially dismissed. This served to screen out the less optimal configurations and recommended configurations were selected. Each scenario was initially analyzed during the PM peak hour for alternative screening. The cycle lengths, splits, and offsets were optimized to reflect the best traffic operations for the design year 2040 conditions. The initial traffic results were recorded and analyzed to determine the appropriate intersection design for the five selected intersections including, Reston Parkway, Utterback Store Road, Baron Cameron Avenue/Springvale Road, Carpers Farm Way/Colvin Run Road (East), and Lewinsville Road. Once the initial concepts were completed, a context sensitivity analysis was conducted and meetings were held with the Route 7 Working Group, surrounding communities and agency stakeholders. Based on the findings of these efforts, the corridor configuration was modified and modeled for the final traffic analysis.

In the final traffic analysis, two calibrated VISSIM models were used to simulate both the AM and PM peak hour analysis. The first model is the "Conventional model", which proposes only conventional intersection configurations at all intersections for the 2040 future traffic. The second model is the "Build model" that includes the preferred alternative intersection designs. Synchro was primarily used for the proposed signal timing optimization and consequently the optimized signal phases and timings were imported into VISSIM for the final traffic analysis results. Appendices H, I, J and K include the Synchro inputs for the AM Conventional, AM Build, PM Conventional and PM Build models, respectively. It is to be noted that the timings and phasing imported from Synchro to VISSIM was preliminary information and was updated based on the network optimization in VISSIM. As such, the Synchro reports provided in the appendices may not match the inputs for the final models from VISSIM. Cycle lengths of 220 and 240 seconds were used along the Route 7 corridor for AM and PM peak hours, respectively. Both AM and PM peak hour models were simulated using the previous parameters used in the initial VISSIM traffic analysis. Specifically, the VISSIM analysis used 30-minute seeding periods and ten separate simulation runs for one-hour simulation results.

The Measures of Effectiveness (MOEs) used in the VISSIM analysis include travel times, throughput volumes, intersection delay, level of service (LOS), and queuing. It is important to note that that no denied vehicle entries were found in the Conventional and Build models for the AM and PM peak hours. Accordingly, all vehicles were able to enter the network for the assigned simulation time. The MOEs will be discussed in detail at the intersection level as well as the overall corridor level through the following intersection specific sections. Each section presents and discusses the appropriate intersection design and analysis for the Reston Parkway, Utterback Store Road, Baron Cameron Avenue/Springvale Road, Carpers Farm Way/Colvin Run Road (East), and Lewinsville Road intersections. Thereafter, the analyses of the other signalized and unsignalized intersections as well as the overall corridor are discussed.

6.1. Reston Parkway

Reston Parkway is a four-legged intersection with the north leg of the intersection providing access to a commercial landscape/ plant nursery store. This intersection currently experiences relatively long delays for the northbound left-turn movement in the PM peak hour. The plant nursery entrance was initially proposed to be relocated, leaving a T-intersection at Reston Parkway. However, that option proved to not be feasible due to access management, geometric, and cost considerations. Two different alternative intersection configurations were considered for this intersection evaluation:

- Displaced Left Turn (Westbound Route 7 to Southbound Reston Parkway)
- Continuous Green "T" (Without the northern leg driveway)

Initial Analysis

The implementation of dual northbound left-turn lanes for the Green "T" alternative and providing reasonable access to a relocated nursery entrance was difficult to achieve due to a variety of factors. Merging traffic from the dual left-turn merge lanes caused conflicts with the adjacent Reston Avenue intersection to the west. Additionally, constructing the service road for the nursery access would limit access to only the westbound direction. As such, the Green "T" alternative was removed from further consideration.

The Displaced Left Turn alternative was considered at this location as well; however, it was removed from further consideration due to spacing concerns with the Utterback Store Road intersection to the east and only moderate benefits achieved from the alternative.

Therefore, a conventional intersection configuration is proposed for the Reston Parkway intersection. This configuration also minimizes the impacts to the nursery which translates to savings to the project while also providing acceptable operations. The results for applying a conventional intersection design are presented in *Section 7 - Overall Corridor Analysis* in this report.

6.2. Utterback Store Road

Utterback Store Road experiences high mainline through volumes with the largest turning movement being the southbound right turn movement with over 300 vehicles in the PM peak hour. Two different configurations were reviewed for the alternative intersection evaluation:

- Displaced Left Turn (Eastbound Route 7 to Northbound Utterback Store Road)
- Continuous Green "T"

Initial Analysis

The displaced left-turn was dismissed in the preliminary analysis phase since the eastbound left-turn movement is not a significant movement at this intersection and due to spacing concerns with the Reston Parkway intersection to the west. Separating the eastbound left-turn movement from the main intersection did not have a significant positive impact on operations. A Continuous Green "T" intersection design was selected due to the anticipated benefits in the AM peak hour and its minimal impact to the surrounding area. The queuing and the throughput results under the 2040 conditions during the PM peak hour for both the Conventional and Continuous Green "T" intersection configurations are shown in Tables 9 and 10, respectively. The delay and level of service under the 2040 conditions are shown in Tables 11 and 12 for the AM and PM peak hours, respectively. The Continuous Green "T" alternative was shown to be a viable option through the initial analysis.

As shown in Table 9, significant queues are observed for the westbound approach in the Conventional configuration which are primarily due to the queues extending from the Georgetown Pike intersection to the west. These queues also eliminate gaps to allow vehicles to turn right onto westbound Route 7 which results in substantial queuing along Utterback Store Road. The Continuous Green "T" alternative does not mitigate the queue problem at the westbound approach, although the southbound approach improves with this option. With respect to the throughput volumes,

Table 10 shows that the Continuous Green T configuration allows more total vehicles through the intersection.

Table 11 indicates that the intersection operates at an overall LOS C with significant delay for the eastbound left-turn in the AM peak hour with the Conventional Intersection configuration. Under the Continuous Green "T" configuration the eastbound left-turn delay improves from LOS F to LOS D, while the overall LOS improves to a LOS B.

Table 12 indicates that the intersection operates at an overall LOS F with significant delays for the eastbound left-turn, the southbound approach, and the westbound approach in the PM peak hour with the Conventional Intersection configuration. These long delays are related to the westbound queuing that originates from the Georgetown Pike intersection. Similar to the Conventional Intersection configuration, the Continuous Green "T" configuration continues to operate with long delays due to the westbound queuing along Route 7.

Table 9: Utterback Store Road and Route 7 PM Peak Hour – Initial Analysis: Average and Maximum Queues

Intersection	Approach	Movement	2040 Conventional		2040 Continous Green "T"	
			Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)
Utterback Store Rd	Route 7 (EB)	Left	145	380	155	385
		Thru	145	380	0	0
	Utterback Store Rd (SB)	Left	1,145	1,540	230	555
		Right	* 1,145	* 1,535	225	550
	Route 7 (WB)	Right	* 4,300	* 5,060	* 4,020	* 4,870
		Thru	4,300	5,060	4,015	4,865

* Queue extends beyond available turn lane storage

Table 10: Utterback Store Road and Route 7 PM Peak Hour – Initial Analysis: Throughput Volumes

Intersection	Approach	Movement	2040 Conventional Throughput (vph)	2040 Continous Green "T" Throughput (vph)
Utterback Store Rd	Route 7 (EB)	Left	203	202
		Thru	1,713	1,652
	Utterback Store Rd (SB)	Left	81	103
		Right	217	278
	Route 7 (WB)	Right	2,187	2,343
		Thru	110	124
	Total		4,511	4,702

Table 11: Utterback Store Road and Route 7 AM Peak Hour – Initial Analysis: Level of Service and Delay

Intersection	Approach	Movement	2040 Conventional Throughput				2040 Continous Green "T" Throughput			
			Delay (s/veh)	LOS	Inter. Delay (s/veh)	Inter. LOS	Delay (s/veh)	LOS	Inter. Delay (s/veh)	Inter. LOS
Utterback Store Rd	Route 7 (EB)	Left	124.8	F	20.1	C	51.5	D	17.8	B
		Thru	0.8	A			0.0	A		
	Utterback Store Rd (SB)	Left	110.8	F			49.7	D		
		Right	74.3	E			46.2	D		
	Route 7 (WB)	Right	48.0	D			7.3	A		
		Thru	35.2	D			10.4	B		

Table 12: Utterback Store Road and Route 7 PM Peak Hour – Initial Analysis: Level of Service and Delay

Intersection	Approach	Movement	2040 Conventional Throughput				2040 Continous Green "T" Throughput			
			Delay (s/veh)	LOS	Inter. Delay (s/veh)	Inter. LOS	Delay (s/veh)	LOS	Inter. Delay (s/veh)	Inter. LOS
Utterback Store Rd	Route 7 (EB)	Left	128.8	F	114.0	F	127.1	F	115.9	F
		Thru	7.6	A			3.2	A		
	Utterback Store Rd (SB)	Left	199.4	F			157.5	F		
		Right	267.3	F			175.4	F		
	Route 7 (WB)	Right	77.4	E			48.7	D		
		Thru	180.8	F			188.4	F		

Context Sensitivity

As the evaluation progressed, it was determined that the benefits of the alternate design would have only marginal improvements to the intersection operations. Moreover, a school and a park are located near the intersection and the Continuous Green "T" design would disable the anticipated pedestrian crossings at the intersection. Bishopsgate Way is located approximately 1000' east of the existing Utterback Store Road intersection and the alternate design would create a "weave" for vehicles that intend to turn into Bishopsgate Way from Utterback Store Road and vice versa. This was undesirable to the surrounding community and for the safety of the anticipated pedestrians and bicyclists along the corridor. Additionally, the Continuous Green "T" design would have a slightly higher construction cost than a conventional intersection design and, with the marginal operational improvements to the intersection, the expected cost of the alternate design outweighed the anticipated benefits that it would generate. Due to various concerns and marginal operational improvements, it was determined that Utterback Store Road will remain a conventional intersection for the preliminary design.

6.3. Baron Cameron Avenue/Springvale Road

The Baron Cameron Avenue/Springvale Road intersection experiences high westbound left-turn volumes from Route 7, high northbound right turn volumes from Baron Cameron Avenue, as well as high through volumes along Route 7; particularly in the westbound direction during the PM peak hour. As such, the conventional intersection design experiences over saturated conditions. The currently

adopted County's comprehensive plan indicates that this intersection is slated to be a partial interchange. To assess whether the implementation of the interchange is needed immediately or whether it could be deferred, at-grade alternatives that could theoretically defer the need for an interchange were developed. One alternative closely matched the Synchronized Split Phase intersection outlined in the FHWA document, while another alternative was modeled after the diverging diamond interchange concept in the FHWA document, except there were no grade separated intersections in the alternative.

The alternatives that were analyzed for this intersection include the following:

- Synchronized Split Phase
- At-Grade Diverging Diamond
- Westbound Flyover Ramp (Grade Separated Ramp from Westbound Route 7 to Southbound Baron Cameron Avenue)
- Single Point Urban Interchange (SPUI)
- Eastbound Flyover (Partial Interchange with Grade Separation of Eastbound Route 7 Through Traffic)

Initial Analysis

During the preliminary model runs, it became apparent that the at-grade options, including a conventional layout, were not going to provide favorable results in terms of delay, queuing, and overall operations for the corridor. The Synchronized Split Phase and the At-Grade Diverging Diamond alternatives generally operate efficiently for directional flow traffic conditions during peak hours; however, these options are not feasible at this intersection since the PM peak hour along Route 7 experiences high volumes in both the eastbound and westbound directions. Applying these alternatives to the side street approaches also would not mitigate the main issues of the through and turning movement traffic volumes on Route 7. Therefore, these options were removed from further consideration and grade separated options at Baron Cameron Avenue/Springvale Road were developed.

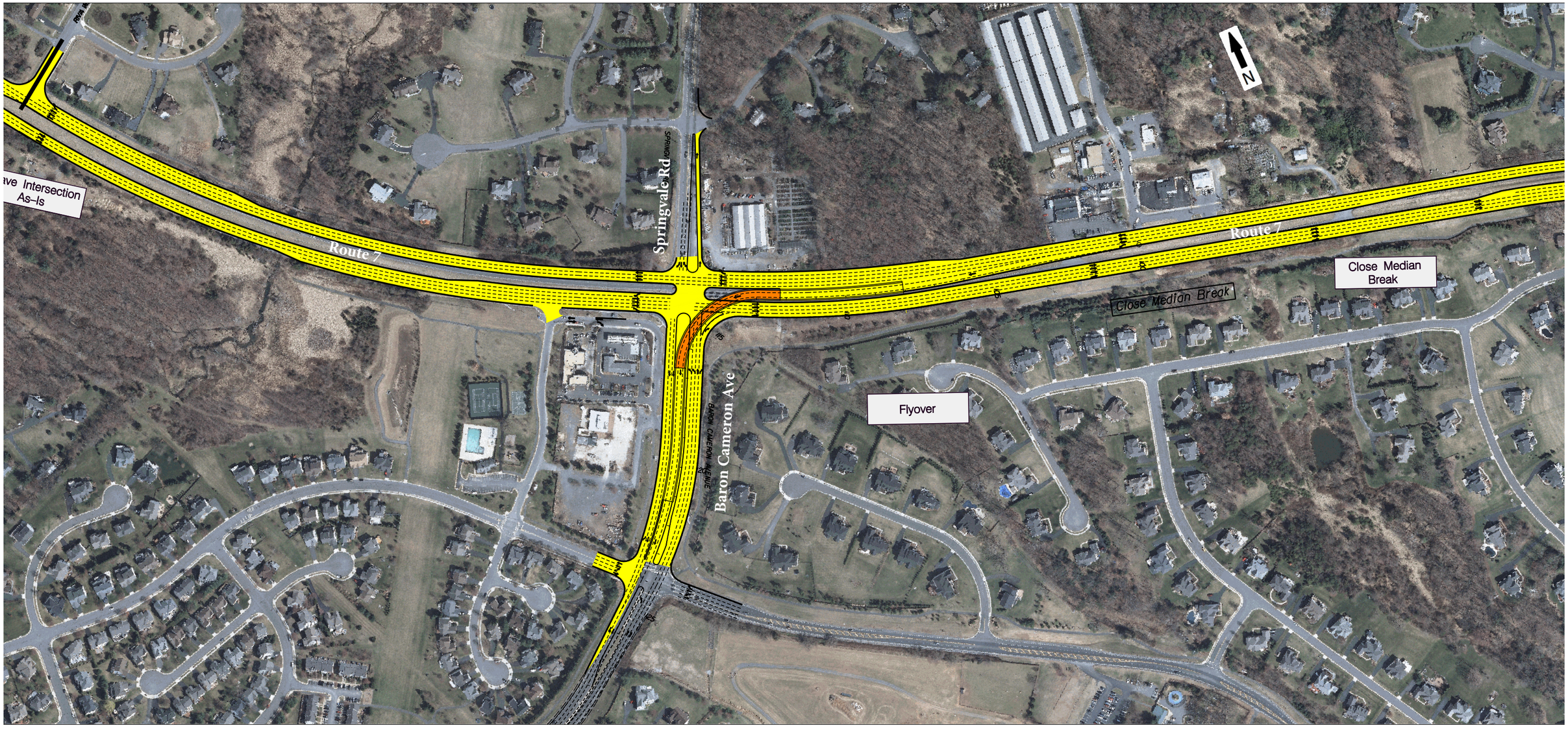
The Westbound Flyover Ramp alternative included a single lane westbound to southbound flyover ramp. The northbound Baron Cameron approach included dual left-turn lanes, an exclusive through lane, and a single free-flow right-turn lane. When compared to the conventional intersection configuration, the flyover ramp configuration has one less northbound right-turn lane which operated efficiently. All other approaches are similar to the conventional intersection configuration. Figure 12 illustrates the flyover ramp configuration used in the analysis.

The Single Point Urban Interchange (SPUI) configuration has the mainline through movements operating in free flow conditions, while the remaining movements are coordinated at the above or below grade intersection. The Single Point Urban Interchange (SPUI) configuration is shown in Figure 13.

The Eastbound Flyover configuration has the eastbound mainline through movements operating in free flow conditions, while the remaining movements are coordinated at the above or below grade intersection. Several iterations of this design were modeled throughout the analysis process. The preferred alternative intersection design option, the Eastbound Flyover configuration is shown in Figure 14.

The Conventional Intersection configuration used in the 2040 model removes the existing northbound and southbound split phase signal operation. An additional lane was added along the northbound approach removing the existing shared through-left-turn lane. Thus, under the Conventional intersection configuration, the northbound approach has dual left-turn lanes, an exclusive through lane, and dual northbound right-turn lanes. The northbound right-turn lanes would not operate as free-flow, but a right-turn on red is allowed from the outer right-turn lane. The southbound approach configuration was modified from a shared through left-turn lane, an exclusive through lane, and an exclusive right-turn lane to an exclusive left-turn lane, an exclusive through lane, and a shared through right-turn lane.

Figure 12: Westbound Flyover Intersection Design



VDOT Virginia Department of Transportation

Figure 13: Single Point Urban Interchange (SPUI) Intersection Design

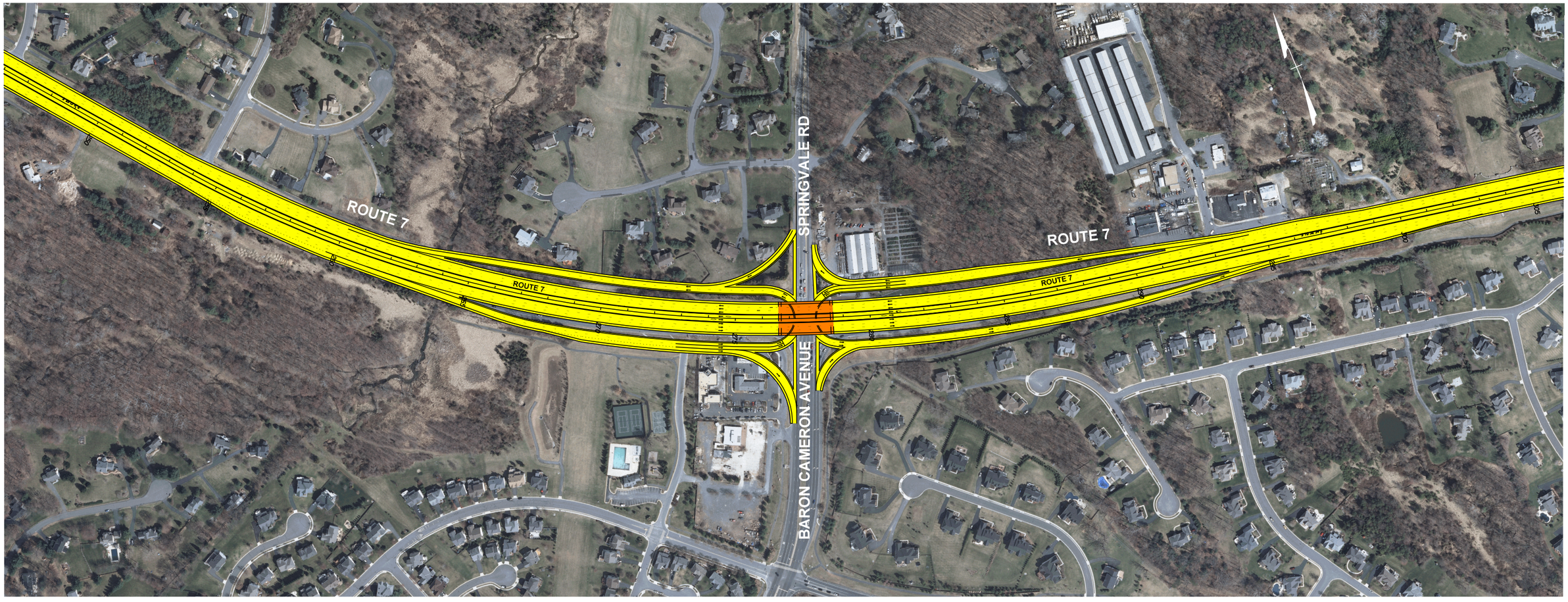


Figure 14: Eastbound Flyover Intersection Design

The results for the Westbound Flyover Ramp, Single Point Urban Interchange (SPUI), and Eastbound Flyover are shown in Tables 13 through 15. The Conventional Intersection results are included for comparison.

Table 13 indicates that the Conventional model has the largest queues occurring on westbound Route 7 in the study area. A notable queue also occurs on northbound Baron Cameron Avenue and both the westbound and northbound queues can be attributed to the high westbound vehicle volume.

The Westbound Flyover Ramp model has long queues similar to the Conventional model, but the westbound left-turn and northbound right-turn have no significant queues due to the flyover ramp and free flow northbound right-turn. The westbound through and right-turn queues are also reduced with the Westbound Flyover Ramp model, which results from the elimination of the westbound left-turn queues extending beyond the turn lane.

With the SPUI configuration, the queuing is improved overall for all movements compared to the conventional intersection. The SPUI significantly reduces the queues for the westbound, northbound and southbound movements and almost eliminates the eastbound queues.

In the Eastbound Flyover configuration, the eastbound lefts traveled past the Baron Cameron Avenue intersection and made a U-Turn at a median break. This model eliminates all queuing for the eastbound movements and greatly reduces the queuing for northbound vehicles when compared to the Conventional model. The westbound motorists also experience reduced queuing. The queues on Springvale Road remain similar to the Conventional model.

Table 13: Baron Cameron Avenue/Springvale Road and Route 7 PM Peak Hour – Initial Analysis: Average and Maximum Queue

Intersection	Approach	Movement	2040 Conventional		2040 Westbound Flyover Ramp (WB to SB)		2040 SPUI		2040 Eastbound Flyover	
			Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)
Baron Cameron Ave/Springvale Rd	Baron Cameron Ave (NB)	Left	*1,315	*1,695	*1,025	*1,725	80	290	285	510
		Through	1,320	1,700	1,020	1,725	70	290	280	545
		Right	*1,320	*1,700	0	0	0	0	0	0
	Springvale Rd (SB)	Left	95	235	145	280	65	225	80	225
		Through	95	240	145	280	65	225	80	225
		Right	90	240	135	275	65	225	80	225
	Route 7 (WB)	Left	*2,230	*3,125	0	0	50	230	*1,640	*2,515
		Through	2,230	3,125	1,340	1,985	1,275	1,670	1,640	2,515
		Right	*2,220	*3,125	*1,340	*1,980	40	225	*1,640	*2,515
	Route 7 (EB)	Left	125	540	55	325	5	30	NA	NA
		Through	125	540	55	325	0	0	0	0
		Right	20	200	45	325	5	15	0	0

* Queue extends beyond available turn lane storage

Regarding the throughput shown in Table 14, the throughput volumes vary from model to model with the Conventional having the least throughput, the SPUI having the largest throughput, and the remaining models having slightly less throughput than the SPUI model and greater throughput than the Conventional model. The northbound throughput at Baron Cameron Avenue increases by 315 vehicles in the 2040 Westbound Flyover Ramp model compared to the conventional intersection configuration. As previously mentioned, the SPUI model has the largest total intersection throughput from all the alternative intersection models. The northbound approach throughput for the SPUI increases by 450 vehicles when compared to the conventional intersection configuration. The mainline through movements remain unaffected by the traffic signals and the signal controller has fewer phases to incorporate in the cycle, which allows more time to clear all the movements.

Table 14: Baron Cameron Avenue/Springvale Road and Route 7 PM Peak Hour – Initial Analysis: Throughput

Intersection	Approach	Movement	2040 Conventional Throughput (vph)	2040 Westbound Flyover Ramp (WB to SB) Throughput (vph)	2040 SPUI Throughput (vph)	2040 Eastbound Flyover Throughput (vph)
Baron Cameron Ave/Springvale Rd	Baron Cameron Ave (NB)	Left	195	276	324	290
		Through	240	295	320	304
		Right	748	927	989	1,004
	Springvale Rd (SB)	Left	29	28	29	29
		Through	225	214	219	217
		Right	34	34	33	33
	Route 7 (WB)	Left	714	823	837	798
		Through	2,356	2,654	2,734	2,638
		Right	36	39	41	64
	Route 7 (EB)	Left	29	28	28	26
		Through	1,536	1,461	1,481	1,491
		Right	239	229	233	232
	Total		**6,381**	**7,008**	**7,268**	**7,126**

Table 15 shows the comparison of delay and LOS for the model alternatives in the initial analysis. The Conventional model has a poor LOS, with the most notable delay for the northbound left which is due to the westbound through traffic blocking the intersection and restricting the northbound left from completing the movement onto westbound Route 7.

The Westbound Flyover Ramp improves the major movement operations with the most notable improvements being for the westbound movements. Additionally, the eastbound through, northbound left, and northbound right movements improve due to the elimination of the westbound left phase and the implementation of the free flow northbound right.

The SPUI design improves all movements at the intersection due to the removal of the eastbound and westbound through movements. Vehicles are able to efficiently enter and exit the intersection via acceleration and deceleration ramps.

The Eastbound Flyover operates similarly to the Westbound Flyover Ramp design. This design operates better for all northbound, all southbound, and the eastbound through movements. The other movements provide similar delay to the Westbound Flyover Ramp and this alternative provides better operations than a conventional intersection. In the initial VISSIM model of the Eastbound Flyover, the eastbound lefts traveled past the Baron Cameron Avenue intersection and made a U-Turn at a median break.

Table 15: Baron Cameron Avenue/Springvale Road and Route 7 PM Peak Hour – Initial Analysis: Level of Service and Delay

Intersection	Approach	Movement	2040 Conventional				2040 Westbound Flyover Ramp (WB to SB)				2040 SPUI				2040 Eastbound Flyover			
			Delay (s/veh)	LOS	Inter. Delay (s/veh)	Inter. LOS	Delay (s/veh)	LOS	Inter. Delay (s/veh)	Inter. LOS	Delay (s/veh)	LOS	Inter. Delay (s/veh)	Inter. LOS	Delay (s/veh)	LOS	Inter. Delay (s/veh)	Inter. LOS
Baron Cameron Ave/Springvale Rd	Baron Cameron Ave (NB)	Left	478.5	F	120.10	F	222.9	F	54.90	D	47.9	D	34.50	C	175	F	49.30	D
		Through	153.6	F			174.8	F			24.6	C			101	F		
		Right	42.4	D			4.6	A			4.5	A			3.1	A		
	Springvale Rd (SB)	Left	116.8	F			122.8	F			57.9	E			108.9	F		
		Through	104.5	F			143.4	F			54	D			93.7	F		
		Right	141.5	F			122.7	F			7.1	A			99.5	F		
	Route 7 (WB)	Left	124.2	F			11.5	B			23.2	C			17.9	B		
		Through	174.9	F			74.5	E			64.6	E			81.2	F		
		Right	69.6	E			10	A			3.1	A			11.1	B		
	Route 7 (EB)	Left	136.2	F			143.1	F			25.7	C			N/A	NA		
		Through	39.4	D			17.1	B			3.3	A			4	A		
		Right	18.4	B			6.5	A			9.1	A			10.7	B		

The County Comprehensive Plan shows this intersection as only a *partial* interchange and during discussions with VDOT, Fairfax County and within the working group, this designation would take considerable time and effort to change. Thus, the SPUI option was removed from further consideration although it had the best operational results. The other options were advanced to final analysis.

Context Sensitivity

The original Eastbound Flyover design at Baron Cameron Avenue forced the eastbound left turning vehicles to perform a U-turn maneuver to access Springvale Road. After reviewing the design for access and consistency, as well as receiving feedback from stakeholders, an eastbound left-turn lane was added to the off ramp to Baron Cameron Avenue to allow vehicles direct access to Springvale Road from Route 7. In addition, the commercial enterprises and the residential area on the southwest corner of the intersection will maintain their access to Route 7 via the off-ramp. This generates the need to provide a through lane for the eastbound approach to Baron Cameron Avenue. Accordingly, the eastbound approach consists of a shared left/through with a dedicated free flow right turn lane. This configuration requires the split phasing for westbound and eastbound movements of Route 7. It is to be noted that concurrent phasing, complete with separate lanes for each movement, was evaluated but the cost involved with the additional lane for a very low volume of anticipated traffic and the slightly worse impacts to the intersection operations made the concurrent phasing option not cost effective.

Final Analysis

The Westbound Flyover Ramp design only provided improvements to a few select movements and it was found that the design caused complications with the adjacent intersection of Baron Cameron

Avenue/Hunter Mill Road to the south; it was difficult to allow vehicles using the flyover ramp to turn onto Hunter Mill Road or Hunter Gate Way. The Conventional intersection design did not provide acceptable operations for the peak periods either. Therefore, the Eastbound Flyover design was selected for the Build model due to its traffic flow improvements to both peak hours and its constructability. Additionally, the Eastbound Flyover conforms to the County's comprehensive plan and easily allows for the future expansion of the interchange.

Refinements to the Eastbound Flyover design occurred during the final analysis as part of a value engineering assessment. The resulting conceptual design shows the eastbound traffic traveling **under** the intersection instead of above it. This had no bearing on the results of the analysis.

The VISSIM results for the Conventional and Build cases are shown in Tables 16 and 17 for AM and PM periods, respectively.

Significant improvements can be seen for almost all movements in the AM peak hour in the Build model compared to the Conventional model. The implementation of the Eastbound Flyover design improves the intersection LOS from an E to a C in VISSIM. The elimination of the large eastbound through volume entering the intersection and the introduction of the northbound free flow right-turn allows more time to the other movements, which improves the approach movements and the overall delay and LOS of the intersection.

The PM peak hour experiences improved intersection delay from LOS D in the Conventional model to LOS C in the Build model. The largest improvements are observed with the eastbound through movement which is reflected in an improvement of the eastbound delay and LOS from D in the Conventional model to A in the Build model. The westbound left-turn movement improved from LOS F in the Conventional model to A in the Build model. In addition, noticeable improvements are also indicated in the eastbound right-turn and the northbound right-turn movements; which all are attributed to the elimination of the eastbound through movement and the free flow northbound right-turn. Since the eastbound through volume is much higher in the AM peak hour, a more significant effect is seen in the AM peak hour than the PM peak hour.

Table 16: Baron Cameron Ave/Springvale Rd and Route 7 AM Level of Service and Delay

Intersection	Approach	Movement	2040 AM Conventional						2040 AM Build					
			Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Inter. Delay (s/veh)	Inter. LOS	Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Inter. Delay (s/veh)	Inter. LOS
Baron Cameron Ave/Springvale Rd	Baron Cameron Ave (NB)	Left	134.3	F	105.6	F	68.9	E	116.8	F	35.1	D	22.0	C
		Through	140.6	F					78.1	E				
		Right	92.2	F					11.9	B				
	Springvale Rd (SB)	Left	245.0	F	120.1	F			116.4	F	93.5	F		
		Through	105.5	F					93.2	F				
		Right	87.8	F					74.6	E				
	Route 7 (WB)	Left	204.3	F	71.2	E			26.2	C	22.3	C		
		Through	12.7	B					21.4	C				
		Right	10.7	B					5.3	A				
	Route 7 (EB)	Left	178.6	F	40.6	D			141.9	F	2.9	A		
		Ramp Through	--	--					63.2	E				
		Through	40.8	D					1.5	A				
		Right	29.6	C					2.3	A				

Table 17: Baron Cameron Ave/Springvale Rd and Route 7 PM Level of Service and Delay

Intersection	Approach	Movement	2040 PM Conventional						2040 PM Build					
			Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Inter. Delay (s/veh)	Inter. LOS	Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Inter. Delay (s/veh)	Inter. LOS
Baron Cameron Ave/Springvale Rd	Baron Cameron Ave (NB)	Left	105.3	F	65.9	E	48.0	D	102.1	F	46.8	D	23.7	C
		Through	132.2	F					102.2	F				
		Right	31.8	C					11.4	B				
	Springvale Rd (SB)	Left	155.9	F	114.9	F			177.3	F	114.1	F		
		Through	111.6	F					109.2	F				
		Right	99.0	F					92.5	F				
	Route 7 (WB)	Left	116.2	F	37.8	D			8.3	A	16.5	B		
		Through	15.7	B					19.0	B				
		Right	12.2	B					3.9	A				
	Route 7 (EB)	Left	241.4	F	44.8	D			139.1	F	5.1	A		
		Ramp Through	--	--					145.1	F				
		Through	44.7	D					0.6	A				
		Right	23.6	C					2.1	A				

Table 18 shows the throughput volumes from the VISSIM simulation for the Baron Cameron Avenue/Springvale Road intersection. In the AM peak hour, the throughput volumes in the Build model are similar but still greater than the ones in the Conventional model. The throughput in the PM peak hour overall is greater in Build model than in the Conventional model. The difference comes mainly from the westbound through movement. The westbound approach in the Conventional model has a significant volume of traffic that has been metered at Lewinsville Road, which is reflected in the difference between the Conventional model throughput and the PM demand volume.

Table 18: Baron Cameron Ave/Springvale Rd and Route 7 Throughput Volumes

Intersection	Approach	Movement	2040 AM Demand (vph)	2040 AM Conventional Throughput (vph)	2040 AM Build Throughput (vph)	2040 PM Demand (vph)	2040 PM Conventional Throughput (vph)	2040 PM Build Throughput (vph)
Baron Cameron Ave/Springvale Rd	Baron Cameron Ave (NB)	Left	185	186	172	320	322	326
		Through	270	258	251	315	314	314
		Right	1,120	1,076	1,067	995	983	998
	Springvale Rd (SB)	Left	70	64	62	40	36	35
		Through	420	394	412	285	263	275
		Right	70	69	71	40	39	41
	Route 7 (WB)	Left	660	651	674	1,020	989	1,037
		Through	1,380	1,403	1,411	3,625	3,445	3,638
		Right	75	75	75	50	51	55
	Route 7 (EB)	Left	20	19	21	30	28	28
		Through	2,767	2,799	2,777	1,685	1,602	1,603
		Right	270	278	284	270	259	265
	Total		**7,307**	**7,269**	**7,276**	**8,675**	**8,329**	**8,614**

Table 19 shows the queue lengths from the VISSIM simulation for the Baron Cameron Avenue/Springvale Road intersection. The queues for all movements in the AM peak hour improve with the implementation of the Eastbound Flyover design. The free flowing eastbound through condition eliminates the AM eastbound queue and greatly reduces the westbound queues since the westbound left-turns only conflict with 20 vehicles per hour in the AM and 30 vehicles per hour for the PM peak hour from the off-ramp eastbound through traffic. In addition, the northbound free flow right-turn significantly reduces the queue lengths for the northbound approach. In the PM peak hour, the queues for the eastbound and westbound approaches improve in the Build model compared to the Conventional model. The northbound and southbound queue lengths are similar in the Build model and the Conventional model. The queues will be further addressed in the final corridor analysis when the individual signalized intersection timings are optimized during the final design.

Appendices D, E, F and G emonstrate the Baron Cameron Ave/Springvale Rd intersection average and maximum queues for the 10 runs for the AM Conventional, AM Build, PM Conventional and PM Build models, respectively.

Table 19: Baron Cameron Ave/Springvale Rd and Route 7 Queuing Analysis

Intersection	Approach	Movement	2040 AM Conventional		2040 AM Build		2040 PM Conventional		2040 PM Build	
			Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)
Baron Cameron Ave/Springvale Rd	Baron Cameron Ave (NB)	Left	1,439	2,547	341	1,090	281	701	212	826
		Through	1,440	2,548	341	1,090	282	702	212	826
		Right	1,441	2,549	0	0	282	703	0	0
	Springvale Rd (SB)	Left	189	492	142	434	113	340	107	316
		Through	190	493	143	435	114	341	108	318
		Right	188	493	139	436	112	341	106	318
	Route 7 (WB)	Left	399	885	57	344	435	1,967	148	1,378
		Through	400	887	58	344	436	1,967	148	1,378
		Right	324	887	57	344	326	1,968	148	1,379
	Route 7 (EB)	Left	366	1,573	30	122	196	816	53	199
		Through	368	1,575	0	0	197	817	0	0
		Right	10	372	23	182	42	741	5	257

6.4. Carpers Farm Way/Colvin Run Road (East)

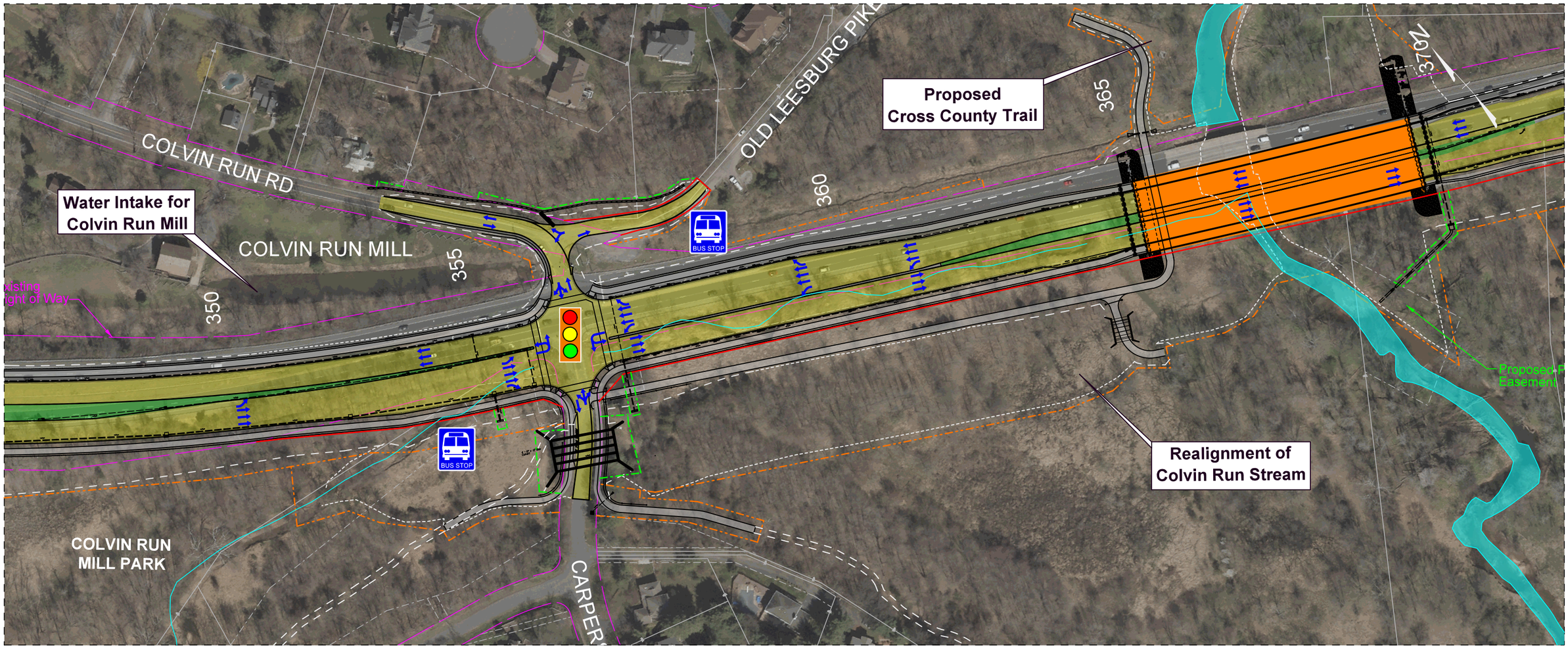
The Carpers Farm Way/Colvin Run Road (East) intersection has a relatively high southbound left-turn movement from Colvin Run Road while the other side street movements are relatively minor. JMT proposed a concept modeled after the Median U-turn and the Restricted Crossing U-Turn concepts identified by FHWA. This alternate design would allow the southbound left-turns to proceed through the intersection while the other left-turn movements would be restricted. These restricted lefts would need to perform a U-turn at a median opening downstream of the intersection along Route 7. This alternative is called a Hybrid Median U-turn for the purposes of this report and is shown in Figure 17. This Hybrid Median U-turn configuration was considered to grant more green time to the through movements.

Initial Analysis

Carpers Farm Way/Colvin Run Road (East) and Route 7 is an existing conventional signalized intersection that allows all turning movements. For the initial 2040 analysis, the southbound left-turn movement was the only left-turn movement allowed at the intersection. Since the intersection of Delta Glen Court/Colvin Run Road (West) and Route 7 does not allow southbound left-turns, this left-turn movement is critical and will need to remain for access. Also, the diversion of the southbound lefts to perform a right-turn at Route 7 and to complete a U-turn downstream was problematic, particularly during the PM peak period due to the high volume of through traffic along the Route 7 corridor. The remaining left-turn movements at the intersection were eliminated due to the low volumes and improved operations at the intersection. The northbound and eastbound left-turn movements were rerouted to a median break approximately 3,100 feet east of the intersection. The westbound left-turn movement was rerouted to a median break located 1,300 feet west.

Virginia Department of Transportation

Figure 15: Hybrid Median U-Turn



Legend

Proposed Road	Construction Limits in Cut
Proposed Bridge	Construction Limits in Fill
Proposed Shared Use Path/Sidewalk/Trail	Proposed Temporary Easement
Proposed Preliminary Stormwater Management Basin	Proposed Permanent Easement
Proposed Signal	Proposed Right of Way
Existing Right of Way	Existing Bus Stop Location (Location to be revised with Proposed Design)

Route 7 Corridor Improvements Project

Fairfax County, Virginia
State Project Number: 0007-029-128, P102, R202, C502, B610
UPC 52328

ALL INFORMATION PRESENTED AT THIS PUBLIC INFORMATION MEETING FOR THE ROUTE 7 CORRIDOR IMPROVEMENTS PROJECT IS CONCEPTUAL AND PRELIMINARY IN NATURE. ITEMS SHOWN ARE SUBJECT TO CHANGE BASED ON COMMENTS RECEIVED AND INFORMATION OBTAINED AS THE PROJECT PROGRESSES. ITEMS UNKNOWN AND/OR UNAVAILABLE AT THIS TIME AND THEREFORE NOT DEPICTED ON THIS DISPLAY INCLUDE UTILITY AND/OR MAINTENANCE EASEMENTS; AND OTHER DESIGN ELEMENTS TO BE INCORPORATED AS THE PROJECT FURTHER DEVELOPS. THE PRELIMINARY LOCATION OF POTENTIAL SOUND BARRIER WALLS ARE SHOWN ON SEPARATE DISPLAY BOARDS. THIS CONCEPTUAL LAYOUT IS UNAPPROVED AND IS NOT BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

The VISSIM queue, throughput, delay, and LOS results for the Conventional Intersection and Hybrid Median U-Turn are shown in Tables 20 through 22. In 2040 with the Hybrid Median U-turn configuration the westbound queuing along Route 7 is modeled to decrease by approximately 1,300 feet from the Conventional configuration.

Table 20: Carpers Farm Way/Colvin Run Rd (East) and Route 7 PM Peak Hour – Initial Analysis: Average and Maximum Queue

Intersection	Approach	Movement	2040 Conventional		2040 Hybrid Median U-Turn	
			Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)
Carpers Farm Way/Colvin Run Rd (East)	Carpers Farm Way (NB)	Left	30	115	N/A	N/A
		Through	30	115	N/A	N/A
		Right	30	115	5	40
	Colvin Run Rd (SB)	Left	215	420	165	455
		Right	215	420	165	460
	Route 7 (WB)	Left	*1,970	*2,985	N/A	N/A
		Through	1,970	2,985	925	1,665
		Right	*1,970	*2,985	*925	*1,665
	Route 7 (EB)	Left	25	*225	N/A	N/A
		Through	25	225	40	365
		Right	20	*225	40	365

* Queue extends beyond available turn lane storage

In 2040, with the Hybrid Median U-turn configuration, the green time that would be allocated for the northbound and eastbound left-turns was reallocated to the westbound through movement resulting in more throughput along Route 7.

The 2040 Conventional intersection operates with an overall LOS C with long delays on the northbound and southbound approaches. With the high westbound volume, limited green time is available for the turning movements at the intersection. The Hybrid Median U-Turn intersection operates with an overall LOS B in the PM peak hour and substantially reduces delays, allowing for all movements to operate at a LOS E or better.

Table 21: Carpers Farm Way/Colvin Run Rd (East) and Route 7 PM Peak Hour – Initial Analysis: Throughput

Intersection	Approach	Movement	2040 Conventional Throughput (vph)	2040 Hybrid Median U-Turn Throughput (vph)
Carpers Farm Way/Colvin Run Rd (East)	Carpers Farm Way (NB)	Left	17	N/A
		Through	13	N/A
		Right	38	0
	Colvin Run Rd (SB)	Left	186	169
		Through	15	N/A
		Right	12	25
	Route 7 (WB)	Left	36	N/A
		Through	3,314	3,697
		Right	226	280
	Route 7 (EB)	Left	25	N/A
		Through	2,143	2,200
		Right	28	0
	Total		6,053	6,371

Table 22: Carpers Farm Way/Colvin Run Rd (East) and Route 7 PM Peak Hour – Initial Analysis: Level of Service and Delay

Intersection	Approach	Movement	2040 Conventional				2040 Hybrid Median U-Turn			
			Delay (s/veh)	LOS	Inter. Delay (s/veh)	Inter. LOS	Delay (s/veh)	LOS	Inter. Delay (s/veh)	Inter. LOS
Carpers Farm Way/Colvin Run Rd (East)	Carpers Farm Way (NB)	Left	98.8	F	31.1	C	N/A	N/A	13.1	B
		Through	84.1	F			N/A	N/A		
		Right	42.1	D			8.6	A		
	Colvin Run Rd (SB)	Left	161.7	F			70.3	E		
		Right	139.0	F			62.0	E		
	Route 7 (WB)	Left	37.3	D			N/A	N/A		
		Through	37.4	D			13.2	B		
		Right	22.7	C			10.1	B		
	Route 7 (EB)	Left	45.8	F			N/A	N/A		
		Through	8.7	A			8.8	A		
		Right	5.0	A			4.3	A		

Context Sensitivity

The Carpers Farm Way/Colvin Run Road (East) Hybrid Median U-Turn design proposal was shown to community members within the Carpers Farm Way area and was immediately met with strong opposition to the proposal. After discussions with the nearby communities and stakeholders and giving due consideration that while the proposal did offer enhanced intersection operations, the enhancements were marginal; i.e. the LOS for the conventional intersection is expected to maintain an acceptable level of service. Thus, the intersection of Carpers Farm Way and Route 7 was determined to remain a conventional intersection in the final concept.

6.5. Lewinsville Road

Lewinsville Road is commonly used as a bypass road around the Tysons area and as the main access to the Spring Hill area north of Tysons. This use generates relatively high turning movements to and from Lewinsville Road at the intersection with Route 7. Motorists are anticipated to experience long delays and queues along both Route 7 and Lewinsville Road with such turning movement volumes.

The current spacing between the intersection of Lewinsville Road/ Route 7 and the intersection of Brook Road/ Lewinsville Road is approximately 150 feet. This non-standard intersection spacing provides limited space for queuing for the southbound approach along Lewinsville Road and negatively impacts the operations at both existing intersections on Lewinsville Road.

Initial Analysis

A Displaced Left intersection design was selected for the Lewinsville Road and Route 7 intersection in the VISSIM model with the guidance of the FHWA selection tool; the alternate design was the only appropriate design that served both peak hour volumes. In theory, the Displaced Left geometry grants additional green time to the side street movements and improves operations at the main intersection while the heavy left movement is shifted to a displaced signalized intersection with a partial signal. This design will also realign the intersection approximately 830' east of its current location which will provide additional distance between Route 7 and the Lewinsville Road/ Brook Road intersection. Moreover, if a conventional design was selected, an eastbound dual left-turn onto Lewinsville Road would be recommended due to the high peak hour turning volumes. The local community is opposed to having dual left-turn lanes and two receiving lanes on Lewinsville Road. The Conventional design currently does not allow enough southbound vehicles to turn right onto westbound Route 7 due to the short storage length available and the proximity to the Brook Road intersection. The Displaced Left design allows for

a single left-turn lane from Route 7 to Lewinsville Road with one reciprocal receiving lane on Lewinsville Road and allows southbound vehicles to easily merge onto westbound Route 7 with a free flow right-turn. With this alternative, the overall operation of the intersection is greatly improved.

The VISSIM queue, throughput, delay and LOS results for the Conventional intersection configuration and Displaced Left Turn configuration are shown in Tables 23 through 25.

Without the realignment of Lewinsville Road substantial queuing occurs along Lewinsville Road in the 2040 scenario. Under existing conditions, the queue along Lewinsville Road is over half a mile long. If no improvements are made to this intersection the queue is expected to be more than double that length in 2040.

With the improved alignment of Lewinsville Road in the displaced left-turn configuration, queuing along Lewinsville Road improves from approximately 6,545 feet shown in the conventional intersection configuration to 3,340 feet. Queuing also improves for the overall intersection with displaced left-turn configuration. In both models, a large queue from Towlston Road extends east and causes additional queuing for the westbound vehicles at Lewinsville Road along Route 7 corridor.

Table 23: Lewinsville Road and Route 7 PM Peak Hour – Initial Analysis: Average and Maximum Queues

Intersection	Approach	Movement	2040 Conventional		2040 Displaced Left-Turn	
			Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)
Lewinsville Rd	McLean Bible Church (NB)	Left	50	130	55	135
		Through	55	130	55	135
		Right	50	130	45	130
	Lewinsville Rd (SB)	Left	*6,115	*6,545	40	125
		Through	6,120	6,545	40	125
		Right	*6,110	*6,535	*2,495	*3,340
	Route 7 (WB)	Left	*4,225	*5,640	*2,315	*3,865
		Through	4,225	5,640	2,315	3,865
		Right	*4,220	*5,635	*2,315	*3,865
	Route 7 (EB)	Left after crossover	-	-	370	720
		Left before crossover	410	*835	115	540
		Through	410	835	85	415
		Right	260	*825	N/A	N/A

* Queue extends beyond available turn lane storage

The increased allotment of green time to the through movements afforded by the displaced left-turn configuration and the free flowing southbound right-turn allows the throughput to increase from 6,186 to 6,715 vehicles, an increase of 529 vehicles, as shown in Table 24.

Table 24: Lewinsville Road and Route 7 PM Peak Hour – Initial Analysis: Throughput

Intersection	Approach	Movement	2040 Conventional Throughput (vph)	2040 Displaced Left-Turn Throughput (vph)
Lewinsville Rd	McLean Bible Church (NB)	Left	29	52
		Through	61	62
		Right	9	0
	Lewinsville Rd (SB)	Left	36	71
		Through	16	22
		Right	522	695
	Route 7 (WB)	Left	10	33
		Through	3,186	3,394
		Right	158	167
	Route 7 (EB)	Left	339	322
		Through	1,820	1,897
		Right		
	Total		**6,186**	**6,715**

The intersection functions at an overall LOS D with many of the turning movements operating at a LOS F with the conventional intersection configuration. The southbound approach experiences substantial delays; especially with the southbound left-turn movement.

The southbound left-turn movement delay decreases from 738 seconds of delay under the conventional intersection configuration to 124 seconds of delay with the displaced left-turn configuration. The displaced left-turn scenario increases the throughput of the intersection while generating slightly additional delay for the southbound right-turn movement.

Table 25: Lewinsville Road and Route 7 PM Peak Hour – Initial Analysis: Level of Service and Delay

Intersection	Approach	Movement	2040 Conventional				2040 Displaced Left-Turn			
			Delay (s/veh)	LOS	Inter. Delay (s/veh)	Inter. LOS	Delay (s/veh)	LOS	Inter. Delay (s/veh)	Inter. LOS
Lewinsville Rd	McLean Bible Church (NB)	Left	122.3	F	48.80	D	162.7	F	62.50	E
		Through	121.5	F			98.3	F		
		Right	6.1	A			5.3	A		
	Lewinsville Rd (SB)	Left	738.2	F			124	F		
		Through	427.6	F			130.6	F		
		Right	90.1	F			109.1	F		
	Route 7 (WB)	Left	97.1	F			122.3	F		
		Through	44.4	D			71.1	E		
		Right	17.9	B			19.1	B		
	Route 7 (EB)	Left	168.3	F			166.9	F		
		Through	7	A			19.1	B		
		Right	4.8	A			N/A	-		

Although the displaced left-turn configuration did not show improvement to the delay and LOS when compared to the conventional configuration in the initial evaluation, the other initial results indicated sizeable improvements; particularly in overall throughput and in context sensitivity. The displaced left-turn configuration proceeded to final analysis as it was anticipated that the delay and LOS would improve once the VISSIM model was modified to incorporate refined corridor signal timings, storage lengths, and roadway geometry.

Final Analysis

The Displaced Left option was further analyzed and modified for optimal traffic operations. Modifications to the storage lengths, signal timings and offsets, and McLean Bible Church Lane configurations were made. The traffic operations of the Displaced Left option with the modifications implemented for the Final Analysis are reported below.

The intersection of Wolftrap Run Road is near the area of Lewinsville Road and will be impacted by the improvements. The original concept moved the access point from Wolftrap Run Road to the west to Lucky Estates Drive and was proposed to be a right-in/left-in/right-out configuration with a median U-turn allowed at the western side of the displaced left for Lewinsville Road for exiting residents and visitors to proceed west on Route 7.

New traffic volumes were provided by VDOT for the Route 7/Lewinsville Road intersection in 2015. The revised volumes for the westbound right-turn movement doubled in the PM peak hour and the eastbound left-turn movement decreased by 120 vehicles in the AM peak hour. The final analysis for the project area was updated using these revised volumes.

This intersection experienced substantial scrutiny and community feedback due to its complexity and mix of uses between commuter route, church access, and neighborhood access. Of main concern for the Wolftrap Run Road residents was the access to and from their neighborhood. Several options involving the displaced left and the median U-turn and the church access configuration were evaluated. The final conceptual design that was accepted by all stakeholders in shown in Figure 17 (in the following section of this report) and described below:

- A service road from Wolftrap Run Road/Lucky Estates Drive to the western McLean Bible Church access
- Shared Northbound Through/Left-turn lane to access westbound Route 7 and Lewinsville at the western church access
- Dual westbound left turns along Route 7 entering at the western church access
- Single westbound left turn along Route 7 at the eastern church access

The main ingress point for the church will be at the western access while the main egress point for the church will be at the eastern access point. Both access points will be signalized. With this configuration, the neighborhoods served by Wolftrap Run Road have the option of using the signalized intersection at the western church access or the left in/right in/right out access previously designed.

Tables 26 and 27 show the AM and PM peak hour delays and LOS for the movements, approaches and the overall intersection for the Conventional and Build models, respectively. As shown in Table 26, the overall intersection LOS in the Conventional model is C for the AM and D for the PM Peak hour. From Table 27, the LOS for the eastern side of the displaced left the westbound approach has a LOS of B and the eastbound has an LOS of A, which result in an overall LOS B for the AM and PM peak hours. For the crossover intersection, the overall intersection LOS is D and B for the AM and PM peak hour respectively.

Table 26: Lewinsville Road and Route 7 AM and PM Conventional Level of Service and Delay

Intersection	Approach	Movement	2040 AM Conventional						2040 PM Conventional					
			Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Inter. Delay (s/veh)	Inter. LOS	Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Inter. Delay (s/veh)	Inter. LOS
Lewinsville Rd	McLean Bible Church (NB)	Left	94.85	F	81.92	F	32.85	C	104.61	F	108.47	F	47.58	D
		Through	113.4	F					117.68	F				
		Right	14.3	B					8.91	A				
	Lewinsville Rd (SB)	Left	76.79	E	21.13	C			97.86	F	27.34	C		
		Through	106.69	F					105.11	F				
		Right	9.59	A					17.55	B				
	Route 7 (WB)	Left	112.69	F	60.23	E			101.37	F	56.62	E		
		Through	64.48	E					59.19	E				
		Right	11.83	B					25.87	C				
	Route 7 (EB)	Left	83.94	F	20.94	C			223.61	F	39.34	D		
		Through	8.54	A					11.66	B				
		Right	3.32	A					3.14	A				

Table 27: Lewinsville Road and Route 7 AM and PM Build Level of Service and Delay

Intersection	Approach	Movement		2040 AM Build							2040 PM Build						
			Model Volume (vph)	Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Inter. Delay (s/veh)	Inter. LOS	Model Volume (vph)	Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Inter. Delay (s/veh)	Inter. LOS	
Lewinsville Rd	McLean Bible Church (NB)	Left	7.9	103.9	F	89	F	12	B	17.6	118.6	F	109	F	14	B	
		Through	11.2	101.0	F					59.2	114.5	F					
		Right	3.6	19.5	B					5.1	17.4	B					
	Lewinsville Rd (SB)	Left	81	102.2	F	101	F			90	111.8	F	110	F			
		Shared Thru/Right	10.9	95.2	F					13.4	100.2	F					
		Right	431.1	**						665.5	**						
	Route 7 (WB)	Left	6.5	100.9	F	18	B			7.7	96.7	F	14	B			
		Thru	1655.1	17.5	B					3130.8	13.9	B					
		Right	167.7	**						308.7	**						
	Route 7 (EB)	Left	700.2	2.7	A	7	A			365.7	2.1	A	6	A			
		Thru	3262.5	7.4	A					2048.4	7.3	A					
		Right															
Lewinsville at Crossover	McLean Bible Church (NB)	Shared Left/Thru	35.4	161.8	F	98	F	37	D	25.9	161.3	F	122	F	18	B	
		Right	84.1	70.9	E					13.5	46.3	D					
	Route 7 (WB)	Left	34.3	119.7	F	72	E			43.2	121.9	F	16	B			
		Thru	1603.6	71.2	E					3116.4	14.1	B					
	Route 7 (EB)	Left/U-turn	679.9	47.4	D	20	C			362.7	80.9	F	20	C			
		Thru	3165.5	14.7	B					2183.6	10.4	B					
		Right	10.5	1.7	A					47.1	2.2	A					
Total WBT				88.7	F						28.0	C					
Total EBT				22.1	C						17.7	B					

** Free Flow Right Turn

The throughput volume in the AM peak hour is similar for all movements between the Conventional and Build models as seen in Table 28. The throughput of the Build model is much higher in the PM peak hour than the Conventional model due to the Displaced Left configuration, especially for the southbound right and westbound through movements. With the realignment of the intersection and the relocation of the Brook Road intersection away from the Route 7 intersection, the southbound movements are no longer hindered, which improves the throughput for the southbound approach. In the Build model, the

heavy westbound through and the southbound right-turn movements reach and exceed the desired demand volumes.

Table 28: Lewinsville Road and Route 7 Throughput

Intersection	Approach	Movement	2040 AM Demand (vph)	2040 AM Conventional Throughput (vph)	2040 AM Build Throughput (vph)	2040 PM Demand (vph)	2040 PM Conventional Throughput (vph)	2040 PM Build Throughput (vph)
Lewinsville Rd	McLean Bible Church (NB)	Left	10	9	9	20	19	19
		Through	10	10	11	60	60	59
		Right	5	6	4	5	5	6
	Lewinsville Rd (SB)	Left	80	84	81	90	73	90
		Through	5	5	6	10	6	8
		Right	425	441	436	655	572	671
	Route 7 (WB)	Left	20	20	19	30	29	28
		Through	1,630	1,674	1,643	3,110	2,920	3,110
		Right	165	169	168	300	286	309
	Route 7 (EB)	Left	680	636	700	375	337	366
		Through	3,270	3,218	3,263	2,225	2,184	2,184
		Right	10	10	11	50	46	47
	Total		**6,310**	**6,280**	**6,350**	**6,930**	**6,535**	**6,897**

Table 29 shows a comparison in the average and maximum queues between the Conventional and Build models at the Lewinsville intersection in the AM and the PM peak hours. The AM peak hour queues generally improve on all approaches in the Build model. Except the northbound approach which only shows minor benefit, the other approaches show strong benefits from the Displaced Left Turn design. This is due to the longer allotted green times for the signal phases and longer storage lengths on the southbound approach compared to the Conventional configuration. There are significant improvements in the queue lengths on all of the westbound, eastbound and southbound movements in the Build model compared to the Conventional model in the PM peak hour. The extra green time and Displaced Left geometry removes the overflowing eastbound left-turn condition, which reduces the queues on the eastbound and westbound approaches as described earlier.

Appendices D, E, F and G show Lewinsville average and maximum queues for the 10 runs for the AM Conventional, AM Build, PM Conventional and PM Build models, respectively.

Table 29: Lewinsville Road and Route 7 Average and Maximum Queues

Intersection	Approach	Movement	2040 AM Conventional		2040 AM Build		2040 PM Conventional		2040 PM Build	
			Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)
Lewinsville Rd	McLean Bible Church (NB)	Left	10	56	10	55	44	180	40	148
		Through	10	55	9	54	44	180	40	148
		Right	8	55	7	54	42	180	39	149
	Lewinsville Rd (SB)	Left	87	304	46	186	1,480	2,761	56	209
		Through	88	304	6	64	1,479	2,760	7	72
		Right	75	301	0	0	1,478	2,758	0	0
	Route 7 (WB)	Left (eastern)	-	-	33	324	-	-	63	441
		Left (western)	253	790	22	92	3,506	4,580	26	92
		Through	253	790	34	324	3,505	4,580	64	441
		Right	257	796	32	328	3,511	4,586	63	446
	Route 7 (EB)	Left (eastern)	-	-	0	32	-	-	0	52
		Left (western)	511	2,253	230	1,093	758	1,508	187	680
		Through	512	2,253	63	578	757	1,508	32	392
		Right	382	2,251	156	1,095	689	1,508	76	682

6.6. Additional Intersections:

The remaining signalized intersections were analyzed and are proposed to remain conventional intersections due to a combination of right-of-way restrictions, public input, context sensitivity analysis, the guidance of the FHWA alternative intersection selection tool, and/or the status outlined in the county comprehensive plan.

Signal warrant analyses were conducted for each existing unsignalized intersection. None of the intersections meet the warrants for a signal installation for the existing (2011) or opening year (2018) per the analyses. Due to access management criteria and in the interest of safely processing users through the corridor and from the side streets, some unsignalized intersection access configurations are proposed to be modified. The VISSIM results and any intersection modifications are reported below for each respective intersection.

Signalized Intersections

Delta Glen Ct/Colvin Run (West)

In addition to adding a through lane eastbound and westbound along Route 7, the configuration of this intersection is modified to allow for a shared through/left-turn from southbound Colvin Run to allow access to eastbound Route 7 and to Delta Glen Ct. No alternative intersection designs were evaluated at this intersection.

Beulah Road/Forestville Drive

The configuration of this intersection is to remain as a conventional intersection with three through lanes, a left turn and a right turn lane along the eastbound and westbound Route 7 approaches. The southbound approach is proposed to have 3 lanes; a left turn lane, a through lane, and a right turn lane. The northbound approach is proposed to remain a 3-lane approach; a left turn lane, a shared left/through lane, and a right turn lane. It is anticipated that the traffic volume growth beyond 2040 may warrant the consideration of implementing a grade separated solution for this intersection in the County's Comprehensive Transportation Plan.

Towlston Road

The configuration of this intersection is to remain as a conventional intersection with three through lanes, a left turn and a right turn lane along the eastbound and westbound Route 7 approaches. The northbound and southbound approaches are proposed to have 3 lanes, a left turn lane, a through lane, and a right turn lane. It is anticipated that the traffic volume growth beyond 2040 warrant the consideration of implementing a grade separated solution for this intersection in the County's Comprehensive Transportation Plan.

Dulles Toll Road Westbound Off-Ramp/Jarrett Valley Drive

The configuration of this intersection is to remain as a conventional intersection with four through lanes on the eastbound approach and three through lanes on the westbound approach. Additionally, its proximity to the bridges over the Dulles Toll Road prevent any major intersection modifications under this study.

