



Fairfax County Parkway Widening

Fairfax County Parkway Widening and Interchange at Popes Head Road
Fairfax County, Virginia

ENVIRONMENTAL ASSESSMENT NOVEMBER 2019



Federal Project #: STP-5A01(775)
VDOT Project#: 0286-029-259, P101
UPC#: 107937

ENVIRONMENTAL ASSESSMENT

FAIRFAX COUNTY PARKWAY WIDENING AND INTERCHANGE AT POPES HEAD ROAD FAIRFAX COUNTY, VIRGINIA



VDOT Project#: 0286-029-259, P101

UPC#: 107937

[NOVEMBER 2019]

U.S. Department of Transportation
Federal Highway Administration
and
Virginia Department of Transportation

DRAFT ENVIRONMENTAL ASSESSMENT

Fairfax County Parkway Widening and Interchange at Popes Head Road

Fairfax County, Virginia
Federal Project No.: STP-5A01(775)
State Project No.: 0286-029-259
VDOT UPC: 107937

From: Ox Road (Route 123)
To: 2000 feet North of Lee Highway (Route 29)

Submitted Pursuant to 42 USC 4332(2)(C)

Approved for Public Availability

11/14/19

Date

John Dimkins

For Division Administrator
Federal Highway Administration

TABLE OF CONTENTS

Section 1	PURPOSE AND NEED	5
1.1	INTRODUCTION	5
1.2	STUDY AREA	7
1.3	HISTORY	7
1.4	TRAFFIC FORECASTING METHODOLOGY	7
1.5	NEED	9
1.5.1	Existing Conditions	9
1.5.2	Existing Traffic Conditions	12
1.5.3	Existing Safety	20
1.5.4	Future Traffic Conditions – 2046 No Build	21
1.5.5	Future Safety	31
1.6	SUMMARY	32
Section 2	ALTERNATIVES	33
2.1	INTRODUCTION: PURPOSE OF THIS CHAPTER	33
2.2	OPTIONS DEVELOPMENT AND SCREENING PROCESS	33
2.3	OPTIONS ELIMINATED FROM DETAILED STUDY	33
2.3.1	Transportation System Management Option	33
2.4	IDENTIFICATION OF PREFERRED ALTERNATIVE	34
2.4.1	Fairfax County Parkway Widening	34
2.4.2	Intersections and Interchanges	34
2.4.3	Pedestrian and Bicycle Accommodations	67
2.5	ALTERNATIVES CARRIED FORWARD	69
2.5.1	No Build (No Action) Alternative	69
2.5.2	Preferred Alternative	72
2.5.3	Pedestrian and Bicycle Accommodations	73
2.6	PREFERRED ALTERNATIVE CAPACITY AND SAFETY ANALYSIS	74
2.6.1	Fairfax County Parkway Travel Time Analysis	74
2.6.2	Fairfax County Parkway Density and Speed Analysis	77
2.6.3	Arterial Intersection Operations	84

2.6.4	Traffic Analysis Findings	88
2.6.5	Crash Analysis Findings	89
2.7	ABILITY TO MEET NEEDS	90
Section 3	ENVIRONMENTAL CONSEQUENCES	91
3.1	OVERVIEW OF ENVIRONMENTAL ISSUES	91
3.2	DISCUSSION OF ENVIRONMENTAL ISSUES	101
3.2.1	Right of Way/Relocations	101
3.2.2	Environmental Justice	103
3.2.3	Parks and Recreation	104
3.2.4	Water Quality	106
3.2.5	Natural Resources	109
3.2.6	Pedestrian and Bicycle Accommodations	115
3.2.7	Air Quality	116
3.2.8	Noise	117
3.3	CONSTRUCTION	122
3.3.1	Water Quality	122
3.3.2	Air	122
3.3.3	Noise	123
3.3.4	Solid Waste and Hazardous Materials	123
3.3.5	Late Discoveries	123
3.4	INDIRECT EFFECTS	123
3.4.1	No-Build Alternative	124
3.4.2	Preferred Alternative	124
3.5	CUMULATIVE EFFECTS	125
3.5.1	No-Build Alternative	126
3.5.2	Preferred Alternative	126
Section 4	COORDINATION AND COMMENTS	128
4.1	AGENCY COORDINATION	128
4.2	PUBLIC INVOLVEMENT	128

APPENDICES

APPENDIX 1 – Project Maps

APPENDIX 2 – Cultural Resources

APPENDIX 3 – Natural Resource

APPENDIX 4 – Hazardous Materials

APPENDIX 5 – Parks and Recreation

APPENDIX 6 – Right of Way/Relocations

APPENDIX 7 – Noise Analysis

APPENDIX 8 – Air Quality Analysis

APPENDIX 9 – Environmental Justice

APPENDIX 10 – Scoping Letters and Agency Comments

APPENDIX 11 – Public Notice and Comments

Section 1

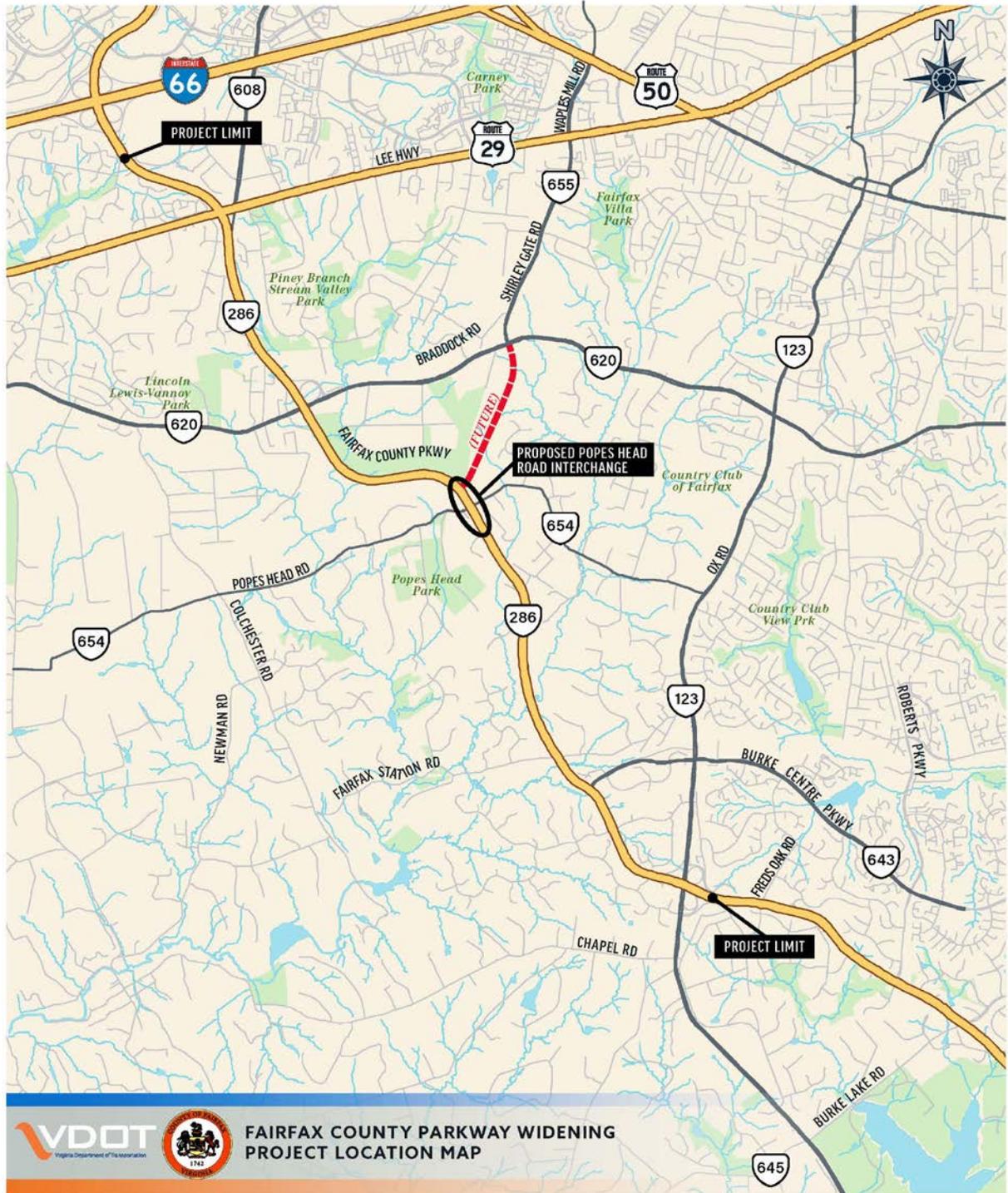
PURPOSE AND NEED

1.1 INTRODUCTION

The Virginia Department of Transportation (VDOT) has initiated a study to evaluate improvements to widen Fairfax County Parkway (Route 286) from north of US Route 29 (Lee Highway) to Route 123 (Ox Road). The proposed improvements consist of widening Fairfax County Parkway from four lanes to six lanes and a new interchange to consolidate the Popes Head Road and future Shirley Gate Road. The proposed project would include the extension of the Fairfax County Parkway Trail, modification or elimination of all intersections along the corridor, and minor improvements at the Fairfax County Parkway at Route 123 interchange. The intersections that would be modified include Fairfax County Parkway at Ladues End Lane/Nomes Court and at Burke Centre Parkway. The intersections that would be eliminated include Fairfax County Parkway at Popes Head Road and at Colchester Meadow Lane. The interchange at Popes Head Road is funded for construction and is currently planned to be implemented in advance of the widening.

Figure 1-1 depicts the location of the proposed widening along Fairfax County Parkway.

Figure 1-1: Project Location Map



1.2 STUDY AREA

The project area for the proposed roadway spans approximately 1,180 acres in area along the roadway corridor and extends approximately 1,670 feet north of Route 29 near the northern limit of the project and approximately 2,340 feet south of Route 123 near the southern limit of the project. The study area consists primarily of low-density residential. The project area is located in central Fairfax County, approximately 3 miles southwest of the City of Fairfax at the midpoint of the project and 0.5 miles south of I-66 at its northern terminus. Planned land uses in this area include public facilities, private open space, 0.1-0.2 dwelling units (du)/acre (ac), 0.2-0.5 du/ac, 1-2 du/ac, and public parks.

1.3 HISTORY

The idea for a “Springfield Bypass” started in the 1970s and the [Commonwealth Transportation Board](#) approved final plans on July 16, 1987 for the 33-mile road, with 16 interchanges and 35 traffic signals between [US Route 1](#) at [Fort Belvoir](#) and near [Dranesville](#). Nearly a year later, the [Fairfax County Board of Supervisors](#) revised the roadway’s name from Springfield Bypass to the Fairfax County Parkway on June 20, 1988. The Fairfax County Parkway opened to traffic as a secondary roadway (Route 7100) in a series of constructed segments between 1987 and 2001, with the segment between Route 123 and I-66 opening in 1995 connecting to previously constructed portions of Fairfax County Parkway. In 2010, the Fairfax County Parkway was officially changed to a primary route which resulted in changing the roadway designation from Route 7100 to Route 286. In 2013, the Fairfax County Parkway was widened from four to six lanes from north of US Route 29 to north of Rugby Road including the construction of an interchange at Fair Lakes Parkway and Monument Drive.

The National Capital Region Transportation Planning Board’s 2016 Constrained Long-Range Plan (CLRP) includes sections north of Rugby Road that are to be widened in the future from 4 to 6 lanes. South of Route 123, where the Fairfax County Parkway is 4 lanes, the CLRP does not include widening to 6 lanes; however, the Fairfax County Comprehensive Plan includes widening to 6 lanes with HOV. The number and type of lanes is currently being evaluated by Fairfax County as part of their Long Range Study. Fairfax County Parkway is a four-lane divided roadway with a mix of interchanges and signalized and unsignalized intersections. Although originally designed as a four-lane facility, the 1991 Fairfax County Comprehensive Plan depicted the entire Fairfax County Parkway as a proposed six-lane facility.

1.4 TRAFFIC FORECASTING METHODOLOGY

The study limits for the Traffic Analysis was from Roberts Parkway to US 29 as established in the Interchange Justification Report (IJR) Framework Document. No changes are proposed to the US 29 interchange at the north end of the corridor and therefore the analysis was limited to just south of the US 29 interchange. The limits were extended to the south to the Roberts Parkway intersection to address the potential for traffic diverted from the Burke Centre Parkway intersection.

Forecast Years

The proposed improvements will be implemented in three phases due to funding constraints. Phase 1 is the Fairfax County Parkway and Popes Head Road and Shirley Gate Road interchange. Phase 1 is fully funded for right of way and construction. Construction is to begin in 2023 and completed in 2025. Phase 2 includes the widening of Fairfax County Parkway from north of US 29 to Nomes Court. Phase 2 is fully funded for right of way and partially funded for construction. It is estimated that construction could begin in 2023 and be completed in 2026. Phase 3 includes the widening of Fairfax County Parkway from Nomes Court to Route 123. Phase 3 is fully funded for design and is currently not funded for right of way or construction in the six-year plan. It is estimated that construction could begin in 2025 and be completed in 2028 depending on funding. Therefore, the opening year is anticipated to be 2026 and the design year for the IJR is 2046. Traffic volumes were developed for the following scenarios:

- Existing conditions (2016)
- 2026
 - No Build conditions including all projects funded through construction by 2026 based on the National Capital Region Transportation Planning Board's 2016 Constrained Long Range Plan (CLRP) and the VDOT Six Year Improvement Program (SYIP)
 - Build conditions including the No Build improvements plus the Route 286 Widening and the interchange at Popes Head Road project
- 2046
 - No Build conditions including all projects funded through construction by 2026 based on the National Capital Region Transportation Planning Board's 2016 Constrained Long Range Plan (CLRP) and the VDOT Six Year Improvement Program (SYIP)
 - Build conditions including the No Build improvements plus the Route 286 Widening and the interchange at Popes Head Road project

The existing conditions and 2046 traffic analysis are presented in the EA. Traffic analysis for the opening year, 2026, is presented in the IJR.

Travel Demand Model

The Fairfax County Transportation Model (FCTM) developed by Fairfax County as an extension of the regional travel demand model developed by the Metropolitan Washington Council of Governments (MWCOCG), was used as the basis for the traffic forecasts. The version of the FCTM provided by Fairfax County Department of Transportation to the study team uses trip tables generated by the MWCOCG Travel Demand Forecasting Model, Version 2.3.57a (adopted October 21, 2015) and Land Use Round 9.0 Cooperative Forecasts (adopted in 2016). To create consistency between the FCTM and the MWCOCG Model (Version 2.3.66, adopted November 16, 2016) that was current at the time of the forecasting efforts, trip tables for input into FCTM for this project were based upon the latest MWCOCG Model.

Model Validation and Calibration: Prior to using the model for development of 2026 and 2046 forecasts, a series of refinements were completed to the base year model including calibration of the model to better match observed conditions. The model was then validated to ensure reasonable volumes across a set of cut lines and corridors defined to capture the movements in the study area.

No Build Model Development: Following the completion of the 2016 model validation, the future year No Build models were developed using zonal demographic data provided by MWCOC in conjunction with the FCTM. Prior to running the No Build 2026 and 2046 models, the model networks were reviewed to confirm that they accurately reflect the projected contained in the CLRP.

Build Network Development: The 2026 and 2046 Build networks were developed by incorporating the proposed improvements associated with the Fairfax County Parkway widening and Popes Head Road interchange project into the No Build input network.

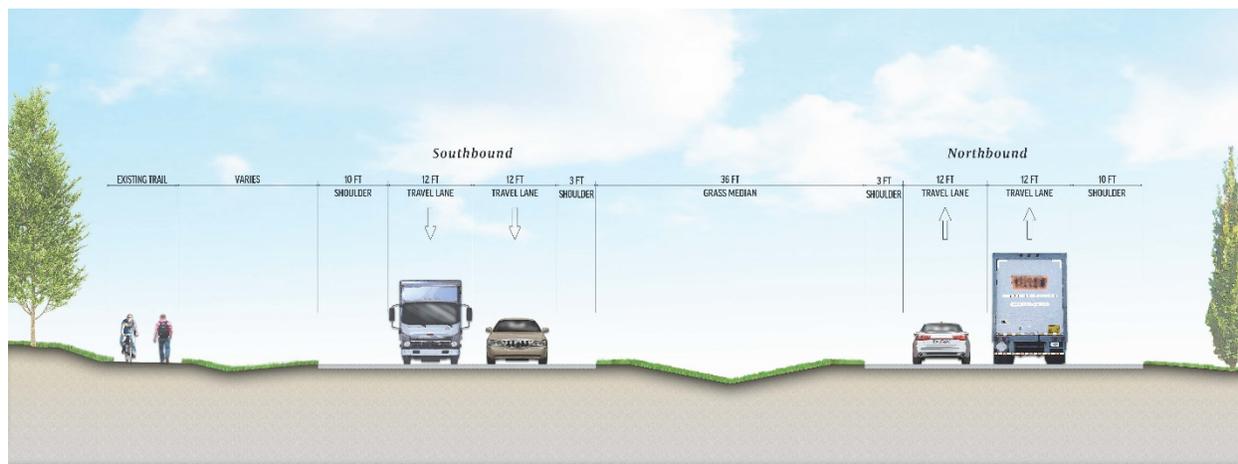
VISUM Model

Following the development of the calibrated FCTM, a VISUM model was established to produce AM and PM peak period traffic volumes at a more detailed level than the model forecasts. The FCTM subarea network was imported into VISUM and refined to include the detailed geometry of all roadway and intersections within the study area including signalized intersections and key unsignalized intersections. Following the validation of the base year (2016) VISUM models for the AM and PM peak periods, the future year VISUM models were developed to establish the 2026 and 2046 AM and PM peak period turning movement forecasts for both No Build and Build conditions.

1.5 NEED

1.5.1 Existing Conditions

Fairfax County Parkway is generally a four-lane divided, open-section roadway and classified as an Urban Other Principal Arterial within the project limits. The typical section consists of two 12-foot wide travel lanes in each direction with a 10-foot wide paved shoulder on the outside and divided by a 42-foot wide median. The existing roadway was designed with the provision of providing a future additional lane in each direction in the median. Between Braddock Road and Route 29, there is an existing 12-foot wide auxiliary lane in each direction that serves as acceleration and deceleration lanes for the two interchanges. Approximately 2,000 feet north of the Route 29 interchange the Parkway transitions from a four-lane facility to a six-lane facility with a concrete median barrier. Fairfax County Parkway has a 50-mph design speed and a 50-mph posted speed limit. **Figure 1-2** depicts the existing typical section along Fairfax County Parkway

Figure 1-2: Existing Typical Section – Burke Centre Parkway to Braddock Road

Interchanges

Along Fairfax County Parkway within the study limits, there are three existing interchanges located at US Route 29 (Lee Highway), Route 620 (Braddock Road), and Route 123 (Ox Road).

US Route 29 Interchange: US Route 29 is a six-lane divided roadway classified as an Other Principal Arterial in the vicinity of the interchange. The US Route 29 interchange with Fairfax County Parkway is a three-level diamond interchange with directional entrance and exit ramps located along northbound and southbound Fairfax County Parkway. The interchange also serves Route 608 (West Ox Road). The entrance ramp from US Route 29 to southbound Fairfax County Parkway is a two-lane entrance ramp that transitions to a single lane and continues as an auxiliary lane along southbound Fairfax County Parkway to Braddock Road.

Braddock Road Interchange: Braddock Road is a four-lane divided roadway classified as a Minor Arterial in the vicinity of the interchange. The Braddock Road interchange is a folded diamond interchange with a loop ramp located in the northeast quadrant of the interchange. Two signalized intersections located along Braddock Road serve the northbound and southbound Fairfax County Parkway ramp movements.

Route 123 Interchange: Route 123 is a four-lane divided roadway classified as an Other Principal Arterial in the vicinity of the interchange. The Route 123 interchange is a partial cloverleaf interchange with loop ramps located in the northeast and southeast quadrants of the interchange. The loop ramp in the southeast quadrant serves the southbound Fairfax County Parkway movements to northbound and southbound Route 123. Two signalized intersections located along Route 123 serve the northbound and southbound Fairfax County Parkway ramp movements. The southbound ramps signal includes a fourth leg of the intersection serving Robert Carter Road.

Intersections

Fairfax County Parkway at Popes Head Road: This signalized intersection is located along Fairfax County Parkway approximately one mile south of the Braddock Road interchange. Both

northbound and southbound Fairfax County Parkway include single left-turn and right-turn lanes and two through lanes. The eastbound and westbound Popes Head Road approaches include separate left-turn, through, and right-turn lanes.

Fairfax County Parkway at Colchester Meadow Lane: This unsignalized intersection is located along Fairfax County Parkway approximately 800 feet south of the intersection with Popes Head Road. Both eastbound and westbound Colchester Meadow Lane are stop-controlled and have a single lane for all turning movements. Both northbound and southbound Fairfax County Parkway include a single left-turn and right-turn lane and two through lanes.

Fairfax County Parkway at Ladues End Lane / Nomes Court: This unsignalized intersection is located approximately 0.6 miles south of the Popes Head Road intersection. Both eastbound Ladues End Lane and westbound Nomes Court are stop-controlled and have a single lane for all turning movements. Both northbound and southbound Fairfax County Parkway includes a single left-turn and right-turn lane and two through lanes.

Fairfax County Parkway at Burke Centre Parkway: This three-legged signalized intersection is located south of the Fairfax Station Road overpass along Fairfax County Parkway and approximately 0.85 miles north of the Route 123 interchange. The northbound Fairfax County Parkway approach includes two through lanes and a channelized right-turn lane. Southbound Fairfax County Parkway has two left-turn lanes and two through lanes. Westbound Burke Centre Parkway has two right-turn lanes and a single left-turn lane.

Pedestrian and Bicycle Facilities

There is an existing 8-foot wide asphalt path along Fairfax County Parkway between Burke Centre Parkway and US Route 29. Between Burke Centre Parkway and Braddock Road, the asphalt path is located on the west side of the Parkway and between Braddock Road and US Route 29, the asphalt path is located on the east side of the Fairfax County Parkway. At the Braddock Road interchange, the existing asphalt path is located adjacent to the southbound Fairfax County Parkway on-ramp from Braddock Road and connects to the existing asphalt path along the south side of the Braddock Road.

At the intersection of Braddock Road and the northbound Fairfax County Parkway ramps, signalized pedestrian crossings on the west and north legs of the intersection connect the asphalt path along the south side of Braddock Road to the asphalt trail located adjacent to the northbound Fairfax County Parkway on-ramp from Braddock Road.

At the Fairfax County Parkway and Burke Centre Parkway intersection, there are signalized pedestrian crossings on the south and east legs of the intersection that connect the asphalt path along the west side of Fairfax County Parkway to the existing asphalt path along the north side of Burke Centre Parkway.

At the US Route 29 interchange, the existing asphalt path is located adjacent to the northbound Fairfax County Parkway off-ramp to US Route 29 and West Ox Road and connects to the existing asphalt paths along the south side of US Route 29 and along West Ox Road.

The Countywide Trails Plan Map, which was adopted by the Fairfax County Board of Supervisors and is part of the Fairfax County Comprehensive Plan, depicts a major regional trail (Fairfax County Parkway Trail) and a major paved trail along the Fairfax County Parkway within the majority of the limits of the project and includes a note that states “[t]rails are to be located on one side of the Fairfax County Parkway.” A major paved trail is defined as being asphalt or concrete and is 8 feet or more in width. The Fairfax County Parkway Trail is part of the County’s major regional trail system and is a major paved trail. The existing pedestrian and bicycle facilities need to be reconstructed where impacted, upgraded, and made safer by eliminating all existing at-grade crossings of Fairfax County Parkway.

1.5.2 Existing Traffic Conditions

1.5.2.1 Fairfax County Parkway Travel Time Analysis

AM Peak Hour

Figures 1-3 and 1-4 summarize cumulative travel times for northbound and southbound Fairfax County Parkway during the AM peak hour under existing conditions between intersections and interchanges along the corridor from the Roberts Parkway intersection located south of the Route 123 interchange to south of the US 29 interchange. During the AM peak hour, the peak travel direction along Fairfax County Parkway is northbound toward I-66 and the employment centers in the Dulles area and Washington, D.C. The existing corridor travel times along Fairfax County Parkway during the AM peak hour are 15.8 minutes in the northbound direction and 8.0 minutes in the southbound direction. For comparison purposes, the corridor free-flow travel time along Fairfax County Parkway is 7.4 minutes in the northbound direction and 7.5 minutes in the southbound direction.

Figure 1-3: AM Peak Hour – Northbound Fairfax County Parkway Cumulative Travel Times (Existing)

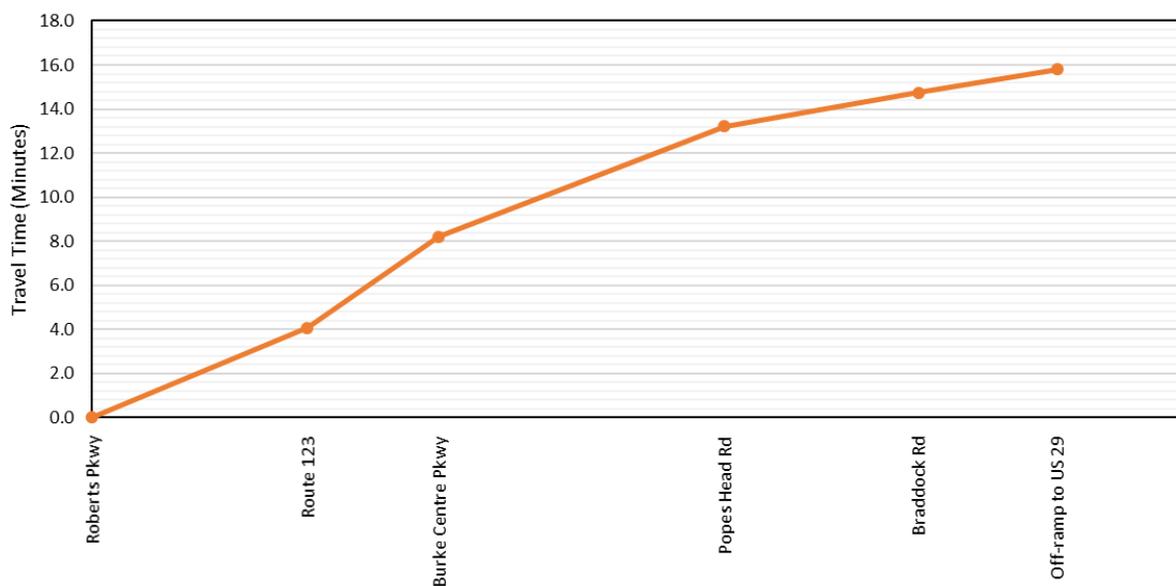
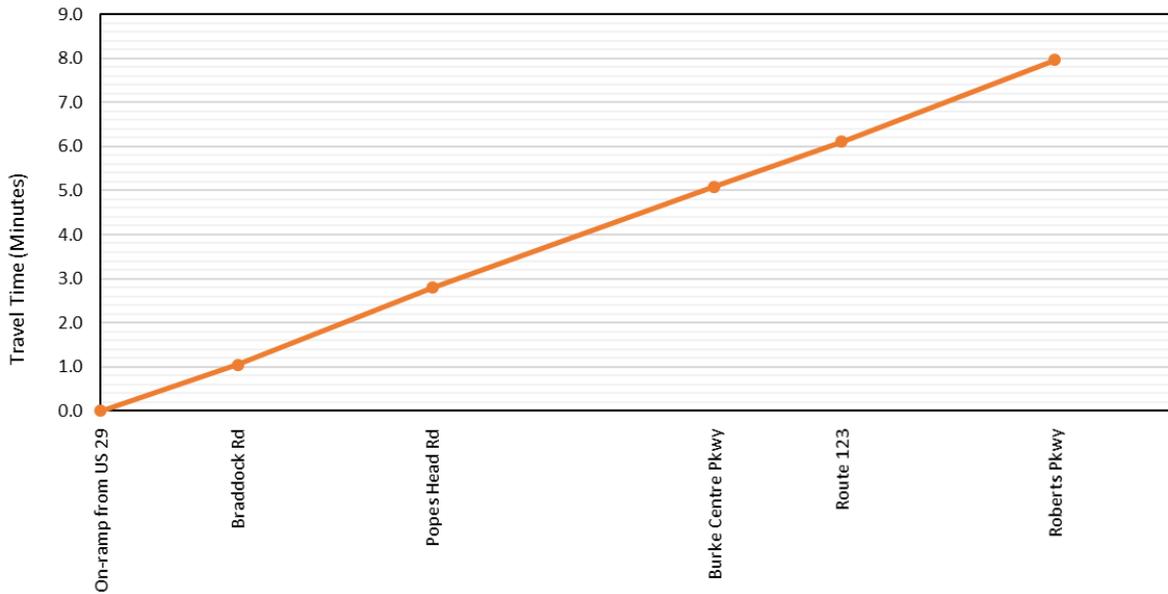


Figure 1-4: AM Peak Hour – Southbound Fairfax County Parkway Cumulative Travel Times (Existing)



PM Peak Hour

Figures 1-5 and 1-6 summarize cumulative travel times for northbound and southbound Fairfax County Parkway during the PM peak hour under existing conditions between intersections and interchanges along the corridor from the Roberts Parkway intersection located south of the Route 123 interchange to south of the US 29 interchange. During the PM peak hour, the peak direction along Fairfax County Parkway is southbound toward Springfield and the Route 123 corridor. The existing corridor travel times along Fairfax County Parkway for the PM peak hour are 8.4 minutes in the northbound direction and 13.8 minutes in the southbound direction. For comparison purposes, the corridor free-flow travel time along Fairfax County Parkway is 7.4 minutes in the northbound direction and 7.5 minutes in the southbound direction.