Unsignalized Intersections

Intersection	Modification
Bishopsgate Way	Bishopsgate Way currently has full access to Route 7. A northbound left turn restriction is proposed while the westbound left-turn from Route 7 to Bishopsgate Way will continue to be permitted. Northbound vehicles desiring to make a left-turn will travel east to the Amanda Drive/Markell Court intersection and make a U-turn.
Great Passage Boulevard	The right-in/right-out configuration for this intersection will remain unchanged.
Amanda Drive/Markell Court	This intersection will be modified to right-in and right-out for Markell Court and right-in/left-in and right-out for Amanda Drive. Westbound travelers bound for Markell Court and Amanda Drive travelers bound for eastbound Route 7 will make a U-turn at Bishopsgate Way or at the signalized Utterback Store Road intersection. Markell Court travelers bound for westbound Route 7 will make a U-turn at the Baron Cameron Avenue intersection.
Riva Ridge Drive	The right-in/right-out configuration for this intersection will remain unchanged.
Colvin Forest Drive	The right-in/right-out configuration for this intersection will remain unchanged.
Faulkner Drive	Faulkner Drive currently has full access to Route 7. A southbound left turn restriction is proposed while the eastbound left-turn from Route 7 to Faulkner Drive will continue to be permitted. Southbound vehicles desiring to travel eastbound will travel west to the signalized Carpers Farm Way/Colvin Run Road (East) intersection and make a U-turn.

Intersection	Modification
Middleton Ridge Road	Middleton Ridge Road currently has full access to Route 7. A northbound left-turn restriction is proposed while the westbound left-turn from Route 7 to Middleton Ridge Road will continue to be permitted. Northbound vehicles desiring to travel westbound will travel east to the signalized Beulah Road/Forestville Drive intersection and make a U-turn.
Newcombs Farm Road	The right-in/right-out configuration for this intersection will remain unchanged.
Trotting Horse Lane	Trotting Horse Lane currently has full access to Route 7. The intersection is proposed to be modified to have right-in/left-in/right-out access. Southbound vehicles on Trotting Horse Lane desiring to travel eastbound on Route 7 will use Fairpine Lane to access the signalized Forestville Drive/Beulah Road intersection with Route 7.
Atwood Road	Atwood Road currently has full access to Route 7. A northbound left turn restriction is proposed while the westbound left-turn from Route 7 to Atwood Road will continue to be permitted. Northbound vehicles desiring to make a left-turn will travel east to the signalized Towlston Road intersection and make a U-turn.
Lyons Street	Lyons Street currently has full access to Route 7. The intersection is proposed to be modified to have right-in/right-out access. Southbound vehicles bound for eastbound Route 7 will use Vernon Drive to access the signalized Towlston Road/Route 7 intersection. Vehicles intending to access Lyons Street from eastbound Route 7 will use Towlston Road and Vernon Drive to access Lyons Street or make a U-turn at Route 7 and Towlston Road intersection.

Intersection	Modification
Stokley Way	Stokley Way currently has full access to Route 7. The intersection is proposed to be modified to have right-in/right-out access. Northbound vehicles bound for westbound Route 7 will perform a U-turn at the signalized Towlston Road intersection. Additionally, westbound vehicles intending to access Stokley Way will utilize Atwood Road and Robnel Place or make a U-turn at Route 7 and Atwood Road intersection.
Trap Road	Trap Road currently has full access to Route 7. The intersection is proposed to be modified to have right-in/right-out access. Since Trap Road intersects Towlston Road approximately ½ mile south of Route 7, northbound traffic bound for westbound Route 7 can use the signalized Towlston Road intersection with Route 7 or can U-turn at the signalized Lewinsville Road/Route 7 intersection to the east. Similarly, westbound Route 7 travelers bound for Trap Road can either U-turn at the signalized Towlston Road intersection or use Towlston Road to access Trap Road.

Intersection	Modification
Lucky Estates Drive/Wolftrap Run Road	The access for Wolftrap Run Road will be relocated to a new Lucky Estates Drive access point. This will be done utilizing the existing service road that currently connects the two roads. The access to Route 7 at Lucky Estates Drive will be limited to right-in/right-out. Northbound travelers bound for westbound Route 7 will perform a U-turn at the signalized Western Church Access point/Route 7 intersection. There will no longer be any access to Route 7 from Wolftrap Run Road. The relocation of this access to Route 7 was implemented to provide adequate storage for the displaced left intersection design at Lewinsville Road as well as meeting access management criteria. This also provides adequate distance for vehicles coming from Lucky Estates Drive/Wolftrap Run Road to transition to the left-turn lane to either turn onto Lewinsville Road or U-turn to proceed on westbound Route 7. In addition, an extension of the access road to the east will be constructed connecting Wolftrap Run Road to the Western Church Access road. The intersection of the service road and the Western Church Access will be a full movement T-intersection. The intersection of Route 7 and the Western Church Access will also be a full movement T-intersection allowing rights and lefts from the Western Church Access to Route 7 as well as allowing eastbound right turns and westbound left turns in from Route 7. The westbound left turn and northbound right turn movements will both have dual lanes serving the turning movement.
Laurel Hill Road	Laurel Hill Road will remain unchanged as a right-in/right-out.

Table 30 shows the unsignalized intersection delays and the levels of service including the median U-turns for the AM and PM peak hour for the Conventional model and the Build model. Table 30 indicates that the Build model is expected to provide some improvements in delays and levels of service during the AM peak hour when compared to the Conventional model. At the Newcombs Farm Road, Lyons Street and Lucky Estates Drive/Wolftrap via "Lucky Estates Access" intersections, the LOS of the

northbound right-turn movement improved from LOS C to LOS B. Furthermore, the Atwood Road westbound left-turn movement LOS improved from F to E. At the Trap Road and the Stokley Way intersections, the LOS of the northbound right-turn movement during the PM peak also improved from LOS B to LOS A.

In the PM peak, Lucky Estates Drive/Wolftrap Run Road northbound right-turn movement via "Lucky Estates Access" LOS went from B in the Conventional model to A in the Build model. One the other hand, the LOS for the Lucky Estates Drive/Wolftrap Run Road northbound movement via the "MBC access" is F for both the AM and PM periods. This is due to the vehicles accessing eastbound Route 7 from Wolftrap Road via the service road must wait for the northbound traffic to get green and dissipate the queue.

Furthermore, the Lyons Street southbound right movement LOS went from a D in the Conventional to an E in the Build model. From inspection of the operations at this location, it is expected that the existing traffic counts on the Lyons Street include cut-through traffic diverting from Towlston Road signalized intersection. The relatively high number of existing right turning vehicles in the PM peak hour serves to substantiate this observation. This volume has been translated to the future volumes used for the analysis. The actual future volume at this intersection will likely be less than the forecasted future volume due to the increased capacity of Route 7 and the changes to the intersection configurations. This will generate a more favorable LOS and delay than what is shown in this analysis. This intersection will need to be evaluated again as the corridor continues to be improved.

The Faulkner Drive intersection eastbound left movement went from a LOS D in the Conventional to LOS E in the Build model. This is due to the increased Route 7 throughput in the PM peak hour through the build configurations. The demand volume is estimated to be 5 vehicles turning left. Acceptable gaps are provided by the upstream signals. It is to be noted that the higher demand volume in the AM peak hour experiences a LOS of A.

For the Lewinsville Rd / Brook Rd intersection, it can be seen how the eastbound movements LOS improved in the Build models. In the AM peak hour, the eastbound approach improved from LOS C in the Conventional model to LOS A in the Build model. Furthermore, in the PM peak hour the LOS improved from LOS F in the Conventional model to LOS A in the Build.

Table 30: Unsignalized and Median U-turn Intersections Level of Service and Delay

Intersection	Approach	Movement	2040 AM Conventional				2040 AM Build				2040 PM Conventional				2040 PM Build			
			Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS
Bishopsgate Way	NB	Left			14.5	B			13.3	B			8.4	A			8.2	A
		Through																
		Right	14.5	B			13.3	B			8.4	A			8.2	A		
	SB	Left																
		Through																
		Right																
	WB	U-turn	7.1	A	-	-	9.3	A	-	-	4.0	A	-	-	2.8	A	-	-
		Left	24.8	C			22.7	C			10.4	B			6.9	A		
		Through	-	-			-	-			-	-			-	-		
		Right	-	-			-	-			-	-			-	-		
	EB	Left			-	-			-	-			-	-			-	-
		Through	-	-			-	-			-	-			-	-		
		Right	-	-			-	-			-	-			-	-		
Great Passage Boulevard	NB	Left																
		Through																
		Right																
	SB	Left			6.6	A			6.6	A			10.3	B			15.3	C
		Through																
		Right	6.6	A			6.6	A			10.3	B			15.3	C		
	WB	Left			-	-			-	-			-	-			-	-
		Through	-	-			-	-			-	-			-	-		
		Right	-	-			-	-			-	-			-	-		
	EB	Left			-	-			-	-			-	-			-	-
		Through	-	-			-	-			-	-			-	-		
		Right	-	-			-	-			-	-			-	-		
Amanda Drive/Markell Court	NB	Left			10.5	B			12.7	B			6.9	A			6.7	A
		Through																
		Right	10.5	B			12.7	B			6.9	A			6.7	A		
	SB	Left			6.8	A			7.3	A			13.3	B			15.6	C
		Through																
		Right	6.8	A			7.3	A			13.3	B			15.6	C		
	WB	Left			-	-			-	-			-	-			-	-
		Through	-	-				-			-	-			-	-		
		Right	-	-				-			-	-			-	-		
	EB	U-turn	1.0	A	-	-	1.5	A	-	-	7.6	A	-	-	10.2	B	-	-
		Left	5.8	A			4.8	A			25.2	D			23.4	C		
		Through	-	-			-	-			-	-			-	-		
		Right	-	-			-	-			-	-			-	-		
Riva Ridge Drive	NB	Left																
		Through																
		Right																
	SB	Left			7.6	A			7.3	A			12.5	B			18.6	C
		Through																
		Right	7.6	A			7.3	A			12.5	B			18.6	B		
	WB	Left			-	-			-	-			-	-			-	-
		Through	-	-			-	-			-	-			-	-		
		Right	-	-			-	-			-	-			-	-		
	EB	Left			-	-			-	-			-	-			-	-
		Through	-	-			-	-			-	-			-	-		
		Right	-	-			-	-			-	-			-	-		
Colvin Forest Drive	NB	Left			13.6	B			14.2	B			8.1	A			7.9	A
		Through																
		Right	13.6	B			14.2	B			8.1	A			7.9	A		
	SB	Left																
		Through																
		Right																
	WB	Left			-	-			-	-			-	-			-	-
		Through	-	-			-	-			-	-			-	-		
		Right	-	-			-	-			-	-			-	-		
	EB	Left			-	-			-	-			-	-			-	-
		Through	-	-			-	-			-	-			-	-		
		Right	-	-			-	-			-	-			-	-		

Table 30: Unsignalized and Median U-turn Intersections Level of Service and Delay (continued)

Intersection	Approach	Movement	2040 AM Conventional				2040 AM Build				2040 PM Conventional				2040 PM Build			
			Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS
Faulkner Drive	NB	Left																
		Through																
		Right																
	SB	Left																
		Through			6.3	A			7.5	A			15.3	C			16.6	C
		Right	6.3	A			7.5	A			15.3	C			16.6	C		
	WB	Left																
		Through	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-
		Right	-	-				-			-	-			-	-		
	EB	Left	9.2	A			13.6	B			29.7	D			39.9	E		
		Through	-	-	-	-	-	-	13.6	-	-	-	29.7	-	-	-	39.9	-
		Right	-	-			-	-			-	-			-	-		
Middleton Ridge Road	NB	Left																
		Through			12.1	B			14.3	B			4.6	A			8.3	A
		Right	12.1	B			14.3	B			4.6	A			8.3	A		
	SB	Left																
		Through																
		Right																
	WB	Left	18.5	C			33.1	D			10.6	B			10.6	B		
		Through	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Right	-	-			-	-			-	-			-	-		
	EB	Left																
		Through	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Right	-	-			-	-			-	-			-	-		
Newcombs Farm Road	NB	Left																
		Through			19.5	C			13.5	B			8.7	A			7.9	A
		Right	19.5	C			13.5	B			8.7	A			7.9	A		
	SB	Left																
		Through																
		Right																
	WB	Left																
		Through	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Right	-	-			-	-			-	-			-	-		
	EB	Left																
		Through	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Right	-	-			-	-			-	-			-	-		
Trotting Horse Lane	NB	Left																
		Through																
		Right																
	SB	Left																
		Through			7.3	A			7.6	A			22.5	C			22.0	C
		Right	7.3	A			7.6	A			22.5	C			22.0	C		
	WB	Left																
		Through	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Right	-	-			-	-			-	-			-	-		
	EB	Left																
		Through	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Right	-	-			-	-			-	-			-	-		
Atwood Road	NB	Left																
		Through			21.0	C			21.2	C			9.2	A			8.5	A
		Right	21.0	C			21.2	C			9.2	A			8.5	A		
	SB	Left																
		Through																
		Right																
	WB	Left	60.6	F			44.3	E			21.5	C			22.3	C		
		Through	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-
		Right	-	-				-			-	-			-	-		
	EB	Left																
		Through	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Right	-	-			-	-			-	-			-	-		

Table 30: Unsignalized and Median U-turn Intersections Level of Service and Delay (continued)

Intersection	Approach	Movement	2040 AM Conventional				2040 AM Build				2040 PM Conventional				2040 PM Build			
			Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS
Lyons Street	NB	Left			23.2	C			15.0	B			9.7	A			6.9	A
		Through																
		Right	23.2	C			15.0	B			9.7	A			6.9	A		
	SB	Left			10.7	B			9.8	A			29.8	D			41.7	E
		Through																
		Right	10.7	B			9.8	A			29.8	D			41.7	E		
	WB	Left			-	-			-	-			-	-			-	-
		Through	-	-			-	-			-	-			-	-		
		Right	-	-			-	-			-	-			-	-		
	EB	Left			-	-			-	-			-	-			-	-
		Through	-	-			-	-			-	-			-	-		
		Right	-	-			-	-			-	-			-	-		
Stokley Way	NB	Left			20.8	C			21.1	C			10.2	B			8.7	A
		Through																
		Right	20.8	C			21.1	C			10.2	B			8.7	A		
	SB	Left																
		Through																
		Right																
	WB	Left			-	-			-	-			-	-			-	-
		Through	-	-			-	-			-	-			-	-		
		Right	-	-			-	-			-	-			-	-		
	EB	Left			-	-			-	-			-	-			-	-
		Through	-	-			-	-			-	-			-	-		
		Right	-	-			-	-			-	-			-	-		
Trap Road	NB	Left			16.5	C			15.4	C			10.6	B			9.4	A
		Through																
		Right	16.5	C			15.4	C			10.6	B			9.4	A		
	SB	Left																
		Through																
		Right																
	WB	Left			-	-			-	-			-	-			-	-
		Through	-	-			-	-			-	-			-	-		
		Right	-	-			-	-			-	-			-	-		
	EB	Left			-	-			-	-			-	-			-	-
		Through	-	-			-	-			-	-			-	-		
		Right	-	-			-	-			-	-			-	-		
Lucky Estates Drive/Wolftrap Run Road	NB "Lucky Estates	Left			23.0	C			11.4	B			10.1	B			8.0	A
		Through																
		Right	23.0	C			11.4	B			10.1	B			8.0	A		
	NB "MBC Access"	Left					77.2	F	77.2	F					97.9	F	97.9	F
		Through																
		Right																
	WB	Left	17.0	C	-	-			-	-	17.0	C	-	-			-	-
		Through	-	-			-	-			-	-			-	-		
		Right	-	-			-	-			-	-			-	-		
	EB	Left			-	-			-	-			-	-			-	-
		Through	-	-			-	-			-	-			-	-		
		Right	-	-			-	-			-	-			-	-		
Laurell Hill Road	NB	Left			11.5	B			12.5	B			8.7	A			7.6	A
		Through																
		Right	11.5	B			12.5	B			8.7	A			7.6	A		
	SB	Left																
		Through																
		Right																
	WB	Left			-	-			-	-			-	-			-	-
		Through	-	-			-	-			-	-			-	-		
		Right	-	-			-	-			-	-			-	-		
	EB	Left			-	-			-	-			-	-			-	-
		Through	-	-			-	-			-	-			-	-		
		Right	-	-			-	-			-	-			-	-		
Lewinsville Rd/Brook Rd	NB	Left	2.4	A	-	-	1.4	A	-	-	14.1	B	-	-	2.5	A	-	-
		Through	-	-			-	-			-	-			-	-		
		Right	-	-			-	-			-	-			-	-		
	SB	Left			-	-			-	-			-	-			-	-
		Through	-	-			-	-			-	-			-	-		
		Right	-	-			-	-			-	-			-	-		
	EB	Left	22.3	C	23.9	C	16.7	C	8.2	A	1183.6	F	1556.8	F	16.4	C	9.1	A
		Through																
		Right	24.2	C			6.6	A			1564.7	F			8.0	A		

7. Overall Corridor Analysis

The VISSIM model was evaluated at both the individual intersection level and the entire corridor level. As outlined throughout this report, there are two models for the design year 2040; a Conventional model and a Build model. The Conventional model includes conventional intersection configurations at all signalized intersections. The Build model includes the Eastbound Flyover design for the Baron Cameron Avenue/Springvale Road intersection and the Displaced Left intersection design for the Lewinsville Road intersection. Proposed modifications to the unsignalized intersections include left-turn restrictions and median U-turns in both the Conventional and Build models. The following sections outline the results of the comparison between the Conventional and the Build models for the overall corridor operations.

7.1. Travel Times

Table 31 shows the travel times for westbound Route 7 in the study area. The travel time is measured for three segments that cover from Dulles Toll Road Westbound Off-Ramp/Jarrett Valley Drive to Beulah Road/ Forestville Drive, from Beulah Road/Forestville Drive to Baron Cameron Avenue/Springvale Road and from Baron Cameron Avenue/Springvale Road to Reston Parkway. In addition to the three segments, the total average travel time is also measured from Dulles Toll Road Westbound Off-Ramp/Jarrett Valley Drive intersection to the Reston Parkway intersection representing the overall westbound corridor. In the PM peak hour, the Build model has a travel time of 9.07 minutes while the Conventional model has a time of 11.92 minutes. Because of the significant improvement in delay at Lewinsville Road in the Build model compared to the Conventional model, the largest difference in travel time between the Conventional and Build models is observed in the first segment, Dulles Toll Road Westbound Off-Ramp/Jarrett Valley Drive to Beulah Road/Forestville Drive, with a 2.6 minutes improvement in the Build model. In the AM peak hour, the Build model and Conventional model show similar travel times for the westbound direction for the three segments. This is expected as the vehicular peak in the AM peak hour is in the eastbound direction with the signals optimized for that direction; therefore, the westbound direction in the AM peak does not experience the signal progression benefits.

Table 31: Travel Time Summary – Westbound Route 7

Intersection	Westbound Travel Times (min)			
	2040 AM Conventional	2040 AM Build	2040 PM Conventional	2040 PM Build
Section 1 (Dulles Toll Road WB Off-Ramp/Jarrett Valley Dr to Beulah Rd/Forestville Dr)	3.77	4.69	6.13	3.49
Section 2 (Beulah Rd/Forestville Dr to Baron Cameron Ave/Springvale Rd)	2.85	3.38	3.36	3.45
Section 3 (Baron Cameron Ave/Springvale to Reston Parkway)	1.74	1.78	2.25	1.90
Total Westbound Travel Time (Dulles Toll Road WB Off-Ramp/Jarrett Valley Dr to Reston Parkway)	8.34	9.98	11.92	9.07

Table 32 shows the travel times for eastbound Route 7 in the study area. Similar to the westbound direction, the travel time was measured for the eastbound from Reston Parkway to Dulles Toll Road Westbound Off-Ramp/Jarrett Valley Drive for the overall eastbound corridor. In addition, the overall corridor was split into three travel time segments, from Reston Parkway to Baron Cameron Avenue/Springvale Road, from Baron Cameron Avenue/Springvale Road to Beulah Road/Forestville Drive and from Beulah Road/Forestville Drive to Dulles Toll Road Westbound Off-Ramp/Jarrett Valley Drive. For the AM peak hour, the Build model has a shorter travel time of 8.55 minutes through the corridor, while the Conventional model has a time of 8.78 minutes. Moreover, travel time for segments 1 and 2 in the Build model improved over the Conventional model. The flyover design for the eastbound Route 7 through movement at the intersection of Baron Cameron Avenue/Springvale Road decreases the eastbound travel time in the AM peak hour. For the PM peak hour, the Build model has a shorter eastbound corridor travel time of 8.18 minutes compared to 8.25 minutes for the Conventional model.

Table 32: Travel Time Summary – Eastbound Route 7

Intersection	Eastbound Travel Times (min)			
	2040 AM Conventional	2040 AM Build	2040 PM Conventional	2040 PM Build
Section 1 (Reston Parkway to Baron Cameron Ave/Springvale Rd)	2.35	1.80	2.31	1.67
Section 2 (Baron Cameron Ave/Springvale Rd to Beulah Rd/Forestville Dr)	3.53	3.26	2.91	3.20
Section 3 (Beulah Rd/Forestville Dr to Dulles Toll Road WB Off-Ramp/Jarrett Valley Dr)	2.85	3.45	3.01	3.17
Total Eastbound Travel Time (Reston Parkway to Dulles Toll Road WB Off-Ramp/Jarrett Valley Dr)	8.78	8.55	8.25	8.18

Appendices D, E, F and G show the westbound and eastbound travel times for the 10 runs for the AM Conventional, AM Build, PM Conventional and PM Build models, respectively

7.2. Delays and Level of Service

The VISSIM model was used for evaluating delay and LOS for both peak hours in the final traffic analysis. Table 33 shows signalized intersection delay and LOS based on the VISSIM 5.40 model in the study area.

The results for the Build model indicate remarkable improvements in delay and levels of service with the alternative intersections at Baron Cameron Avenue and Lewinsville Road as well as with the access management solutions at the unsignalized intersections along the corridor. These spot improvements also translate to the overall corridor. There is a significant difference in delays at Baron Cameron Avenue/Springvale Road between the Conventional and Build models, particularly in the AM peak hour. This is reflected in an improvement in LOS from E to C in the AM peak hour and from LOS D to C in the PM peak hour. Significant delay reductions are also seen at the Lewinsville Road intersection, Dulles Toll Road WB off-ramp/Jarret Valley Drive as well as the Reston Parkway intersection during the PM peak hour.

Appendices D, E, F and G show the delay and LOS for the signalized intersections by movement and approach for the AM Conventional, AM Build, PM Conventional and PM Build models, respectively.

Table 33: Signalized Intersections Level of Service and Delay

Intersection	2040 AM Conventional		2040 AM Build		2040 PM Conventional		2040 PM Build	
	Inter. Delay (s/veh)	Inter. LOS	Inter. Delay (s/veh)	Inter. LOS	Inter. Delay (s/veh)	Inter. LOS	Inter. Delay (s/veh)	Inter. LOS
Reston Parkway	25.6	C	24.2	C	53.0	D	22.1	C
Utterback Store Rd	11.3	B	10.3	B	21.5	C	18.1	B
Baron Cameron Ave/Springvale Rd	68.9	E	21.9	C	48.0	D	23.2	C
Delta Glen Ct/Colvin Run Rd (West)	9.0	A	9.4	A	11.1	B	9.1	A
Carpers Farm Way/Colvin Run Rd (East)	20.5	C	22.5	C	19.5	B	25.5	C
Beulah Rd/Forestville Dr	21.6	C	30.8	C	22.8	C	18.5	B
Towlston Rd	15.5	B	25.1	C	28.0	C	30.1	C
Lewinsville Rd (eastern)			11.7	B			14.0	B
Lewinsville Rd (western)	32.8	C	37.2	D	47.6	D	18.3	B
Dulles Toll Road WB Off-Ramp/Jarrett Valley Dr	4.3	A	7.1	A	26.5	C	5.4	A

7.3. Recommended/Proposed Storage Length for Turn Lanes

The following section is presenting the recommended auxiliary lane length for the signalized intersections as well the unsignalized turn lanes within Route 7 project corridor. The criteria to follow for designing the auxiliary lanes was discussed and agreed upon with VDOT to meet either the criteria established in the VDOT Road Design Manual (RDM) requiring just the taper and storage without deceleration length or that established in the AASHTO Green Book. Table 34 shows the recommended storage length and taper for the proposed turn lanes at the signalized intersections along the corridor. The design of the storage length was calculated based on the maximum of the maximum queues from the AM and PM Build Peak hours. A minimum length of 200 feet is used based on VDOT RDM. For left turn lanes with low turning volumes or queues, a storage of 100 feet minimum, deceleration and taper is provided based on AASHTO requirements.

Table 34: Recommended Storage Length Lane and Taper for the Signalized intersections

Intersection	Approach	Movement	Design Speed (mph)	Number of Storage Lanes	Max of the AM and PM Volumes (vph)	VISSIM Max Queue Length Output (ft) (Year 2040)	Min Storage Length (ft)	Recommended Storage Length including taper (ft)	Remarks
Reston Parkway	WB	Left	60	1	**255**	**474**	200	**200 Taper / 490 Storage**	
		Right	60	1	**5**	**472**	200	**200 Taper / 200 Storage*** **	
	EB	Left	60	1	**5**	**992**	200	**100 Storage / 405 Deceleration/ 200 Taper**** **	
		Right	60	1	**620**	**992**	200	**200 Taper / 1030 Storage**	
Utterback Store Rd	WB	Left	60	1			200	**100 Storage / 405 Deceleration/ 200 Taper**** **	U-turn
		Right	60	1	**190**	**309**	200	**200 Taper / 375 Storage**	
	EB	Left	60	1	**220**	**580**	200	**200 Taper / 590 Stotrage**	
		Right							
Baron Cameron Ave/Springvale Rd	WB	Left	60	2	**1020**	**1378**	200	**200 Taper / 1380 Storage**	
		Right	60	1	**75**	**1379**	200	**200 Taper / 200 Storage*** **	
	EB	Left	45	1	**30**	**199**	200		Left turn is a ramp exit
		Right	--	NA	**270**				Right turn is a ramp exit
Colvin Run Rd/Delta Glen	WB	Left	60	1	**60**	**900**	200	**100 Storage / 405 Deceleration/ 200 Taper**** **	
		Right	60	1	**15**	**884**	200	**200 Taper / 200 Storage*** **	
	EB	Left	60	1	**210**	**396**	200	**200 Taper / 405 Storage**	
		Right	60	NA	**20**	**384**	200		Continuous drop lane from Baron Cameron EB on ramp
Colvin Run Road (East)/Carpers Farm Way	WB	Left	60	1	**60**	**1631**	200	**100 Storage / 405 Deceleration/ 200 Taper**** **	
		Right	60	1	**315**	**1631**	200	**200 Taper /320 Storage*** **	
	EB	Left	60	1	**25**	**888**	200	**100 Storage / 405 Deceleration/ 200 Taper**** **	
		Right	60	1	**30**	**888**	200	**200 Taper / 200 Storage*** **	
Beulah Rd/Forestville Dr	WB	Left	60	1	**195**	**562**	200	**100 Storage / 405 Deceleration/ 200 Taper**** **	
		Right	60	1	**40**	**563**	200	**200 Taper / 200 Storage*** **	
	EB	Left	60	1	**45**	**1591**	200	**200 Taper / 200 Storage*** **	
		Right	60	1	**195**	**1592**	200	**200 Taper / 200 Storage*** **	
Towlston Rd	WB	Left	60	1	**80**	**1370**	200	**100 Storage / 405 Deceleration/ 200 Taper**** **	
		Right	60	1	**60**	**1371**	200	**200 Taper / 200 Storage*** **	
	EB	Left	60	1	**257**	**908**	200	**200 Taper / 910 Storage**	
		Right	60	1	**85**	**909**	200	**200 Taper / 200 Storage*** **	
Lewinsville Rd	WB	Left (western)	50	2	**646***	**480 ****	200	**200 Taper / 450 Stotrage**	Dual Left turn to western entrance of McLean Bible Church. Due to spacing limitation, the storage length will be limited to 450' and 200' taper
		Left (eastern)	50	1	**360***	**625 ****	200	**200 Taper / 625 Stotrage**	Left turn to eastern McLean Bible Curch entrance/Lewinsville intersection
		Right	50	1			200	**200 Taper / 200 Storage**	Free flow right turn
	EB	Left (eastern)	50	1	**680**	**52**	200	**680**	Displaced Left Turn Pocket Lane/No taper is required
		Left (western)	50	1	**700**	**1093**	200	**200 Taper / 1020 Storage**	Initial Displaced Left Turn prior to crossing over Westbound lanes
		Right	50	1	**270***	**81 ****	200	**200 Taper / 200 Storage**	

Movement does not exist

* Sunday Egress/Ingress Peak Volume

** Queue length based on Sunday Egress/Ingress Volumes

*** The VISSIM calculated maximum queue in this case accounts for **Right** turning vehicles that are denied entry into the turn lane due to the through queues. Based on the relatively low volume, the minimum turn lane length is proposed for this case.

**** The VISSIM calculated maximum queue in this case accounts for **Left** turning vehicles that are denied entry into the turn lane due to the through queues. Based on the relatively low volume, storage/deceleration/taper based on AAHSTO requirements are provided for off peak high speed vehicle movements.

Table 35 shows the recommended storage length and taper for the proposed unsignalized left turn lanes along the corridor. The design includes storage, deceleration and taper based on AASHTO requirements. The minimum storage Table 35length used is 100 feet based on AASHTO (pg. 9-127), whereas the deceleration length is determined for a 60 mph design speed is 605 feet including the taper length.

Table 35: Unsignalized Left Turn Lane Warrants for Mainline Route 7

Side Street	Eastbound Route 7				Recommended Turn Lane Geometry (ft)	Notes
	Max 2040 TurningVolume	Existing Turn Lane?	Existing Turn Lane Length (ft)	Turn Lane Warranted?		
Amanda Dr	15	Yes	480	Yes	100 Storage / 405 Deceleration / 200 Taper	
Faulkner Dr	45	Yes	340	Yes	100 Storage / 180 Deceleration / 200 Taper	Full deceleration cannot be provided due to geomtric constraints
U-Turn near Atwood Rd	5	No	N/A	Yes	100 Storage / 405 Deceleration / 200 Taper	

Intersection	Westbound Route 7				Recommended Turn Lane Geometry (ft)	Notes
	Max 2040 Volume	Existing Turn Lane?	Existing Turn Lane Length (ft)	Warranted?		
Bishops Gate Way	35	Yes	300	Yes	100 Storage / 405 Deceleration / 200 Taper	
Middleton Ridge Rd	55	Yes	500	Yes	100 Storage / 405 Deceleration / 200 Taper	
Atwood Rd	86	Yes	130	Yes	100 Storage / 405 Deceleration / 200 Taper	
Lucky Estates Dr	25	Yes	200	Yes	100 Storage / 405 Deceleration / 200 Taper	

Table 36 shows the recommended storage length and taper for the proposed unsignalized right turn lanes along the corridor. Only storage and taper were provided if right turn lane is warranted or to replace an existing tight turn lane.

Table 36: Unsignalized Right Turn Lane Warrants for Mainline Route 7

Side Street	Eastbound Route 7				Recommended Turn Lane Geometry (ft)	Notes
	Max 2040 Turning Volume	Existing Turn Lane?	Existing Turn Lane Length (ft)	Turn Lane Warranted?		
Bishops Gate Way	65	Yes	480	**Yes. Full-width lane and taper required**	**200 Taper / 200 Storage**	
Markell Ct / Amanda Dr	5	Yes	500	**No**	**200 Taper / 200 Storage**	Turn lane / Taper provided to replace existing
Christian Fellowship Church	Not Available	Yes	360	**No**	**200 Taper / 100 Storage**	Turn lane / Taper provided even though the Sunday traffic volume is unknown due to the significant size of the church parking lot and existing turn lane / taper and potential political issues if none is provided.
Driveway for Colvin Forest Estates	Not Available	Yes	410	**No**	**200 Taper / 100 Storage**	Turn lane is an extension of the adjacent church access. Likely part of proffer or agreement with HOA. Serves 4 houses
Colvin Forest Dr	30	Yes	380	**Yes. Taper required**	**200 Taper / 200 Storage**	Turn lane / Taper provided to replace existing
Faulkner Dr	15	No		**Yes. Taper required**	**200 Taper / 100 Storage**	
Middleton Ridge	10	Yes	510	**Yes. Taper required**	**200 Taper / 200 Storage**	Turn lane / Taper provided to replace existing
Newcombs Farm	25	Yes	270	**Yes. Taper required**	**200 Taper / 100 Storage**	Turn lane / Taper provided to replace existing. Due to proximity of Middleton Ridge intersection 100 storage provided
Preschool	Not Available	Yes	160		**200 Taper / 100 Storage**	Taper provided to increase safety for turning vehicles
Atwood Rd	15	Yes	180	**Yes. Taper required**	**200 Taper / 100 Storage**	
Stokely Way	10	Yes	390	**Yes. Taper required**	**200 Taper / 200 Storage**	Turn lane / Taper provided to replace existing
Trap Rd	95	Yes	160	**Yes. Full-width lane and taper required**	**200 Taper / 200 Storage**	
Wolftrap Run / Lucky Estates	20	Yes	300	**Yes. Taper required**	**200 Taper / 200 Storage**	Turn lane / Taper provided to replace existing
Laurel Hill Rd	40	Yes	320	**Yes. Full-width lane and taper required**	**200 Taper / 200 Storage**	
Old Ash Grove	Not Available	Yes	220	**No**	**100 Taper / 100 Storage**	Lower posted speed for mainline at this point (45 mph). Turn lane / Taper provided to replace existing

Table 36: Unsignalized Right Turn Lane Warrants for Mainline Route 7 (continued)

Intersection	Westbound Route 7				Recommended Turn Lane Geometry (ft)	Notes
	Max 2040 Volume	Existing Turn Lane?	Existing Turn Lane Length (ft)	Warranted?		
Great Passage Blvd	25	Yes	310	**Yes. Taper required**	**200 Taper / 200 Storage**	Existing turn lane does not have a taper.
Markell Ct/Amanda Dr	10	Yes	522	**Yes. Taper required**	**200 Taper / 200 Storage**	Turn lane / Taper provided to replace existing
Riva Ridge Dr	65	Yes	380	**Yes. Full-width lane and taper required**	**200 Taper / 200 Storage**	
Faulkner Dr	10	Yes	320	**Yes. Taper required**	**200 Taper / 200 Storage**	Turn lane / Taper provided to replace existing
Trotting Horse Ln	30	Yes	190	**Yes. Taper required**	**200 Taper / 100 Storage**	
Lyons St	5	No		**No**	**200 Taper / 100 Storage**	Taper provided to increase safety for turning vehicles
Covance Laboratories Entrance	Not Available	Yes	190	**No**	**None**	Property is vacant. No turn lane will be provided
Covance Laboratories Second Entrance	Not Available	Yes	240	**No**	**None**	Shared entrance with a private residential property
Dreamweaver Ct	Not Available	No		**No**	**200 Taper / 100 Storage**	Turn lane provided to increase safety for turning vehicles. Extension of Royal Estates turn lane
Royal Estates Dr	Not Available	Yes	120	**No**	**200 Taper / 100 Storage**	Taper provided to increase safety for turning vehicles

8. Conclusions and Recommendations

This report evaluated multiple intersection alternatives throughout the project corridor to determine a conceptual design that will optimize the traffic operations of the Route 7 corridor while also leveraging investments in infrastructure to delay the need for constructing grade separated intersections. An initial traffic analysis was performed to determine viable intersection alternatives for each signalized intersection. Under the guidance of the FHWA Alternative Intersection Selection Tool along with engineering judgment, several signalized intersections were eligible for alternative intersection designs. These intersections included Reston Parkway, Utterback Store Road, Baron Cameron Avenue/Springvale Road, Carpers Farm Way/Colvin Run Road (East), and Lewinsville Road.

A VISSIM model was created and analyzed for the PM peak hour as this time period experiences higher overall volumes and serves as the worst-case scenario during the day. Five different alternatives were evaluated, each with different intersection configurations. After analyzing the results, a preliminary corridor design was selected for the initial analysis that includes the following design improvements:

- A Continuous Green "T" at Utterback Store Road
- An Eastbound Flyover at Baron Cameron Avenue
- A Hybrid Median U-Turn at Carpers Farm Way
- A Displaced Left at Lewinsville Road.
- Median modifications at several unsignalized intersections

The corridor design and the associated models were modified as the design process progressed to incorporate access management concerns, context sensitivity, constructability, and stakeholder input. As the result of the initial analysis, the corridor design carried forward to the final analysis in this study included alternative intersection designs at the Baron Cameron Avenue/Springvale Road and Lewinsville Road intersections. The remainder of the signalized intersections through the corridor are proposed to be conventional configurations. Several the unsignalized intersections along the corridor were also modified to address the above-mentioned inputs.

A Conventional model and a Build model were created in VISSIM to analyze the AM and PM peak hour performance of the corridor for the final analysis. The Conventional model has no specific alternative designs other than an additional third through lane in each direction of Route 7 and extra lanes on the side street approaches at some signalized intersection in the assigned corridor. At many of the

unsignalized intersections, median modifications were considered. The Build model included two innovative intersection designs; the Eastbound Flyover at Baron Cameron Avenue/Springvale Road, and Displaced Left at Lewinsville Road. Like the Conventional model, median modifications were designed at the unsignalized intersections in the Build model.

The measures of effectiveness used in the comparison are travel times through the corridor segments and the corridor as a whole, intersection delay, intersection throughput, intersection level of service, and average and maximum approach queues. The final conceptual design was selected and recommended for the Route 7 Corridor based on the comparison of the measures of effectiveness, context sensitivity analysis, access management considerations and input from the communities and other stakeholders.

In summary, the following features were concluded as the final concept design along the Route 7 corridor, based on the final analysis results in this study:

- Conventional configurations at Reston Parkway, Utterback Store Road, Delta Glen Court/ Colvin Run Road (West), Carpers Farm Way/Colvin Run Road (East), Beulah Road/Forestville Drive, Towlston Road and Dulles Toll Road WB Off-Ramp/Jarrett Valley Drive
- Eastbound grade separation at Baron Cameron Avenue/Springvale Road
- Eastbound Displaced Left at Lewinsville Road
- Right-in/left-in and right-out at Bishopsgate Way, Faulkner Drive, Middleton Ridge Road, Atwood Road and Lucky Estates Drive/Wolftrap Run Road
- Right-in/right-out for Markell Court and right-in/left-in and right-out for Amanda Drive
- Right-in/right-out at Trotting Horse Lane, Lyons Street, Stokley Way and Trap Road
- Great Passage Boulevard, Riva Ridge Drive, Colvin Forest Drive, Newcombs Farm Road, Laurel Hill Road will remain unchanged as right-in/right-out

Figure 16 and 17 schematically show the geometric improvements along the Route 7 corridor in the study area.

This report serves as in-depth investigation for the future traffic operations along Route 7 corridor between Reston Parkway and the Dulles Toll Road Westbound Off-Ramp/Jarrett Valley Drive intersection in Fairfax County. The study conducted the 2040 future operational analyses and assessed the operations of different intersection configuration alternatives. The report succesfully summarized the recommendendations of the preferred alternative for each intersection and provided a conceptual design with the most benefits to traffic operations for the corridor.

Virginia Department of Transportation

Figure 16:
Route 7 Corridor Improvements Project (1of 2)

Legend

- Proposed Road
- Proposed Bridge
- Proposed Shared Use Path
- Proposed Stormwater Management Basin
- Proposed Signal
- Existing Right of Way

Route 7 Corridor Improvements Project

Fairfax County, Virginia
State Project Number: 0007-029-128, P102, R202, C502, B610
UPC 52328
Federal Project Number

SCALE
0 150 300 450 600

THIS LAYOUT DEPICTING THE PROPOSED CORRIDOR IMPROVEMENTS IS CONCEPTUAL IN NATURE. THE CONCEPT DOES NOT INCLUDE FINAL DESIGN ITEMS THAT COULD BECOME NECESSARY AS THE PROJECT ADVANCES SUCH AS SOUND BARRIER WALLS ALONG WITH PROPOSED RIGHT OF WAY, TEMPORARY, AND PERMANENT EASEMENTS. THIS CONCEPT LAYOUT IS UNAPPROVED AND SHALL NOT BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

VDOT Virginia Department of Transportation

Figure 17:
Route 7 Corridor Improvements Project (2 of 2)

Legend

- Proposed Road
- Proposed Bridge
- Proposed Shared Use Path
- Proposed Stormwater Management Basin
- Proposed Signal
- Existing Right of Way

Route 7 Corridor Improvements Project

Fairfax County, Virginia
State Project Number: 0007-029-128, P102, R202, C502, B610
UPC 52328
Federal Project Number

VDOT Project No. 0007-029-128, P102
Widen Route 7 to 6-lanes

VDOT Proj. No. 00007-029-139, P101
Replace Bridge Deck and Widen Route 7 to 6-lanes
Spring of 2016 to Spring of 2018

SCALE 0 150 300 450 600'

THIS LAYOUT DEPICTING THE PROPOSED CORRIDOR IMPROVEMENTS IS CONCEPTUAL IN NATURE. THE CONCEPT DOES NOT INCLUDE FINAL DESIGN ITEMS THAT COULD BECOME NECESSARY AS THE PROJECT ADVANCES SUCH AS SOUND BARRIER WALLS ALONG WITH PROPOSED RIGHT OF WAY, TEMPORARY, AND PERMANENT EASEMENTS. THIS CONCEPT LAYOUT IS UNAPPROVED AND SHALL NOT BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

APPENDIX A

Existing Turning Movements and ADT Data

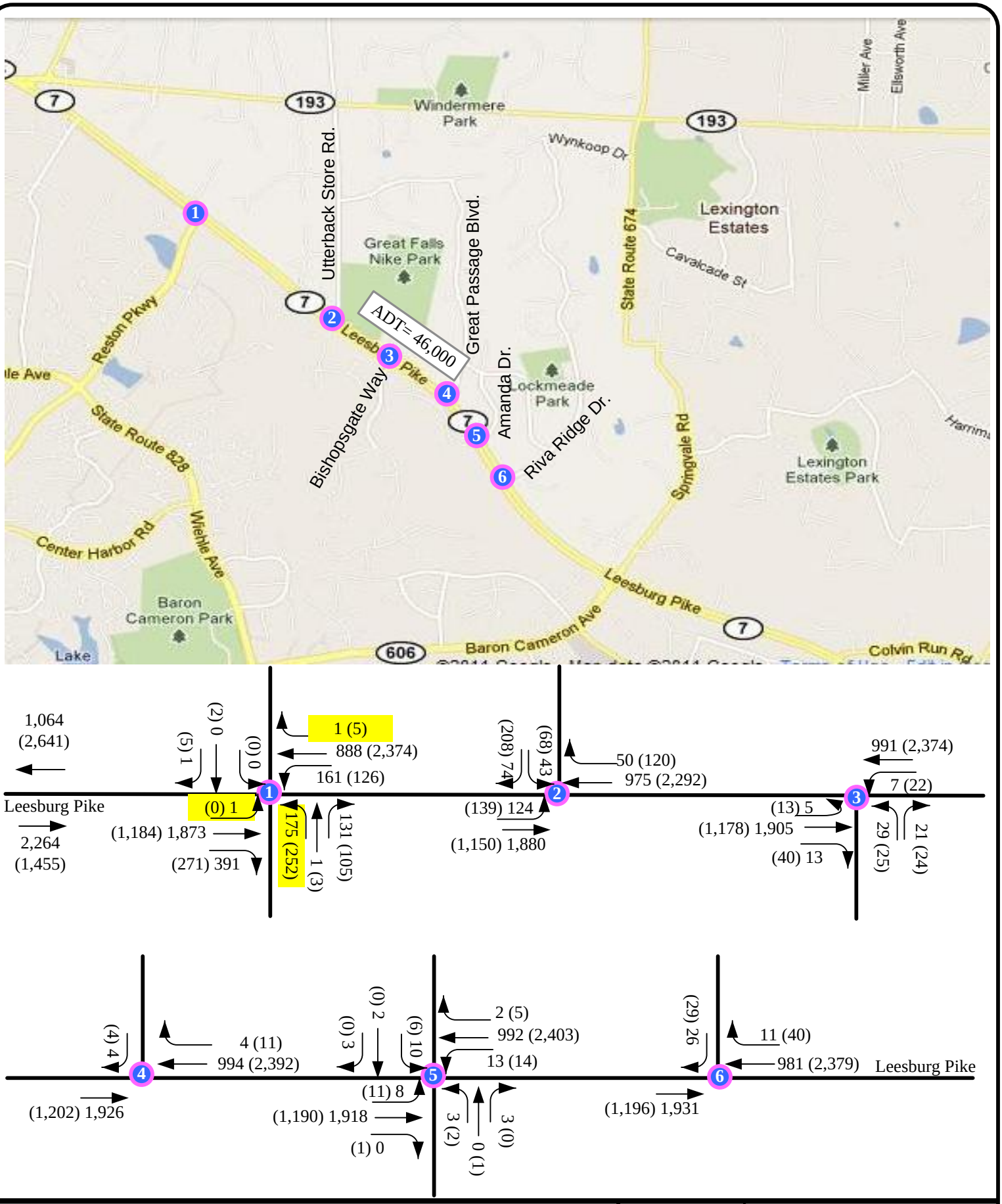


Figure 1A – Existing 2011 Daily, AM & (PM) Peak Hour Turning Traffic Volumes

Route 7 Widening, from Reston Ave. to Dulles Toll Road

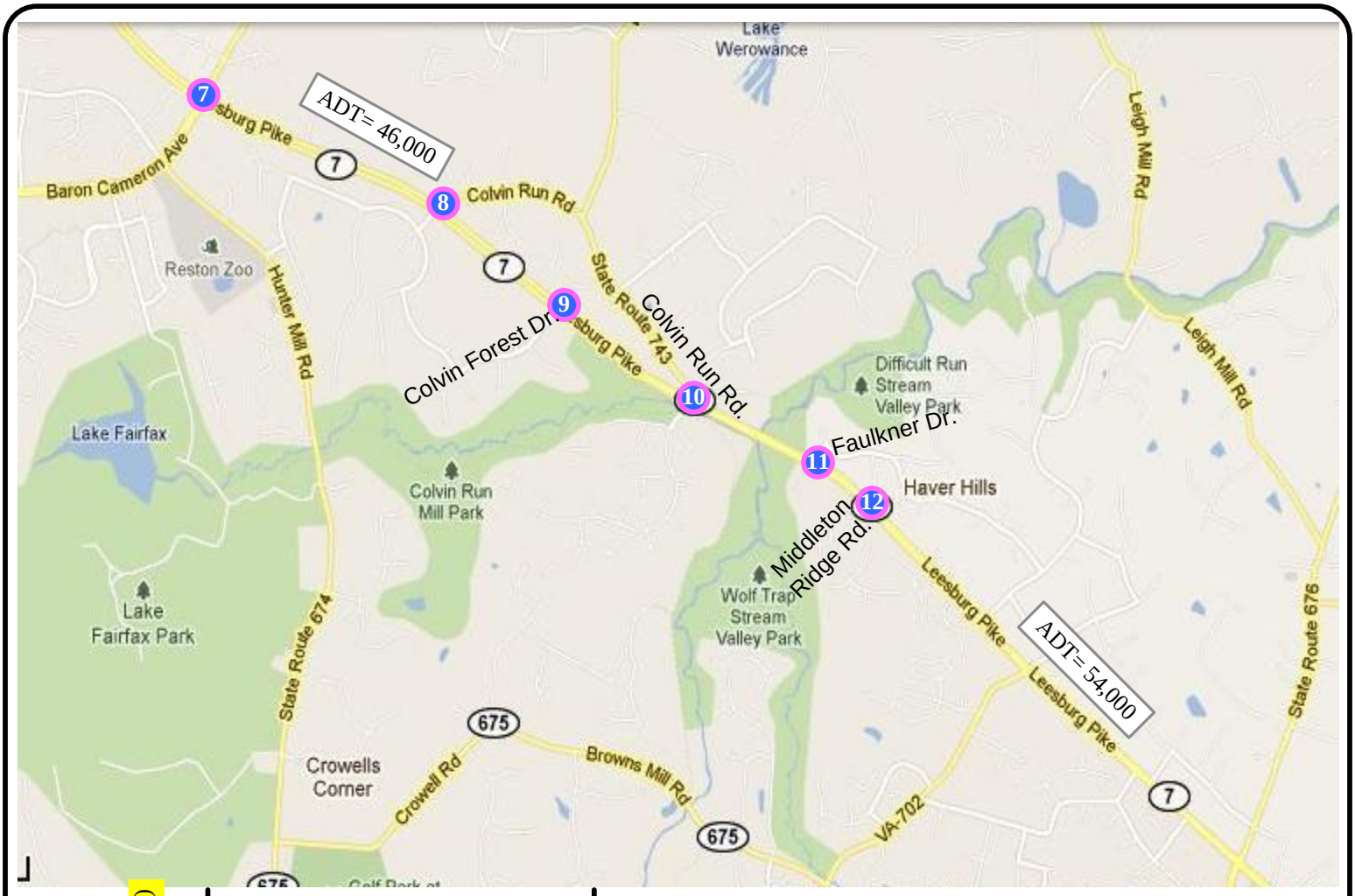
Project: 0007-029-128, P102, R202, C502, B610; UPC# 52328/Act. 616

N

Jan 14, 2013

VDOT

NOVA-TP<EA>



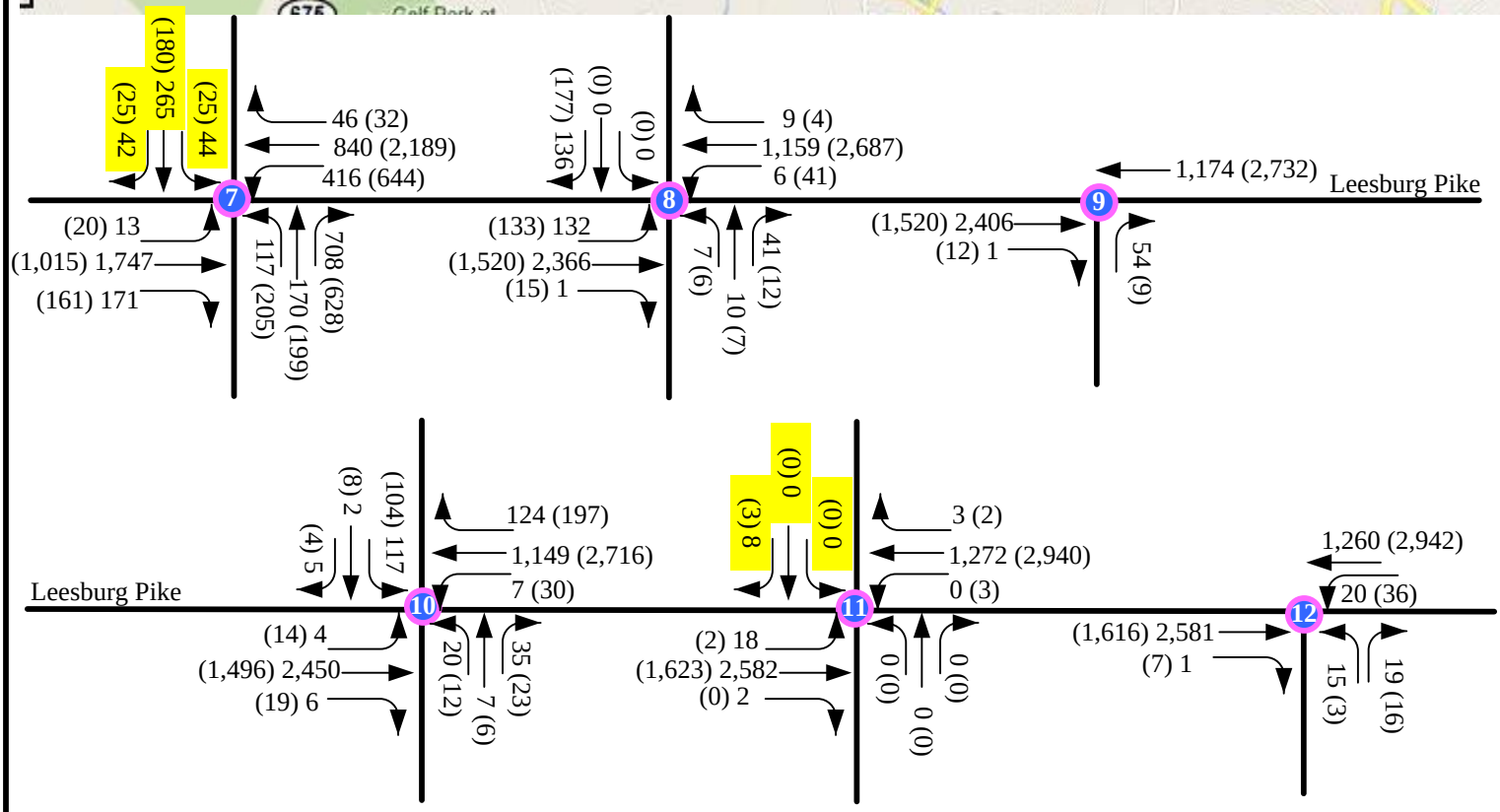


Figure 1B – Existing 2011 Daily, AM & (PM) Peak Hour Turning Traffic Volumes

Route 7 Widening, from Reston Ave. to Dulles Toll Road

Project: 0007-029-128, P102, R202, C502, B610; UPC# 52328/Act. 616

N

Jan 14, 2013

VDOT

NOVA-TP<EA>

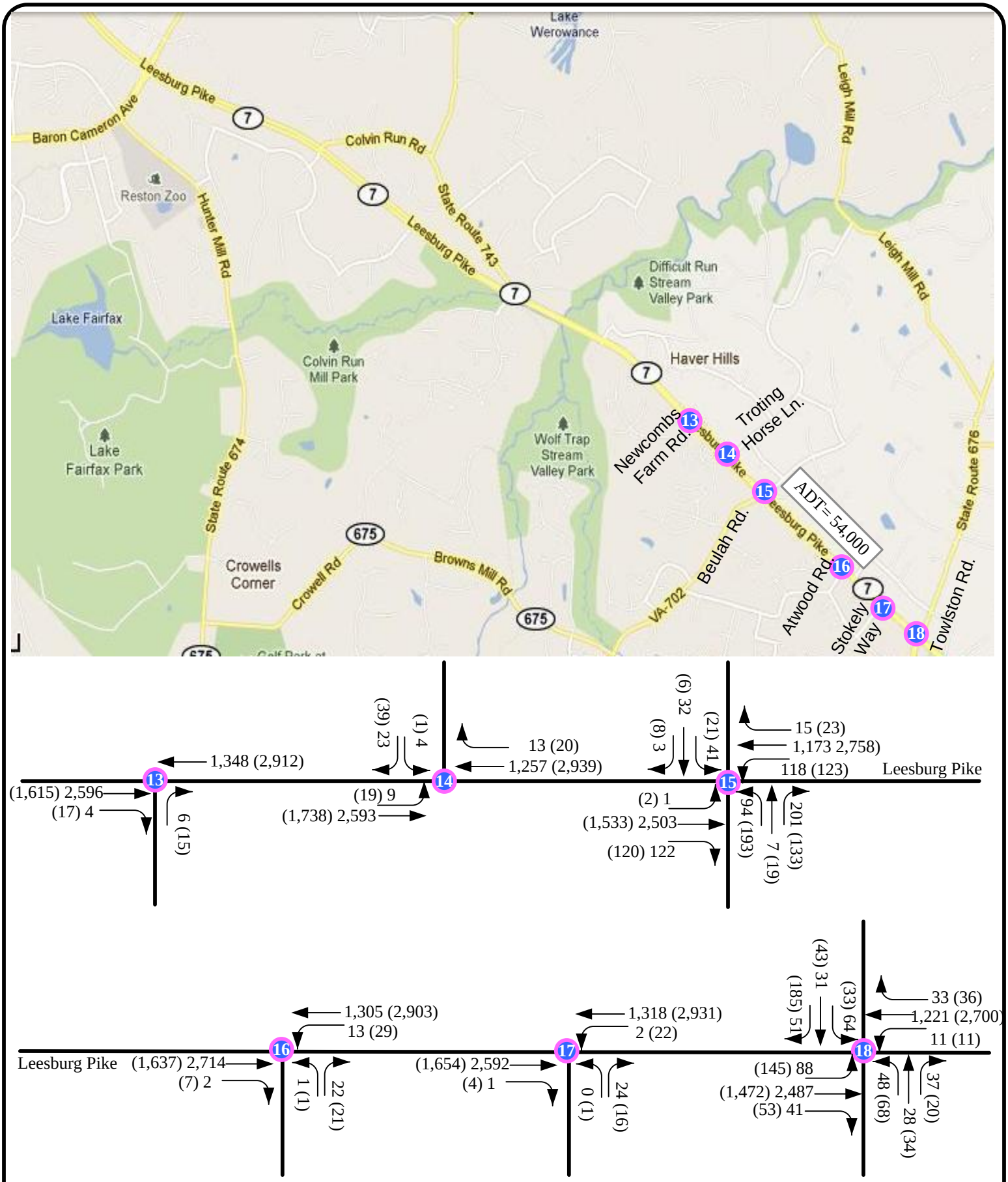


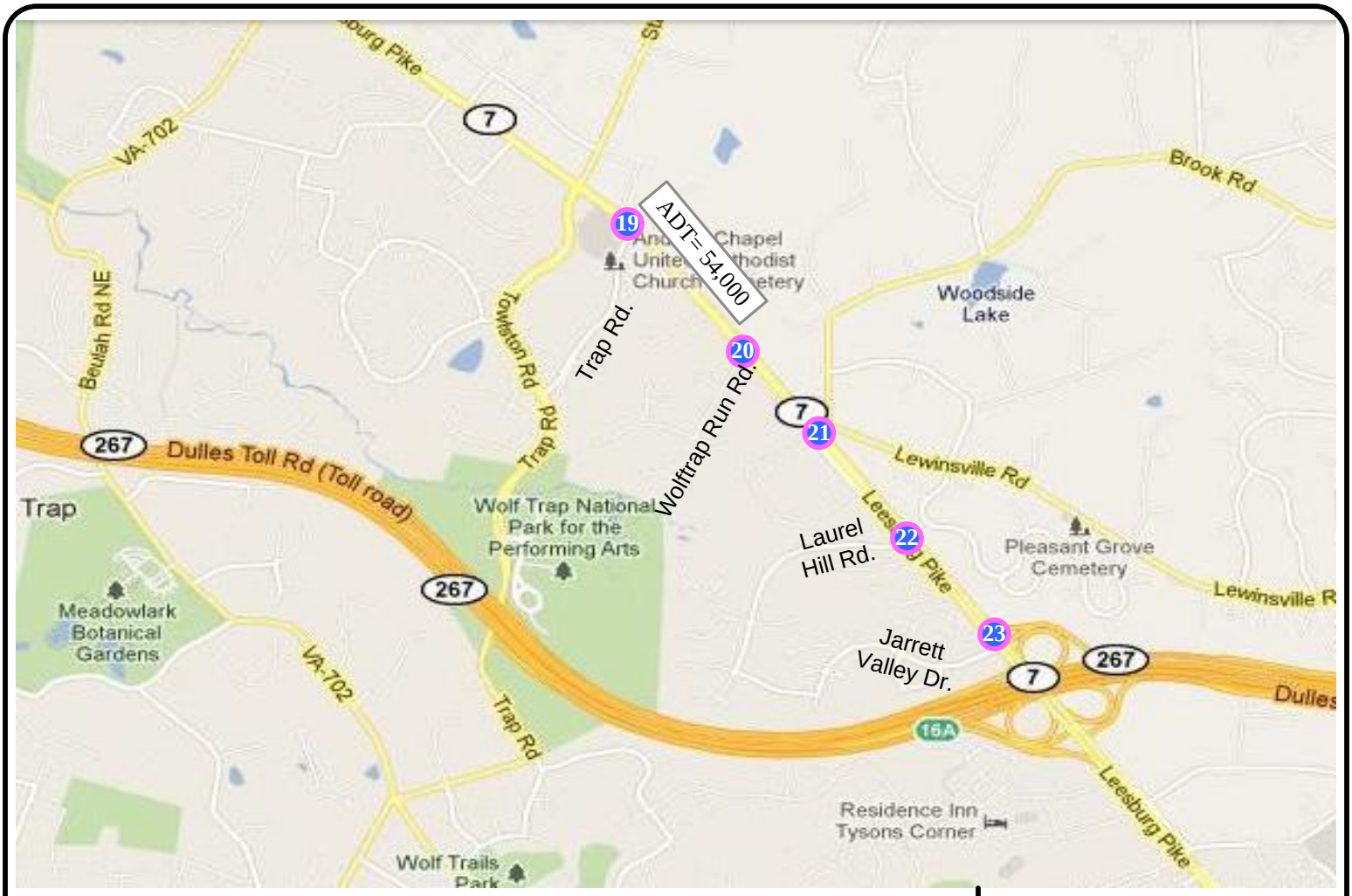
Figure 1C – Existing 2011 Daily, AM & (PM) Peak Hour Turning Traffic Volumes