Figure 1-5: PM Peak Hour – Northbound Fairfax County Parkway Cumulative Travel Times (Existing)

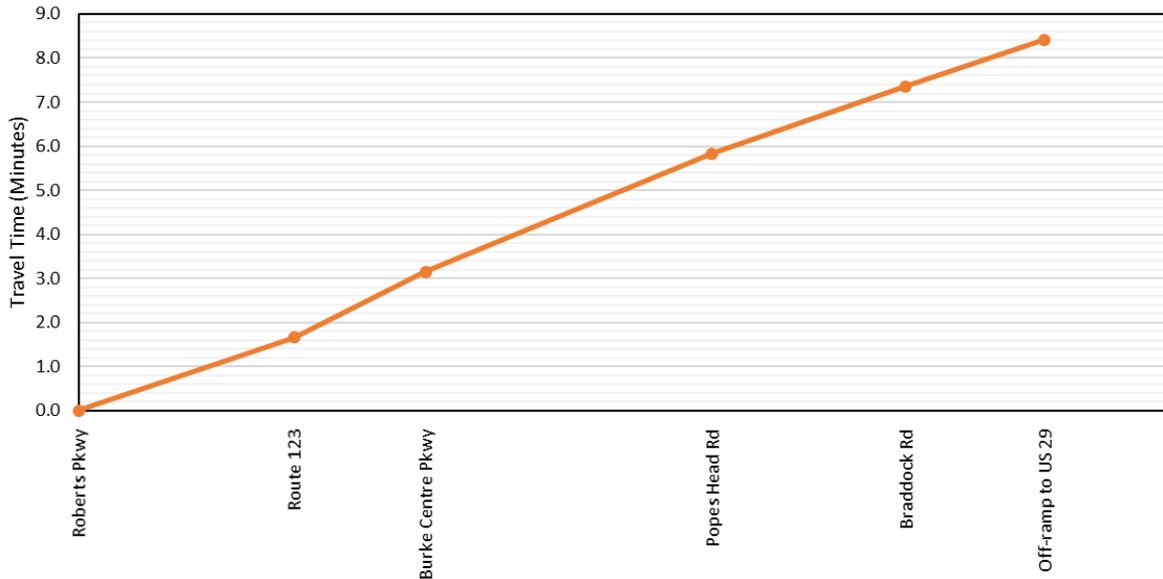
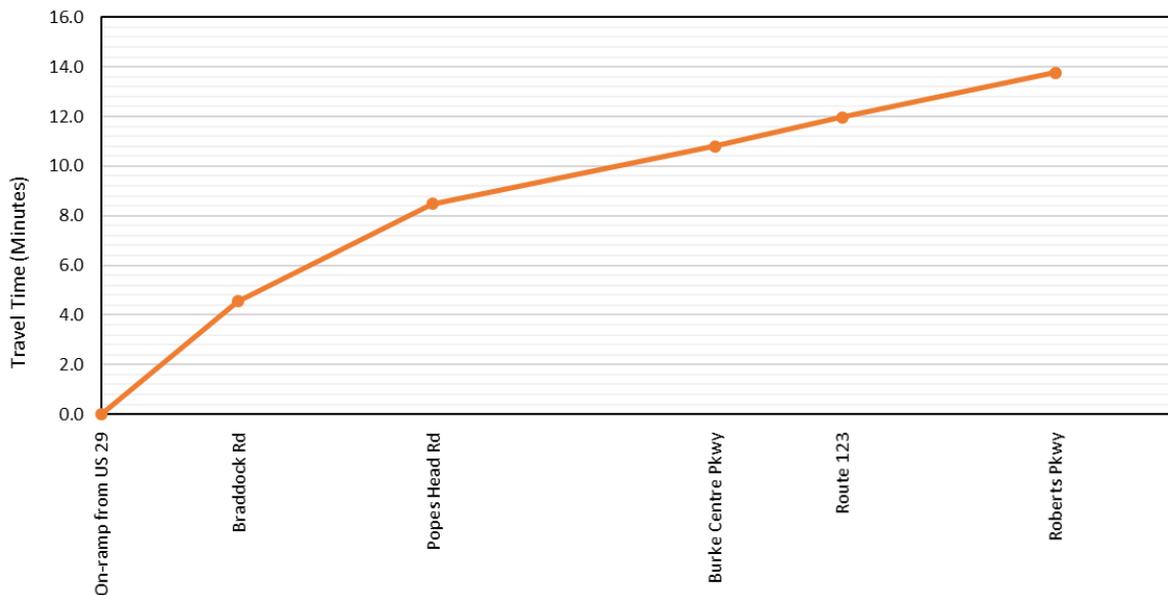


Figure 1-6: PM Peak Hour – Southbound Fairfax County Parkway Cumulative Travel Times (Existing)



1.5.2.2 Fairfax County Parkway Density and Speed Analysis

Operational conditions for the Fairfax County Parkway corridor and arterial intersections were color-coded to reflect various congestion levels based on density and delay thresholds established in the HCM. **Tables 1-1 and 1-2** summarize the thresholds for freeways segments, weave/ramp segments, signalized intersections, and unsignalized intersections in accordance with the Traffic Operations and Safety Analysis Manual (TOSAM).

Table 1-1: Freeway Measures of Effectiveness

Congestion Level	Freeways	Weaves/Ramps
	Average Density (veh/mi/ln)	Average Density (veh/mi/ln)
Light Traffic	≤ 26	≤ 28
Moderate Traffic	>26 - 35	>28 - 35
Heavy Congestion	>35 - 45	>35 - 45
Severe Congestion	>45	>45

Source: VDOT TOSAM – Version 1.0 (page F-31)

Table 1-2: Intersection Measures of Effectiveness

Congestion Level	Intersections	
	Signalized	Unsignalized
	Average Delay (sec/veh)	Average Delay (sec/veh)
Light Traffic	≤ 35	≤ 25
Moderate Traffic	>35 - 55	>25 - 35
Heavy Congestion	>55 - 80	>35 - 50
Severe Congestion	>80	>50

AM Peak Period

Tables 1-3a and 1-3b depict existing travel speeds and densities along northbound and southbound Fairfax County Parkway during the AM peak hour. Also shown is the volume input versus the volume throughput (i.e., volume served based on the simulated outputs from VISSIM) at segments along Fairfax County Parkway. Although density is not typically used as a measure of effectiveness along signalized arterials, it is presented as a baseline for comparison to future No Build and Build conditions.

Table 1-3a: AM Peak Hour Northbound Fairfax County Parkway Speed and Density by Segment (Existing)

Segment-Lane	Length (ft)	Location	Type	Volume Input	Volume Throughput		Percent Unserved	Lane Speed (mph)	Average Speed (mph)	Lane Density (vpmpl)	Average Density (vpmpl)
477-1	1113	NB FCP between Roberts Pkwy/Karmich St and New Rd start of turn lane	Mainline	2011	1002	2069		48	48	21	21
477-2	1113				1067			49		22	
476-1	319	NB FCP between New Rd start of turn lane and intersection	Mainline	1990	1012	2054		48	48	22	22
476-2	319				1042			48		22	
469-1	2696	NB FCP between New Rd and Freds Oak Rd start of turn lanes	Mainline	1994	1028	2068		38	38	34	33
469-2	2696				1040			39		33	
470-1	356	NB FCP between Freds Oak Rd start of turn lanes and intersection	Mainline	1963	1079	2045		27	27	57	55
470-2	356				965			27		52	
261-1	749	NB FCP between Freds Oak Rd and diverge to Rt 123	Mainline	1993	1093	2075		25	24	58	57
261-2	749				982			24		56	
882-1	365	NB FCP diverge to Rt 123	Diverge	1993	326	2083		41	26	8	46
882-2	365				831			18		64	
882-3	365				926			19		67	
885-1	1338	NB FCP between diverge to Rt 123 and merge from NB Rt 123	Mainline	1574	786	1676		9	10	96	93
885-2	1338				891			11		89	
851-1	350	NB FCP merge from NB Rt 123	Merge	2264	403	2365		8	9	50	89
851-2	350				868			8		109	
851-3	350				1094			10		107	
379-1	644	NB FCP between merge from NB Rt 123 and merge from SB Rt 123	Mainline	2264	1152	2360		12	13	94	94
379-2	644				1208			13		95	
552-1	253	NB FCP merge from SB Rt 123	Merge	2303	26	2398		16	14	2	63
552-2	253				1167			13		93	
552-3	253				1205			13		95	
221-1	2346	NB FCP between merge from SB Rt 123 and Burke Centre Pkwy start of turn lanes	Mainline	2303	1194	2397		13	13	94	94
221-2	2346				1203			13		94	
223-1	457	NB FCP between Burke Centre Pkwy start of turn lanes and intersection	Mainline	2291	1181	2387		12	12	99	99
223-2	457				1206			12		99	
455-1	4944	NB FCP between Burke Centre Pkwy and Ladues End Ln/Nomes Ct start of turn lanes	Mainline	2929	1520	3048		23	23	65	65
455-2	4944				1528			23		66	
456-1	364	NB FCP between Ladues End Ln/Nomes Ct start of turn lanes and intersection	Mainline	2924	1489	2986		19	19	78	78
456-2	364				1497			19		78	
453-1	2822	NB FCP between Ladues End Ln/Nomes Ct and Colchester Meadow Ln start of turn	Mainline	2927	1498	3014		20	20	76	76
453-2	2822				1516			20		76	
454-1	334	NB FCP between Colchester Meadow Ln start of turn lanes and intersection	Mainline	2925	1522	3068		21	21	72	72
454-2	334				1546			21		72	
446-1	326	NB FCP between Colchester Meadow Ln and Popes Head Rd start of turn lanes	Mainline	2930	1520	3074		21	21	72	72
446-2	326				1554			22		72	
448-1	393	NB FCP between Popes Head Rd start of turn lanes and intersection	Mainline	2916	1479	3065		20	21	73	73
448-2	393				1586			22		73	
424-1	6204	NB FCP between Popes Head Rd and diverge to Braddock Rd	Mainline	3331	1675	3417		49	49	34	35
424-2	6204				1742			49		35	
430-1	445	NB FCP diverge to Braddock Rd	Diverge	3331	101	3393		51	48	2	24
430-2	445				1627			47		35	
430-3	445				1665			46		36	
437-1	1126	NB FCP between diverge to Braddock Rd and merge from Braddock Rd	Mainline	3194	1608	3241		49	49	33	33
437-2	1126				1633			49		33	
419-1	3753	NB FCP between merge from Braddock Rd and south of US 29 diverge	Mainline	4126	1202	4148		52	51	23	27
419-2	3753				1462			51		29	
419-3	3753				1483			50		30	
558-1	1384	NB FCP off-ramp to Rt 123	Ramp	419	418	418		34	34	12	12
551-1	1729	NB FCP on-ramp from NB Rt 123	Ramp	690	681	681	-1%	21	21	32	32
258-1	1820	NB FCP on-ramp from SB Rt 123	Ramp	39	36	36	-7%	41	41	1	1
569-1	1156	NB FCP off-ramp to Braddock Rd	Ramp	137	140	140		38	38	4	4
319-1	455	NB FCP on-ramp from Braddock Rd	Ramp	932	922	922	-1%	31	31	30	30

Table 1-3b: AM Peak Hour Southbound Fairfax County Parkway Speed and Density by Segment (Existing)

Segment-Lane	Length (ft)	Location	Type	Volume Input	Volume Throughput	Percent Unserved	Lane Speed (mph)	Average Speed (mph)	Lane Density (vpmpl)	Average Density (vpmpl)	
420-1	3928	SB FCP weave between US 29 and Braddock Rd	Weave	3218	3229		856	51	17	21	
420-2	3928						1255		25		
420-3	3928						1118		22		
431-1	2194	SB FCP between diverge to Braddock Rd and merge from Braddock Rd	Mainline	2324	2330		1184	51	23	23	
431-2	2194						1146		22		
429-1	369						SB FCP merge from Braddock Rd		Merge		2742
429-2	369	1367	28								
429-3	369	1196	24								
425-1	4643	SB FCP between merge from Braddock Rd and Popes Head Rd start of turn lanes	Mainline	2742	2766		1397	45	31	31	
425-2	4643						1369		30		
427-1	386	SB FCP between Popes Head Rd start of turn lanes and intersection	Mainline	2646	2676		1328	23	59	58	
427-2	386						1349		58		
443-1	402	SB FCP between Popes Head Rd and Colchester Meadow Ln start of turn lanes	Mainline	2721	2752		1345	46	29	29	
443-2	402						1407		29		
445-1	360	SB FCP between Colchester Meadow Ln start of turn lanes and intersection	Mainline	2717	2747		1349	48	28	29	
445-2	360						1398		29		
451-1	2733	SB FCP between Colchester Meadow Ln and Ladues End Ln/Nomes Ct start of turn	Mainline	2718	2767		1363	50	27	28	
451-2	2733						1404		28		
452-1	382	SB FCP between Ladues End Ln/Nomes Ct start of turn lanes and intersection	Mainline	2717	2771		1368	49	28	28	
452-2	382						1403		28		
457-1	4952	SB FCP between Ladues End Ln/Nomes Ct and Burke Centre Pkwy start of turn lanes	Mainline	2720	2779		1345	48	28	29	
457-2	4952						1434		30		
20002-1	438	SB FCP between Burke Centre Pkwy start of turn lanes and intersection	Mainline	2520	2561		1317	40	33	32	
20002-2	438						1245		31		
220-1	3960	SB FCP between Burke Centre Pkwy and diverge to Rt 123	Mainline	2533	2571		1314	49	27	26	
220-2	3960						1257		25		
850-1	385	SB FCP diverge to Rt 123	Diverge	2533	2551		318	49	7	19	
850-2	385						1076		24		
850-3	385						1157		26		
884-1	1426	SB FCP between diverge to Rt 123 and merge from Rt 123	Mainline	2072	2091		990	50	20	21	
884-2	1426						1101		22		
259-1	453	SB FCP weave between Rt 123 and Freds Oak Rd start of turn lanes	Weave	2262	2290		79	36	2	16	
259-2	453						1106		48		
259-3	453						1106		49		
260-1	434	SB FCP between Freds Oak Rd start of turn lanes and intersection	Mainline	2243	2263		1135	49	23	23	
260-2	434						1129		23		
467-1	2716	SB FCP between Freds Oak Rd and New Rd start of turn lane	Mainline	2266	2291		1147	50	23	23	
467-2	2716						1144		23		
468-1	332	SB FCP between New Rd start of turn lane and intersection	Mainline	2258	2289		1133	49	23	23	
468-2	332						1156		24		
473-1	904	SB FCP between New Rd and Roberts Pkwy/Karmich St start of turn lanes	Mainline	2279	2323		1123	40	28	28	
473-2	904						1199		42		
480-1	595	SB FCP between Roberts Pkwy/Karmich St start of turn lanes and intersection	Mainline	2131	2186		1091	25	43	43	
480-2	595						1095		25		
432-1	582	SB FCP off-ramp to Braddock Rd	Ramp	894	900	900		33	33	28	28
436-1	719	SB FCP on-ramp from Braddock Rd	Ramp	418	427	427		39	39	11	11
796-1	657	SB FCP off-ramp to Rt 123	Ramp	461	473	473		31	31	17	17
543-1	988	SB FCP on-ramp from Rt 123	Ramp	190	200	200		35	35	6	6

PM Peak Hour

Tables 1-4a and 1-4b depict existing travel speeds and densities along northbound and southbound Fairfax County Parkway during the PM peak hour. Also shown is the volume input versus the volume throughput (i.e., volume served based on the simulated outputs from VISSIM) at segments along Fairfax County Parkway.

Table 1-3a: PM Peak Hour Northbound Fairfax County Parkway Speed and Density by Segment (Existing)

Segment-Lane	Length (ft)	Location	Type	Volume Input	Volume Throughput		Percent Unserved	Lane Speed (mph)	Average Speed (mph)	Lane Density (vpmpl)	Average Density (vpmpl)
477-1	1112	NB FCP between Roberts Pkwy/Karmich St and New Rd start of turn lane	Mainline	2301	1126	2331		49	49	23	24
477-2	1112				1205			50		24	
476-1	319	NB FCP between New Rd start of turn lane and intersection	Mainline	2269	1136	2298		51	51	22	23
476-2	319				1162			51		23	
469-1	2696	NB FCP between New Rd and Freds Oak Rd start of turn lanes	Mainline	2273	1158	2309		50	50	23	23
469-2	2696				1150			50		23	
470-1	356	NB FCP between Freds Oak Rd start of turn lanes and intersection	Mainline	2218	1186	2246		49	49	24	23
470-2	356				1061			50		21	
261-1	749	NB FCP between Freds Oak Rd and diverge to Rt 123	Mainline	2254	1194	2270		49	50	24	23
261-2	749				1076			50		21	
882-1	365	NB FCP diverge to Rt 123	Diverge	2254	211	2276		51	49	4	16
882-2	365				1002			49		21	
882-3	365				1062			49		22	
885-1	1338	NB FCP between diverge to Rt 123 and merge from NB Rt 123	Mainline	1950	945	1963		51	50	19	19
885-2	1338				1018			50		20	
851-1	350	NB FCP merge from NB Rt 123	Merge	2504	231	2525		13	35	18	22
851-2	350				1221			45		27	
851-3	350				1073			48		22	
379-1	644	NB FCP between merge from NB Rt 123 and merge from SB Rt 123	Mainline	2504	1270	2519		49	49	26	26
379-2	644				1249			49		25	
552-1	253	NB FCP merge from SB Rt 123	Merge	2520	7	2535		19	40	1	17
552-2	253				1280			50		25	
552-3	253				1248			50		25	
221-1	2346	NB FCP between merge from SB Rt 123 and Burke Centre Pkwy start of turn lanes	Mainline	2520	1286	2538		35	35	37	37
221-2	2346				1252			35		36	
223-1	457	NB FCP between Burke Centre Pkwy start of turn lanes and intersection	Mainline	2505	1259	2518		17	17	76	76
223-2	457				1260			17		76	
455-1	4944	NB FCP between Burke Centre Pkwy and Ladues End Ln/Nomes Ct start of turn lanes	Mainline	2830	1429	2870		50	50	29	29
455-2	4944				1441			50		29	
456-1	364	NB FCP between Ladues End Ln/Nomes Ct start of turn lanes and intersection	Mainline	2828	1437	2875		49	49	29	29
456-2	364				1438			49		29	
453-1	2822	NB FCP between Ladues End Ln/Nomes Ct and Colchester Meadow Ln start of turn	Mainline	2830	1436	2874		40	40	36	36
453-2	2822				1438			40		36	
454-1	334	NB FCP between Colchester Meadow Ln start of turn lanes and intersection	Mainline	2826	1430	2865		26	26	55	55
454-2	334				1435			26		55	
446-1	326	NB FCP between Colchester Meadow Ln and Popes Head Rd start of turn lanes	Mainline	2828	1389	2805	-1%	23	24	60	60
446-2	326				1415			24		60	
448-1	393	NB FCP between Popes Head Rd start of turn lanes and intersection	Mainline	2790	1410	2823		22	22	66	65
448-2	393				1413			22		65	
424-1	6204	NB FCP between Popes Head Rd and diverge to Braddock Rd	Mainline	2928	1499	2969		49	49	31	30
424-2	6204				1470			49		30	
430-1	445	NB FCP diverge to Braddock Rd	Diverge	2928	430	2972		49	45	9	23
430-2	445				1236			43		29	
430-3	445				1305			43		30	
437-1	1126	NB FCP between diverge to Braddock Rd and merge from Braddock Rd	Mainline	2326	1135	2355		50	50	23	23
437-2	1126				1220			50		24	
935-1	3750	NB FCP between merge from Braddock Rd and south of US 29 diverge	Mainline	3054	879	3090		52	51	17	20
935-2	3750				1108			51		22	
935-3	3750				1103			50		22	
558-1	1384	NB FCP off-ramp to Rt 123	Ramp	304	310	310		35	35	9	9
551-1	1729	NB FCP on-ramp from NB Rt 123	Ramp	554	567	567		25	25	23	23
258-1	1820	NB FCP on-ramp from SB Rt 123	Ramp	16	14	14	-13%	41	41	0	0
569-1	1156	NB FCP off-ramp to Braddock Rd	Ramp	602	615	615		36	36	17	17
319-1	455	NB FCP on-ramp from Braddock Rd	Ramp	728	733	733		32	32	23	23

Table 1-4b: PM Peak Hour Southbound Fairfax County Parkway Speed and Density by Segment (Existing)

Segment-Lane	Length (ft)	Location	Type	Volume Input	Volume Throughput	Percent Unserved	Lane Speed (mph)	Average Speed (mph)	Lane Density (vpmp)	Average Density (vpmp)	
69-1	1595	SB FCP weave between US 29 and Braddock Rd (part 1)	Weave	3448	3473		9	12	116	101	
69-2	1595						11		102		
69-3	1595						16		86		
420-1	2150	SB FCP weave between US 29 and Braddock Rd (part 2)	Weave	3448	3322	-4%	13	12	66	91	
420-2	2150						10		111		
420-3	2150						14		95		
431-1	2193	SB FCP between diverge to Braddock Rd and merge from Braddock Rd	Mainline	2708	2693	-1%	10	12	121	111	
431-2	2193						15		102		
429-1	369	SB FCP merge from Braddock Rd	Merge	3079	3071		4	10	89	101	
429-2	369						10		119		
429-3	369						17		95		
425-1	4643	SB FCP between merge from Braddock Rd and Popes Head Rd start of turn lanes	Mainline	3079	3069		23	23	67	67	
425-2	4643						23		68		
427-1	386	SB FCP between Popes Head Rd start of turn lanes and intersection	Mainline	2957	2937	-1%	23	23	63	63	
427-2	386						23		63		
443-1	395	SB FCP between Popes Head Rd and Colchester Meadow Ln start of turn lanes	Mainline	3007	2988	-1%	49	49	31	31	
443-2	395						49		30		
445-1	368	SB FCP between Colchester Meadow Ln start of turn lanes and intersection	Mainline	3001	2979	-1%	50	50	30	30	
445-2	368						50		30		
451-1	2732	SB FCP between Colchester Meadow Ln and Ladues End Ln/Nomes Ct start of turn	Mainline	3001	2988		50	50	30	30	
451-2	2732						50		30		
452-1	384	SB FCP between Ladues End Ln/Nomes Ct start of turn lanes and intersection	Mainline	2997	2982	-1%	50	50	30	30	
452-2	384						50		30		
457-1	4952	SB FCP between Ladues End Ln/Nomes Ct and Burke Centre Pkwy start of turn lanes	Mainline	2999	2990		46	47	32	32	
457-2	4952						47		32		
20002-1	438	SB FCP between Burke Centre Pkwy start of turn lanes and intersection	Mainline	2731	2719		40	40	35	34	
20002-2	438						40		34		
220-1	3960	SB FCP between Burke Centre Pkwy and diverge to Rt 123	Mainline	2747	2737		46	47	35	29	
220-2	3960						49		24		
850-1	385	SB FCP diverge to Rt 123	Diverge	2747	2722	-1%	18	27	47	41	
850-2	385						24		45		
850-3	385						39		32		
884-1	1426	SB FCP between diverge to Rt 123 and merge from Rt 123	Mainline	1691	1687		52	51	14	17	
884-2	1426						50		19		
259-1	453	SB FCP weave between Rt 123 and Freds Oak Rd start of turn lanes	Weave	1874	1867		41	48	2	12	
259-2	453						51		17		
259-3	453						51		18		
260-1	434	SB FCP between Freds Oak Rd start of turn lanes and intersection	Mainline	1832	1824		51	51	17	18	
260-2	434						51		18		
467-1	2716	SB FCP between Freds Oak Rd and New Rd start of turn lane	Mainline	1854	1849		51	51	18	18	
467-2	2716						51		19		
468-1	332	SB FCP between New Rd start of turn lane and intersection	Mainline	1850	1835	-1%	51	51	18	18	
468-2	332						51		19		
473-1	905	SB FCP between New Rd and Roberts Pkwy/Karmich St start of turn lanes	Mainline	1864	1848	-1%	48	49	18	19	
473-2	905						49		20		
480-1	598	SB FCP between Roberts Pkwy/Karmich St start of turn lanes and intersection	Mainline	1742	1724	-1%	24	25	35	35	
480-2	598						25		35		
432-1	582	SB FCP off-ramp to Braddock Rd	Ramp	740	743	743		40	40	18	18
436-1	719	SB FCP on-ramp from Braddock Rd	Ramp	371	364	364	-2%	14	14	39	39
796-1	657	SB FCP off-ramp to Rt 123	Ramp	1056	1053	1053		12	12	88	88
543-1	988	SB FCP on-ramp from Rt 123	Ramp	183	177	177	-3%	34	34	5	5

1.5.2.3 Arterial Intersection Operations

Table 1-5 depicts overall intersection delay for both signalized and unsignalized intersections within the study area for the AM and PM peak hours for existing conditions.

Table 1-4: Intersection Delay Summary (Existing Conditions)

Intersection		Existing Conditions		
		Intersection Control	Average Delay (seconds)	
			AM Peak Hour	PM Peak Hour
1	Fairfax County Pkwy & Roberts Pkwy/ Karmich St	Signalized	31	26
2	Fairfax County Pkwy & New Rd	Unsignalized	3	1
3	Fairfax County Pkwy & Freds Oak Rd	Unsignalized	19	3
4	Route 123 & Chapel Rd	Signalized	30	16
5	Route 123 & Fairfax County Pkwy SB Ramps/ Robert Carter Rd	Signalized	43	62
6	Route 123 & Fairfax County Pkwy NB Ramps	Signalized	7	7
7	Route 123 & Clara Barton Dr	Signalized	12	8
8	Fairfax County Pkwy & Burke Centre Pkwy	Signalized	125	27
9	Burke Centre Pkwy & Fairview Woods Dr West	Unsignalized	1	1
10	Burke Centre Pkwy & Fairview Woods Dr East	Unsignalized	1	1
11	Burke Centre Pkwy & Route 123	Signalized	37	34
12	Fairfax County Pkwy & Ladues End Ln/ Nomes Ct	Unsignalized	49	3
13	Fairfax County Pkwy & Colchester Meadow Ln	Unsignalized	37	9
14	Fairfax County Pkwy & Popes Head Rd	Signalized	110	102
15	Popes Head Rd & Revercomb Ct	Unsignalized	1	2
16	Popes Head Rd & Lewisham Rd	Unsignalized	3	2
17	Fairfax County Pkwy SB Ramps & Braddock Rd	Signalized	33	57
18	Fairfax County Pkwy NB Ramps & Braddock Rd	Signalized	11	14

1.5.3 Existing Safety

Crash data along Fairfax County Parkway was reviewed for a five-year period from January 1, 2013 through December 31, 2017. Crash data was obtained from the VDOT Tableau Tool.

A total of 506 crashes were reported along northbound and southbound Fairfax County Parkway within the study area between 2013 and 2017. **Table 1-6** summarizes the crashes by collision type and severity. As shown, 201 crashes (40 percent) resulted in an injury and two crashes (0.4 percent) resulted in a fatality. The two fatal crashes occurred along southbound Fairfax County Parkway – one occurred north of the Braddock Road interchange and one occurred south of the Braddock Road interchange. A total of 269 (53 percent) of the crashes were rear end collisions which are frequently attributed to congestion. A total of 85 (17 percent) were angle crashes, and 80 (16 percent) were fixed-object crashes.

Table 1-6: Fairfax County Parkway Crash Summary

Crash Type		Number of Crashes		Total Crashes	% of Total Crashes
		Northbound	Southbound		
Collision Type	Rear End	155	114	269	53.2%
	Sideswipe	13	11	24	4.7%
	Angle	50	35	85	16.8%
	Fixed Object	52	28	80	15.8%
	Other	27	21	48	9.5%
Crash Severity	Fatal Injury	0	2	2	0.4%
	Ambulatory Injury	16	11	27	5.3%
	Visible Injury	37	25	62	12.3%
	Non-Visible Injury	68	44	112	22.1%
	Property Damage Only	176	127	303	59.9%
Total Crashes		297	209	506	-

Calculated crash rates along northbound and southbound Fairfax County Parkway were compared to VDOT’s annually-published 2016 average crash rates for statewide Primary roads, Northern Virginia Primary roads, and statewide Urban Freeways (see **Table 1-7**). VDOT’s annually published 2017 crash rates were not published at the time this report was written. The average crash rate along Fairfax County Parkway of 52 crashes per 100 million vehicle miles travelled is greater than the statewide Urban Freeway Average crash rate (43 crashes per 100 million VMT) but lower than the average crash rate for statewide Primary roads (127 crashes per 100 million VMT) and the Northern Virginia Primary roads (132 crashes per 100 million VMT).

Table 1-7: Crash Frequency and Rate (per 100 million VMT) Comparison

Facility	Crash Rate per 100 Million VMT
Fairfax County Parkway	
Northbound	61.4
Southbound	43.0
Combined	52.2
2016 Average Crash Rates	
Statewide Primary Roads Average Crash Rate	126.5
Northern Virginia Primary Roads Average Crash Rate	132.4
Statewide Urban Freeway Average Crash Rate	43.2

1.5.4 Future Traffic Conditions – 2046 No Build

1.5.4.1 Travel Time

AM Peak Period

A comparison of overall corridor travel times for existing conditions, 2046 No Build conditions, and 2046 Build conditions is summarized in **Figures 1-7 and 1-8** for northbound and southbound Fairfax County Parkway during the AM peak hour.

Northbound Direction: Under 2046 No Build conditions, the northbound total travel time is 21.9 minutes which is 6.1 minutes greater than existing conditions. The travel time between Roberts Parkway and Route 123 increases 5.7 minutes under No Build conditions due to longer queues and delays extending farther upstream from the Burke Centre Parkway signalized intersection because of higher northbound travel demand in 2046 compared to existing conditions. Northbound travel times under 2026 AM No Build conditions only increased by 0.4 minutes between Route 123 and Popes Head Road because this section of the corridor has already reached capacity under existing conditions.

Southbound Direction: Under 2046 No Build conditions, the southbound Fairfax County Parkway total travel time is 20.5 minutes which is 12.5 minutes greater than existing conditions. This is due to severe congestion and queueing approaching the diverge to Route 123 which extends upstream through the northern end of the study corridor. Compared to existing conditions, average travel times increase by 1.3 minutes approaching Braddock Road, 3.0 minutes approaching Popes Head Road, 4.6 minutes approaching Burke Centre Parkway, and 3.6 minutes approaching Route 123. The severe southbound congestion meters the traffic throughput downstream of the Route 123 interchange which results in no increase in travel time south of Route 123.