Route 7 Widening, from Reston Ave. to Dulles Toll Road

Project: 0007-029-128, P102, R202, C502, B610; UPC# 52328/Act. 616

Nov. 23, 2011

NOVA-TP<EA>



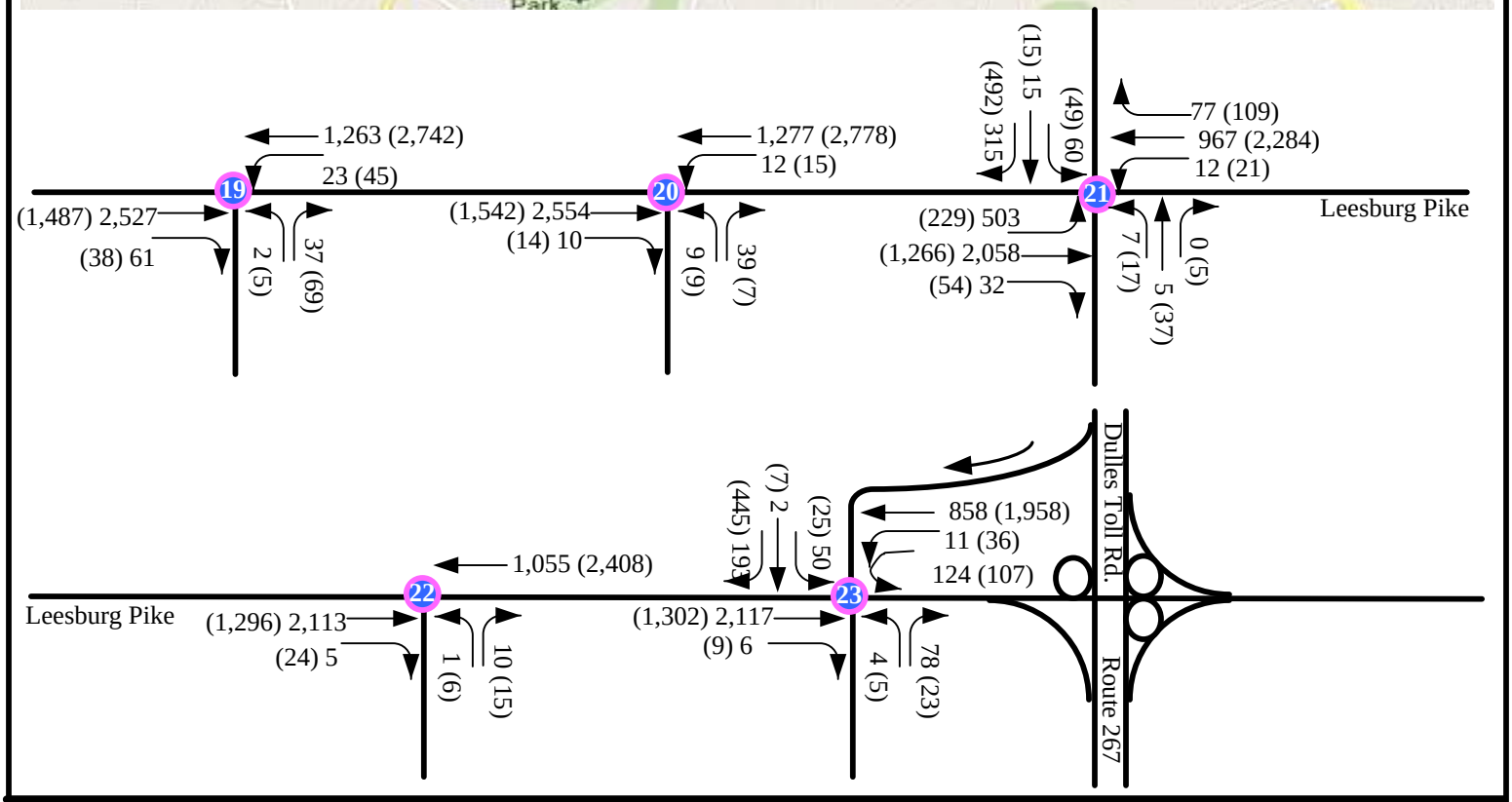


Figure 1D – Existing 2011 Daily, AM & (PM) Peak Hour Turning Traffic Volumes

Route 7 Widening, from Reston Ave. to Dulles Toll Road

Project: 0007-029-128, P102, R202, C502, B610; UPC# 52328/Act. 616

N

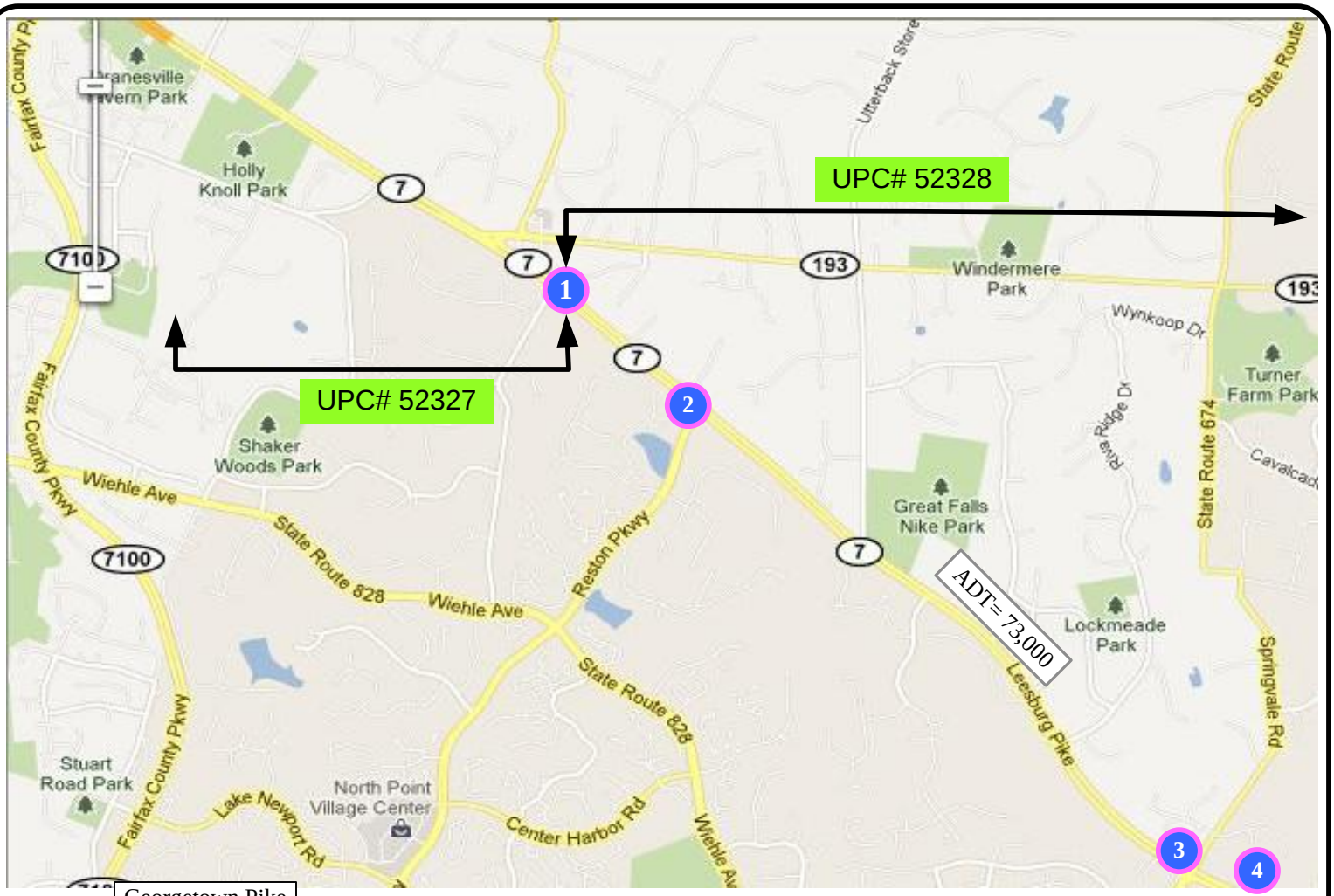
Nov. 23, 2011

VDOT

NOVA-TP<EA>

APPENDIX B

Projected Turning Movements and ADT Data



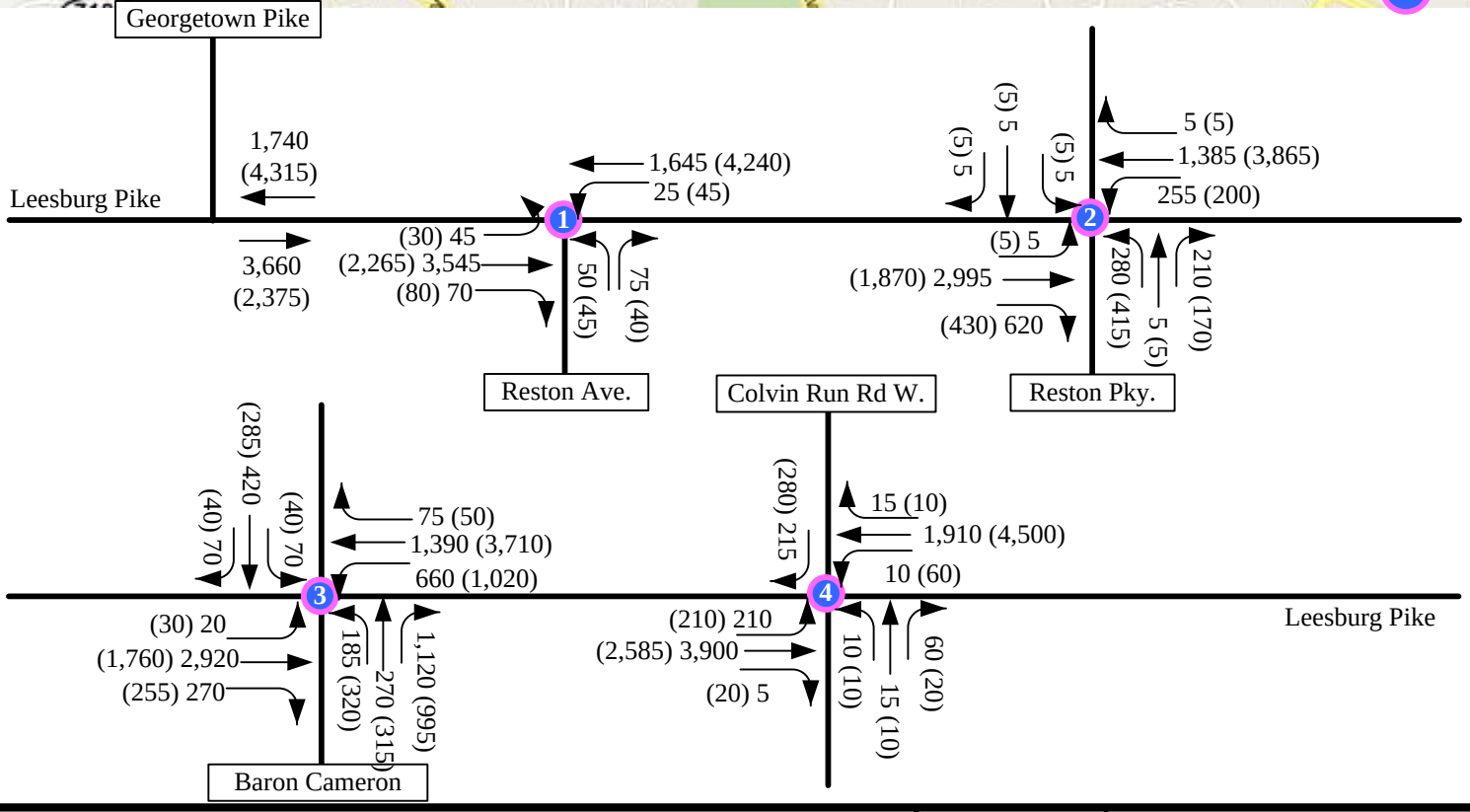


Figure 2A – Forecasted Design Year 2040 Daily, AM & (PM) Peak Hour Traffic Volumes

Route 7 Widening, from Reston Ave. to Dulles Toll Road

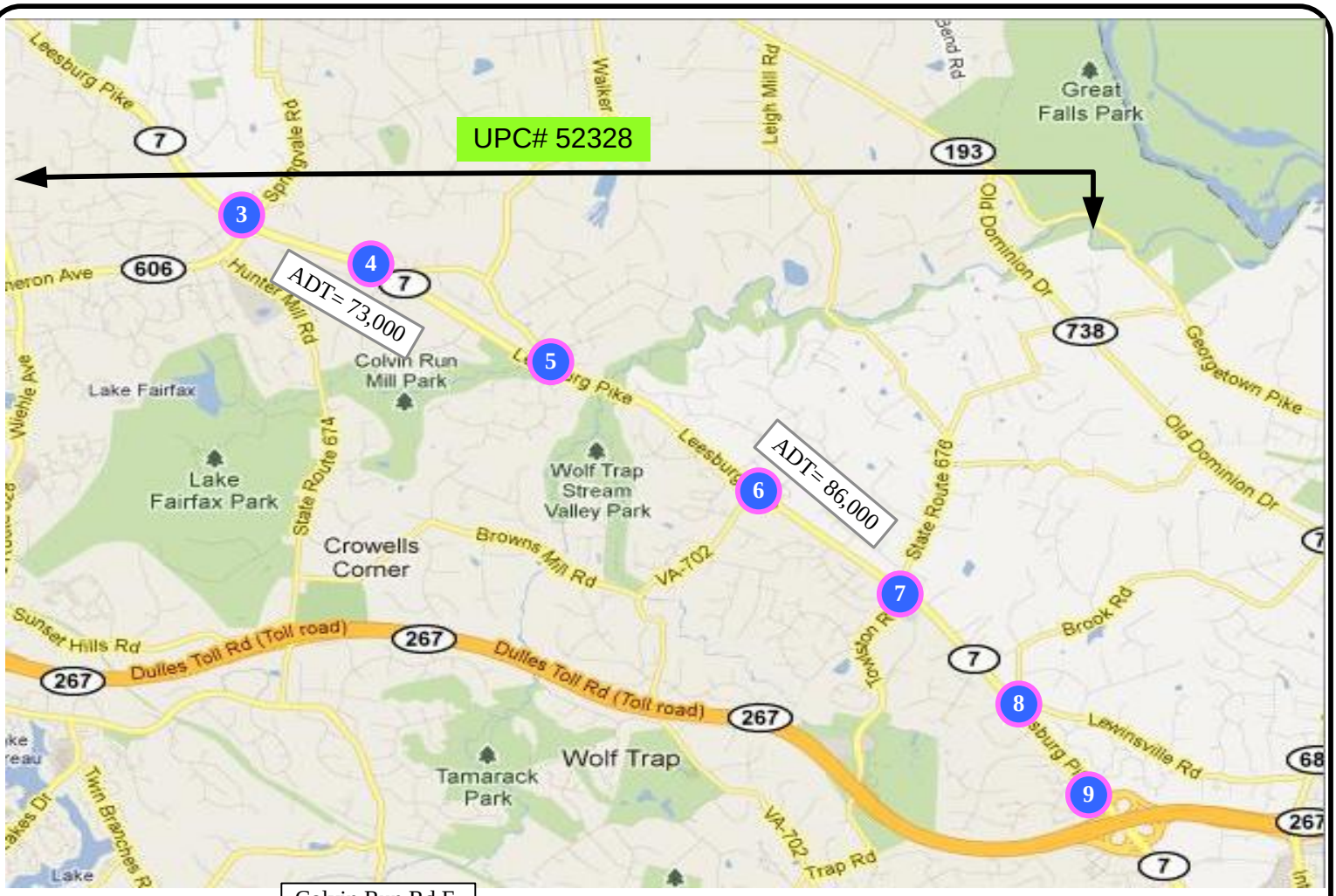
Project: 0007-029-128, P102, R202, C502, B610; UPC# 52328/Act. 616

N

Nov. 23, 2011

VDOT

NOVA-TP<EA>



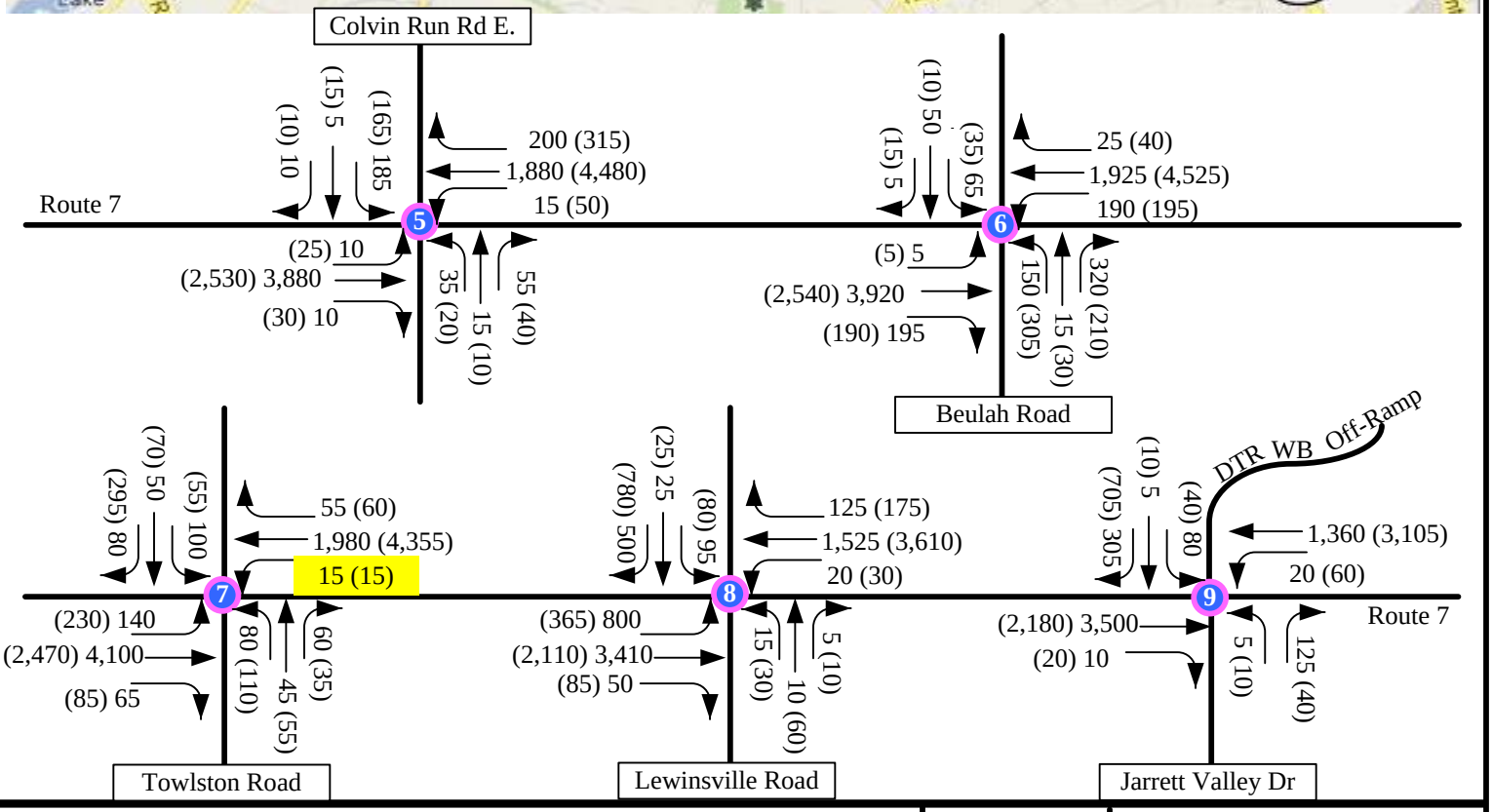


Figure 2B – Forecasted Design Year 2040 Daily, AM & (PM) Peak Hour Traffic Volumes

Route 7 Widening, from Reston Ave. to Dulles Toll Road

Project: 0007-029-128, P102, R202, C502, B610; UPC# 52328/Act. 616

Jan 14, 2013

NOVA-TP<EA>

APPENDIX C

Route 7 Travel Times Memo

JOHNSON, MIRMIRAN & THOMPSON
Engineering A Brighter Future®

Route 7 Travel Time Runs
Summary of Findings

Introduction

Route 7 (Leesburg Pike) is proposed to be widened from Reston Avenue to the Dulles Toll Road interchange in Fairfax County. As part of this project, a traffic study is required to be conducted prior to beginning the design of the widening to ascertain intersection configurations and to justify the improvements. Travel time runs were conducted during both the AM and PM peak hours in order to assist in calibrating the traffic models for use in the operational analysis. The peak hours were calculated based on the existing traffic volumes that were collected by VDOT in September and October of 2011. The calculated peak hours along the corridor are 7:30 AM – 8:30 AM and 4:45 PM – 5:45 PM. The speed limit along the corridor is 55 mph from the western project limit near Reston Avenue to just west of Wolftrap Run Road, 45 mph from just west of Wolftrap Run Road to just west of Jarrett Valley Drive and 35 mph from just west of Jarrett Valley Drive to the eastern project limit at the Dulles Toll Road.

Methodology

The dates and times of the travel time runs are listed below and closely coincide with the AM and PM peak hours of the corridor:

- Wednesday, November 7, 2012 – 7:15 AM – 9:00 AM and 4:15 PM – 6:00 PM
- Tuesday, February 12, 2013 – 7:30 AM – 9:00 AM and 4:45 PM – 6:45 PM

The segmented travel times were recorded between each of the nine signalized intersections between Reston Parkway and the Dulles Toll Road bridge. As the data collection vehicle passed over the stop bar at the particular signalized intersection the time was recorded. A minimum of three travel time runs were completed for each direction for both the AM and PM peak hours. The runs were expanded from the actual peak hours in order to fully capture the peak periods and to allow time for the test vehicles to complete their runs. The recorded travel times at each intersection are shown at the end of this section.

Findings

In order to calculate the average speed between Reston Parkway and the Dulles Toll Road Bridge the overall travel time and distance was calculated. The overall travel time includes all signalized intersection delay that was experienced during the travel time runs. The overall distance in miles was divided by the overall average travel time in hours in order to obtain average speed in miles per hour. The average travel speeds along three segments in the eastbound direction are shown in **Table 1** and the westbound direction is shown in **Table 2**. The overall average travel speed summary for the corridor for both AM and PM peak hours are shown in **Table 3**.

Table 1—Average Travel Speed by Segments (Eastbound)

Eastbound	November AM Speed (MPH)	February AM Speed (MPH)	November PM Speed (MPH)	February PM Speed (MPH)
Reston Pkwy to Colvin Run Rd/Delta Glen Ct	34	19	44	39
Colvin Run Rd/Delta Glen Ct to Beulah Rd	16	14	48	44
Beulah Rd to DTR Bridge	22	31	39	43

Table 2—Average Travel Speed by Segments (Westbound)

Westbound	November AM Speed (MPH)	February AM Speed (MPH)	November PM Speed (MPH)	February PM Speed (MPH)
DTR Bridge to Beulah Rd	43	42	41	31
Beulah Rd to Colvin Run Rd/Delta Glen Ct	51	46	25	19
Colvin Run Rd/Delta Glen Ct to Reston Pkwy	48	51	18	41

Table 3—Average Travel Speed Summary (from Reston Parkway to Dulles Toll Road)

Peak Hour	Direction	November 2012	February 2013
AM Peak	Eastbound	19 MPH	17 MPH
	Westbound	44 MPH	44 MPH
PM Peak	Eastbound	40 MPH	38 MPH
	Westbound	22 MPH	25 MPH

AM Peak Hour

The eastbound direction experiences the heaviest volume of traffic during the AM peak hour. In November, major congestion was experienced in the eastbound direction between Utterback Store Road to Beulah Road (3.75 miles) and from Towlston Road to the DTR Bridge (1.50 miles). The travel time runs collected in February had similar results with the heaviest congestion experienced from Reston Parkway to Beulah Road (4.25 miles) and from Lewinsville Road to the DTR Bridge (0.75 miles). A speed difference of 15 mph, as shown in **Table 1**, was observed between the November and February trials along the segment from Reston Parkway to Colvin Run Road/Delta Glen Court. This change can be attributed to any number of factors that were outside of our ability to record. One supposition is the fact that the sky was cloudy on the day in November while the sky was clearer on the day in February. This has the effect of enhancing the sun glare delays typically experienced during these times of the year where the sun rises near the beginning of the peak hour. The westbound direction had very little congestion in the AM peak hour and the average travel speed results were very similar in both November and February.

As shown in **Table 3**, during the AM peak hour the eastbound direction had an average travel time of 19 mph in November and 17 mph in February. The westbound direction had an average speed of 44 mph in both trials.

PM Peak Hour

The westbound direction experiences the heaviest volume of traffic during the PM peak hour. In November, most of the congestion was experienced in the westbound direction from Towlston Road to

Beulah Road (0.75 miles) and from Capers Farm Way to Reston Parkway (3.15 miles). In February, most of the delay was experienced in the westbound direction from Lewinsville Road to Baron Cameron Avenue (4.10 miles). As shown in **Table 2**, the PM westbound direction had a difference of 23 mph from Delta Glen Court to Reston Parkway. The queue from the Georgetown Pike intersection extended east to Reston Parkway and caused additional delay and slower travel speeds during this time; however, this major congestion was experienced only in the November trial. The nature of the congestion suggested that there was an incident to the west of the Georgetown Pike intersection, out of sight of the data collectors, which contributed to the congestion.

As shown in **Table 3**, the westbound direction had an average speed of 22 mph in November and 25 mph in February while the eastbound direction had an average travel time of 40 mph in November and 38 mph in February during the PM peak hour.

It is to be noted that the average travel speeds listed account for not only the noted congested areas, but also the areas that do not experience major congestion on a routine basis. This has the effect of showing an average speed that is higher than what may be perceived by motorists traversing this segment. For example, the average speed westbound in the evening peak hour between Lewinsville Road and Delta Glen Court/Colvin Run Road is much lower than the average speed calculated for the entire corridor segment. Nonetheless, the average speed for the segment does incorporate this into the calculations as witnessed by the much lower speeds shown in comparison to the non-peak direction.

Conclusion

The data clearly indicates that the overall average travel times overall are essentially the same during both the November and February travel time run trials. During the AM peak hour, the average travel speed through the project limits is in the range of 15-20 mph in the eastbound direction. Similarly, the average travel speed through the project limits is in the range of 20-25 mph in the westbound direction during the PM peak hour. The models that will be generated for the operational analysis of the Route 7 project will use these travel times as a basis for their calibration.

Recorded Travel Times

November 2012 Travel Time Runs
AM Peak Hour

11/7/12 AM START TIME		7:18 AM	7:49 AM	8:26 AM	7:18 AM	7:49 AM	8:26 AM	
LOCATION (EB)	Distance (Miles)	RUN 1 (MIN:SEC)	RUN 2 (MIN:SEC)	RUN 3 (MIN:SEC)	Run 1 Speed (MPH)	Run 2 Speed (MPH)	Run 3 Speed (MPH)	AVERAGE (MPH)
Reston Parkway to Utterback Store Rd	0.51	0:41	0:39	0:42	45.2	47.5	44.1	
Utterback Store Rd to Baron Cameron Ave	1.14	2:30	2:29	2:36	27.3	27.5	26.2	
Baron Cameron Ave to Delta Glen Ct	0.66	1:31	2:55	0:54	26.2	13.6	44.2	
Delta Glen Ct to Capers Farm Way	0.81	3:45	2:48	2:56	13.0	17.4	16.7	
Capers Farm Way to Beulah Rd	1.12	4:20	3:45	4:28	15.5	17.9	15.0	
Beulah Rd to Towlston Rd	0.72	0:58	1:02	1:30	44.8	41.9	28.9	
Towlson Rd to Lewinsville Rd	0.77	1:13	1:58	4:16	37.8	23.4	10.8	
Lewinsville Rd to Jarret Valley Dr	0.63	2:28	4:25	3:28	15.3	8.6	10.9	
Jarret Valley Dr to DTR Bridge	0.09	0:11	0:51	0:58	29.5	6.4	5.6	
Total	6.46	17:37	20:52	21:48	22.0	18.6	17.8	19

11/7/12 AM START TIME		7:39 AM	8:13 AM	8:52 AM	7:39 AM	8:13 AM	8:52 AM	
LOCATION (WB)	Distance (Miles)	RUN 1 (MIN:SEC)	RUN 2 (MIN:SEC)	RUN 3 (MIN:SEC)	Run 1 Speed (MPH)	Run 2 Speed (MPH)	Run 3 Speed (MPH)	AVERAGE (MPH)
DTR Bridge to Jarret Valley Dr	0.16	0:12	0:10	0:11	48.0	57.6	52.4	
Jarret Valley Dr to Lewinsville Rd	0.63	1:11	1:50	0:40	32.1	20.7	56.5	
Lewinsville Rd to Towlston Rd	0.77	0:59	1:15	1:03	47.0	36.8	43.8	
Towlston Rd to Beulah Rd	0.72	1:01	0:51	1:55	42.5	51.0	22.6	
Beulah Rd to Capers Farm Way	1.12	1:20	1:12	1:14	50.5	55.9	54.6	
Capers Farm Way to Delta Glen Ct	0.81	0:58	1:19	0:53	50.3	37.0	55.5	
Delta Glen Ct to Baron Cameron Ave	0.66	0:56	0:58	0:54	42.8	41.0	44.2	
Baron Cameron Ave to Utterback Store Rd	1.14	1:16	1:17	1:12	53.7	53.3	56.9	
Utterback Store Rd to Reston Pkwy	0.51	0:39	0:38	0:41	47.5	49.0	45.4	
Total	6.53	8:32	9:30	8:43	45.9	41.2	44.9	44

November 2012 Travel Time Runs
PM Peak Hour

11/7/12 PM START TIME		4:11 PM	4:34 PM	5:18 PM	4:11 PM	4:34 PM	5:18 PM	
LOCATION (EB)	Distance (Miles)	RUN 1 (MIN:SEC)	RUN 2 (MIN:SEC)	RUN 3 (MIN:SEC)	Run 1 Speed (MPH)	Run 2 Speed (MPH)	Run 3 Speed (MPH)	AVERAGE (MPH)
Reston Parkway to Utterback Store Rd	0.51	0:32	0:36	0:37	57.9	51.5	50.1	
Utterback Store Rd to Baron Cameron Ave	1.14	1:20	2:36	2:18	51.2	26.2	29.7	
Baron Cameron Ave to Delta Glen Ct	0.66	1:14	0:46	0:57	32.3	51.9	41.9	
Delta Glen Ct to Capers Farm Way	0.81	1:01	0:49	0:55	48.0	59.8	53.3	
Capers Farm Way to Beulah Rd	1.12	1:53	1:10	2:01	35.6	57.5	33.3	
Beulah Rd to Towlston Rd	0.72	0:58	1:22	0:58	44.8	31.7	44.8	
Towlson Rd to Lewinsville Rd	0.77	1:06	1:06	1:00	41.8	41.8	46.0	
Lewinsville Rd to Jarret Valley Dr	0.63	1:15	1:36	0:47	30.3	23.6	48.3	
Jarret Valley Dr to DTR Bridge	0.09	0:09	0:09	0:07	36.0	36.0	46.3	
Total	6.46	9:28	10:10	9:40	40.9	38.1	40.1	40

11/7/12 PM START TIME		4:23 PM	4:48 PM	5:32 PM	4:23 PM	4:48 PM	5:32 PM	
LOCATION (WB)	Distance (Miles)	RUN 1 (MIN:SEC)	RUN 2 (MIN:SEC)	RUN 3 (MIN:SEC)	Run 1 Speed (MPH)	Run 2 Speed (MPH)	Run 3 Speed (MPH)	AVERAGE (MPH)
DTR Bridge to Jarret Valley Dr	0.16	0:10	0:14	0:13	57.6	41.1	44.3	
Jarret Valley Dr to Lewinsville Rd	0.63	0:45	1:02	0:42	50.4	36.6	54.1	
Lewinsville Rd to Towlston Rd	0.77	1:01	1:17	0:52	45.3	35.9	53.1	
Towlston Rd to Beulah Rd	0.72	1:14	1:23	3:27	35.1	31.3	12.6	
Beulah Rd to Capers Farm Way	1.12	1:21	1:33	5:21	49.7	43.3	12.5	
Capers Farm Way to Delta Glen Ct	0.81	2:34	3:29	4:35	19.0	14.0	10.7	
Delta Glen Ct to Baron Cameron Ave	0.66	2:08	1:47	6:49	18.7	22.3	5.8	
Baron Cameron Ave to Utterback Store Rd	1.14	1:26	5:56	5:05	47.6	11.5	13.4	
Utterback Store Rd to Reston Pkwy	0.51	1:41	3:04	2:15	18.4	10.1	13.7	
Total	6.53	12:20	19:45	29:19	31.8	19.8	13.4	22

February 2013 Travel Time Runs
AM Peak Hour

2/12/13 AM START TIME		7:27 AM	8:06 AM	8:48 AM	7:27 AM	8:06 AM	8:48 AM	
LOCATION (EB)	Distance (Miles)	RUN 1 (MIN:SEC)	RUN 2 (MIN:SEC)	RUN 3 (MIN:SEC)	Run 1 Speed (MPH)	Run 2 Speed (MPH)	Run 3 Speed (MPH)	AVERAGE (MPH)
Reston Parkway to Utterback Store Rd	0.51	2:00	1:40	0:39	15.4	18.5	47.5	
Utterback Store Rd to Baron Cameron Ave	1.14	8:36	6:17	2:50	7.9	10.9	24.1	
Baron Cameron Ave to Delta Glen Ct	0.66	2:19	2:37	3:21	17.2	15.2	11.9	
Delta Glen Ct to Capers Farm Way	0.81	4:41	3:07	4:30	10.4	15.7	10.9	
Capers Farm Way to Beulah Rd	1.12	3:27	4:54	4:55	19.5	13.7	13.6	
Beulah Rd to Towlston Rd	0.72	1:01	0:56	1:01	42.5	46.6	42.5	
Towlson Rd to Lewinsville Rd	0.77	1:07	1:15	1:16	41.1	36.8	36.2	
Lewinsville Rd to Jarret Valley Dr	0.63	1:14	3:53	1:53	30.8	9.8	20.1	
Jarret Valley Dr to DTR Bridge	0.09	0:15	0:11	0:28	21.6	30.0	11.5	
Total	6.46	24:40	24:50	20:53	15.7	15.6	18.6	17

2/12/13 AM START TIME		7:55 AM	8:34 AM	8:13 AM	7:55 AM	8:34 AM	8:13 AM	
LOCATION (WB)	Distance (Miles)	RUN 1 (MIN:SEC)	RUN 2 (MIN:SEC)	RUN 3 (MIN:SEC)	Run 1 Speed (MPH)	Run 2 Speed (MPH)	Run 3 Speed (MPH)	AVERAGE (MPH)
DTR Bridge to Jarret Valley Dr	0.16	0:10	0:40	0:10	56.5	14.3	56.5	
Jarret Valley Dr to Lewinsville Rd	0.63	0:48	0:51	1:48	47.3	44.5	21.0	
Lewinsville Rd to Towlston Rd	0.77	1:01	1:00	1:27	45.1	46.0	31.7	
Towlston Rd to Beulah Rd	0.72	0:56	0:56	0:55	46.6	46.6	47.1	
Beulah Rd to Capers Farm Way	1.12	1:39	1:11	1:22	40.7	56.9	49.0	
Capers Farm Way to Delta Glen Ct	0.81	1:34	0:52	1:10	31.1	56.1	41.7	
Delta Glen Ct to Baron Cameron Ave	0.66	1:01	0:54	0:54	39.0	44.2	44.2	
Baron Cameron Ave to Utterback Store Rd	1.14	1:17	1:14	1:13	53.3	55.5	55.9	
Utterback Store Rd to Reston Pkwy	0.51	0:33	0:32	0:33	56.2	58.3	56.2	
Total	6.53	8:59	8:10	9:32	43.6	48.0	41.1	44

February 2013 Travel Time Runs
PM Peak Hour

2/12/13 PM START TIME		5:02 PM	5:38 PM	6:14 PM	5:02 PM	5:38 PM	6:14 PM	
LOCATION (EB)	Distance (Miles)	RUN 1 (MIN:SEC)	RUN 2 (MIN:SEC)	RUN 3 (MIN:SEC)	Run 1 Speed (MPH)	Run 2 Speed (MPH)	Run 3 Speed (MPH)	AVERAGE (MPH)
Reston Parkway to Utterback Store Rd	0.51	0:31	0:32	0:42	59.4	58.3	44.1	
Utterback Store Rd to Baron Cameron Ave	1.14	2:17	1:29	2:47	29.9	46.1	24.5	
Baron Cameron Ave to Delta Glen Ct	0.66	1:36	1:07	1:28	24.9	35.5	27.1	
Delta Glen Ct to Capers Farm Way	0.81	1:00	0:54	0:58	48.8	54.3	50.3	
Capers Farm Way to Beulah Rd	1.12	1:38	2:16	1:43	41.2	29.7	39.0	
Beulah Rd to Towlston Rd	0.72	1:00	1:03	0:56	43.3	41.3	46.6	
Towlson Rd to Lewinsville Rd	0.77	0:54	0:54	1:14	51.1	51.1	37.4	
Lewinsville Rd to Jarret Valley Dr	0.63	1:30	0:44	0:48	25.2	51.8	47.3	
Jarret Valley Dr to DTR Bridge	0.09	0:12	0:06	0:07	27.0	54.0	45.0	
Total	6.46	10:38	9:05	10:43	36.5	42.7	36.1	38

2/12/13 PM START TIME		4:45 PM	5:17 PM	5:50 PM	6:27 PM	4:45 PM	5:17 PM	5:50 PM	6:27 PM	
LOCATION (WB)	Distance (Miles)	RUN 1 (MIN:SEC)	RUN 2 (MIN:SEC)	RUN 3 (MIN:SEC)	RUN 4 (MIN:SEC)	Run 1 Speed (MPH)	Run 2 Speed (MPH)	Run 3 Speed (MPH)	Run 4 Speed (MPH)	AVERAGE (MPH)
DTR Bridge to Jarret Valley Dr	0.16	0:23	0:11	0:11	0:12	25.3	53.3	53.3	48.0	
Jarret Valley Dr to Lewinsville Rd	0.63	1:23	0:41	2:04	1:54	27.4	55.6	18.3	19.9	
Lewinsville Rd to Towlston Rd	0.77	1:16	2:38	3:37	2:55	36.2	17.5	12.7	15.8	
Towlston Rd to Beulah Rd	0.72	1:03	2:02	2:15	1:34	41.3	21.4	19.3	31.6	
Beulah Rd to Capers Farm Way	1.12	3:46	4:05	3:54	3:42	17.8	16.5	17.2	18.1	
Capers Farm Way to Delta Glen Ct	0.81	2:19	3:31	1:58	2:00	21.1	13.9	24.8	24.4	
Delta Glen Ct to Baron Cameron Ave	0.66	1:05	1:32	3:05	1:44	36.8	26.0	12.9	23.0	
Baron Cameron Ave to Utterback Store Rd	1.14	1:12	1:13	1:25	1:20	56.9	55.9	48.1	51.3	
Utterback Store Rd to Reston Pkwy	0.51	0:35	0:32	0:38	1:10	53.3	58.3	49.0	26.4	
Total	6.53	13:02	16:25	19:07	16:31	30.0	23.9	20.5	23.7	25

APPENDIX D

VISSIM Output: 2040 AM Conventional

VISSIM 2040 AM Conventional Model Level of Service and Delay

Intersection	Approach	Movement	2040 AM Conventional						
			Model Volume (vph)	Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Inter. Delay (s/veh)	Inter. LOS
Lewinsville Rd	NB	Left	9	94.85	F	81.92	F	32.85	C
		Through	10	113.40	F				
		Right	6	14.30	B				
	SB	Left	84	76.79	E	21.13	C		
		Shared Through/Right	5	106.69	F				
		Right	441	9.59	A				
	WB	Left	20	112.69	F	60.23	E		
		Through	1674	64.48	E				
		Right	169	11.83	B				
	EB	Left	636	83.94	F	20.94	C		
		Through	3218	8.54	A				
		Right	10	3.32	A				
Towlston Rd	NB	Left	88	127.04	F	89.81	F	15.50	B
		Through	43	105.06	F				
		Right	56	19.59	B				
	SB	Left	103	26.61	C	27.66	C		
		Through	50	56.24	E				
		Right	82	11.68	B				
	WB	Left	56	147.58	F	13.41	B		
		Through	1966	9.93	A				
		Right	56	1.78	A				
	EB	Left	185	96.87	F	12.63	B		
		Through	4065	8.99	A				
		Right	71	1.86	A				
Beulah Rd/Forestville Dr.	NB	Left	148	120.74	F	81.32	F	21.59	C
		Through	17	124.52	F				
		Right	312	60.38	E				
	SB	Left	69	107.78	F	124.66	F		
		Through	51	155.89	F				
		Right	4	6.89	A				
	WB	Left	187	199.36	F	21.31	C		
		Through	1934	4.37	A				
		Right	25	1.10	A				
	EB	Left	19	111.14	F	11.67	B		
		Through	3888	11.54	B				
		Right	189	4.28	A				

VISSIM 2040 AM Conventional Model Level of Service and Delay (continued)

Intersection	Approach	Movement	2040 AM Conventional						
			Model Volume (vph)	Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Inter. Delay (s/veh)	Inter. LOS
Carpers Farm Way/Colvin Run Rd (East)	NB	Left	32	92.53	F	73.24	E	20.53	C
		Through	16	88.01	F				
		Right	55	57.86	E				
	SB	Left	182	104.51	F	104.00	F		
		Through	4	126.45	F				
		Right	9	84.76	F				
	WB	Left	16	141.97	F	8.75	A		
		Through	1884	8.25	A				
		Right	204	2.98	A				
	EB	Left	11	131.55	F	21.34	C		
		Through	3861	21.04	C				
		Right	11	16.90	B				
Delta Glen Ct/Colvin Run Rd (West)	NB	Left	8	121.73	F	70.53	E	9.04	A
		Through	12	114.64	F				
		Right	62	54.84	D				
	SB	Left				10.78	B		
		Through							
		Right	216	10.78	B				
	WB	Left	10	129.74	F	8.26	A		
		Through	1966	7.69	A				
		Right	14	3.94	A				
	EB	Left	198	101.93	F	8.05	A		
		Through	3705	3.04	A				
		Right	5	1.13	A				
Baron Cameron Avenue/Springvale Road	NB	Left	186	134.34	F	105.56	F	68.88	E
		Through	258	140.63	F				
		Right	1076	92.20	F				
	SB	Left	64	244.99	F	120.08	F		
		Through	394	105.52	F				
		Right	69	87.82	F				
	WB	Left	651	204.27	F	71.22	E		
		Through	1403	12.72	B				
		Right	75	10.71	B				
	EB	Left	19	178.63	F	40.59	D		
		Through	2799	40.75	D				
		Right	278	29.55	C				

VISSIM 2040 AM Conventional Model Level of Service and Delay (continued)

Intersection	Approach	Movement	2040 AM Conventional						
			Model Volume (vph)	Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Inter. Delay (s/veh)	Inter. LOS
Utterback Store Rd	NB	Left						11.26	B
		Through							
		Right							
	SB	Left	68	54.92	D	26.49	C		
		Through							
		Right	110	9.00	A				
	WB	Left				11.87	B		
		Through	1593	12.17	B				
		Right	73	5.22	A				
	EB	Left	209	69.22	E	10.06	B		
		Through	2906	5.80	A				
		Right							
Reston Park Way	NB	Left	292	100.81	F	72.52	E	25.56	C
		Through	5	99.69	F				
		Right	212	32.96	C				
	SB	Left	5	108.19	F	80.46	F		
		Through	6	111.12	F				
		Right	6	28.99	C				
	WB	Left	271	128.21	F	25.01	C		
		Through	1433	5.57	A				
		Right	5	0.31	A				
	EB	Left	6	109.24	F	18.69	B		
		Through	2864	19.87	B				
		Right	608	12.15	B				
Dulles Toll Road WB Off-Ramp/Jarrett Valley Dr	NB	Left	5	108.23	F	11.16	B	4.33	A
		Through							
		Right	133	7.74	A				
	SB	Left	79	103.16	F	22.63	C		
		Through	6	81.35	F				
		Right	310	1.06	A				
	WB	Left	21	111.81	F	4.72	A		
		Through	1342	3.04	A				
		Right							
	EB	Left				1.92	A		
		Through	3599	1.92	A				
		Right	10	0.82	A				

VISSIM 2040 AM Conventional Model Travel Times

Intersection	Westbound Travel Times (seconds)										
	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7	Run 8	Run 9	Run 10	**Average**
Section 1 (Dulles Toll Road WB Off-Ramp/Jarrett Valley Dr to Beulah Rd/Forestville Dr)	223.10	226.40	225.30	227.20	230.70	226.80	227.90	223.20	224.70	225.60	**226.09**
Section 2 (Beulah Rd/Forestville Dr to Baron Cameron Ave/Springvale Rd)	176.10	170.00	171.50	172.30	169.00	168.00	170.80	171.60	171.00	167.50	**170.78**
Section 3 (Baron Cameron Ave/Springvale to Reston Parkway)	103.70	103.40	105.30	104.00	104.60	105.10	103.30	103.80	104.30	104.30	**104.18**
Total Westbound Travel Time (Dulles Toll Road WB Off-Ramp/Jarrett Valley Dr to Reston Parkway)	502.80	495.90	502.80	499.80	504.80	501.40	497.30	502.90	499.10	495.50	**500.23**

Intersection	Eastbound Travel Times (seconds)										
	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7	Run 8	Run 9	Run 10	**Average**
Section 1 (Reston Parkway to Baron Cameron Ave/Springvale Rd)	142.80	143.70	144.10	141.20	139.30	138.70	141.00	140.10	140.80	137.60	**140.93**
Section 2 (Baron Cameron Ave/Springvale Rd to Beulah Rd/Forestville Dr)	211.60	212.60	208.60	206.00	215.30	213.00	206.10	210.50	223.70	208.10	**211.55**
Section 3 (Beulah Rd/Forestville Dr to Dulles Toll Road WB Off-Ramp/Jarrett Valley Dr)	171.60	169.30	176.40	169.90	170.60	171.60	168.00	176.70	167.30	171.50	**171.29**
Total Eastbound Travel Time (Reston Parkway to Dulles Toll Road WB Off-Ramp/Jarrett Valley Dr)	527.00	527.00	532.20	519.50	525.00	530.10	520.70	528.90	533.40	523.10	**526.69**

VISSIM 2040 AM Conventional Model Throughput

Intersection	Approach	Movement	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7	Run 8	Run 9	Run 10	Average
Lewinsville Rd	McLean Bible Church (NB)	Left	7	10	10	8	10	9	9	9	6	8	**9**
		Through	4	9	12	12	13	8	11	11	10	10	**10**
		Right	7	5	5	4	4	7	9	9	5	8	**6**
	Lewinsville Rd (SB)	Left	84	85	77	79	86	88	79	79	84	97	**84**
		Through	8	5	2	6	7	3	3	3	10	2	**5**
		Right	424	430	443	459	433	429	455	455	439	439	**441**
	Route 7 (WB)	Left	25	26	16	18	17	18	20	20	20	19	**20**
		Through	1,614	1,714	1,643	1,680	1,696	1,658	1,712	1,712	1,674	1,632	**1,674**
		Right	176	151	165	157	170	181	167	167	182	169	**169**
	Route 7 (EB)	Left	629	635	652	663	650	606	651	651	628	598	**636**
		Through	3,283	3,251	3,216	3,227	3,178	3,228	3,212	3,212	3,264	3,106	**3,218**
		Right	13	12	14	8	8	11	8	8	4	13	**10**
Baron Cameron Ave/Springvale Rd	Baron Cameron Ave (NB)	Left	201	180	174	185	181	189	183	183	191	188	**186**
		Through	263	233	250	271	261	257	268	268	245	260	**258**
		Right	1,083	1,073	1,075	1,062	1,073	1,063	1,081	1,081	1,085	1,081	**1,076**
	Springvale Rd (SB)	Left	72	67	63	66	62	60	55	55	66	70	**64**
		Through	414	402	361	389	379	400	398	398	394	401	**394**
		Right	52	69	80	73	77	70	72	72	59	62	**69**
	Route 7 (WB)	Left	650	612	639	630	635	677	680	680	634	671	**651**
		Through	1,365	1,405	1,396	1,430	1,451	1,411	1,379	1,379	1,400	1,410	**1,403**
		Right	63	85	68	86	87	68	78	78	72	65	**75**
	Route 7 (EB)	Left	18	20	17	17	25	18	20	20	21	14	**19**
		Through	2,815	2,870	2,876	2,808	2,845	2,680	2,799	2,799	2,814	2,686	**2,799**
		Right	251	275	295	305	267	274	287	287	298	241	**278**

VISSIM 2040 AM Conventional Model Queues

Intersection	Approach	Movement	Run 1		Run 2		Run 3		Run 4		Run 5		Run 6		Run 7		Run 8		Run 9		Run 10		Average	
			Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)
Lewinsville Rd	McLean Bible Church (NB)	Left	7	47	8	48	11	46	10	43	13	85	8	46	9	63	10	66	9	46	10	66	10	56
		Through	7	46	8	48	11	46	10	43	13	85	8	46	10	63	10	65	9	46	10	66	10	55
		Right	5	46	7	48	9	46	8	43	10	85	8	46	6	63	6	66	8	46	8	65	8	55
	Lewinsville Rd (SB)	Left	85	300	89	298	78	318	91	329	93	318	85	325	91	294	79	273	83	299	95	289	87	304
		Through	86	300	89	298	78	318	91	329	94	318	85	325	92	294	80	273	84	298	96	289	88	304
		Right	74	296	73	294	61	314	82	326	78	315	77	321	80	290	63	269	74	295	83	285	75	301
	Route 7 (WB)	Left	261	881	255	776	241	746	262	788	262	748	244	836	266	816	239	776	254	774	246	762	253	790
		Through	261	880	255	776	241	745	261	788	262	747	243	835	266	815	239	776	254	774	246	761	253	790
		Right	264	887	258	782	245	752	266	794	267	754	248	842	270	822	244	782	259	780	251	768	257	796
	Route 7 (EB)	Left	483	2,555	615	2,737	791	2,588	406	1,425	612	2,786	253	1,396	526	2,182	703	3,127	290	1,029	433	2,703	511	2,253
		Through	483	2,556	616	2,737	791	2,589	406	1,425	612	2,787	254	1,396	527	2,182	704	3,128	291	1,029	434	2,704	512	2,253
		Right	331	2,553	467	2,735	643	2,586	258	1,423	511	2,785	140	1,394	389	2,180	588	3,126	162	1,027	332	2,701	382	2,251

Intersection	Approach	Movement	Run 1		Run 2		Run 3		Run 4		Run 5		Run 6		Run 7		Run 8		Run 9		Run 10		Average	
			Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)
Baron Cameron Ave/Springvale Rd	Baron Cameron Ave (NB)	Left	764	1,964	1,782	2,738	1,465	2,671	1,238	2,177	1,757	2,734	1,317	2,422	1,908	2,753	1,262	2,735	1,328	2,617	1,568	2,655	1,439	2,547
		Through	765	1,965	1,782	2,739	1,466	2,672	1,239	2,177	1,758	2,735	1,318	2,423	1,909	2,754	1,263	2,736	1,329	2,618	1,569	2,656	1,440	2,548
		Right	766	1966	1783	2740	1466	2673	1240	2178	1759	2736	1319	2424	1910	2755	1264	2737	1330	2619	1570	2657	1,441	2,549
	Springvale Rd (SB)	Left	189	495	243	546	168	478	164	451	190	540	196	516	163	500	203	503	190	439	185	454	189	492
		Through	189	495	243	546	169	479	165	452	190	541	197	517	163	501	204	503	191	439	185	455	190	493
		Right	188	495	243	546	168	479	162	452	188	541	196	517	161	501	201	504	188	439	185	455	188	493
	Route 7 (WB)	Left	584	927	272	733	276	688	717	1,976	203	546	318	663	732	1,179	249	689	263	646	378	804	399	885
		Through	586	928	273	735	276	690	719	1,978	201	548	319	664	734	1,180	249	691	264	647	379	805	400	887
		Right	570	928	194	735	179	690	680	1,978	135	548	184	665	714	1,180	154	691	156	648	278	805	324	887
	Route 7 (EB)	Left	372	1,535	415	1,704	409	1,592	376	1,594	343	1,610	332	1,373	356	1,501	351	1,672	393	1,743	312	1,407	366	1,573
		Through	373	1,537	417	1,706	411	1,593	378	1,595	345	1,612	335	1,374	358	1,503	353	1,673	395	1,744	314	1,409	368	1,575
		Right	24	1,144	8	181	5	111	9	155	6	181	8	239	7	196	21	1,161	7	185	7	169	10	372

APPENDIX E

VISSIM Output: 2040 AM Build

VISSIM 2040 AM Build Model Level of Service and Delay

Intersection	Approach	Movement	2040 AM Build						
			Model Volume (vph)	Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Inter. Delay (s/veh)	Inter. LOS
Lewinsville Rd	NB	Left	8	103.93	F	89.09	F	11.69	B
		Through	11	101.00	F				
		Right	4	19.49	B				
	SB	Left	81	102.22	F	101.38	F		
		Shared Through/Right	11	95.17	F				
		Right							
	WB	Left	7	100.90	F	17.82	B		
		Through	1655	17.49	B				
		Right							
	EB	Left	700	2.73	A	6.59	A		
		Through	3263	7.42	A				
		Right							
Lewinsville at Crossover	NB	Shared Left/Thru	35	161.83	F	97.82	F	37.19	D
		Right	84	70.88	E				
	WB	Left	34	119.66	F	72.17	F		
		Thru	1605	71.16	E				
	EB	Left/U-turn	680	47.41	D	20.43	C		
		Thru	3166	14.70	B				
		Right	11	1.74	A				
Towlston Rd	NB	Left	88	107.44	F	89.28	F	25.07	C
		Through	45	141.84	F				
		Right	58	20.79	C				
	SB	Left	102	102.43	F	72.83	E		
		Through	52	117.24	F				
		Right	83	8.74	A				
	WB	Left	55	64.59	E	20.61	C		
		Through	1915	19.84	B				
		Right	56	3.76	A				
	EB	Left	187	71.73	E	21.71	C		
		Through	4079	19.62	B				
		Right	69	9.51	A				
Beulah Rd/Forestville Dr.	NB	Left	156	135.49	F	92.22	F	30.80	C
		Through	17	157.58	F				
		Right	317	67.31	E				
	SB	Left	76	172.32	F	141.71	F		
		Through	53	107.97	F				
		Right	4	6.23	A				
	WB	Left	193	149.09	F	33.52	C		
		Through	1950	22.48	C				
		Right	26	2.37	A				
	EB	Left	21	123.71	F	18.20	B		
		Through	3821	18.09	B				
		Right	189	8.63	A				

VISSIM 2040 AM Build Model Level of Service and Delay (continued)

Intersection	Approach	Movement	2040 AM Build						
			Model Volume (vph)	Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Inter. Delay (s/veh)	Inter. LOS
Carpers Farm Way/Colvin Run Rd (East)	NB	Left	33	89.11	F	67.98	E	22.52	C
		Through	16	83.59	F				
		Right	54	50.47	D				
	SB	Left	183	100.02	F	99.67	F		
		Through	5	112.13	F				
		Right	10	87.82	F				
	WB	Left	12	127.22	F	23.92	C		
		Through	1892	24.82	C				
		Right	206	9.41	A				
	EB	Left	8	121.99	F	16.65	B		
		Through	3877	16.45	B				
		Right	11	5.78	A				
Delta Glen Ct/Colvin Run Rd (West)	NB	Left	9	115.32	F	69.30	E	9.38	A
		Through	12	111.12	F				
		Right	62	54.55	D				
	SB	Left				9.70	A		
		Through							
		Right	215	9.70	A				
	WB	Left	10	137.42	F	9.40	A		
		Through	1952	8.78	A				
		Right	16	3.87	A				
	EB	Left	198	123.46	F	8.09	A		
		Through	3731	1.98	A				
		Right	7	0.41	A				
Baron Cameron Avenue/Springvale Road	NB	Left	172	116.79	F	35.14	D	21.88	C
		Through	251	78.13	E				
		Right	1067	11.91	B				
	SB	Left	62	116.39	F	93.48	F		
		Through	412	93.24	F				
		Right	71	74.62	E				
	WB	Left	674	26.18	C	22.34	C		
		Through	1411	21.41	C				
		Right	75	5.31	A				
	EB	Left	21	141.94	F	2.50	A		
		Through	2777	1.48	A				
		Right	284	2.27	A				

VISSIM 2040 AM Build Model Level of Service and Delay (continued)

Intersection	Approach	Movement	2040 AM Build						
			Model Volume (vph)	Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Inter. Delay (s/veh)	Inter. LOS
Utterback Store Rd	NB	Left						10.27	B
		Through							
		Right							
	SB	Left	70	55.16	E	26.34	C		
		Through							
		Right	116	9.04	A				
	WB	Left				10.14	B		
		Through	1594	10.52	B				
		Right	72	1.71	A				
	EB	Left	203	67.57	E	9.39	A		
		Through	2945	5.38	A				
		Right							
Reston Park Way	NB	Left	290	99.22	F	69.65	E	24.24	C
		Through	5	91.26	F				
		Right	210	28.25	C				
	SB	Left	6	112.80	F	94.31	F		
		Through	6	113.48	F				
		Right	4	44.30	D				
	WB	Left	261	126.97	F	25.65	C		
		Through	1441	7.38	A				
		Right	5	0.88	A				
	EB	Left	7	121.56	F	16.73	B		
		Through	2906	18.14	B				
		Right	614	8.93	A				
Dulles Toll Road WB Off-Ramp/Jarrett Valley Dr	NB	Left	4	116.10	F	14.73	B	7.05	A
		Through							
		Right	130	11.38	B				
	SB	Left	81	100.57	F	22.16	C		
		Through	6	85.25	F				
		Right	309	0.41	A				
	WB	Left	21	113.63	F	4.77	A		
		Through	1341	3.08	A				
		Right							
	EB	Left				5.97	A		
		Through	3588	5.97	A				
		Right	9	4.59	A				

VISSIM 2040 AM Build Model Travel Times

Intersection	Westbound Travel Times (seconds)										
	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7	Run 8	Run 9	Run 10	**Average**
Section 1 (Dulles Toll Road WB Off-Ramp/Jarrett Valley Dr to Beulah Rd/Forestville Dr)	277.90	285.50	279.50	279.10	277.00	285.70	287.20	277.30	283.60	280.50	**281.33**
Section 2 (Beulah Rd/Forestville Dr to Baron Cameron Ave/Springvale Rd)	204.50	203.40	202.20	202.30	202.50	200.00	204.10	203.10	201.90	201.30	**202.53**
Section 3 (Baron Cameron Ave/Springvale to Reston Parkway)	105.60	107.10	106.20	105.60	106.50	107.30	107.40	106.60	108.10	106.50	**106.69**
Total Westbound Travel Time (Dulles Toll Road WB Off-Ramp/Jarrett Valley Dr to Reston Parkway)	595.80	599.20	598.20	595.60	593.00	600.80	605.10	594.80	603.70	601.70	**598.79**

Intersection	Eastbound Travel Times (seconds)										
	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7	Run 8	Run 9	Run 10	**Average**
Section 1 (Reston Parkway to Baron Cameron Ave/Springvale Rd)	106.40	106.90	107.90	109.00	106.40	108.40	109.40	109.60	109.90	108.90	**108.28**
Section 2 (Baron Cameron Ave/Springvale Rd to Beulah Rd/Forestville Dr)	193.10	196.30	192.20	193.80	194.10	198.20	197.30	196.60	198.90	197.70	**195.82**
Section 3 (Beulah Rd/Forestville Dr to Dulles Toll Road WB Off-Ramp/Jarrett Valley Dr)	216.10	207.50	205.40	204.60	201.80	208.10	206.50	207.00	210.20	201.60	**206.88**
Total Eastbound Travel Time (Reston Parkway to Dulles Toll Road WB Off-Ramp/Jarrett Valley Dr)	519.00	511.00	505.40	508.10	503.20	519.20	516.00	515.80	519.60	510.20	**512.75**

VISSIM 2040 AM Build Model Throughput

Intersection	Approach	Movement	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7	Run 8	Run 9	Run 10	Average
Lewinsville Rd	McLean Bible Church (NB)	Left	6	10	10	11	11	14	7	4	7	10	**9**
		Through	13	6	7	19	12	9	10	13	10	13	**11**
		Right	6	2	5	3	6	5	7	2	6	2	**4**
	Lewinsville Rd (SB)	Left	83	78	75	75	80	86	77	82	86	88	**81**
		Through	8	7	3	8	9	4	5	6	1	5	**6**
		Right	431	438	446	459	429	417	453	407	440	444	**436**
	Route 7 (WB)	Left	23	18	19	28	17	15	22	17	16	16	**19**
		Through	1,621	1,696	1,624	1,607	1,651	1,642	1,663	1,645	1,670	1,606	**1,643**
		Right	158	155	154	194	183	160	174	167	170	167	**168**
	Route 7 (EB)	Left	682	695	721	729	751	679	682	694	682	687	**700**
		Through	3,319	3,318	3,198	3,302	3,231	3,208	3,266	3,326	3,254	3,203	**3,263**
		Right	12	11	4	9	14	12	13	10	9	11	**11**
Baron Cameron Ave/Springvale Rd	Baron Cameron Ave (NB)	Left	163	186	171	188	180	142	165	193	170	158	**172**
		Through	261	250	227	230	220	261	248	273	253	282	**251**
		Right	1,099	1,045	1,065	1,074	1,073	1,062	1,064	1,056	1,053	1,078	**1,067**
	Springvale Rd (SB)	Left	58	67	68	69	54	70	69	62	42	65	**62**
		Through	441	426	361	405	423	395	387	419	449	413	**412**
		Right	55	68	79	76	86	69	73	73	66	65	**71**
	Route 7 (WB)	Left	683	637	680	692	648	662	742	644	659	690	**674**
		Through	1,393	1,414	1,391	1,374	1,422	1,426	1,407	1,432	1,403	1,446	**1,411**
		Right	66	86	69	91	85	74	78	67	74	62	**75**
	Route 7 (EB)	Left	27	21	16	16	14	26	26	20	20	12	**20**
		Through	2,796	2,831	2,734	2,736	2,806	2,721	2,800	2,782	2,818	2,747	**2,777**
		Right	268	279	292	307	257	290	296	299	304	248	**284**

VISSIM 2040 AM Build Model Queues

Intersection	Approach	Movement	Run 1		Run 2		Run 3		Run 4		Run 5		Run 6		Run 7		Run 8		Run 9		Run 10		Average	
			Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)
Lewinsville Rd	McLean Bible Church (NB)	Left	9	47	7	47	7	47	17	68	12	88	10	49	12	46	7	62	10	47	8	47	10	55
		Through	9	46	6	45	7	46	16	67	12	87	9	48	12	45	6	61	10	46	7	46	9	54
		Right	7	46	3	46	5	45	12	67	11	87	5	48	10	45	5	61	7	46	6	46	7	54
	Lewinsville Rd (SB)	Left	49	226	46	192	44	169	39	164	45	191	50	161	44	223	49	148	49	185	46	205	46	186
		Through	7	89	8	40	2	127	8	43	7	126	3	43	5	45	11	66	3	39	4	23	6	64
		Right	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Route 7 (WB)	Left (western)	19	70	22	91	30	89	21	72	21	128	28	132	27	93	22	72	14	125	18	50	22	92
		Left (eastern)	33	318	38	394	29	344	34	338	30	267	33	316	36	319	34	292	35	335	32	319	33	324
		Through	33	318	38	394	29	344	34	338	30	267	33	316	37	319	34	292	35	335	33	319	34	324
		Right	30	322	37	398	29	348	31	342	29	271	33	320	34	323	31	296	33	339	30	323	32	328
	Route 7 (EB)	Left (eastern)	0	0	0	0	0	0	1	322	0	0	0	0	0	0	0	0	0	0	0	0	0	32
		Left (western)	239	1,107	231	1,154	240	1,079	224	1,058	249	1,084	238	1,225	235	1,009	226	1,245	202	905	217	1,063	230	1,093
		Through	56	464	103	938	50	398	49	340	47	757	54	359	56	351	67	869	103	898	45	406	63	578
		Right	161	1,109	154	1,156	162	1,081	156	1,060	170	1,086	161	1,227	155	1,011	153	1,247	139	906	146	1,065	156	1,095

Intersection	Approach	Movement	Run 1		Run 2		Run 3		Run 4		Run 5		Run 6		Run 7		Run 8		Run 9		Run 10		Average	
			Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)
Baron Cameron Ave/Springvale Rd	Baron Cameron Ave (NB)	Left	142	711	136	670	135	650	1,289	2,741	116	741	998	2,750	139	558	153	786	136	500	166	788	341	1,090
		Through	142	711	136	670	135	650	1,289	2,742	116	741	998	2,750	139	558	153	787	136	500	166	789	341	1,090
		Right	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Springvale Rd (SB)	Left	135	453	163	466	125	363	142	471	136	426	135	440	134	407	146	428	156	429	144	454	142	434
		Through	135	454	164	467	127	364	143	472	136	427	136	441	135	407	148	429	157	430	145	454	143	435
		Right	131	456	160	469	121	366	139	474	133	429	130	443	132	409	147	430	154	432	143	456	139	436
	Route 7 (WB)	Left	62	356	57	403	57	379	57	305	52	246	57	368	59	338	60	362	54	310	59	370	57	344
		Through	62	356	57	403	57	379	57	305	53	246	57	368	59	338	60	363	54	310	59	370	58	344
		Right	60	356	56	403	56	380	57	306	53	247	56	369	57	339	60	363	54	310	58	370	57	344
	Route 7 (EB)	Left	36	108	19	103	23	100	28	124	24	164	43	159	34	106	30	106	28	147	30	107	30	122
		Through	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Right	25	165	26	165	11	160	26	181	21	221	28	221	28	165	21	168	21	209	20	164	23	182

APPENDIX F

VISSIM Output: 2040 PM Conventional

VISSIM 2040 PM Conventional Model Level of Service and Delay

Intersection	Approach	Movement	2040 PM Conventional						
			Model Volume (vph)	Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Inter. Delay (s/veh)	Inter. LOS
Lewinsville Rd	NB	Left	19	104.61	F	108.47	F	47.58	D
		Through	60	117.68	F				
		Right	5	8.91	A				
	SB	Left	73	97.86	F	27.34	C		
		Shared Through/Right	6	105.11	F				
		Right	572	17.55	B				
	WB	Left	29	101.37	F	56.62	E		
		Through	2920	59.19	E				
		Right	286	25.87	C				
	EB	Left	337	223.61	F	39.34	D		
		Through	2184	11.66	B				
		Right	46	3.14	A				
Towlston Rd	NB	Left	123	108.17	F	94.45	F	28.02	C
		Through	52	118.16	F				
		Right	34	8.86	A				
	SB	Left	55	102.71	F	100.32	F		
		Through	70	196.11	F				
		Right	295	77.03	E				
	WB	Left	77	101.64	F	17.64	B		
		Through	4005	16.22	B				
		Right	54	3.07	A				
	EB	Left	240	124.77	F	27.49	C		
		Through	2319	18.13	B				
		Right	81	7.87	A				
Beulah Rd/Forestville Dr.	NB	Left	290	227.66	F	167.60	F	22.84	C
		Through	30	183.27	F				
		Right	191	73.86	E				
	SB	Left	40	105.64	F	88.59	F		
		Through	10	122.48	F				
		Right	15	20.31	C				
	WB	Left	187	132.8	F	12.16	B		
		Through	4290	7.01	A				
		Right	35	0.78	A				
	EB	Left	33	151.82	F	11.24	B		
		Through	2360	9.98	A				
		Right	186	2.66	A				

VISSIM 2040 PM Conventional Model Level of Service and Delay (continued)

Intersection	Approach	Movement	2040 PM Conventional						
			Model Volume (vph)	Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Inter. Delay (s/veh)	Inter. LOS
Carpers Farm Way/Colvin Run Rd (East)	NB	Left	17	103.42	F	70.51	E	19.54	B
		Through	13	102.51	F				
		Right	39	45.18	D				
	SB	Left	166	106.39	F	104.52	F		
		Through	13	101.4	F				
		Right	10	76.42	E				
	WB	Left	48	111.59	F	19.19	B		
		Through	4225	18.77	B				
		Right	291	9.96	A				
	EB	Left	23	167.5	F	12.07	B		
		Through	2366	10.67	B				
		Right	28	3.96	A				
Delta Glen Ct/Colvin Run Rd (West)	NB	Left	9	158.59	F	116.36	F	11.10	B
		Through	9	177.91	F				
		Right	22	76.42	E				
	SB	Left				50.69	D		
		Through							
		Right	285	50.69	D				
	WB	Left	53	139.16	F	8.03	A		
		Through	4204	6.39	A				
		Right	10	1.37	A				
	EB	Left	194	60.84	E	10.20	B		
		Through	2403	6.16	A				
		Right	22	4.5	A				
Baron Cameron Avenue/Springvale Road	NB	Left	322	105.3	F	65.86	E	47.99	D
		Through	314	132.15	F				
		Right	983	31.75	C				
	SB	Left	36	155.87	F	114.92	F		
		Through	263	111.64	F				
		Right	39	99	F				
	WB	Left	989	116.24	F	37.85	D		
		Through	3445	15.72	B				
		Right	51	12.22	B				
	EB	Left	28	241.35	F	44.75	D		
		Through	1602	44.69	D				
		Right	259	23.56	C				

VISSIM 2040 PM Conventional Model Level of Service and Delay (continued)

Intersection	Approach	Movement	2040 PM Conventional						
			Model Volume (vph)	Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Inter. Delay (s/veh)	Inter. LOS
Utterback Store Rd	NB	Left						21.54	C
		Through							
		Right							
	SB	Left	99	130.52	F	82.04	F		
		Through							
		Right	292	65.64	E				
	WB	Left				16.17	B		
		Through	3564	16.66	B				
		Right	170	5.83	A				
	EB	Left	236	137.99	F	19.77	B		
		Through	1813	4.35	A				
		Right							
Reston Park Way	NB	Left	370	208.82	F	158.46	F	52.95	D
		Through	5	119.68	F				
		Right	162	44.45	D				
	SB	Left	4	128.07	F	125.12	F		
		Through	6	141.18	F				
		Right	6	105.01	F				
	WB	Left	185	157.73	F	62.44	E		
		Through	3573	57.57	E				
		Right	5	13.18	B				
	EB	Left	5	130.2	F	12.44	B		
		Through	1883	13.79	B				
		Right	420	4.98	A				
Dulles Toll Road WB Off-Ramp/Jarrett Valley Dr	NB	Left	11	118.7	F	28.59	C	26.50	C
		Through							
		Right	43	5.48	A				
	SB	Left	35	133.96	F	69.96	E		
		Through	9	108.26	F				
		Right	569	65.43	E				
	WB	Left	63	128.65	F	34.55	C		
		Through	3069	32.61	C				
		Right							
	EB	Left				1.77	A		
		Through	2081	1.79	A				
		Right	22	0.15	A				

VISSIM 2040 PM Conventional Model Travel Times

Intersection	Westbound Travel Times (seconds)										
	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7	Run 8	Run 9	Run 10	**Average**
Section 1 (Dulles Toll Road WB Off-Ramp/Jarrett Valley Dr to Beulah Rd/Forestville Dr)	361.40	353.30	342.90	367.90	348.00	371.70	366.30	402.10	383.40	382.40	**367.94**
Section 2 (Beulah Rd/Forestville Dr to Baron Cameron Ave/Springvale Rd)	198.60	202.60	200.90	199.50	201.20	199.70	202.30	209.70	200.70	199.90	**201.51**
Section 3 (Baron Cameron Ave/Springvale to Reston Parkway)	140.90	138.40	139.00	126.20	135.20	137.70	124.10	145.70	126.40	135.20	**134.88**
Total Westbound Travel Time (Dulles Toll Road WB Off-Ramp/Jarrett Valley Dr to Reston Parkway)	715.90	693.70	699.50	708.00	688.40	731.50	707.10	760.00	719.10	731.10	**715.43**

Intersection	Eastbound Travel Times (seconds)										
	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7	Run 8	Run 9	Run 10	**Average**
Section 1 (Reston Parkway to Baron Cameron Ave/Springvale Rd)	142.60	136.60	136.60	140.00	139.40	140.60	139.30	138.40	138.40	135.70	**138.76**
Section 2 (Baron Cameron Ave/Springvale Rd to Beulah Rd/Forestville Dr)	171.80	175.50	175.90	172.70	173.50	174.30	176.10	177.80	174.90	174.00	**174.65**
Section 3 (Beulah Rd/Forestville Dr to Dulles Toll Road WB Off-Ramp/Jarrett Valley Dr)	179.00	174.00	184.70	182.50	193.30	184.40	175.90	177.30	176.00	177.90	**180.50**
Total Eastbound Travel Time (Reston Parkway to Dulles Toll Road WB Off-Ramp/Jarrett Valley Dr)	495.70	487.40	493.60	495.70	509.10	502.00	489.50	494.90	491.10	493.00	**495.20**

VISSIM 2040 PM Conventional Model Throughput

Intersection	Approach	Movement	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7	Run 8	Run 9	Run 10	Average
Lewinsville Rd	McLean Bible Church (NB)	Left	20	12	17	21	17	18	17	20	21	23	**19**
		Through	45	74	62	59	51	71	63	51	60	61	**60**
		Right	7	3	3	5	7	2	3	6	5	7	**5**
	Lewinsville Rd (SB)	Left	71	68	76	70	69	81	76	73	76	72	**73**
		Through	4	8	6	13	3	5	3	2	8	4	**6**
		Right	561	569	580	585	575	563	572	584	558	569	**572**
	Route 7 (WB)	Left	40	32	27	36	22	29	31	20	21	27	**29**
		Through	2,934	2,947	2,912	2,912	2,894	2,939	2,926	2,851	2,942	2,943	**2,920**
		Right	293	254	309	304	284	293	268	292	270	293	**286**
	Route 7 (EB)	Left	366	341	339	349	291	339	330	354	331	331	**337**
		Through	2,187	2,140	2,179	2,188	2,127	2,175	2,158	2,225	2,277	2,179	**2,184**
		Right	46	48	65	39	43	46	43	43	44	44	**46**
Baron Cameron Ave/Springvale Rd	Baron Cameron Ave (NB)	Left	346	323	328	297	309	334	312	318	331	323	**322**
		Through	289	327	314	310	329	306	314	323	304	323	**314**
		Right	979	971	1,026	945	985	985	974	989	958	1,013	**983**
	Springvale Rd (SB)	Left	39	33	36	46	40	29	36	34	36	34	**36**
		Through	266	238	252	268	257	288	256	268	266	267	**263**
		Right	36	45	45	40	38	32	43	34	44	35	**39**
	Route 7 (WB)	Left	1,015	937	1,000	1,047	961	1,003	988	955	959	1,024	**989**
		Through	3,420	3,450	3,429	3,470	3,455	3,424	3,441	3,423	3,445	3,488	**3,445**
		Right	50	61	45	53	59	47	40	57	55	41	**51**
	Route 7 (EB)	Left	32	26	32	25	34	23	23	28	30	31	**28**
		Through	1,560	1,632	1,570	1,613	1,607	1,597	1,613	1,620	1,656	1,547	**1,602**
		Right	266	265	257	282	239	253	266	265	261	233	**259**

VISSIM 2040 PM Conventional Model Queues

Intersection	Approach	Movement	Run 1		Run 2		Run 3		Run 4		Run 5		Run 6		Run 7		Run 8		Run 9		Run 10		Average	
			Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)
Lewinsville Rd	McLean Bible Church (NB)	Left	39	169	52	164	42	195	41	130	41	211	60	212	40	230	39	149	42	192	46	147	44	180
		Through	39	169	52	164	42	195	41	130	41	211	60	212	40	230	39	149	42	191	46	147	44	180
		Right	37	169	49	163	41	195	38	129	40	211	57	211	36	230	36	149	41	191	44	147	42	180
	Lewinsville Rd (SB)	Left	984	2,232	1,820	3,255	997	2,232	1,293	2,790	1,771	2,989	1,144	2,064	2,219	3,457	1,714	2,777	1,288	2,508	1,568	3,301	1,480	2,761
		Through	984	2,232	1,820	3,254	997	2,231	1,292	2,789	1,770	2,988	1,144	2,063	2,218	3,456	1,714	2,776	1,287	2,507	1,568	3,300	1,479	2,760
		Right	982	2,230	1,818	3,253	995	2,230	1,290	2,788	1,769	2,987	1,142	2,062	2,217	3,455	1,712	2,775	1,286	2,505	1,566	3,299	1,478	2,758
	Route 7 (WB)	Left	3,496	4,351	3,215	5,681	3,380	4,341	3,442	4,369	2,948	4,351	3,846	4,654	3,704	4,351	3,866	5,032	3,526	4,333	3,634	4,337	3,506	4,580
		Through	3,496	4,350	3,214	5,681	3,379	4,341	3,441	4,369	2,947	4,350	3,845	4,654	3,704	4,350	3,865	5,031	3,526	4,333	3,634	4,337	3,505	4,580
		Right	3,501	4,357	3,220	5,687	3,386	4,347	3,447	4,375	2,953	4,357	3,852	4,660	3,710	4,357	3,872	5,038	3,532	4,339	3,640	4,343	3,511	4,586
	Route 7 (EB)	Left	685	1,474	534	1,100	1,245	1,965	947	1,654	1,287	2,600	814	1,540	892	1,547	484	1,206	457	1,228	231	768	758	1,508
		Through	684	1,474	533	1,100	1,245	1,965	947	1,654	1,286	2,600	814	1,540	892	1,547	484	1,206	457	1,228	230	768	757	1,508
		Right	607	1,474	404	1,100	1,227	1,965	866	1,654	1,235	2,600	793	1,540	826	1,547	394	1,206	393	1,228	140	768	689	1,508

Intersection	Approach	Movement	Run 1		Run 2		Run 3		Run 4		Run 5		Run 6		Run 7		Run 8		Run 9		Run 10		Average	
			Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)
Baron Cameron Ave/Springvale Rd	Baron Cameron Ave (NB)	Left	214	571	274	638	311	877	252	666	296	654	256	714	399	874	309	689	219	614	279	709	281	701
		Through	215	573	276	639	312	879	253	667	297	656	257	716	401	875	310	691	220	615	280	710	282	702
		Right	214	573	276	640	312	879	253	668	297	656	257	716	401	876	310	691	219	615	280	711	282	703
	Springvale Rd (SB)	Left	130	413	124	378	103	278	100	338	116	298	119	299	103	300	113	346	121	394	101	356	113	340
		Through	131	414	125	379	105	279	101	339	117	299	121	300	104	301	114	347	123	396	102	357	114	341
		Right	129	414	123	379	104	280	99	339	116	299	119	300	101	301	111	348	120	396	99	357	112	341
	Route 7 (WB)	Left	337	1,540	417	2,399	383	1,647	530	2,763	416	2,142	369	1,093	431	1,767	727	3,525	334	1,025	405	1,765	435	1,967
		Through	338	1,541	417	2,400	384	1,647	530	2,763	416	2,143	370	1,093	432	1,768	728	3,525	334	1,025	406	1,765	436	1,967
		Right	234	1,542	297	2,401	274	1,648	413	2,765	332	2,144	245	1,095	317	1,769	650	3,526	214	1,027	282	1,766	326	1,968
	Route 7 (EB)	Left	212	730	181	825	191	896	190	842	196	875	198	795	186	757	220	804	201	845	180	789	196	816
		Through	214	732	183	827	193	898	192	844	198	876	199	797	188	758	222	805	203	846	182	790	197	817
		Right	76	854	25	649	13	173	63	854	27	804	30	733	32	729	70	894	42	912	37	809	42	741

APPENDIX G

VISSIM Output: 2040 PM Build

VISSIM 2040 PM Build Model Level of Service and Delay

Intersection	Approach	Movement	2040 PM Build						
			Model Volume (vph)	Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Inter. Delay (s/veh)	Inter. LOS
Lewinsville Rd	NB	Left	18	118.58	F	109.34	F	14.00	B
		Through	59	114.51	F				
		Right	5	17.40	B				
	SB	Left	90	111.77	F	110.28	F		
		Shared Through/Right	13	100.24	F				
		Right			A				
	WB	Left	8	96.73	F	14.12	B		
		Through	3131	13.92	B				
		Right			A				
	EB	Left	366	2.12	A	6.49	A		
		Through	2048	7.27	A				
		Right							
Lewinsville at Crossover	NB	Shared Left/Thru	26	161.35	F	121.93	F	18.31	B
		Right	14	46.32	D				
	WB	Left	43	121.89	F	15.56	F		
		Thru	3116	14.09	B				
	EB	Left/U-turn	363	80.93	F	20.09	C		
		Thru	2184	10.37	B				
		Right	47	2.21	A				
Towlston Rd	NB	Left	123	111.63	F	96.75	F	30.10	C
		Through	52	118.08	F				
		Right	34	10.54	B				
	SB	Left	55	101.05	F	93.47	F		
		Through	70	189.46	F				
		Right	294	69.14	E				
	WB	Left	82	95.67	F	21.35	C		
		Through	4295	20.16	C				
		Right	59	4.77	A				
	EB	Left	247	109.58	F	29.46	C		
		Through	2371	21.88	C				
		Right	83	8.00	A				
Beulah Rd/Forestville Dr.	NB	Left	310	121.61	F	84.95	F	18.52	B
		Through	31	130.17	F				
		Right	202	21.82	C				
	SB	Left	40	127.95	F	101.14	F		
		Through	10	113.21	F				
		Right	15	21.40	C				
	WB	Left	199	134.28	F	12.29	B		
		Through	4539	7.04	A				
		Right	38	0.80	A				
	EB	Left	35	202.81	F	14.09	B		
		Through	2404	12.34	B				
		Right	190	2.01	A				

VISSIM 2040 PM Build Model Level of Service and Delay (continued)

Intersection	Approach	Movement	2040 PM Build						
			Model Volume (vph)	Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Inter. Delay (s/veh)	Inter. LOS
Carpers Farm Way/Colvin Run Rd (East)	NB	Left	17	103.82	F	70.65	E	25.53	C
		Through	13	103.91	F				
		Right	39	44.86	D				
	SB	Left	169	106.68	F	105.51	F		
		Through	15	102.30	F				
		Right	10	90.08	F				
	WB	Left	46	128.04	F	23.03	C		
		Through	4482	22.57	C				
		Right	307	13.99	B				
	EB	Left	25	127.89	F	22.89	C		
		Through	2411	21.96	C				
		Right	30	8.89	A				
Delta Glen Ct/Colvin Run Rd (West)	NB	Left	9	149.48	F	98.23	F	9.09	A
		Through	9	147.83	F				
		Right	23	60.13	E				
	SB	Left				45.43	D		
		Through							
		Right	279	45.43	D				
	WB	Left	60	121.96	F	4.96	A		
		Through	4440	3.39	A				
		Right	10	1.40	A				
	EB	Left	202	82.05	F	10.93	B		
		Through	2446	5.13	A				
		Right	19	1.07	A				
Baron Cameron Avenue/Springvale Road	NB	Left	326	102.10	F	46.79	D	23.23	C
		Through	314	102.16	F				
		Right	998	11.35	B				
	SB	Left	35	177.27	F	114.08	F		
		Through	275	109.23	F				
		Right	41	92.47	F				
	WB	Left	1037	8.33	A	16.48	B		
		Through	3638	18.99	B				
		Right	55	3.89	A				
	EB	Left	28	139.09	F	2.87	A		
		Through	1603	0.63	A				
		Right	265	2.09	A				

VISSIM 2040 PM Build Model Level of Service and Delay (continued)

Intersection	Approach	Movement	2040 PM Build						
			Model Volume (vph)	Delay (s/veh)	LOS	Appr. Delay (s/veh)	Appr. LOS	Inter. Delay (s/veh)	Inter. LOS
Utterback Store Rd	NB	Left						18.11	B
		Through							
		Right							
	SB	Left	104	112.95	F	74.11	E		
		Through							
		Right	307	60.93	E				
	WB	Left				11.62	B		
		Through	3794	12.06	B				
		Right	178	2.28	A				
	EB	Left	247	132.75	F	19.41	B		
		Through	1845	4.23	A				
		Right							
Reston Park Way	NB	Left	414	107.21	F	80.84	F	22.12	C
		Through	6	85.10	F				
		Right	172	17.34	B				
	SB	Left	6	120.71	F	109.20	F		
		Through	5	140.29	F				
		Right	4	54.27	D				
	WB	Left	199	149.93	F	18.18	B		
		Through	3887	11.46	B				
		Right	5	2.23	A				
	EB	Left	6	128.26	F	13.55	B		
		Through	1905	15.12	B				
		Right	431	4.99	A				
Dulles Toll Road WB Off-Ramp/Jarrett Valley Dr	NB	Left	11	114.64	F	28.11	C	5.41	A
		Through							
		Right	43	6.02	A				
	SB	Left	42	117.41	F	8.68	A		
		Through	11	107.04	F				
		Right	710	0.74	A				
	WB	Left	64	113.65	F	6.07	A		
		Through	3109	3.84	A				
		Right							
	EB	Left				2.68	A		
		Through	2111	2.70	A				
		Right	20	0.32	A				

VISSIM 2040 PM Build Model Travel Times

Intersection	Westbound Travel Times (seconds)										
	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7	Run 8	Run 9	Run 10	**Average**
Section 1 (Dulles Toll Road WB Off-Ramp/Jarrett Valley Dr to Beulah Rd/Forestville Dr)	204.60	207.80	204.80	207.90	215.80	205.10	222.00	213.40	207.50	206.90	**209.58**
Section 2 (Beulah Rd/Forestville Dr to Baron Cameron Ave/Springvale Rd)	207.10	206.30	206.80	210.20	206.20	206.70	207.10	205.90	210.60	205.00	**207.19**
Section 3 (Baron Cameron Ave/Springvale to Reston Parkway)	115.10	113.60	115.40	114.70	112.20	111.20	115.60	112.00	114.50	115.60	**113.99**
Total Westbound Travel Time (Dulles Toll Road WB Off-Ramp/Jarrett Valley Dr to Reston Parkway)	538.10	543.50	541.80	544.70	546.40	536.80	554.90	543.40	546.50	543.80	**543.99**

Intersection	Eastbound Travel Times (seconds)										
	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7	Run 8	Run 9	Run 10	**Average**
Section 1 (Reston Parkway to Baron Cameron Ave/Springvale Rd)	100.30	99.30	101.40	100.80	100.20	99.80	101.10	100.30	101.00	99.80	**100.40**
Section 2 (Baron Cameron Ave/Springvale Rd to Beulah Rd/Forestville Dr)	192.30	191.40	194.00	192.20	191.90	193.70	190.90	190.70	194.10	188.90	**192.01**
Section 3 (Beulah Rd/Forestville Dr to Dulles Toll Road WB Off-Ramp/Jarrett Valley Dr)	190.30	185.20	190.60	189.40	190.30	194.00	188.80	191.40	190.80	189.00	**189.98**
Total Eastbound Travel Time (Reston Parkway to Dulles Toll Road WB Off-Ramp/Jarrett Valley Dr)	492.10	481.80	491.90	489.90	488.40	494.00	492.10	494.40	494.20	486.20	**490.50**

VISSIM 2040 PM Build Model Throughput

Intersection	Approach	Movement	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7	Run 8	Run 9	Run 10	Average
Lewinsville Rd	McLean Bible Church (NB)	Left	20	18	18	19	14	22	19	25	18	18	**19**
		Through	64	53	70	69	48	57	58	53	50	70	**59**
		Right	3	10	5	5	6	7	8	7	7	3	**6**
	Lewinsville Rd (SB)	Left	89	85	92	94	86	94	91	88	94	87	**90**
		Through	8	11	6	9	8	8	7	8	4	11	**8**
		Right	647	685	682	683	666	650	687	662	666	681	**671**
	Route 7 (WB)	Left	34	24	19	31	31	30	28	26	31	27	**28**
		Through	3,169	3,177	3,131	3,130	3,110	3,090	3,074	3,081	3,106	3,036	**3,110**
		Right	307	348	314	332	296	296	291	306	314	283	**309**
	Route 7 (EB)	Left	399	331	371	373	376	372	365	356	363	351	**366**
		Through	2,024	2,024	2,057	2,061	2,062	2,026	2,046	2,084	2,084	2,016	**2,048**
		Right	61	34	53	44	48	49	37	42	55	48	**47**
Baron Cameron Ave/Springvale Rd	Baron Cameron Ave (NB)	Left	331	324	327	322	309	310	317	342	335	339	**326**
		Through	310	327	297	296	320	330	319	312	308	320	**314**
		Right	1,006	992	1,049	951	998	1,023	1,006	970	1,020	969	**998**
	Springvale Rd (SB)	Left	39	34	36	31	31	46	38	37	24	35	**35**
		Through	282	259	262	294	272	284	260	281	280	278	**275**
		Right	38	48	44	43	40	31	45	38	44	37	**41**
	Route 7 (WB)	Left	1,071	3,611	3,611	3,611	3,611	3,611	3,611	3,611	3,611	3,611	**3,357**
		Through	3,611	3,710	3,591	3,583	3,681	3,608	3,655	3,592	3,669	3,677	**3,638**
		Right	45	59	56	58	58	55	44	67	60	47	**55**
	Route 7 (EB)	Left	22	28	23	39	21	31	27	35	32	21	**28**
		Through	1,584	1,600	1,609	1,591	1,609	1,615	1,606	1,604	1,646	1,562	**1,603**
		Right	282	267	274	289	252	255	275	265	255	238	**265**

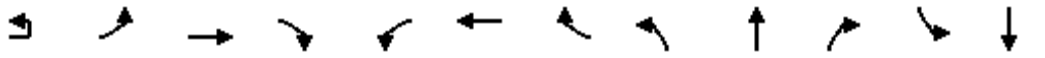
VISSIM 2040 PM Build Model Queues

Intersection	Approach	Movement	Run 1		Run 2		Run 3		Run 4		Run 5		Run 6		Run 7		Run 8		Run 9		Run 10		Average	
			Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)
Lewinsville Rd	McLean Bible Church (NB)	Left	42	165	34	129	47	165	51	185	35	106	42	149	34	107	36	165	35	145	46	166	40	148
		Through	42	165	34	129	48	166	51	185	35	106	42	149	34	107	36	166	36	145	46	166	40	148
		Right	41	165	33	130	46	166	50	186	34	106	41	149	33	108	33	166	35	146	45	166	39	149
	Lewinsville Rd (SB)	Left	66	230	55	205	53	243	54	186	51	184	59	239	62	203	56	189	55	201	52	208	56	209
		Through	6	90	6	68	6	68	6	42	8	65	8	120	6	46	9	84	6	65	10	68	7	72
		Right	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Route 7 (WB)	Left (western)	27	93	24	88	20	71	28	70	31	110	27	105	25	88	29	90	28	113	21	88	26	92
		Left (eastern)	66	446	64	441	65	416	61	427	65	507	63	471	66	447	62	438	62	423	58	391	63	441
		Through	66	446	64	441	65	416	62	427	65	506	63	471	66	447	62	438	63	423	59	391	64	441
		Right	64	451	64	446	65	421	60	432	63	512	62	476	67	452	61	443	62	429	57	396	63	446
	Route 7 (EB)	Left (eastern)	0	0	0	0	0	22	0	224	0	129	0	67	0	53	0	0	0	0	0	22	0	52
		Left (western)	205	705	175	646	192	623	189	686	204	783	198	681	172	645	169	605	187	700	175	724	187	680
		Through	35	597	29	249	26	211	32	307	29	528	30	229	39	520	31	366	35	666	30	243	32	392
		Right	83	707	74	648	73	625	77	688	83	785	76	683	71	647	75	607	80	702	72	726	76	682

Intersection	Approach	Movement	Run 1		Run 2		Run 3		Run 4		Run 5		Run 6		Run 7		Run 8		Run 9		Run 10		Average	
			Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)
Baron Cameron Ave/Springvale Rd	Baron Cameron Ave (NB)	Left	191	618	207	730	199	757	189	793	204	630	291	1,877	208	728	205	628	218	752	207	749	212	826
		Through	191	618	207	730	199	757	190	793	204	630	291	1,877	208	728	205	628	219	753	208	749	212	826
		Right	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Springvale Rd (SB)	Left	109	306	96	286	96	263	117	363	115	349	103	319	106	319	106	295	114	362	109	302	107	316
		Through	110	307	98	287	97	264	118	364	116	350	104	321	107	320	107	296	115	363	111	303	108	318
		Right	107	308	96	288	92	265	117	365	114	351	102	321	105	321	105	297	115	364	105	304	106	318
	Route 7 (WB)	Left	145	1,475	156	1,392	133	1,291	144	1,511	108	1,375	148	1,136	196	1,759	161	1,242	159	1,198	129	1,402	148	1,378
		Through	146	1,475	157	1,392	133	1,291	144	1,511	109	1,375	148	1,136	197	1,759	161	1,242	159	1,198	129	1,402	148	1,378
		Right	145	1,476	157	1,393	133	1,292	144	1,512	108	1,376	148	1,136	197	1,759	161	1,243	159	1,199	129	1,403	148	1,379
	Route 7 (EB)	Left	46	146	45	144	43	147	58	204	46	166	56	203	69	455	67	179	59	145	39	205	53	199
		Through	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Right	2	206	1	203	1	206	2	265	2	225	3	267	26	519	2	223	2	190	8	264	5	257

APPENDIX H

Synchro Input: 2040 AM Conventional



Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	20	680	3270	10	20	1630	165	10	10	5	80	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			0%			-5%			-2%			-1%
Storage Length (ft)		850		380	400		225	0		100	0	
Storage Lanes		1		1	2		1	1		1	1	
Taper Length (ft)		150			120			25			25	
Lane Util. Factor	0.91	1.00	0.91	1.00	0.97	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt				0.850			0.850			0.850		
Flt Protected		0.950			0.950			0.950			0.950	
Satd. Flow (prot)	0	1770	5085	1583	3519	5212	1623	1787	1881	1599	1778	1872
Flt Permitted		0.950			0.950			0.754			0.751	
Satd. Flow (perm)	0	1770	5085	1583	3519	5212	1623	1419	1881	1599	1406	1872
Right Turn on Red				Yes			Yes			Yes		
Satd. Flow (RTOR)				55			89			57		
Link Speed (mph)			45			45			15			35
Link Distance (ft)			1979			2023			2224			186
Travel Time (s)			30.0			30.7			101.1			3.6
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)			0%			0%			0%			0%
Adj. Flow (vph)	20	680	3270	10	20	1630	165	10	10	5	80	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	700	3270	10	20	1630	165	10	10	5	80	5
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	R NA	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left
Median Width(ft)			24			24			12			12
Link Offset(ft)			0			0			0			0
Crosswalk Width(ft)			16			16			16			16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	0.97	0.97	0.97	0.99	0.99	0.99	0.99	0.99
Turning Speed (mph)	9	15		9	15		9	15		9	15	
Number of Detectors	1	5	2	1	1	2	1	1	1	1	1	1
Detector Template												
Leading Detector (ft)	50	500	300	56	35	300	56	35	35	35	35	35
Trailing Detector (ft)	0	0	150	50	-5	150	50	-5	-5	-5	-5	-5
Turn Type	Prot	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	pm+ov	Perm	NA
Protected Phases	5!	5	2		1	6			4	1		8
Permitted Phases				2			6	4		4	8	
Detector Phase	5	5	2	2	1	6	6	4	4	4	8	8
Switch Phase												
Minimum Initial (s)	5.0	5.0	15.0	15.0	5.0	15.0	15.0	5.0	5.0	5.0	5.0	5.0

Lane Group	SBR
Lane Configurations	
Volume (vph)	425
Ideal Flow (vphpl)	1900
Lane Width (ft)	12
Grade (%)	
Storage Length (ft)	100
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Ped Bike Factor	
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1591
Flt Permitted	
Satd. Flow (perm)	1591
Right Turn on Red	Yes
Satd. Flow (RTOR)	22
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	1.00
Growth Factor	100%
Heavy Vehicles (%)	2%
Bus Blockages (#/hr)	0
Parking (#/hr)	
Mid-Block Traffic (%)	
Adj. Flow (vph)	425
Shared Lane Traffic (%)	
Lane Group Flow (vph)	425
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	0.99
Turning Speed (mph)	9
Number of Detectors	1
Detector Template	
Leading Detector (ft)	35
Trailing Detector (ft)	-5
Turn Type	pm+ov
Protected Phases	5!
Permitted Phases	8
Detector Phase	8
Switch Phase	
Minimum Initial (s)	5.0

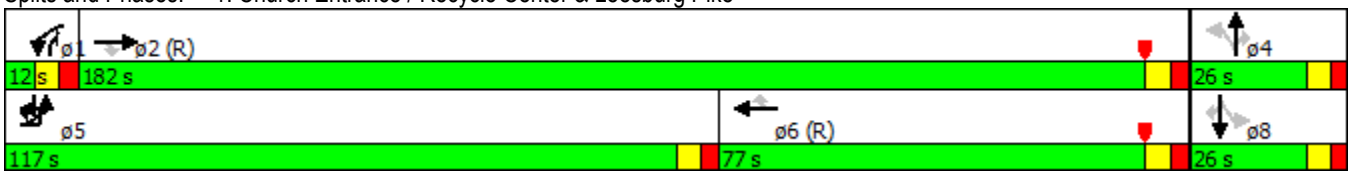
Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Minimum Split (s)	12.0	12.0	22.5	22.5	12.0	22.5	22.5	12.0	12.0	12.0	12.0	12.0
Total Split (s)	117.0	117.0	182.0	182.0	12.0	77.0	77.0	26.0	26.0	12.0	26.0	26.0
Total Split (%)	53.2%	53.2%	82.7%	82.7%	5.5%	35.0%	35.0%	11.8%	11.8%	5.5%	11.8%	11.8%
Maximum Green (s)	110.0	110.0	174.5	174.5	5.0	69.5	69.5	19.0	19.0	5.0	19.0	19.0
Yellow Time (s)	4.0	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.0	7.5	7.5	7.0	7.5	7.5	7.0	7.0	7.0	7.0	7.0
Lead/Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag			Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Minimum Gap (s)	3.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		105.2	179.3	179.3	5.0	74.3	74.3	19.0	19.0	26.2	19.0	19.0
Actuated g/C Ratio		0.48	0.82	0.82	0.02	0.34	0.34	0.09	0.09	0.12	0.09	0.09
v/c Ratio		0.83	0.79	0.01	0.25	0.93	0.27	0.08	0.06	0.02	0.66	0.03
Control Delay		49.2	3.3	0.0	110.0	77.1	21.7	94.4	93.5	0.2	125.5	92.8
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		49.2	3.3	0.0	110.0	77.1	21.7	94.4	93.5	0.2	125.5	92.8
LOS		D	A	A	F	E	C	F	F	A	F	F
Approach Delay			11.4			72.5			75.2			40.6
Approach LOS			B			E			E			D
90th %ile Green (s)	110.0	110.0	174.5	174.5	5.0	69.5	69.5	19.0	19.0	5.0	19.0	19.0
90th %ile Term Code	Max	Max	Coord	Coord	Max	Coord	Coord	Hold	Hold	Max	Max	Max
70th %ile Green (s)	110.0	110.0	174.5	174.5	5.0	69.5	69.5	19.0	19.0	5.0	19.0	19.0
70th %ile Term Code	Max	Max	Coord	Coord	Max	Coord	Coord	Hold	Hold	Max	Max	Max
50th %ile Green (s)	110.0	110.0	174.5	174.5	5.0	69.5	69.5	19.0	19.0	5.0	19.0	19.0
50th %ile Term Code	Max	Max	Coord	Coord	Max	Coord	Coord	Hold	Hold	Max	Max	Max
30th %ile Green (s)	110.0	110.0	186.5	186.5	0.0	69.5	69.5	19.0	19.0	0.0	19.0	19.0
30th %ile Term Code	Max	Max	Coord	Coord	Skip	Coord	Coord	Hold	Hold	Skip	Max	Max
10th %ile Green (s)	86.0	86.0	186.5	186.5	0.0	93.5	93.5	19.0	19.0	0.0	19.0	19.0
10th %ile Term Code	Gap	Gap	Coord	Coord	Skip	Coord	Coord	Hold	Hold	Skip	Max	Max
Stops (vph)		543	885	0	20	1482	87	11	11	0	75	6
Fuel Used(gal)		23	55	0	1	74	5	0	0	0	3	0
CO Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
NOx Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
VOC Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
Dilemma Vehicles (#)		0	21	0	0	36	0	0	0	0	0	0
Queue Length 50th (ft)		733	466	0	14	872	81	14	14	0	115	7
Queue Length 95th (ft)		m732	m449	m0	38	#1185	187	43	43	0	#238	27
Internal Link Dist (ft)			1899			1943			2144			106
Turn Bay Length (ft)		850		380	400		225			100		
Base Capacity (vph)		885	4144	1300	79	1760	606	122	162	240	121	161
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0

Lane Group	SBR
Minimum Split (s)	12.0
Total Split (s)	117.0
Total Split (%)	53.2%
Maximum Green (s)	110.0
Yellow Time (s)	4.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	0.0
Total Lost Time (s)	7.0
Lead/Lag	Lead
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time Before Reduce (s)	0.0
Time To Reduce (s)	0.0
Recall Mode	None
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	131.2
Actuated g/C Ratio	0.60
v/c Ratio	0.44
Control Delay	24.1
Queue Delay	0.0
Total Delay	24.1
LOS	C
Approach Delay	
Approach LOS	
90th %ile Green (s)	110.0
90th %ile Term Code	Max
70th %ile Green (s)	110.0
70th %ile Term Code	Max
50th %ile Green (s)	110.0
50th %ile Term Code	Max
30th %ile Green (s)	110.0
30th %ile Term Code	Max
10th %ile Green (s)	86.0
10th %ile Term Code	Gap
Stops (vph)	213
Fuel Used(gal)	4
CO Emissions (g/hr)	0
NOx Emissions (g/hr)	0
VOC Emissions (g/hr)	0
Dilemma Vehicles (#)	0
Queue Length 50th (ft)	297
Queue Length 95th (ft)	451
Internal Link Dist (ft)	
Turn Bay Length (ft)	100
Base Capacity (vph)	957
Starvation Cap Reductn	0

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.79	0.79	0.01	0.25	0.93	0.27	0.08	0.06	0.02	0.66	0.03

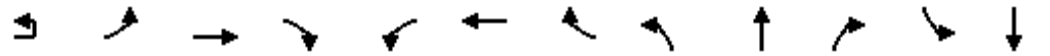
Intersection Summary			
Area Type:	Other		
Cycle Length: 220			
Actuated Cycle Length: 220			
Offset: 80 (36%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.93			
Intersection Signal Delay: 31.5		Intersection LOS: C	
Intersection Capacity Utilization 124.5%		ICU Level of Service H	
Analysis Period (min) 60			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			
! Phase conflict between lane groups.			

Splits and Phases: 1: Church Entrance / Recycle Center & Leesburg Pike



Lane Group	SBR
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.44

Intersection Summary



Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	10	175	4092	65	50	1975	55	85	45	60	108	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-2%			0%			-1%			0%
Storage Length (ft)		440		145	200		70	350		350	390	
Storage Lanes		1		1	1		1	1		1	1	
Taper Length (ft)		180			100			25			25	
Lane Util. Factor	0.91	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt				0.850			0.850			0.850		
Flt Protected		0.950			0.950			0.950			0.950	
Satd. Flow (prot)	0	1787	5136	1599	1770	5085	1583	1778	1872	1591	1770	1863
Flt Permitted		0.950			0.950			0.724			0.624	
Satd. Flow (perm)	0	1787	5136	1599	1770	5085	1583	1355	1872	1591	1162	1863
Right Turn on Red				Yes			Yes			Yes		
Satd. Flow (RTOR)				55			89			92		
Link Speed (mph)			55			55			25			35
Link Distance (ft)			3810			775			1826			1736
Travel Time (s)			47.2			9.6			49.8			33.8
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)			0%			0%			0%			0%
Adj. Flow (vph)	10	175	4092	65	50	1975	55	85	45	60	108	50
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	185	4092	65	50	1975	55	85	45	60	108	50
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	R NA	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left
Median Width(ft)			12			12			12			12
Link Offset(ft)			0			0			0			0
Crosswalk Width(ft)			16			16			16			16
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	1.00	1.00	1.00	0.99	0.99	0.99	1.00	1.00
Turning Speed (mph)	9	15		9	15		9	15		9	15	
Number of Detectors	1	1	1	1	1	1	1	1	1	1	1	1
Detector Template												
Leading Detector (ft)	50	35	206	46	35	206	46	5	35	35	5	35
Trailing Detector (ft)	0	-5	200	40	-5	200	40	0	-5	-5	0	-5
Turn Type	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA
Protected Phases	1!	1	6	7	5	2	3	7	4	5	3	8
Permitted Phases				6			2	4		4	8	
Detector Phase	1	1	6	6	5	2	2	7	4	4	3	8
Switch Phase												
Minimum Initial (s)	5.0	5.0	15.0	5.0	5.0	15.0	5.0	5.0	5.0	5.0	5.0	5.0

Lane Group	SBR
Lane Configurations	
Volume (vph)	80
Ideal Flow (vphpl)	1900
Lane Width (ft)	12
Grade (%)	
Storage Length (ft)	390
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Ped Bike Factor	
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1583
Flt Permitted	
Satd. Flow (perm)	1583
Right Turn on Red	Yes
Satd. Flow (RTOR)	57
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	1.00
Growth Factor	100%
Heavy Vehicles (%)	2%
Bus Blockages (#/hr)	0
Parking (#/hr)	
Mid-Block Traffic (%)	
Adj. Flow (vph)	80
Shared Lane Traffic (%)	
Lane Group Flow (vph)	80
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Number of Detectors	1
Detector Template	
Leading Detector (ft)	5
Trailing Detector (ft)	0
Turn Type	pm+ov
Protected Phases	1!
Permitted Phases	8
Detector Phase	8
Switch Phase	
Minimum Initial (s)	5.0

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Minimum Split (s)	12.0	12.0	22.5	12.0	12.0	22.5	12.0	12.0	12.0	12.0	12.0	12.0
Total Split (s)	41.0	41.0	180.0	13.0	13.0	152.0	14.0	13.0	13.0	13.0	14.0	14.0
Total Split (%)	18.6%	18.6%	81.8%	5.9%	5.9%	69.1%	6.4%	5.9%	5.9%	5.9%	6.4%	6.4%
Maximum Green (s)	34.0	34.0	172.5	6.0	6.0	144.5	7.0	6.0	6.0	6.0	7.0	7.0
Yellow Time (s)	4.0	4.0	5.5	4.0	4.0	5.5	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	2.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.0	7.5	7.0	7.0	7.5	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	4.0	3.0	3.0	4.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	4.0	3.0	3.0	4.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	C-Max	None	None	C-Max	None	None	None	None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		27.6	172.5	186.0	6.0	150.9	165.4	12.0	6.0	19.0	14.0	7.0
Actuated g/C Ratio		0.13	0.78	0.85	0.03	0.69	0.75	0.05	0.03	0.09	0.06	0.03
v/c Ratio		0.83	1.02	0.05	1.04	0.57	0.05	1.00	0.88	0.27	1.16	0.85
Control Delay		104.7	42.0	0.0	366.9	23.7	1.4	287.0	252.4	5.5	470.1	218.1
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		104.7	42.0	0.0	366.9	23.7	1.4	287.0	252.4	5.5	470.1	218.1
LOS		F	D	A	F	C	A	F	F	A	F	F
Approach Delay			44.0			31.4			189.9			267.9
Approach LOS			D			C			F			F
90th %ile Green (s)	34.0	34.0	172.5	6.0	6.0	144.5	7.0	6.0	6.0	6.0	7.0	7.0
90th %ile Term Code	Max	Max	Coord	Max	Max	Coord	Max	Max	Max	Max	Max	Max
70th %ile Green (s)	31.6	31.6	172.5	6.0	6.0	146.9	7.0	6.0	6.0	6.0	7.0	7.0
70th %ile Term Code	Gap	Gap	Coord	Max	Max	Coord	Max	Max	Max	Max	Max	Max
50th %ile Green (s)	28.1	28.1	172.5	6.0	6.0	150.4	7.0	6.0	6.0	6.0	7.0	7.0
50th %ile Term Code	Gap	Gap	Coord	Max	Max	Coord	Max	Max	Max	Max	Max	Max
30th %ile Green (s)	24.6	24.6	172.5	6.0	6.0	153.9	7.0	6.0	6.0	6.0	7.0	7.0
30th %ile Term Code	Gap	Gap	Coord	Max	Max	Coord	Max	Max	Max	Max	Max	Max
10th %ile Green (s)	19.5	19.5	172.5	6.0	6.0	159.0	7.0	6.0	6.0	6.0	7.0	7.0
10th %ile Term Code	Gap	Gap	Coord	Max	Max	Coord	Max	Max	Max	Max	Max	Max
Stops (vph)		183	822	0	41	1734	6	87	38	1	104	44
Fuel Used(gal)		12	149	2	5	51	0	7	3	1	12	3
CO Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
NOx Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
VOC Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
Dilemma Vehicles (#)		0	118	0	0	10	0	0	0	0	0	1
Queue Length 50th (ft)		278	~546	1	~79	958	5	120	67	0	~178	74
Queue Length 95th (ft)		m253	m377	m1	m#126	m1098	m12	#254	#194	27	#335	#202
Internal Link Dist (ft)			3730			695			1746			1656
Turn Bay Length (ft)		440		145	200		70	350		350	390	
Base Capacity (vph)		276	4027	1360	48	3488	1212	85	51	221	93	59
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0

Lane Group	SBR
Minimum Split (s)	12.0
Total Split (s)	41.0
Total Split (%)	18.6%
Maximum Green (s)	34.0
Yellow Time (s)	4.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	0.0
Total Lost Time (s)	7.0
Lead/Lag	Lead
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time Before Reduce (s)	0.0
Time To Reduce (s)	0.0
Recall Mode	None
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	41.6
Actuated g/C Ratio	0.19
v/c Ratio	0.23
Control Delay	26.1
Queue Delay	0.0
Total Delay	26.1
LOS	C
Approach Delay	
Approach LOS	
90th %ile Green (s)	34.0
90th %ile Term Code	Max
70th %ile Green (s)	31.6
70th %ile Term Code	Gap
50th %ile Green (s)	28.1
50th %ile Term Code	Gap
30th %ile Green (s)	24.6
30th %ile Term Code	Gap
10th %ile Green (s)	19.5
10th %ile Term Code	Gap
Stops (vph)	23
Fuel Used(gal)	2
CO Emissions (g/hr)	0
NOx Emissions (g/hr)	0
VOC Emissions (g/hr)	0
Dilemma Vehicles (#)	0
Queue Length 50th (ft)	28
Queue Length 95th (ft)	102
Internal Link Dist (ft)	
Turn Bay Length (ft)	390
Base Capacity (vph)	345
Starvation Cap Reductn	0

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.67	1.02	0.05	1.04	0.57	0.05	1.00	0.88	0.27	1.16	0.85

Intersection Summary			
Area Type:	Other		
Cycle Length: 220			
Actuated Cycle Length: 220			
Offset: 10 (5%), Referenced to phase 2:WBT and 6:EBT, Start of Yellow			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.16			
Intersection Signal Delay: 52.0		Intersection LOS: D	
Intersection Capacity Utilization 113.8%		ICU Level of Service H	
Analysis Period (min) 60			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

! Phase conflict between lane groups.

Splits and Phases: 2: Towlston Road & Leesburg Pike

Lane Group	SBR
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.23

Intersection Summary

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	25	20	3910	195	190	1925	25	150	15	320	75	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-3%			-4%			3%			-2%
Storage Length (ft)		100		200	750		750	0		200	320	
Storage Lanes		1		1	1		1	1		1	1	
Taper Length (ft)		50			120			120			25	
Lane Util. Factor	0.91	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt				0.850			0.850			0.850		
Flt Protected		0.950			0.950			0.950			0.950	
Satd. Flow (prot)	0	1796	5162	1607	1805	5187	1615	1743	1835	1560	1787	1881
Flt Permitted		0.950			0.950			0.334			0.748	
Satd. Flow (perm)	0	1796	5162	1607	1805	5187	1615	613	1835	1560	1407	1881
Right Turn on Red				Yes			Yes			Yes		
Satd. Flow (RTOR)				89			55			57		
Link Speed (mph)			55			55			35			25
Link Distance (ft)			913			3810			3260			1783
Travel Time (s)			11.3			47.2			63.5			48.6
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)			0%			0%			0%			0%
Adj. Flow (vph)	25	20	3910	195	190	1925	25	150	15	320	75	50
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	45	3910	195	190	1925	25	150	15	320	75	50
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	R NA	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left
Median Width(ft)			12			12			12			12
Link Offset(ft)			0			0			0			0
Crosswalk Width(ft)			16			16			16			16
Two way Left Turn Lane												
Headway Factor	0.98	0.98	0.98	0.98	0.97	0.97	0.97	1.02	1.02	1.02	0.99	0.99
Turning Speed (mph)	9	15		9	15		9	15		9	15	
Number of Detectors	1	1	3	1	1	3	1	1	1	1	1	1
Detector Template												
Leading Detector (ft)	50	35	306	46	35	306	46	5	35	35	5	35
Trailing Detector (ft)	0	-5	150	40	-5	150	40	0	-5	-5	0	-5
Turn Type	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA
Protected Phases	5!	5	2	3	1	6	7	3	8	1	7	4
Permitted Phases				2			6	8		8	4	
Detector Phase	5	5	2	2	1	6	6	3	8	8	7	4
Switch Phase												
Minimum Initial (s)	5.0	5.0	15.0	5.0	5.0	15.0	5.0	5.0	5.0	5.0	5.0	5.0

Lane Group	SBR
Lane Configurations	
Volume (vph)	5
Ideal Flow (vphpl)	1900
Lane Width (ft)	12
Grade (%)	
Storage Length (ft)	320
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Ped Bike Factor	
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1599
Flt Permitted	
Satd. Flow (perm)	1599
Right Turn on Red	Yes
Satd. Flow (RTOR)	92
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	1.00
Growth Factor	100%
Heavy Vehicles (%)	2%
Bus Blockages (#/hr)	0
Parking (#/hr)	
Mid-Block Traffic (%)	
Adj. Flow (vph)	5
Shared Lane Traffic (%)	
Lane Group Flow (vph)	5
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	0.99
Turning Speed (mph)	9
Number of Detectors	1
Detector Template	
Leading Detector (ft)	0
Trailing Detector (ft)	0
Turn Type	pm+ov
Protected Phases	5!
Permitted Phases	4
Detector Phase	4
Switch Phase	
Minimum Initial (s)	5.0

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Minimum Split (s)	12.0	12.0	22.5	12.0	12.0	22.5	12.0	12.0	12.0	12.0	12.0	12.0
Total Split (s)	19.0	19.0	161.0	19.0	27.0	169.0	12.0	19.0	20.0	27.0	12.0	13.0
Total Split (%)	8.6%	8.6%	73.2%	8.6%	12.3%	76.8%	5.5%	8.6%	9.1%	12.3%	5.5%	5.9%
Maximum Green (s)	12.0	12.0	153.5	12.0	20.0	161.5	5.0	12.0	13.0	20.0	5.0	6.0
Yellow Time (s)	4.0	4.0	5.5	4.0	4.0	5.5	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	2.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.0	7.5	7.0	7.0	7.5	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	C-Max	None	None	C-Max	None	None	None	None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		10.2	153.5	173.0	20.0	166.0	178.5	25.0	13.0	40.0	11.0	6.0
Actuated g/C Ratio		0.05	0.70	0.79	0.09	0.75	0.81	0.11	0.06	0.18	0.05	0.03
v/c Ratio		0.54	1.09	0.15	1.16	0.49	0.02	1.15	0.14	0.97	0.96	0.98
Control Delay		110.1	172.3	0.1	411.2	7.9	0.2	419.6	101.4	144.6	258.0	329.9
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		110.1	172.3	0.1	411.2	7.9	0.2	419.6	101.4	144.6	258.0	329.9
LOS		F	F	A	F	A	A	F	F	F	F	F
Approach Delay			163.6			43.6			228.3			275.7
Approach LOS			F			D			F			F
90th %ile Green (s)	12.0	12.0	153.5	12.0	20.0	161.5	5.0	12.0	13.0	20.0	5.0	6.0
90th %ile Term Code	Max	Max	Coord	Max	Max	Coord	Max	Max	Max	Max	Max	Max
70th %ile Green (s)	12.0	12.0	153.5	12.0	20.0	161.5	5.0	12.0	13.0	20.0	5.0	6.0
70th %ile Term Code	Max	Max	Coord	Max	Max	Coord	Max	Max	Max	Max	Max	Max
50th %ile Green (s)	11.0	11.0	153.5	12.0	20.0	162.5	5.0	12.0	13.0	20.0	5.0	6.0
50th %ile Term Code	Gap	Gap	Coord	Max	Max	Coord	Max	Max	Max	Max	Max	Max
30th %ile Green (s)	9.3	9.3	153.5	12.0	20.0	164.2	5.0	12.0	13.0	20.0	5.0	6.0
30th %ile Term Code	Gap	Gap	Coord	Max	Max	Coord	Max	Max	Max	Max	Max	Max
10th %ile Green (s)	0.0	0.0	153.5	12.0	20.0	180.5	5.0	12.0	13.0	20.0	5.0	6.0
10th %ile Term Code	Skip	Skip	Coord	Max	Max	Coord	Max	Max	Max	Max	Max	Max
Stops (vph)		45	3169	0	168	317	0	125	15	246	81	42
Fuel Used(gal)		2	219	1	24	55	1	17	1	19	5	4
CO Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
NOx Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
VOC Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
Dilemma Vehicles (#)		0	107	0	0	78	0	0	0	0	0	0
Queue Length 50th (ft)		67	~2310	1	~329	136	0	~246	21	397	103	74
Queue Length 95th (ft)		m69	m#2158	m0	m#597	m343	m1	#441	59	#754	#223	#214
Internal Link Dist (ft)			833			3730			3180			1703
Turn Bay Length (ft)		100		200	750		750			200	320	
Base Capacity (vph)		97	3601	1282	164	3914	1320	131	108	330	78	51
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0

Lane Group	SBR
Minimum Split (s)	12.0
Total Split (s)	19.0
Total Split (%)	8.6%
Maximum Green (s)	12.0
Yellow Time (s)	4.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	0.0
Total Lost Time (s)	7.0
Lead/Lag	Lead
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time Before Reduce (s)	0.0
Time To Reduce (s)	0.0
Recall Mode	None
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	20.5
Actuated g/C Ratio	0.09
v/c Ratio	0.02
Control Delay	0.2
Queue Delay	0.0
Total Delay	0.2
LOS	A
Approach Delay	
Approach LOS	
90th %ile Green (s)	12.0
90th %ile Term Code	Max
70th %ile Green (s)	12.0
70th %ile Term Code	Max
50th %ile Green (s)	11.0
50th %ile Term Code	Gap
30th %ile Green (s)	9.3
30th %ile Term Code	Gap
10th %ile Green (s)	0.0
10th %ile Term Code	Skip
Stops (vph)	0
Fuel Used(gal)	0
CO Emissions (g/hr)	0
NOx Emissions (g/hr)	0
VOC Emissions (g/hr)	0
Dilemma Vehicles (#)	0
Queue Length 50th (ft)	0
Queue Length 95th (ft)	0
Internal Link Dist (ft)	
Turn Bay Length (ft)	320
Base Capacity (vph)	232
Starvation Cap Reductn	0

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.46	1.09	0.15	1.16	0.49	0.02	1.15	0.14	0.97	0.96	0.98

Intersection Summary			
Area Type:	Other		
Cycle Length: 220			
Actuated Cycle Length: 220			
Offset: 200 (91%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.16			
Intersection Signal Delay: 133.1		Intersection LOS: F	
Intersection Capacity Utilization 119.0%		ICU Level of Service H	
Analysis Period (min) 60			

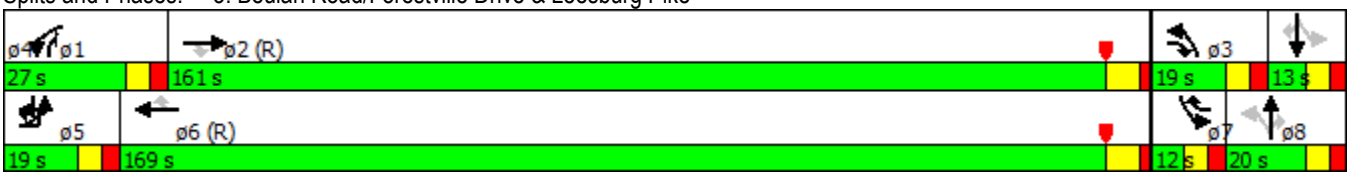
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

! Phase conflict between lane groups.