Figure 1-7: AM Peak Hour – Northbound Fairfax County Parkway Cumulative Travel Times (Existing and 2046)

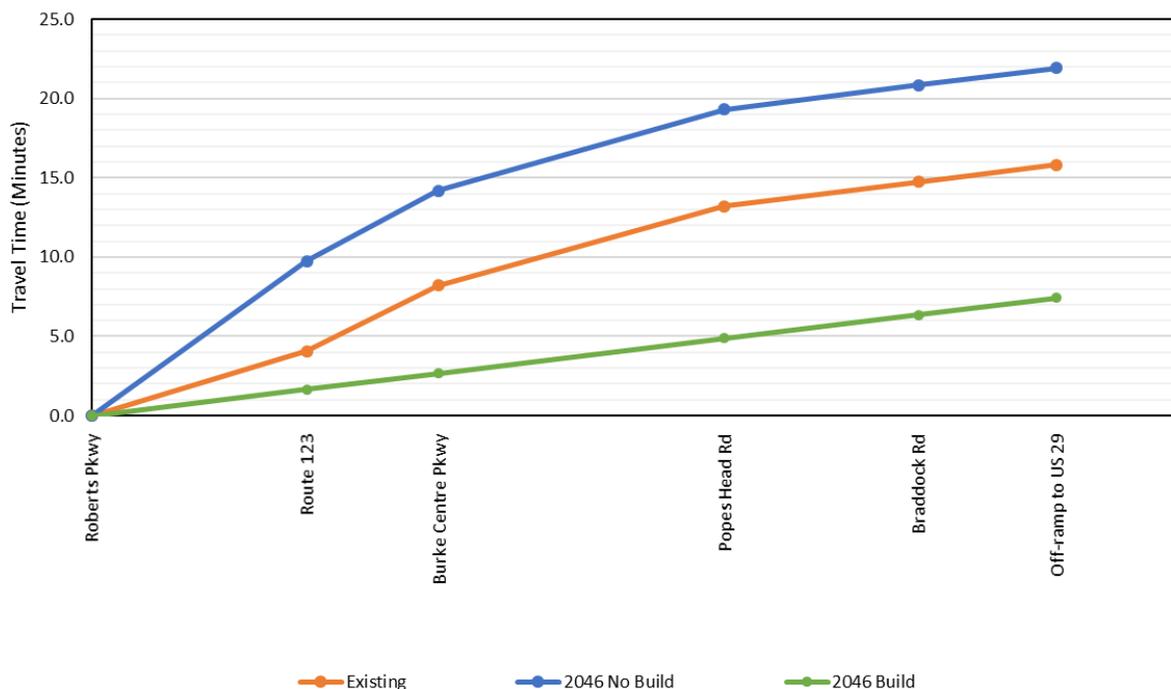
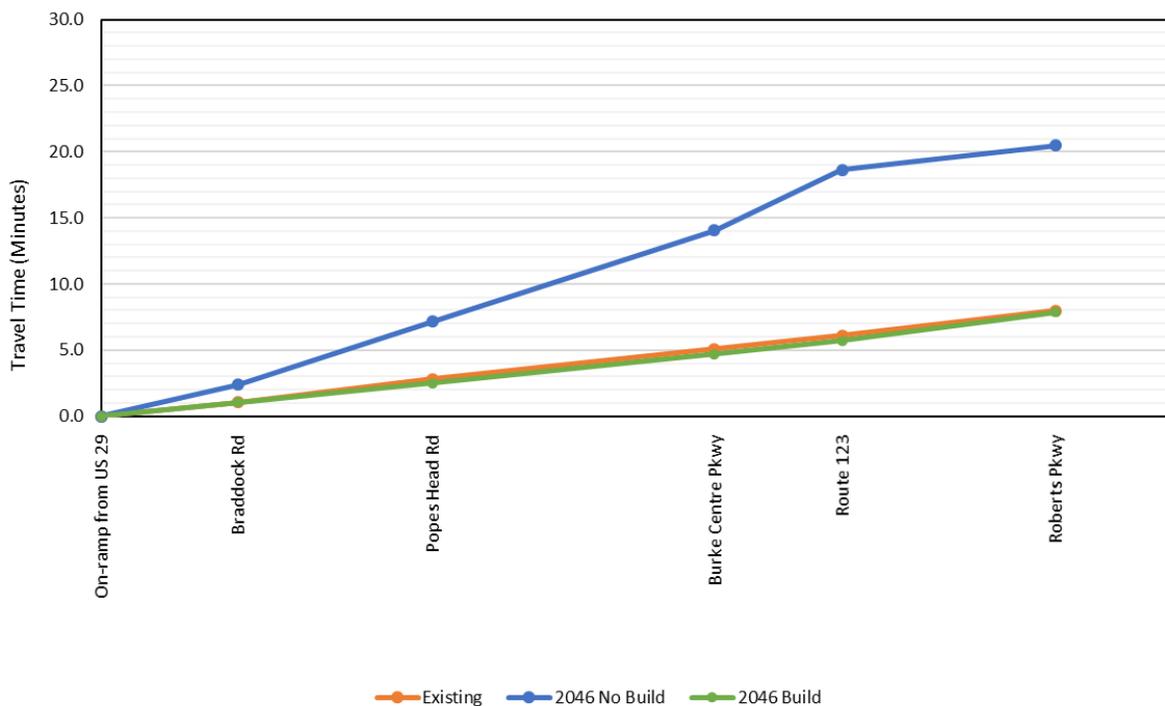


Figure 1-8: AM Peak Hour – Southbound Fairfax County Parkway Cumulative Travel Times (Existing and 2046)



PM Peak Period

A comparison of overall corridor travel times for existing conditions, 2046 No Build conditions, and 2046 Build conditions is summarized in **Figures 1-9 and 1-10** for northbound and southbound Fairfax County Parkway during the PM peak hour.

Northbound Direction: Under 2046 No Build conditions, the northbound Fairfax County Parkway total travel time is 13.1 minutes which is 4.7 minutes longer than existing conditions. This travel time increase is primarily due to travel time increases of 1.1 minutes approaching Route 123, 1.8 minutes approaching Burke Centre Parkway, and 1.8 minutes approaching Popes Head Road. Travel times do not increase north of Popes Head Road due to the signals at Burke Centre Parkway and Popes Head Road metering northbound traffic under No Build conditions.

Southbound Direction: The southbound Fairfax County Parkway total travel time is 29.2 minutes which is 15.5 minutes longer than existing conditions. Travel times increase by 3.0 minutes approaching Braddock Road due to high traffic volumes merging onto Fairfax County Parkway from US 29 and severe congestion beginning at the diverge to Route 123 and extending upstream through the northern end of the study corridor. Travel times also increase by 2.4 minutes approaching Popes Head Road, 7.0 minutes approaching Burke Centre Parkway, and 3.2 minutes approaching Route 123. The severe southbound congestion meters the traffic throughput downstream of the Route 123 interchange which results in no increase in travel time south of Route 123.

Figure 1-9: PM Peak Hour – Northbound Fairfax County Parkway Cumulative Travel Times (Existing and 2046)

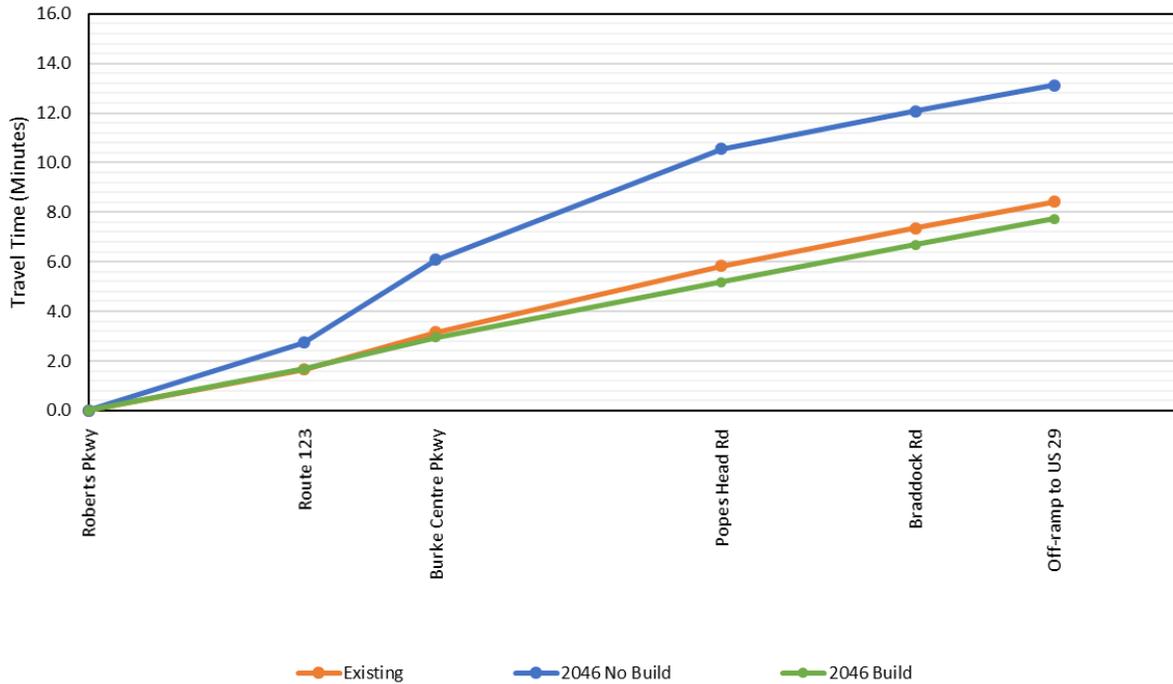
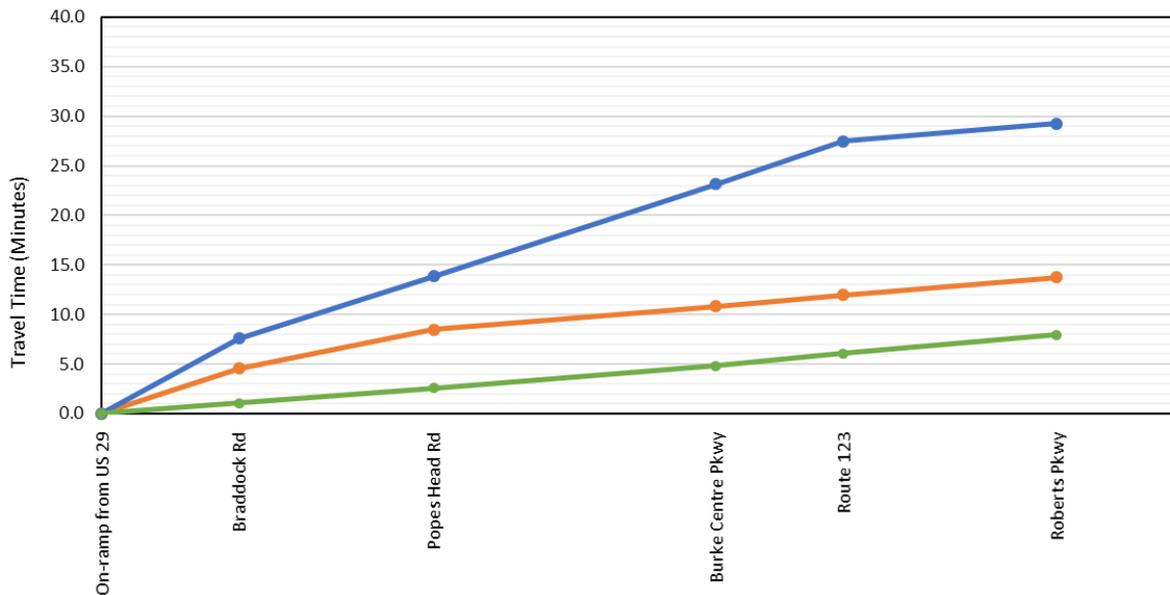


Figure 1-10: PM Peak Hour – Southbound Fairfax County Parkway Cumulative Travel Times (Existing and 2046)



1.5.4.2 Fairfax County Parkway Density and Speed Analysis

AM Peak Period

Tables 1-8a, 1-8b depict 2046 No Build travel speeds and densities along northbound and southbound Fairfax County Parkway during the AM peak hour. Also shown is the volume input versus the volume throughput (i.e., volume served based on the simulated outputs from VISSIM) at segments along Fairfax County Parkway. Northbound segments experience severe congestion between Roberts Parkway and the Popes Head Road intersection. After traveling through the Popes Head Road intersection, northbound vehicles experience periods of light and moderate traffic. In the southbound direction, the diverge to Route 123 experiences severe congestion which extends upstream through the northern end of the study corridor.

Table 1-8a: AM Peak Hour Northbound Fairfax County Parkway Speed and Density by Segment (2046 No Build)

Segment-Lane	Length (ft)	Location	Type	Volume Input	Volume Throughput		Percent Unserved	Lane Speed (mph)	Average Speed (mph)	Lane Density (vpmpl)	Average Density (vpmpl)
477-1	1112	NB FCP between Roberts Pkwy/Karmich St and New Rd start of turn lane	Mainline	2455	966	1979	-19%	12	13	84	83
477-2	1112				1013			13		82	
476-1	319	NB FCP between New Rd start of turn lane and intersection	Mainline	2433	947	1930	-21%	10	10	101	99
476-2	319				983			11		97	
469-1	2696	NB FCP between New Rd and Freds Oak Rd start of turn lanes	Mainline	2442	903	1885	-23%	8	8	118	115
469-2	2696				982			9		111	
470-1	356	NB FCP between Freds Oak Rd start of turn lanes and intersection	Mainline	2410	924	1836	-24%	7	7	130	126
470-2	356				912			8		122	
261-1	749	NB FCP between Freds Oak Rd and diverge to Rt 123	Mainline	2442	969	1860	-24%	9	8	108	110
261-2	749				892			8		112	
882-1	365	NB FCP diverge to Rt 123	Diverge	2442	343	1861	-24%	35	16	10	80
882-2	365				702			6		114	
882-3	365				816			7		116	
885-1	1338	NB FCP between diverge to Rt 123 and merge from NB Rt 123	Mainline	1889	649	1466	-22%	5	6	134	127
885-2	1338				817			7		121	
851-1	350	NB FCP merge from NB Rt 123	Merge	2790	514	2332	-16%	7	7	79	108
851-2	350				751			6		124	
851-3	350				1067			9		120	
379-1	644	NB FCP between merge from NB Rt 123 and merge from SB Rt 123	Mainline	2790	1122	2314	-17%	11	12	98	99
379-2	644				1192			12		99	
552-1	253	NB FCP merge from SB Rt 123	Merge	2830	26	2344	-17%	14	13	2	65
552-2	253				1132			12		96	
552-3	253				1186			12		98	
221-1	2346	NB FCP between merge from SB Rt 123 and Burke Centre Pkwy start of turn lanes	Mainline	2830	1167	2354	-17%	12	12	96	96
221-2	2346				1187			12		96	
223-1	457	NB FCP between Burke Centre Pkwy start of turn lanes and intersection	Mainline	2815	1158	2341	-17%	12	12	100	101
223-2	457				1183			12		101	
455-1	4944	NB FCP between Burke Centre Pkwy and Ladues End Ln/Nomes Ct start of turn lanes	Mainline	3530	1514	3042	-14%	22	22	68	68
455-2	4944				1528			22		68	
456-1	364	NB FCP between Ladues End Ln/Nomes Ct start of turn lanes and intersection	Mainline	3525	1481	2978	-16%	19	19	78	78
456-2	364				1497			19		78	
453-1	2822	NB FCP between Ladues End Ln/Nomes Ct and Colchester Meadow Ln start of turn lanes	Mainline	3528	1498	3006	-15%	20	20	76	76
453-2	2822				1508			20		77	
454-1	334	NB FCP between Colchester Meadow Ln start of turn lanes and intersection	Mainline	3526	1524	3061	-13%	21	21	72	72
454-2	334				1536			21		73	
446-1	326	NB FCP between Colchester Meadow Ln and Popes Head Rd start of turn lanes	Mainline	3531	1528	3070	-13%	21	21	72	72
446-2	326				1542			21		72	
448-1	393	NB FCP between Popes Head Rd start of turn lanes and intersection	Mainline	3495	1470	3048	-13%	20	21	73	73
448-2	393				1577			21		74	
424-1	6204	NB FCP between Popes Head Rd and diverge to Braddock Rd	Mainline	3951	1680	3418	-14%	49	49	34	35
424-2	6204				1738			49		35	
430-1	445	NB FCP diverge to Braddock Rd	Diverge	3951	162	3395	-14%	50	47	3	25
430-2	445				1593			46		35	
430-3	445				1639			46		36	
437-1	1126	NB FCP between diverge to Braddock Rd and merge from Braddock Rd	Mainline	3685	1563	3159	-14%	50	49	32	32
437-2	1126				1597			49		32	
935-1	3752	NB FCP between merge from Braddock Rd and south of US 29 diverge	Mainline	4642	1188	4079	-12%	51	51	23	27
935-2	3752				1436			51		28	
935-3	3752				1455			50		29	
558-1	1384	NB FCP off-ramp to Rt 123	Ramp	553	390	390	-29%	35	35	11	11
551-1	1728	NB FCP on-ramp from NB Rt 123	Ramp	901	883	883	-2%	13	13	67	67
258-1	1819	NB FCP on-ramp from SB Rt 123	Ramp	40	35	35	-12%	41	41	1	1
569-1	1156	NB FCP off-ramp to Braddock Rd	Ramp	266	227	227	-15%	39	39	6	6
319-1	455	NB FCP on-ramp from Braddock Rd	Ramp	957	932	932	-3%	31	31	30	30

Table 1-8b: AM Peak Hour Southbound Fairfax County Parkway Speed and Density by Segment (2046 No Build)

Segment-Lane	Length (ft)	Location	Type	Volume Input	Volume Throughput	Percent Unserved	Lane Speed (mph)	Average Speed (mph)	Lane Density (vpmpl)	Average Density (vpmpl)	
936-1	3922	SB FCP weave between US 29 and Braddock Rd	Weave	3719	3560	-4%	28	27	39	49	
936-2	3922						26		56		
936-3	3922						27		51		
431-1	2194	SB FCP between diverge to Braddock Rd and merge from Braddock Rd	Mainline	2801	2584	-8%	15	17	86	82	
431-2	2194						18		78		
429-1	369						SB FCP merge from Braddock Rd		Merge		3392
429-2	369	12	102								
429-3	369	17	88								
425-1	4643	SB FCP between merge from Braddock Rd and Popes Head Rd start of turn lanes	Mainline	3392	2934	-13%	16	16	93	94	
425-2	4643						16		94		
427-1	386	SB FCP between Popes Head Rd start of turn lanes and intersection	Mainline	3274	2808	-14%	14	14	103	102	
427-2	386						14		102		
443-1	387	SB FCP between Popes Head Rd and Colchester Meadow Ln start of turn lanes	Mainline	3358	2876	-14%	18	18	82	82	
443-2	387						18		82		
445-1	367	SB FCP between Colchester Meadow Ln start of turn lanes and intersection	Mainline	3354	2853	-15%	18	18	82	82	
445-2	367						18		82		
451-1	2720	SB FCP between Colchester Meadow Ln and Ladues End Ln/Nomes Ct start of turn	Mainline	3356	2825	-16%	17	17	85	85	
451-2	2720						17		86		
452-1	383	SB FCP between Ladues End Ln/Nomes Ct start of turn lanes and intersection	Mainline	3354	2798	-17%	16	16	86	87	
452-2	383						16		87		
457-1	4952	SB FCP between Ladues End Ln/Nomes Ct and Burke Centre Pkwy start of turn lanes	Mainline	3358	2748	-18%	15	15	90	91	
457-2	4952						16		91		
20002-1	438	SB FCP between Burke Centre Pkwy start of turn lanes and intersection	Mainline	2988	2405	-20%	12	12	103	100	
20002-2	438						13		96		
220-1	3960	SB FCP between Burke Centre Pkwy and diverge to Rt 123	Mainline	3003	2404	-20%	10	11	115	107	
220-2	3960						13		99		
850-1	385	SB FCP diverge to Rt 123	Diverge	3003	2382	-21%	2	9	137	114	
850-2	385						4		130		
850-3	385						21		74		
884-1	1426	SB FCP between diverge to Rt 123 and merge from Rt 123	Mainline	2350	1878	-20%	50	50	17	19	
884-2	1426						49		21		
259-1	453	SB FCP weave between Rt 123 and Freds Oak Rd start of turn lanes	Weave	2583	2123	-18%	43	48	2	14	
259-2	453						51		20		
259-3	453						51		20		
260-1	434	SB FCP between Freds Oak Rd start of turn lanes and intersection	Mainline	2555	2096	-18%	51	51	21	20	
260-2	434						51		20		
467-1	2716	SB FCP between Freds Oak Rd and New Rd start of turn lane	Mainline	2592	2136	-18%	51	51	21	21	
467-2	2716						51		21		
468-1	332	SB FCP between New Rd start of turn lane and intersection	Mainline	2578	2121	-18%	51	50	21	21	
468-2	332						50		21		
473-1	905	SB FCP between New Rd and Roberts Pkwy/Karmich St start of turn lanes	Mainline	2608	2153	-17%	45	45	23	24	
473-2	905						45		25		
480-1	595	SB FCP between Roberts Pkwy/Karmich St start of turn lanes and intersection	Mainline	2391	1981	-17%	25	25	40	40	
480-2	595						25		40		
432-1	582	SB FCP off-ramp to Braddock Rd	Ramp	918	854	854	-7%	30	30	29	29
436-1	719	SB FCP on-ramp from Braddock Rd	Ramp	591	524	524	-11%	6	6	91	91
796-1	657	SB FCP off-ramp to Rt 123	Ramp	653	516	516	-21%	3	3	169	169
543-1	988	SB FCP on-ramp from Rt 123	Ramp	233	242	242		35	35	7	7

PM Peak Period

Tables 1-9a, 1-9b depict 2046 No Build travel speeds and densities along northbound and southbound Fairfax County Parkway during the PM peak hour. Also shown is the volume input versus the volume throughput (i.e., volume served based on the simulated outputs from VISSIM) at segments along Fairfax County Parkway. Northbound Fairfax County Parkway approaching Popes Head Road operates with severe congestion, extending upstream through the Route 123 interchange. Heavy congestion occurs between Freds Oak Road and the Route 123 interchange. In the southbound direction, severe congestion occurs at the diverge to Route 123 and extends to the northern limit of the study corridor.

Table 1-9a: PM Peak Hour Northbound Fairfax County Parkway Speed and Density by Segment (2046 No Build)

Segment-Lane	Length (ft)	Location	Type	Volume Input	Volume Throughput		Percent Unserved	Speed		Density	
								Lane Speed (mph)	Average Speed (mph)	Lane Density (vpmpl)	Average Density (vpmpl)
477-1	1118	NB FCP between Roberts Pkwy/Karmich St and New Rd start of turn lane	Mainline	2565	1264	2592		48	49	26	27
477-2	1118				1329			49		27	
476-1	319	NB FCP between New Rd start of turn lane and intersection	Mainline	2532	1272	2562		50	50	26	26
476-2	319				1291			50		26	
469-1	2696	NB FCP between New Rd and Freds Oak Rd start of turn lanes	Mainline	2540	1291	2569		46	46	29	29
469-2	2696				1277			46		29	
470-1	356	NB FCP between Freds Oak Rd start of turn lanes and intersection	Mainline	2485	1325	2507		39	40	37	34
470-2	356				1181			41		31	
261-1	749	NB FCP between Freds Oak Rd and diverge to Rt 123	Mainline	2521	1326	2523		34	35	43	41
261-2	749				1198			35		39	
882-1	365	NB FCP diverge to Rt 123	Diverge	2521	299	2521		47	34	6	35
882-2	365				1068			27		49	
882-3	365				1154			28		49	
885-1	1338	NB FCP between diverge to Rt 123 and merge from NB Rt 123	Mainline	2101	957	2081	-1%	13	14	87	82
885-2	1338				1124			16		78	
851-1	350	NB FCP merge from NB Rt 123	Merge	2900	509	2741	-5%	4	9	124	114
851-2	350				914			8		121	
851-3	350				1318			14		98	
379-1	644	NB FCP between merge from NB Rt 123 and merge from SB Rt 123	Mainline	2900	1306	2728	-6%	17	17	80	83
379-2	644				1422			17		86	
552-1	253	NB FCP merge from SB Rt 123	Merge	2920	14	2740	-6%	8	13	2	58
552-2	253				1347			16		84	
552-3	253				1379			16		88	
								16		87	
221-1	2346	NB FCP between merge from SB Rt 123 and Burke Centre Pkwy start of turn lanes	Mainline	2920	1369	2737	-6%	16	16	87	87
221-2	2346				1368			16		88	
223-1	457	NB FCP between Burke Centre Pkwy start of turn lanes and intersection	Mainline	2905	1356	2727	-6%	15	15	89	89
223-2	457				1371			16		88	
455-1	4944	NB FCP between Burke Centre Pkwy and Ladues End Ln/Nomes Ct start of turn lanes	Mainline	3382	1581	3169	-6%	30	29	55	56
455-2	4944				1588			29		57	
456-1	364	NB FCP between Ladues End Ln/Nomes Ct start of turn lanes and intersection	Mainline	3380	1574	3152	-7%	23	23	69	70
456-2	364				1578			23		70	
453-1	2822	NB FCP between Ladues End Ln/Nomes Ct and Colchester Meadow Ln start of turn	Mainline	3382	1567	3123	-8%	21	21	75	75
453-2	2822				1556			21		75	
454-1	334	NB FCP between Colchester Meadow Ln start of turn lanes and intersection	Mainline	3378	1558	3105	-8%	20	20	77	78
454-2	334				1546			20		78	
446-1	326	NB FCP between Colchester Meadow Ln and Popes Head Rd start of turn lanes	Mainline	3380	1522	3040	-10%	20	20	75	77
446-2	326				1518			20		78	
448-1	393	NB FCP between Popes Head Rd start of turn lanes and intersection	Mainline	3292	1525	3023	-8%	21	20	74	74
448-2	393				1498			20		73	
424-1	6204	NB FCP between Popes Head Rd and diverge to Braddock Rd	Mainline	3639	1665	3292	-10%	49	49	34	33
424-2	6204				1627			50		33	
430-1	445	NB FCP diverge to Braddock Rd	Diverge	3639	468	3292	-10%	49	45	10	25
430-2	445				1381			43		32	
430-3	445				1442			43		33	
437-1	1126	NB FCP between diverge to Braddock Rd and merge from Braddock Rd	Mainline	2900	1274	2620	-10%	50	50	25	26
437-2	1126				1345			50		27	
935-1	3602	NB FCP between merge from Braddock Rd and south of US 29 diverge	Mainline	3764	1010	3483	-7%	52	51	20	23
935-2	3602				1245			51		24	
935-3	3602				1228			50		24	
558-1	1384	NB FCP off-ramp to Rt 123	Ramp	420	416	416	-1%	34	34	12	12
551-1	1729	NB FCP on-ramp from NB Rt 123	Ramp	799	706	706	-12%	7	7	110	110
258-1	1820	NB FCP on-ramp from SB Rt 123	Ramp	20	19	19	-7%	41	41	0	0
569-1	1156	NB FCP off-ramp to Braddock Rd	Ramp	739	669	669	-10%	36	36	18	18
319-1	455	NB FCP on-ramp from Braddock Rd	Ramp	864	861	861		31	31	27	27

Table 1-9b: PM Peak Hour Southbound Fairfax County Parkway Speed and Density by Segment (2046 No Build)

Segment-Lane	Length (ft)	Location	Type	Volume Input	Volume Throughput		Percent Unserved	Lane Speed (mph)	Average Speed (mph)	Lane Density (vpmp)	Average Density (vpmp)
69-1	1595	SB FCP weave between US 29 and Braddock Rd (part 1)	Weave	4083	2552	-37%	7	5	7	142	128
69-2	1595							6		130	
69-3	1595							9		112	
420-1	2151	SB FCP weave between US 29 and Braddock Rd (part 2)	Weave	4083	2434	-40%	8	9	8	72	111
420-2	2151							5		143	
420-3	2151							9		119	
431-1	2193	SB FCP between diverge to Braddock Rd and merge from Braddock Rd	Mainline	3318	2036	-39%	8	6	8	147	134
431-2	2193							10		122	
429-1	369	SB FCP merge from Braddock Rd	Merge	3846	2514	-35%	7	3	7	154	137
429-2	369							6		142	
429-3	369							11		115	
425-1	4643	SB FCP between merge from Braddock Rd and Popes Head Rd start of turn lanes	Mainline	3846	2513	-35%	14	14	14	86	87
425-2	4643							14		88	
427-1	386	SB FCP between Popes Head Rd start of turn lanes and intersection	Mainline	3631	2359	-35%	13	13	13	91	90
427-2	386							13		90	
443-1	385	SB FCP between Popes Head Rd and Colchester Meadow Ln start of turn lanes	Mainline	3713	2436	-34%	15	15	15	81	80
443-2	385							15		80	
445-1	369	SB FCP between Colchester Meadow Ln start of turn lanes and intersection	Mainline	3707	2424	-35%	13	13	13	91	90
445-2	369							14		90	
451-1	2720	SB FCP between Colchester Meadow Ln and Ladues End Ln/Nomes Ct start of turn	Mainline	3707	2426	-35%	12	12	12	104	103
451-2	2720							12		102	
452-1	384	SB FCP between Ladues End Ln/Nomes Ct start of turn lanes and intersection	Mainline	3703	2422	-35%	12	11	12	104	103
452-2	384							12		102	
457-1	4952	SB FCP between Ladues End Ln/Nomes Ct and Burke Centre Pkwy start of turn lanes	Mainline	3705	2422	-35%	12	11	12	105	103
457-2	4952							12		101	
20002-1	438	SB FCP between Burke Centre Pkwy start of turn lanes and intersection	Mainline	3408	2235	-34%	10	8	10	124	114
20002-2	438							12		105	
220-1	3960	SB FCP between Burke Centre Pkwy and diverge to Rt 123	Mainline	3426	2249	-34%	14	8	14	122	93
220-2	3960							19		64	
850-1	385	SB FCP diverge to Rt 123	Diverge	3426	2227	-35%	11	4	11	125	103
850-2	385							4		133	
850-3	385							23		49	
884-1	1426	SB FCP between diverge to Rt 123 and merge from Rt 123	Mainline	1725	1137	-34%	52	53	52	8	11
884-2	1426							51		14	
259-1	453	SB FCP weave between Rt 123 and Freds Oak Rd start of turn lanes	Weave	2072	1478	-29%	49	44	49	2	10
259-2	453							52		13	
259-3	453							51		14	
260-1	434	SB FCP between Freds Oak Rd start of turn lanes and intersection	Mainline	2030	1451	-29%	52	52	52	14	14
260-2	434							51		14	
467-1	2716	SB FCP between Freds Oak Rd and New Rd start of turn lane	Mainline	2052	1478	-28%	52	52	52	14	14
467-2	2716							51		15	
468-1	332	SB FCP between New Rd start of turn lane and intersection	Mainline	2046	1476	-28%	51	52	51	14	14
468-2	332							51		15	
473-1	906	SB FCP between New Rd and Roberts Pkwy/Karmich St start of turn lanes	Mainline	2065	1497	-27%	51	51	51	14	15
473-2	906							50		15	
480-1	595	SB FCP between Roberts Pkwy/Karmich St start of turn lanes and intersection	Mainline	1952	1415	-28%	26	26	26	27	27
480-2	595							26		27	
432-1	582	SB FCP off-ramp to Braddock Rd	Ramp	765	481	481	-37%	44	44	11	11
436-1	719	SB FCP on-ramp from Braddock Rd	Ramp	528	476	476	-10%	3	3	145	145
796-1	657	SB FCP off-ramp to Rt 123	Ramp	1701	1104	1104	-35%	9	9	116	116
543-1	988	SB FCP on-ramp from Rt 123	Ramp	347	338	338	-3%	34	34	10	10

1.5.4.3 Arterial Intersection Operations

Table 1-10 depicts overall intersection delay for both signalized and unsignalized intersections within the study area for the AM and PM peak hours for 2046 No Build and Build conditions. During the AM peak hour under 2046 No Build conditions, seven total study intersections operate with severe congestion. During the PM peak hour under 2046 No Build conditions, six total intersections operate with severe congestion.

Table 1-10: Intersection Delay Summary (2046 Conditions)

Intersection		Intersection Control		Average Delay (seconds)			
		Existing/No Build Operation	Build Operation	2046 No Build		2046 Build	
				AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
1	Fairfax County Pkwy & Roberts Pkwy/ Karmich St	Signalized	Signalized	90	33	74	66
2	Fairfax County Pkwy & New Rd	Stop	Stop	38	1	8	2
3	Fairfax County Pkwy & Freds Oak Rd	Stop	Stop	104	7	3	3
4	Route 123 & Chapel Rd	Signalized	Signalized	28	27	28	28
5	Route 123 & Fairfax County Pkwy SB Ramps/ Robert Carter Rd	Signalized	Signalized	106	148	49	77
6	Route 123 & Fairfax County Pkwy NB Ramps	Signalized	Signalized	11	9	4	9
7	Route 123 & Clara Barton Dr	Signalized	Signalized	10	7	11	7
8	Fairfax County Pkwy & Burke Centre Pkwy	Signalized	Stop (AM) Signalized (PM)	418	306	10	27
9	Burke Centre Pkwy & Fairview Woods Dr West	Stop	Stop	26	16	11	4
10	Burke Centre Pkwy & Fairview Woods Dr East	Stop	Stop	1	1	1	1
11	Burke Centre Pkwy & Route 123	Signalized	Signalized	34	34	34	33
12	Fairfax County Pkwy & Ladues End Ln/ Nomes Ct	Stop	Stop	95	99	2	3
12A	Fairfax County Pkwy & Ladues End Ln/ Nomes Ct RCUT	N/A	Stop	N/A	N/A	24	39
13	Fairfax County Pkwy & Colchester Meadow Ln	Stop	N/A	47	50	N/A	N/A
14	Fairfax County Pkwy & Popes Head Rd	Signalized	N/A	217	278	N/A	N/A
14A	Fairfax County Pkwy SB ramps & Popes Head Rd Roundabout	N/A	Roundabout	N/A	N/A	2	1
14B	Fairfax County Pkwy SB ramps & Shirley Gate Rd Roundabout	N/A	Roundabout	N/A	N/A	2	3
14C	Fairfax County Pkwy NB ramps & Shirley Gate Rd Roundabout	N/A	Roundabout	N/A	N/A	3	3
14D	Popes Head Rd & Colchester Meadow Ln	N/A	Stop	N/A	N/A	1	1
15	Popes Head Rd & Revercomb Ct	Stop	Stop	1	2	1	1
16	Popes Head Rd & Lewisham Rd	Stop	Stop	50	293	1	1
17	Fairfax County Pkwy SB Ramps & Braddock Rd	Signalized	Signalized	54	67	28	17
18	Fairfax County Pkwy NB Ramps & Braddock Rd	Signalized	Signalized	11	13	10	13

1.5.5 Future Safety

There are no planned No Build improvements along Fairfax County Parkway that would mitigate existing observed crash trends along the corridor and the surrounding study area roadways. Therefore, with the anticipated growth in travel demand along Fairfax County Parkway and other roadways within the study area, congestion will increase and correspondingly, crash frequency would likely increase under future No Build conditions. Crash frequency increase would be directly related to the increase in traffic volume growth predicted under future No Build conditions. The same crash patterns in terms of crash types, crash severity, and other crash characteristics would be expected under No Build conditions.

1.6 SUMMARY

The purpose of the project follows:

- Address existing and future capacity needs along Fairfax County Parkway
- Improve safety

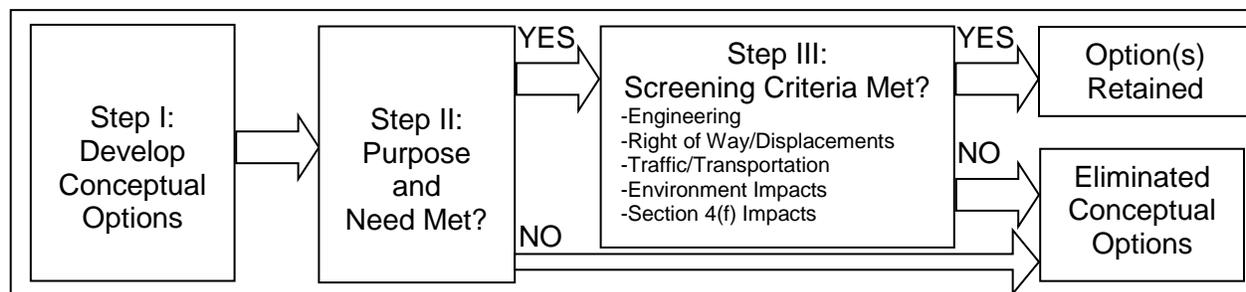
SECTION 2 - ALTERNATIVES

2.1 INTRODUCTION: PURPOSE OF THIS CHAPTER

This section discusses the range of options considered, the process used to identify and screen the options, options considered and eliminated from further consideration, and options carried forward for detailed study. The options carried forward for detailed study are the Preferred Alternative and the No-Build Alternative.

2.2 OPTIONS DEVELOPMENT AND SCREENING PROCESS

The flowchart below illustrates the steps in the options development and screening process. This process involved identifying a range of options initially and then narrowing the options to a Preferred Alternative for detailed consideration.



2.3 OPTIONS ELIMINATED FROM DETAILED STUDY

Various Options were considered along the Fairfax County Parkway corridor for the widening and the intersection and interchange improvements.

2.3.1 Transportation System Management Option

A Transportation System Management (TSM) option was considered to address the needs of the Fairfax County Parkway corridor and the Popes Head Road intersection. TSM strategies focus on improving the operational efficiency of the roadway transportation system without adding major system improvements, such as adding lanes or new ramps. VDOT will continue to update traffic signal timings, a TSM strategy, in response to fluctuations in travel demands; however, signal timing improvements alone would not address the capacity and safety deficiencies of the Fairfax County Parkway corridor and the needs of the corridor cannot be adequately satisfied solely by a TSM option. Therefore, the TSM option was eliminated from detailed study.

2.4 IDENTIFICATION OF PREFERRED ALTERNATIVE

2.4.1 Fairfax County Parkway Widening

The original design of the Fairfax County Parkway provided a 42-foot wide grass swale median to accommodate the future widening to a six-lane facility. Adding an additional lane in each direction into the median, however, requires either a raised median to remove the need for the inside shoulder or a concrete median traffic barrier. North of Route 29, the Fairfax County Parkway transitions from a four-lane facility to a six-lane facility with a concrete median barrier.

The local community was asked for their preference on the type of median treatment along Fairfax County Parkway. The majority of respondents preferred a raised grass median over a concrete median barrier to maintain the aesthetic character of the Parkway. Since the northern terminus of the project is tying into the existing six-lane section that includes concrete median barrier, the proposed typical section through the Route 29 interchange to the northern terminus includes concrete median barrier. A raised, grass median is proposed south of the Route 29 interchange to the southern project limits. This option was selected to be carried forward.

2.4.2 Intersections and Interchanges

There are four at-grade intersections on the Fairfax County Parkway within the study limits at: (1) Ladues End Lane / Nomes Court, (2) Burke Centre Parkway, (3) Colchester Meadow Lane, and (4) Popes Head Road. The Burke Centre Parkway and Popes Head Road intersections are signalized while the Ladues End Lane / Nomes Court and Colchester Meadow Lane intersections are unsignalized. The Colchester Meadow Lane and Popes Head Road intersections would be eliminated with the construction of the proposed interchange at Popes Head Road and Fairfax County Parkway. Operational improvements to the Ladues End Lane / Nomes Court and Burke Centre Parkway intersections with Fairfax County Parkway are proposed. Existing interchanges within the Fairfax County Parkway widening project limits are located at Route 29, Braddock Road and Route 123. Minor enhancements to the Route 123 interchange would be implemented but no improvements are planned for the Route 29 and Braddock Road interchanges.

2.4.2.A Fairfax County Parkway at Popes Head Road Interchange

The selection of a preferred option for the Fairfax County Parkway at Popes Head Road interchange evolved during a series of formal and informal meetings with community associations and leaders, elected officials, and the general public and incorporated feedback received at public meetings. In addition to stakeholder input, the interchange design considerations included the following:

- Improving traffic safety and operations along Fairfax County Parkway and addressing existing and future capacity deficiencies
- Providing direct versus indirect access to Popes Head Road and accommodating access to future Shirley Gate Road Extension to and from the Fairfax County Parkway
- Right of way impacts

Table 2.1: Summary of the Popes Head Road Interchange Configuration Options

Initial Options	Public Information Meeting #1 (Dec 2017)	Meeting with Communities along Popes Head Road (April 2018)	Public Information Meetings #2 (Sept/Oct 2018)	Public Information Meeting #3 (Jan 2019)	Status
Single Point Urban	NOT CARRIED FORWARD				
Diverging Diamond	NOT CARRIED FORWARD				
Flyover with Shirley Gate Road and Diamond Interchange with Popes Head Road	NOT CARRIED FORWARD				
Compressed Diamond	Compressed Diamond	NOT CARRIED FORWARD			
Double Roundabout	Double Roundabout	NOT CARRIED FORWARD			
		Option 1: Triple Roundabouts	Option 1: Triple Roundabouts	Option 1: Triple Roundabouts	Preferred Alternative
			Option 1A: Triple Roundabouts with Additional Ramps		NOT CARRIED FORWARD
				Option 1A Modified: Triple Roundabouts with Additional Ramp	NOT CARRIED FORWARD
Split Diamond with Traffic Signals	Split Diamond with Traffic Signals	Option 2: Split Diamond with Traffic Signals	Option 2: Split Diamond with Traffic Signals	NOT CARRIED FORWARD	
		Option 2A: Quadruple Roundabouts with FCP At-Grade	Option 2A: Quadruple Roundabouts with FCP At-Grade	NOT CARRIED FORWARD	
		Option 2B: Quadruple Roundabouts with FCP Over/Under	NOT CARRIED FORWARD		
		Option 2C: Quadruple Roundabouts with direct access from Popes Head Road	NOT CARRIED FORWARD		
			Option 2D: Quadruple Roundabouts with Additional Ramps	NOT CARRIED FORWARD	
		Option 3: Rotary Interchange	NOT CARRIED FORWARD		
		Option 4A: Diamond Interchange at Popes Head Road and Directional Flyover to future Shirley Gate Road (2 levels)	NOT CARRIED FORWARD		
		Option 4B: Diamond Interchange at Popes Head Road and Directional Flyover to future Shirley Gate Road (3 levels)	NOT CARRIED FORWARD		

- Environmental considerations including impacts to Patriot Park located to the west of the planned alignment of the future Shirley Gate Road Extension and east of the Fairfax County Parkway
- Project cost

In advance of the Public Hearing meeting, several preliminary options for the Popes Head Road interchange were developed by the study team and presented at three public meetings and at one community meeting to solicit stakeholder and public input. **Table 2-1** summarizes the interchange options presented and considered at each meeting and whether the options were carried forward for further consideration and refinement to reach a consensus on a Preferred Option.

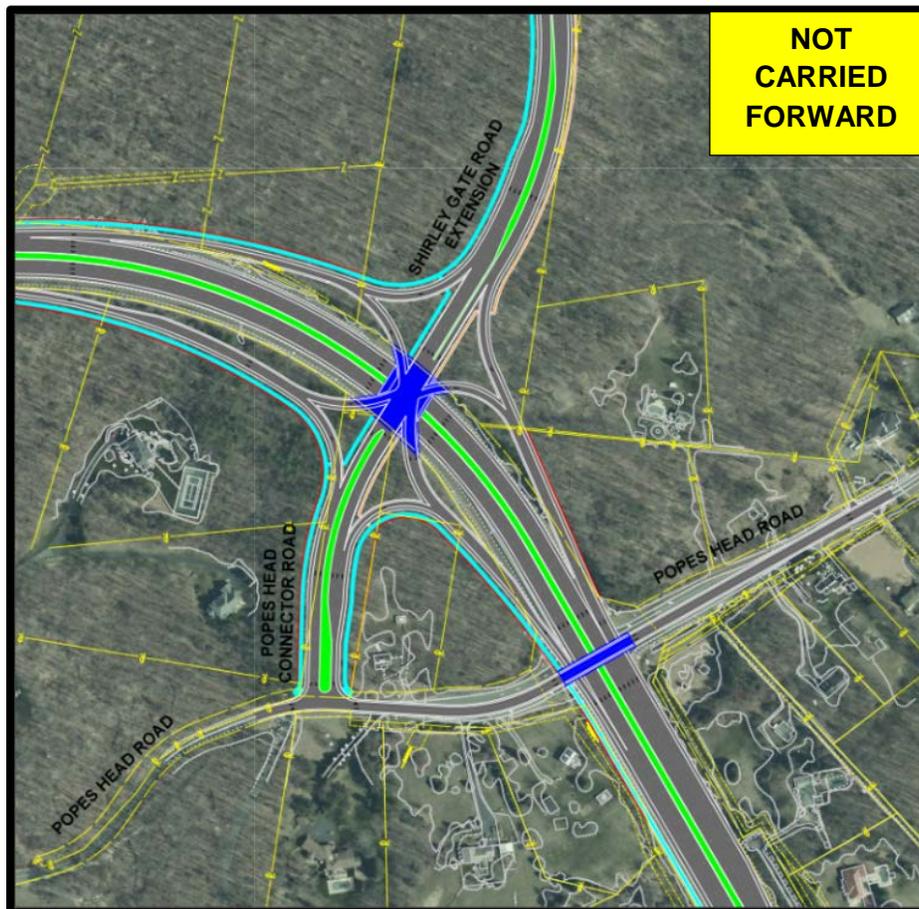
A key feature of all of the options under consideration is the removal of the unsignalized intersection of Fairfax County Parkway and Colchester Meadow Lane located approximately 900 feet south of the Popes Head Road signalized intersection. Due to the proximity of the existing Colchester Meadow Lane intersection in relation to the proposed ramps serving Popes Head Road to and from Fairfax County Parkway, Colchester Meadow Lane would be extended and/or realigned to provide access to Colchester Meadow Lane from the Popes Head Road interchange with all options.

Initial Options

Six preliminary options were initially developed and evaluated in advance of the public outreach process. Three of the six preliminary options were eliminated and not carried forward for additional consideration:

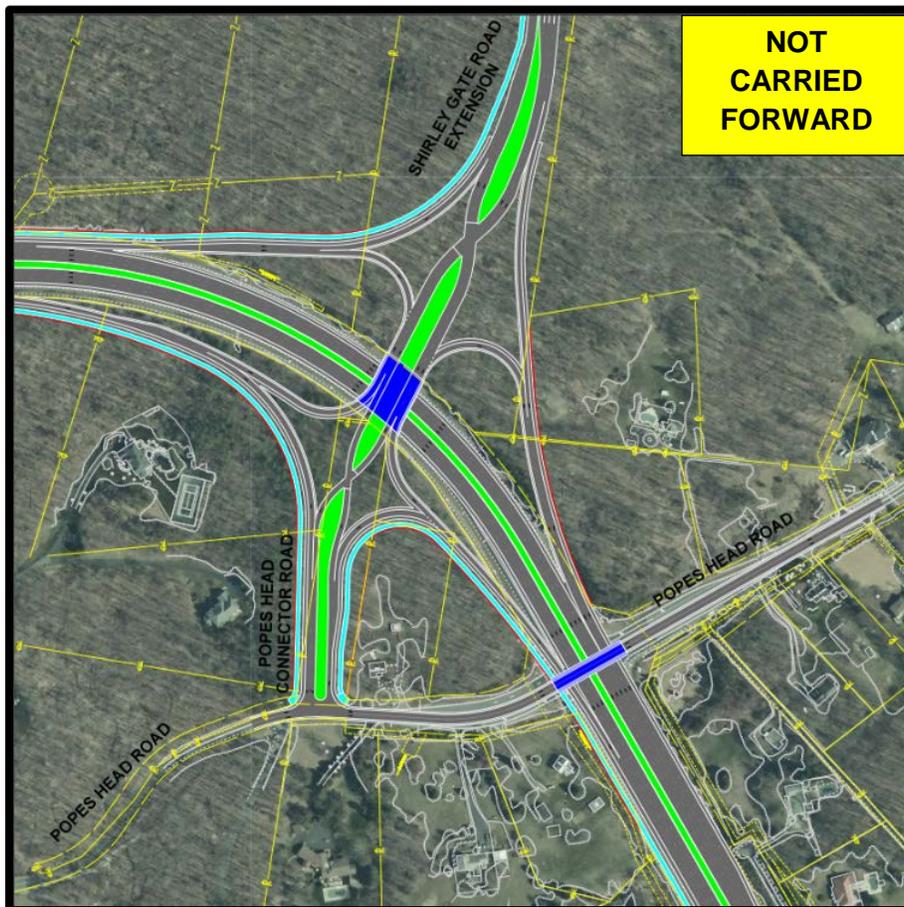
- **Single Point Urban Interchange (see Figure 2-1):** This option includes a single point urban interchange (SPUI) along Fairfax County Parkway at future Shirley Gate Road and a grade separation of Popes Head Road. Direct access to Fairfax County Parkway would be provided to future Shirley Gate Road and indirect access would be provided to Popes Head Road via a connection on the west side of Fairfax County Parkway. This option would reduce the number of required intersections and conflict points, but would require a larger, more complex, and more expensive bridge over Fairfax County Parkway. Additionally, it would not provide direct access to Popes Head Road. **Therefore, this option was eliminated and not carried forward for additional consideration.**

Figure 2-1: Single Point Urban Interchange



- **Diverging Diamond Interchange (see Figure 2-2):** This option includes a diverging diamond interchange (DDI) along Fairfax County Parkway at future Shirley Gate Road and a grade separation of Popes Head Road. Direct access to the Fairfax County Parkway would be provided to future Shirley Gate Road and indirect access would be provided to Popes Head Road via a connection on the west side of Fairfax County Parkway. This option would not provide direct access to Popes Head Road. The interchange would require more right of way compared to the compressed diamond interchange option and a larger, more expensive bridge over Fairfax County Parkway. **Therefore, this option was eliminated and not carried forward for additional consideration.**

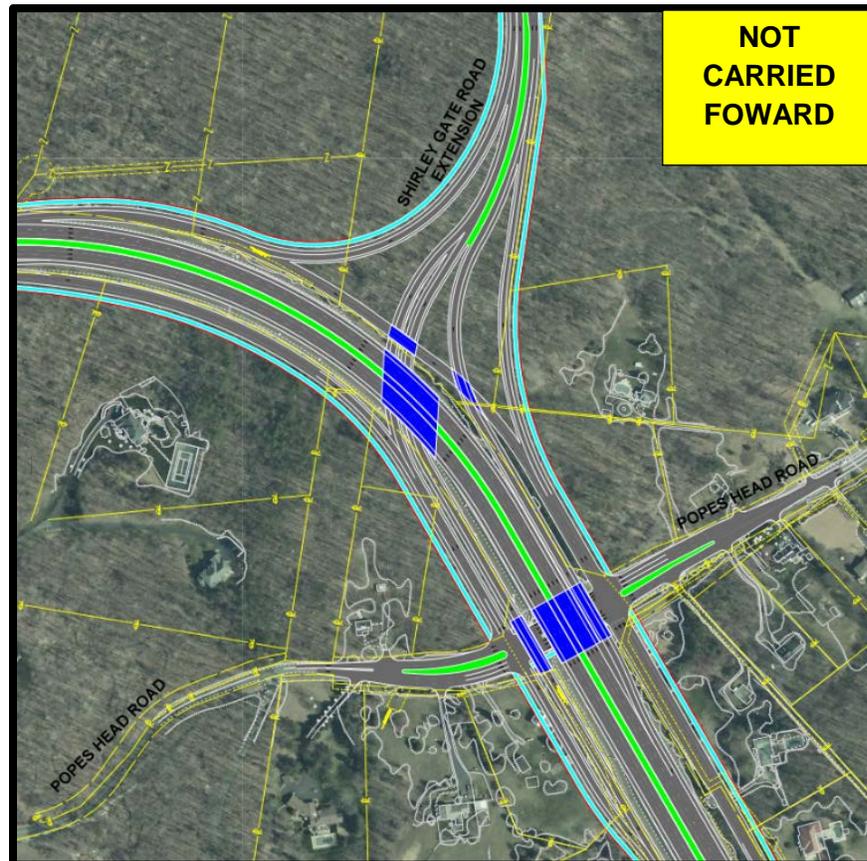
Figure 2-2: Diverging Diamond Interchange



- **Flyover Interchange with future Shirley Gate Road Extension and Diamond Interchange with Popes Head Road (see Figure 2-3):** This option includes direct flyover ramps between Fairfax County Parkway and future Shirley Gate Road and a diamond interchange at the Fairfax County Parkway and Popes Head Road. Direct access to the Fairfax County Parkway would be provided to both future Shirley Gate Road and Popes Head Road and the movements to and from future Shirley Gate Road would be free flowing. The flyover interchange at future Shirley Gate Road would have more extensive bridge structures compared to the other options. This option would provide direct access to Popes Head Road and eliminate the need for a connection on the west side of the Fairfax County Parkway, but would result in greater right of way acquisition to accommodate the additional ramps, greater impacts to Patriot Park, and have a higher cost due to the bridge structures and extensive ramp construction at the future Shirley Gate Road interchange along Fairfax County Parkway. **Therefore, this option was eliminated and not carried forward for additional consideration.**

It should be noted that an option with some similar features was presented by community leaders in advance of the meeting with the communities along Popes Head Road held on April 26, 2018.

Figure 2-3: Flyover Interchange with Future Shirley Gate Road and Diamond Interchange with Popes Head Road



The three remaining options carried forward and presented at Public Information Meeting #1:

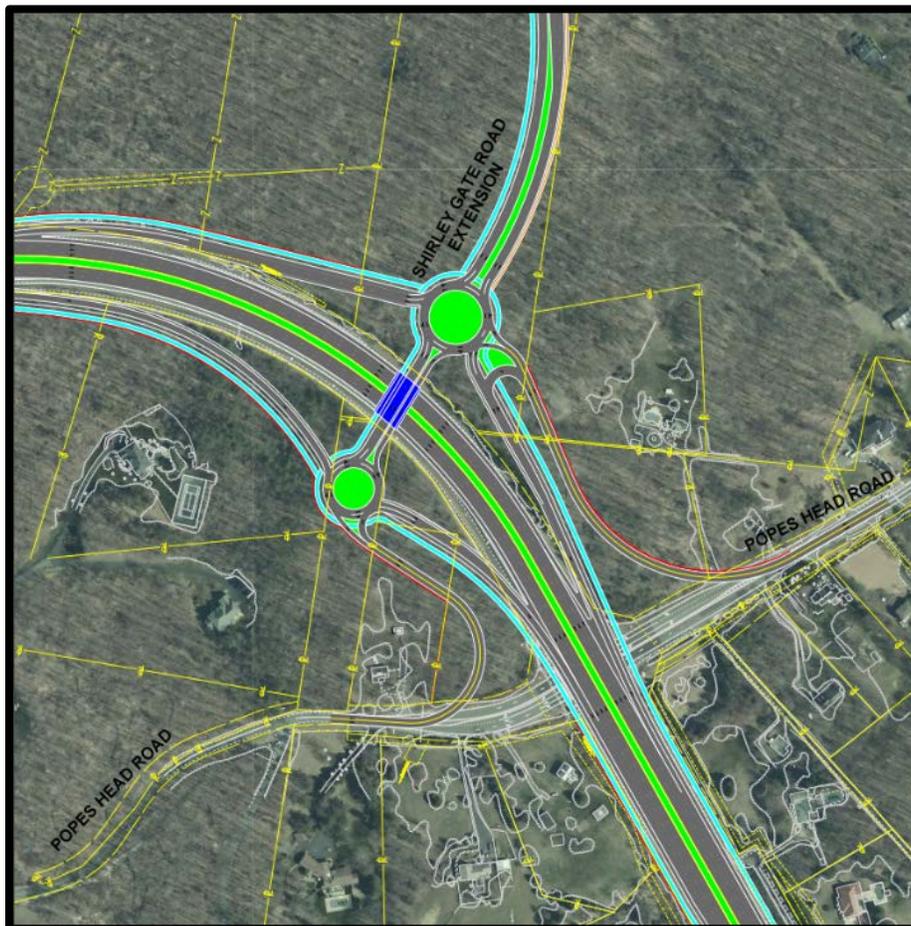
- **Compressed Diamond Interchange (see Figure 2-4):** This option includes a compressed diamond interchange of Fairfax County Parkway with future Shirley Gate Road with traffic signals serving the interchange ramps and a grade separation of Popes Head Road. Direct access to Fairfax County Parkway would be provided to future Shirley Gate Road and indirect access would be provided to Popes Head Road via a connection on the west side of Fairfax County Parkway. This option generally reflects the preferred option for the future Shirley Gate Road Extended Corridor Study. This option would reduce right of way acquisition compared to other interchange options, but would not provide direct access to Popes Head Road.

Figure 2-4: Compressed Diamond Interchange



- **Double Roundabout Interchange (see Figure 2-5):** This option includes a diamond interchange at future Shirley Gate Road with roundabouts serving the ramp intersections. Connection from Popes Head Road to the roundabouts on both the east and west sides of Fairfax County Parkway would be provided to accommodate movements to Fairfax County Parkway and through movements along Popes Head Road. Popes Head Road motorists traveling across Fairfax County Parkway would be required to travel north to the future Shirley Gate Road interchange and travel through both roundabouts and then return south to Popes Head Road.

Figure 2-5: Double Roundabout Interchange



- **Split Diamond Interchange with Traffic Signals (see Figure 2-6):** This option includes frontage roads along both the east and west sides of Fairfax County Parkway with diamond interchanges at both future Shirley Gate Road and Popes Head Road. Access to Fairfax County Parkway would be provided to both future Shirley Gate Road and Popes Head Road via the frontage roads and four signalized intersections. This option increases right of way acquisition along Fairfax County Parkway to accommodate the frontage roads, but would not require the connection to Popes Head Road west of the Fairfax County Parkway.