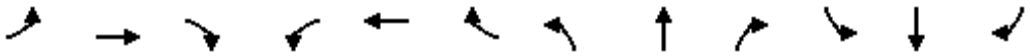
Splits and Phases: 3: Beulah Road/Forestville Drive & Leesburg Pike



Lane Group	SBR
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.02

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	3880	10	15	1880	200	35	15	55	185	5	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		-2%			-3%			-3%			0%	
Storage Length (ft)	170		270	300		300	0		0	0		0
Storage Lanes	1		1	1		1	0		0	0		0
Taper Length (ft)	90			90			25			25		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850			0.850		0.929			0.993	
Flt Protected	0.950			0.950				0.984			0.956	
Satd. Flow (prot)	1787	5136	1599	1796	5162	1607	0	1728	0	0	1768	0
Flt Permitted	0.950			0.950				0.905			0.596	
Satd. Flow (perm)	1787	5136	1599	1796	5162	1607	0	1590	0	0	1102	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			55			200		22			1	
Link Speed (mph)		55			55			25			35	
Link Distance (ft)		4302			1930			1220			1072	
Travel Time (s)		53.3			23.9			33.3			20.9	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	10	3880	10	15	1880	200	35	15	55	185	5	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	10	3880	10	15	1880	200	0	105	0	0	200	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.98	0.98	0.98	0.98	0.98	0.98	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1	1	1	1		1	1	
Detector Template												
Leading Detector (ft)	35	0	0	35	0	0	5	25		5	25	
Trailing Detector (ft)	-5	0	0	-5	0	0	0	-5		0	-5	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Detector Phase	5	2	2	1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	15.0	15.0	5.0	15.0	15.0	5.0	5.0		5.0	5.0	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	12.0	25.0	25.0	12.0	25.0	25.0	43.0	43.0		12.0	12.0	
Total Split (s)	12.0	165.0	165.0	12.0	165.0	165.0	43.0	43.0		43.0	43.0	
Total Split (%)	5.5%	75.0%	75.0%	5.5%	75.0%	75.0%	19.5%	19.5%		19.5%	19.5%	
Maximum Green (s)	5.0	155.0	155.0	5.0	155.0	155.0	36.0	36.0		36.0	36.0	
Yellow Time (s)	4.0	5.5	5.5	4.0	5.5	5.5	4.0	4.0		4.0	4.0	
All-Red Time (s)	3.0	4.5	4.5	3.0	4.5	4.5	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Total Lost Time (s)	7.0	10.0	10.0	7.0	10.0	10.0		7.0			7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0		3.0	3.0	
Minimum Gap (s)	2.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	
Walk Time (s)							7.0	7.0				
Flash Dont Walk (s)							29.0	29.0				
Pedestrian Calls (#/hr)							0	0				
Act Effct Green (s)	5.0	159.8	159.8	5.0	162.2	162.2		36.0			36.0	
Actuated g/C Ratio	0.02	0.73	0.73	0.02	0.74	0.74		0.16			0.16	
v/c Ratio	0.25	1.04	0.01	0.38	0.49	0.16		0.38			1.10	
Control Delay	111.5	116.7	0.0	166.1	3.5	0.3		68.8			306.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Total Delay	111.5	116.7	0.0	166.1	3.5	0.3		68.8			306.1	
LOS	F	F	A	F	A	A		E			F	
Approach Delay		116.4			4.3			68.8			306.1	
Approach LOS		F			A			E			F	
90th %ile Green (s)	5.0	155.0	155.0	5.0	155.0	155.0	36.0	36.0		36.0	36.0	
90th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Hold	Hold		Max	Max	
70th %ile Green (s)	5.0	155.0	155.0	5.0	155.0	155.0	36.0	36.0		36.0	36.0	
70th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Hold	Hold		Max	Max	
50th %ile Green (s)	0.0	155.0	155.0	5.0	167.0	167.0	36.0	36.0		36.0	36.0	
50th %ile Term Code	Skip	Coord	Coord	Max	Coord	Coord	Hold	Hold		Max	Max	
30th %ile Green (s)	0.0	167.0	167.0	0.0	167.0	167.0	36.0	36.0		36.0	36.0	
30th %ile Term Code	Skip	Coord	Coord	Skip	Coord	Coord	Hold	Hold		Max	Max	
10th %ile Green (s)	0.0	167.0	167.0	0.0	167.0	167.0	36.0	36.0		36.0	36.0	
10th %ile Term Code	Skip	Coord	Coord	Skip	Coord	Coord	Hold	Hold		Max	Max	
Stops (vph)	11	3349	0	16	206	0		75			177	
Fuel Used(gal)	1	260	0	1	28	2		3			21	
CO Emissions (g/hr)	0	0	0	0	0	0		0			0	
NOx Emissions (g/hr)	0	0	0	0	0	0		0			0	
VOC Emissions (g/hr)	0	0	0	0	0	0		0			0	
Dilemma Vehicles (#)	0	108	0	0	33	0		0			0	
Queue Length 50th (ft)	14	~2267	0	24	63	1		109			~339	
Queue Length 95th (ft)	m16	#2729	m0	m45	m84	m1		208			#618	
Internal Link Dist (ft)		4222			1850			1140			992	
Turn Bay Length (ft)	170		270	300		300						
Base Capacity (vph)	40	3730	1176	40	3805	1237		278			181	
Starvation Cap Reductn	0	0	0	0	0	0		0			0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn	0	0	0	0	0	0		0			0	
Storage Cap Reductn	0	0	0	0	0	0		0			0	
Reduced v/c Ratio	0.25	1.04	0.01	0.38	0.49	0.16		0.38			1.10	

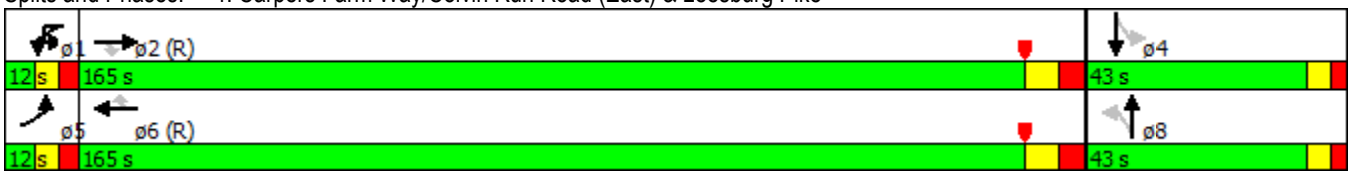
Intersection Summary			
Area Type:	Other		
Cycle Length: 220			
Actuated Cycle Length: 220			
Offset: 138 (63%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.10			
Intersection Signal Delay: 84.4		Intersection LOS: F	
Intersection Capacity Utilization 106.9%		ICU Level of Service G	
Analysis Period (min) 60			

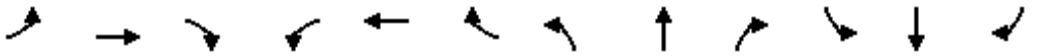
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

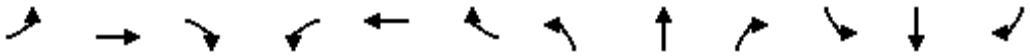
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Carpers Farm Way/Colvin Run Road (East) & Leesburg Pike





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	210	3900	5	10	1910	15	10	15	60	0	0	215
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		-3%			-2%			0%			0%	
Storage Length (ft)	300		225	180		70	0		0	0		0
Storage Lanes	1		1	1		1	0		0	0		1
Taper Length (ft)	80			100			25			25		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850			0.850		0.905				0.865
Flt Protected	0.950			0.950				0.994				
Satd. Flow (prot)	1796	5162	1607	1787	5136	1599	0	1676	0	0	0	1611
Flt Permitted	0.950			0.950				0.994				
Satd. Flow (perm)	1796	5162	1607	1787	5136	1599	0	1676	0	0	0	1611
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			20			89		32				92
Link Speed (mph)		55			55			25			35	
Link Distance (ft)		3521			4302			852			2193	
Travel Time (s)		43.6			53.3			23.2			42.7	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	210	3900	5	10	1910	15	10	15	60	0	0	215
Shared Lane Traffic (%)												
Lane Group Flow (vph)	210	3900	5	10	1910	15	0	85	0	0	0	215
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.98	0.98	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	1				1
Detector Template												
Leading Detector (ft)	35	300	46	35	300	46	5	35				35
Trailing Detector (ft)	-5	150	40	-5	150	40	0	-5				-5
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA				Over
Protected Phases	5	2	8	1	6		8	8				5
Permitted Phases			2			6						
Detector Phase	5	2	2	1	6	6	8	8				5
Switch Phase												
Minimum Initial (s)	5.0	15.0	5.0	5.0	15.0	15.0	5.0	5.0				5.0



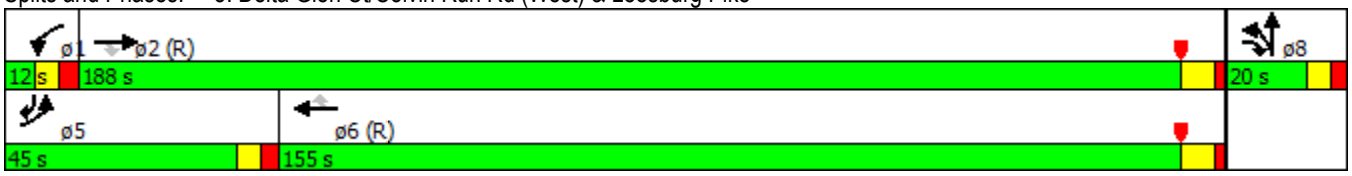
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	12.0	22.5	12.0	12.0	22.5	22.5	12.0	12.0				12.0
Total Split (s)	45.0	188.0	20.0	12.0	155.0	155.0	20.0	20.0				45.0
Total Split (%)	20.5%	85.5%	9.1%	5.5%	70.5%	70.5%	9.1%	9.1%				20.5%
Maximum Green (s)	38.0	180.5	13.0	5.0	147.5	147.5	13.0	13.0				38.0
Yellow Time (s)	4.0	5.5	4.0	4.0	5.5	5.5	4.0	4.0				4.0
All-Red Time (s)	3.0	2.0	3.0	3.0	2.0	2.0	3.0	3.0				3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0				0.0
Total Lost Time (s)	7.0	7.5	7.0	7.0	7.5	7.5		7.0				7.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag						Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.0	2.0	2.0	4.0	4.0	2.0	2.0				4.0
Minimum Gap (s)	4.0	4.0	2.0	2.0	4.0	4.0	2.0	2.0				4.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0
Recall Mode	None	C-Max	None	None	C-Max	C-Max	None	None				None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	31.3	190.3	212.4	5.2	156.8	156.8		10.4				31.3
Actuated g/C Ratio	0.14	0.86	0.97	0.02	0.71	0.71		0.05				0.14
v/c Ratio	0.82	0.87	0.00	0.24	0.52	0.01		0.77				0.70
Control Delay	99.4	5.7	0.0	140.8	3.8	0.0		114.1				72.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0				0.0
Total Delay	99.4	5.7	0.0	140.8	3.8	0.0		114.1				72.9
LOS	F	A	A	F	A	A		F				E
Approach Delay		10.4			4.4			114.1				
Approach LOS		B			A			F				
90th %ile Green (s)	38.0	180.5	13.0	5.0	147.5	147.5	13.0	13.0				38.0
90th %ile Term Code	Max	Coord	Max	Max	Coord	Coord	Max	Max				Max
70th %ile Green (s)	35.6	180.5	13.0	5.0	149.9	149.9	13.0	13.0				35.6
70th %ile Term Code	Gap	Coord	Max	Max	Coord	Coord	Max	Max				Gap
50th %ile Green (s)	31.9	193.8	11.7	0.0	154.9	154.9	11.7	11.7				31.9
50th %ile Term Code	Gap	Coord	Gap	Skip	Coord	Coord	Gap	Gap				Gap
30th %ile Green (s)	28.2	196.4	9.1	0.0	161.2	161.2	9.1	9.1				28.2
30th %ile Term Code	Gap	Coord	Gap	Skip	Coord	Coord	Gap	Gap				Gap
10th %ile Green (s)	22.9	200.2	5.3	0.0	170.3	170.3	5.3	5.3				22.9
10th %ile Term Code	Gap	Coord	Gap	Skip	Coord	Coord	Gap	Gap				Gap
Stops (vph)	205	819	0	11	634	0		51				342
Fuel Used(gal)	13	107	0	1	65	0		3				13
CO Emissions (g/hr)	0	0	0	0	0	0		0				0
NOx Emissions (g/hr)	0	0	0	0	0	0		0				0
VOC Emissions (g/hr)	0	0	0	0	0	0		0				0
Dilemma Vehicles (#)	0	30	0	0	6	0		0				0
Queue Length 50th (ft)	306	189	0	15	290	0		77				196
Queue Length 95th (ft)	m269	m342	m0	m30	522	m0		#199				335
Internal Link Dist (ft)		3441			4222			772			2113	
Turn Bay Length (ft)	300		225	180		70						
Base Capacity (vph)	310	4464	1552	41	3659	1164		129				354
Starvation Cap Reductn	0	0	0	0	0	0		0				0

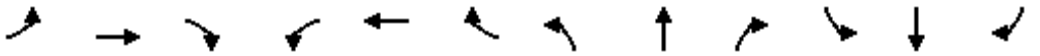
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn	0	0	0	0	0	0		0				0
Storage Cap Reductn	0	0	0	0	0	0		0				0
Reduced v/c Ratio	0.68	0.87	0.00	0.24	0.52	0.01		0.66				0.61

Intersection Summary			
Area Type:	Other		
Cycle Length: 220			
Actuated Cycle Length: 220			
Offset: 192 (87%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 130			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 12.1		Intersection LOS: B	
Intersection Capacity Utilization 102.5%		ICU Level of Service G	
Analysis Period (min) 60			

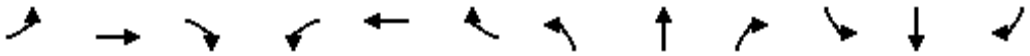
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Delta Glen Ct/Colvin Run Rd (West) & Leesburg Pike





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	2920	270	660	1390	75	185	270	1120	70	420	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		-1%			-3%			-1%			0%	
Storage Length (ft)	240		280	680		400	0		650	250		0
Storage Lanes	1		1	2		1	2		1	1		0
Taper Length (ft)	100			85			25			25		
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	0.97	1.00	0.88	1.00	0.95	0.95
Ped Bike Factor												
Frt			0.850			0.850			0.850		0.979	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1778	5111	1591	3485	5162	1607	3450	1872	2801	1770	3465	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1778	5111	1591	3485	5162	1607	3450	1872	2801	1770	3465	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			159			75			55		7	
Link Speed (mph)		55			55			35			35	
Link Distance (ft)		870			3521			927			1980	
Travel Time (s)		10.8			43.6			18.1			38.6	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	20	2920	270	660	1390	75	185	270	1120	70	420	70
Shared Lane Traffic (%)												
Lane Group Flow (vph)	20	2920	270	660	1390	75	185	270	1120	70	490	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			36			36	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.98	0.98	0.98	0.99	0.99	0.99	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1	1	1	1	1	1	1	
Detector Template												
Leading Detector (ft)	35	0	0	35	0	0	35	35	35	35	35	
Trailing Detector (ft)	-5	0	0	-5	0	0	-5	-5	-5	-5	-5	
Turn Type	Prot	NA	Free	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases	5	2		1	6	3	7	4	1	3	8	
Permitted Phases			Free			6			4			
Detector Phase	5	2		1	6	6	7	4	4	3	8	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0	5.0	5.0	5.0	5.0	5.0	5.0	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	12.0	22.0		12.0	22.0	12.0	12.0	12.0	12.0	12.0	12.0	
Total Split (s)	13.0	122.0		44.0	153.0	14.0	18.0	40.0	44.0	14.0	36.0	
Total Split (%)	5.9%	55.5%		20.0%	69.5%	6.4%	8.2%	18.2%	20.0%	6.4%	16.4%	
Maximum Green (s)	6.0	115.0		37.0	146.0	7.0	11.0	33.0	37.0	7.0	29.0	
Yellow Time (s)	4.0	5.0		4.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	3.0	2.0		3.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	4.0		5.0	4.0	2.0	3.0	3.0	5.0	2.0	3.0	
Minimum Gap (s)	2.0	4.0		5.0	4.0	2.0	3.0	3.0	5.0	2.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Recall Mode	None	C-Max		None	C-Max	None	None	None	None	None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	5.8	115.0	220.0	37.0	151.2	165.2	11.0	33.0	77.0	7.0	29.0	
Actuated g/C Ratio	0.03	0.52	1.00	0.17	0.69	0.75	0.05	0.15	0.35	0.03	0.13	
v/c Ratio	0.43	1.09	0.17	1.13	0.39	0.06	1.08	0.96	1.10	1.25	1.06	
Control Delay	148.6	207.6	0.2	319.6	9.3	0.3	307.7	152.8	248.6	649.7	241.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	148.6	207.6	0.2	319.6	9.3	0.3	307.7	152.8	248.6	649.7	241.5	
LOS	F	F	A	F	A	A	F	F	F	F	F	
Approach Delay		189.8			105.4			239.1			292.5	
Approach LOS		F			F			F			F	
90th %ile Green (s)	6.0	115.0		37.0	146.0	7.0	11.0	33.0	37.0	7.0	29.0	
90th %ile Term Code	Max	Coord		Max	Coord	Max	Max	Max	Max	Max	Max	
70th %ile Green (s)	6.0	115.0		37.0	146.0	7.0	11.0	33.0	37.0	7.0	29.0	
70th %ile Term Code	Max	Coord		Max	Coord	Max	Max	Max	Max	Max	Max	
50th %ile Green (s)	6.0	115.0		37.0	146.0	7.0	11.0	33.0	37.0	7.0	29.0	
50th %ile Term Code	Max	Coord		Max	Coord	Max	Max	Max	Max	Max	Max	
30th %ile Green (s)	0.0	115.0		37.0	159.0	7.0	11.0	33.0	37.0	7.0	29.0	
30th %ile Term Code	Skip	Coord		Max	Coord	Max	Max	Max	Max	Max	Max	
10th %ile Green (s)	0.0	115.0		37.0	159.0	7.0	11.0	33.0	37.0	7.0	29.0	
10th %ile Term Code	Skip	Coord		Max	Coord	Max	Max	Max	Max	Max	Max	
Stops (vph)	19	2599	0	607	467	2	165	236	1505	56	442	
Fuel Used(gal)	1	229	5	69	42	2	14	12	76	14	58	
CO Emissions (g/hr)	0	0	0	0	0	0	0	0	0	0	0	
NOx Emissions (g/hr)	0	0	0	0	0	0	0	0	0	0	0	
VOC Emissions (g/hr)	0	0	0	0	0	0	0	0	0	0	0	
Dilemma Vehicles (#)	0	58	0	0	36	0	0	11	0	0	10	
Queue Length 50th (ft)	31	~1727	0	~577	277	2	~155	367	~585	~126	~403	
Queue Length 95th (ft)	m41	#2130	m0	#846	351	m2	m#255	m#657	#1402	#294	#638	
Internal Link Dist (ft)		790			3441			847			1900	
Turn Bay Length (ft)	240		280	680		400			650	250		
Base Capacity (vph)	48	2671	1591	586	3547	1225	172	280	1016	56	462	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.42	1.09	0.17	1.13	0.39	0.06	1.08	0.96	1.10	1.25	1.06	

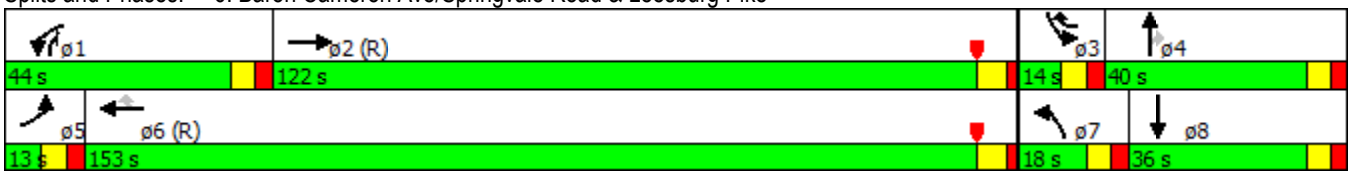
Intersection Summary			
Area Type:	Other		
Cycle Length: 220			
Actuated Cycle Length: 220			
Offset: 142 (65%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.25			
Intersection Signal Delay: 183.9		Intersection LOS: F	
Intersection Capacity Utilization 117.7%		ICU Level of Service H	
Analysis Period (min) 60			

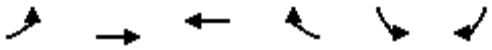
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

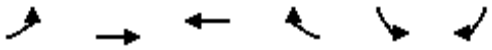
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Baron Cameron Ave/Springvale Road & Leesburg Pike

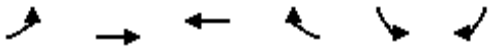




Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	195	3030	1535	80	70	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		2%	1%		0%	
Storage Length (ft)	330			200	0	265
Storage Lanes	1			1	1	1
Taper Length (ft)	85				25	
Lane Util. Factor	1.00	0.91	0.91	1.00	1.00	1.00
Ped Bike Factor						
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1752	5034	5060	1575	1770	1583
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1752	5034	5060	1575	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				80		20
Link Speed (mph)		55	55		35	
Link Distance (ft)		2707	1036		3891	
Travel Time (s)		33.6	12.8		75.8	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	195	3030	1535	80	70	115
Shared Lane Traffic (%)						
Lane Group Flow (vph)	195	3030	1535	80	70	115
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	R NA	R NA	Left	Right	L NA	R NA
Median Width(ft)		24	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	2	2	1	1	1
Detector Template						
Leading Detector (ft)	35	300	300	56	35	50
Trailing Detector (ft)	-5	150	150	50	-5	0
Turn Type	Prot	NA	NA	pm+ov	Prot	pm+ov
Protected Phases	5	2	6	4	4	5
Permitted Phases				6		4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	5.0	15.0	15.0	5.0	5.0	5.0



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Minimum Split (s)	12.0	22.5	22.5	12.0	12.0	12.0
Total Split (s)	28.0	93.0	65.0	17.0	17.0	28.0
Total Split (%)	25.5%	84.5%	59.1%	15.5%	15.5%	25.5%
Maximum Green (s)	21.0	85.5	57.5	10.0	10.0	21.0
Yellow Time (s)	4.0	5.5	5.5	4.0	4.0	4.0
All-Red Time (s)	3.0	2.0	2.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.5	7.5	7.0	7.0	7.0
Lead/Lag	Lead		Lag			Lead
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	4.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	4.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	C-Max	C-Max	None	None	None
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
Act Effct Green (s)	16.9	86.5	62.5	79.1	9.0	33.0
Actuated g/C Ratio	0.15	0.79	0.57	0.72	0.08	0.30
v/c Ratio	0.72	0.77	0.53	0.07	0.49	0.24
Control Delay	62.7	9.1	10.0	0.1	59.8	23.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.7	9.1	10.0	0.1	59.8	23.7
LOS	E	A	B	A	E	C
Approach Delay		12.3	9.5		37.4	
Approach LOS		B	A		D	
90th %ile Green (s)	21.0	85.5	57.5	10.0	10.0	21.0
90th %ile Term Code	Max	Coord	Coord	Max	Max	Max
70th %ile Green (s)	20.0	85.5	58.5	10.0	10.0	20.0
70th %ile Term Code	Gap	Coord	Coord	Max	Max	Gap
50th %ile Green (s)	17.5	85.5	61.0	10.0	10.0	17.5
50th %ile Term Code	Gap	Coord	Coord	Max	Max	Gap
30th %ile Green (s)	14.9	86.7	64.8	8.8	8.8	14.9
30th %ile Term Code	Gap	Coord	Coord	Gap	Gap	Gap
10th %ile Green (s)	11.3	89.2	70.9	6.3	6.3	11.3
10th %ile Term Code	Gap	Coord	Coord	Gap	Gap	Gap
Stops (vph)	194	1394	588	0	66	67
Fuel Used(gal)	9	83	24	1	3	4
CO Emissions (g/hr)	0	0	0	0	0	0
NOx Emissions (g/hr)	0	0	0	0	0	0
VOC Emissions (g/hr)	0	0	0	0	0	0
Dilemma Vehicles (#)	0	108	38	0	0	0
Queue Length 50th (ft)	226	583	139	0	48	49
Queue Length 95th (ft)	m245	m781	m155	m0	106	103
Internal Link Dist (ft)		2627	956		3811	
Turn Bay Length (ft)	330			200		265
Base Capacity (vph)	334	3957	2877	1154	160	462
Starvation Cap Reductn	0	0	0	0	0	0

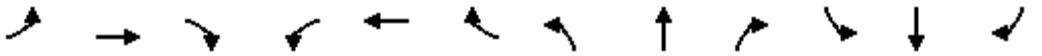


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.77	0.53	0.07	0.44	0.25

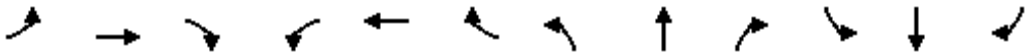
Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 2 (2%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.77			
Intersection Signal Delay: 12.3		Intersection LOS: B	
Intersection Capacity Utilization 74.8%		ICU Level of Service D	
Analysis Period (min) 60			

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Leesburg Pike & Utterback Store Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	2995	620	255	1385	5	280	5	210	5	5	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		-1%			0%			0%			0%	
Storage Length (ft)	300		700	650		180	310		0	0		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	80			80			75			25		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850			0.850		0.853			0.925	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1778	5111	1591	1770	5085	1583	3433	1589	0	1770	1723	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1778	5111	1591	1770	5085	1583	3433	1589	0	1770	1723	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			229			89		197			5	
Link Speed (mph)		55			55			40			15	
Link Distance (ft)		2464			2707			1363			861	
Travel Time (s)		30.5			33.6			23.2			39.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	5	2995	620	255	1385	5	280	5	210	5	5	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	5	2995	620	255	1385	5	280	215	0	5	10	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1	1	1	1		1	1	
Detector Template												
Leading Detector (ft)	35	246	35	35	246	56	35	35		5	25	
Trailing Detector (ft)	-5	240	-5	-5	240	50	-5	-5		0	-5	
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA		Prot	NA	
Protected Phases	5	2	7	1	6	3	7	4		3	8	
Permitted Phases			2			6						
Detector Phase	5	2	2	1	6	6	7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	15.0	5.0	5.0	15.0	5.0	5.0	5.0		5.0	5.0	



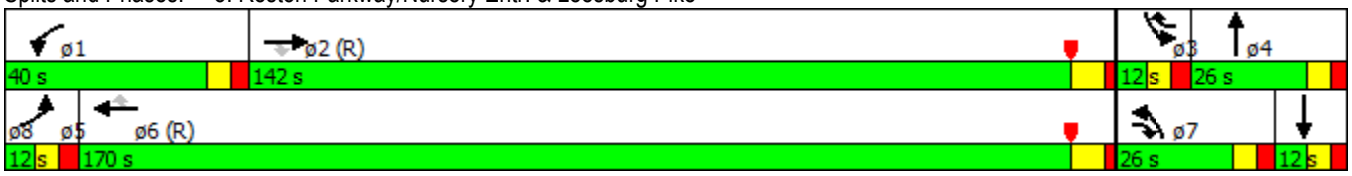
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	12.0	22.5	12.0	12.0	22.5	12.0	12.0	12.0		12.0	12.0	
Total Split (s)	12.0	142.0	26.0	40.0	170.0	12.0	26.0	26.0		12.0	12.0	
Total Split (%)	5.5%	64.5%	11.8%	18.2%	77.3%	5.5%	11.8%	11.8%		5.5%	5.5%	
Maximum Green (s)	5.0	134.5	19.0	33.0	162.5	5.0	19.0	19.0		5.0	5.0	
Yellow Time (s)	4.0	5.5	4.0	4.0	5.5	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	3.0	2.0	3.0	3.0	2.0	3.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.5	7.0	7.0	7.5	7.0	7.0	7.0		7.0	7.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	4.0	2.0	2.0	4.0	2.0	2.0	2.0		2.0	2.0	
Minimum Gap (s)	2.0	4.0	2.0	2.0	4.0	2.0	2.0	2.0		2.0	2.0	
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Recall Mode	None	C-Max	None	None	C-Max	None	None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	5.0	139.9	166.4	34.8	179.3	182.2	19.0	21.4		5.0	5.0	
Actuated g/C Ratio	0.02	0.64	0.76	0.16	0.82	0.83	0.09	0.10		0.02	0.02	
v/c Ratio	0.12	0.92	0.49	0.91	0.33	0.00	0.95	0.65		0.12	0.23	
Control Delay	129.2	21.8	2.8	141.3	1.9	0.0	161.1	23.8		112.2	83.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	129.2	21.8	2.8	141.3	1.9	0.0	161.1	23.8		112.2	83.9	
LOS	F	C	A	F	A	A	F	C		F	F	
Approach Delay		18.7			23.5			101.5			93.3	
Approach LOS		B			C			F			F	
90th %ile Green (s)	5.0	134.5	19.0	33.0	162.5	5.0	19.0	19.0		5.0	5.0	
90th %ile Term Code	Max	Coord	Max	Max	Coord	Max	Max	Max		Max	Max	
70th %ile Green (s)	0.0	134.5	19.0	33.0	174.5	0.0	19.0	31.0		0.0	5.0	
70th %ile Term Code	Skip	Coord	Max	Max	Coord	Skip	Max	Hold		Skip	Max	
50th %ile Green (s)	0.0	139.7	19.0	39.8	186.5	0.0	19.0	19.0		0.0	0.0	
50th %ile Term Code	Skip	Coord	Max	Gap	Coord	Skip	Max	Hold		Skip	Skip	
30th %ile Green (s)	0.0	142.4	19.0	37.1	186.5	0.0	19.0	19.0		0.0	0.0	
30th %ile Term Code	Skip	Coord	Max	Gap	Coord	Skip	Max	Hold		Skip	Skip	
10th %ile Green (s)	0.0	148.3	19.0	31.2	186.5	0.0	19.0	19.0		0.0	0.0	
10th %ile Term Code	Skip	Coord	Max	Gap	Coord	Skip	Max	Hold		Skip	Skip	
Stops (vph)	6	2488	113	214	74	0	259	32		6	7	
Fuel Used(gal)	0	106	12	16	26	0	14	3		0	0	
CO Emissions (g/hr)	0	0	0	0	0	0	0	0		0	0	
NOx Emissions (g/hr)	0	0	0	0	0	0	0	0		0	0	
VOC Emissions (g/hr)	0	0	0	0	0	0	0	0		0	0	
Dilemma Vehicles (#)	0	73	0	0	31	0	0	5		0	0	
Queue Length 50th (ft)	7	1267	90	332	35	0	212	25		7	7	
Queue Length 95th (ft)	m9	#1968	m214	#684	70	m0	#375	186		29	38	
Internal Link Dist (ft)		2384			2627			1283			781	
Turn Bay Length (ft)	300		700	650		180	310					
Base Capacity (vph)	40	3249	1258	283	4144	1326	296	332		40	44	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	

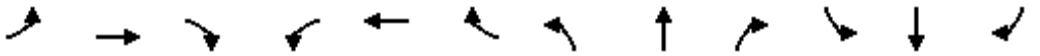
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.13	0.92	0.49	0.90	0.33	0.00	0.95	0.65		0.13	0.23	

Intersection Summary			
Area Type:	Other		
Cycle Length: 220			
Actuated Cycle Length: 220			
Offset: 24 (11%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.95			
Intersection Signal Delay: 27.3		Intersection LOS: C	
Intersection Capacity Utilization 104.6%		ICU Level of Service G	
Analysis Period (min) 60			

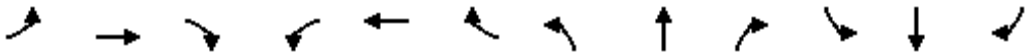
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: Reston Parkway/Nursery Entr. & Leesburg Pike





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	3500	10	20	1360	0	5	0	125	80	5	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			-5%			0%			0%	
Storage Length (ft)	0		0	250		0	0		0	0		0
Storage Lanes	0		0	1		0	1		1	1		0
Taper Length (ft)	25			100			25			25		
Lane Util. Factor	1.00	0.86	0.86	1.00	0.91	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor												
Frt									0.850			
Flt Protected				0.950			0.950			0.950	0.958	
Satd. Flow (prot)	0	6408	0	1814	5212	0	1770	0	1583	1681	1695	0
Flt Permitted				0.950			0.950			0.950	0.958	
Satd. Flow (perm)	0	6408	0	1814	5212	0	1770	0	1583	1681	1695	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1							92			
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		425			4372			1243			359	
Travel Time (s)		6.4			66.2			33.9			9.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	3500	10	20	1360	0	5	0	125	80	5	0
Shared Lane Traffic (%)										47%		
Lane Group Flow (vph)	0	3510	0	20	1360	0	5	0	125	42	43	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	0.97	0.97	0.97	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		2		1	2		1		1	1	2	
Detector Template		Thru		Left	Thru		Left		Right	Left	Thru	
Leading Detector (ft)		100		20	100		20		20	20	100	
Trailing Detector (ft)		0		0	0		0		0	0	0	
Turn Type		NA		Prot	NA		Prot		Prot	Split	NA	
Protected Phases		2		1	6		4		4	3	3	
Permitted Phases												
Detector Phase		2		1	6		4		4	3	3	
Switch Phase												
Minimum Initial (s)		15.0		5.0	15.0		5.0		5.0	5.0	5.0	

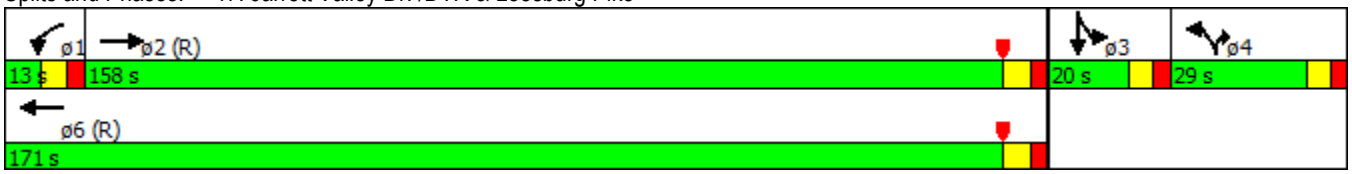


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)		22.5		12.0	22.5		12.0		12.0	12.0	12.0	
Total Split (s)		158.0		13.0	171.0		29.0		29.0	20.0	20.0	
Total Split (%)		71.8%		5.9%	77.7%		13.2%		13.2%	9.1%	9.1%	
Maximum Green (s)		150.5		6.0	163.5		22.0		22.0	13.0	13.0	
Yellow Time (s)		4.5		4.0	4.5		4.0		4.0	4.0	4.0	
All-Red Time (s)		3.0		3.0	3.0		3.0		3.0	3.0	3.0	
Lost Time Adjust (s)		0.0		0.0	0.0		0.0		0.0	0.0	0.0	
Total Lost Time (s)		7.5		7.0	7.5		7.0		7.0	7.0	7.0	
Lead/Lag		Lag		Lead			Lag		Lag	Lead	Lead	
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0		3.0	3.0		3.0		3.0	3.0	3.0	
Minimum Gap (s)		3.0		3.0	3.0		3.0		3.0	3.0	3.0	
Time Before Reduce (s)		0.0		0.0	0.0		0.0		0.0	0.0	0.0	
Time To Reduce (s)		0.0		0.0	0.0		0.0		0.0	0.0	0.0	
Recall Mode		C-Max		None	C-Max		None		None	None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		167.6		7.7	177.0		11.0		11.0	10.5	10.5	
Actuated g/C Ratio		0.76		0.04	0.80		0.05		0.05	0.05	0.05	
v/c Ratio		0.72		0.32	0.32		0.06		0.75	0.53	0.54	
Control Delay		4.1		116.5	6.3		96.6		61.1	126.0	126.9	
Queue Delay		0.0		0.0	0.0		0.0		0.0	0.0	0.0	
Total Delay		4.1		116.5	6.3		96.6		61.1	126.0	126.9	
LOS		A		F	A		F		E	F	F	
Approach Delay		4.1			7.9						126.4	
Approach LOS		A			A						F	
90th %ile Green (s)		150.5		9.3	166.8		18.7		18.7	13.0	13.0	
90th %ile Term Code		Coord		Max	Coord		Gap		Gap	Max	Max	
70th %ile Green (s)		156.0		8.9	171.9		13.8		13.8	12.8	12.8	
70th %ile Term Code		Coord		Gap	Coord		Gap		Gap	Gap	Gap	
50th %ile Green (s)		162.4		7.8	177.2		10.3		10.3	11.0	11.0	
50th %ile Term Code		Coord		Gap	Coord		Gap		Gap	Gap	Gap	
30th %ile Green (s)		182.5		0.0	182.5		6.8		6.8	9.2	9.2	
30th %ile Term Code		Coord		Skip	Coord		Gap		Gap	Gap	Gap	
10th %ile Green (s)		186.4		0.0	186.4		5.5		5.5	6.6	6.6	
10th %ile Term Code		Coord		Skip	Coord		Gap		Gap	Gap	Gap	
Stops (vph)		790		20	345		6		39	41	42	
Fuel Used(gal)		22		1	45		0		3	1	1	
CO Emissions (g/hr)		0		0	0		0		0	0	0	
NOx Emissions (g/hr)		0		0	0		0		0	0	0	
VOC Emissions (g/hr)		0		0	0		0		0	0	0	
Dilemma Vehicles (#)		54		0	31		0		0	0	0	
Queue Length 50th (ft)		85		29	172		7		48	64	65	
Queue Length 95th (ft)		799		73	278		27		162	131	134	
Internal Link Dist (ft)		345			4292			1163			279	
Turn Bay Length (ft)				250								
Base Capacity (vph)		4880		64	4192		177		241	99	100	
Starvation Cap Reductn		0		0	0		0		0	0	0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn		0		0	0		0		0	0	0	
Storage Cap Reductn		0		0	0		0		0	0	0	
Reduced v/c Ratio		0.72		0.31	0.32		0.03		0.52	0.42	0.43	

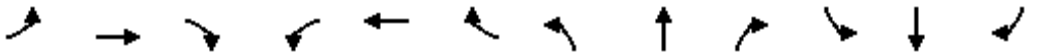
Intersection Summary			
Area Type:	Other		
Cycle Length: 220			
Actuated Cycle Length: 220			
Offset: 114 (52%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.75			
Intersection Signal Delay: 8.6		Intersection LOS: A	
Intersection Capacity Utilization 80.7%		ICU Level of Service D	
Analysis Period (min) 60			

Splits and Phases: 47: Jarrett Valley Dr. /DTR & Leesburg Pike

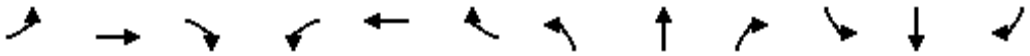


APPENDIX I

Synchro Input: 2040 AM Build



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	3270	0	20	1630	165	10	10	5	80	5	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			-5%			-2%			-1%	
Storage Length (ft)	850		380	790		790	0		100	0		100
Storage Lanes	0		0	2		1	2		1	1		0
Taper Length (ft)	150			120			25			25		
Lane Util. Factor	1.00	0.91	0.91	0.97	0.91	1.00	0.97	1.00	0.88	1.00	1.00	1.00
Ped Bike Factor												
Frt						0.850			0.850			
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	5085	0	3519	5212	1623	3467	1881	2815	1778	1872	0
Flt Permitted				0.950			0.950			0.950		
Satd. Flow (perm)	0	5085	0	3519	5212	1623	3467	1881	2815	1778	1872	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						165			102			
Link Speed (mph)		45			45			15			35	
Link Distance (ft)		1248			1208			2224			151	
Travel Time (s)		18.9			18.3			101.1			2.9	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	3270	0	20	1630	165	10	10	5	80	5	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	3270	0	20	1630	165	10	10	5	80	5	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	0.97	0.97	0.97	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		2		1	2	1	1	1	1	1	1	
Detector Template												
Leading Detector (ft)		300		35	300	56	35	35	35	35	35	
Trailing Detector (ft)		150		-5	150	50	-5	-5	-5	-5	-5	
Turn Type		NA		Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases		2		1	6	3	7	4	1	3	8	
Permitted Phases						6			4			
Detector Phase		2		1	6	6	7	4	4	3	8	
Switch Phase												
Minimum Initial (s)		15.0		5.0	15.0	5.0	5.0	5.0	5.0	5.0	5.0	

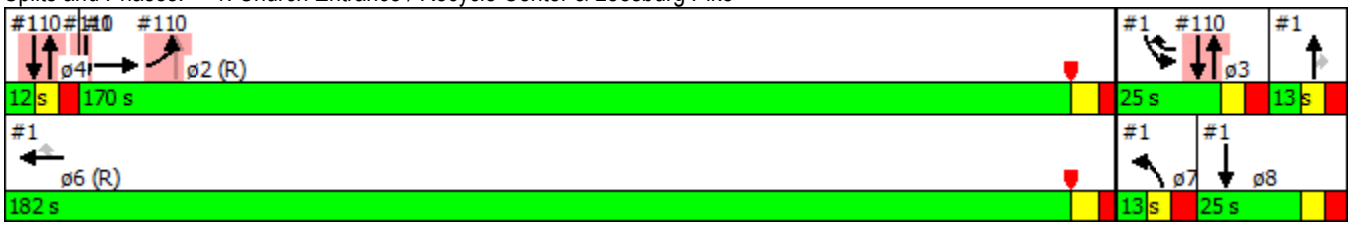


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)		22.5		12.0	22.5	13.0	13.0	13.0	12.0	13.0	13.0	
Total Split (s)		170.0		12.0	182.0	25.0	13.0	13.0	12.0	25.0	25.0	
Total Split (%)		77.3%		5.5%	82.7%	11.4%	5.9%	5.9%	5.5%	11.4%	11.4%	
Maximum Green (s)		162.5		5.0	174.5	17.0	5.0	5.0	5.0	17.0	17.0	
Yellow Time (s)		4.5		4.0	4.5	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)		3.0		3.0	3.0	4.0	4.0	4.0	3.0	4.0	4.0	
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		7.5		7.0	7.5	8.0	8.0	8.0	7.0	8.0	8.0	
Lead/Lag		Lag		Lead		Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)		2.0		2.0	2.0	3.0	3.0	2.0	2.0	3.0	2.0	
Minimum Gap (s)		2.0		2.0	2.0	3.0	3.0	2.0	2.0	3.0	2.0	
Time Before Reduce (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Time To Reduce (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Recall Mode		Max		Max	Max	Max	Max	Max	Max	Max	Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		162.5		5.0	174.5	199.0	5.0	5.0	18.0	17.0	17.0	
Actuated g/C Ratio		0.74		0.02	0.79	0.90	0.02	0.02	0.08	0.08	0.08	
v/c Ratio		0.87		0.25	0.39	0.11	0.13	0.24	0.02	0.58	0.03	
Control Delay		7.3		110.2	7.2	0.3	109.0	119.4	0.0	45.3	21.2	
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	104.7	2.2	
Total Delay		7.3		110.2	7.2	0.3	109.0	119.4	0.0	150.0	23.4	
LOS		A		F	A	A	F	F	A	F	C	
Approach Delay		7.3			7.7			91.4			142.6	
Approach LOS		A			A			F			F	
90th %ile Green (s)		162.5		5.0	174.5	17.0	5.0	5.0	5.0	17.0	17.0	
90th %ile Term Code		Coord		MaxR	Coord	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	
70th %ile Green (s)		162.5		5.0	174.5	17.0	5.0	5.0	5.0	17.0	17.0	
70th %ile Term Code		Coord		MaxR	Coord	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	
50th %ile Green (s)		162.5		5.0	174.5	17.0	5.0	5.0	5.0	17.0	17.0	
50th %ile Term Code		Coord		MaxR	Coord	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	
30th %ile Green (s)		162.5		5.0	174.5	17.0	5.0	5.0	5.0	17.0	17.0	
30th %ile Term Code		Coord		MaxR	Coord	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	
10th %ile Green (s)		162.5		5.0	174.5	17.0	5.0	5.0	5.0	17.0	17.0	
10th %ile Term Code		Coord		MaxR	Coord	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	
Stops (vph)		1221		20	462	1	11	11	0	37	6	
Fuel Used(gal)		47		1	29	2	0	0	0	1	0	
CO Emissions (g/hr)		0		0	0	0	0	0	0	0	0	
NOx Emissions (g/hr)		0		0	0	0	0	0	0	0	0	
VOC Emissions (g/hr)		0		0	0	0	0	0	0	0	0	
Dilemma Vehicles (#)		41		0	37	0	0	0	0	0	0	
Queue Length 50th (ft)		514		14	238	0	7	15	0	16	7	
Queue Length 95th (ft)		1033		38	300	9	23	46	0	#103	25	
Internal Link Dist (ft)		1168			1128			2144			71	
Turn Bay Length (ft)				790		790			100			
Base Capacity (vph)		3755		79	4134	1483	78	42	323	137	144	
Starvation Cap Reductn		0		0	0	0	0	0	0	57	108	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn		0		0	0	0	0	0	0	0	0	
Storage Cap Reductn		0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio		0.87		0.25	0.39	0.11	0.13	0.24	0.02	1.00	0.14	

Intersection Summary			
Area Type:	Other		
Cycle Length: 220			
Actuated Cycle Length: 220			
Offset: 78 (35%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 130			
Control Type: Pretimed			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 10.0		Intersection LOS: B	
Intersection Capacity Utilization 90.5%		ICU Level of Service E	
Analysis Period (min) 60			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 1: Church Entrance / Recycle Center & Leesburg Pike



Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	10	175	4092	65	50	1975	55	85	45	60	108	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-2%			0%			-1%			0%
Storage Length (ft)		775		200	200		70	350		350	390	
Storage Lanes		1		1	1		1	1		1	1	
Taper Length (ft)		180			100			25			25	
Lane Util. Factor	0.91	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt				0.850			0.850			0.850		
Flt Protected		0.950			0.950			0.950			0.950	
Satd. Flow (prot)	0	1787	5136	1599	1770	5085	1583	1778	1872	1591	1770	1863
Flt Permitted		0.950			0.950			0.724			0.624	
Satd. Flow (perm)	0	1787	5136	1599	1770	5085	1583	1355	1872	1591	1162	1863
Right Turn on Red				Yes			Yes			Yes		
Satd. Flow (RTOR)				55			89			92		
Link Speed (mph)			55			55			25			35
Link Distance (ft)			3810			775			1826			1736
Travel Time (s)			47.2			9.6			49.8			33.8
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)			0%			0%			0%			0%
Adj. Flow (vph)	10	175	4092	65	50	1975	55	85	45	60	108	50
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	185	4092	65	50	1975	55	85	45	60	108	50
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	R NA	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left
Median Width(ft)			12			12			12			12
Link Offset(ft)			0			0			0			0
Crosswalk Width(ft)			16			16			16			16
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	1.00	1.00	1.00	0.99	0.99	0.99	1.00	1.00
Turning Speed (mph)	9	15		9	15		9	15		9	15	
Number of Detectors	1	1	1	1	1	1	1	1	1	1	1	1
Detector Template												
Leading Detector (ft)	50	35	206	46	35	206	46	5	35	35	5	35
Trailing Detector (ft)	0	-5	200	40	-5	200	40	0	-5	-5	0	-5
Turn Type	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA
Protected Phases	1!	1	6	7	5	2	3	7	4	5	3	8
Permitted Phases				6			2	4		4	8	
Detector Phase	1	1	6	6	5	2	2	7	4	4	3	8
Switch Phase												
Minimum Initial (s)	5.0	5.0	15.0	5.0	5.0	15.0	5.0	5.0	5.0	5.0	5.0	5.0

Lane Group	SBR
Lane Configurations	
Volume (vph)	80
Ideal Flow (vphpl)	1900
Lane Width (ft)	12
Grade (%)	
Storage Length (ft)	390
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Ped Bike Factor	
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1583
Flt Permitted	
Satd. Flow (perm)	1583
Right Turn on Red	Yes
Satd. Flow (RTOR)	57
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	1.00
Growth Factor	100%
Heavy Vehicles (%)	2%
Bus Blockages (#/hr)	0
Parking (#/hr)	
Mid-Block Traffic (%)	
Adj. Flow (vph)	80
Shared Lane Traffic (%)	
Lane Group Flow (vph)	80
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Number of Detectors	1
Detector Template	
Leading Detector (ft)	5
Trailing Detector (ft)	0
Turn Type	pm+ov
Protected Phases	1!
Permitted Phases	8
Detector Phase	8
Switch Phase	
Minimum Initial (s)	5.0

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Minimum Split (s)	12.0	12.0	22.5	12.0	12.0	22.5	12.0	12.0	12.0	12.0	12.0	12.0
Total Split (s)	41.0	41.0	180.0	13.0	13.0	152.0	14.0	13.0	13.0	13.0	14.0	14.0
Total Split (%)	18.6%	18.6%	81.8%	5.9%	5.9%	69.1%	6.4%	5.9%	5.9%	5.9%	6.4%	6.4%
Maximum Green (s)	34.0	34.0	172.5	6.0	6.0	144.5	7.0	6.0	6.0	6.0	7.0	7.0
Yellow Time (s)	4.0	4.0	5.5	4.0	4.0	5.5	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	2.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.0	7.5	7.0	7.0	7.5	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	4.0	3.0	3.0	4.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	4.0	3.0	3.0	4.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	C-Max	None	None	C-Max	None	None	None	None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		27.6	172.5	186.0	6.0	150.9	165.4	12.0	6.0	19.0	14.0	7.0
Actuated g/C Ratio		0.13	0.78	0.85	0.03	0.69	0.75	0.05	0.03	0.09	0.06	0.03
v/c Ratio		0.83	1.02	0.05	1.04	0.57	0.05	1.00	0.88	0.27	1.16	0.85
Control Delay		104.7	42.0	0.0	369.0	5.8	0.1	287.0	252.4	5.5	470.1	218.1
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		104.7	42.0	0.0	369.0	5.8	0.1	287.0	252.4	5.5	470.1	218.1
LOS		F	D	A	F	A	A	F	F	A	F	F
Approach Delay			44.0			14.4			189.9			267.9
Approach LOS			D			B			F			F
90th %ile Green (s)	34.0	34.0	172.5	6.0	6.0	144.5	7.0	6.0	6.0	6.0	7.0	7.0
90th %ile Term Code	Max	Max	Coord	Max	Max	Coord	Max	Max	Max	Max	Max	Max
70th %ile Green (s)	31.6	31.6	172.5	6.0	6.0	146.9	7.0	6.0	6.0	6.0	7.0	7.0
70th %ile Term Code	Gap	Gap	Coord	Max	Max	Coord	Max	Max	Max	Max	Max	Max
50th %ile Green (s)	28.1	28.1	172.5	6.0	6.0	150.4	7.0	6.0	6.0	6.0	7.0	7.0
50th %ile Term Code	Gap	Gap	Coord	Max	Max	Coord	Max	Max	Max	Max	Max	Max
30th %ile Green (s)	24.6	24.6	172.5	6.0	6.0	153.9	7.0	6.0	6.0	6.0	7.0	7.0
30th %ile Term Code	Gap	Gap	Coord	Max	Max	Coord	Max	Max	Max	Max	Max	Max
10th %ile Green (s)	19.5	19.5	172.5	6.0	6.0	159.0	7.0	6.0	6.0	6.0	7.0	7.0
10th %ile Term Code	Gap	Gap	Coord	Max	Max	Coord	Max	Max	Max	Max	Max	Max
Stops (vph)		183	823	0	43	815	0	87	38	1	104	44
Fuel Used(gal)		12	149	2	5	27	0	7	3	1	12	3
CO Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
NOx Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
VOC Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
Dilemma Vehicles (#)		0	118	0	0	10	0	0	0	0	0	1
Queue Length 50th (ft)		278	~547	1	~79	78	0	120	67	0	~178	74
Queue Length 95th (ft)		m253	m377	m1	m#125	m1170	m0	#254	#194	27	#335	#202
Internal Link Dist (ft)			3730			695			1746			1656
Turn Bay Length (ft)		775		200	200		70	350		350	390	
Base Capacity (vph)		276	4027	1360	48	3488	1212	85	51	221	93	59
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0

Lane Group	SBR
Minimum Split (s)	12.0
Total Split (s)	41.0
Total Split (%)	18.6%
Maximum Green (s)	34.0
Yellow Time (s)	4.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	0.0
Total Lost Time (s)	7.0
Lead/Lag	Lead
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time Before Reduce (s)	0.0
Time To Reduce (s)	0.0
Recall Mode	None
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	41.6
Actuated g/C Ratio	0.19
v/c Ratio	0.23
Control Delay	26.1
Queue Delay	0.0
Total Delay	26.1
LOS	C
Approach Delay	
Approach LOS	
90th %ile Green (s)	34.0
90th %ile Term Code	Max
70th %ile Green (s)	31.6
70th %ile Term Code	Gap
50th %ile Green (s)	28.1
50th %ile Term Code	Gap
30th %ile Green (s)	24.6
30th %ile Term Code	Gap
10th %ile Green (s)	19.5
10th %ile Term Code	Gap
Stops (vph)	23
Fuel Used(gal)	2
CO Emissions (g/hr)	0
NOx Emissions (g/hr)	0
VOC Emissions (g/hr)	0
Dilemma Vehicles (#)	0
Queue Length 50th (ft)	28
Queue Length 95th (ft)	102
Internal Link Dist (ft)	
Turn Bay Length (ft)	390
Base Capacity (vph)	345
Starvation Cap Reductn	0

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.67	1.02	0.05	1.04	0.57	0.05	1.00	0.88	0.27	1.16	0.85

Intersection Summary			
Area Type:	Other		
Cycle Length: 220			
Actuated Cycle Length: 220			
Offset: 10 (5%), Referenced to phase 2:WBT and 6:EBT, Start of Yellow			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.16			
Intersection Signal Delay: 46.8		Intersection LOS: D	
Intersection Capacity Utilization 113.8%		ICU Level of Service H	
Analysis Period (min) 60			
~ Volume exceeds capacity, queue is theoretically infinite.			
Queue shown is maximum after two cycles.			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			
! Phase conflict between lane groups.			

Splits and Phases: 2: Towlston Road & Leesburg Pike

Lane Group	SBR
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.23

Intersection Summary

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	25	20	3910	195	190	1925	25	150	15	320	75	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-3%			-4%			3%			-2%
Storage Length (ft)		100		200	750		750	0		200	320	
Storage Lanes		1		1	1		1	1		1	1	
Taper Length (ft)		50			120			120			25	
Lane Util. Factor	0.91	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt				0.850			0.850			0.850		
Flt Protected		0.950			0.950			0.950			0.950	
Satd. Flow (prot)	0	1796	5162	1607	1805	5187	1615	1743	1835	1560	1787	1881
Flt Permitted		0.950			0.950			0.334			0.748	
Satd. Flow (perm)	0	1796	5162	1607	1805	5187	1615	613	1835	1560	1407	1881
Right Turn on Red				Yes			Yes			Yes		
Satd. Flow (RTOR)				89			55			57		
Link Speed (mph)			55			55			35			25
Link Distance (ft)			913			3810			3260			1783
Travel Time (s)			11.3			47.2			63.5			48.6
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)			0%			0%			0%			0%
Adj. Flow (vph)	25	20	3910	195	190	1925	25	150	15	320	75	50
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	45	3910	195	190	1925	25	150	15	320	75	50
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	R NA	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left
Median Width(ft)			12			12			12			12
Link Offset(ft)			0			0			0			0
Crosswalk Width(ft)			16			16			16			16
Two way Left Turn Lane												
Headway Factor	0.98	0.98	0.98	0.98	0.97	0.97	0.97	1.02	1.02	1.02	0.99	0.99
Turning Speed (mph)	9	15		9	15		9	15		9	15	
Number of Detectors	1	1	3	1	1	3	1	1	1	1	1	1
Detector Template												
Leading Detector (ft)	50	35	306	46	35	306	46	5	35	35	5	35
Trailing Detector (ft)	0	-5	150	40	-5	150	40	0	-5	-5	0	-5
Turn Type	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA
Protected Phases	5!	5	2	3	1	6	7	3	8	1	7	4
Permitted Phases				2			6	8		8	4	
Detector Phase	5	5	2	2	1	6	6	3	8	8	7	4
Switch Phase												
Minimum Initial (s)	5.0	5.0	15.0	5.0	5.0	15.0	5.0	5.0	5.0	5.0	5.0	5.0

Lane Group	SBR
Lane Configurations	
Volume (vph)	5
Ideal Flow (vphpl)	1900
Lane Width (ft)	12
Grade (%)	
Storage Length (ft)	320
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Ped Bike Factor	
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1599
Flt Permitted	
Satd. Flow (perm)	1599
Right Turn on Red	Yes
Satd. Flow (RTOR)	92
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	1.00
Growth Factor	100%
Heavy Vehicles (%)	2%
Bus Blockages (#/hr)	0
Parking (#/hr)	
Mid-Block Traffic (%)	
Adj. Flow (vph)	5
Shared Lane Traffic (%)	
Lane Group Flow (vph)	5
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	0.99
Turning Speed (mph)	9
Number of Detectors	1
Detector Template	
Leading Detector (ft)	0
Trailing Detector (ft)	0
Turn Type	pm+ov
Protected Phases	5!
Permitted Phases	4
Detector Phase	4
Switch Phase	
Minimum Initial (s)	5.0

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Minimum Split (s)	12.0	12.0	22.5	12.0	12.0	22.5	12.0	12.0	12.0	12.0	12.0	12.0
Total Split (s)	19.0	19.0	161.0	19.0	27.0	169.0	12.0	19.0	20.0	27.0	12.0	13.0
Total Split (%)	8.6%	8.6%	73.2%	8.6%	12.3%	76.8%	5.5%	8.6%	9.1%	12.3%	5.5%	5.9%
Maximum Green (s)	12.0	12.0	153.5	12.0	20.0	161.5	5.0	12.0	13.0	20.0	5.0	6.0
Yellow Time (s)	4.0	4.0	5.5	4.0	4.0	5.5	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	2.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.0	7.5	7.0	7.0	7.5	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	C-Max	None	None	C-Max	None	None	None	None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		10.2	153.5	173.0	20.0	166.0	178.5	25.0	13.0	40.0	11.0	6.0
Actuated g/C Ratio		0.05	0.70	0.79	0.09	0.75	0.81	0.11	0.06	0.18	0.05	0.03
v/c Ratio		0.54	1.09	0.15	1.16	0.49	0.02	1.15	0.14	0.97	0.96	0.98
Control Delay		109.8	171.3	0.1	410.0	7.7	0.2	419.6	101.4	144.6	258.0	329.9
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		109.8	171.3	0.1	410.0	7.7	0.2	419.6	101.4	144.6	258.0	329.9
LOS		F	F	A	F	A	A	F	F	F	F	F
Approach Delay			162.6			43.4			228.3			275.7
Approach LOS			F			D			F			F
90th %ile Green (s)	12.0	12.0	153.5	12.0	20.0	161.5	5.0	12.0	13.0	20.0	5.0	6.0
90th %ile Term Code	Max	Max	Coord	Max	Max	Coord	Max	Max	Max	Max	Max	Max
70th %ile Green (s)	12.0	12.0	153.5	12.0	20.0	161.5	5.0	12.0	13.0	20.0	5.0	6.0
70th %ile Term Code	Max	Max	Coord	Max	Max	Coord	Max	Max	Max	Max	Max	Max
50th %ile Green (s)	11.0	11.0	153.5	12.0	20.0	162.5	5.0	12.0	13.0	20.0	5.0	6.0
50th %ile Term Code	Gap	Gap	Coord	Max	Max	Coord	Max	Max	Max	Max	Max	Max
30th %ile Green (s)	9.3	9.3	153.5	12.0	20.0	164.2	5.0	12.0	13.0	20.0	5.0	6.0
30th %ile Term Code	Gap	Gap	Coord	Max	Max	Coord	Max	Max	Max	Max	Max	Max
10th %ile Green (s)	0.0	0.0	153.5	12.0	20.0	180.5	5.0	12.0	13.0	20.0	5.0	6.0
10th %ile Term Code	Skip	Skip	Coord	Max	Max	Coord	Max	Max	Max	Max	Max	Max
Stops (vph)		45	2968	0	168	303	0	125	15	246	81	42
Fuel Used(gal)		2	214	1	24	55	1	17	1	19	5	4
CO Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
NOx Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
VOC Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
Dilemma Vehicles (#)		0	107	0	0	84	0	0	0	0	0	0
Queue Length 50th (ft)		67	~2310	1	~329	136	0	~246	21	397	103	74
Queue Length 95th (ft)		m69	m#2157	m0	m#597	m342	m1	#441	59	#754	#223	#214
Internal Link Dist (ft)			833			3730			3180			1703
Turn Bay Length (ft)		100		200	750		750			200	320	
Base Capacity (vph)		97	3601	1282	164	3914	1320	131	108	330	78	51
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0

Lane Group	SBR
Minimum Split (s)	12.0
Total Split (s)	19.0
Total Split (%)	8.6%
Maximum Green (s)	12.0
Yellow Time (s)	4.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	0.0
Total Lost Time (s)	7.0
Lead/Lag	Lead
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time Before Reduce (s)	0.0
Time To Reduce (s)	0.0
Recall Mode	None
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	20.5
Actuated g/C Ratio	0.09
v/c Ratio	0.02
Control Delay	0.2
Queue Delay	0.0
Total Delay	0.2
LOS	A
Approach Delay	
Approach LOS	
90th %ile Green (s)	12.0
90th %ile Term Code	Max
70th %ile Green (s)	12.0
70th %ile Term Code	Max
50th %ile Green (s)	11.0
50th %ile Term Code	Gap
30th %ile Green (s)	9.3
30th %ile Term Code	Gap
10th %ile Green (s)	0.0
10th %ile Term Code	Skip
Stops (vph)	0
Fuel Used(gal)	0
CO Emissions (g/hr)	0
NOx Emissions (g/hr)	0
VOC Emissions (g/hr)	0
Dilemma Vehicles (#)	0
Queue Length 50th (ft)	0
Queue Length 95th (ft)	0
Internal Link Dist (ft)	
Turn Bay Length (ft)	320
Base Capacity (vph)	232
Starvation Cap Reductn	0

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.46	1.09	0.15	1.16	0.49	0.02	1.15	0.14	0.97	0.96	0.98

Intersection Summary			
Area Type:	Other		
Cycle Length: 220			
Actuated Cycle Length: 220			
Offset: 200 (91%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.16			
Intersection Signal Delay: 132.4		Intersection LOS: F	
Intersection Capacity Utilization 119.0%		ICU Level of Service H	
Analysis Period (min) 60			

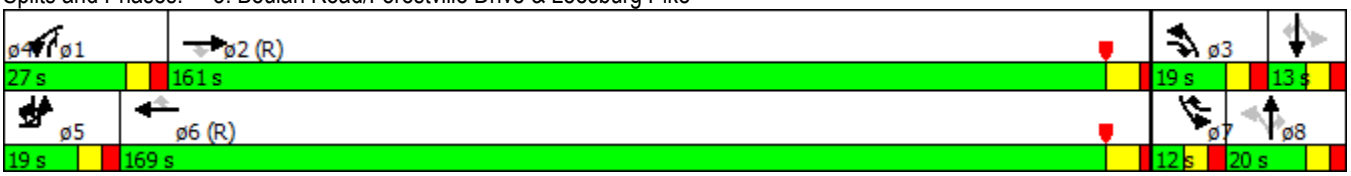
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

! Phase conflict between lane groups.