Figure 2-6: Split Diamond Interchange with Traffic Signals

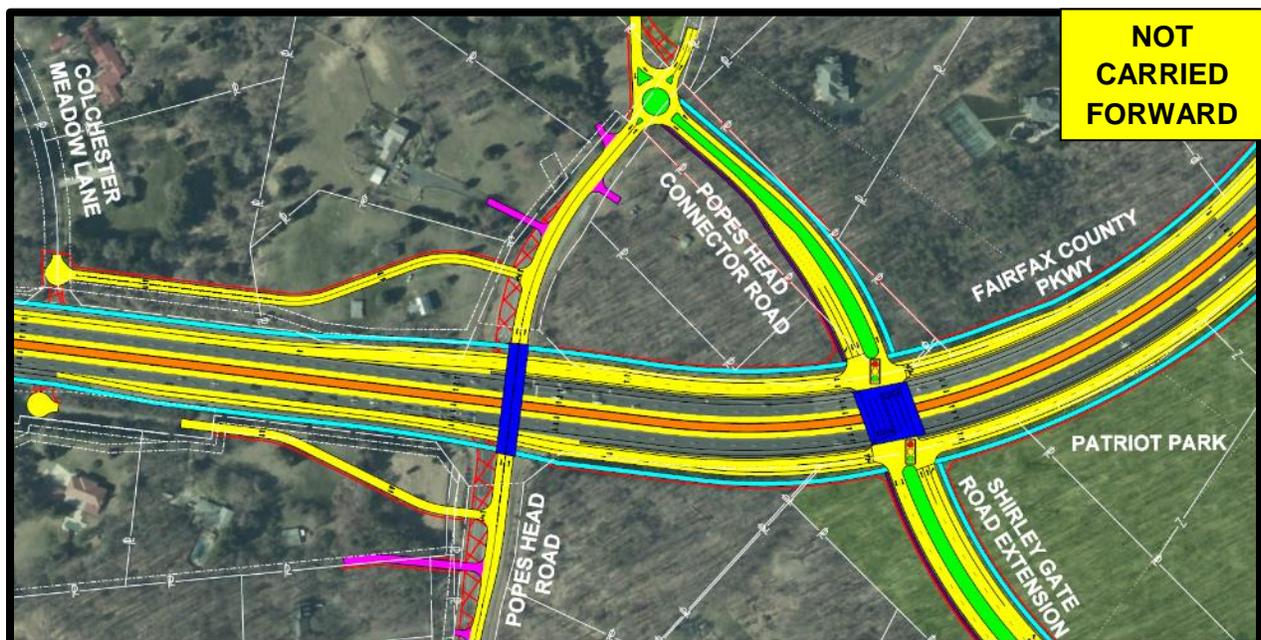


Public Information Meeting #1

The three preliminary options carried forward were refined and presented at Public Information Meeting #1 on December 7, 2017. The following is a summary of the options presented, public feedback, and a summary of advantages and disadvantages of each option:

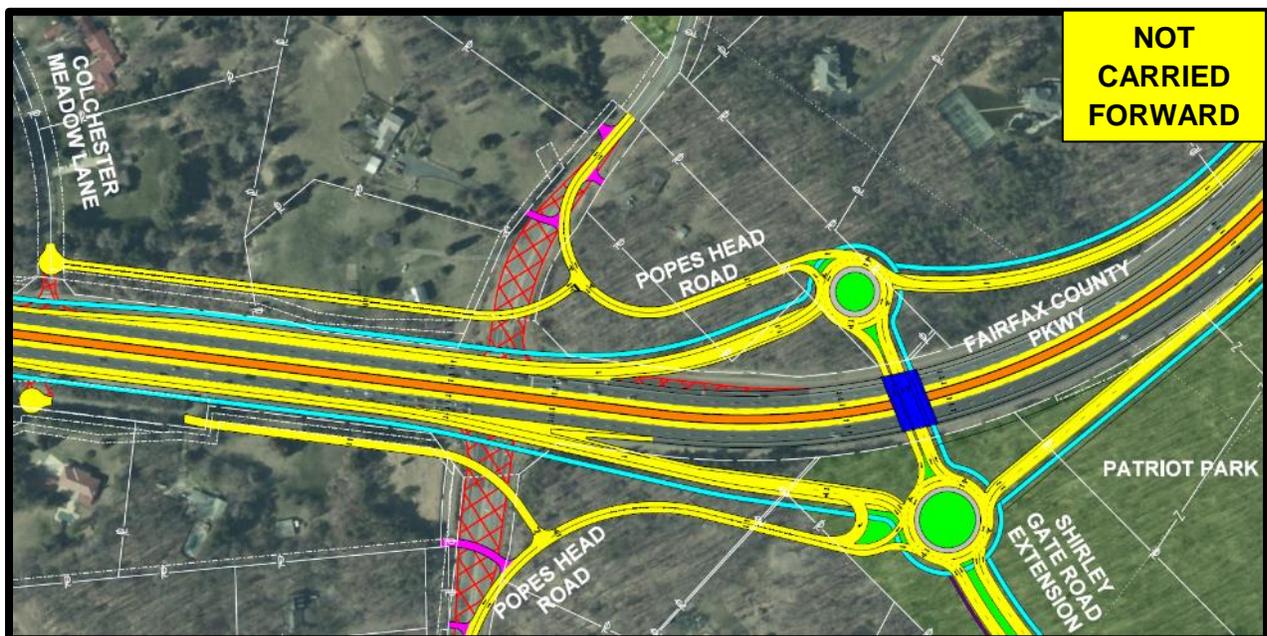
- **Compressed Diamond Interchange (see Figure 2-7):** As previously noted, this option includes a compressed diamond interchange along Fairfax County Parkway at future Shirley Gate Road and a grade separation of Popes Head Road. Direct access to Fairfax County Parkway would be provided to future Shirley Gate Road and indirect access would be provided to Popes Head Road via a connection on the west side of Fairfax County Parkway. The Popes Head Road communities voiced concerns regarding the large footprint on the west side of the interchange resulting from the connection from the future Shirley Gate Road interchange to Popes Head Road and this option would not provide direct access to Popes Head Road. Additionally, the Popes Head Road community leaders stated a preference for roundabouts rather than traffic signals for intersection control due to their proven safety benefits and lower travel speeds. **Therefore, this option was eliminated and not carried forward for additional consideration.**

Figure 2-7: Compressed Diamond Interchange



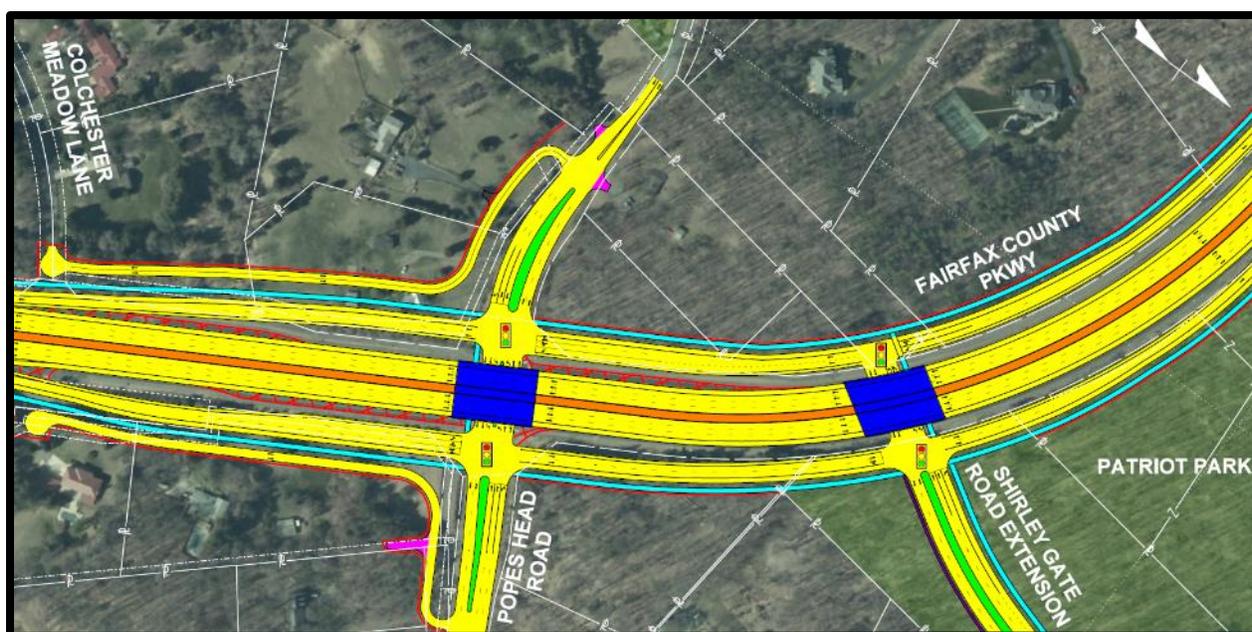
- **Double Roundabout Interchange (see Figure 2-8):** As previously noted, this option includes a diamond interchange at future Shirley Gate Road with roundabouts serving the ramp intersections. Connections from Popes Head Road to the roundabouts on both the east and west sides of the Fairfax County Parkway would be provided to accommodate movements to and from the Fairfax County Parkway and through movements along Popes Head Road. Popes Head Road motorists that travel across Fairfax County Parkway would be required to travel north to the future Shirley Gate Road interchange and travel through both roundabouts and then return south to Popes Head Road. The Popes Heads Road community expressed a strong desire to have a direct, continuous route for Popes Head Road traffic crossing the Fairfax County Parkway. **Therefore, this option was eliminated and not carried forward for additional consideration.**

Figure 2-8: Double Roundabout Interchange



- **Split Diamond Interchange with Traffic Signals (see Figure 2-9):** As previously noted, this option includes frontage roads along both the east and west sides of the Fairfax County Parkway with diamond interchanges at both future Shirley Gate Road and Popes Head Road. Access to the Fairfax County Parkway would be provided to both future Shirley Gate Road and Popes Head Road via the frontage roads and four signalized intersections. This option increases right of way acquisition along Fairfax County Parkway to accommodate the frontage roads, but would not require a connection to Popes Head Road west of the Fairfax County Parkway. **This option was carried forward and presented at the meeting with communities along Popes Head Road on April 26, 2018 (Option 2).**

Figure 2-9: Split Diamond Interchange with Traffic Signals



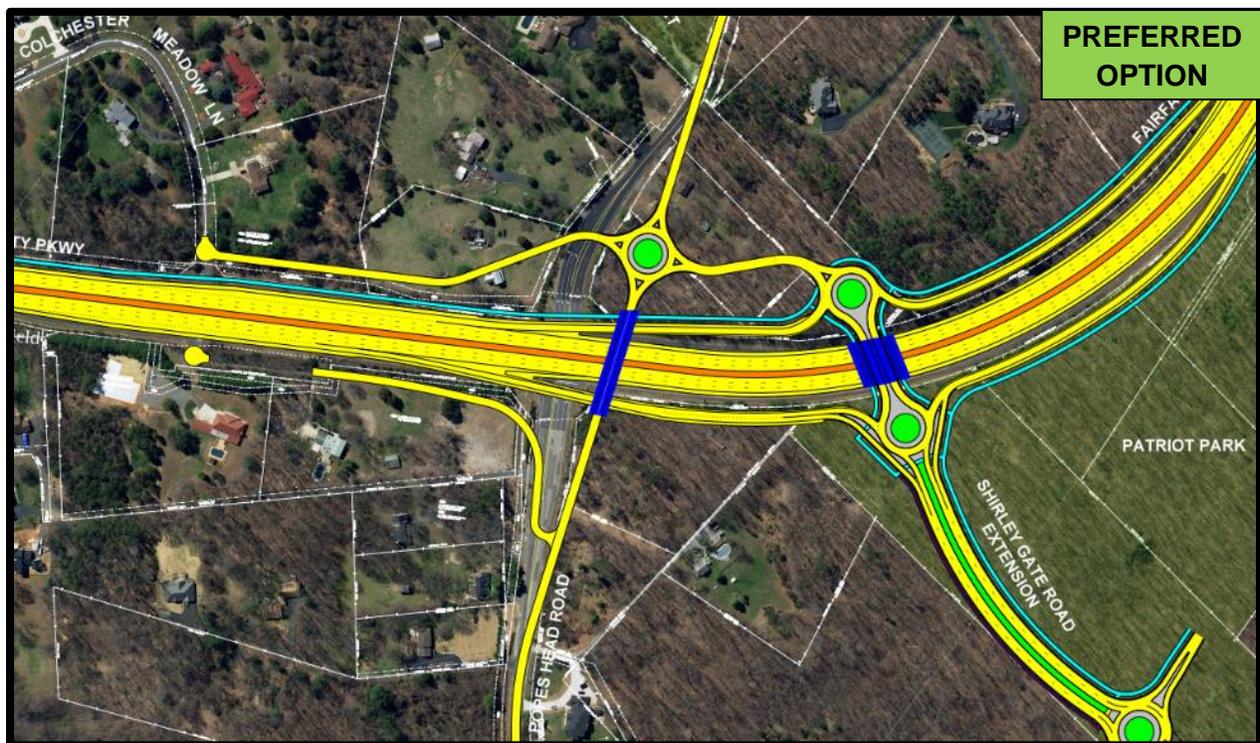
Meeting with Communities along Popes Head Road

As a result of Public Information Meeting #1 and based on input from the communities along Popes Head Road, several additional options were developed and presented at a meeting held on April 26, 2018.

- **Option 1: Triple Roundabouts (see Figure 2-10):** This option was developed based upon the compressed diamond interchange option but provides roundabouts to serve the ramps at the future Shirley Gate Road interchange in lieu of traffic signals in response to community desires to lower speeds along Popes Head Road and to improve safety. The use of roundabouts at the future Shirley Gate Road interchange provides more flexibility of the intersection approach angles whereas with traffic signals, intersection approaches desirably intersect at approximately right angles. With the Triple Roundabout option, the use of roundabouts allows the connection to Popes Head Road on the west side of Fairfax County Parkway to be aligned closer to the Fairfax County Parkway minimizing right of

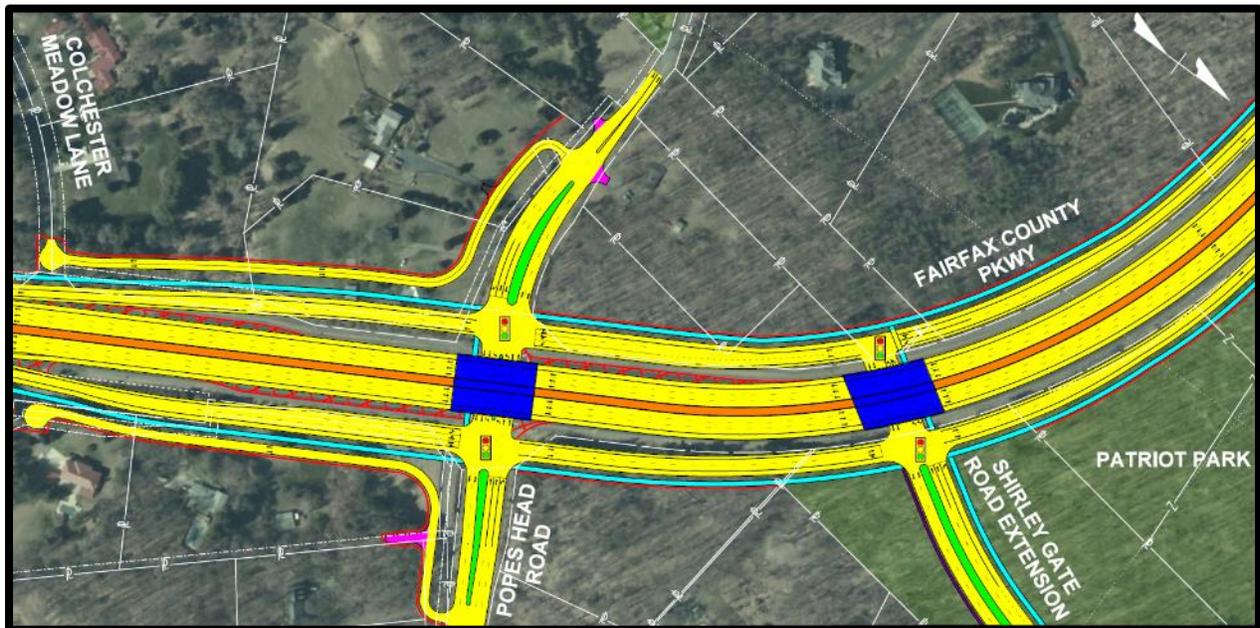
way impacts and the overall interchange footprint. A noted disadvantage of this option is that motorists along Popes Head Road destined for northbound Fairfax County Parkway would have to traverse three roundabouts to access northbound Fairfax County Parkway. Northbound Fairfax County Parkway motorists destined for westbound Popes Head Road and eastbound Popes Head motorists destined for northbound Fairfax County would also have to traverse three roundabouts. Additionally, eastbound and westbound Popes Head Road motorists destined for southbound Fairfax County Parkway and southbound Fairfax County Parkway motorists destined for eastbound Popes Head Road would have to traverse two roundabouts; however, this is typical at traditional diamond interchanges. **This option was carried forward to be presented at the Public Information Meetings in September and October 2018.**

Figure 2-10: Option 1 - Triple Roundabouts



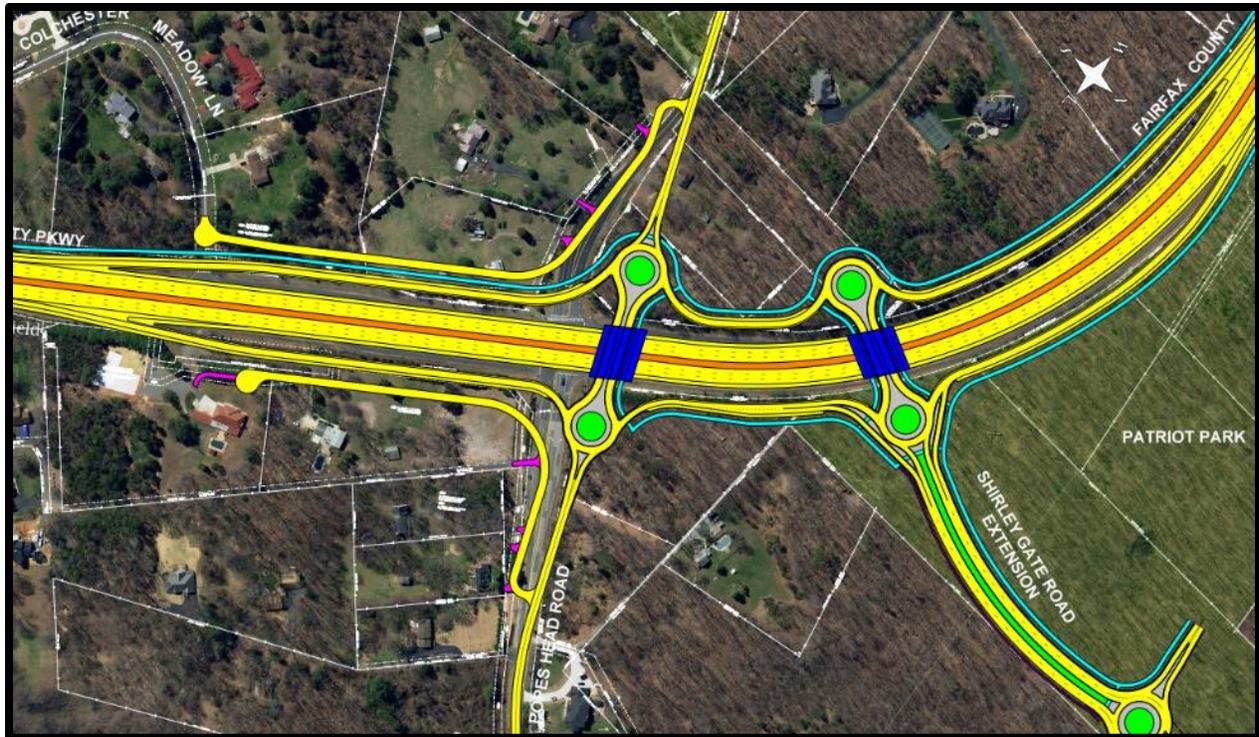
- **Option 2: Split Diamond Interchange with Traffic Signals (see Figure 2-11):** As noted above, this option increases right of way acquisition along Fairfax County Parkway to accommodate the frontage roads, but would not require the connection to Popes Head Road west of the Fairfax County Parkway. **This option was carried forward to be presented at the Public Information Meetings in September and October 2018.** Based on community feedback to provide roundabouts to serve the interchanges ramps in lieu of traffic signals, three additional options were developed that include frontage roads along Fairfax County Parkway similar to Option 2, but that include roundabouts to serve the ramp movements (Option 2A, Option 2B, and Option 2C).

Figure 2-11: Option 2 - Split Diamond Interchange with Traffic Signals



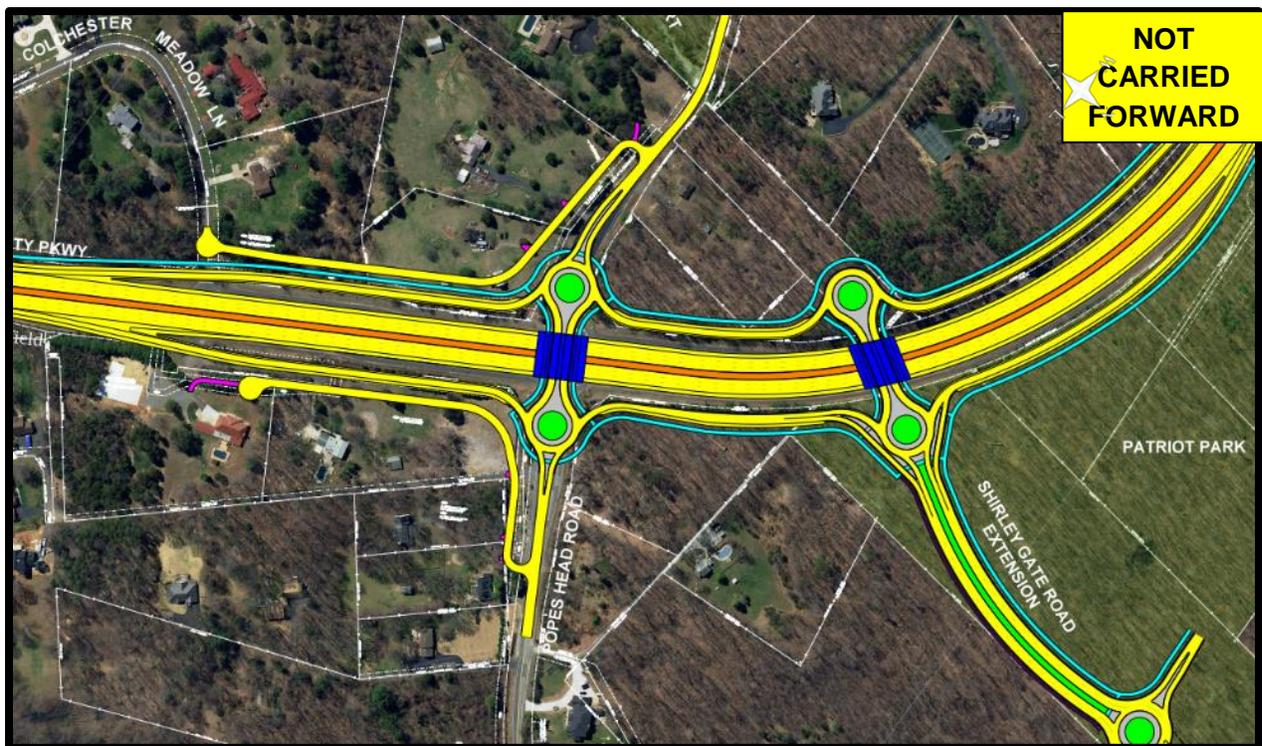
- **Option 2A: Quadruple Roundabouts with Fairfax County Parkway At-Grade (see Figure 2-12):** This option is similar to Option 2, but provides roundabouts at the four ramp intersections in lieu of traffic signals. The result is a larger interchange footprint in the vicinity of the roundabout intersections, but the approaches to the roundabouts would be single lanes. This option was carried forward to be presented at the Public Information Meetings in September and October 2018.

Figure 2-12: Option 2A - Quadruple Roundabouts with Fairfax County Parkway At-Grade



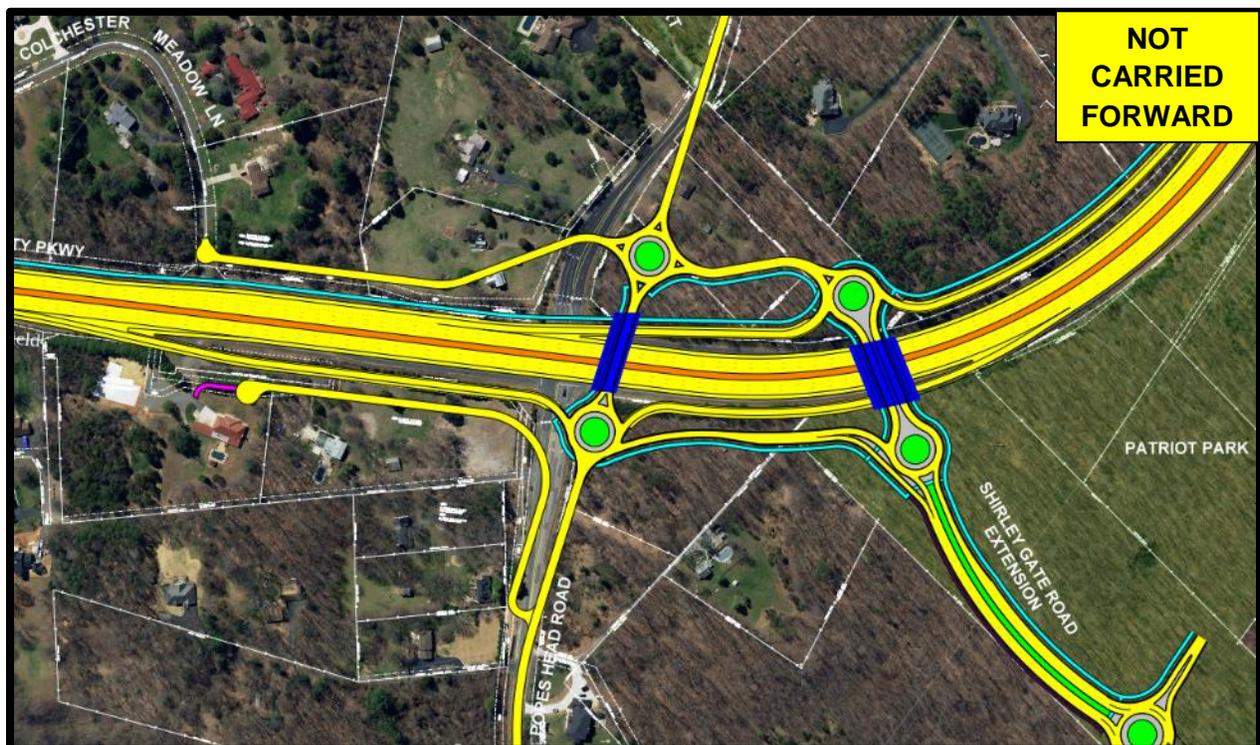
- **Option 2B: Quadruple Roundabouts with Fairfax County Parkway Over/Under (see Figure 2-13):** This option is similar to Option 2A, but would keep Popes Head Road at its existing elevation and would raise the Fairfax County Parkway over Popes Head Road and future Shirley Gate Road or would lower the Fairfax County Parkway under the Popes Heads Road and future Shirley Gate Road bridges. Maintaining traffic along Fairfax County Parkway would be challenging and expensive with this option since the elevated (or lowered) roadway would be along the existing alignment of Fairfax County Parkway. **Therefore, this option was eliminated and not carried forward for additional consideration.**

Figure 2-13: Option 2B - Quadruple Roundabouts with Fairfax County Parkway Over/Under



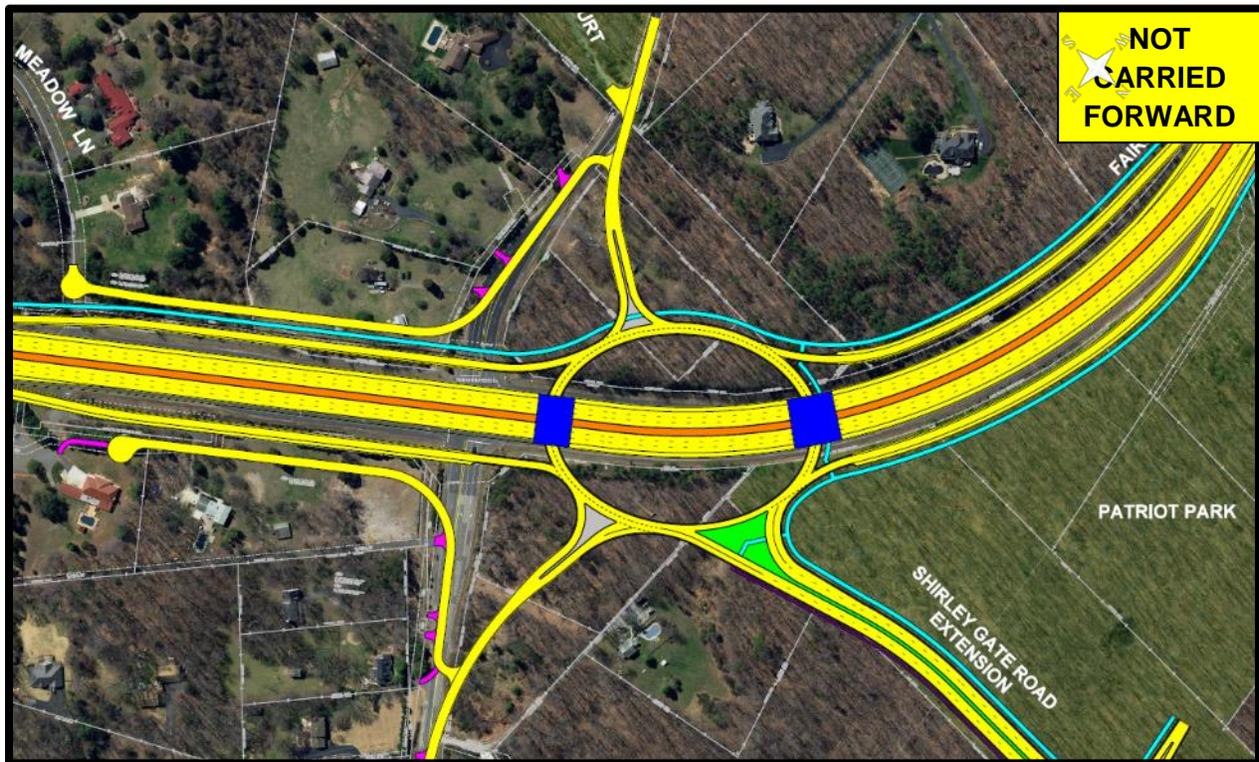
- **Option 2C: Quadruple Roundabouts with Direct Access from Popes Head Road (see Figure 2-14):** This option includes four roundabouts but provides direct access ramps from future Shirley Gate Road to southbound Fairfax County Parkway and from Popes Head Road to northbound Fairfax County Parkway. This option increases the required right of way due to the additional ramps. In addition, this option does not provide direct access from southbound future Shirley Gate Road to northbound Fairfax County Parkway. Motorists traveling from future Shirley Gate Road would need to go through four roundabouts to travel north on Fairfax County Parkway. **Therefore, this option was eliminated and not carried forward for additional consideration.** This option was later refined as Option 2D: Quadruple Roundabouts with Additional Ramps.

Figure 2-14: Option 2C - Quadruple Roundabouts with Direct Access from Popes Head Road



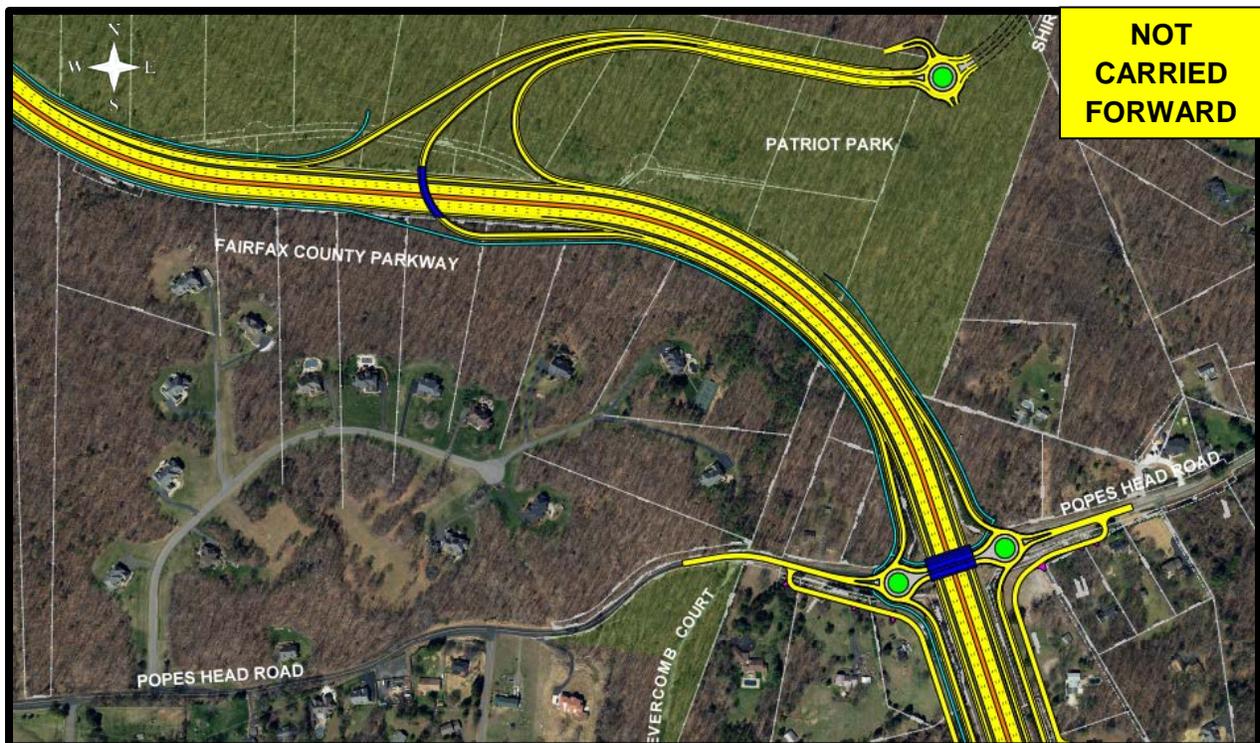
- **Option 3: Rotary Interchange (see Figure 2-15):** This option would provide a rotary interchange with seven access points along the rotary with several located in close proximity to each other. This concept would have a large footprint to accommodate the turning movements at each entrance to the rotary resulting in greater right of way impacts. In addition, the interchange was perceived to be complex for motorists to maneuver. **Therefore, this option was eliminated and not carried forward for additional consideration.**

Figure 2-15: Option 3 - Rotary Interchange



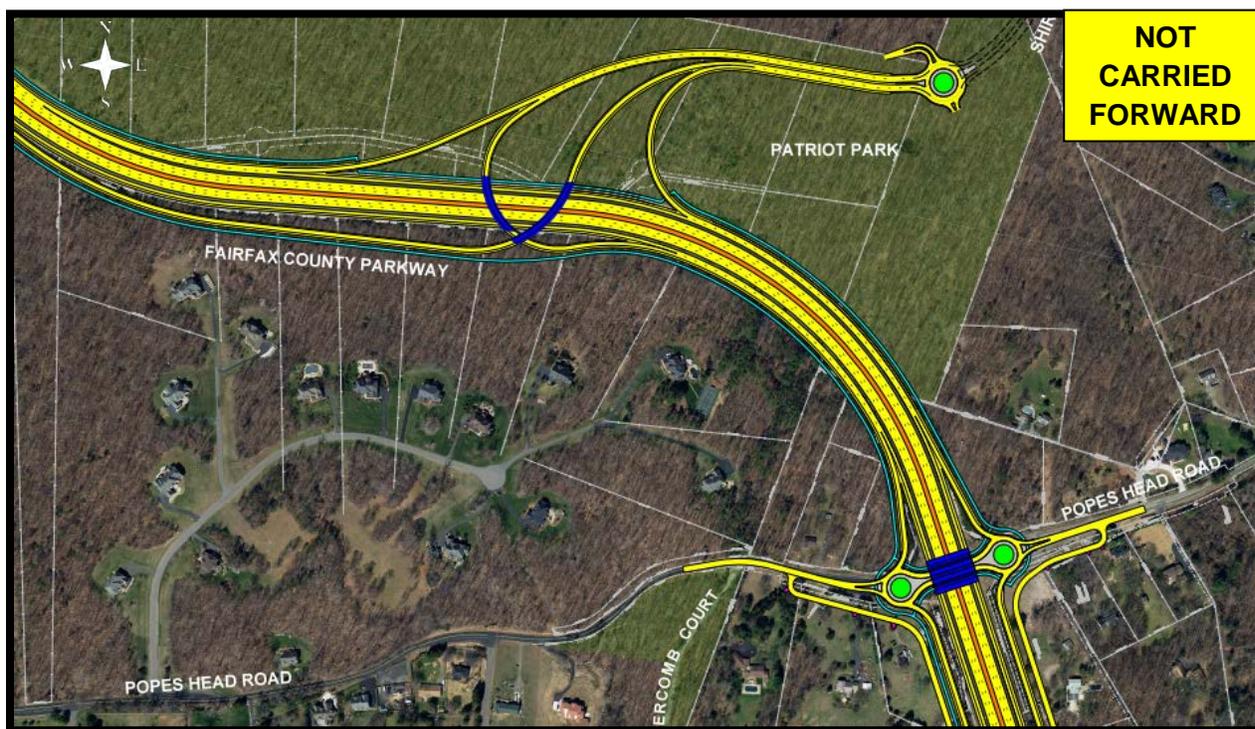
- **Option 4A: Diamond Interchange at Popes Head Road and Directional Flyover to Future Shirley Gate Road (2 levels)** (see Figure 2-16): This option includes a direct flyover ramp from westbound future Shirley Gate Road to southbound Fairfax County Parkway and a diamond interchange at the Fairfax County Parkway and Popes Head Road with roundabouts serving the intersections. Direct access to the Fairfax County Parkway would be provided to both future Shirley Gate Road and Popes Head Road and the movements to and from future Shirley Gate Road would be free flowing. Collector-distributor roadways would be provided along the Fairfax County Parkway from south of Popes Head Road to future Shirley Gate Road increasing the width of the proposed improvements in the vicinity of the Popes Head Road interchange thereby increasing impacts to residential properties in the vicinity of Popes Head Road. The direct access to Popes Head Road would eliminate the need for a connection on the west side of the Fairfax County Parkway but would result in greater right of way acquisition to accommodate the additional ramps, greater impacts to Patriot Park, and have a higher cost. **Therefore, this option was eliminated and not carried forward for additional consideration.**

Figure 2-16: Option 4A - Diamond Interchange at Popes Head Road and Directional Flyover to Future Shirley Gate Road (2 levels)



- Option 4B: Diamond Interchange at Popes Head Road and Directional Flyover to Future Shirley Gate Road (3 levels)** (see Figure 2-17): This option is similar to Option 4A but would also have a flyover connection from southbound Fairfax County Parkway to northbound future Shirley Gate Road resulting in three levels and more extensive bridge structures compared to the other options. Due to the greater right of way acquisition to accommodate the additional ramps, greater impacts to Patriot Park, and the higher cost, **this option was eliminated and not carried forward for additional consideration.**

Figure 2-17: Option 4B - Diamond Interchange at Popes Head Road and Directional Flyover to Future Shirley Gate Road (3 levels)



Public Information Meeting #2

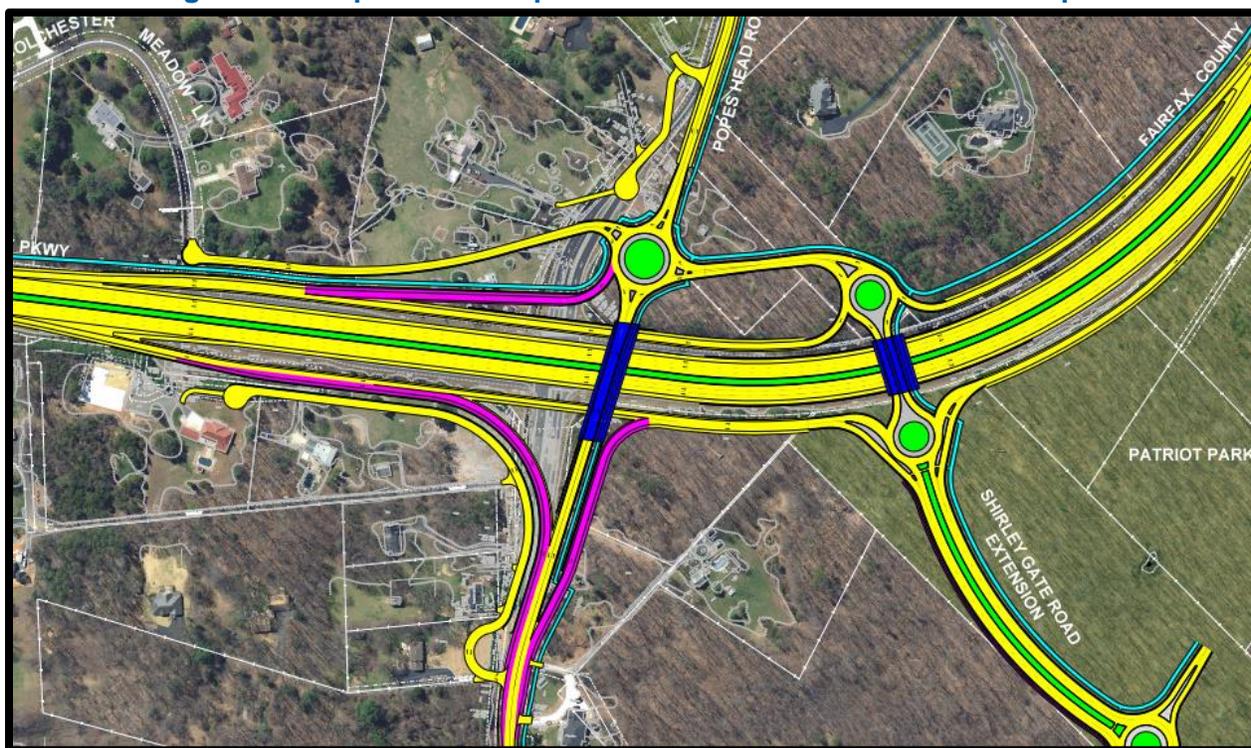
After further refinement of the options, the following options were presented at a series of Public Information Meetings held on September 25, September 27 and October 3, 2018.

- Option 1: Triple Roundabouts (see Figure 2-10):** See discussion above regarding the characteristics of this option. **This option was carried forward to be presented at the Public Information Meeting in January 2019.**
- Option 1A: Triple Roundabouts with Additional Ramps (see Figure 2-18):** This option is similar to Option 1 but provides three additional ramps to accommodate traffic from Popes Head Road to Fairfax County Parkway including:

- Northbound Fairfax County Parkway to eastbound Popes Head Road: This is a low volume movement forecasted to be less than 10 vehicles per hour during peak hours and would result in approximately a 1-minute travel time savings.
- Westbound Popes Head Road to northbound Fairfax County Parkway: This is the highest volume movement at the interchange (approximately 430 vehicles per hour in the 2046 design year) and would result in approximately a 15 second travel time savings for motorists from westbound Popes Head Road to northbound Fairfax County Parkway. With Option 1, these motorists would travel through three roundabouts to access northbound Fairfax County Parkway.
- Eastbound Popes Head Road to southbound Fairfax County Parkway: This ramp would serve approximately 75 vehicles per hour and would result in approximately 30 seconds of travel time savings for motorists from eastbound Popes Head Road to southbound Fairfax County Parkway.

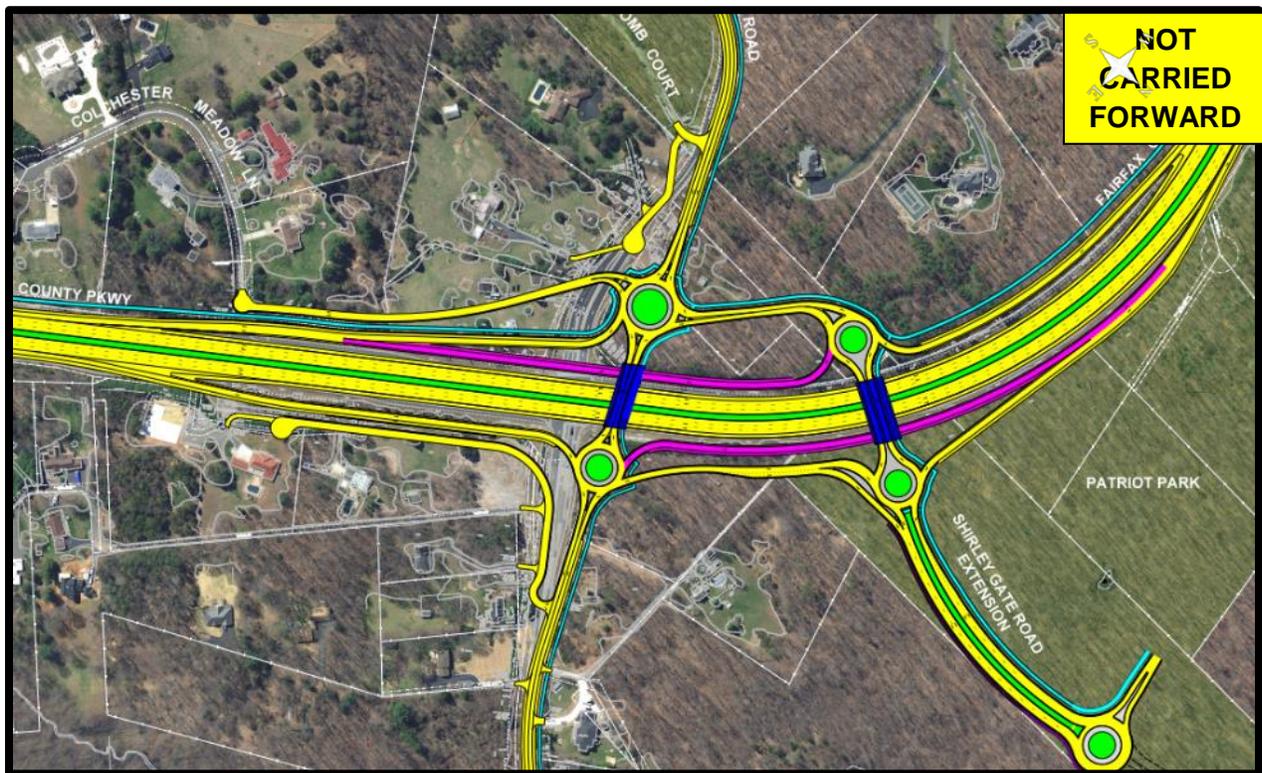
Due to the increased cost associated with constructing the ramps (approximately \$2 to 2.2 million per ramp) and greater impacts to right of way and minimal traffic volumes especially for the ramps from eastbound Popes Head Road to southbound Fairfax County Parkway and northbound Fairfax County Parkway to eastbound Popes Head Road, **this option was eliminated and not carried forward for additional consideration.**

Figure 2-18: Option 1A - Triple Roundabouts with Additional Ramps



- **Option 2: Split Diamond Interchange with Traffic Signals (see Figure 2-11):** See discussion above regarding the characteristics of this option. Due to the lower delays and safety benefits associated with roundabouts compared to traffic signals, community's preference for roundabouts rather than traffic signals, and the greater cost of this interchange compared to other options that would adequately serve forecasted traffic volumes and provide acceptable traffic operations, **this option was eliminated and not carried forward for additional consideration.**
- **Option 2A: Quadruple Roundabouts with Fairfax County Parkway At-Grade (see Figure 2-12):** See discussion above regarding the characteristics of this option. Due to the more extensive right of way impacts compared to options with three roundabouts and the greater cost of this interchange compared to other options that would adequately serve forecasted traffic volumes and provide acceptable traffic operations, **this option was eliminated and not carried forward for additional consideration.**
- **Option 2D: Quadruple Roundabouts with Additional Ramps (see Figure 2-19):** This option is a modification from Option 2C but provides an additional ramp from Popes Head Road to southbound Fairfax County Parkway. Due to the additional right of way required and cost for this interchange compared to other options that would adequately serve forecasted traffic volumes and provide acceptable traffic operations, **this option was eliminated and not carried forward for additional consideration.**

Figure 2-19: Option 2D - Quadruple Roundabouts with Additional Ramps



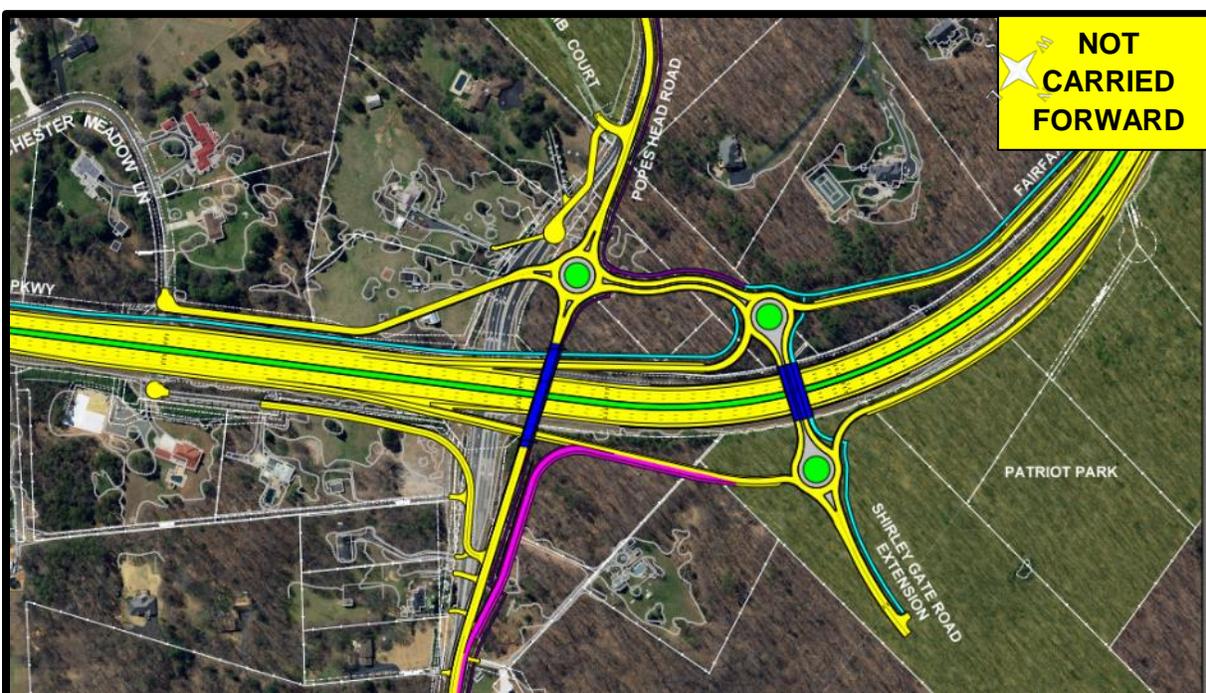
Public Information Meeting #3

After further refinement, the following two options (Option 1 and Option 1A Modified) were presented at a Public Information Meeting held on January 7, 2019 as the preferred options to be included in the Preferred Alternative.

- **Option 1: Triple Roundabouts (see Figure 2-10):** As discussed above, this option provides a diamond interchange at future Shirley Gate Road and a grade separation of Popes Head Road with roundabouts serving the interchange ramps achieving greater safety benefits compared to traffic signals. Direct access to Fairfax County Parkway would be provided to future Shirley Gate Road and indirect access would be provided to Popes Head Road via a connection on the west side of the Fairfax County Parkway. With the Triple Roundabouts option, the use of roundabouts allows the connection to Popes Head Road on the west side of the Fairfax County Parkway to be aligned closer to the Fairfax County Parkway minimizing right of way impacts and the overall interchange footprint. Motorists along Popes Head Road destined for northbound Fairfax County Parkway would have to traverse three roundabouts to access northbound Fairfax County Parkway. Northbound Fairfax County motorists destined for westbound Popes Head Road and eastbound Popes Head motorists destined for northbound Fairfax County would also have to traverse three roundabouts. Additionally, eastbound and westbound Popes Head Road motorists destined for southbound Fairfax County Parkway and southbound Fairfax County Parkway motorists destined for eastbound Popes Head Road would have to traverse two roundabouts which is very typical at traditional diamond interchanges.

- Option 1A Modified: Triple Roundabouts with Additional Ramp (see Figure 2-20):** This option was developed as a modification to Options 1 and 1A and provides one of the three ramps considered in Option 1A. Option 1A Modified provides an additional connection from westbound Popes Head Road to the ramp from northbound Fairfax County Parkway. This additional ramp connection would serve the highest volume interchange movement from westbound Popes Head Road to northbound Fairfax County Parkway (430 vehicles per hour in the 2046 design year) and reduce travel delays for this movement by approximately 15 seconds. This option would result in greater property impacts to the undeveloped property on the northeast quadrant of Fairfax County Parkway and Popes Head Road where the La Biblia Pentecostal Church is proposed to be constructed. After being considered as a bid option, **this option was eliminated and not carried forward for additional consideration.**

Figure 2-20: Option 1A Modified – Triple Roundabouts with Additional Ramp



Identification of a Popes Head Road Interchange Preferred Option

Table 2-2 summarizes a comparison of the six Build options under consideration in addition to the No Build Option for the Fairfax County Parkway at Popes Head Road interchange. VDOT and Fairfax County reached a consensus on the Preferred Option for the interchange, Option 1 – Triple Roundabouts, because this option best meets the project purpose and need of addressing safety and capacity deficiencies along Fairfax County Parkway while minimizing right of way impacts and project costs. In terms of traffic operations, all of the options considered operate under light traffic conditions including Option 1. Although Option 1 has greater travel times for the northbound Fairfax County Parkway right-turn to eastbound Popes Head Road, this is a low volume movement (less than 10 vehicles per hour). Option 1 minimizes right of way impacts to

adjacent properties and has the lowest project cost compared to other interchange options under consideration.

Recent Modification to the Popes Head Road Interchange Preferred Option

Option 1 Modification 9.16.2019: Triple Roundabouts (see Figure 2-21): The current preferred Option 1 9.16.2019 for the Fairfax County Parkway at Ladues End Lane/Nomes Court intersection is to provide a left-turn only from southbound Fairfax County Parkway to Nomes Court and right-in/right-out access to and from Nomes Court. Access between Ladues End Lane and Fairfax County Parkway would be eliminated and a frontage road would be provided from Popes Head Road to Ladues End Lane to provide access to residential properties. This is shown in Figure 2-21 below. The traffic analysis presented in Section 2 of the EA and the environmental analysis presented in Section 3 of the EA are based on Option 1. However, this modification in the preferred Option 1 9.16.2019 would have no substantive change in the traffic analysis.

Figure 2-21: Option 1 Modification 9.16.19 - Triple Roundabouts

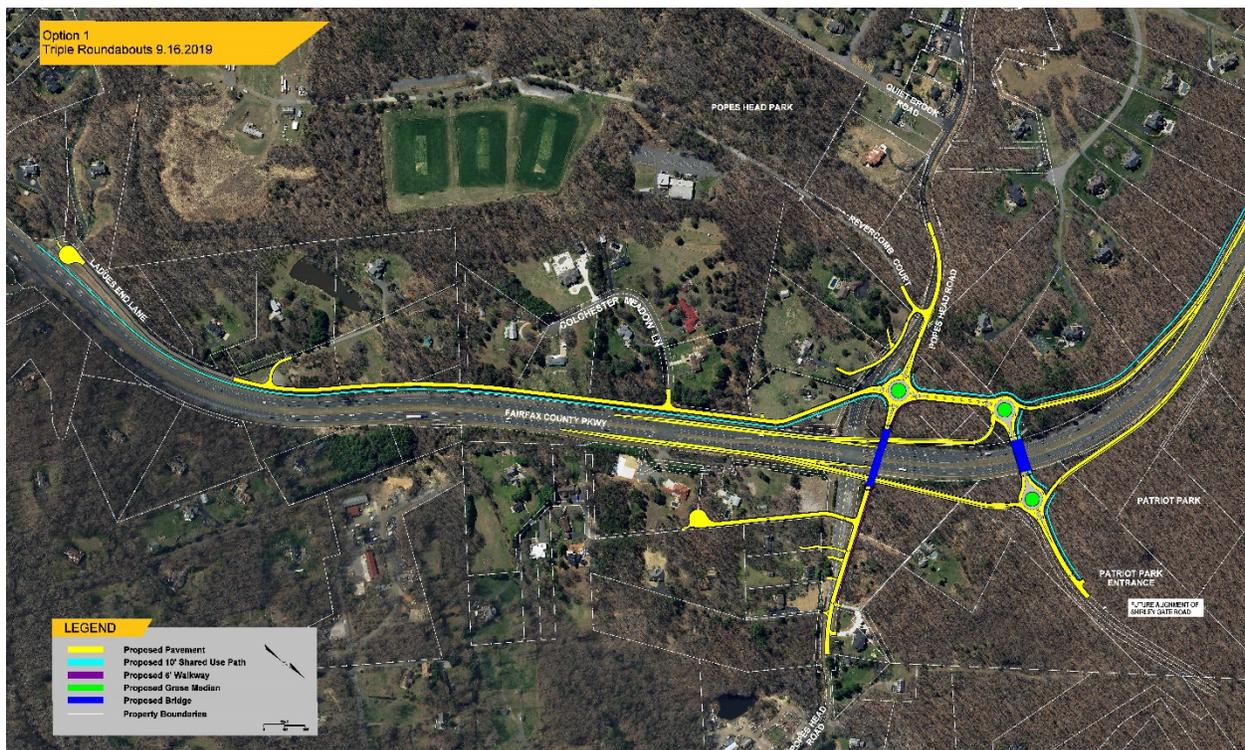


Table 2-2: Fairfax County Parkway at Popes Head Road Interchange Options Comparison

Option	Advantages	Disadvantages
No Build	<ul style="list-style-type: none"> ○ Provides direct access from Popes Head Road to the Fairfax County Parkway ○ No right of way impacts 	<ul style="list-style-type: none"> ○ Long delays and congestion at Fairfax County Parkway at the Popes Head Road intersection ○ Does not remove the signal along Fairfax County Parkway ○ Does not address existing safety deficiencies at the intersection
Option 1: Triple Roundabouts	<ul style="list-style-type: none"> ○ "Light traffic" conditions ○ Improved safety with roundabouts compared to traffic signals (Option 2) ○ Less right of way impacts compared to all other options ○ Lowest cost option 	<ul style="list-style-type: none"> ○ Less direct access to and from Fairfax County Parkway and Popes Head Road compared to other options ○ Increased delay for the northbound Fairfax County Parkway right-turn to Popes Head Road
Option 1A: Triple Roundabouts with Additional Ramps	<ul style="list-style-type: none"> ○ "Light traffic" conditions ○ Improved safety with roundabouts compared to traffic signals (Option 2) ○ Provides more direct access to and from Popes Head Road compared to Options 1 and 1A Modified ○ Less right of way impacts compared to Options 2, 2A, and 2D ○ Lower cost compared to Options 2 and 2D 	<ul style="list-style-type: none"> ○ Greater right of way impacts compared to Options 1 and 1A Modified ○ Higher cost compared to Options 1, 1A Modified, and 2A ○ Creates three additional conflict points with the additional ramps from to and from Fairfax County Parkway
Option 1A Modified: Triple Roundabouts with Additional Ramp	<ul style="list-style-type: none"> ○ "Light traffic" conditions ○ Improved safety with roundabouts compared to traffic signals (Option 2) ○ Less right of way impacts compared to Options 1A, 2, 2A, and 2D ○ Lower cost compared to Options 1A, 2, 2A, and 2D ○ Provides more direct access to northbound Fairfax County Parkway from westbound Popes Head Road compared to Option 1 	<ul style="list-style-type: none"> ○ Greater right of way impacts compared to Option 1 ○ Higher cost compared to Option 1 ○ Creates an additional conflict point with the additional ramp from westbound Popes Head Road to northbound Fairfax County Parkway
Option 2: Split Diamond with Traffic Signals	<ul style="list-style-type: none"> ○ "Light traffic" conditions ○ Less right of way impacts compared to Options 2A and 2D 	<ul style="list-style-type: none"> ○ Greater traffic delay compared to roundabout options ○ Traffic signals have higher crash frequency compared to roundabouts ○ Greater right of way impacts compared to Options 1, 1A, and 1A Modified ○ Higher cost compared to all other options
Option 2A: Quadruple Roundabouts with FCP At-Grade	<ul style="list-style-type: none"> ○ "Light traffic" conditions ○ Improved safety with roundabouts compared to traffic signals (Option 2) ○ Less right of way impacts compared to Option 2D ○ Lower cost compared to Options 1A, 2, and 2D 	<ul style="list-style-type: none"> ○ Greater right of way impacts compared to Options 1, 1A, 1A Modified, and 2 ○ Higher cost compared to Options 1 and 1A Modified
Option 2D: Quadruple Roundabouts with Additional Ramps	<ul style="list-style-type: none"> ○ "Light traffic" conditions ○ Improved safety with roundabouts compared to traffic signals (Option 2) ○ Lower cost compared to Option 2 ○ More direct access to and from Fairfax County Parkway and Popes Head Road compared to other options including direct access to NB and SB Fairfax County Parkway from both Popes Head Road and future Shirley Gate Road 	<ul style="list-style-type: none"> ○ Greater right of way impacts compared to all other options ○ Higher cost compared to Options 1, 1A, 1A Modified, and 2A ○ Creates two additional conflict points with the additional ramps to northbound and southbound Fairfax County Parkway

2.4.2.B Fairfax County Parkway at Burke Centre Parkway

Similar to the Fairfax County Parkway at Popes Head Road intersection, the development of options at the intersection of Fairfax County Parkway and Burke Centre Parkway evolved over a series of meetings with the public to identify a preferred option that balances the operational and safety needs along the Fairfax County Parkway corridor with impacts to the community in terms of access to Burke Centre Parkway and diversion to alternate routes.

The following is a summary of the three options that were evaluated in addition to the No Build option. Two additional options are also discussed that were not considered further including a Continuous Green-T and an interchange. **Figures 2-22 through 2-26** depict the various options. With all options, it is assumed that the pedestrian crossing of the Fairfax County Parkway on the south leg of the intersection would be eliminated and relocated adjacent to the Norfolk Southern Railroad (NSRR) located 0.25 miles north of the intersection.

- **Continuous Green-T (see Figure 2-22):** This option would accommodate all existing movements at the intersection and maintain free flow traffic operations for southbound Fairfax County Parkway. A traffic signal would control northbound Fairfax County Parkway through traffic, southbound Fairfax County left turns, and westbound Burke Centre Parkway left turns and right turns. A raised median would be provided along southbound Fairfax County Parkway to create a physically separated acceleration lane for left turns from Burke Centre Parkway to merge with southbound Fairfax County Parkway traffic.

This option was not considered further due to the low volume of traffic making a westbound left turn onto southbound Fairfax County Parkway (less than 15 vehicles per hour), the left-hand merge condition that would be created along southbound Fairfax County Parkway, and because it would not improve existing and future safety deficiencies along northbound Fairfax County Parkway.