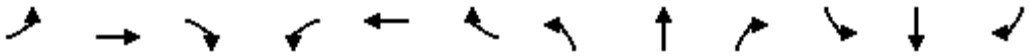
Splits and Phases: 3: Beulah Road/Forestville Drive & Leesburg Pike



Lane Group	SBR
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.02

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	3880	10	15	1880	200	35	15	55	185	5	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		-2%			-3%			-3%			0%	
Storage Length (ft)	170		270	300		300	0		0	0		0
Storage Lanes	1		1	1		1	0		0	0		0
Taper Length (ft)	90			90			25			25		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850			0.850		0.929			0.993	
Flt Protected	0.950			0.950				0.984			0.956	
Satd. Flow (prot)	1787	5136	1599	1796	5162	1607	0	1728	0	0	1768	0
Flt Permitted	0.950			0.950				0.905			0.596	
Satd. Flow (perm)	1787	5136	1599	1796	5162	1607	0	1590	0	0	1102	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			55			200		22			1	
Link Speed (mph)		55			55			25			35	
Link Distance (ft)		4302			1930			1220			1072	
Travel Time (s)		53.3			23.9			33.3			20.9	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	10	3880	10	15	1880	200	35	15	55	185	5	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	10	3880	10	15	1880	200	0	105	0	0	200	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.98	0.98	0.98	0.98	0.98	0.98	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1	1	1	1		1	1	
Detector Template												
Leading Detector (ft)	35	0	0	35	0	0	5	25		5	25	
Trailing Detector (ft)	-5	0	0	-5	0	0	0	-5		0	-5	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Detector Phase	5	2	2	1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	15.0	15.0	5.0	15.0	15.0	5.0	5.0		5.0	5.0	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	12.0	25.0	25.0	12.0	25.0	25.0	43.0	43.0		12.0	12.0	
Total Split (s)	12.0	165.0	165.0	12.0	165.0	165.0	43.0	43.0		43.0	43.0	
Total Split (%)	5.5%	75.0%	75.0%	5.5%	75.0%	75.0%	19.5%	19.5%		19.5%	19.5%	
Maximum Green (s)	5.0	155.0	155.0	5.0	155.0	155.0	36.0	36.0		36.0	36.0	
Yellow Time (s)	4.0	5.5	5.5	4.0	5.5	5.5	4.0	4.0		4.0	4.0	
All-Red Time (s)	3.0	4.5	4.5	3.0	4.5	4.5	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Total Lost Time (s)	7.0	10.0	10.0	7.0	10.0	10.0		7.0			7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0		3.0	3.0	
Minimum Gap (s)	2.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	
Walk Time (s)							7.0	7.0				
Flash Dont Walk (s)							29.0	29.0				
Pedestrian Calls (#/hr)							0	0				
Act Effct Green (s)	5.0	159.8	159.8	5.0	162.2	162.2		36.0			36.0	
Actuated g/C Ratio	0.02	0.73	0.73	0.02	0.74	0.74		0.16			0.16	
v/c Ratio	0.25	1.04	0.01	0.38	0.49	0.16		0.38			1.10	
Control Delay	112.7	109.0	0.0	166.7	3.4	0.3		68.8			306.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Total Delay	112.7	109.0	0.0	166.7	3.4	0.3		68.8			306.1	
LOS	F	F	A	F	A	A		E			F	
Approach Delay		108.7			4.3			68.8			306.1	
Approach LOS		F			A			E			F	
90th %ile Green (s)	5.0	155.0	155.0	5.0	155.0	155.0	36.0	36.0		36.0	36.0	
90th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Hold	Hold		Max	Max	
70th %ile Green (s)	5.0	155.0	155.0	5.0	155.0	155.0	36.0	36.0		36.0	36.0	
70th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Hold	Hold		Max	Max	
50th %ile Green (s)	0.0	155.0	155.0	5.0	167.0	167.0	36.0	36.0		36.0	36.0	
50th %ile Term Code	Skip	Coord	Coord	Max	Coord	Coord	Hold	Hold		Max	Max	
30th %ile Green (s)	0.0	167.0	167.0	0.0	167.0	167.0	36.0	36.0		36.0	36.0	
30th %ile Term Code	Skip	Coord	Coord	Skip	Coord	Coord	Hold	Hold		Max	Max	
10th %ile Green (s)	0.0	167.0	167.0	0.0	167.0	167.0	36.0	36.0		36.0	36.0	
10th %ile Term Code	Skip	Coord	Coord	Skip	Coord	Coord	Hold	Hold		Max	Max	
Stops (vph)	10	2806	0	16	197	0		75			177	
Fuel Used(gal)	1	244	0	1	28	2		3			21	
CO Emissions (g/hr)	0	0	0	0	0	0		0			0	
NOx Emissions (g/hr)	0	0	0	0	0	0		0			0	
VOC Emissions (g/hr)	0	0	0	0	0	0		0			0	
Dilemma Vehicles (#)	0	102	0	0	33	0		0			0	
Queue Length 50th (ft)	15	~2269	0	24	63	1		109			~338	
Queue Length 95th (ft)	m16	#2728	m0	m45	m84	m1		208			#619	
Internal Link Dist (ft)		4222			1850			1140			992	
Turn Bay Length (ft)	170		270	300		300						
Base Capacity (vph)	40	3730	1176	40	3805	1237		278			181	
Starvation Cap Reductn	0	0	0	0	0	0		0			0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn	0	0	0	0	0	0		0			0	
Storage Cap Reductn	0	0	0	0	0	0		0			0	
Reduced v/c Ratio	0.25	1.04	0.01	0.38	0.49	0.16		0.38			1.10	

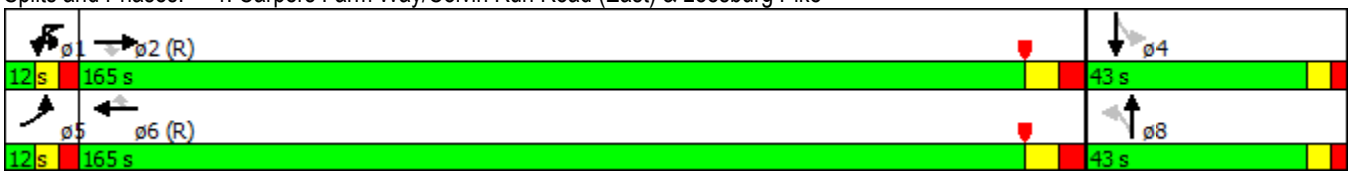
Intersection Summary			
Area Type:	Other		
Cycle Length: 220			
Actuated Cycle Length: 220			
Offset: 138 (63%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.10			
Intersection Signal Delay: 79.6		Intersection LOS: E	
Intersection Capacity Utilization 106.9%		ICU Level of Service G	
Analysis Period (min) 60			

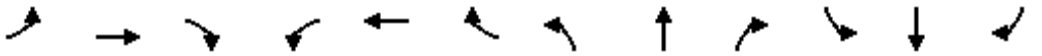
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

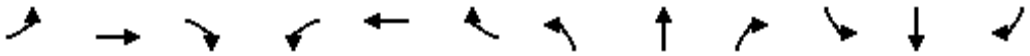
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Carpers Farm Way/Colvin Run Road (East) & Leesburg Pike





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	210	3900	5	10	1910	15	10	15	60	0	0	215
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		-3%			-2%			0%			0%	
Storage Length (ft)	740		0	180		110	0		0	0		0
Storage Lanes	1		1	1		1	0		0	0		1
Taper Length (ft)	80			100			25			25		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850			0.850		0.905				0.865
Flt Protected	0.950			0.950				0.994				
Satd. Flow (prot)	1796	5162	1607	1787	5136	1599	0	1676	0	0	0	1611
Flt Permitted	0.950			0.950				0.994				
Satd. Flow (perm)	1796	5162	1607	1787	5136	1599	0	1676	0	0	0	1611
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			20			89		32				92
Link Speed (mph)		55			55			25			35	
Link Distance (ft)		1783			4302			852			2193	
Travel Time (s)		22.1			53.3			23.2			42.7	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	210	3900	5	10	1910	15	10	15	60	0	0	215
Shared Lane Traffic (%)												
Lane Group Flow (vph)	210	3900	5	10	1910	15	0	85	0	0	0	215
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.98	0.98	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	1				1
Detector Template												
Leading Detector (ft)	35	300	46	35	300	46	5	35				35
Trailing Detector (ft)	-5	150	40	-5	150	40	0	-5				-5
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA				Over
Protected Phases	5	2	8	1	6		8	8				5
Permitted Phases			2			6						
Detector Phase	5	2	2	1	6	6	8	8				5
Switch Phase												
Minimum Initial (s)	5.0	15.0	5.0	5.0	15.0	15.0	5.0	5.0				5.0



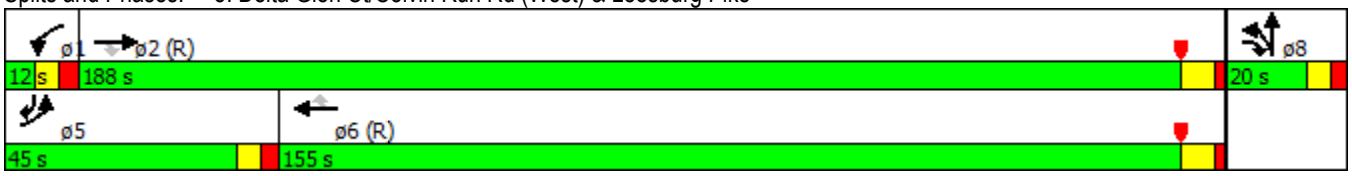
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	12.0	22.5	12.0	12.0	22.5	22.5	12.0	12.0				12.0
Total Split (s)	45.0	188.0	20.0	12.0	155.0	155.0	20.0	20.0				45.0
Total Split (%)	20.5%	85.5%	9.1%	5.5%	70.5%	70.5%	9.1%	9.1%				20.5%
Maximum Green (s)	38.0	180.5	13.0	5.0	147.5	147.5	13.0	13.0				38.0
Yellow Time (s)	4.0	5.5	4.0	4.0	5.5	5.5	4.0	4.0				4.0
All-Red Time (s)	3.0	2.0	3.0	3.0	2.0	2.0	3.0	3.0				3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0				0.0
Total Lost Time (s)	7.0	7.5	7.0	7.0	7.5	7.5		7.0				7.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag						Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.0	2.0	2.0	4.0	4.0	2.0	2.0				4.0
Minimum Gap (s)	4.0	4.0	2.0	2.0	4.0	4.0	2.0	2.0				4.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0
Recall Mode	None	C-Max	None	None	C-Max	C-Max	None	None				None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	31.3	190.3	212.4	5.2	156.8	156.8		10.4				31.3
Actuated g/C Ratio	0.14	0.86	0.97	0.02	0.71	0.71		0.05				0.14
v/c Ratio	0.82	0.87	0.00	0.24	0.52	0.01		0.77				0.70
Control Delay	127.5	8.8	0.0	140.6	3.7	0.0		114.1				71.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0				0.0
Total Delay	127.5	8.8	0.0	140.6	3.7	0.0		114.1				71.7
LOS	F	A	A	F	A	A		F				E
Approach Delay		14.8			4.3			114.1				
Approach LOS		B			A			F				
90th %ile Green (s)	38.0	180.5	13.0	5.0	147.5	147.5	13.0	13.0				38.0
90th %ile Term Code	Max	Coord	Max	Max	Coord	Coord	Max	Max				Max
70th %ile Green (s)	35.6	180.5	13.0	5.0	149.9	149.9	13.0	13.0				35.6
70th %ile Term Code	Gap	Coord	Max	Max	Coord	Coord	Max	Max				Gap
50th %ile Green (s)	31.9	193.8	11.7	0.0	154.9	154.9	11.7	11.7				31.9
50th %ile Term Code	Gap	Coord	Gap	Skip	Coord	Coord	Gap	Gap				Gap
30th %ile Green (s)	28.2	196.4	9.1	0.0	161.2	161.2	9.1	9.1				28.2
30th %ile Term Code	Gap	Coord	Gap	Skip	Coord	Coord	Gap	Gap				Gap
10th %ile Green (s)	22.9	200.2	5.3	0.0	170.3	170.3	5.3	5.3				22.9
10th %ile Term Code	Gap	Coord	Gap	Skip	Coord	Coord	Gap	Gap				Gap
Stops (vph)	206	1852	0	11	593	0		51				331
Fuel Used(gal)	12	85	0	1	64	0		3				13
CO Emissions (g/hr)	0	0	0	0	0	0		0				0
NOx Emissions (g/hr)	0	0	0	0	0	0		0				0
VOC Emissions (g/hr)	0	0	0	0	0	0		0				0
Dilemma Vehicles (#)	0	69	0	0	6	0		0				0
Queue Length 50th (ft)	310	138	0	15	291	0		77				197
Queue Length 95th (ft)	m424	#2392	m0	m30	523	m0		#199				335
Internal Link Dist (ft)		1703			4222			772			2113	
Turn Bay Length (ft)	740			180		110						
Base Capacity (vph)	310	4464	1552	41	3659	1164		129				354
Starvation Cap Reductn	0	0	0	0	0	0		0				0

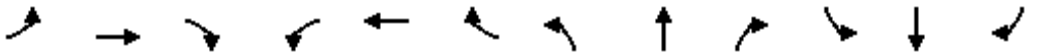
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn	0	0	0	0	0	0		0				0
Storage Cap Reductn	0	0	0	0	0	0		0				0
Reduced v/c Ratio	0.68	0.87	0.00	0.24	0.52	0.01		0.66				0.61

Intersection Summary			
Area Type:	Other		
Cycle Length: 220			
Actuated Cycle Length: 220			
Offset: 192 (87%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 130			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 14.9		Intersection LOS: B	
Intersection Capacity Utilization 102.5%		ICU Level of Service G	
Analysis Period (min) 60			

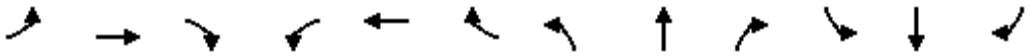
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Delta Glen Ct/Colvin Run Rd (West) & Leesburg Pike





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	0	270	660	1390	75	185	270	1120	70	420	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		-1%			-3%			-1%			0%	
Storage Length (ft)	240		280	0		0	0		650	250		0
Storage Lanes	1		0	2		1	2		1	1		0
Taper Length (ft)	100			85			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.97	0.91	1.00	0.97	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor												
Frt			0.850			0.850			0.850		0.979	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1778	0	1591	3485	5162	1607	3450	1872	1591	1770	3465	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1778	0	1591	3485	5162	1607	3450	1872	1591	1770	3465	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			270			63			1014		8	
Link Speed (mph)		45			55			45			35	
Link Distance (ft)		569			567			927			1980	
Travel Time (s)		8.6			7.0			14.0			38.6	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	20	0	270	660	1390	75	185	270	1120	70	420	70
Shared Lane Traffic (%)												
Lane Group Flow (vph)	20	0	270	660	1390	75	185	270	1120	70	490	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	L NA	Left	Right
Median Width(ft)		96			96			36			36	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.98	0.98	0.98	0.99	0.99	0.99	1.00	1.00	1.00
Turning Speed (mph)	20		15	15		9	20		15	15		9
Number of Detectors	1		1	1	1	1	1	1	1	1	1	
Detector Template												
Leading Detector (ft)	35		0	35	0	0	35	35	35	35	35	
Trailing Detector (ft)	-5		0	-5	0	0	-5	-5	-5	-5	-5	
Turn Type	Prot		Free	Prot	NA	pm+ov	Prot	NA	Free	Prot	NA	
Protected Phases	5			1	6	7	3	8		7	4	
Permitted Phases			Free			6			Free			
Detector Phase	5			1	6	6	3	8		7	4	
Switch Phase												
Minimum Initial (s)	5.0			5.0	15.0	5.0	5.0	5.0		5.0	5.0	



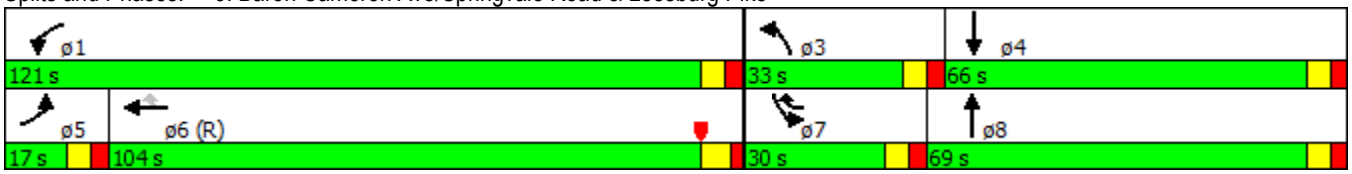
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	12.0			12.0	22.0	12.0	12.0	12.0		12.0	12.0	
Total Split (s)	17.0			121.0	104.0	30.0	33.0	69.0		30.0	66.0	
Total Split (%)	7.7%			55.0%	47.3%	13.6%	15.0%	31.4%		13.6%	30.0%	
Maximum Green (s)	10.0			114.0	97.0	23.0	26.0	62.0		23.0	59.0	
Yellow Time (s)	4.0			4.0	5.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	3.0			3.0	2.0	3.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0			0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0			7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Lead/Lag	Lead				Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0			5.0	4.0	2.0	3.0	3.0		2.0	3.0	
Minimum Gap (s)	2.0			5.0	4.0	2.0	3.0	3.0		2.0	3.0	
Time Before Reduce (s)	0.0			0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0			0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Recall Mode	None			None	C-Max	None	None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	7.2		220.0	145.3	136.1	156.3	17.2	40.5	220.0	13.2	36.5	
Actuated g/C Ratio	0.03		1.00	0.66	0.62	0.71	0.08	0.18	1.00	0.06	0.17	
v/c Ratio	0.35		0.17	0.29	0.44	0.06	0.69	0.78	0.70	0.66	0.84	
Control Delay	140.6		0.2	13.3	19.1	1.2	127.4	83.2	12.6	132.3	102.8	
Queue Delay	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	140.6		0.2	13.3	19.1	1.2	127.4	83.2	12.6	132.3	102.8	
LOS	F		A	B	B	A	F	F	B	F	F	
Approach Delay					16.7			38.2			106.5	
Approach LOS					B			D			F	
90th %ile Green (s)	9.8			133.0	116.2	18.5	21.7	47.5		18.5	44.3	
90th %ile Term Code	Gap			Coord	Coord	Gap	Gap	Gap		Gap	Hold	
70th %ile Green (s)	8.1			140.6	125.5	15.4	19.0	43.0		15.4	39.4	
70th %ile Term Code	Gap			Coord	Coord	Gap	Gap	Hold		Gap	Gap	
50th %ile Green (s)	7.0			145.4	131.4	13.2	17.2	40.4		13.2	36.4	
50th %ile Term Code	Gap			Coord	Coord	Gap	Gap	Hold		Gap	Gap	
30th %ile Green (s)	0.0			150.2	150.2	11.0	15.4	37.8		11.0	33.4	
30th %ile Term Code	Skip			Coord	Coord	Gap	Gap	Hold		Gap	Gap	
10th %ile Green (s)	0.0			157.3	157.3	7.9	12.7	33.8		7.9	29.0	
10th %ile Term Code	Skip			Coord	Coord	Gap	Gap	Hold		Gap	Gap	
Stops (vph)	20		0	203	563	7	175	253	597	68	462	
Fuel Used(gal)	1		1	8	21	0	8	9	17	7	45	
CO Emissions (g/hr)	0		0	0	0	0	0	0	0	0	0	
NOx Emissions (g/hr)	0		0	0	0	0	0	0	0	0	0	
VOC Emissions (g/hr)	0		0	0	0	0	0	0	0	0	0	
Dilemma Vehicles (#)	0		0	0	46	0	0	4	0	0	11	
Queue Length 50th (ft)	30		0	89	343	3	136	375	510	102	364	
Queue Length 95th (ft)	m39		m0	333	471	m28	m191	m504	471	184	477	
Internal Link Dist (ft)		489			487			847			1900	
Turn Bay Length (ft)	240		280						650	250		
Base Capacity (vph)	80		1591	2301	3193	1159	407	527	1591	185	935	
Starvation Cap Reductn	0		0	0	0	0	0	0	0	0	0	

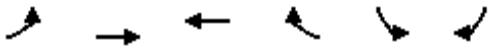
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn	0		0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0		0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.25		0.17	0.29	0.44	0.06	0.45	0.51	0.70	0.38	0.52	

Intersection Summary			
Area Type:	Other		
Cycle Length: 220			
Actuated Cycle Length: 220			
Offset: 137 (62%), Referenced to phase 2: and 6:WBT, Start of Yellow			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay: 34.7		Intersection LOS: C	
Intersection Capacity Utilization 63.5%		ICU Level of Service B	
Analysis Period (min) 60			

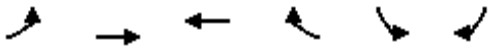
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Baron Cameron Ave/Springvale Road & Leesburg Pike

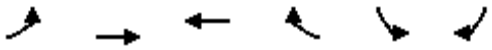




Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	205	3020	1545	70	70	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		2%	1%		0%	
Storage Length (ft)	700			200	0	265
Storage Lanes	1			1	1	1
Taper Length (ft)	85				25	
Lane Util. Factor	1.00	0.91	0.91	1.00	1.00	1.00
Ped Bike Factor						
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1752	5034	5060	1575	1770	1583
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1752	5034	5060	1575	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				70		19
Link Speed (mph)		55	55		35	
Link Distance (ft)		2707	470		3825	
Travel Time (s)		33.6	5.8		74.5	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	205	3020	1545	70	70	115
Shared Lane Traffic (%)						
Lane Group Flow (vph)	205	3020	1545	70	70	115
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	R NA	Left	Right	L NA	R NA
Median Width(ft)		24	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	2	2	1	1	1
Detector Template						
Leading Detector (ft)	35	300	300	56	35	50
Trailing Detector (ft)	-5	150	150	50	-5	0
Turn Type	Prot	NA	NA	pm+ov	Prot	pm+ov
Protected Phases	5	2	6	4	4	5
Permitted Phases				6		4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	5.0	15.0	15.0	5.0	5.0	5.0



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Minimum Split (s)	12.0	22.5	22.5	12.0	12.0	12.0
Total Split (s)	28.0	93.0	65.0	17.0	17.0	28.0
Total Split (%)	25.5%	84.5%	59.1%	15.5%	15.5%	25.5%
Maximum Green (s)	21.0	85.5	57.5	10.0	10.0	21.0
Yellow Time (s)	4.0	5.5	5.5	4.0	4.0	4.0
All-Red Time (s)	3.0	2.0	2.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.5	7.5	7.0	7.0	7.0
Lead/Lag	Lead		Lag			Lead
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	4.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	4.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	C-Max	C-Max	None	None	None
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
Act Effct Green (s)	17.4	86.5	62.1	78.6	9.0	33.4
Actuated g/C Ratio	0.16	0.79	0.56	0.71	0.08	0.30
v/c Ratio	0.74	0.76	0.54	0.06	0.48	0.23
Control Delay	64.2	8.9	10.8	0.1	59.8	23.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	64.2	8.9	10.8	0.1	59.8	23.7
LOS	E	A	B	A	E	C
Approach Delay		12.4	10.4		37.4	
Approach LOS		B	B		D	
90th %ile Green (s)	21.0	85.5	57.5	10.0	10.0	21.0
90th %ile Term Code	Max	Coord	Coord	Max	Max	Max
70th %ile Green (s)	20.7	85.5	57.8	10.0	10.0	20.7
70th %ile Term Code	Gap	Coord	Coord	Max	Max	Gap
50th %ile Green (s)	18.1	85.5	60.4	10.0	10.0	18.1
50th %ile Term Code	Gap	Coord	Coord	Max	Max	Gap
30th %ile Green (s)	15.5	86.7	64.2	8.8	8.8	15.5
30th %ile Term Code	Gap	Coord	Coord	Gap	Gap	Gap
10th %ile Green (s)	11.7	89.1	70.4	6.4	6.4	11.7
10th %ile Term Code	Gap	Coord	Coord	Gap	Gap	Gap
Stops (vph)	207	1381	533	0	66	68
Fuel Used(gal)	10	83	23	0	3	4
CO Emissions (g/hr)	0	0	0	0	0	0
NOx Emissions (g/hr)	0	0	0	0	0	0
VOC Emissions (g/hr)	0	0	0	0	0	0
Dilemma Vehicles (#)	0	108	119	0	0	0
Queue Length 50th (ft)	238	581	104	0	48	49
Queue Length 95th (ft)	m260	m772	554	2	106	104
Internal Link Dist (ft)		2627	390		3745	
Turn Bay Length (ft)	700			200		265
Base Capacity (vph)	334	3956	2854	1145	160	468
Starvation Cap Reductn	0	0	0	0	0	0



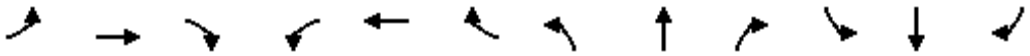
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.76	0.54	0.06	0.44	0.25

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 2 (2%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.76			
Intersection Signal Delay: 12.7		Intersection LOS: B	
Intersection Capacity Utilization 74.6%		ICU Level of Service D	
Analysis Period (min) 60			

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Leesburg Pike & Utterback Store Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	2995	620	255	1385	5	280	5	210	5	5	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		-1%			0%			0%			0%	
Storage Length (ft)	300		700	650		180	310		0	0		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	80			80			75			25		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850			0.850		0.853			0.925	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1778	5111	1591	1770	5085	1583	3433	1589	0	1770	1723	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1778	5111	1591	1770	5085	1583	3433	1589	0	1770	1723	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			229			89		197			5	
Link Speed (mph)		55			55			40			15	
Link Distance (ft)		2420			2707			1363			861	
Travel Time (s)		30.0			33.6			23.2			39.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	5	2995	620	255	1385	5	280	5	210	5	5	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	5	2995	620	255	1385	5	280	215	0	5	10	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1	1	1	1		1	1	
Detector Template												
Leading Detector (ft)	35	246	35	35	246	56	35	35		5	25	
Trailing Detector (ft)	-5	240	-5	-5	240	50	-5	-5		0	-5	
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA		Prot	NA	
Protected Phases	5	2	7	1	6	3	7	4		3	8	
Permitted Phases			2			6						
Detector Phase	5	2	2	1	6	6	7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	15.0	5.0	5.0	15.0	5.0	5.0	5.0		5.0	5.0	



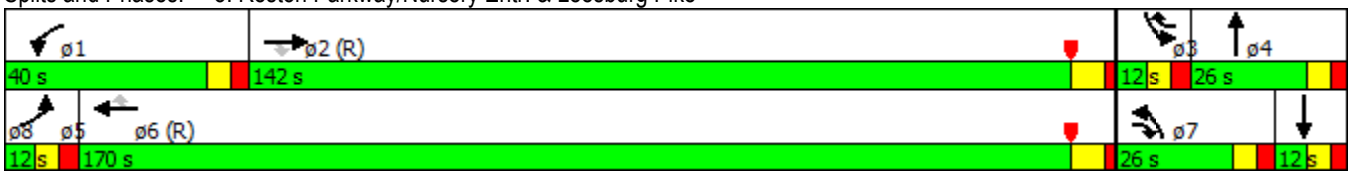
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	12.0	22.5	12.0	12.0	22.5	12.0	12.0	12.0		12.0	12.0	
Total Split (s)	12.0	142.0	26.0	40.0	170.0	12.0	26.0	26.0		12.0	12.0	
Total Split (%)	5.5%	64.5%	11.8%	18.2%	77.3%	5.5%	11.8%	11.8%		5.5%	5.5%	
Maximum Green (s)	5.0	134.5	19.0	33.0	162.5	5.0	19.0	19.0		5.0	5.0	
Yellow Time (s)	4.0	5.5	4.0	4.0	5.5	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	3.0	2.0	3.0	3.0	2.0	3.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.5	7.0	7.0	7.5	7.0	7.0	7.0		7.0	7.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	4.0	2.0	2.0	4.0	2.0	2.0	2.0		2.0	2.0	
Minimum Gap (s)	2.0	4.0	2.0	2.0	4.0	2.0	2.0	2.0		2.0	2.0	
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Recall Mode	None	C-Max	None	None	C-Max	None	None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	5.0	139.9	166.4	34.8	179.3	182.2	19.0	21.4		5.0	5.0	
Actuated g/C Ratio	0.02	0.64	0.76	0.16	0.82	0.83	0.09	0.10		0.02	0.02	
v/c Ratio	0.12	0.92	0.49	0.91	0.33	0.00	0.95	0.65		0.12	0.23	
Control Delay	129.6	21.8	2.9	141.3	2.7	0.0	161.1	23.8		112.2	83.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	129.6	21.8	2.9	141.3	2.7	0.0	161.1	23.8		112.2	83.9	
LOS	F	C	A	F	A	A	F	C		F	F	
Approach Delay		18.7			24.1			101.5			93.3	
Approach LOS		B			C			F			F	
90th %ile Green (s)	5.0	134.5	19.0	33.0	162.5	5.0	19.0	19.0		5.0	5.0	
90th %ile Term Code	Max	Coord	Max	Max	Coord	Max	Max	Max		Max	Max	
70th %ile Green (s)	0.0	134.5	19.0	33.0	174.5	0.0	19.0	31.0		0.0	5.0	
70th %ile Term Code	Skip	Coord	Max	Max	Coord	Skip	Max	Hold		Skip	Max	
50th %ile Green (s)	0.0	139.7	19.0	39.8	186.5	0.0	19.0	19.0		0.0	0.0	
50th %ile Term Code	Skip	Coord	Max	Gap	Coord	Skip	Max	Hold		Skip	Skip	
30th %ile Green (s)	0.0	142.4	19.0	37.1	186.5	0.0	19.0	19.0		0.0	0.0	
30th %ile Term Code	Skip	Coord	Max	Gap	Coord	Skip	Max	Hold		Skip	Skip	
10th %ile Green (s)	0.0	148.3	19.0	31.2	186.5	0.0	19.0	19.0		0.0	0.0	
10th %ile Term Code	Skip	Coord	Max	Gap	Coord	Skip	Max	Hold		Skip	Skip	
Stops (vph)	6	2491	116	223	108	0	259	32		6	7	
Fuel Used(gal)	0	105	12	16	27	0	14	3		0	0	
CO Emissions (g/hr)	0	0	0	0	0	0	0	0		0	0	
NOx Emissions (g/hr)	0	0	0	0	0	0	0	0		0	0	
VOC Emissions (g/hr)	0	0	0	0	0	0	0	0		0	0	
Dilemma Vehicles (#)	0	73	0	0	33	0	0	5		0	0	
Queue Length 50th (ft)	7	1280	95	346	48	0	212	25		7	7	
Queue Length 95th (ft)	m9	#1968	m222	#695	95	m0	#375	186		29	38	
Internal Link Dist (ft)		2340			2627			1283			781	
Turn Bay Length (ft)	300		700	650		180	310					
Base Capacity (vph)	40	3249	1258	283	4144	1326	296	332		40	44	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	

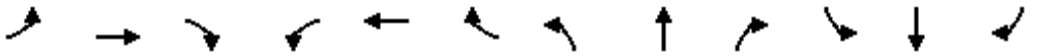
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.13	0.92	0.49	0.90	0.33	0.00	0.95	0.65		0.13	0.23	

Intersection Summary			
Area Type:	Other		
Cycle Length: 220			
Actuated Cycle Length: 220			
Offset: 24 (11%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.95			
Intersection Signal Delay: 27.5		Intersection LOS: C	
Intersection Capacity Utilization 104.6%		ICU Level of Service G	
Analysis Period (min) 60			

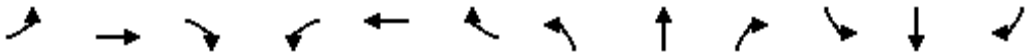
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: Reston Parkway/Nursery Entr. & Leesburg Pike





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	3500	10	20	1360	0	5	0	125	80	5	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			-5%			0%			0%	
Storage Length (ft)	0		0	250		0	0		0	0		0
Storage Lanes	0		0	1		0	1		1	1		0
Taper Length (ft)	25			100			25			25		
Lane Util. Factor	1.00	0.86	0.86	1.00	0.91	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor												
Frt									0.850			
Flt Protected				0.950			0.950			0.950	0.958	
Satd. Flow (prot)	0	6408	0	1814	5212	0	1770	0	1583	1681	1695	0
Flt Permitted				0.950			0.950			0.950	0.958	
Satd. Flow (perm)	0	6408	0	1814	5212	0	1770	0	1583	1681	1695	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1							92			
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		425			4372			1243			359	
Travel Time (s)		6.4			66.2			33.9			9.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	3500	10	20	1360	0	5	0	125	80	5	0
Shared Lane Traffic (%)										47%		
Lane Group Flow (vph)	0	3510	0	20	1360	0	5	0	125	42	43	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	0.97	0.97	0.97	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		2		1	2		1		1	1	2	
Detector Template		Thru		Left	Thru		Left		Right	Left	Thru	
Leading Detector (ft)		100		20	100		20		20	20	100	
Trailing Detector (ft)		0		0	0		0		0	0	0	
Turn Type		NA		Prot	NA		Prot		Prot	Split	NA	
Protected Phases		2		1	6		4		4	3	3	
Permitted Phases									4			
Detector Phase		2		1	6		4		4	3	3	
Switch Phase												
Minimum Initial (s)		15.0		5.0	15.0		5.0		5.0	5.0	5.0	

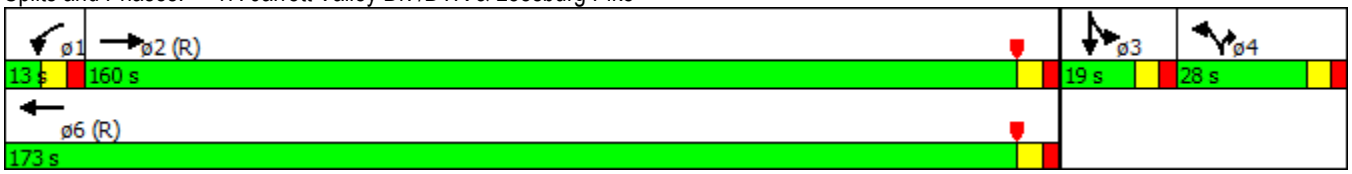


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)		22.5		12.0	22.5		12.0		12.0	12.0	12.0	
Total Split (s)		160.0		13.0	173.0		28.0		28.0	19.0	19.0	
Total Split (%)		72.7%		5.9%	78.6%		12.7%		12.7%	8.6%	8.6%	
Maximum Green (s)		152.5		6.0	165.5		21.0		21.0	12.0	12.0	
Yellow Time (s)		4.5		4.0	4.5		4.0		4.0	4.0	4.0	
All-Red Time (s)		3.0		3.0	3.0		3.0		3.0	3.0	3.0	
Lost Time Adjust (s)		0.0		0.0	0.0		0.0		0.0	0.0	0.0	
Total Lost Time (s)		7.5		7.0	7.5		7.0		7.0	7.0	7.0	
Lead/Lag		Lag		Lead			Lag		Lag	Lead	Lead	
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0		3.0	3.0		3.0		3.0	3.0	3.0	
Minimum Gap (s)		3.0		3.0	3.0		3.0		3.0	3.0	3.0	
Time Before Reduce (s)		0.0		0.0	0.0		0.0		0.0	0.0	0.0	
Time To Reduce (s)		0.0		0.0	0.0		0.0		0.0	0.0	0.0	
Recall Mode		C-Max		None	C-Max		None		None	None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		168.1		7.5	177.3		11.0		11.0	10.2	10.2	
Actuated g/C Ratio		0.76		0.03	0.81		0.05		0.05	0.05	0.05	
v/c Ratio		0.72		0.33	0.32		0.06		0.75	0.55	0.55	
Control Delay		3.1		117.8	6.2		96.6		61.1	129.3	130.3	
Queue Delay		0.0		0.0	0.0		0.0		0.0	0.0	0.0	
Total Delay		3.1		117.8	6.2		96.6		61.1	129.3	130.3	
LOS		A		F	A		F		E	F	F	
Approach Delay		3.1			7.8						129.8	
Approach LOS		A			A						F	
90th %ile Green (s)		152.5		8.3	167.8		18.7		18.7	12.0	12.0	
90th %ile Term Code		Coord		Max	Coord		Gap		Gap	Max	Max	
70th %ile Green (s)		156.8		8.9	172.7		13.8		13.8	12.0	12.0	
70th %ile Term Code		Coord		Gap	Coord		Gap		Gap	Max	Max	
50th %ile Green (s)		162.4		7.8	177.2		10.3		10.3	11.0	11.0	
50th %ile Term Code		Coord		Gap	Coord		Gap		Gap	Gap	Gap	
30th %ile Green (s)		182.5		0.0	182.5		6.8		6.8	9.2	9.2	
30th %ile Term Code		Coord		Skip	Coord		Gap		Gap	Gap	Gap	
10th %ile Green (s)		186.4		0.0	186.4		5.5		5.5	6.6	6.6	
10th %ile Term Code		Coord		Skip	Coord		Gap		Gap	Gap	Gap	
Stops (vph)		658		20	341		6		39	41	42	
Fuel Used(gal)		20		1	45		0		3	1	1	
CO Emissions (g/hr)		0		0	0		0		0	0	0	
NOx Emissions (g/hr)		0		0	0		0		0	0	0	
VOC Emissions (g/hr)		0		0	0		0		0	0	0	
Dilemma Vehicles (#)		48		0	31		0		0	0	0	
Queue Length 50th (ft)		56		29	172		7		48	64	65	
Queue Length 95th (ft)		636		74	272		27		162	132	135	
Internal Link Dist (ft)		345			4292			1163			279	
Turn Bay Length (ft)				250								
Base Capacity (vph)		4897		62	4200		168		234	91	92	
Starvation Cap Reductn		0		0	0		0		0	0	0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn		0		0	0		0		0	0	0	
Storage Cap Reductn		0		0	0		0		0	0	0	
Reduced v/c Ratio		0.72		0.32	0.32		0.03		0.53	0.46	0.47	

Intersection Summary			
Area Type:	Other		
Cycle Length: 220			
Actuated Cycle Length: 220			
Offset: 114 (52%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.75			
Intersection Signal Delay: 8.0		Intersection LOS: A	
Intersection Capacity Utilization 80.7%		ICU Level of Service D	
Analysis Period (min) 60			

Splits and Phases: 47: Jarrett Valley Dr. /DTR & Leesburg Pike



APPENDIX J

Synchro Input: 2040 PM Conventional

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	20	375	2225	50	30	3110	300	20	60	5	90	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			0%			-5%			-2%			-1%
Storage Length (ft)		850		380	400		225	0		100	0	
Storage Lanes		1		1	2		1	1		1	1	
Taper Length (ft)		150			120			25			25	
Lane Util. Factor	0.91	1.00	0.91	1.00	0.97	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt				0.850			0.850			0.850		
Flt Protected		0.950			0.950			0.950			0.950	
Satd. Flow (prot)	0	1770	5085	1583	3519	5212	1623	1787	1881	1599	1778	1872
Flt Permitted		0.950			0.950			0.751			0.718	
Satd. Flow (perm)	0	1770	5085	1583	3519	5212	1623	1413	1881	1599	1344	1872
Right Turn on Red				Yes			Yes			Yes		
Satd. Flow (RTOR)				50			89			52		
Link Speed (mph)			45			45			15			35
Link Distance (ft)			1979			2023			2224			186
Travel Time (s)			30.0			30.7			101.1			3.6
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)			0%			0%			0%			0%
Adj. Flow (vph)	20	375	2225	50	30	3110	300	20	60	5	90	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	395	2225	50	30	3110	300	20	60	5	90	10
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	R NA	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left
Median Width(ft)			24			24			12			12
Link Offset(ft)			0			0			0			0
Crosswalk Width(ft)			16			16			16			16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	0.97	0.97	0.97	0.99	0.99	0.99	0.99	0.99
Turning Speed (mph)	9	15		9	15		9	15		9	15	
Number of Detectors	1	5	2	1	1	2	1	1	1	1	1	1
Detector Template												
Leading Detector (ft)	50	500	300	56	35	300	56	35	35	35	35	35
Trailing Detector (ft)	0	0	150	50	-5	150	50	-5	-5	-5	-5	-5
Turn Type	Prot	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	pm+ov	Perm	NA
Protected Phases	5!	5	2		1	6			4	1		8
Permitted Phases				2			6	4		4	8	
Detector Phase	5	5	2	2	1	6	6	4	4	4	8	8
Switch Phase												
Minimum Initial (s)	5.0	5.0	15.0	15.0	5.0	15.0	15.0	5.0	5.0	5.0	5.0	5.0

Lane Group	SBR
Lane Configurations	
Volume (vph)	655
Ideal Flow (vphpl)	1900
Lane Width (ft)	12
Grade (%)	
Storage Length (ft)	100
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Ped Bike Factor	
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1591
Flt Permitted	
Satd. Flow (perm)	1591
Right Turn on Red	Yes
Satd. Flow (RTOR)	20
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	1.00
Growth Factor	100%
Heavy Vehicles (%)	2%
Bus Blockages (#/hr)	0
Parking (#/hr)	
Mid-Block Traffic (%)	
Adj. Flow (vph)	655
Shared Lane Traffic (%)	
Lane Group Flow (vph)	655
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	0.99
Turning Speed (mph)	9
Number of Detectors	1
Detector Template	
Leading Detector (ft)	35
Trailing Detector (ft)	-5
Turn Type	pm+ov
Protected Phases	5!
Permitted Phases	8
Detector Phase	8
Switch Phase	
Minimum Initial (s)	5.0

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Minimum Split (s)	12.0	12.0	22.5	22.5	12.0	22.5	22.5	12.0	12.0	12.0	12.0	12.0
Total Split (s)	48.0	48.0	177.0	177.0	12.0	141.0	141.0	51.0	51.0	12.0	51.0	51.0
Total Split (%)	20.0%	20.0%	73.8%	73.8%	5.0%	58.8%	58.8%	21.3%	21.3%	5.0%	21.3%	21.3%
Maximum Green (s)	41.0	41.0	169.5	169.5	5.0	133.5	133.5	44.0	44.0	5.0	44.0	44.0
Yellow Time (s)	4.0	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.0	7.5	7.5	7.0	7.5	7.5	7.0	7.0	7.0	7.0	7.0
Lead/Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag			Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Minimum Gap (s)	3.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		41.0	171.9	171.9	5.0	133.5	133.5	44.0	44.0	53.6	44.0	44.0
Actuated g/C Ratio		0.17	0.72	0.72	0.02	0.56	0.56	0.18	0.18	0.22	0.18	0.18
v/c Ratio		1.31	0.61	0.04	0.41	1.07	0.32	0.08	0.17	0.01	0.37	0.03
Control Delay		638.5	9.8	1.1	124.4	183.7	19.4	82.4	84.3	0.0	90.8	81.0
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		638.5	9.8	1.1	124.4	183.7	19.4	82.4	84.3	0.0	90.8	81.0
LOS		F	A	A	F	F	B	F	F	A	F	F
Approach Delay			102.7			168.8			78.9			186.8
Approach LOS			F			F			E			F
90th %ile Green (s)	41.0	41.0	169.5	169.5	5.0	133.5	133.5	44.0	44.0	5.0	44.0	44.0
90th %ile Term Code	Max	Max	Coord	Coord	Max	Coord	Coord	Hold	Hold	Max	Max	Max
70th %ile Green (s)	41.0	41.0	169.5	169.5	5.0	133.5	133.5	44.0	44.0	5.0	44.0	44.0
70th %ile Term Code	Max	Max	Coord	Coord	Max	Coord	Coord	Hold	Hold	Max	Max	Max
50th %ile Green (s)	41.0	41.0	169.5	169.5	5.0	133.5	133.5	44.0	44.0	5.0	44.0	44.0
50th %ile Term Code	Max	Max	Coord	Coord	Max	Coord	Coord	Hold	Hold	Max	Max	Max
30th %ile Green (s)	41.0	41.0	169.5	169.5	5.0	133.5	133.5	44.0	44.0	5.0	44.0	44.0
30th %ile Term Code	Max	Max	Coord	Coord	Max	Coord	Coord	Hold	Hold	Max	Max	Max
10th %ile Green (s)	41.0	41.0	181.5	181.5	0.0	133.5	133.5	44.0	44.0	0.0	44.0	44.0
10th %ile Term Code	Max	Max	Coord	Coord	Skip	Coord	Coord	Hold	Hold	Skip	Max	Max
Stops (vph)		336	958	1	30	2876	91	17	51	0	79	10
Fuel Used(gal)		61	45	1	2	208	8	1	2	0	2	0
CO Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
NOx Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
VOC Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
Dilemma Vehicles (#)		0	49	0	0	60	0	0	0	0	0	0
Queue Length 50th (ft)		~795	528	1	24	~1996	148	27	82	0	127	13
Queue Length 95th (ft)		#1218	731	m7	m39	#2427	228	66	153	0	223	40
Internal Link Dist (ft)			1899			1943			2144			106
Turn Bay Length (ft)		850		380	400		225			100		
Base Capacity (vph)		302	3642	1147	73	2899	942	259	344	397	246	343
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0

Lane Group	SBR
Minimum Split (s)	12.0
Total Split (s)	48.0
Total Split (%)	20.0%
Maximum Green (s)	41.0
Yellow Time (s)	4.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	0.0
Total Lost Time (s)	7.0
Lead/Lag	Lead
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time Before Reduce (s)	0.0
Time To Reduce (s)	0.0
Recall Mode	None
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	92.0
Actuated g/C Ratio	0.38
v/c Ratio	1.05
Control Delay	201.6
Queue Delay	0.0
Total Delay	201.6
LOS	F
Approach Delay	
Approach LOS	
90th %ile Green (s)	41.0
90th %ile Term Code	Max
70th %ile Green (s)	41.0
70th %ile Term Code	Max
50th %ile Green (s)	41.0
50th %ile Term Code	Max
30th %ile Green (s)	41.0
30th %ile Term Code	Max
10th %ile Green (s)	41.0
10th %ile Term Code	Max
Stops (vph)	580
Fuel Used(gal)	32
CO Emissions (g/hr)	0
NOx Emissions (g/hr)	0
VOC Emissions (g/hr)	0
Dilemma Vehicles (#)	0
Queue Length 50th (ft)	~1108
Queue Length 95th (ft)	#1647
Internal Link Dist (ft)	
Turn Bay Length (ft)	100
Base Capacity (vph)	622
Starvation Cap Reductn	0

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		1.31	0.61	0.04	0.41	1.07	0.32	0.08	0.17	0.01	0.37	0.03

Intersection Summary			
Area Type:	Other		
Cycle Length: 240			
Actuated Cycle Length: 240			
Offset: 158 (66%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.31			
Intersection Signal Delay: 144.3		Intersection LOS: F	
Intersection Capacity Utilization 150.4%		ICU Level of Service H	
Analysis Period (min) 60			

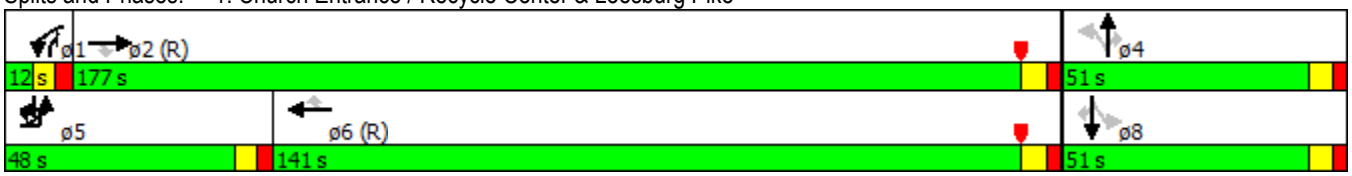
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

! Phase conflict between lane groups.

Splits and Phases: 1: Church Entrance / Recycle Center & Leesburg Pike



Lane Group	SBR
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	1.05

Intersection Summary

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	10	247	2468	85	80	4345	60	120	55	35	57	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-2%			0%			-1%			0%
Storage Length (ft)		440		145	200		70	350		350	390	
Storage Lanes		1		1	1		1	1		1	1	
Taper Length (ft)		180			100			25			25	
Lane Util. Factor	0.91	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt				0.850			0.850			0.850		
Flt Protected		0.950			0.950			0.950			0.950	
Satd. Flow (prot)	0	1787	5136	1599	1770	5085	1583	1778	1872	1591	1770	1863
Flt Permitted		0.950			0.950			0.500			0.693	
Satd. Flow (perm)	0	1787	5136	1599	1770	5085	1583	936	1872	1591	1291	1863
Right Turn on Red				Yes			Yes			Yes		
Satd. Flow (RTOR)				50			82			84		
Link Speed (mph)			55			55			25			35
Link Distance (ft)			3810			775			1826			1736
Travel Time (s)			47.2			9.6			49.8			33.8
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)			0%			0%			0%			0%
Adj. Flow (vph)	10	247	2468	85	80	4345	60	120	55	35	57	70
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	257	2468	85	80	4345	60	120	55	35	57	70
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	R NA	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left
Median Width(ft)			12			12			12			12
Link Offset(ft)			0			0			0			0
Crosswalk Width(ft)			16			16			16			16
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	1.00	1.00	1.00	0.99	0.99	0.99	1.00	1.00
Turning Speed (mph)	9	15		9	15		9	15		9	15	
Number of Detectors	1	1	1	1	1	1	1	1	1	1	1	1
Detector Template												
Leading Detector (ft)	50	35	206	46	35	206	46	5	35	35	5	35
Trailing Detector (ft)	0	-5	200	40	-5	200	40	0	-5	-5	0	-5
Turn Type	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA
Protected Phases	1!	1	6	7	5	2	3	7	4	5	3	8
Permitted Phases				6			2	4		4	8	
Detector Phase	1	1	6	6	5	2	2	7	4	4	3	8
Switch Phase												
Minimum Initial (s)	5.0	5.0	15.0	5.0	5.0	15.0	5.0	5.0	5.0	5.0	5.0	5.0

Lane Group	SBR
Lane Configurations	
Volume (vph)	295
Ideal Flow (vphpl)	1900
Lane Width (ft)	12
Grade (%)	
Storage Length (ft)	390
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Ped Bike Factor	
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1583
Flt Permitted	
Satd. Flow (perm)	1583
Right Turn on Red	Yes
Satd. Flow (RTOR)	52
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	1.00
Growth Factor	100%
Heavy Vehicles (%)	2%
Bus Blockages (#/hr)	0
Parking (#/hr)	
Mid-Block Traffic (%)	
Adj. Flow (vph)	295
Shared Lane Traffic (%)	
Lane Group Flow (vph)	295
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Number of Detectors	1
Detector Template	
Leading Detector (ft)	5
Trailing Detector (ft)	0
Turn Type	pm+ov
Protected Phases	1!
Permitted Phases	8
Detector Phase	8
Switch Phase	
Minimum Initial (s)	5.0

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Minimum Split (s)	12.0	12.0	22.5	12.0	12.0	22.5	12.0	12.0	12.0	12.0	12.0	12.0
Total Split (s)	34.0	34.0	187.0	12.0	26.0	179.0	12.0	12.0	15.0	26.0	12.0	15.0
Total Split (%)	14.2%	14.2%	77.9%	5.0%	10.8%	74.6%	5.0%	5.0%	6.3%	10.8%	5.0%	6.3%
Maximum Green (s)	27.0	27.0	179.5	5.0	19.0	171.5	5.0	5.0	8.0	19.0	5.0	8.0
Yellow Time (s)	4.0	4.0	5.5	4.0	4.0	5.5	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	2.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.0	7.5	7.0	7.0	7.5	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	4.0	3.0	3.0	4.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	4.0	3.0	3.0	4.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	C-Max	None	None	C-Max	None	None	None	None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		27.0	182.8	195.3	15.7	171.5	184.0	13.0	8.0	30.7	13.0	8.0
Actuated g/C Ratio		0.11	0.76	0.81	0.07	0.71	0.77	0.05	0.03	0.13	0.05	0.03
v/c Ratio		1.28	0.63	0.06	0.70	1.20	0.05	1.76	0.89	0.13	0.72	1.13
Control Delay		593.4	20.3	3.2	127.5	371.9	0.0	1484.6	244.2	0.9	158.1	476.1
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		593.4	20.3	3.2	127.5	371.9	0.0	1484.6	244.2	0.9	158.1	476.1
LOS		F	C	A	F	F	A	F	F	A	F	F
Approach Delay			72.2			362.5			912.4			190.0
Approach LOS			E			F			F			F
90th %ile Green (s)	27.0	27.0	179.5	5.0	19.0	171.5	5.0	5.0	8.0	19.0	5.0	8.0
90th %ile Term Code	Max	Max	Coord	Max	Max	Coord	Max	Max	Max	Max	Max	Max
70th %ile Green (s)	27.0	27.0	179.8	5.0	18.7	171.5	5.0	5.0	8.0	18.7	5.0	8.0
70th %ile Term Code	Max	Max	Coord	Max	Gap	Coord	Max	Max	Max	Gap	Max	Max
50th %ile Green (s)	27.0	27.0	182.2	5.0	16.3	171.5	5.0	5.0	8.0	16.3	5.0	8.0
50th %ile Term Code	Max	Max	Coord	Max	Gap	Coord	Max	Max	Max	Gap	Max	Max
30th %ile Green (s)	27.0	27.0	184.6	5.0	13.9	171.5	5.0	5.0	8.0	13.9	5.0	8.0
30th %ile Term Code	Max	Max	Coord	Max	Gap	Coord	Max	Max	Max	Gap	Max	Max
10th %ile Green (s)	27.0	27.0	188.1	5.0	10.4	171.5	5.0	5.0	8.0	10.4	5.0	8.0
10th %ile Term Code	Max	Max	Coord	Max	Gap	Coord	Max	Max	Max	Gap	Max	Max
Stops (vph)		214	1274	16	79	3688	0	112	47	0	64	56
Fuel Used(gal)		41	93	2	4	419	0	39	4	1	3	8
CO Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
NOx Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
VOC Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
Dilemma Vehicles (#)		0	94	0	0	32	0	0	0	0	0	1
Queue Length 50th (ft)		~509	774	4	129	~3080	0	~230	89	0	88	~128
Queue Length 95th (ft)		m#754	1083	m26	m137	m#2879	m0	#459	#232	0	#209	#302
Internal Link Dist (ft)			3730			695			1746			1656
Turn Bay Length (ft)		440		145	200		70	350		350	390	
Base Capacity (vph)		201	3912	1310	140	3633	1232	68	62	276	79	62
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0

Lane Group	SBR
Minimum Split (s)	12.0
Total Split (s)	34.0
Total Split (%)	14.2%
Maximum Green (s)	27.0
Yellow Time (s)	4.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	0.0
Total Lost Time (s)	7.0
Lead/Lag	Lead
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time Before Reduce (s)	0.0
Time To Reduce (s)	0.0
Recall Mode	None
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	42.0
Actuated g/C Ratio	0.18
v/c Ratio	0.92
Control Delay	128.3
Queue Delay	0.0
Total Delay	128.3
LOS	F
Approach Delay	
Approach LOS	
90th %ile Green (s)	27.0
90th %ile Term Code	Max
70th %ile Green (s)	27.0
70th %ile Term Code	Max
50th %ile Green (s)	27.0
50th %ile Term Code	Max
30th %ile Green (s)	27.0
30th %ile Term Code	Max
10th %ile Green (s)	27.0
10th %ile Term Code	Max
Stops (vph)	228
Fuel Used(gal)	13
CO Emissions (g/hr)	0
NOx Emissions (g/hr)	0
VOC Emissions (g/hr)	0
Dilemma Vehicles (#)	0
Queue Length 50th (ft)	396
Queue Length 95th (ft)	#731
Internal Link Dist (ft)	
Turn Bay Length (ft)	390
Base Capacity (vph)	319
Starvation Cap Reductn	0

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		1.28	0.63	0.06	0.57	1.20	0.05	1.76	0.89	0.13	0.72	1.13

Intersection Summary			
Area Type:	Other		
Cycle Length: 240			
Actuated Cycle Length: 240			
Offset: 216 (90%), Referenced to phase 2:WBT and 6:EBT, Start of Yellow			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.76			
Intersection Signal Delay: 265.0		Intersection LOS: F	
Intersection Capacity Utilization 146.9%		ICU Level of Service H	
Analysis Period (min) 60			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

! Phase conflict between lane groups.

Splits and Phases: 2: Towlston Road & Leesburg Pike

Lane Group	SBR
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.92

Intersection Summary

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	5	35	2535	190	195	4525	40	305	30	210	40	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-3%			-4%			3%			-2%
Storage Length (ft)		100		200	750		750	0		200	320	
Storage Lanes		1		1	1		1	1		1	1	
Taper Length (ft)		50			120			120			25	
Lane Util. Factor	0.91	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt				0.850			0.850			0.850		
Flt Protected		0.950			0.950			0.950			0.950	
Satd. Flow (prot)	0	1796	5162	1607	1805	5187	1615	1743	1835	1560	1787	1881
Flt Permitted		0.950			0.950			0.364				
Satd. Flow (perm)	0	1796	5162	1607	1805	5187	1615	668	1835	1560	1881	1881
Right Turn on Red				Yes			Yes			Yes		
Satd. Flow (RTOR)				104			82			52		
Link Speed (mph)			55			55			35			25
Link Distance (ft)			913			3810			3260			1783
Travel Time (s)			11.3			47.2			63.5			48.6
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)			0%			0%			0%			0%
Adj. Flow (vph)	5	35	2535	190	195	4525	40	305	30	210	40	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	40	2535	190	195	4525	40	305	30	210	40	10
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	R NA	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left
Median Width(ft)			12			12			12			12
Link Offset(ft)			0			0			0			0
Crosswalk Width(ft)			16			16			16			16
Two way Left Turn Lane												
Headway Factor	0.98	0.98	0.98	0.98	0.97	0.97	0.97	1.02	1.02	1.02	0.99	0.99
Turning Speed (mph)	9	15		9	15		9	15		9	15	
Number of Detectors	1	1	3	1	1	3	1	1	1	1	1	1
Detector Template												
Leading Detector (ft)	50	35	306	46	35	306	46	5	35	35	5	35
Trailing Detector (ft)	0	-5	150	40	-5	150	40	0	-5	-5	0	-5
Turn Type	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA
Protected Phases	5!	5	2	3	1	6	7	3	8	1	7	4
Permitted Phases				2			6	8		8	4	
Detector Phase	5	5	2	2	1	6	6	3	8	8	7	4
Switch Phase												
Minimum Initial (s)	5.0	5.0	15.0	5.0	5.0	15.0	5.0	5.0	5.0	5.0	5.0	5.0

Lane Group	SBR
Lane Configurations	
Volume (vph)	15
Ideal Flow (vphpl)	1900
Lane Width (ft)	12
Grade (%)	
Storage Length (ft)	320
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Ped Bike Factor	
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1599
Flt Permitted	
Satd. Flow (perm)	1599
Right Turn on Red	Yes
Satd. Flow (RTOR)	116
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	1.00
Growth Factor	100%
Heavy Vehicles (%)	2%
Bus Blockages (#/hr)	0
Parking (#/hr)	
Mid-Block Traffic (%)	
Adj. Flow (vph)	15
Shared Lane Traffic (%)	
Lane Group Flow (vph)	15
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	0.99
Turning Speed (mph)	9
Number of Detectors	1
Detector Template	
Leading Detector (ft)	0
Trailing Detector (ft)	0
Turn Type	pm+ov
Protected Phases	5!
Permitted Phases	4
Detector Phase	4
Switch Phase	
Minimum Initial (s)	5.0

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Minimum Split (s)	12.0	12.0	22.5	12.0	12.0	22.5	12.0	12.0	12.0	12.0	12.0	12.0
Total Split (s)	12.0	12.0	148.0	35.0	45.0	181.0	14.0	35.0	33.0	45.0	14.0	12.0
Total Split (%)	5.0%	5.0%	61.7%	14.6%	18.8%	75.4%	5.8%	14.6%	13.8%	18.8%	5.8%	5.0%
Maximum Green (s)	5.0	5.0	140.5	28.0	38.0	173.5	7.0	28.0	26.0	38.0	7.0	5.0
Yellow Time (s)	4.0	4.0	5.5	4.0	4.0	5.5	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	2.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.0	7.5	7.0	7.0	7.5	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	C-Max	None	None	C-Max	None	None	None	None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		6.5	150.1	185.6	30.8	174.4	186.1	37.6	26.4	64.2	10.9	5.0
Actuated g/C Ratio		0.03	0.63	0.77	0.13	0.73	0.78	0.16	0.11	0.27	0.05	0.02
v/c Ratio		0.83	0.79	0.15	0.84	1.20	0.03	1.33	0.15	0.46	0.48	0.26
Control Delay		194.3	25.6	0.4	125.4	376.0	0.0	690.2	99.1	57.2	110.1	131.9
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		194.3	25.6	0.4	125.4	376.0	0.0	690.2	99.1	57.2	110.1	131.9
LOS		F	C	A	F	F	A	F	F	E	F	F
Approach Delay			26.3			362.5			413.7			88.2
Approach LOS			C			F			F			F
90th %ile Green (s)	5.0	5.0	140.5	28.0	38.0	173.5	7.0	28.0	26.0	38.0	7.0	5.0
90th %ile Term Code	Max	Max	Coord	Max	Max	Coord	Max	Max	Max	Max	Max	Max
70th %ile Green (s)	5.0	5.0	143.6	28.0	34.9	173.5	7.0	28.0	26.0	34.9	7.0	5.0
70th %ile Term Code	Max	Max	Coord	Max	Gap	Coord	Max	Max	Max	Gap	Max	Max
50th %ile Green (s)	5.0	5.0	147.2	28.0	31.3	173.5	7.0	28.0	26.0	31.3	7.0	5.0
50th %ile Term Code	Max	Max	Coord	Max	Gap	Coord	Max	Max	Max	Gap	Max	Max
30th %ile Green (s)	5.0	5.0	150.9	28.0	27.6	173.5	7.0	28.0	26.0	27.6	7.0	5.0
30th %ile Term Code	Max	Max	Coord	Max	Gap	Coord	Max	Max	Hold	Gap	Max	Max
10th %ile Green (s)	12.5	12.5	168.3	28.0	22.2	178.0	0.0	28.0	28.0	22.2	0.0	0.0
10th %ile Term Code	Gap	Gap	Coord	Max	Gap	Coord	Skip	Max	Hold	Gap	Skip	Skip
Stops (vph)		29	1393	1	187	3132	0	256	26	131	40	11
Fuel Used(gal)		2	54	1	13	514	1	52	2	8	2	0
CO Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
NOx Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
VOC Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
Dilemma Vehicles (#)		0	78	0	0	65	0	0	1	0	0	0
Queue Length 50th (ft)		~69	993	0	302	~3180	0	~557	44	213	55	16
Queue Length 95th (ft)		m#127	m1200	m7	m243	m#2335	m0	#920	97	348	113	48
Internal Link Dist (ft)			833			3730			3180			1703
Turn Bay Length (ft)		100		200	750		750			200	320	
Base Capacity (vph)		48	3228	1266	285	3769	1270	229	201	455	83	39
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0

Lane Group	SBR
Minimum Split (s)	12.0
Total Split (s)	12.0
Total Split (%)	5.0%
Maximum Green (s)	5.0
Yellow Time (s)	4.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	0.0
Total Lost Time (s)	7.0
Lead/Lag	Lead
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time Before Reduce (s)	0.0
Time To Reduce (s)	0.0
Recall Mode	None
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	16.1
Actuated g/C Ratio	0.07
v/c Ratio	0.07
Control Delay	0.6
Queue Delay	0.0
Total Delay	0.6
LOS	A
Approach Delay	
Approach LOS	
90th %ile Green (s)	5.0
90th %ile Term Code	Max
70th %ile Green (s)	5.0
70th %ile Term Code	Max
50th %ile Green (s)	5.0
50th %ile Term Code	Max
30th %ile Green (s)	5.0
30th %ile Term Code	Max
10th %ile Green (s)	12.5
10th %ile Term Code	Gap
Stops (vph)	0
Fuel Used(gal)	0
CO Emissions (g/hr)	0
NOx Emissions (g/hr)	0
VOC Emissions (g/hr)	0
Dilemma Vehicles (#)	0
Queue Length 50th (ft)	0
Queue Length 95th (ft)	0
Internal Link Dist (ft)	
Turn Bay Length (ft)	320
Base Capacity (vph)	215
Starvation Cap Reductn	0

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.83	0.79	0.15	0.68	1.20	0.03	1.33	0.15	0.46	0.48	0.26

Intersection Summary			
Area Type:	Other		
Cycle Length: 240			
Actuated Cycle Length: 240			
Offset: 22 (9%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.33			
Intersection Signal Delay: 249.5		Intersection LOS: F	
Intersection Capacity Utilization 136.4%		ICU Level of Service H	
Analysis Period (min) 60			

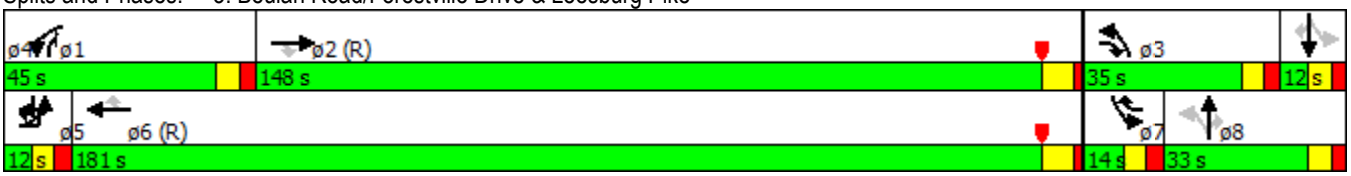
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

! Phase conflict between lane groups.