Figure 2-22: Fairfax County Parkway at Burke Centre Parkway – Continuous Green-T



- **Option A: Right-In/Right-Out Only (see Figure 2-23):** This option would eliminate the existing traffic signal and divert southbound Fairfax County Parkway left-turn traffic to Burke Centre Parkway and westbound Burke Centre Parkway left-turn traffic to southbound Fairfax County to other alternate routes. An acceleration lane would be provided along northbound Fairfax County Parkway to accommodate the heavy westbound right-turn movement.

Figure 2-23: Fairfax County Parkway at Burke Centre Parkway – Option A: Right-In/Right-Out Only



- Option B: Allow All Turning Movements Except Prohibit Left Turns from Burke Centre Parkway (see Figure 2-24):** This option would accommodate all movements at the intersection except the low volume (less than 15 vehicles per hour) westbound Burke Centre Parkway left turn to southbound Fairfax County Parkway which would be prohibited. Southbound Fairfax County Parkway would be free flow and not controlled by a traffic signal. A traffic signal would control northbound Fairfax County Parkway through traffic, southbound Fairfax County Parkway left turns, and westbound Burke Centre Parkway right turns.

Figure 2-24: Fairfax County Parkway at Burke Centre Parkway – Option B: Allow All Turning Movements Except Prohibit Left Turns from Burke Centre Parkway



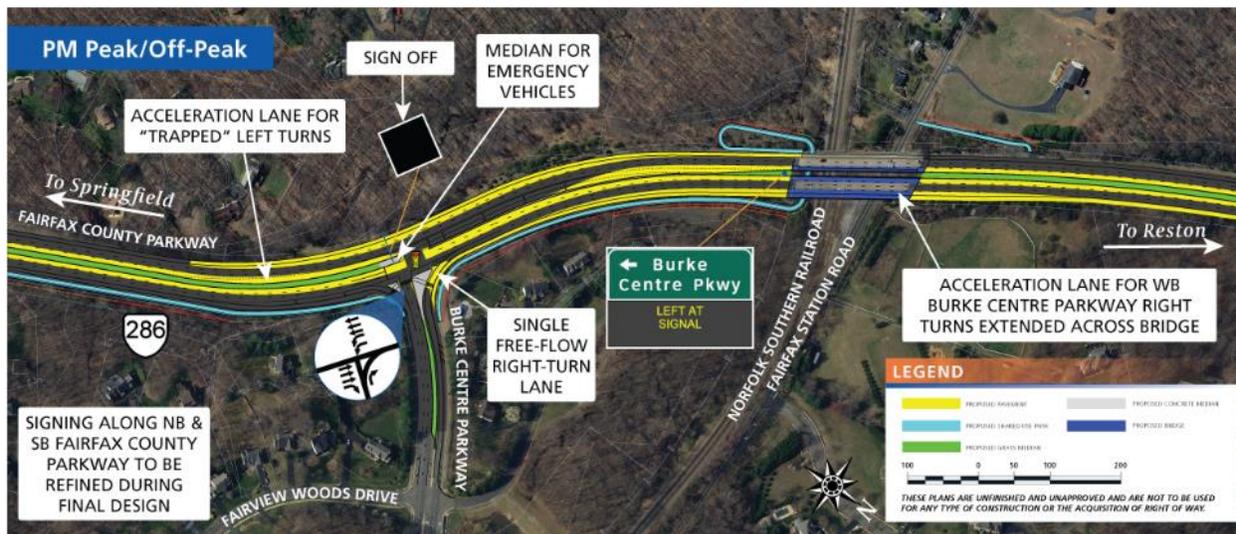
- Option C: Time of Day Left-Turn Restriction (see Figures 2-25 and 2-26):** This option is a combination of Option A: Right-In/Right-Out and Option B: Allow All Turning Movements except Prohibit Left Turns from Burke Centre Parkway. During the morning peak period, the intersection would operate with Option A: Right-In/Right-Out only and during the PM peak period and off-peak hours, all movements would be permitted with the exception of the westbound left-turn from Burke Centre Parkway to southbound Fairfax County Parkway. This option was developed to balance the operational and safety needs of the Fairfax County Parkway during the AM peak hour while minimizing impacts to access to the Burke Centre Parkway and diversion to alternate routes during the remainder of the day. The following are other key features of the Option C design:
 - The westbound Burke Centre Parkway approach to Fairfax County Parkway would have a single free-flow right-turn lane and a 1,500-foot acceleration lane that extends over the Norfolk Southern Railroad and Fairfax Station Road Bridge. The westbound Burke Centre Parkway right-turn would operate in this manner at all times of the day.
 - The southbound left-turn lane from Fairfax County Parkway to Burke Centre Parkway would be extended from approximately 400 feet to approximately 850 feet to provide additional storage and reduce the potential for left-turning vehicles impeding southbound through vehicles in the future.

- Due to long-term maintenance issues associated with gates, the option would not include gates in the southbound Fairfax County Parkway left-turn lane. To address concerns regarding motorists entering the southbound Fairfax County Parkway left-turn lane to Burke Centre Parkway inadvertently and becoming “trapped” and not being able to merge back with southbound Fairfax County Parkway traffic, an acceleration lane would be constructed along southbound Fairfax County Parkway within the median to provide a means for motorists to accelerate and merge with traffic.
- Signing would be provided along northbound and southbound Fairfax County Parkway to notify motorists of the operation of the signal. Along southbound Fairfax County Parkway, there would be a dynamic message sign (DMS) approaching the intersection and a No Left Turn “Blank Out” sign that displays a No Left Turn arrow during the AM peak period and is dark (or turned off) during the PM peak period and off-peak.

Figure 2-25: Fairfax County Parkway at Burke Centre Parkway – Option C: Time of Day Left-Turn Restriction (AM Peak Operation)



**Figure 2-26: Fairfax County Parkway at Burke Centre Parkway – Option C:
Time of Day Left-Turn Restriction (PM Peak / Off-Peak Operation)**



- Burke Centre Parkway Interchange Option:** The Fairfax County Comprehensive Plan does not include an interchange at the Fairfax County Parkway at Burke Centre Parkway intersection and an interchange is not included in the scope of the current Fairfax County Parkway Widening project; therefore, an interchange was not considered further as part of the project. However, in response to the demonstrated need for additional capacity and safety needs at the intersection and community feedback to consider this option as a long-term solution for the intersection, the Fairfax County Board of Supervisors intend to nominate this intersection for a Comprehensive Plan Amendment.

Identification of a Burke Centre Parkway Intersection Preferred Option

Tables 2-3 summarizes a comparison of the three options under consideration in addition to the No Build option for the Fairfax County Parkway at Burke Centre Parkway intersection. VDOT and Fairfax County reached a consensus on the preferred option for the intersection, Option C: Time of Day Left-Turn Restriction based on a review of technical information and input from stakeholders. Option C: Time of Day Left-Turn Restriction best meets the project purpose and need while balancing the access needs of the residential and business communities served by Burke Centre Parkway. Option C addresses capacity and safety deficiencies during the AM peak period when northbound Fairfax County Parkway volumes are highest and crash frequency is greatest but also provides access to residents and businesses along Burke Centre Parkway during other periods of the day.

It should be noted that the prohibition of the left-turn movements from southbound Fairfax County Parkway to Burke Centre Parkway during the AM peak hour would divert traffic to the Fairfax County Parkway at Roberts Parkway southbound left-turn movement. This intersection is located outside the limits of the Fairfax County Parkway Widening project and therefore improvements at

this intersection would be implemented as part of a separate project but have been assumed to be completed under Build conditions.

Table 2-3: Comparison of Fairfax County Parkway at Burke Centre Parkway Intersection Options

Option	Advantages	Disadvantages
No Build	<ul style="list-style-type: none"> ○ Accommodates all existing turning movements ○ Does not divert SB Fairfax County Parkway left turn traffic to alternate routes 	<ul style="list-style-type: none"> ○ Traffic signal remains on NB and SB Fairfax County Parkway ○ Does not address recurring congestion along NB Fairfax County Parkway ○ Does not address safety deficiencies including the potential for NB and SB rear end and angle crashes ○ WB Burke Centre Parkway continues to be used as an alternate route to avoid congestion along NB Fairfax County Parkway
Option A: Right-In/Right-Out Only	<ul style="list-style-type: none"> ○ Eliminates the NB and SB Fairfax County Parkway traffic signals thereby eliminating recurring congestion along Fairfax County Parkway ○ Improves safety by removing the existing signal and reducing the potential for angle and rear end crashes 	<ul style="list-style-type: none"> ○ Does not accommodate the SB Fairfax County Parkway left turn to Burke Centre Parkway ○ Diverts SB Fairfax County Parkway left turns to Burke Centre Parkway to alternate routes; improvements recommended at the intersection of Fairfax County Parkway and Roberts Parkway
Option B: Allow All Turning Movements Except Prohibit Left Turns from Burke Centre Parkway	<ul style="list-style-type: none"> ○ Eliminates the SB Fairfax County Parkway traffic signal ○ Accommodates SB Fairfax County Parkway left turns to Burke Centre Parkway ○ Does not divert SB Fairfax County Parkway left turn traffic to alternate routes 	<ul style="list-style-type: none"> ○ Traffic signal remains on NB Fairfax County Parkway ○ Reduces but does not eliminate congestion along NB Fairfax County Parkway ○ Does not address safety deficiencies including the potential for NB rear end and angle crashes
Option C: Time of Day Left-Turn Restriction	<ul style="list-style-type: none"> ○ Eliminates the NB Fairfax County Parkway traffic signal during the AM peak period thereby eliminating recurring congestion along Fairfax County Parkway ○ Improves safety by removing the existing signal and reducing the potential for angle and rear end crashes during the AM peak period 	<ul style="list-style-type: none"> ○ Does not accommodate the SB Fairfax County Parkway left turn to Burke Centre Parkway during the AM peak hour ○ Diverts SB Fairfax County Parkway left turns to Burke Centre Parkway to alternate routes during the AM peak hour; improvements recommended at the intersection of Fairfax County

	<ul style="list-style-type: none"> ○ Eliminates the SB Fairfax County Parkway traffic signal at all times of the day ○ Accommodates SB Fairfax County Parkway left turns to Burke Centre Parkway during the majority of the day (PM peak period and off-peak hours) ○ Does not divert SB Fairfax County Parkway left turn traffic to alternate routes during the majority of the day (PM peak period and off-peak hours) 	<p>Parkway and Roberts Parkway</p> <ul style="list-style-type: none"> ○ Traffic signal remains on NB Fairfax County Parkway during the majority of the day (PM peak period and off-peak hours) ○ Reduces but does not eliminate congestion along NB Fairfax County Parkway during the PM peak hour ○ Does not fully address safety deficiencies including the potential for NB rear end and angle crashes during the majority of the day (PM peak period and off-peak hours) ○ Motorists may get “trapped” in the SB Fairfax County Parkway left-turn lane; acceleration lane provided downstream to assist with remerging with SB Fairfax County Parkway traffic
--	---	---

2.4.2.C Fairfax County Parkway at Ladues End Lane/Nomes Court Intersection

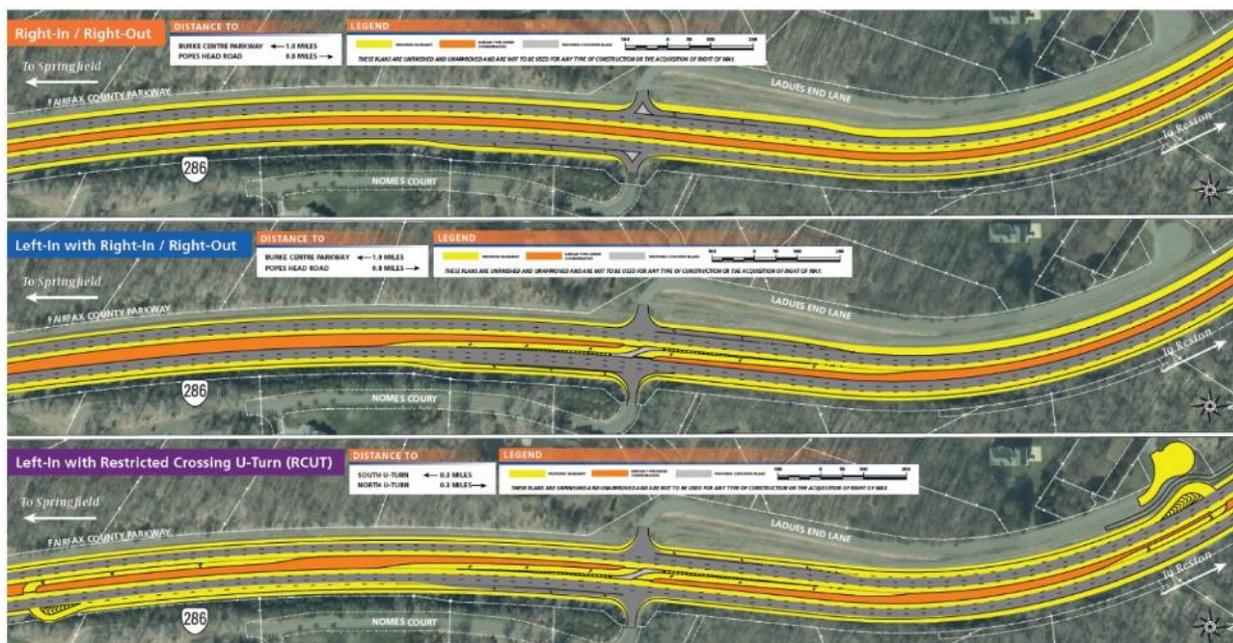
Intersection Options Considered

Three options were considered to minimize conflict points at the existing unsignalized intersection of Fairfax County Parkway with Ladues End Lane/Nomes Court (see **Figure 2-27**) located approximately 0.8 miles south of the Popes Head Road intersection and approximately 1-mile north of the Burke Centre Parkway intersection. Turning movements at this intersection are low (3 vehicles per hour or less) since the west side of the intersection (Ladues End Lane) serves ten residential properties and the east side of the intersection (Nomes Court) serves five residential properties.

- **Right-in/Right-out:** Left turns to Ladues End Lane and left turns from Nomes Court would be diverted to the proposed Popes Head Road interchange to the north to make a “U-turn”. Left turns to Nomes Court and left turns from Ladues End lane would be diverted to the south to either the Fairfax County Parkway at Burke Centre Parkway intersection to make a U-turn or the Route 123 interchange depending on the time of day.
- **Left-in with Right-in/Right-out:** Left turns from Nomes Court would be diverted to the proposed Popes Head Road interchange to the north to make a “U-turn”. Left turns from Ladues End Lane would be diverted to the south to Burke Centre Parkway to make a U-turn or to the Route 123 interchange depending on the time of day.
- **Left-in with Restricted Crossing U-Turn (RCUT) to the South:** Left turns from Nomes Court would be diverted to the proposed Popes Head Road interchange to the

north to make a “U-turn”. Left turns from Ladues End Lane would use the RCUT intersection proposed along Fairfax County Parkway approximately 1,400 feet south of the intersection.

Figure 2-27: Fairfax County Parkway at Ladues End Lane/Nomes Court Access Options



Identification of a Ladues End Lane/Nomes Court Preferred Option

The recommended Preferred Option for the Fairfax County Parkway at Ladues End Lane/Nomes Court intersection is the Left-in with RCUT to the South option which would restrict left turns from Ladues End Lane and Nomes Court onto Fairfax County Parkway and accommodate left turns from Fairfax County Parkway onto Ladues End Lane and Nomes Court. Vehicles exiting eastbound Ladues End Lane desiring to go northbound on Fairfax County Parkway would turn right to southbound Fairfax County Parkway and use the proposed RCUT in the median south of the intersection to enter the northbound Fairfax County Parkway travel lanes. Vehicles exiting westbound Nomes Court desiring to go southbound on Fairfax County Parkway would use the proposed interchange at Popes Head Road to travel southbound on Fairfax County Parkway. This option reduces conflict points at the intersection while balancing access needs for the residents along Ladues End Lane and Nomes Court.

Recent Modification to the Ladues End Lane/Nomes Court Preferred Option

The current preferred Ladues End Lane/Nomes Court Preferred Option shown in **Figure 2-21, Option 1 9.16.2019** is to provide a left-turn only from southbound Fairfax County Parkway to Nomes Court and right-in/right-out access to and from Nomes Court. Access between Ladues End Lane and the Fairfax County Parkway would be eliminated and a frontage road would be provided from Popes Head Road to Ladues End Lane to provide access to residential properties. This modification in the preferred Ladues End Lane/Nomes Court Preferred Option. The traffic

analysis presented in Section 2 of the EA and the environmental analysis presented in Section 3 of the EA are based on the Left-in with RCUT to the South option which would restrict left turns from Ladues End Lane and Nomes Court onto the Fairfax County Parkway and accommodate left turns from Fairfax County Parkway into Ladues End Lane and Nomes Court. The preferred Ladues End/Nomes Court Preferred Option has been modified since these analyses were done. However, this modification would have no substantive change in the traffic analysis.

2.4.2.D Fairfax County Parkway at Route 123 Interchange

The Route 123 interchange is located at the southern terminus of the planned Fairfax County Parkway widening to six lanes; therefore, it is a logical terminus. A large portion of traffic along Fairfax County Parkway travels to and from Route 123 south of the study area. Although the scope of the Fairfax County Parkway Widening project does not include substantial interchange improvements at the Route 123 interchange, minor interchange improvements were considered to maximize the efficiency of the proposed widening project at the transition from six lanes to four lanes along the Fairfax County Parkway.

Recognizing the need to provide additional capacity for traffic traveling between Fairfax County Parkway to the north and Route 123 to the south, the Fairfax County Parkway Widening project considered minor improvements to the Route 123 interchange focusing on improvements that would increase capacity of the southbound Fairfax County Parkway to southbound Route 123 and northbound Route 123 to northbound Fairfax County Parkway movements. It is acknowledged that more extensive improvements are needed to address the long-term capacity needs of the Fairfax County Parkway at Route 123 interchange. However, these improvements are not included in the scope of the Fairfax County Parkway Widening project and are not necessary for the project to meet the criteria in 23 CFR 771.111(f). The following improvements are proposed as part of the Preferred Option:

- To provide additional capacity from southbound Fairfax County Parkway to southbound Route 123, the rightmost through lane along Fairfax County Parkway would drop onto the ramp to Route 123. The existing rightmost lane (future middle lane) along southbound Fairfax County Parkway would be an option lane creating a two-lane exit ramp to southbound Route 123.
- The loop ramp from southbound Fairfax County Parkway to Route 123 would be widened to two lanes that widens again to become a triple left turn to travel southbound on Route 123 at the signalized intersection of the southbound off-ramp and Robert Carter Road.
- In order to accommodate the signalized triple left turn from southbound Fairfax County Parkway to southbound Route 123, southbound Route 123 would be widened to three through lanes between the Fairfax County Parkway at southbound off-ramp/Robert Carter Road signalized intersection and the Chapel Road signalized intersection. The third through lane would terminate as a right-turn lane drop onto Chapel Road.
- Along northbound Route 123, an additional through lane would be constructed beginning north of the Chapel Road signalized intersection and continuing through the Fairfax County Parkway southbound off-ramp/Robert Carter Road signalized

- intersection and dropping onto the loop ramp to northbound Fairfax County Parkway. This would provide additional capacity for the movement from northbound Route 123 to northbound Fairfax County Parkway as well as increase capacity for the heavy proposed triple left-turn movement from southbound Fairfax County Parkway to southbound Route 123.
- The terminus of the loop ramp from southbound Fairfax County Parkway to northbound Route 123 would become signal-controlled to eliminate the weave along northbound Route 123 between the two existing loop ramps to improve traffic operations and safety in addition to safety for the pedestrian crossing of the east leg of the Fairfax County Parkway southbound off-ramp/ Robert Carter Road signalized intersection. Currently, this pedestrian crossing occurs across the uncontrolled ramp movement.

These improvements to the Route 123 interchange would improve the operation and safety of the interchange independent of the future widening of Route 123 from four to six lanes outside the interchange; therefore, these improvements have independent utility.

It should be noted that the 2016 CLRP includes the widening of Route 123 from four to six lanes from the existing six-lane section along Route 123 that terminates in the vicinity of Route 611/Lorton Road to Braddock Road. Therefore, the forecasts and analysis of the interchange includes the widening of Route 123 through the Fairfax County Parkway interchange from four to six lanes in addition to the interchange improvements noted above for the 2046 design year. The 2026 interim year analysis does not include the additional widening from four to six lanes along Route 123.

2.4.3 Pedestrian and Bicycle Accommodations

Pedestrian and bicycle accommodations are included in the project. The Countywide Trails Plan Map, which was adopted by the Fairfax County Board of Supervisors and is part of the Fairfax County Comprehensive Plan, depicts a major regional trail (Fairfax County Parkway Trail) and a major paved trail along the Fairfax County Parkway within the majority of the limits of the project and includes a note that states “[t]rails are to be located on one side of the Fairfax County Parkway.” A major paved trail is defined as being asphalt or concrete and is 8 feet or more in width. The Fairfax County Parkway Trail is part of the County’s major regional trail system and is a major paved trail.

2.5 ALTERNATIVES CARRIED FORWARD

2.5.1 No Build (No Action) Alternative

The No Build Alternative has been included for evaluation and as a benchmark for the comparison of future conditions and impacts. The operational analysis of the No Build Alternative was included in the Purpose and Need Section. The No Build Alternative would retain the existing four-lane Fairfax County Parkway facility, maintain the at-grade signalized intersection at Fairfax County Parkway and Popes Head Road and allow for routine maintenance and safety upgrades. This alternative also assumes that the projects currently programmed and funded in VDOT’s FY 2019-

2024 Six-Year Improvement Program (SYIP) and the Metropolitan Washington Council of Governments (MWCOG) Constrained Long-Range Transportation Plan (CLRP) for the National Capital Region will be implemented as discussed. The projects listed in the SYIP and MWCOG CLRP within the study area are shown in **Table 2-4**.

As noted in **Table 2-4**, the extension of future Shirley Gate Road from the existing terminus at Braddock Road to the Fairfax County Parkway is included in the CLRP. The project has been included in the Fairfax County Transportation Plan since 1991 and in 2014, was included in the County's Six-Year Transportation Project Priorities plan. A Planning Study with stakeholder outreach was conducted in 2015 and 2016. The Planning Study evaluated existing conditions, options, and environmental considerations. This planned extension includes the construction of a four-lane new alignment roadway connecting the Fairfax County Parkway and Braddock Road. The future Shirley Gate Road Extension is assumed to be complete in 2025 per the 2016 CLRP; however, it is not included in 2046 No Build conditions since the construction of the extension is dependent on the construction of the Popes Head Road interchange with Fairfax County Parkway. This project is included in the traffic forecasts and analysis of the 2046 Build scenarios.

Table 2-4: No Build Improvements

Project Location	Description	Completion Date	Include d in CLRP?	Included in 2015 Base Year?	Include in 2026 No Build?	Include in 2046 No Build?
I-66 – I-495 to US 15	Upgrade existing lanes and construct HOT lanes	2021	YES	NO	YES	YES
Route 29 – Union Mill Road to Buckley's Gate Drive	Widen from 4 lanes to 6 lanes	2024	YES	NO	YES	YES
Route 123 – Hoos Road to Burke Centre Pkwy	Widen from 4 lanes to 6 lanes	2025	YES	NO	NO ²	YES
Route 123 – Burke Centre Pkwy to Braddock Rd	Widen from 4 lanes to 6 lanes	2025	YES	NO	NO ²	YES
Future Shirley Gate Road – Fairfax County Pkwy to Braddock Rd	Construct new 4 lane road	2025	YES	NO	NO ¹	NO ¹
Braddock Road – Fairfax County Parkway to Ox Road	Widen from 4 lanes to 6 lanes	2025	YES	NO	NO ²	YES
Route 651/New Guinea Rd - Route 123 to Roberts Rd	Construct new 4 lane road	2025	YES	NO	NO ²	YES
Guinea Road – Roberts Pkwy to Pommeroy Drive	Widen from 2 lanes to 4 lanes	2025	YES	NO	NO ²	YES
Route 286/Fairfax County Pkwy – I-66 to Fair Lakes Parkway	Convert the 8 existing lanes to provide 6 general purpose lanes plus 2 HOV lanes during peak periods	2035	YES	NO	NO	YES
Route 286/Fairfax County Pkwy – Fair Lakes Parkway to Route 267/Dulles Toll Road	Widen and/or convert existing lanes to provide 4 general purpose lanes plus 2 HOV lanes during peak periods	2035	YES	NO	NO	YES

¹ The future Shirley Gate Road Extension is assumed to be complete in 2025 per the 2016 CLRP; however, it is not included in the 2026 and 2046 No Build conditions since the construction of the Extension is dependent on the construction of the Popes Head Road interchange with the Fairfax County Parkway. This project is included in the 2026 and 2046 Build scenarios.

² Based on discussions with the Project Team and Fairfax County, it was collectively determined that, although these projects are included in the CLRP with a completion date on or before 2025, it was reasonable to assume they would not be constructed during that time frame. Therefore, they were not included in the 2026 No Build and Build scenarios.

2.5.2 Preferred Alternative

The project involves replacing the existing at-grade signalized intersection along the Fairfax County Parkway at Popes Head Road with a new grade-separated interchange. The interchange includes four ramps along Fairfax County Parkway in addition to three roundabouts serving the Popes Head Road and future Shirley Gate Road interchange movements. Two roundabouts are proposed at future Shirley Gate Road which would function as an entrance to Patriot Park in the interim until the extension of future Shirley Gate Road is constructed in the future. A connection to the west of the Fairfax County Parkway would be provided forming a third roundabout to serve Popes Head Road access to the interchange. This is shown as **Option 1 - Triple Roundabouts (see Figure 2-10)**

The proposed improvements at the Fairfax County Parkway at Burke Centre Parkway intersection include two different operations depending on the time of day. During the AM peak period, the intersection would operate with a Right-In/Right-Out configuration to and from Burke Centre Parkway without signalization and with all left turns prohibited. During the PM peak period and off-peak hours, all turning movements would be permitted with the exception of the westbound Burke Centre Parkway left turn to southbound Fairfax County Parkway.

The improvements at the Fairfax County Parkway at Ladues End Lane/Nomes Court intersection include restricting left-turning movements from Ladues End Lane and Nomes Court onto the Fairfax County Parkway and accommodating left turns from Fairfax County Parkway onto Ladues End Lane and Nomes Court. Vehicles exiting eastbound Ladues End Lane desiring to go northbound on the Fairfax County Parkway would turn right to southbound Fairfax County Parkway and use a proposed Restricted Crossing U-Turn (RCUT) in the median located 1,400 feet south of the intersection to enter the northbound Fairfax County Parkway travel lanes. Vehicles exiting westbound Nomes Court desiring to go southbound on Fairfax County Parkway would turn right to northbound Fairfax County Parkway and use the proposed interchange at Popes Head Road to travel southbound on Fairfax County Parkway.

Minor interchange improvements are proposed at the Fairfax County Parkway at Route 123 interchange including increasing capacity at the intersection of Route 123 at the Fairfax County Parkway southbound ramps/Robert Carter Road intersection to accommodate the heavy northbound Route 123 to northbound Fairfax County Parkway (AM peak) and southbound Fairfax County Parkway to southbound Route 123 (PM peak) movements.

In addition, Fairfax County Parkway would be widened from four to six lanes from north of the US 29 interchange to the Route 123 interchange.

Recent Modifications to the Preferred Alternative

The current Preferred Alternative for Option 1 and Ladues End Lane/Nomes Court intersection are shown in **Option 1 9.16.2019: Triple Roundabouts (see Figure 2-21)**. The current Preferred Alternative for Option 1 9.16.2019 for the Fairfax County Parkway at Ladues End Lane/Nomes Court intersection is to provide a left-turn only from southbound Fairfax County Parkway to Nomes Court and right-in/right-out access to and from Nomes Court. Access between Ladues End Lane

and Fairfax County Parkway would be eliminated and a frontage road would be provided from Popes Head Road to Ladues End Lane to provide access to residential properties. The traffic analysis presented in Section 2 of the EA and the environmental analysis presented in Section 3 of the EA are based on Option 1 and the Left-in with RCUT to the South option which would restrict left turns from Ladues End Lane and Nomes Court onto Fairfax County Parkway and accommodate left turns from Fairfax County Parkway into Ladues End Lane and Nomes Court as the Preferred Alternative as described above. Option 1 and the Ladues End Lane/Nomes Court intersection have been modified since these analyses were done. However, this modification would have no substantive change in the traffic analysis.

2.5.3 Pedestrian and Bicycle Accommodations

There is an existing 8-foot wide asphalt path along the Fairfax County Parkway between Route 29 and Burke Centre Parkway. The asphalt path is located on the east side of the Fairfax County Parkway between Route 29 and Braddock Road and on the west side of the Fairfax County Parkway between Route 29 and Burke Centre Parkway. As part of the scope of the Popes Head Road Interchange project, a 10-foot shared use path is proposed along the west side of the Fairfax County Parkway where the existing 8-foot wide asphalt path is being impacted by the construction of the interchange. The Fairfax County Parkway Widening project includes a continuous upgraded or new 10-foot wide shared use path along the project limits. Between Route 29 and Braddock Road, the existing asphalt path along the east side of Fairfax County Parkway would be upgraded to a 10-foot wide shared use path. Between Braddock Road and the limits of the Popes Head Road interchange project, the existing asphalt path along the west side of the Fairfax County Parkway would be upgraded to a 10-foot wide shared use path. Between the limits of the Popes Head Road Interchange project and Burke Centre Parkway, the existing asphalt path along the west side of the Fairfax County Parkway would be upgraded to a 10-foot wide shared use path. A new 10-foot wide shared use path would be constructed along Fairfax County Parkway between Burke Centre Parkway and Route 123. The preliminary design includes a new 10-foot wide shared use path between Burke Centre Parkway and Route 123 on the east side of the Fairfax County Parkway, but the final location has not been finalized.

The upgraded shared use path would have at-grade crossings at several existing locations within the project limits at the Route 29 interchange, the Braddock Road interchange, and Route 123 interchange. A grade-separated bike/pedestrian crossing is proposed near the Burke Centre Parkway intersection to improve safety and accessibility to existing bike/pedestrian facilities. All existing at-grade crossings of the Fairfax County Parkway would be eliminated by the widening project.