Splits and Phases: 3: Beulah Road/Forestville Drive & Leesburg Pike



Lane Group	SBR
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.07

Intersection Summary

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	25	2530	30	10	50	4480	315	20	10	40	165	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		-2%				-3%			-3%			0%
Storage Length (ft)	170		270		300		300	0		0	0	
Storage Lanes	1		1		1		1	0		0	0	
Taper Length (ft)	90				90			25			25	
Lane Util. Factor	1.00	0.91	1.00	0.91	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850				0.850		0.923			0.993
Flt Protected	0.950				0.950				0.986			0.958
Satd. Flow (prot)	1787	5136	1599	0	1796	5162	1607	0	1721	0	0	1772
Flt Permitted	0.950				0.950				0.917			0.662
Satd. Flow (perm)	1787	5136	1599	0	1796	5162	1607	0	1600	0	0	1225
Right Turn on Red			Yes				Yes			Yes		
Satd. Flow (RTOR)			82				138		24			1
Link Speed (mph)		55				55			25			35
Link Distance (ft)		4302				1930			1220			1072
Travel Time (s)		53.3				23.9			33.3			20.9
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%				0%			0%			0%
Adj. Flow (vph)	25	2530	30	10	50	4480	315	20	10	40	165	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	25	2530	30	0	60	4480	315	0	70	0	0	190
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	R NA	Left	Left	Right	Left	Left	Right	Left	Left
Median Width(ft)		12				12			0			0
Link Offset(ft)		0				0			0			0
Crosswalk Width(ft)		16				16			16			16
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.98	0.98	0.98	0.98	0.98	0.98	0.98	1.00	1.00
Turning Speed (mph)	15		9	9	15		9	15		9	15	
Number of Detectors	1	1	1	1	1	1	1	1	1		1	1
Detector Template												
Leading Detector (ft)	35	0	0	50	35	0	0	5	25		5	25
Trailing Detector (ft)	-5	0	0	0	-5	0	0	0	-5		0	-5
Turn Type	Prot	NA	Perm	Prot	Prot	NA	Perm	Perm	NA		Perm	NA
Protected Phases	5	2		1	1	6			8			4
Permitted Phases			2				6	8			4	
Detector Phase	5	2	2	1	1	6	6	8	8		4	4
Switch Phase												
Minimum Initial (s)	5.0	15.0	15.0	5.0	5.0	15.0	15.0	5.0	5.0		5.0	5.0

Lane Group	SBR
Lane Configurations	
Volume (vph)	10
Ideal Flow (vphpl)	1900
Lane Width (ft)	12
Grade (%)	
Storage Length (ft)	0
Storage Lanes	0
Taper Length (ft)	
Lane Util. Factor	1.00
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	0
Flt Permitted	
Satd. Flow (perm)	0
Right Turn on Red	Yes
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	1.00
Growth Factor	100%
Heavy Vehicles (%)	2%
Bus Blockages (#/hr)	0
Parking (#/hr)	
Mid-Block Traffic (%)	
Adj. Flow (vph)	10
Shared Lane Traffic (%)	
Lane Group Flow (vph)	0
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Turn Type	
Protected Phases	
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Minimum Split (s)	12.0	25.0	25.0	12.0	12.0	25.0	25.0	43.0	43.0		12.0	12.0
Total Split (s)	12.0	175.0	175.0	22.0	22.0	185.0	185.0	43.0	43.0		43.0	43.0
Total Split (%)	5.0%	72.9%	72.9%	9.2%	9.2%	77.1%	77.1%	17.9%	17.9%		17.9%	17.9%
Maximum Green (s)	5.0	165.0	165.0	15.0	15.0	175.0	175.0	36.0	36.0		36.0	36.0
Yellow Time (s)	4.0	5.5	5.5	4.0	4.0	5.5	5.5	4.0	4.0		4.0	4.0
All-Red Time (s)	3.0	4.5	4.5	3.0	3.0	4.5	4.5	3.0	3.0		3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	0.0		0.0			0.0
Total Lost Time (s)	7.0	10.0	10.0		7.0	10.0	10.0		7.0			7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lead	Lag	Lag					
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	3.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0		3.0	3.0
Minimum Gap (s)	2.0	3.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0		3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Recall Mode	None	C-Max	C-Max	None	None	C-Max	C-Max	None	None		None	None
Walk Time (s)								7.0	7.0			
Flash Dont Walk (s)								29.0	29.0			
Pedestrian Calls (#/hr)								0	0			
Act Effct Green (s)	5.0	168.0	168.0		12.0	177.4	177.4		36.0			36.0
Actuated g/C Ratio	0.02	0.70	0.70		0.05	0.74	0.74		0.15			0.15
v/c Ratio	0.68	0.70	0.03		0.67	1.17	0.26		0.27			1.03
Control Delay	192.8	9.9	0.0		103.7	348.8	9.0		61.9			185.9
Queue Delay	0.0	0.0	0.0		0.0	0.0	0.0		0.0			0.0
Total Delay	192.8	9.9	0.0		103.7	348.8	9.0		61.9			185.9
LOS	F	A	A		F	F	A		E			F
Approach Delay		11.6				323.8			61.9			185.9
Approach LOS		B				F			E			F
90th %ile Green (s)	5.0	165.0	165.0	15.0	15.0	175.0	175.0	36.0	36.0		36.0	36.0
90th %ile Term Code	Max	Coord	Coord	Max	Max	Coord	Coord	Hold	Hold		Max	Max
70th %ile Green (s)	5.0	165.4	165.4	14.6	14.6	175.0	175.0	36.0	36.0		36.0	36.0
70th %ile Term Code	Max	Coord	Coord	Gap	Gap	Coord	Coord	Hold	Hold		Max	Max
50th %ile Green (s)	5.0	167.5	167.5	12.5	12.5	175.0	175.0	36.0	36.0		36.0	36.0
50th %ile Term Code	Max	Coord	Coord	Gap	Gap	Coord	Coord	Hold	Hold		Max	Max
30th %ile Green (s)	5.0	169.6	169.6	10.4	10.4	175.0	175.0	36.0	36.0		36.0	36.0
30th %ile Term Code	Max	Coord	Coord	Gap	Gap	Coord	Coord	Hold	Hold		Max	Max
10th %ile Green (s)	0.0	172.5	172.5	7.5	7.5	187.0	187.0	36.0	36.0		36.0	36.0
10th %ile Term Code	Skip	Coord	Coord	Gap	Gap	Coord	Coord	Hold	Hold		Max	Max
Stops (vph)	22	1064	0		56	3195	89		41			172
Fuel Used(gal)	2	94	1		3	432	6		2			15
CO Emissions (g/hr)	0	0	0		0	0	0		0			0
NOx Emissions (g/hr)	0	0	0		0	0	0		0			0
VOC Emissions (g/hr)	0	0	0		0	0	0		0			0
Dilemma Vehicles (#)	0	26	0		0	102	0		0			0
Queue Length 50th (ft)	40	649	0		94	~3115	139		65			~327
Queue Length 95th (ft)	m#76	730	m0		m79	m1472	m99		146			m#348
Internal Link Dist (ft)		4222				1850			1140			992
Turn Bay Length (ft)	170		270		300		300					
Base Capacity (vph)	37	3595	1143		112	3815	1224		260			184
Starvation Cap Reductn	0	0	0		0	0	0		0			0

Lane Group	SBR
Minimum Split (s)	
Total Split (s)	
Total Split (%)	
Maximum Green (s)	
Yellow Time (s)	
All-Red Time (s)	
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	
Minimum Gap (s)	
Time Before Reduce (s)	
Time To Reduce (s)	
Recall Mode	
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
90th %ile Green (s)	
90th %ile Term Code	
70th %ile Green (s)	
70th %ile Term Code	
50th %ile Green (s)	
50th %ile Term Code	
30th %ile Green (s)	
30th %ile Term Code	
10th %ile Green (s)	
10th %ile Term Code	
Stops (vph)	
Fuel Used(gal)	
CO Emissions (g/hr)	
NOx Emissions (g/hr)	
VOC Emissions (g/hr)	
Dilemma Vehicles (#)	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Spillback Cap Reductn	0	0	0		0	0	0		0			0
Storage Cap Reductn	0	0	0		0	0	0		0			0
Reduced v/c Ratio	0.68	0.70	0.03		0.54	1.17	0.26		0.27			1.03

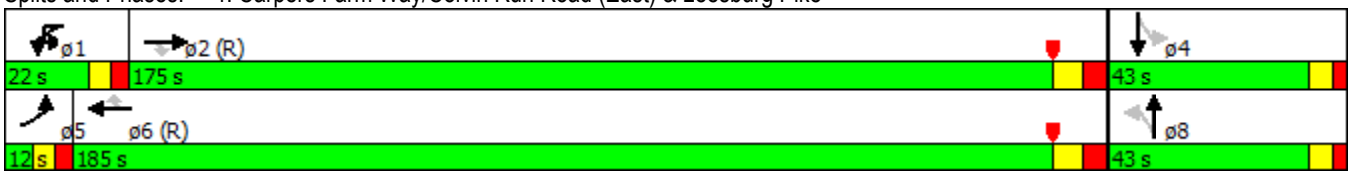
Intersection Summary			
Area Type:	Other		
Cycle Length: 240			
Actuated Cycle Length: 240			
Offset: 228 (95%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.17			
Intersection Signal Delay: 213.2		Intersection LOS: F	
Intersection Capacity Utilization 117.9%		ICU Level of Service H	
Analysis Period (min) 60			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

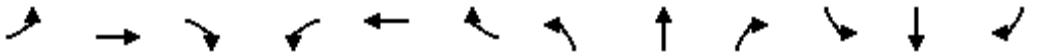
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Carpers Farm Way/Colvin Run Road (East) & Leesburg Pike

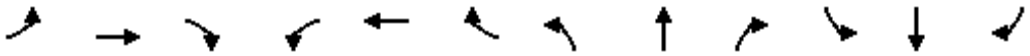


Lane Group	SBR
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	210	2585	20	60	4500	10	10	10	20	0	0	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		-3%			-2%			0%			0%	
Storage Length (ft)	300		225	180		70	0		0	0		0
Storage Lanes	1		1	1		1	0		0	0		1
Taper Length (ft)	80			100			25			25		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850			0.850		0.932				0.865
Flt Protected	0.950			0.950				0.988				
Satd. Flow (prot)	1796	5162	1607	1787	5136	1599	0	1715	0	0	0	1611
Flt Permitted	0.950			0.950				0.988				
Satd. Flow (perm)	1796	5162	1607	1787	5136	1599	0	1715	0	0	0	1611
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			20			82		15				52
Link Speed (mph)		55			55			25			35	
Link Distance (ft)		3521			4302			852			2193	
Travel Time (s)		43.6			53.3			23.2			42.7	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	210	2585	20	60	4500	10	10	10	20	0	0	280
Shared Lane Traffic (%)												
Lane Group Flow (vph)	210	2585	20	60	4500	10	0	40	0	0	0	280
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.98	0.98	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	1				1
Detector Template												
Leading Detector (ft)	35	300	46	35	300	46	5	35				35
Trailing Detector (ft)	-5	150	40	-5	150	40	0	-5				-5
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA				Over
Protected Phases	5	2	8	1	6		8	8				5
Permitted Phases			2			6						
Detector Phase	5	2	2	1	6	6	8	8				5
Switch Phase												
Minimum Initial (s)	5.0	15.0	5.0	5.0	15.0	15.0	5.0	5.0				5.0



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	12.0	22.5	12.0	12.0	22.5	22.5	12.0	12.0				12.0
Total Split (s)	35.0	206.0	12.0	22.0	193.0	193.0	12.0	12.0				35.0
Total Split (%)	14.6%	85.8%	5.0%	9.2%	80.4%	80.4%	5.0%	5.0%				14.6%
Maximum Green (s)	28.0	198.5	5.0	15.0	185.5	185.5	5.0	5.0				28.0
Yellow Time (s)	4.0	5.5	4.0	4.0	5.5	5.5	4.0	4.0				4.0
All-Red Time (s)	3.0	2.0	3.0	3.0	2.0	2.0	3.0	3.0				3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0				0.0
Total Lost Time (s)	7.0	7.5	7.0	7.0	7.5	7.5		7.0				7.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag						Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.0	2.0	2.0	4.0	4.0	2.0	2.0				4.0
Minimum Gap (s)	4.0	4.0	2.0	2.0	4.0	4.0	2.0	2.0				4.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0
Recall Mode	None	C-Max	None	None	C-Max	C-Max	None	None				None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	28.0	201.5	214.0	12.0	185.5	185.5		5.0				28.0
Actuated g/C Ratio	0.12	0.84	0.89	0.05	0.77	0.77		0.02				0.12
v/c Ratio	1.00	0.60	0.01	0.67	1.13	0.01		0.80				1.20
Control Delay	173.6	13.6	1.7	125.1	252.1	0.0		180.1				473.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0				0.0
Total Delay	173.6	13.6	1.7	125.1	252.1	0.0		180.1				473.8
LOS	F	B	A	F	F	A		F				F
Approach Delay		25.5			249.9			180.1				
Approach LOS		C			F			F				
90th %ile Green (s)	28.0	198.5	5.0	15.0	185.5	185.5	5.0	5.0				28.0
90th %ile Term Code	Max	Coord	Max	Max	Coord	Coord	Max	Max				Max
70th %ile Green (s)	28.0	198.8	5.0	14.7	185.5	185.5	5.0	5.0				28.0
70th %ile Term Code	Max	Coord	Max	Gap	Coord	Coord	Max	Max				Max
50th %ile Green (s)	28.0	201.0	5.0	12.5	185.5	185.5	5.0	5.0				28.0
50th %ile Term Code	Max	Coord	Max	Gap	Coord	Coord	Max	Max				Max
30th %ile Green (s)	28.0	203.1	5.0	10.4	185.5	185.5	5.0	5.0				28.0
30th %ile Term Code	Max	Coord	Max	Gap	Coord	Coord	Max	Max				Max
10th %ile Green (s)	28.0	206.0	5.0	7.5	185.5	185.5	5.0	5.0				28.0
10th %ile Term Code	Max	Coord	Max	Gap	Coord	Coord	Max	Max				Max
Stops (vph)	188	1085	2	60	1176	0		22				425
Fuel Used(gal)	16	85	0	4	375	0		2				40
CO Emissions (g/hr)	0	0	0	0	0	0		0				0
NOx Emissions (g/hr)	0	0	0	0	0	0		0				0
VOC Emissions (g/hr)	0	0	0	0	0	0		0				0
Dilemma Vehicles (#)	0	99	0	0	2	0		0				0
Queue Length 50th (ft)	~338	627	2	100	~3071	0		40				~464
Queue Length 95th (ft)	m#507	m895	m3	m87	m54	m0		#156				#817
Internal Link Dist (ft)		3441			4222			772			2113	
Turn Bay Length (ft)	300		225	180		70						
Base Capacity (vph)	209	4333	1434	111	3969	1254		50				233
Starvation Cap Reductn	0	0	0	0	0	0		0				0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn	0	0	0	0	0	0		0				0
Storage Cap Reductn	0	0	0	0	0	0		0				0
Reduced v/c Ratio	1.00	0.60	0.01	0.54	1.13	0.01		0.80				1.20

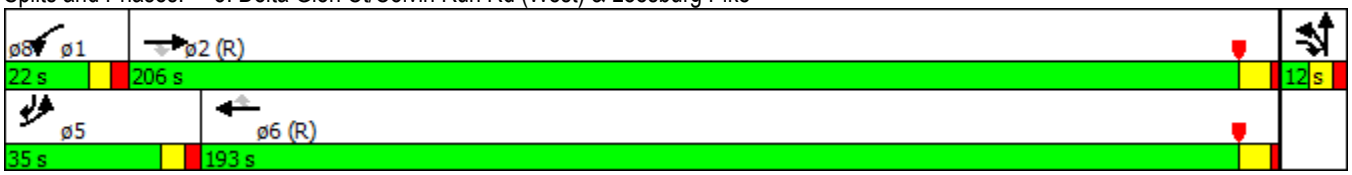
Intersection Summary			
Area Type:	Other		
Cycle Length: 240			
Actuated Cycle Length: 240			
Offset: 50 (21%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.20			
Intersection Signal Delay: 175.7		Intersection LOS: F	
Intersection Capacity Utilization 126.4%		ICU Level of Service H	
Analysis Period (min) 60			

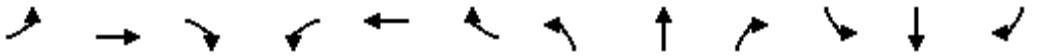
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

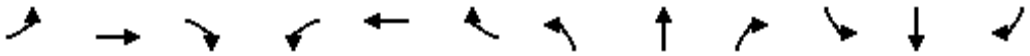
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Delta Glen Ct/Colvin Run Rd (West) & Leesburg Pike





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	1760	255	1020	3710	50	320	315	995	40	285	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		-1%			-3%			-1%			0%	
Storage Length (ft)	240		280	680		400	0		650	250		0
Storage Lanes	1		1	2		1	2		1	1		0
Taper Length (ft)	100			85			25			25		
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	0.97	1.00	0.88	1.00	0.95	0.95
Ped Bike Factor												
Frt			0.850			0.850			0.850		0.982	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1778	5111	1591	3485	5162	1607	3450	1872	2801	1770	3476	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1778	5111	1591	3485	5162	1607	3450	1872	2801	1770	3476	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			177			82			50		5	
Link Speed (mph)		55			55			35			35	
Link Distance (ft)		870			3521			927			1980	
Travel Time (s)		10.8			43.6			18.1			38.6	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	30	1760	255	1020	3710	50	320	315	995	40	285	40
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	1760	255	1020	3710	50	320	315	995	40	325	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			36			36	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.98	0.98	0.98	0.99	0.99	0.99	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1	1	1	1	1	1	1	
Detector Template												
Leading Detector (ft)	35	0	0	35	0	0	35	35	35	35	35	
Trailing Detector (ft)	-5	0	0	-5	0	0	-5	-5	-5	-5	-5	
Turn Type	Prot	NA	Free	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases	5	2		1	6	3	7	4	1	3	8	
Permitted Phases			Free			6			4			
Detector Phase	5	2		1	6	6	7	4	4	3	8	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0	5.0	5.0	5.0	5.0	5.0	5.0	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	12.0	22.0		12.0	22.0	12.0	12.0	12.0	12.0	12.0	12.0	
Total Split (s)	12.0	100.0		83.0	171.0	12.0	29.0	45.0	83.0	12.0	28.0	
Total Split (%)	5.0%	41.7%		34.6%	71.3%	5.0%	12.1%	18.8%	34.6%	5.0%	11.7%	
Maximum Green (s)	5.0	93.0		76.0	164.0	5.0	22.0	38.0	76.0	5.0	21.0	
Yellow Time (s)	4.0	5.0		4.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	3.0	2.0		3.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	4.0		5.0	4.0	2.0	3.0	3.0	5.0	2.0	2.0	
Minimum Gap (s)	2.0	4.0		5.0	4.0	2.0	3.0	3.0	5.0	2.0	2.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Recall Mode	None	C-Max		None	C-Max	None	None	None	None	None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	5.0	94.1	240.0	74.9	164.0	176.0	22.0	38.0	119.9	5.0	21.0	
Actuated g/C Ratio	0.02	0.39	1.00	0.31	0.68	0.73	0.09	0.16	0.50	0.02	0.09	
v/c Ratio	0.81	0.88	0.16	0.94	1.05	0.04	1.01	1.06	0.70	1.11	1.06	
Control Delay	251.8	64.5	0.2	90.3	117.9	0.1	177.7	247.0	35.6	522.7	262.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	
Total Delay	251.8	64.5	0.2	90.3	117.9	0.1	177.7	247.0	35.9	522.7	262.7	
LOS	F	E	A	F	F	A	F	F	D	F	F	
Approach Delay		59.3			110.8			104.5			291.2	
Approach LOS		E			F			F			F	
90th %ile Green (s)	5.0	93.0		76.0	164.0	5.0	22.0	38.0	76.0	5.0	21.0	
90th %ile Term Code	Max	Coord		Max	Coord	Max	Max	Max	Max	Max	Max	
70th %ile Green (s)	5.0	93.0		76.0	164.0	5.0	22.0	38.0	76.0	5.0	21.0	
70th %ile Term Code	Max	Coord		Max	Coord	Max	Max	Max	Max	Max	Max	
50th %ile Green (s)	5.0	93.0		76.0	164.0	5.0	22.0	38.0	76.0	5.0	21.0	
50th %ile Term Code	Max	Coord		Max	Coord	Max	Max	Max	Max	Max	Max	
30th %ile Green (s)	5.0	93.0		76.0	164.0	5.0	22.0	38.0	76.0	5.0	21.0	
30th %ile Term Code	Max	Coord		Max	Coord	Max	Max	Max	Max	Max	Max	
10th %ile Green (s)	5.0	98.4		70.6	164.0	5.0	22.0	38.0	70.6	5.0	21.0	
10th %ile Term Code	Max	Coord		Gap	Coord	Max	Max	Max	Gap	Max	Max	
Stops (vph)	25	1224	0	940	3149	0	291	287	708	31	290	
Fuel Used(gal)	3	80	5	59	230	1	16	20	19	7	40	
CO Emissions (g/hr)	0	0	0	0	0	0	0	0	0	0	0	
NOx Emissions (g/hr)	0	0	0	0	0	0	0	0	0	0	0	
VOC Emissions (g/hr)	0	0	0	0	0	0	0	0	0	0	0	
Dilemma Vehicles (#)	0	89	0	0	90	0	0	1	0	0	6	
Queue Length 50th (ft)	49	721	0	794	~2332	0	~274	~556	527	~71	~290	
Queue Length 95th (ft)	m#151	#1220	m0	m654	m1159	m0	m#384	m#777	m315	#202	#491	
Internal Link Dist (ft)		790			3441			847			1900	
Turn Bay Length (ft)	240		280	680		400			650	250		
Base Capacity (vph)	37	2003	1591	1103	3527	1200	316	296	1424	36	308	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	92	0	0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.81	0.88	0.16	0.92	1.05	0.04	1.01	1.06	0.75	1.11	1.06	

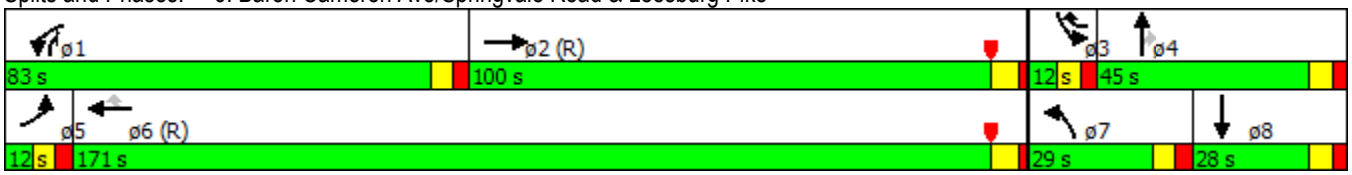
Intersection Summary			
Area Type:	Other		
Cycle Length: 240			
Actuated Cycle Length: 240			
Offset: 64 (27%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.11			
Intersection Signal Delay: 105.1		Intersection LOS: F	
Intersection Capacity Utilization 119.9%		ICU Level of Service H	
Analysis Period (min) 60			

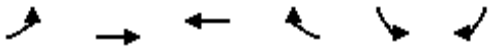
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

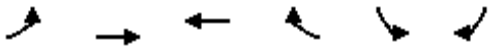
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Baron Cameron Ave/Springvale Road & Leesburg Pike

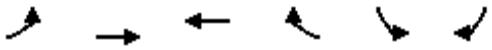




Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	220	1820	3630	190	110	330
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		2%	1%		0%	
Storage Length (ft)	330			200	0	265
Storage Lanes	1			1	1	1
Taper Length (ft)	85				25	
Lane Util. Factor	1.00	0.91	0.91	1.00	1.00	1.00
Ped Bike Factor						
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1752	5034	5060	1575	1770	1583
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1752	5034	5060	1575	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				97		1
Link Speed (mph)		55	55		35	
Link Distance (ft)		2707	1034		3825	
Travel Time (s)		33.6	12.8		74.5	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	220	1820	3630	190	110	330
Shared Lane Traffic (%)						
Lane Group Flow (vph)	220	1820	3630	190	110	330
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	R NA	Left	Right	L NA	R NA
Median Width(ft)		24	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	2	2	1	1	1
Detector Template						
Leading Detector (ft)	35	300	300	56	35	50
Trailing Detector (ft)	-5	150	150	50	-5	0
Turn Type	Prot	NA	NA	pm+ov	Prot	pm+ov
Protected Phases	5	2	6	4	4	5
Permitted Phases				6		4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	5.0	15.0	15.0	5.0	5.0	5.0



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Minimum Split (s)	12.0	22.5	22.5	12.0	12.0	12.0
Total Split (s)	36.0	215.0	179.0	25.0	25.0	36.0
Total Split (%)	15.0%	89.6%	74.6%	10.4%	10.4%	15.0%
Maximum Green (s)	29.0	207.5	171.5	18.0	18.0	29.0
Yellow Time (s)	4.0	5.5	5.5	4.0	4.0	4.0
All-Red Time (s)	3.0	2.0	2.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.5	7.5	7.0	7.0	7.0
Lead/Lag	Lead		Lag			Lead
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	4.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	4.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	C-Max	C-Max	None	None	None
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
Act Effct Green (s)	29.0	207.5	171.5	197.0	18.0	54.0
Actuated g/C Ratio	0.12	0.86	0.71	0.82	0.08	0.22
v/c Ratio	1.04	0.42	1.00	0.15	0.83	0.93
Control Delay	225.0	12.8	30.5	0.8	164.1	136.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	225.0	12.8	30.5	0.8	164.1	136.0
LOS	F	B	C	A	F	F
Approach Delay		35.7	29.0		143.0	
Approach LOS		D	C		F	
90th %ile Green (s)	29.0	207.5	171.5	18.0	18.0	29.0
90th %ile Term Code	Max	Coord	Coord	Max	Max	Max
70th %ile Green (s)	29.0	207.5	171.5	18.0	18.0	29.0
70th %ile Term Code	Max	Coord	Coord	Max	Max	Max
50th %ile Green (s)	29.0	207.5	171.5	18.0	18.0	29.0
50th %ile Term Code	Max	Coord	Coord	Max	Max	Max
30th %ile Green (s)	29.0	207.5	171.5	18.0	18.0	29.0
30th %ile Term Code	Max	Coord	Coord	Max	Max	Max
10th %ile Green (s)	29.0	207.5	171.5	18.0	18.0	29.0
10th %ile Term Code	Max	Coord	Coord	Max	Max	Max
Stops (vph)	193	1007	3358	13	102	304
Fuel Used(gal)	17	55	109	2	7	21
CO Emissions (g/hr)	0	0	0	0	0	0
NOx Emissions (g/hr)	0	0	0	0	0	0
VOC Emissions (g/hr)	0	0	0	0	0	0
Dilemma Vehicles (#)	0	13	31	0	0	0
Queue Length 50th (ft)	~370	622	~2128	17	176	520
Queue Length 95th (ft)	#677	667	m1964	m16	#363	#878
Internal Link Dist (ft)		2627	954		3745	
Turn Bay Length (ft)	330			200		265
Base Capacity (vph)	211	4352	3615	1310	132	356
Starvation Cap Reductn	0	0	0	0	0	0



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.04	0.42	1.00	0.15	0.83	0.93

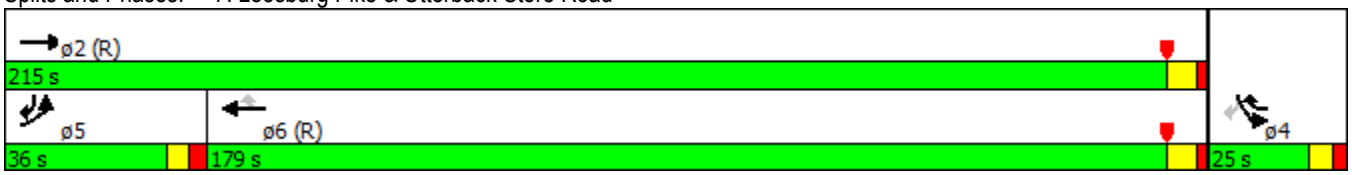
Intersection Summary			
Area Type:	Other		
Cycle Length: 240			
Actuated Cycle Length: 240			
Offset: 166 (69%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.04			
Intersection Signal Delay: 39.1		Intersection LOS: D	
Intersection Capacity Utilization 106.3%		ICU Level of Service G	
Analysis Period (min) 60			

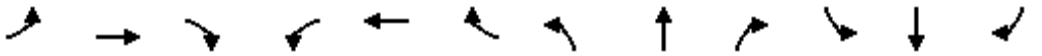
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

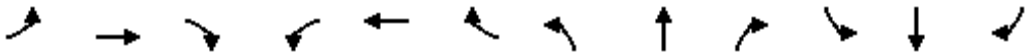
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Leesburg Pike & Utterback Store Road





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	1870	430	200	3865	5	415	5	170	5	5	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		-1%			0%			0%			0%	
Storage Length (ft)	300		700	650		180	310		0	0		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	80			80			75			25		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850			0.850		0.854			0.925	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1778	5111	1591	1770	5085	1583	3433	1591	0	1770	1723	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1778	5111	1591	1770	5085	1583	3433	1591	0	1770	1723	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			296			82		170			5	
Link Speed (mph)		55			55			40			15	
Link Distance (ft)		2420			2707			1363			861	
Travel Time (s)		30.0			33.6			23.2			39.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	5	1870	430	200	3865	5	415	5	170	5	5	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	5	1870	430	200	3865	5	415	175	0	5	10	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1	1	1	1		1	1	
Detector Template												
Leading Detector (ft)	35	246	35	35	246	56	35	35		5	25	
Trailing Detector (ft)	-5	240	-5	-5	240	50	-5	-5		0	-5	
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA		Prot	NA	
Protected Phases	5	2	7	1	6	3	7	4		3	8	
Permitted Phases			2			6						
Detector Phase	5	2	2	1	6	6	7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	15.0	5.0	5.0	15.0	5.0	5.0	5.0		5.0	5.0	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	12.0	22.5	12.0	12.0	22.5	12.0	12.0	12.0		12.0	12.0	
Total Split (s)	12.0	148.0	34.0	46.0	182.0	12.0	34.0	34.0		12.0	12.0	
Total Split (%)	5.0%	61.7%	14.2%	19.2%	75.8%	5.0%	14.2%	14.2%		5.0%	5.0%	
Maximum Green (s)	5.0	140.5	27.0	39.0	174.5	5.0	27.0	27.0		5.0	5.0	
Yellow Time (s)	4.0	5.5	4.0	4.0	5.5	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	3.0	2.0	3.0	3.0	2.0	3.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.5	7.0	7.0	7.5	7.0	7.0	7.0		7.0	7.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	4.0	2.0	2.0	4.0	2.0	2.0	2.0		2.0	2.0	
Minimum Gap (s)	2.0	4.0	2.0	2.0	4.0	2.0	2.0	2.0		2.0	2.0	
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Recall Mode	None	C-Max	None	None	C-Max	None	None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	5.0	155.5	190.0	31.2	191.3	194.2	27.0	29.4		5.0	5.0	
Actuated g/C Ratio	0.02	0.65	0.79	0.13	0.80	0.81	0.11	0.12		0.02	0.02	
v/c Ratio	0.14	0.56	0.33	0.87	0.95	0.00	1.08	0.51		0.14	0.25	
Control Delay	121.8	15.2	1.6	137.1	7.7	0.0	278.1	17.2		123.8	91.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	121.8	15.2	1.6	137.1	7.7	0.0	278.1	17.2		123.8	91.6	
LOS	F	B	A	F	A	A	F	B		F	F	
Approach Delay		12.9			14.0			200.7			102.3	
Approach LOS		B			B			F			F	
90th %ile Green (s)	5.0	140.5	27.0	39.0	174.5	5.0	27.0	27.0		5.0	5.0	
90th %ile Term Code	Max	Coord	Max	Max	Coord	Max	Max	Hold		Max	Max	
70th %ile Green (s)	0.0	144.1	27.0	35.4	186.5	0.0	27.0	39.0		0.0	5.0	
70th %ile Term Code	Skip	Coord	Max	Gap	Coord	Skip	Max	Hold		Skip	Max	
50th %ile Green (s)	0.0	159.9	27.0	31.6	198.5	0.0	27.0	27.0		0.0	0.0	
50th %ile Term Code	Skip	Coord	Max	Gap	Coord	Skip	Max	Hold		Skip	Skip	
30th %ile Green (s)	0.0	163.8	27.0	27.7	198.5	0.0	27.0	27.0		0.0	0.0	
30th %ile Term Code	Skip	Coord	Max	Gap	Coord	Skip	Max	Hold		Skip	Skip	
10th %ile Green (s)	0.0	169.4	27.0	22.1	198.5	0.0	27.0	27.0		0.0	0.0	
10th %ile Term Code	Skip	Coord	Max	Gap	Coord	Skip	Max	Hold		Skip	Skip	
Stops (vph)	6	687	32	196	996	0	376	21		6	7	
Fuel Used(gal)	0	47	7	13	91	0	31	2		0	0	
CO Emissions (g/hr)	0	0	0	0	0	0	0	0		0	0	
NOx Emissions (g/hr)	0	0	0	0	0	0	0	0		0	0	
VOC Emissions (g/hr)	0	0	0	0	0	0	0	0		0	0	
Dilemma Vehicles (#)	0	55	0	0	23	0	0	4		0	0	
Queue Length 50th (ft)	8	187	47	324	173	0	~374	7		8	8	
Queue Length 95th (ft)	m16	572	43	m305	m#2447	m0	#594	144		31	40	
Internal Link Dist (ft)		2340			2627			1283			781	
Turn Bay Length (ft)	300		700	650		180	310					
Base Capacity (vph)	37	3312	1321	287	4053	1296	386	343		36	40	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.14	0.56	0.33	0.70	0.95	0.00	1.08	0.51		0.14	0.25	

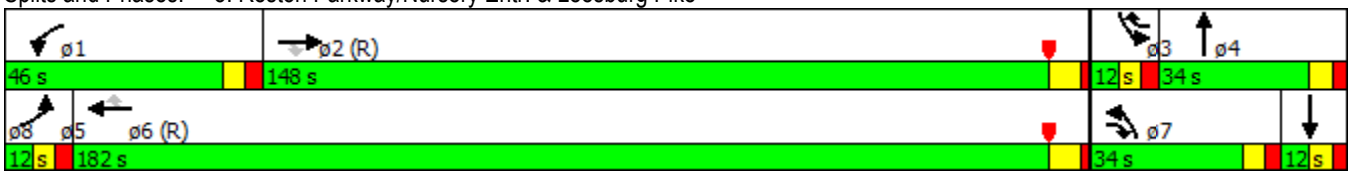
Intersection Summary			
Area Type:	Other		
Cycle Length: 240			
Actuated Cycle Length: 240			
Offset: 200 (83%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.08			
Intersection Signal Delay: 29.6		Intersection LOS: C	
Intersection Capacity Utilization 115.3%		ICU Level of Service H	
Analysis Period (min) 60			

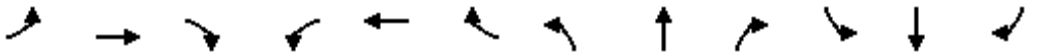
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

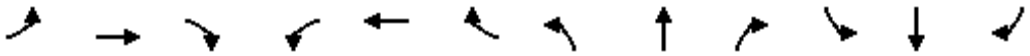
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: Reston Parkway/Nursery Entr. & Leesburg Pike





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	2180	20	60	3105	0	10	0	40	40	10	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			-5%			0%			0%	
Storage Length (ft)	0		0	250		0	0		0	0		0
Storage Lanes	0		0	1		0	1		1	1		0
Taper Length (ft)	25			100			25			25		
Lane Util. Factor	1.00	0.86	0.86	1.00	0.91	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor												
Frt		0.999							0.850			
Flt Protected				0.950			0.950			0.950	0.971	
Satd. Flow (prot)	0	6401	0	1814	5212	0	1770	0	1583	1681	1718	0
Flt Permitted				0.950			0.950			0.950	0.971	
Satd. Flow (perm)	0	6401	0	1814	5212	0	1770	0	1583	1681	1718	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2							84			
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		425			4372			1243			359	
Travel Time (s)		6.4			66.2			33.9			9.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	2180	20	60	3105	0	10	0	40	40	10	0
Shared Lane Traffic (%)										38%		
Lane Group Flow (vph)	0	2200	0	60	3105	0	10	0	40	25	25	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	0.97	0.97	0.97	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		2		1	2		1		1	1	2	
Detector Template		Thru		Left	Thru		Left		Right	Left	Thru	
Leading Detector (ft)		100		20	100		20		20	20	100	
Trailing Detector (ft)		0		0	0		0		0	0	0	
Turn Type		NA		Prot	NA		Prot		Prot	Split	NA	
Protected Phases		2		1	6		4		4	3	3	
Permitted Phases									4			
Detector Phase		2		1	6		4		4	3	3	
Switch Phase												
Minimum Initial (s)		15.0		5.0	15.0		5.0		5.0	5.0	5.0	

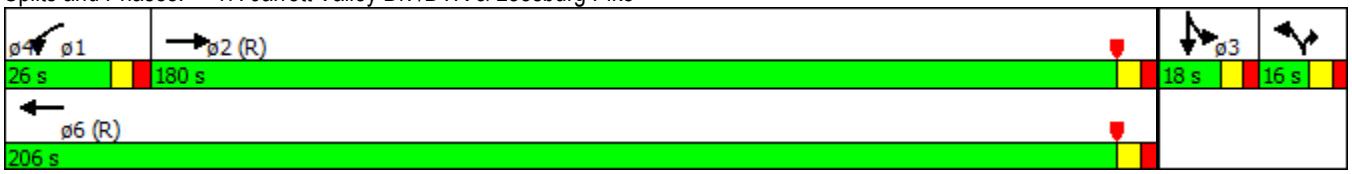


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)		22.5		12.0	22.5		12.0		12.0	12.0	12.0	
Total Split (s)		180.0		26.0	206.0		16.0		16.0	18.0	18.0	
Total Split (%)		75.0%		10.8%	85.8%		6.7%		6.7%	7.5%	7.5%	
Maximum Green (s)		172.5		19.0	198.5		9.0		9.0	11.0	11.0	
Yellow Time (s)		4.5		4.0	4.5		4.0		4.0	4.0	4.0	
All-Red Time (s)		3.0		3.0	3.0		3.0		3.0	3.0	3.0	
Lost Time Adjust (s)		0.0		0.0	0.0		0.0		0.0	0.0	0.0	
Total Lost Time (s)		7.5		7.0	7.5		7.0		7.0	7.0	7.0	
Lead/Lag		Lag		Lead			Lag		Lag	Lead	Lead	
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0		3.0	3.0		3.0		3.0	3.0	3.0	
Minimum Gap (s)		3.0		3.0	3.0		3.0		3.0	3.0	3.0	
Time Before Reduce (s)		0.0		0.0	0.0		0.0		0.0	0.0	0.0	
Time To Reduce (s)		0.0		0.0	0.0		0.0		0.0	0.0	0.0	
Recall Mode		C-Max		None	C-Max		None		None	None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		187.5		13.3	209.3		7.0		7.0	8.7	8.7	
Actuated g/C Ratio		0.78		0.06	0.87		0.03		0.03	0.04	0.04	
v/c Ratio		0.44		0.60	0.68		0.20		0.31	0.41	0.40	
Control Delay		1.8		136.0	7.4		121.9		6.5	133.1	132.0	
Queue Delay		0.0		0.0	0.0		0.0		0.0	0.0	0.0	
Total Delay		1.8		136.0	7.4		121.9		6.5	133.1	132.0	
LOS		A		F	A		F		A	F	F	
Approach Delay		1.8			9.9						132.5	
Approach LOS		A			A						F	
90th %ile Green (s)		173.3		18.3	198.6		8.9		8.9	11.0	11.0	
90th %ile Term Code		Coord		Gap	Coord		Gap		Gap	Max	Max	
70th %ile Green (s)		178.1		15.4	200.5		7.6		7.6	10.4	10.4	
70th %ile Term Code		Coord		Gap	Coord		Gap		Gap	Gap	Gap	
50th %ile Green (s)		182.4		13.3	202.7		6.8		6.8	9.0	9.0	
50th %ile Term Code		Coord		Gap	Coord		Gap		Gap	Gap	Gap	
30th %ile Green (s)		186.7		11.2	204.9		6.0		6.0	7.6	7.6	
30th %ile Term Code		Coord		Gap	Coord		Gap		Gap	Gap	Gap	
10th %ile Green (s)		217.2		8.3	232.5		0.0		0.0	0.0	0.0	
10th %ile Term Code		Coord		Gap	Coord		Skip		Skip	Skip	Skip	
Stops (vph)		87		58	974		11		0	25	25	
Fuel Used(gal)		8		4	105		0		0	1	1	
CO Emissions (g/hr)		0		0	0		0		0	0	0	
NOx Emissions (g/hr)		0		0	0		0		0	0	0	
VOC Emissions (g/hr)		0		0	0		0		0	0	0	
Dilemma Vehicles (#)		8		0	53		0		0	0	0	
Queue Length 50th (ft)		41		95	612		16		0	42	42	
Queue Length 95th (ft)		47		174	928		48		0	95	95	
Internal Link Dist (ft)		345			4292			1163			279	
Turn Bay Length (ft)				250								
Base Capacity (vph)		5002		143	4546		66		140	77	78	
Starvation Cap Reductn		0		0	0		0		0	0	0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn		0		0	0		0		0	0	0	
Storage Cap Reductn		0		0	0		0		0	0	0	
Reduced v/c Ratio		0.44		0.42	0.68		0.15		0.29	0.32	0.32	

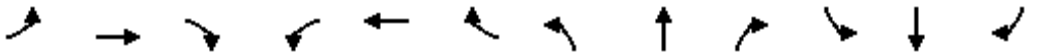
Intersection Summary			
Area Type:	Other		
Cycle Length: 240			
Actuated Cycle Length: 240			
Offset: 208 (87%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.68			
Intersection Signal Delay: 7.9		Intersection LOS: A	
Intersection Capacity Utilization 80.1%		ICU Level of Service D	
Analysis Period (min) 60			

Splits and Phases: 47: Jarrett Valley Dr. /DTR & Leesburg Pike

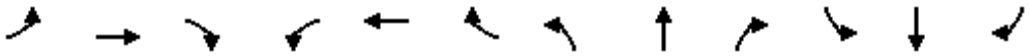


APPENDIX K

Synchro Input: 2040 PM Build



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	2225	0	30	3110	300	20	60	5	90	10	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			-5%			-2%			-1%	
Storage Length (ft)	850		380	790		790	0		100	0		100
Storage Lanes	0		0	2		1	2		1	1		0
Taper Length (ft)	150			120			25			25		
Lane Util. Factor	1.00	0.91	0.91	0.97	0.91	1.00	0.97	1.00	0.88	1.00	1.00	1.00
Ped Bike Factor												
Frt						0.850			0.850			
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	5085	0	3519	5212	1623	3467	1881	2815	1778	1872	0
Flt Permitted				0.950			0.950			0.950		
Satd. Flow (perm)	0	5085	0	3519	5212	1623	3467	1881	2815	1778	1872	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						255			93			
Link Speed (mph)		45			45			15			35	
Link Distance (ft)		1248			1208			2224			151	
Travel Time (s)		18.9			18.3			101.1			2.9	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	2225	0	30	3110	300	20	60	5	90	10	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2225	0	30	3110	300	20	60	5	90	10	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	0.97	0.97	0.97	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		2		1	2	1	1	1	1	1	1	
Detector Template												
Leading Detector (ft)		300		35	300	56	35	35	35	35	35	
Trailing Detector (ft)		150		-5	150	50	-5	-5	-5	-5	-5	
Turn Type		NA		Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases		2		1	6	3	7	4	1	3	8	
Permitted Phases						6			4			
Detector Phase		2		1	6	6	7	4	4	3	8	
Switch Phase												
Minimum Initial (s)		15.0		5.0	15.0	5.0	5.0	5.0	5.0	5.0	5.0	



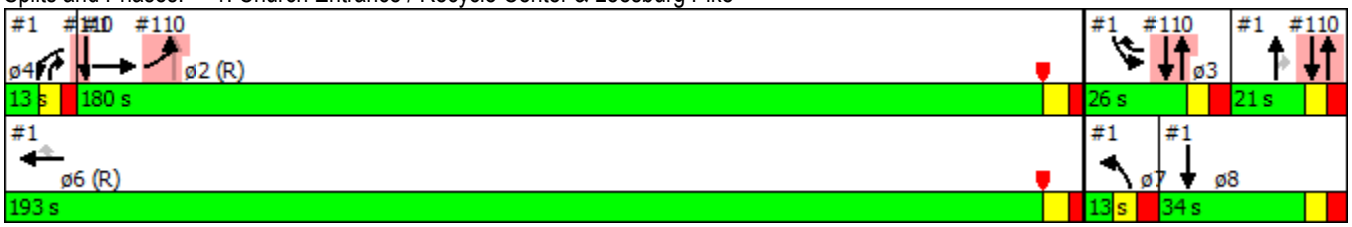
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)		22.5		12.0	22.5	13.0	13.0	13.0	12.0	13.0	13.0	
Total Split (s)		180.0		13.0	193.0	26.0	13.0	21.0	13.0	26.0	34.0	
Total Split (%)		75.0%		5.4%	80.4%	10.8%	5.4%	8.8%	5.4%	10.8%	14.2%	
Maximum Green (s)		172.5		6.0	185.5	18.0	5.0	13.0	6.0	18.0	26.0	
Yellow Time (s)		4.5		4.0	4.5	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)		3.0		3.0	3.0	4.0	4.0	4.0	3.0	4.0	4.0	
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		7.5		7.0	7.5	8.0	8.0	8.0	7.0	8.0	8.0	
Lead/Lag		Lag		Lead		Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)		2.0		2.0	2.0	3.0	3.0	2.0	2.0	3.0	2.0	
Minimum Gap (s)		2.0		2.0	2.0	3.0	3.0	2.0	2.0	3.0	2.0	
Time Before Reduce (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Time To Reduce (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Recall Mode		Max		Max	Max	Max	Max	Max	Max	Max	Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		172.5		6.0	185.5	211.0	5.0	13.0	27.0	18.0	26.0	
Actuated g/C Ratio		0.72		0.02	0.77	0.88	0.02	0.05	0.11	0.08	0.11	
v/c Ratio		0.61		0.34	0.77	0.21	0.28	0.59	0.01	0.68	0.05	
Control Delay		9.5		118.3	14.1	0.6	125.6	136.8	0.0	62.1	21.3	
Queue Delay		0.1		0.0	0.0	0.0	0.0	0.0	0.0	229.3	4.6	
Total Delay		9.6		118.3	14.1	0.6	125.6	136.8	0.0	291.4	25.9	
LOS		A		F	B	A	F	F	A	F	C	
Approach Delay		9.6			13.9			126.1			264.8	
Approach LOS		A			B			F			F	
90th %ile Green (s)		172.5		6.0	185.5	18.0	5.0	13.0	6.0	18.0	26.0	
90th %ile Term Code		Coord		MaxR	Coord	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	
70th %ile Green (s)		172.5		6.0	185.5	18.0	5.0	13.0	6.0	18.0	26.0	
70th %ile Term Code		Coord		MaxR	Coord	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	
50th %ile Green (s)		172.5		6.0	185.5	18.0	5.0	13.0	6.0	18.0	26.0	
50th %ile Term Code		Coord		MaxR	Coord	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	
30th %ile Green (s)		172.5		6.0	185.5	18.0	5.0	13.0	6.0	18.0	26.0	
30th %ile Term Code		Coord		MaxR	Coord	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	
10th %ile Green (s)		172.5		6.0	185.5	18.0	5.0	13.0	6.0	18.0	26.0	
10th %ile Term Code		Coord		MaxR	Coord	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	
Stops (vph)		988		30	1107	6	20	58	0	43	11	
Fuel Used(gal)		35		1	63	4	1	3	0	2	0	
CO Emissions (g/hr)		0		0	0	0	0	0	0	0	0	
NOx Emissions (g/hr)		0		0	0	0	0	0	0	0	0	
VOC Emissions (g/hr)		0		0	0	0	0	0	0	0	0	
Dilemma Vehicles (#)		49		0	65	0	0	0	0	0	0	
Queue Length 50th (ft)		394		24	619	7	16	95	0	24	14	
Queue Length 95th (ft)		733		m39	700	27	39	#190	0	#275	39	
Internal Link Dist (ft)		1168			1128			2144			71	
Turn Bay Length (ft)				790		790			100			
Base Capacity (vph)		3654		87	4028	1457	72	101	399	133	202	
Starvation Cap Reductn		198		0	0	0	0	0	0	55	163	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn		0		0	0	0	0	0	0	0	0	
Storage Cap Reductn		0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio		0.64		0.34	0.77	0.21	0.28	0.59	0.01	1.15	0.26	

Intersection Summary			
Area Type:	Other		
Cycle Length: 240			
Actuated Cycle Length: 240			
Offset: 170 (71%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 90			
Control Type: Pretimed			
Maximum v/c Ratio: 0.77			
Intersection Signal Delay: 18.2		Intersection LOS: B	
Intersection Capacity Utilization 84.7%		ICU Level of Service E	
Analysis Period (min) 60			

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Church Entrance / Recycle Center & Leesburg Pike



Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	10	247	2468	85	80	4345	60	120	55	35	57	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-2%			0%			-1%			0%
Storage Length (ft)		775		200	200		70	350		350	390	
Storage Lanes		1		1	1		1	1		1	1	
Taper Length (ft)		180			100			25			25	
Lane Util. Factor	0.91	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt				0.850			0.850			0.850		
Flt Protected		0.950			0.950			0.950			0.950	
Satd. Flow (prot)	0	1787	5136	1599	1770	5085	1583	1778	1872	1591	1770	1863
Flt Permitted		0.950			0.950			0.500			0.693	
Satd. Flow (perm)	0	1787	5136	1599	1770	5085	1583	936	1872	1591	1291	1863
Right Turn on Red				Yes			Yes			Yes		
Satd. Flow (RTOR)				63			82			84		
Link Speed (mph)			55			55			25			35
Link Distance (ft)			3810			775			1826			1736
Travel Time (s)			47.2			9.6			49.8			33.8
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)			0%			0%			0%			0%
Adj. Flow (vph)	10	247	2468	85	80	4345	60	120	55	35	57	70
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	257	2468	85	80	4345	60	120	55	35	57	70
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	R NA	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left
Median Width(ft)			12			12			12			12
Link Offset(ft)			0			0			0			0
Crosswalk Width(ft)			16			16			16			16
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	1.00	1.00	1.00	0.99	0.99	0.99	1.00	1.00
Turning Speed (mph)	9	15		9	15		9	15		9	15	
Number of Detectors	1	1	1	1	1	1	1	1	1	1	1	1
Detector Template												
Leading Detector (ft)	50	35	206	46	35	206	46	5	35	35	5	35
Trailing Detector (ft)	0	-5	200	40	-5	200	40	0	-5	-5	0	-5
Turn Type	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA
Protected Phases	1!	1	6	7	5	2	3	7	4	5	3	8
Permitted Phases				6			2	4		4	8	
Detector Phase	1	1	6	6	5	2	2	7	4	4	3	8
Switch Phase												
Minimum Initial (s)	5.0	5.0	15.0	5.0	5.0	15.0	5.0	5.0	5.0	5.0	5.0	5.0

Lane Group	SBR
Lane Configurations	
Volume (vph)	295
Ideal Flow (vphpl)	1900
Lane Width (ft)	12
Grade (%)	
Storage Length (ft)	390
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Ped Bike Factor	
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1583
Flt Permitted	
Satd. Flow (perm)	1583
Right Turn on Red	Yes
Satd. Flow (RTOR)	52
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	1.00
Growth Factor	100%
Heavy Vehicles (%)	2%
Bus Blockages (#/hr)	0
Parking (#/hr)	
Mid-Block Traffic (%)	
Adj. Flow (vph)	295
Shared Lane Traffic (%)	
Lane Group Flow (vph)	295
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Number of Detectors	1
Detector Template	
Leading Detector (ft)	5
Trailing Detector (ft)	0
Turn Type	pm+ov
Protected Phases	1!
Permitted Phases	8
Detector Phase	8
Switch Phase	
Minimum Initial (s)	5.0

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Minimum Split (s)	12.0	12.0	22.5	12.0	12.0	22.5	12.0	12.0	12.0	12.0	12.0	12.0
Total Split (s)	34.0	34.0	187.0	12.0	26.0	179.0	12.0	12.0	15.0	26.0	12.0	15.0
Total Split (%)	14.2%	14.2%	77.9%	5.0%	10.8%	74.6%	5.0%	5.0%	6.3%	10.8%	5.0%	6.3%
Maximum Green (s)	27.0	27.0	179.5	5.0	19.0	171.5	5.0	5.0	8.0	19.0	5.0	8.0
Yellow Time (s)	4.0	4.0	5.5	4.0	4.0	5.5	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	2.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.0	7.5	7.0	7.0	7.5	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	4.0	3.0	3.0	4.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	4.0	3.0	3.0	4.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	C-Max	None	None	C-Max	None	None	None	None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		27.0	182.8	195.3	15.7	171.5	184.0	13.0	8.0	30.7	13.0	8.0
Actuated g/C Ratio		0.11	0.76	0.81	0.07	0.71	0.77	0.05	0.03	0.13	0.05	0.03
v/c Ratio		1.28	0.63	0.06	0.70	1.20	0.05	1.76	0.89	0.13	0.72	1.13
Control Delay		593.4	20.5	2.8	150.1	375.3	0.1	1484.6	244.2	0.9	158.1	476.1
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		593.4	20.5	2.8	150.1	375.3	0.1	1484.6	244.2	0.9	158.1	476.1
LOS		F	C	A	F	F	A	F	F	A	F	F
Approach Delay			72.4			366.2			912.4			190.0
Approach LOS			E			F			F			F
90th %ile Green (s)	27.0	27.0	179.5	5.0	19.0	171.5	5.0	5.0	8.0	19.0	5.0	8.0
90th %ile Term Code	Max	Max	Coord	Max	Max	Coord	Max	Max	Max	Max	Max	Max
70th %ile Green (s)	27.0	27.0	179.8	5.0	18.7	171.5	5.0	5.0	8.0	18.7	5.0	8.0
70th %ile Term Code	Max	Max	Coord	Max	Gap	Coord	Max	Max	Max	Gap	Max	Max
50th %ile Green (s)	27.0	27.0	182.2	5.0	16.3	171.5	5.0	5.0	8.0	16.3	5.0	8.0
50th %ile Term Code	Max	Max	Coord	Max	Gap	Coord	Max	Max	Max	Gap	Max	Max
30th %ile Green (s)	27.0	27.0	184.6	5.0	13.9	171.5	5.0	5.0	8.0	13.9	5.0	8.0
30th %ile Term Code	Max	Max	Coord	Max	Gap	Coord	Max	Max	Max	Gap	Max	Max
10th %ile Green (s)	27.0	27.0	188.1	5.0	10.4	171.5	5.0	5.0	8.0	10.4	5.0	8.0
10th %ile Term Code	Max	Max	Coord	Max	Gap	Coord	Max	Max	Max	Gap	Max	Max
Stops (vph)		214	1289	14	79	3767	0	112	47	0	64	56
Fuel Used(gal)		41	94	2	4	423	0	39	4	1	3	8
CO Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
NOx Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
VOC Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
Dilemma Vehicles (#)		0	94	0	0	76	0	0	0	0	0	1
Queue Length 50th (ft)		~509	774	3	132	~3042	0	~230	89	0	88	~128
Queue Length 95th (ft)		m#754	1083	m23	m174	#3551	m0	#459	#232	0	#209	#302
Internal Link Dist (ft)			3730			695			1746			1656
Turn Bay Length (ft)		775		200	200		70	350		350	390	
Base Capacity (vph)		201	3912	1313	140	3633	1232	68	62	276	79	62
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0

Lane Group	SBR
Minimum Split (s)	12.0
Total Split (s)	34.0
Total Split (%)	14.2%
Maximum Green (s)	27.0
Yellow Time (s)	4.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	0.0
Total Lost Time (s)	7.0
Lead/Lag	Lead
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time Before Reduce (s)	0.0
Time To Reduce (s)	0.0
Recall Mode	None
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	42.0
Actuated g/C Ratio	0.18
v/c Ratio	0.92
Control Delay	128.3
Queue Delay	0.0
Total Delay	128.3
LOS	F
Approach Delay	
Approach LOS	
90th %ile Green (s)	27.0
90th %ile Term Code	Max
70th %ile Green (s)	27.0
70th %ile Term Code	Max
50th %ile Green (s)	27.0
50th %ile Term Code	Max
30th %ile Green (s)	27.0
30th %ile Term Code	Max
10th %ile Green (s)	27.0
10th %ile Term Code	Max
Stops (vph)	228
Fuel Used(gal)	13
CO Emissions (g/hr)	0
NOx Emissions (g/hr)	0
VOC Emissions (g/hr)	0
Dilemma Vehicles (#)	0
Queue Length 50th (ft)	396
Queue Length 95th (ft)	#731
Internal Link Dist (ft)	
Turn Bay Length (ft)	390
Base Capacity (vph)	319
Starvation Cap Reductn	0

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		1.28	0.63	0.06	0.57	1.20	0.05	1.76	0.89	0.13	0.72	1.13

Intersection Summary			
Area Type:	Other		
Cycle Length: 240			
Actuated Cycle Length: 240			
Offset: 216 (90%), Referenced to phase 2:WBT and 6:EBT, Start of Yellow			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.76			
Intersection Signal Delay: 267.2		Intersection LOS: F	
Intersection Capacity Utilization 146.9%		ICU Level of Service H	
Analysis Period (min) 60			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

! Phase conflict between lane groups.

Splits and Phases: 2: Towlston Road & Leesburg Pike

Lane Group	SBR
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.92

Intersection Summary

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	5	35	2535	190	195	4525	40	305	30	210	40	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-3%			-4%			3%			-2%
Storage Length (ft)		100		200	750		750	0		200	320	
Storage Lanes		1		1	1		1	1		1	1	
Taper Length (ft)		50			120			120			25	
Lane Util. Factor	0.91	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt				0.850			0.850			0.850		
Flt Protected		0.950			0.950			0.950			0.950	
Satd. Flow (prot)	0	1796	5162	1607	1805	5187	1615	1743	1835	1560	1787	1881
Flt Permitted		0.950			0.950			0.364				
Satd. Flow (perm)	0	1796	5162	1607	1805	5187	1615	668	1835	1560	1881	1881
Right Turn on Red				Yes			Yes			Yes		
Satd. Flow (RTOR)				104			82			52		
Link Speed (mph)			55			55			35			25
Link Distance (ft)			913			3810			3260			1783
Travel Time (s)			11.3			47.2			63.5			48.6
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)			0%			0%			0%			0%
Adj. Flow (vph)	5	35	2535	190	195	4525	40	305	30	210	40	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	40	2535	190	195	4525	40	305	30	210	40	10
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	R NA	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left
Median Width(ft)			12			12			12			12
Link Offset(ft)			0			0			0			0
Crosswalk Width(ft)			16			16			16			16
Two way Left Turn Lane												
Headway Factor	0.98	0.98	0.98	0.98	0.97	0.97	0.97	1.02	1.02	1.02	0.99	0.99
Turning Speed (mph)	9	15		9	15		9	15		9	15	
Number of Detectors	1	1	3	1	1	3	1	1	1	1	1	1
Detector Template												
Leading Detector (ft)	50	35	306	46	35	306	46	5	35	35	5	35
Trailing Detector (ft)	0	-5	150	40	-5	150	40	0	-5	-5	0	-5
Turn Type	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA
Protected Phases	5!	5	2	3	1	6	7	3	8	1	7	4
Permitted Phases				2			6	8		8	4	
Detector Phase	5	5	2	2	1	6	6	3	8	8	7	4
Switch Phase												
Minimum Initial (s)	5.0	5.0	15.0	5.0	5.0	15.0	5.0	5.0	5.0	5.0	5.0	5.0

Lane Group	SBR
Lane Configurations	
Volume (vph)	15
Ideal Flow (vphpl)	1900
Lane Width (ft)	12
Grade (%)	
Storage Length (ft)	320
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Ped Bike Factor	
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1599
Flt Permitted	
Satd. Flow (perm)	1599
Right Turn on Red	Yes
Satd. Flow (RTOR)	116
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	1.00
Growth Factor	100%
Heavy Vehicles (%)	2%
Bus Blockages (#/hr)	0
Parking (#/hr)	
Mid-Block Traffic (%)	
Adj. Flow (vph)	15
Shared Lane Traffic (%)	
Lane Group Flow (vph)	15
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	0.99
Turning Speed (mph)	9
Number of Detectors	1
Detector Template	
Leading Detector (ft)	0
Trailing Detector (ft)	0
Turn Type	pm+ov
Protected Phases	5!
Permitted Phases	4
Detector Phase	4
Switch Phase	
Minimum Initial (s)	5.0

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Minimum Split (s)	12.0	12.0	22.5	12.0	12.0	22.5	12.0	12.0	12.0	12.0	12.0	12.0
Total Split (s)	12.0	12.0	148.0	35.0	45.0	181.0	14.0	35.0	33.0	45.0	14.0	12.0
Total Split (%)	5.0%	5.0%	61.7%	14.6%	18.8%	75.4%	5.8%	14.6%	13.8%	18.8%	5.8%	5.0%
Maximum Green (s)	5.0	5.0	140.5	28.0	38.0	173.5	7.0	28.0	26.0	38.0	7.0	5.0
Yellow Time (s)	4.0	4.0	5.5	4.0	4.0	5.5	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	2.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.0	7.5	7.0	7.0	7.5	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	C-Max	None	None	C-Max	None	None	None	None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		6.5	150.1	185.6	30.8	174.4	186.1	37.6	26.4	64.2	10.9	5.0
Actuated g/C Ratio		0.03	0.63	0.77	0.13	0.73	0.78	0.16	0.11	0.27	0.05	0.02
v/c Ratio		0.83	0.79	0.15	0.84	1.20	0.03	1.33	0.15	0.46	0.48	0.26
Control Delay		201.5	15.3	0.4	125.4	375.9	0.0	690.2	99.1	57.2	110.1	131.9
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		201.5	15.3	0.4	125.4	375.9	0.0	690.2	99.1	57.2	110.1	131.9
LOS		F	B	A	F	F	A	F	F	E	F	F
Approach Delay			17.0			362.5			413.7			88.2
Approach LOS			B			F			F			F
90th %ile Green (s)	5.0	5.0	140.5	28.0	38.0	173.5	7.0	28.0	26.0	38.0	7.0	5.0
90th %ile Term Code	Max	Max	Coord	Max	Max	Coord	Max	Max	Max	Max	Max	Max
70th %ile Green (s)	5.0	5.0	143.6	28.0	34.9	173.5	7.0	28.0	26.0	34.9	7.0	5.0
70th %ile Term Code	Max	Max	Coord	Max	Gap	Coord	Max	Max	Max	Gap	Max	Max
50th %ile Green (s)	5.0	5.0	147.2	28.0	31.3	173.5	7.0	28.0	26.0	31.3	7.0	5.0
50th %ile Term Code	Max	Max	Coord	Max	Gap	Coord	Max	Max	Max	Gap	Max	Max
30th %ile Green (s)	5.0	5.0	150.9	28.0	27.6	173.5	7.0	28.0	26.0	27.6	7.0	5.0
30th %ile Term Code	Max	Max	Coord	Max	Gap	Coord	Max	Max	Hold	Gap	Max	Max
10th %ile Green (s)	12.5	12.5	168.3	28.0	22.2	178.0	0.0	28.0	28.0	22.2	0.0	0.0
10th %ile Term Code	Gap	Gap	Coord	Max	Gap	Coord	Skip	Max	Hold	Gap	Skip	Skip
Stops (vph)		30	1029	1	187	3125	0	256	26	131	40	11
Fuel Used(gal)		2	42	1	13	514	1	52	2	8	2	0
CO Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
NOx Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
VOC Emissions (g/hr)		0	0	0	0	0	0	0	0	0	0	0
Dilemma Vehicles (#)		0	38	0	0	65	0	0	1	0	0	0
Queue Length 50th (ft)		~70	308	1	302	~3179	0	~557	44	213	55	16
Queue Length 95th (ft)		m#126	m1188	m7	m243	m#2335	m0	#920	97	348	113	48
Internal Link Dist (ft)			833			3730			3180			1703
Turn Bay Length (ft)		100		200	750		750			200	320	
Base Capacity (vph)		48	3228	1266	285	3769	1270	229	201	455	83	39
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0

Lane Group	SBR
Minimum Split (s)	12.0
Total Split (s)	12.0
Total Split (%)	5.0%
Maximum Green (s)	5.0
Yellow Time (s)	4.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	0.0
Total Lost Time (s)	7.0
Lead/Lag	Lead
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time Before Reduce (s)	0.0
Time To Reduce (s)	0.0
Recall Mode	None
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	16.1
Actuated g/C Ratio	0.07
v/c Ratio	0.07
Control Delay	0.6
Queue Delay	0.0
Total Delay	0.6
LOS	A
Approach Delay	
Approach LOS	
90th %ile Green (s)	5.0
90th %ile Term Code	Max
70th %ile Green (s)	5.0
70th %ile Term Code	Max
50th %ile Green (s)	5.0
50th %ile Term Code	Max
30th %ile Green (s)	5.0
30th %ile Term Code	Max
10th %ile Green (s)	12.5
10th %ile Term Code	Gap
Stops (vph)	0
Fuel Used(gal)	0
CO Emissions (g/hr)	0
NOx Emissions (g/hr)	0
VOC Emissions (g/hr)	0
Dilemma Vehicles (#)	0
Queue Length 50th (ft)	0
Queue Length 95th (ft)	0
Internal Link Dist (ft)	
Turn Bay Length (ft)	320
Base Capacity (vph)	215
Starvation Cap Reductn	0

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.83	0.79	0.15	0.68	1.20	0.03	1.33	0.15	0.46	0.48	0.26

Intersection Summary			
Area Type:	Other		
Cycle Length: 240			
Actuated Cycle Length: 240			
Offset: 22 (9%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.33			
Intersection Signal Delay: 246.3		Intersection LOS: F	
Intersection Capacity Utilization 136.4%		ICU Level of Service H	
Analysis Period (min) 60			

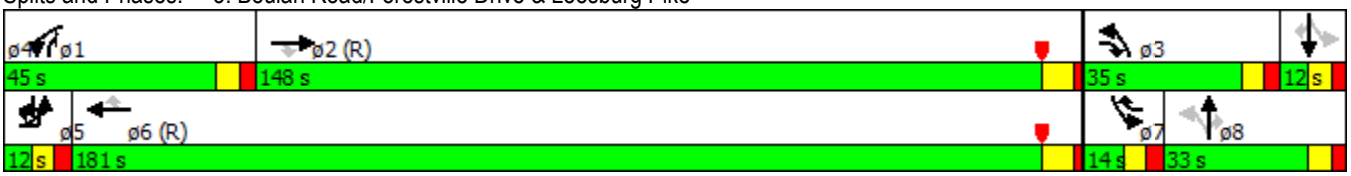
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

! Phase conflict between lane groups.

Splits and Phases: 3: Beulah Road/Forestville Drive & Leesburg Pike



Lane Group	SBR
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.07

Intersection Summary

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	25	2530	30	10	50	4480	315	20	10	40	165	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		-2%				-3%			-3%			0%
Storage Length (ft)	170		270		300		300	0		0	0	
Storage Lanes	1		1		1		1	0		0	0	
Taper Length (ft)	90				90			25			25	
Lane Util. Factor	1.00	0.91	1.00	0.91	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850				0.850		0.923			0.993
Flt Protected	0.950				0.950				0.986			0.958
Satd. Flow (prot)	1787	5136	1599	0	1796	5162	1607	0	1721	0	0	1772
Flt Permitted	0.950				0.950				0.917			0.662
Satd. Flow (perm)	1787	5136	1599	0	1796	5162	1607	0	1600	0	0	1225
Right Turn on Red			Yes				Yes			Yes		
Satd. Flow (RTOR)			82				138		24			1
Link Speed (mph)		55				55			25			35
Link Distance (ft)		4302				1930			1220			1072
Travel Time (s)		53.3				23.9			33.3			20.9
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%				0%			0%			0%
Adj. Flow (vph)	25	2530	30	10	50	4480	315	20	10	40	165	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	25	2530	30	0	60	4480	315	0	70	0	0	190
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	R NA	Left	Left	Right	Left	Left	Right	Left	Left
Median Width(ft)		12				12			0			0
Link Offset(ft)		0				0			0			0
Crosswalk Width(ft)		16				16			16			16
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.98	0.98	0.98	0.98	0.98	0.98	0.98	1.00	1.00
Turning Speed (mph)	15		9	9	15		9	15		9	15	
Number of Detectors	1	1	1	1	1	1	1	1	1		1	1
Detector Template												
Leading Detector (ft)	35	0	0	50	35	0	0	5	25		5	25
Trailing Detector (ft)	-5	0	0	0	-5	0	0	0	-5		0	-5
Turn Type	Prot	NA	Prot	Prot	Prot	NA	Prot	Perm	NA		Perm	NA
Protected Phases	5	2	2	1	1	6	6		8			4
Permitted Phases								8			4	
Detector Phase	5	2	2	1	1	6	6	8	8		4	4
Switch Phase												
Minimum Initial (s)	5.0	15.0	15.0	5.0	5.0	15.0	15.0	5.0	5.0		5.0	5.0

Lane Group	SBR
Lane Configurations	
Volume (vph)	10
Ideal Flow (vphpl)	1900
Lane Width (ft)	12
Grade (%)	
Storage Length (ft)	0
Storage Lanes	0
Taper Length (ft)	
Lane Util. Factor	1.00
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	0
Flt Permitted	
Satd. Flow (perm)	0
Right Turn on Red	Yes
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	1.00
Growth Factor	100%
Heavy Vehicles (%)	2%
Bus Blockages (#/hr)	0
Parking (#/hr)	
Mid-Block Traffic (%)	
Adj. Flow (vph)	10
Shared Lane Traffic (%)	
Lane Group Flow (vph)	0
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Turn Type	
Protected Phases	
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Minimum Split (s)	12.0	25.0	25.0	12.0	12.0	25.0	25.0	43.0	43.0		12.0	12.0
Total Split (s)	12.0	175.0	175.0	22.0	22.0	185.0	185.0	43.0	43.0		43.0	43.0
Total Split (%)	5.0%	72.9%	72.9%	9.2%	9.2%	77.1%	77.1%	17.9%	17.9%		17.9%	17.9%
Maximum Green (s)	5.0	165.0	165.0	15.0	15.0	175.0	175.0	36.0	36.0		36.0	36.0
Yellow Time (s)	4.0	5.5	5.5	4.0	4.0	5.5	5.5	4.0	4.0		4.0	4.0
All-Red Time (s)	3.0	4.5	4.5	3.0	3.0	4.5	4.5	3.0	3.0		3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	0.0		0.0			0.0
Total Lost Time (s)	7.0	10.0	10.0		7.0	10.0	10.0		7.0			7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lead	Lag	Lag					
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	3.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0		3.0	3.0
Minimum Gap (s)	2.0	3.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0		3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Recall Mode	None	C-Max	C-Max	None	None	C-Max	C-Max	None	None		None	None
Walk Time (s)								7.0	7.0			
Flash Dont Walk (s)								29.0	29.0			
Pedestrian Calls (#/hr)								0	0			
Act Effct Green (s)	5.0	168.0	168.0		12.0	177.4	177.4		36.0			36.0
Actuated g/C Ratio	0.02	0.70	0.70		0.05	0.74	0.74		0.15			0.15
v/c Ratio	0.68	0.70	0.03		0.67	1.17	0.26		0.27			1.03
Control Delay	190.8	26.9	0.1		103.6	348.8	9.0		61.9			185.7
Queue Delay	0.0	0.0	0.0		0.0	0.0	0.0		0.0			0.0
Total Delay	190.8	26.9	0.1		103.6	348.8	9.0		61.9			185.7
LOS	F	C	A		F	F	A		E			F
Approach Delay		28.2				323.8			61.9			185.7
Approach LOS		C				F			E			F
90th %ile Green (s)	5.0	165.0	165.0	15.0	15.0	175.0	175.0	36.0	36.0		36.0	36.0
90th %ile Term Code	Max	Coord	Coord	Max	Max	Coord	Coord	Hold	Hold		Max	Max
70th %ile Green (s)	5.0	165.4	165.4	14.6	14.6	175.0	175.0	36.0	36.0		36.0	36.0
70th %ile Term Code	Max	Coord	Coord	Gap	Gap	Coord	Coord	Hold	Hold		Max	Max
50th %ile Green (s)	5.0	167.5	167.5	12.5	12.5	175.0	175.0	36.0	36.0		36.0	36.0
50th %ile Term Code	Max	Coord	Coord	Gap	Gap	Coord	Coord	Hold	Hold		Max	Max
30th %ile Green (s)	5.0	169.6	169.6	10.4	10.4	175.0	175.0	36.0	36.0		36.0	36.0
30th %ile Term Code	Max	Coord	Coord	Gap	Gap	Coord	Coord	Hold	Hold		Max	Max
10th %ile Green (s)	0.0	172.5	172.5	7.5	7.5	187.0	187.0	36.0	36.0		36.0	36.0
10th %ile Term Code	Skip	Coord	Coord	Gap	Gap	Coord	Coord	Hold	Hold		Max	Max
Stops (vph)	22	1446	0		57	3197	90		41			172
Fuel Used(gal)	2	110	1		3	432	6		2			15
CO Emissions (g/hr)	0	0	0		0	0	0		0			0
NOx Emissions (g/hr)	0	0	0		0	0	0		0			0
VOC Emissions (g/hr)	0	0	0		0	0	0		0			0
Dilemma Vehicles (#)	0	29	0		0	102	0		0			0
Queue Length 50th (ft)	39	879	0		94	~3116	139		65			~328
Queue Length 95th (ft)	m#75	985	m1		m79	m1472	m100		146			m#348
Internal Link Dist (ft)		4222				1850			1140			992
Turn Bay Length (ft)	170		270		300		300					
Base Capacity (vph)	37	3595	1143		112	3815	1224		260			184
Starvation Cap Reductn	0	0	0		0	0	0		0			0

Lane Group	SBR
Minimum Split (s)	
Total Split (s)	
Total Split (%)	
Maximum Green (s)	
Yellow Time (s)	
All-Red Time (s)	
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	
Minimum Gap (s)	
Time Before Reduce (s)	
Time To Reduce (s)	
Recall Mode	
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
90th %ile Green (s)	
90th %ile Term Code	
70th %ile Green (s)	
70th %ile Term Code	
50th %ile Green (s)	
50th %ile Term Code	
30th %ile Green (s)	
30th %ile Term Code	
10th %ile Green (s)	
10th %ile Term Code	
Stops (vph)	
Fuel Used(gal)	
CO Emissions (g/hr)	
NOx Emissions (g/hr)	
VOC Emissions (g/hr)	
Dilemma Vehicles (#)	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Spillback Cap Reductn	0	0	0		0	0	0		0			0
Storage Cap Reductn	0	0	0		0	0	0		0			0
Reduced v/c Ratio	0.68	0.70	0.03		0.54	1.17	0.26		0.27			1.03

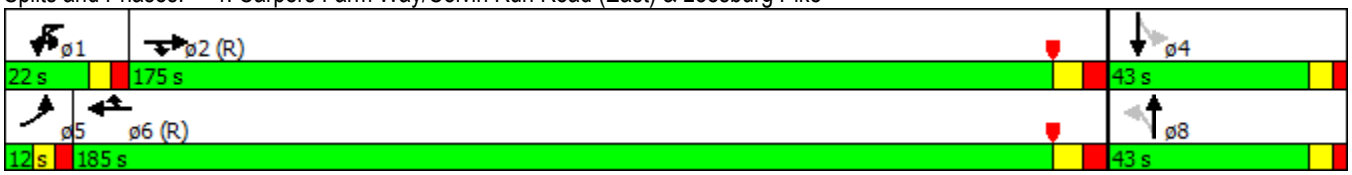
Intersection Summary			
Area Type:	Other		
Cycle Length: 240			
Actuated Cycle Length: 240			
Offset: 228 (95%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.17			
Intersection Signal Delay: 218.8		Intersection LOS: F	
Intersection Capacity Utilization 117.9%		ICU Level of Service H	
Analysis Period (min) 60			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

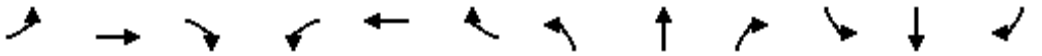
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Carpers Farm Way/Colvin Run Road (East) & Leesburg Pike

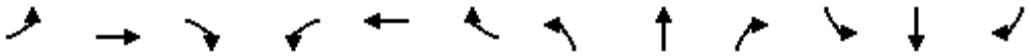


Lane Group	SBR
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	210	2585	20	60	4500	10	10	10	20	0	0	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		-3%			-2%			0%			0%	
Storage Length (ft)	740		0	180		110	0		0	0		0
Storage Lanes	1		1	1		1	0		0	0		1
Taper Length (ft)	80			100			25			25		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850			0.850		0.932				0.865
Flt Protected	0.950			0.950				0.988				
Satd. Flow (prot)	1796	5162	1607	1787	5136	1599	0	1715	0	0	0	1611
Flt Permitted	0.950			0.950				0.988				
Satd. Flow (perm)	1796	5162	1607	1787	5136	1599	0	1715	0	0	0	1611
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			20			82		15				52
Link Speed (mph)		55			55			25			35	
Link Distance (ft)		1783			4302			852			2193	
Travel Time (s)		22.1			53.3			23.2			42.7	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	210	2585	20	60	4500	10	10	10	20	0	0	280
Shared Lane Traffic (%)												
Lane Group Flow (vph)	210	2585	20	60	4500	10	0	40	0	0	0	280
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.98	0.98	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	1				1
Detector Template												
Leading Detector (ft)	35	300	46	35	300	46	5	35				35
Trailing Detector (ft)	-5	150	40	-5	150	40	0	-5				-5
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA				Over
Protected Phases	5	2	8	1	6		8	8				5
Permitted Phases			2			6						
Detector Phase	5	2	2	1	6	6	8	8				5
Switch Phase												
Minimum Initial (s)	5.0	15.0	5.0	5.0	15.0	15.0	5.0	5.0				5.0



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	12.0	22.5	12.0	12.0	22.5	22.5	12.0	12.0				12.0
Total Split (s)	35.0	206.0	12.0	22.0	193.0	193.0	12.0	12.0				35.0
Total Split (%)	14.6%	85.8%	5.0%	9.2%	80.4%	80.4%	5.0%	5.0%				14.6%
Maximum Green (s)	28.0	198.5	5.0	15.0	185.5	185.5	5.0	5.0				28.0
Yellow Time (s)	4.0	5.5	4.0	4.0	5.5	5.5	4.0	4.0				4.0
All-Red Time (s)	3.0	2.0	3.0	3.0	2.0	2.0	3.0	3.0				3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0				0.0
Total Lost Time (s)	7.0	7.5	7.0	7.0	7.5	7.5		7.0				7.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag						Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.0	2.0	2.0	4.0	4.0	2.0	2.0				4.0
Minimum Gap (s)	4.0	4.0	2.0	2.0	4.0	4.0	2.0	2.0				4.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0
Recall Mode	None	C-Max	None	None	C-Max	C-Max	None	None				None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	28.0	201.5	214.0	12.0	185.5	185.5		5.0				28.0
Actuated g/C Ratio	0.12	0.84	0.89	0.05	0.77	0.77		0.02				0.12
v/c Ratio	1.00	0.60	0.01	0.67	1.13	0.01		0.80				1.20
Control Delay	227.0	9.3	0.6	125.1	252.1	0.0		180.1				473.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0				0.0
Total Delay	227.0	9.3	0.6	125.1	252.1	0.0		180.1				473.8
LOS	F	A	A	F	F	A		F				F
Approach Delay		25.5			249.9			180.1				
Approach LOS		C			F			F				
90th %ile Green (s)	28.0	198.5	5.0	15.0	185.5	185.5	5.0	5.0				28.0
90th %ile Term Code	Max	Coord	Max	Max	Coord	Coord	Max	Max				Max
70th %ile Green (s)	28.0	198.8	5.0	14.7	185.5	185.5	5.0	5.0				28.0
70th %ile Term Code	Max	Coord	Max	Gap	Coord	Coord	Max	Max				Max
50th %ile Green (s)	28.0	201.0	5.0	12.5	185.5	185.5	5.0	5.0				28.0
50th %ile Term Code	Max	Coord	Max	Gap	Coord	Coord	Max	Max				Max
30th %ile Green (s)	28.0	203.1	5.0	10.4	185.5	185.5	5.0	5.0				28.0
30th %ile Term Code	Max	Coord	Max	Gap	Coord	Coord	Max	Max				Max
10th %ile Green (s)	28.0	206.0	5.0	7.5	185.5	185.5	5.0	5.0				28.0
10th %ile Term Code	Max	Coord	Max	Gap	Coord	Coord	Max	Max				Max
Stops (vph)	187	1222	1	60	1179	0		22				424
Fuel Used(gal)	16	57	0	4	376	0		2				40
CO Emissions (g/hr)	0	0	0	0	0	0		0				0
NOx Emissions (g/hr)	0	0	0	0	0	0		0				0
VOC Emissions (g/hr)	0	0	0	0	0	0		0				0
Dilemma Vehicles (#)	0	36	0	0	2	0		0				0
Queue Length 50th (ft)	331	710	1	100	~3071	0		40				~464
Queue Length 95th (ft)	m#627	m891	m4	m87	m54	m0		#156				#819
Internal Link Dist (ft)		1703			4222			772			2113	
Turn Bay Length (ft)	740			180		110						
Base Capacity (vph)	209	4333	1434	111	3969	1254		50				233
Starvation Cap Reductn	0	0	0	0	0	0		0				0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn	0	0	0	0	0	0		0				0
Storage Cap Reductn	0	0	0	0	0	0		0				0
Reduced v/c Ratio	1.00	0.60	0.01	0.54	1.13	0.01		0.80				1.20

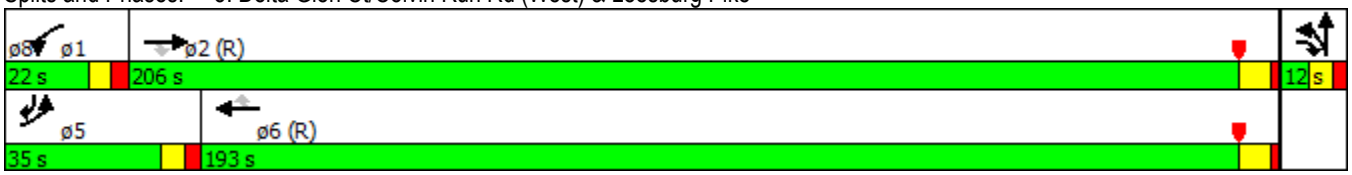
Intersection Summary			
Area Type:	Other		
Cycle Length: 240			
Actuated Cycle Length: 240			
Offset: 50 (21%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.20			
Intersection Signal Delay: 175.7		Intersection LOS: F	
Intersection Capacity Utilization 126.4%		ICU Level of Service H	
Analysis Period (min) 60			

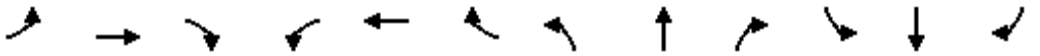
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

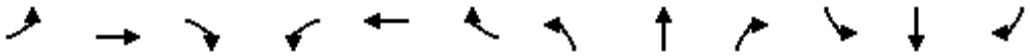
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Delta Glen Ct/Colvin Run Rd (West) & Leesburg Pike





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	0	255	1020	3710	50	320	315	995	40	285	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		-1%			-3%			-1%			0%	
Storage Length (ft)	240		280	0		0	0		650	250		0
Storage Lanes	1		0	2		1	2		1	1		0
Taper Length (ft)	100			85			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.97	0.91	1.00	0.97	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor												
Frt			0.850			0.850			0.850		0.982	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1778	0	1591	3485	5162	1607	3450	1872	1591	1770	3476	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1778	0	1591	3485	5162	1607	3450	1872	1591	1770	3476	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			226			82			995		5	
Link Speed (mph)		45			55			45			35	
Link Distance (ft)		569			567			927			1980	
Travel Time (s)		8.6			7.0			14.0			38.6	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	30	0	255	1020	3710	50	320	315	995	40	285	40
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	0	255	1020	3710	50	320	315	995	40	325	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	L NA	Left	Right
Median Width(ft)		96			96			36			36	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.98	0.98	0.98	0.99	0.99	0.99	1.00	1.00	1.00
Turning Speed (mph)	20		15	15		9	20		15	15		9
Number of Detectors	1		1	1	1	1	1	1	1	1	1	
Detector Template												
Leading Detector (ft)	35		0	35	0	0	35	35	35	35	35	
Trailing Detector (ft)	-5		0	-5	0	0	-5	-5	-5	-5	-5	
Turn Type	Prot		Free	Prot	NA	pm+ov	Prot	NA	Free	Prot	NA	
Protected Phases	5			1	6	7	3	8		7	4	
Permitted Phases			Free			6			Free			
Detector Phase	5			1	6	6	3	8		7	4	
Switch Phase												
Minimum Initial (s)	5.0			5.0	15.0	5.0	5.0	5.0		5.0	5.0	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	12.0			12.0	22.0	12.0	12.0	12.0		12.0	12.0	
Total Split (s)	12.0			183.0	171.0	12.0	29.0	45.0		12.0	28.0	
Total Split (%)	5.0%			76.3%	71.3%	5.0%	12.1%	18.8%		5.0%	11.7%	
Maximum Green (s)	5.0			176.0	164.0	5.0	22.0	38.0		5.0	21.0	
Yellow Time (s)	4.0			4.0	5.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	3.0			3.0	2.0	3.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0			0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0			7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Lead/Lag	Lead				Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0			5.0	4.0	2.0	3.0	3.0		2.0	3.0	
Minimum Gap (s)	2.0			5.0	4.0	2.0	3.0	3.0		2.0	3.0	
Time Before Reduce (s)	0.0			0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0			0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Recall Mode	None			None	C-Max	None	None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	5.0		240.0	176.0	164.0	176.0	22.0	38.0	240.0	5.0	21.0	
Actuated g/C Ratio	0.02		1.00	0.73	0.68	0.73	0.09	0.16	1.00	0.02	0.09	
v/c Ratio	0.81		0.16	0.40	1.05	0.04	1.01	1.06	0.63	1.11	1.06	
Control Delay	262.0		0.2	4.5	113.7	0.0	178.2	248.5	9.3	522.7	262.7	
Queue Delay	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	262.0		0.2	4.5	113.7	0.0	178.2	248.5	9.3	522.7	262.7	
LOS	F		A	A	F	A	F	F	A	F	F	
Approach Delay					89.2			88.6			291.2	
Approach LOS					F			F			F	
90th %ile Green (s)	5.0			176.0	164.0	5.0	22.0	38.0		5.0	21.0	
90th %ile Term Code	Max			Coord	Coord	Max	Max	Max		Max	Max	
70th %ile Green (s)	5.0			176.0	164.0	5.0	22.0	38.0		5.0	21.0	
70th %ile Term Code	Max			Coord	Coord	Max	Max	Max		Max	Max	
50th %ile Green (s)	5.0			176.0	164.0	5.0	22.0	38.0		5.0	21.0	
50th %ile Term Code	Max			Coord	Coord	Max	Max	Max		Max	Max	
30th %ile Green (s)	5.0			176.0	164.0	5.0	22.0	38.0		5.0	21.0	
30th %ile Term Code	Max			Coord	Coord	Max	Max	Max		Max	Max	
10th %ile Green (s)	5.0			176.0	164.0	5.0	22.0	38.0		5.0	21.0	
10th %ile Term Code	Max			Coord	Coord	Max	Max	Max		Max	Max	
Stops (vph)	26		0	132	3150	0	294	287	342	31	290	
Fuel Used(gal)	2		1	7	158	0	17	21	12	7	40	
CO Emissions (g/hr)	0		0	0	0	0	0	0	0	0	0	
NOx Emissions (g/hr)	0		0	0	0	0	0	0	0	0	0	
VOC Emissions (g/hr)	0		0	0	0	0	0	0	0	0	0	
Dilemma Vehicles (#)	0		0	0	90	0	0	1	0	0	6	
Queue Length 50th (ft)	45		0	91	~2332	0	~275	~556	246	~71	~290	
Queue Length 95th (ft)	m#145		m0	m75	m1158	m0	m#386	m#777	m417	#202	#491	
Internal Link Dist (ft)		489			487			847			1900	
Turn Bay Length (ft)	240		280						650	250		
Base Capacity (vph)	37		1591	2555	3527	1200	316	296	1591	36	308	
Starvation Cap Reductn	0		0	0	0	0	0	0	0	0	0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn	0		0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0		0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.81		0.16	0.40	1.05	0.04	1.01	1.06	0.63	1.11	1.06	

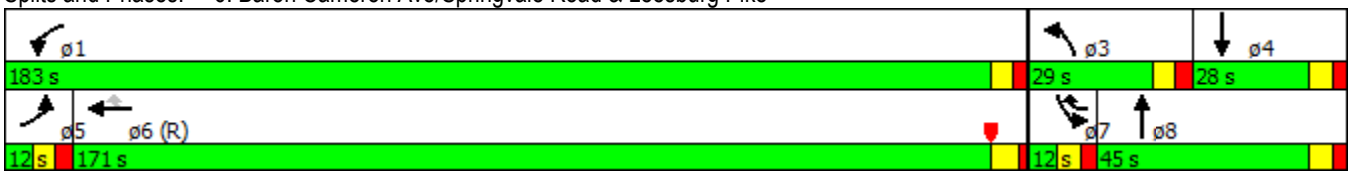
Intersection Summary			
Area Type:	Other		
Cycle Length: 240			
Actuated Cycle Length: 240			
Offset: 92 (38%), Referenced to phase 2: and 6:WBT, Start of Yellow			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.11			
Intersection Signal Delay: 97.0		Intersection LOS: F	
Intersection Capacity Utilization 109.9%		ICU Level of Service H	
Analysis Period (min) 60			

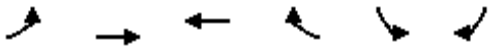
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

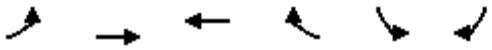
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Baron Cameron Ave/Springvale Road & Leesburg Pike

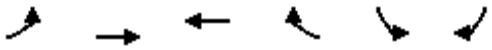




Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	240	1800	3650	170	110	330
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		2%	1%		0%	
Storage Length (ft)	700			200	0	265
Storage Lanes	1			1	1	1
Taper Length (ft)	85				25	
Lane Util. Factor	1.00	0.91	0.91	1.00	1.00	1.00
Ped Bike Factor						
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1752	5034	5060	1575	1770	1583
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1752	5034	5060	1575	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				77		1
Link Speed (mph)		55	55		35	
Link Distance (ft)		2707	469		3825	
Travel Time (s)		33.6	5.8		74.5	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	240	1800	3650	170	110	330
Shared Lane Traffic (%)						
Lane Group Flow (vph)	240	1800	3650	170	110	330
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	R NA	Left	Right	L NA	R NA
Median Width(ft)		24	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	2	2	1	1	1
Detector Template						
Leading Detector (ft)	35	300	300	56	35	50
Trailing Detector (ft)	-5	150	150	50	-5	0
Turn Type	Prot	NA	NA	pm+ov	Prot	pm+ov
Protected Phases	5	2	6	4	4	5
Permitted Phases				6		4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	5.0	15.0	15.0	5.0	5.0	5.0



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Minimum Split (s)	12.0	22.5	22.5	12.0	12.0	12.0
Total Split (s)	36.0	215.0	179.0	25.0	25.0	36.0
Total Split (%)	15.0%	89.6%	74.6%	10.4%	10.4%	15.0%
Maximum Green (s)	29.0	207.5	171.5	18.0	18.0	29.0
Yellow Time (s)	4.0	5.5	5.5	4.0	4.0	4.0
All-Red Time (s)	3.0	2.0	2.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.5	7.5	7.0	7.0	7.0
Lead/Lag	Lead		Lag			Lead
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	4.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	4.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	C-Max	C-Max	None	None	None
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
Act Effct Green (s)	29.0	207.5	171.5	197.0	18.0	54.0
Actuated g/C Ratio	0.12	0.86	0.71	0.82	0.08	0.22
v/c Ratio	1.14	0.41	1.01	0.13	0.83	0.93
Control Delay	355.9	12.6	30.2	0.1	164.1	136.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	355.9	12.6	30.2	0.1	164.1	136.0
LOS	F	B	C	A	F	F
Approach Delay		53.0	28.8		143.0	
Approach LOS		D	C		F	
90th %ile Green (s)	29.0	207.5	171.5	18.0	18.0	29.0
90th %ile Term Code	Max	Coord	Coord	Max	Max	Max
70th %ile Green (s)	29.0	207.5	171.5	18.0	18.0	29.0
70th %ile Term Code	Max	Coord	Coord	Max	Max	Max
50th %ile Green (s)	29.0	207.5	171.5	18.0	18.0	29.0
50th %ile Term Code	Max	Coord	Coord	Max	Max	Max
30th %ile Green (s)	29.0	207.5	171.5	18.0	18.0	29.0
30th %ile Term Code	Max	Coord	Coord	Max	Max	Max
10th %ile Green (s)	29.0	207.5	171.5	18.0	18.0	29.0
10th %ile Term Code	Max	Coord	Coord	Max	Max	Max
Stops (vph)	208	997	1914	0	102	304
Fuel Used(gal)	25	54	82	1	7	21
CO Emissions (g/hr)	0	0	0	0	0	0
NOx Emissions (g/hr)	0	0	0	0	0	0
VOC Emissions (g/hr)	0	0	0	0	0	0
Dilemma Vehicles (#)	0	13	41	0	0	0
Queue Length 50th (ft)	~434	615	~1327	0	176	520
Queue Length 95th (ft)	#761	659	m299	m0	#363	#878
Internal Link Dist (ft)		2627	389		3745	
Turn Bay Length (ft)	700			200		265
Base Capacity (vph)	211	4352	3615	1306	132	356
Starvation Cap Reductn	0	0	0	0	0	0



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.14	0.41	1.01	0.13	0.83	0.93

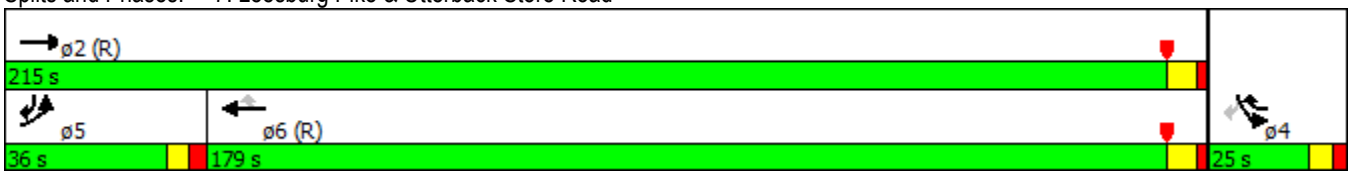
Intersection Summary			
Area Type:	Other		
Cycle Length: 240			
Actuated Cycle Length: 240			
Offset: 166 (69%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.14			
Intersection Signal Delay: 44.6		Intersection LOS: D	
Intersection Capacity Utilization 107.8%		ICU Level of Service G	
Analysis Period (min) 60			

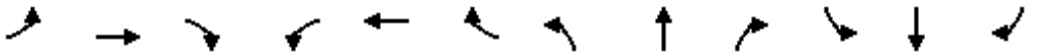
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

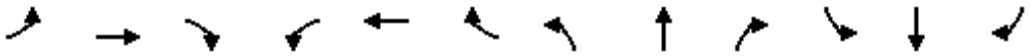
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Leesburg Pike & Utterback Store Road





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	1870	430	200	3865	5	415	5	170	5	5	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		-1%			0%			0%			0%	
Storage Length (ft)	300		700	650		180	310		0	0		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	80			80			75			25		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850			0.850		0.854			0.925	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1778	5111	1591	1770	5085	1583	3433	1591	0	1770	1723	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1778	5111	1591	1770	5085	1583	3433	1591	0	1770	1723	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			296			82		170			5	
Link Speed (mph)		55			55			40			15	
Link Distance (ft)		2420			2707			1363			861	
Travel Time (s)		30.0			33.6			23.2			39.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	5	1870	430	200	3865	5	415	5	170	5	5	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	5	1870	430	200	3865	5	415	175	0	5	10	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1	1	1	1		1	1	
Detector Template												
Leading Detector (ft)	35	246	35	35	246	56	35	35		5	25	
Trailing Detector (ft)	-5	240	-5	-5	240	50	-5	-5		0	-5	
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA		Prot	NA	
Protected Phases	5	2	7	1	6	3	7	4		3	8	
Permitted Phases			2			6						
Detector Phase	5	2	2	1	6	6	7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	15.0	5.0	5.0	15.0	5.0	5.0	5.0		5.0	5.0	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	12.0	22.5	12.0	12.0	22.5	12.0	12.0	12.0		12.0	12.0	
Total Split (s)	12.0	148.0	34.0	46.0	182.0	12.0	34.0	34.0		12.0	12.0	
Total Split (%)	5.0%	61.7%	14.2%	19.2%	75.8%	5.0%	14.2%	14.2%		5.0%	5.0%	
Maximum Green (s)	5.0	140.5	27.0	39.0	174.5	5.0	27.0	27.0		5.0	5.0	
Yellow Time (s)	4.0	5.5	4.0	4.0	5.5	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	3.0	2.0	3.0	3.0	2.0	3.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.5	7.0	7.0	7.5	7.0	7.0	7.0		7.0	7.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	4.0	2.0	2.0	4.0	2.0	2.0	2.0		2.0	2.0	
Minimum Gap (s)	2.0	4.0	2.0	2.0	4.0	2.0	2.0	2.0		2.0	2.0	
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Recall Mode	None	C-Max	None	None	C-Max	None	None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	5.0	155.5	190.0	31.2	191.3	194.2	27.0	29.4		5.0	5.0	
Actuated g/C Ratio	0.02	0.65	0.79	0.13	0.80	0.81	0.11	0.12		0.02	0.02	
v/c Ratio	0.14	0.56	0.33	0.87	0.95	0.00	1.08	0.51		0.14	0.25	
Control Delay	121.8	15.2	1.6	135.9	7.4	0.0	278.1	17.2		123.8	91.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	121.8	15.2	1.6	135.9	7.4	0.0	278.1	17.2		123.8	91.6	
LOS	F	B	A	F	A	A	F	B		F	F	
Approach Delay		12.9			13.7			200.7			102.3	
Approach LOS		B			B			F			F	
90th %ile Green (s)	5.0	140.5	27.0	39.0	174.5	5.0	27.0	27.0		5.0	5.0	
90th %ile Term Code	Max	Coord	Max	Max	Coord	Max	Max	Hold		Max	Max	
70th %ile Green (s)	0.0	144.1	27.0	35.4	186.5	0.0	27.0	39.0		0.0	5.0	
70th %ile Term Code	Skip	Coord	Max	Gap	Coord	Skip	Max	Hold		Skip	Max	
50th %ile Green (s)	0.0	159.9	27.0	31.6	198.5	0.0	27.0	27.0		0.0	0.0	
50th %ile Term Code	Skip	Coord	Max	Gap	Coord	Skip	Max	Hold		Skip	Skip	
30th %ile Green (s)	0.0	163.8	27.0	27.7	198.5	0.0	27.0	27.0		0.0	0.0	
30th %ile Term Code	Skip	Coord	Max	Gap	Coord	Skip	Max	Hold		Skip	Skip	
10th %ile Green (s)	0.0	169.4	27.0	22.1	198.5	0.0	27.0	27.0		0.0	0.0	
10th %ile Term Code	Skip	Coord	Max	Gap	Coord	Skip	Max	Hold		Skip	Skip	
Stops (vph)	6	687	32	195	975	0	376	21		6	7	
Fuel Used(gal)	0	47	7	13	90	0	31	2		0	0	
CO Emissions (g/hr)	0	0	0	0	0	0	0	0		0	0	
NOx Emissions (g/hr)	0	0	0	0	0	0	0	0		0	0	
VOC Emissions (g/hr)	0	0	0	0	0	0	0	0		0	0	
Dilemma Vehicles (#)	0	55	0	0	32	0	0	4		0	0	
Queue Length 50th (ft)	8	187	47	324	169	0	~374	7		8	8	
Queue Length 95th (ft)	m16	572	43	m300	m#2421	m0	#594	144		31	40	
Internal Link Dist (ft)		2340			2627			1283			781	
Turn Bay Length (ft)	300		700	650		180	310					
Base Capacity (vph)	37	3312	1321	287	4053	1296	386	343		36	40	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.14	0.56	0.33	0.70	0.95	0.00	1.08	0.51		0.14	0.25	

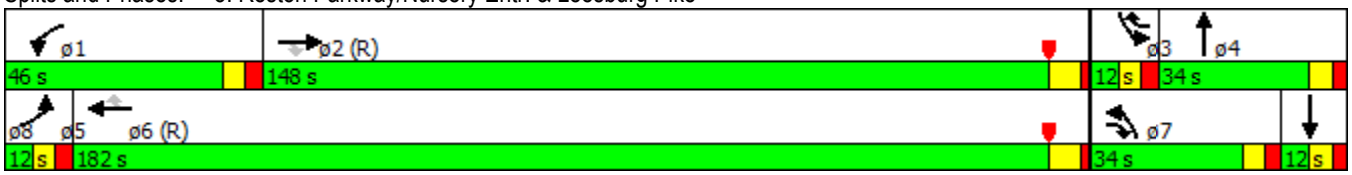
Intersection Summary			
Area Type:	Other		
Cycle Length: 240			
Actuated Cycle Length: 240			
Offset: 200 (83%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.08			
Intersection Signal Delay: 29.4		Intersection LOS: C	
Intersection Capacity Utilization 115.3%		ICU Level of Service H	
Analysis Period (min) 60			

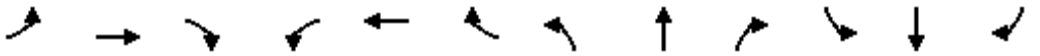
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

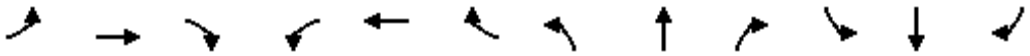
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: Reston Parkway/Nursery Entr. & Leesburg Pike





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	2180	20	60	3105	0	10	0	40	40	10	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			-5%			0%			0%	
Storage Length (ft)	0		0	250		0	0		0	0		0
Storage Lanes	0		0	1		0	1		1	1		0
Taper Length (ft)	25			100			25			25		
Lane Util. Factor	1.00	0.86	0.86	1.00	0.91	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor												
Frt		0.999							0.850			
Flt Protected				0.950			0.950			0.950	0.971	
Satd. Flow (prot)	0	6401	0	1814	5212	0	1770	0	1583	1681	1718	0
Flt Permitted				0.950			0.950			0.950	0.971	
Satd. Flow (perm)	0	6401	0	1814	5212	0	1770	0	1583	1681	1718	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2							84			
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		425			4372			1243			359	
Travel Time (s)		6.4			66.2			33.9			9.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	2180	20	60	3105	0	10	0	40	40	10	0
Shared Lane Traffic (%)										38%		
Lane Group Flow (vph)	0	2200	0	60	3105	0	10	0	40	25	25	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	0.97	0.97	0.97	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		2		1	2		1		1	1	2	
Detector Template		Thru		Left	Thru		Left		Right	Left	Thru	
Leading Detector (ft)		100		20	100		20		20	20	100	
Trailing Detector (ft)		0		0	0		0		0	0	0	
Turn Type		NA		Prot	NA		Prot		Prot	Split	NA	
Protected Phases		2		1	6		4		4	3	3	
Permitted Phases							4		4			
Detector Phase		2		1	6		4		4	3	3	
Switch Phase												
Minimum Initial (s)		15.0		5.0	15.0		5.0		5.0	5.0	5.0	

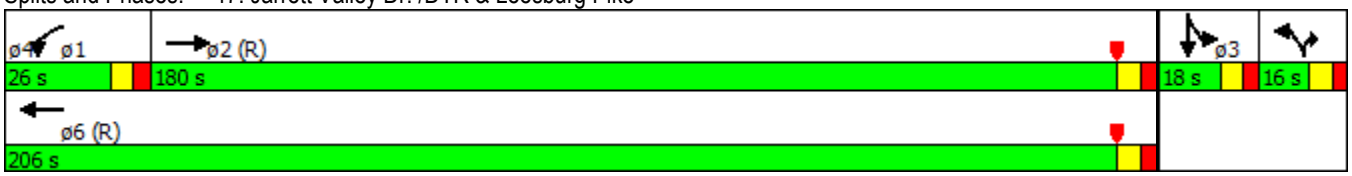


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)		22.5		12.0	22.5		12.0		12.0	12.0	12.0	
Total Split (s)		180.0		26.0	206.0		16.0		16.0	18.0	18.0	
Total Split (%)		75.0%		10.8%	85.8%		6.7%		6.7%	7.5%	7.5%	
Maximum Green (s)		172.5		19.0	198.5		9.0		9.0	11.0	11.0	
Yellow Time (s)		4.5		4.0	4.5		4.0		4.0	4.0	4.0	
All-Red Time (s)		3.0		3.0	3.0		3.0		3.0	3.0	3.0	
Lost Time Adjust (s)		0.0		0.0	0.0		0.0		0.0	0.0	0.0	
Total Lost Time (s)		7.5		7.0	7.5		7.0		7.0	7.0	7.0	
Lead/Lag		Lag		Lead			Lag		Lag	Lead	Lead	
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0		3.0	3.0		3.0		3.0	3.0	3.0	
Minimum Gap (s)		3.0		3.0	3.0		3.0		3.0	3.0	3.0	
Time Before Reduce (s)		0.0		0.0	0.0		0.0		0.0	0.0	0.0	
Time To Reduce (s)		0.0		0.0	0.0		0.0		0.0	0.0	0.0	
Recall Mode		C-Max		None	C-Max		None		None	None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		187.5		13.3	209.3		7.0		7.0	8.7	8.7	
Actuated g/C Ratio		0.78		0.06	0.87		0.03		0.03	0.04	0.04	
v/c Ratio		0.44		0.60	0.68		0.20		0.31	0.41	0.40	
Control Delay		1.9		136.0	7.4		121.9		6.5	133.1	132.0	
Queue Delay		0.0		0.0	0.0		0.0		0.0	0.0	0.0	
Total Delay		1.9		136.0	7.4		121.9		6.5	133.1	132.0	
LOS		A		F	A		F		A	F	F	
Approach Delay		1.9			9.9						132.5	
Approach LOS		A			A						F	
90th %ile Green (s)		173.3		18.3	198.6		8.9		8.9	11.0	11.0	
90th %ile Term Code		Coord		Gap	Coord		Gap		Gap	Max	Max	
70th %ile Green (s)		178.1		15.4	200.5		7.6		7.6	10.4	10.4	
70th %ile Term Code		Coord		Gap	Coord		Gap		Gap	Gap	Gap	
50th %ile Green (s)		182.4		13.3	202.7		6.8		6.8	9.0	9.0	
50th %ile Term Code		Coord		Gap	Coord		Gap		Gap	Gap	Gap	
30th %ile Green (s)		186.7		11.2	204.9		6.0		6.0	7.6	7.6	
30th %ile Term Code		Coord		Gap	Coord		Gap		Gap	Gap	Gap	
10th %ile Green (s)		217.2		8.3	232.5		0.0		0.0	0.0	0.0	
10th %ile Term Code		Coord		Gap	Coord		Skip		Skip	Skip	Skip	
Stops (vph)		117		58	974		11		0	25	25	
Fuel Used(gal)		8		4	105		0		0	1	1	
CO Emissions (g/hr)		0		0	0		0		0	0	0	
NOx Emissions (g/hr)		0		0	0		0		0	0	0	
VOC Emissions (g/hr)		0		0	0		0		0	0	0	
Dilemma Vehicles (#)		4		0	53		0		0	0	0	
Queue Length 50th (ft)		41		95	612		16		0	42	42	
Queue Length 95th (ft)		47		174	928		48		0	95	95	
Internal Link Dist (ft)		345			4292			1163			279	
Turn Bay Length (ft)				250								
Base Capacity (vph)		5002		143	4546		66		140	77	78	
Starvation Cap Reductn		0		0	0		0		0	0	0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn		0		0	0		0		0	0	0	
Storage Cap Reductn		0		0	0		0		0	0	0	
Reduced v/c Ratio		0.44		0.42	0.68		0.15		0.29	0.32	0.32	

Intersection Summary			
Area Type:	Other		
Cycle Length: 240			
Actuated Cycle Length: 240			
Offset: 208 (87%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.68			
Intersection Signal Delay: 8.0		Intersection LOS: A	
Intersection Capacity Utilization 80.1%		ICU Level of Service D	
Analysis Period (min) 60			

Splits and Phases: 47: Jarrett Valley Dr. /DTR & Leesburg Pike



APPENDIX L

Existing Models Calibrated Parameters

Calibrated Signal Timings Splits for AM and PM Existing Models

Intersection	Approach/Movement	Signal Timings Splits			
		AM		PM	
		Original	Calibrated	Original	Calibrated
Georgetown Pike	EBL			49	76
	WBT			140	103
	EBT			199	179
	SBL			31	51
Baron Cameron Ave/Springvale Rd	WBL	32	74	60	49
	EBT	129	87	98	109
Colvin Run Rd (East)/Carpers Farm Way	EBT	176	166		
	WBT	176	166		
	NBT	27	37		
	SBT	27	37		
BeulahRd/Forestville Dr	NB	20	40	30	50
	SB	20	60		
	EBT	180	89	150	130
	WBT	183	123	165	140
	WBL	20	51		
Towlston Rd	EBL			17	37
	WBT			182	137
	EBT			139	114
	SBL			31	56

Desired Speed

In the AM Existing VISSIM model, the desired speed was changed sometimes for calibration purposes as follows:

- West of Baron Cameron intersection for both the eastbound and westbound direction of Route 7, the original desired speed was 80km/h (46.6 mph, 68.4 mph) and the calibrated desired speed is 120 km/h (52.8 mph, 96.3 mph)
- East of DTR / Jarret Valley Drive intersection for the eastbound direction of Route 7, the original desired speed was 70km/h (42.3 mph, 48.5 mph) and the calibrated desired speed is 12 km/h (7.5 mph, 9.3 mph)

APPENDIX M

Existing Traffic Volumes Validation Memo

TECHNICAL MEMORANDUM

Route 7 Corridor Improvement Project

PREPARED FOR:	William Dunn, PE (VDOT)
PREPARED BY:	Randy Boice, PE and Sujith Racha, PE, PTOE (JMT)
SUBJECT:	Route 7 Corridor Improvement Project Comparison of Traffic Volumes UPC 52328
DATE:	10/05/2016

I. Introduction

The purpose of this memorandum is to compare recently obtained (between 2014 and 2016) traffic volumes along the Route 7 at several intersections with the 2011 traffic volumes currently used for the Route 7 Corridor Improvement Project. The assumption is that if the general traffic volumes and patterns have not changed significantly along the Route 7 in the recent years, the 2011 traffic volumes are still considered valid to be used in the VISSIM models and analysis in the Route 7 Corridor Improvement Project. This document presents a comparison of the traffic count data at four intersections along Route 7; Towlston Road, Lewinsville Road, Dulles Toll Road (DTR) Westbound Off-Ramp/Jarrett Valley Drive, and Georgetown Pike. This document then validates that the volume growth since 2011 is very similar to the projected growth line between the original 2011 traffic volumes and the projected year 2040 volumes.

With the exception of the Georgetown Pike intersection, the remaining three intersections are within the current project corridor. The Georgetown Pike intersection is located adjacent to the western terminus of the study corridor and was included in the first phase of the project which recently completed construction. The four intersections included in this document are representative of the different areas along the corridor.

II. Background

Route 7 is proposed to be widened from 4 to 6 lanes between Reston Avenue and DTR Westbound Off-Ramp/Jarrett Valley Drive in Fairfax County. The widening will impact ten signalized and fifteen unsignalized intersections within the project area. The 2011 traffic data was collected in September and October on typical weekdays by the Virginia Department of Transportation (VDOT) for all intersections

within the project corridor. The project has been progressing since 2001 with Phase 1 (from Rolling Holly Drive to Reston Avenue) of the project and Phase 2 (from Reston Avenue to Jarrett Valley Drive) began with the volume data collected in 2011. Given that five years have passed since this data was collected, VDOT wants to confirm that the traffic volumes and patterns along Route 7 are comparable to 2011. It was observed that the traffic patterns along the Route 7 are consistent between Georgetown Pike and Baron Cameron Avenue; Baron Cameron Avenue and Lewinsville Road; and between Lewinsville Road and Jarrett Valley Drive. Therefore, this memorandum was commissioned by VDOT to compare the Route 7 through volumes and the turning movements between the 2011 and the most recent counts available at each of the above listed intersection, to justify the continued use of the 2011 data.

III. Data Analysis and Findings

The 2011 traffic volumes were collected and provided by VDOT along Route 7 at all major intersections within the Route 7 Corridor Improvement Project limits. The projected peak hour turning movement counts for year 2040 were developed from this data and provided to JMT by VDOT for the project analysis and design. Recent year traffic data for the intersections discussed in this document are from different studies outside of the Route 7 Corridor Improvement Project. These studies include:

i. Towlston Road Intersection: 2014 traffic volumes were provided by Fairfax County
ii. Lewinsville Road Intersection: 2015 traffic volumes were provided by Fairfax County
iii. DTR Westbound Off-Ramp/Jarrett Valley Drive Intersection: 2015 traffic volumes obtained from the traffic impact analysis performed for The McLean Islamic Center
iv. Georgetown Pike Intersection: 2016 traffic volumes were provided by Fairfax County; 2011 traffic volumes and 2034 traffic projections from VDOT for Phase 1 of the Route 7 Corridor Improvement Project

Table 1 compares the 2011 traffic count data and the 2014 traffic count data at the intersection of Route 7 and Towlston Road for the AM and PM Peak Hour periods. A negative number in the "% Change" row indicates a decrease in the traffic volume from 2011 to 2014. As seen in Table 1, the traffic volumes in 2014 decrease in some movements and increase in other movements. It is important to note that the higher "% Change" numbers are due to the changes in the lower volume movements where a slight change in volume can spike the percent change in value. These lower volume movements have little bearing on the overall results of the comparison and on the operational modeling results in VISSIM conducted for the Route 7

project. The mainline volumes along Route 7 at this intersection remain the same, in general, when compared to 2011 volumes. The overall intersection traffic volume increased just by 3% and 1% from 2011 to 2014 respectively, for both AM and PM Peak Hours. Table 1 also summarizes the annualized growth rates from the year 2011 to 2014 and from 2011 to the design year 2040 in the AM and PM Peak hours. The total annual growth rate for the AM and PM Peak Hours, both growth rates from year 2011 to year 2040 and from year 2011 to year 2014 were 2% per year. The comparison of these annual growths indicates that the year 2014 traffic volumes are along the growth line from year 2011 to 2040.

Table 1: Traffic Volumes and Annual Growth Comparison at Route 7 and Towlston Rd

	Towlston Road (676) Southbound			Leesburg Pike (7) Westbound			Towlston Road (676) Northbound			Leesburg Pike (7) Eastbound			Total Intersection
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2011 AM PEAK [1]	64	31	51	11	1221	33	48	28	37	88	2487	41	4140
2011 PM PEAK [1]	33	43	185	11	2700	36	68	34	20	145	1472	53	4800
2014 AM PEAK [2]	74	42	70	21	1397	23	49	29	40	154	2625	30	4554
2014 PM PEAK [2]	37	25	227	18	2689	16	59	32	17	140	1613	47	4920
% Change AM	**16%**	**35%**	**37%**	**91%**	**14%**	**-30%**	**2%**	**4%**	**8%**	**75%**	**6%**	**-27%**	**10%**
% Change PM	**12%**	**-42%**	**23%**	**64%**	**0%**	**-56%**	**-13%**	**-6%**	**-15%**	**-3%**	**10%**	**-11%**	**3%**
2040 AM PEAK [3]	108	50	80	55	1975	50	85	45	60	185	4092	65	6850
2040 PM PEAK [3]	57	70	295	60	4345	80	120	55	35	257	2468	85	7927
AM Growth Rate 2011-2014	**5%**	**11%**	**11%**	**24%**	**5%**	**-11%**	**1%**	**1%**	**3%**	**21%**	**2%**	**-10%**	**3%**
PM Growth Rate 2011-2014	**4%**	**-17%**	**7%**	**18%**	**0%**	**-24%**	**-5%**	**-2%**	**-5%**	**-1%**	**3%**	**-4%**	**1%**
AM Growth Rate 2014-2040	**1%**	**1%**	**1%**	**4%**	**1%**	**3%**	**2%**	**2%**	**2%**	**1%**	**2%**	**3%**	**2%**
PM Growth Rate 2014-2040	**2%**	**4%**	**1%**	**5%**	**2%**	**6%**	**3%**	**2%**	**3%**	**2%**	**2%**	**2%**	**2%**
AM Growth Rate 2011-2040	**2%**	**2%**	**2%**	**6%**	**2%**	**1%**	**2%**	**2%**	**2%**	**3%**	**2%**	**2%**	**2%**
PM Growth Rate 2011-2040	**2%**	**2%**	**2%**	**6%**	**2%**	**3%**	**2%**	**2%**	**2%**	**2%**	**2%**	**2%**	**2%**

(1) 2011 Volumes – Actual counts collected for the current study
(2) 2014 Volumes – Actual counts provided by the Fairfax County
(3) 2040 Volumes – Projected volumes based on the 2011 counts collected for the current study

Table 2 compares the 2011 traffic count data and the 2015 traffic count data at the intersection of Route 7 and Lewinsville Road for the AM and PM Peak Hour periods. As with Table 1, a negative number in the "% Change" row indicates a decrease in the traffic volume from 2011 to 2015. According to Table 2, the traffic volumes in 2015 decrease in some movements and increase in other movements. The traffic pattern remains generally the same at the intersection; i.e. high turning volumes for the eastbound left-turn from Route 7 to Lewinsville Road, the reciprocal southbound right-turn from Lewinsville Road onto Route 7, and the through traffic on Route 7. The overall intersection traffic volume increased by 6% from 2011 to

2015 for both AM and PM Peak Hours. As with Table 1, Table 2 also summarizes the annualized growth rates from the year 2011 to 2015 and from 2011 to the design year 2040 in the AM and PM Peak hours. The total annual growth rate in the AM Peak Hour, both growth rates from year 2011 to year 2040 and from year 2011 to year 2015 were 2% per year. For the PM Peak Hour, the growth rate from year 2011 to year 2040 is 1% per year as compared to 2% per year from year 2011 to year 2015. The comparison of these annual growths indicates that the year 2015 traffic volumes are either below or along the growth line from year 2011 to 2040.

Table 2: Traffic Volumes and Annual Growth Comparison at Route 7 and Lewinsville Rd

	Lewinsville Road Southbound			Route 7 Westbound			McLean Bible Church Road Northbound			Route 7 Eastbound			Total Intersection
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2011 AM PEAK (1)	60	15	315	12	967	77	7	5	0	503	2058	32	4051
2011 PM PEAK (1)	49	15	492	21	2284	109	17	37	5	229	1266	54	4578
2015 AM PEAK (2)	54	2	281	3	1121	117	4	6	0	449	2232	10	4279
2015 PM PEAK (2)	56	9	463	2	2205	174	17	43	1	271	1576	31	4848
% Change AM	**-10%**	**-87%**	**-11%**	**-75%**	**16%**	**52%**	**-43%**	**20%**	**0%**	**-11%**	**8%**	**-69%**	**6%**
% Change PM	**14%**	**-40%**	**-6%**	**-90%**	**-3%**	**60%**	**0%**	**16%**	**-80%**	**18%**	**24%**	**-43%**	**6%**
2040 AM PEAK (3)	80	5	425	20	1630	165	10	10	5	680	3270	10	6310
2040 PM PEAK (3)	90	10	655	30	3110	300	20	60	5	375	2225	50	6930
AM Growth Rate 2011-2015	**-3%**	**-40%**	**-3%**	**-29%**	**4%**	**11%**	**-13%**	**5%**	**0%**	**-3%**	**2%**	**-25%**	**2%**
PM Growth Rate 2011-2015	**3%**	**-12%**	**-2%**	**-44%**	**-1%**	**12%**	**0%**	**4%**	**-33%**	**4%**	**6%**	**-13%**	**2%**
AM Growth Rate 2015-2040	**2%**	**4%**	**2%**	**8%**	**2%**	**1%**	**4%**	**2%**	**NA***	**2%**	**2%**	**0%**	**2%**
PM Growth Rate 2015-2040	**2%**	**0%**	**1%**	**11%**	**1%**	**2%**	**1%**	**1%**	**7%**	**1%**	**1%**	**2%**	**1%**
AM Growth Rate 2011-2040	**1%**	**-4%**	**1%**	**2%**	**2%**	**3%**	**1%**	**2%**	**NA***	**1%**	**2%**	**-4%**	**2%**
PM Growth Rate 2011-2040	**2%**	**-1%**	**1%**	**1%**	**1%**	**4%**	**1%**	**2%**	**0%**	**2%**	**2%**	**0%**	**1%**

(1) 2011 Volumes – Actual counts collected for the current study
(2) 2015 Volumes – Actual counts provided by the Fairfax County
(3) 2040 Volumes – Projected volumes based on the 2011 counts collected for the current study
*NA since the Base Volume is zero

Table 3 compares the 2011 traffic count data and the 2015 traffic count data at the intersection of Route 7 and DTR Westbound Off-Ramp/Jarrett Valley Drive for the AM and PM Peak Hour periods. As seen in Table 3, the traffic volumes in 2015 decrease in some movements and increase in other movements. The overall intersection traffic volume increased by 11% from 2011 to 2015 for AM Peak Hour and by 5% for the PM Peak Hour. The increase in westbound through traffic in the AM peak is consistent with a "reverse commute" trend that has been developing since around 2010. The annualized growth rates from the year

2011 to 2015 and from 2011 to the design year 2040 in the AM and PM Peak hours are also shown in the table similar to Table 1 and 2. The total annual growth rate in the AM Peak Hour from year 2011 to year 2040 is 2% per year as compared to 3% per year from year 2011 to year 2015. For the PM Peak Hour, both growth rates from year 2011 to year 2040 and from year 2011 to year 2015 were 2% per year. The comparison of these annual growths indicates that the year 2015 traffic volumes are along the growth line from year 2011 to 2040.

Table 3: Traffic Volumes and Annual Growth Comparison at Route 7 and DTR Westbound Off-Ramp/Jarrett Valley Dr

	Off-Ramp from DTR Southbound			Leesburg Pike (7) Westbound			Jarrett Valley Drive Northbound			Leesburg Pike (7) Eastbound			Total Intersection
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2011 AM PEAK [1]	50	2	--	135	858	--	4	--	78	--	2117	9	3253
2011 PM PEAK [1]	25	7	--	143	1958	--	5	--	23	--	1302	6	3469
2015 AM PEAK [2]	17	4	--	161	1070	--	5	--	70	--	2262	9	3598
2015 PM PEAK [2]	31	4	--	122	1911	--	10	--	31	--	1520	14	3643
% Change AM	**-66%**	**100%**	**--**	**19%**	**25%**	**--**	**25%**	**--**	**-10%**	**--**	**7%**	**0%**	**11%**
% Change PM	**24%**	**-43%**	**--**	**-15%**	**-2%**	**--**	**100%**	**--**	**35%**	**--**	**17%**	**133%**	**5%**
2040 AM PEAK [3]	80	5	--	20	1360	--	5	--	125	--	3500	10	5105
2040 PM PEAK [3]	40	10	--	60	3105	--	10	--	40	--	2180	20	5465
AM Growth Rate 2011-2015	**-24%**	**19%**	**--**	**5%**	**6%**	**--**	**6%**	**--**	**-3%**	**--**	**2%**	**0%**	**3%**
PM Growth Rate 2011-2015	**6%**	**-13%**	**--**	**-4%**	**-1%**	**--**	**19%**	**--**	**8%**	**--**	**4%**	**24%**	**2%**
AM Growth Rate 2015-2040	**6%**	**1%**	**--**	**-8%**	**1%**	**--**	**0%**	**--**	**2%**	**--**	**2%**	**0%**	**1%**
PM Growth Rate 2015-2040	**1%**	**4%**	**--**	**-3%**	**2%**	**--**	**0%**	**--**	**1%**	**--**	**1%**	**1%**	**2%**
AM Growth Rate 2011-2040	**2%**	**3%**	**--**	**-6%**	**2%**	**--**	**1%**	**--**	**2%**	**--**	**2%**	**0%**	**2%**
PM Growth Rate 2011-2040	**2%**	**1%**	**--**	**-3%**	**2%**	**--**	**2%**	**--**	**2%**	**--**	**2%**	**4%**	**2%**

(1) 2011 Volumes – Actual counts collected for the current study
(2) 2015 Volumes – Projected volumes from the McLean Islamic Center traffic impact study
(3) 2040 Volumes – Projected volumes based on the 2011 counts collected for the current study

Table 4 compares the 2008 traffic count data and the 2016 traffic count data at the intersection of Route 7 and Georgetown Pike for the AM and PM Peak Hour periods. This intersection is located outside the limits of Route 7 Corridor Improvement Study; however, the volumes were compared to understand general trend of traffic in the vicinity of the project corridor. Therefore, no traffic volumes were collected and projected for this intersection in the current study. The data used in Phase 1 of the project, which was provided by VDOT, was used to obtain traffic data from 2011 and 2034 for comparing 2016 counts which were provided by the Fairfax County and to derive annual growth rates. As seen in Table 4, the traffic volumes in 2016

decrease in some movements and increase in other movements. The overall intersection traffic volume increased by 3% from 2011 to 2016 for AM Peak Hour and decreased by 3% for the PM Peak Hour. The volumes at this intersection remain the same, in general, when compared to 2011 volumes. The table also summarizes the annualized growth rates from the year 2011 to 2016 and from 2011 to the 2034 (which was the design year for Phase 1) in the AM and PM Peak hours. The total annual growth rate in the AM Peak Hour from year 2011 to year 2034 is 1% per year which is same as the annual growth rate from year 2011 to year 2016. For the PM Peak Hour, the annual growth rate from year 2011 to year 2034 is 1% per year. There is a nominal decrease in volumes by 1% per year is observed from year 2011 to year 2016. The comparison of these annual growths indicates that the year 2016 traffic volumes are along the growth line from year 2011 to 2034 projections from the Phase1 of the project.

Table 4: Traffic Volumes and Annual Growth Comparison at Route 7 and Georgetown Pike

	Georgetown Pike Southbound			Leesburg Pike (7) Westbound			Georgetown Pike Northbound			Leesburg Pike (7) Eastbound			Total Intersection
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2011 AM PEAK [1]	136	--	512	--	901	179	--	--	--	650	2174	--	4552
2011 PM PEAK [1]	106	--	675	--	2537	104	--	--	--	415	1393	--	5230
2016 AM PEAK [2]	145	--	448	--	987	115	--	--	--	768	2241	--	4704
2016 PM PEAK [2]	105	--	655	--	2470	130	--	--	--	384	1309	--	5053
% Change AM	**7%**	**--**	**-13%**	**--**	**10%**	**-36%**	**--**	**--**	**--**	**18%**	**3%**	**--**	**3%**
% Change PM	**-1%**	**--**	**-3%**	**--**	**-3%**	**25%**	**--**	**--**	**--**	**-7%**	**-6%**	**--**	**-3%**
2034 AM PEAK [3]	175	--	740	--	1325	230	--	--	--	940	3125	--	6535
2034 PM PEAK [3]	140	--	975	--	3670	135	--	--	--	600	2005	--	7525
AM Growth Rate 2011-2016	**1%**	**--**	**-3%**	**--**	**2%**	**-8%**	**--**	**--**	**--**	**3%**	**1%**	**--**	**1%**
PM Growth Rate 2011-2016	**0%**	**--**	**-1%**	**--**	**-1%**	**5%**	**--**	**--**	**--**	**-2%**	**-1%**	**--**	**-1%**
AM Growth Rate 2016-2034	**1%**	**--**	**3%**	**--**	**2%**	**4%**	**--**	**--**	**--**	**1%**	**2%**	**--**	**1%**
PM Growth Rate 2016-2034	**2%**	**--**	**2%**	**--**	**2%**	**0%**	**--**	**--**	**--**	**3%**	**2%**	**--**	**2%**
AM Growth Rate 2011-2034	**1%**	**--**	**2%**	**--**	**2%**	**1%**	**--**	**--**	**--**	**2%**	**2%**	**--**	**1%**
PM Growth Rate 2011-2034	**1%**	**--**	**2%**	**--**	**2%**	**1%**	**--**	**--**	**--**	**2%**	**2%**	**--**	**1%**

(1) 2011 Volumes – Actual counts provided by VDOT for Phase 1 of the Route 7 Corridor Improvement Project
(2) 2016 Volumes – Actual counts provided by the Fairfax County
(3) 2034 Volumes – Projected volumes from VDOT for Phase 1 of the Route 7 Corridor Improvement Project

IV. Conclusion

Recent (2014, 2015) traffic volumes obtained for three of the project corridor intersections indicate that, in general, the actual realized annual growth rates from 2011 are very similar to the growth rates used to project the 2040 traffic volumes used for the modeling and design assumptions for the Route 7 Corridor Improvement Project. The 2016 volumes available for the Georgetown Pike intersection are also in line with the traffic projections developed for Phase 1 of the Route 7 Corridor Improvement Project. In conclusion, the comparisons from the applicable study intersections provide an independent data set that validates and supports the continued use of the 2011 existing peak hour and the projected 2040 traffic volumes for the traffic analysis and associated design decisions for the project.

APPENDIX N

2040 Traffic Volume Justification Memo

MEMORANDUM

TO: William Dunn, PE (VDOT)
DATE: July 6, 2016
FROM: Randy Boice, PE (JMT)
PROJECT: Route 7 Corridor Improvement Project (UPC 52328)
JMT JOB NO.: 00-0435

I. INTRODUCTION

The purpose of this memorandum is to provide justification for maintaining the use of the year 2040 as the design year for the project.

II. BACKGROUND

Route 7 is proposed to be widened from 4 to 6 lanes between Reston Parkway and Dulles Toll Road Westbound Off-Ramp/Jarrett Valley Drive in Fairfax County. The widening will impact nine signalized and fifteen unsignalized intersections within the project area. The 2040 projected traffic volume data was developed by VDOT in late 2011 and was based on the 2011 traffic data collected in September and October on typical weekdays for all intersections within the project corridor. The project schedule has been modified since the original data collection and projection activities due to funding constraints and public involvement activities. The schedule modification is such that the advertisement date is now in the 2020 timeframe which would technically make the design year 2042. This memorandum is intended to provide justification for maintaining 2040 as the design year.

III. DESIGN YEAR JUSTIFICATION

The project has been progressing since 2008 and the design to date has been based on the design year established to be 2040. The traffic volume projections were based on the Council of Governments (COG) regional transportation model from 2011 which was based on the 2040 time horizon. The most current COG regional model is still based on the 2040 time horizon.

If the design year was changed to be 2042 the projected volumes would need to be expanded 2 years beyond the COG regional model results through linear interpolation. This would introduce changes to the projected volumes that would need to reset a majority of the evaluations, analysis, and documentation done to date that form the basis of the current design. For example, the through volume for westbound Route 7 during the PM at the Beulah Road intersection would expand from 4,525 vph in 2040 to 4,647 vph in 2042; a difference of 122 vph. Similarly for the northbound right turn during the same time frame at the same intersection would increase from 320 vph in 2040 to 348 vph in 2042; a difference of 28 vph. These relatively low increases will not have a significant impact on any results. The project schedule would be set back about 6 to 8 months in order to redo the documentation for the design. This would also include an increased cost to the project to essentially redo everything that has already been done.

IV. CONCLUSION

The time and cost involved in developing new design year volumes at this point in the project would have no benefit to the overall project. On the contrary, it would further delay the delivery of the project as well as further increase the project development costs for a project that has historically suffered from the lack of adequate funding. The use of 2040 projected traffic data is recommended for the project as it stands today.