The existing shared use path is located on the west side of the Fairfax County Parkway and terminates at the intersection of the Fairfax County Parkway and Burke Centre Parkway with an at-grade pedestrian crossing of Fairfax County Parkway at the existing traffic signal at Burke Centre Parkway. The existing at-grade pedestrian crossing is being removed by providing a grade separated crossing by utilizing the existing Fairfax County Parkway Bridge spanning Fairfax Station Road and Norfolk Southern Railway. The shared use path alignment would be modified to ramp down from the Fairfax County Parkway to run under the Fairfax County Parkway adjacent

to the railroad tracks (separated by a proposed fence) and then ramp back up to the Fairfax County Parkway on the east side and continue south along the east side of the Fairfax County Parkway to Route 123. The Preferred Alternative minimizes construction cost, future maintenance cost and visual impacts of the proposed pedestrian grade separated crossing of the Fairfax County Parkway by utilizing the existing bridge over Fairfax Station Road.

2.6 PREFERRED ALTERNATIVE CAPACITY AND SAFETY ANALYSIS

The base year (2016) VISSIM microscopic models for both the AM and PM peak periods were modified to reflect the committed No Build projects as discussed to create a 2046 No Build conditions model. The 2046 Build conditions model was then created by incorporating the proposed Preferred Alternative.

2.6.1 Fairfax County Parkway Travel Time Analysis

AM Peak Period

A comparison of overall corridor travel times for existing conditions, 2046 No Build conditions, and 2046 Build conditions is summarized in **Figures 2-28 and 2-29** for northbound and southbound Fairfax County Parkway during the AM peak hour. Lower travel times under 2046 Build conditions are attributed to the widening of the Fairfax County Parkway from four to six lanes, the removal of the traffic signals at Popes Head Road and Burke Centre Parkway as well as improvements to the southbound off-ramp to Route 123.

Northbound Direction: Under 2046 Build conditions, the northbound total travel time is 7.4 minutes, which is 14.5 minutes less than No Build conditions. The travel time savings primarily occur between Roberts Parkway and Popes Head Road.

Southbound Direction: The southbound total travel time under 2046 Build conditions is 7.9 minutes, which is 12.6 minutes less than No Build conditions and approximately equivalent to existing conditions. Travel time savings occur between the on-ramp from US 29 through Route 123 with segment travel time savings ranging from 57 percent to 78 percent compared to No Build conditions.

Figure 2-28: AM Peak Hour – Northbound Fairfax County Parkway Cumulative Travel Times (Existing and 2046)

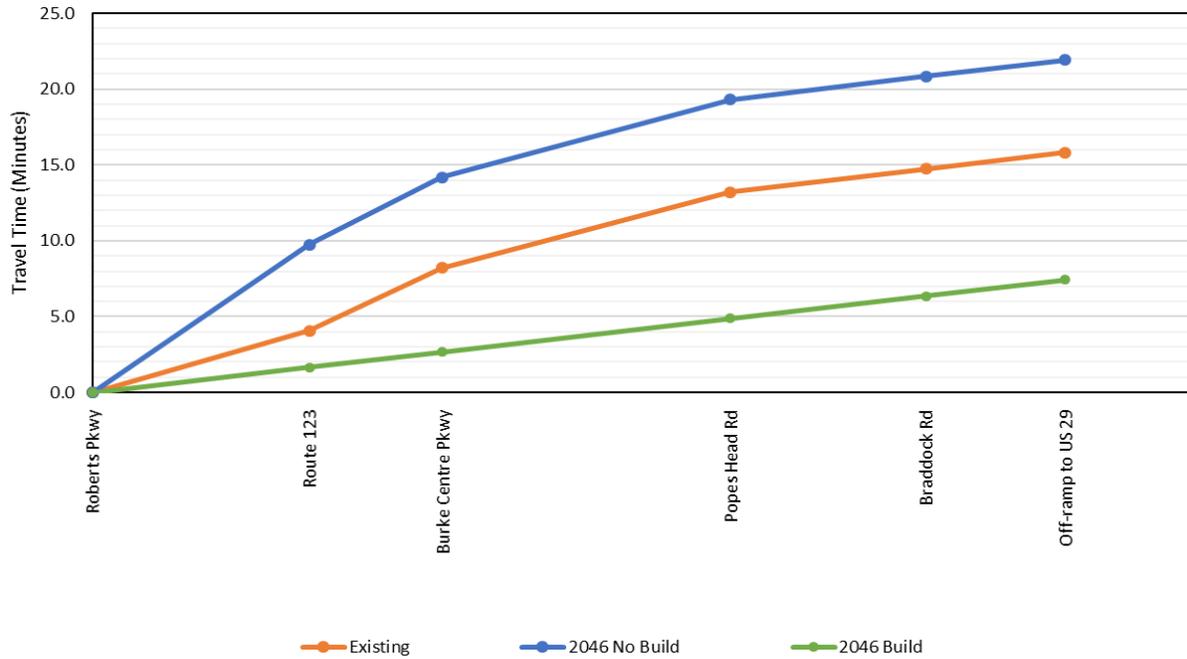
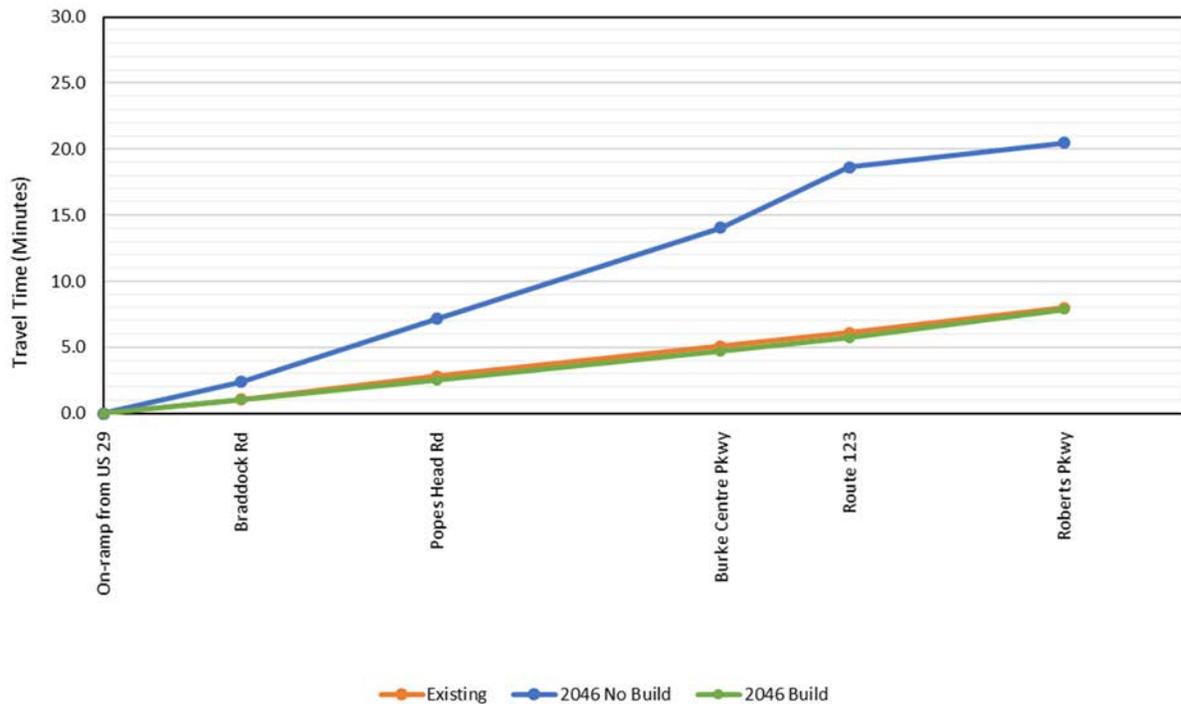


Figure 2-29: AM Peak Hour – Southbound Fairfax County Parkway Cumulative Travel Times (Existing and 2046)



PM Peak Period

A comparison of overall corridor travel times for existing conditions, 2046 No Build conditions, and 2046 Build conditions is summarized in **Figures 2-30 and 2-31** for northbound and southbound Fairfax County Parkway during the PM peak hour.

Lower travel times under 2046 Build conditions are attributed to the widening of Fairfax County Parkway from four to six lanes, the removal of the traffic signal at Popes Head Road, intersection improvements at Burke Centre Parkway as well as improvements to the southbound off-ramp to Route 123.

Northbound Direction: Under 2046 Build conditions, the northbound Fairfax County Parkway total travel time is 7.7 minutes which is 5.4 minutes less than No Build conditions. Travel times decrease by 1.1 minutes approaching Route 123, 2.1 minutes approaching Burke Centre Parkway, and 2.2 minutes approaching Popes Head Road.

Southbound Direction: The southbound Fairfax County Parkway total travel time is 8.0 minutes under Build conditions, which is 21.3 minutes less than No Build conditions. Travel times decrease by 6.5 minutes approaching Braddock Road, 4.8 minutes approaching Popes Head Road, 7.0 minutes approaching Burke Centre Parkway, and 3.1 minutes approaching Route 123.

Figure 2-30: PM Peak Hour – Northbound Fairfax County Parkway Cumulative Travel Times (Existing and 2046)

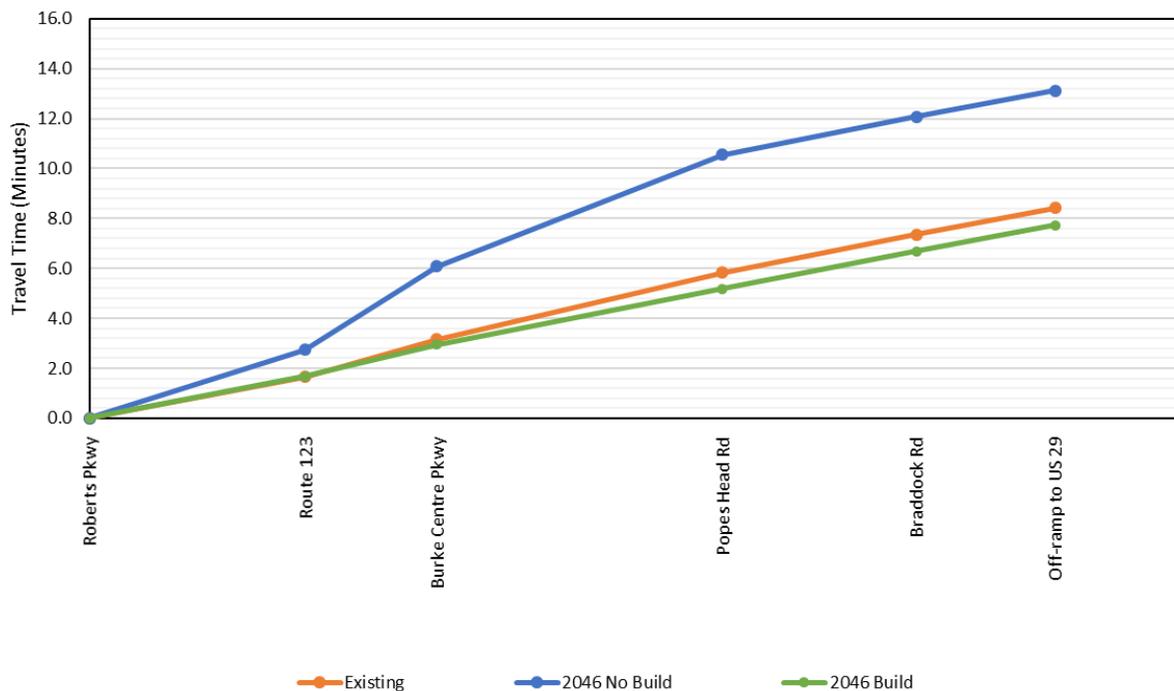
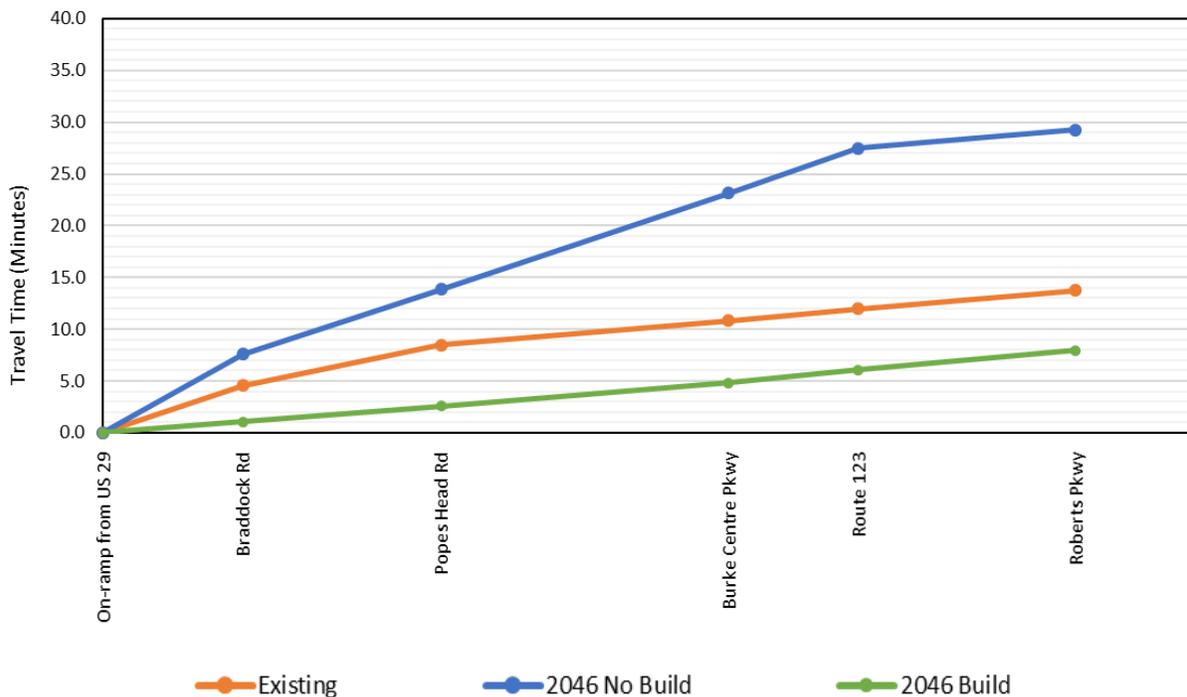


Figure 2-31: PM Peak Hour – Southbound Fairfax County Parkway Cumulative Travel Times (Existing and 2046)



2.6.2 Fairfax County Parkway Density and Speed Analysis

AM Peak Period

Tables 2-5a and 2-5b depict 2046 No Build and Build travel speeds and densities along northbound and southbound Fairfax County Parkway during the AM peak hour. Also shown is the volume input versus the volume throughput (i.e., volume served based on the simulated outputs from VISSIM) at segments along the Fairfax County Parkway. Based on the segment densities, under 2046 Build conditions in the AM peak hour, all northbound and southbound Fairfax County Parkway segments operate with light or moderate traffic conditions within the limits of the proposed improvements. All northbound and southbound merge and diverge junctions serving the Popes Head Road interchange operate with light traffic conditions. The southbound approach to the Roberts Parkway/Karmich Street intersection operates with severe congestion and causes heavy congestion between Freds Oak Road and New Road. The northbound Fairfax County Parkway on-ramp from northbound Route 123 operates with severe congestion due to the high traffic volume (approximately 1,400 vehicles) on the loop ramp. It should be noted that although the southbound diverge to Route 123 experiences light traffic, the center option lane experiences heavy congestion due to the large volume in this lane consisting of vehicles traveling to the off-ramp as well as continuing on southbound Fairfax County Parkway.

Northbound Fairfax County Parkway has speeds ranging from 46 mph to 51 mph, a vast improvement over the 6 mph to 22 mph the majority of the corridor experiences under 2046 No

Build conditions. In the southbound direction, vehicles experience average travel speeds of 43 mph to 52 mph throughout the corridor until speeds decrease to 23 mph to 32 mph approaching the Roberts Parkway/Karmich Street intersection. This also is an improvement over 2046 No Build conditions which experiences low speeds of 14 mph at the Popes Head Road intersection and 9 mph at the diverge to Route 123.

The improvements in corridor traffic conditions and average travel speeds can be attributed to the removal of signals at Popes Head Road and Burke Centre Parkway, improvements to the southbound off-ramp to Route 123, and added capacity along Fairfax County Parkway with the widening from four lanes to six lanes. By removing the signals at Popes Head Road and Burke Centre Parkway, Fairfax County Parkway vehicles are no longer required to stop for these side streets, therefore eliminating queues and delays along the majority of the corridor. The addition of an option lane on southbound Fairfax County Parkway approaching Route 123 provides additional capacity on the off-ramp and adding a third left-turn lane at the ramp terminus onto southbound Route 123 reduces queueing which otherwise would cause severe congestion over multiple segments of southbound Fairfax County Parkway.

Table 2-5a: AM Peak Hour Northbound Fairfax County Parkway Speed and Density by Segment (2046 Build)

Segment-Lane	Length (ft)	Location	Type	Volume Input	Volume Throughput	Percent Unserved	Lane Speed (mph)	Average Speed (mph)	Lane Density (vpmpl)	Average Density (vpmpl)	
477-1	1113	NB FCP between Roberts Pkwy/Karmich St and New Rd start of turn lane	Mainline	2909	2342	-20%	1162	49	24	24	
477-2	1113						1180		24		
476-1	319	NB FCP between New Rd start of turn lane and intersection	Mainline	2887	2327	-19%	1164	50	23	23	
476-2	319						1164		23		
469-1	2696	NB FCP between New Rd and Freds Oak Rd start of turn lanes	Mainline	2896	2339	-19%	1173	50	23	23	
469-2	2696						1166		23		
470-1	356	NB FCP between Freds Oak Rd start of turn lanes and intersection	Mainline	2864	2318	-19%	1207	49	25	24	
470-2	356						1112		22		
261-1	749	NB FCP between Freds Oak Rd and diverge to Rt 123	Mainline	2896	2336	-19%	1204	49	25	24	
261-2	749						1132		23		
882-1	365	NB FCP diverge to Rt 123	Diverge	2896	2337	-19%	168	49	3	16	
882-2	365						1051		22		
882-3	365						1118		23		
885-1	1337	NB FCP between diverge to Rt 123 and on-ramp from NB Rt 123	Mainline	2576	2078	-19%	998	51	20	21	
885-2	1337						1080		21		
851-1	1017	NB FCP between on-ramp from NB Rt 123 and merge from SB Rt 123	Mainline	4055	3505	-14%	1161	51	23	23	
851-2	1017						1256		24		
851-3	1017						1088		21		
552-1	248	NB FCP merge from SB Rt 123	Merge	4111	3560	-13%	24	49	1	18	
552-2	248						1161		23		
552-3	248						1277		25		
552-4	248						1098		22		
221-1	2371	NB FCP between merge from SB Rt 123 and Burke Centre Pkwy start of turn lane	Mainline	4111	3562	-13%	1202	51	24	23	
221-2	2371						1269		25		
221-3	2371						1091		22		
222-1	458	NB FCP between Burke Centre Pkwy start of turn lane and intersection	Mainline	4111	3554	-14%	1186	51	24	23	
222-2	458						1264		25		
222-3	458						1104		22		
455-1	1532	NB FCP merge from Burke Centre Pkwy	Merge	4834	4324	-11%	184	46	5	22	
455-2	1532						1479		31		
455-3	1532						1461		29		
455-4	1532						1199		24		
41-1	2530	NB FCP between merge from Burke Centre Pkwy and RCUT	Mainline	4834	4328	-10%	1463	50	30	29	
41-2	2530						1529		30		
41-3	2530						1335		26		
61-1	1014	NB FCP between RCUT and Ladues End Ln/Nomes Ct start of turn lanes	Mainline	4835	4327	-11%	1	50	0	29	
61-2	1014						1432		29		
61-3	1014						1510		30		
61-4	1014						1385		28		
456-1	195	NB FCP between Ladues End Ln/Nomes Ct start of turn lanes and intersection	Mainline	4830	4326	-10%	1421	50	29	29	
456-2	195						1510		30		
456-3	195						1395		28		
453-1	1057	NB FCP north of Ladues End Ln/Nomes Ct	Mainline	4833	4325	-11%	2	50	0	29	
453-2	1057						1417		29		
453-3	1057						1526		30		
453-4	1057						1380		27		
10568-1	1936	NB FCP between acceleration lane from Ladues End Ln/Nomes Ct and diverge to Popes Head Rd/ Shirley Gate Rd	Mainline	4833	4328	-10%	1513	49	31	29	
10568-2	1936						1462		29		
10568-3	1936						1353		27		
10116-1	497	NB FCP diverge to Popes Head Road/Shirley Gate Rd	Diverge	4833	4323	-11%	316	47	6	23	
10116-2	497						1242		28		
10116-3	497						1372		30		
10116-4	497						1394		29		
10563-1	2637	NB FCP between diverge to Popes Head Rd/Shirley Gate Rd and merge from Popes Head Rd/Shirley Gate Rd	Mainline	4329	3875	-10%	1169	51	23	26	
10563-2	2637						1351		27		
10563-3	2637						1355		27		
10118-1	652	NB FCP merge from Popes Head Rd/Shirley Gate Rd	Merge	4784	4319	-10%	156	46	4	22	
10118-2	652						1405		29		
10118-3	652						1429		28		
10118-4	652						1328		26		
10119-1	3540	NB FCP between merge from Popes Head Rd/Shirley Gate Rd and diverge to Braddock Rd	Mainline	4784	4331	-9%	1477	50	30	29	
10119-2	3540						1482		29		
10119-3	3540						1372		27		
430-1	445	NB FCP diverge to Braddock Rd	Diverge	4784	4336	-9%	199	49	4	22	
430-2	445						1297		27		
430-3	445						1448		30		
430-4	445						1392		29		
437-1	1127	NB FCP between diverge to Braddock Rd and merge from Braddock Rd	Mainline	4487	4074	-9%	1267	50	26	27	
437-2	1127						1428		28		
437-3	1127						1378		27		
419-1	3748	NB FCP between merge from Braddock Rd and south of US 29 diverge	Mainline	5348	4932	-8%	998	51	19	24	
419-2	3748						1227		24		
419-3	3748						1368		27		
419-4	3748						1339		26		
558-1	1384	NB FCP off-ramp to Rt 123	Ramp	320	245	245	-23%	35	35	7	7
551-1	1728	NB FCP on-ramp from NB Rt 123	Ramp	1479	1438	1438	-3%	22	22	64	64
258-1	1821	NB FCP on-ramp from SB Rt 123	Ramp	56	53	53	-6%	41	41	1	1
10561-1	686	NB FCP off-ramp to Popes Head Rd/Shirley Gate Rd	Ramp	504	436	436	-13%	50	50	9	9
10129-1	1193	NB FCP on-ramp from Popes Head Rd/Shirley Gate Rd	Ramp	455	444	444	-3%	34	34	13	13
569-1	1152	NB FCP off-ramp to Braddock Rd	Ramp	297	270	270	-9%	38	38	7	7
319-1	455	NB FCP on-ramp from Braddock Rd	Ramp	861	856	856	-1%	31	31	27	27

Table 2-5b: AM Peak Hour Southbound Fairfax County Parkway Speed and Density by Segment (2046 Build)

Segment-Lane	Length (ft)	Location	Type	Volume Input	Volume Throughput	Percent Unserved	Lane Speed (mph)	Average Speed (mph)	Lane Density (v/mpl)	Average Density (v/mpl)	
69-1	3773	SB FCP weave between US 29 and Braddock Rd	Weave	4081	4090		851	52	17	20	
69-2	3773						1223		24		
69-3	3773						1071		21		
69-4	3773						945		18		
431-1	2195	SB FCP between diverge to Braddock Rd and merge from Braddock Rd	Mainline	3173	3177		1077	52	21	21	
431-2	2195						1124		22		
431-3	2195						976		19		
429-1	748	SB FCP merge from Braddock Rd	Merge	3795	3812		287	50	6	19	
429-2	748						1339		27		
429-3	748						1187		23		
429-4	748						998		19		
10540-1	1787	SB FCP between merge from Braddock Rd and diverge to Popes Head Rd/Shirley Gate Rd	Mainline	3795	3815		1430	51	29	25	
10540-2	1787						1324		26		
10540-3	1787						1061		20		
10121-1	518	SB FCP diverge to Popes Head Rd/Shirley Gate Rd	Diverge	3795	3812		115	51	2	19	
10121-2	518						1274		26		
10121-3	518						1315		26		
10121-4	518						1107		22		
10120-1	2687	SB FCP between diverge to Popes Head Rd/Shirley Gate Rd and merge from Popes Head Rd/Shirley Gate Rd	Mainline	3646	3670		1205	51	24	24	
10120-2	2687						1319		26		
10120-3	2687						1147		22		
10560-1	581	SB FCP merge from Popes Head Rd/Shirley Gate Rd	Merge	3847	3862		73	49	2	19	
10560-2	581						1281		26		
10560-3	581						1340		26		
10560-4	581						1169		23		
10566-1	2653	SB FCP between merge from Popes Head Rd/Shirley Gate Rd and Ladues End Ln/Nomes Ct start of turn lanes	Mainline	3847	3862		1275	51	26	25	
10566-2	2653						1378		27		
10566-3	2653						1209		24		
452-1	513	SB FCP between Ladues End Ln/Nomes Ct start of turn lanes and intersection	Mainline	3845	3860		1251	51	25	25	
452-2	513						1382		27		
452-3	513						1226		24		
457-1	583	SB FCP south of Ladues End Ln/Nomes Ct	Mainline	3849	3859		0	51	0	25	
457-2	583						1246		25		
457-3	583						1384		27		
457-4	583						1229		24		
58-1	90	SB FCP between acceleration lane from Ladues End Ln/Nomes Ct and RCUT start of turn lane	Mainline	3849	3859		1246	51	25	25	
58-2	90						1384		27		
58-3	90						1229		24		
55-1	489	SB FCP between RCUT start of turn lane and RCUT	Mainline	3848	3867		1246	51	25	26	
55-2	489						1389		27		
55-3	489						1232		24		
55-4	489						0		0		
62-1	4258	SB FCP between RCUT and Burke Centre Pkwy	Mainline	3848	3867		1229	50	25	26	
62-2	4258						1395		27		
62-3	4258						1244		24		
220-1	4420	SB FCP between Burke Centre Pkwy and diverge to Rt 123	Diverge	3848	3875		761	49	15	26	
220-2	4420						1702		35		
220-3	4420						1412		28		
884-1	1278	SB FCP between diverge to Rt 123 and merge from Rt 123	Mainline	2919	2941		1434	50	29	29	
884-2	1278						1508		30		
259-1	451	SB FCP weave between Rt 123 and Freds Oak Rd start of turn lanes	Weave	3047	3078		68	43	2	21	
259-2	451						1494		31		
259-3	451						1516		31		
260-1	434	SB FCP between Freds Oak Rd start of turn lanes and intersection	Mainline	3019	3041		1504	49	31	31	
260-2	434						1537		31		
467-1	2716	SB FCP between Freds Oak Rd and New Rd start of turn lane	Mainline	3060	3087		1536	43	36	36	
467-2	2716						1551		36		
468-1	332	SB FCP between New Rd start of turn lane and intersection	Mainline	3046	3071		1525	32	48	48	
468-2	332						1546		48		
473-1	898	SB FCP between New Rd and Roberts Pkwy/Karmich St start of turn lanes	Mainline	3076	3107		1495	28	55	57	
473-2	898						1613		58		
480-1	594	SB FCP between Roberts Pkwy/Karmich St start of turn lanes and intersection	Mainline	2795	2835		1439	23	64	63	
480-2	594						1395		62		
432-1	580	SB FCP off-ramp to Braddock Rd	Ramp	908	909	909	34	34	27	27	
436-1	719	SB FCP on-ramp from Braddock Rd	Ramp	622	633	633	40	40	16	16	
10122-1	1461	SB FCP off-ramp to Popes Head Rd/Shirley Gate Rd	Ramp	149	149	149	40	40	4	4	
10136-1	415	SB FCP on-ramp from Popes Head Rd/Shirley Gate Rd	Ramp	201	192	192	-4%	46	46	4	4
542-1	302	SB FCP off-ramp to Rt 123	Ramp	929	932		571	42	14	11	
542-2	302						361		9		
543-1	1011	SB FCP on-ramp from Rt 123	Ramp	128	134	134	35	35	4	4	

PM Peak Period

Tables 2-6a and 2-6b show Build travel speeds and densities along northbound and southbound Fairfax County Parkway during the PM peak hour. Also shown is the volume input versus the volume throughput (i.e., volume served based on the simulated outputs from VISSIM) at segments along Fairfax County Parkway.

Based on the segment densities, under 2046 Build conditions in the PM peak hour, the northbound merge and diverge junctions serving the Popes Head Road interchange operate with light traffic conditions. All other northbound segments operate with light or moderate traffic conditions with the exception of severe congestion at the signalized intersection of Burke Centre Parkway. Northbound vehicles experience severe congestion during the PM peak hour compared to light traffic during the AM peak hour because during the PM peak hour, northbound vehicles must stop for the southbound left-turn movement, whereas this movement is prohibited during the AM peak period. The northbound on-ramp from northbound Route 123 also operates with severe congestion due to the high loop ramp volume (approximately 1,200 vehicles).

In the southbound direction, the merge and diverge junctions serving the Popes Head Road interchange operate with light traffic conditions. Southbound vehicles experience heavy congestion between the merge from Popes Head Road and approaching Burke Centre Parkway. Heavy congestion also occurs between Burke Centre Parkway and the diverge to Route 123. These areas of heavy congestion can be attributed to the high volume throughput throughout the corridor and the large portion of traffic exiting onto the Route 123 off-ramp. With the removal of signalized intersections at Popes Head Road and Burke Centre Parkway in the southbound direction, all of the volume demand is being served in this area, whereas there was approximately 35 percent unserved demand under 2046 No Build conditions. The signal at Roberts Parkway/Karmich Street is the first location that vehicles traveling southbound are interrupted which results in severe congestion approaching the intersection. The southbound off-ramp to Route 123 also experiences severe congestion due to high off-ramp volumes (about 2,500 vehicles) as well as the middle option lane in the southbound Fairfax County Parkway diverge to Route 123 which carries higher traffic volumes since it is a shared lane to both Route 123 and Fairfax County Parkway.

In the northbound direction, average travel speeds range from 44 mph to 51 mph throughout the corridor with the exception of 18 mph speeds on the approach to the Burke Centre Parkway signalized intersection.

In the southbound direction, although vehicles experience heavy congestion, the average travel speeds range from 45 mph to 51 mph throughout the majority of the corridor. The diverge to Route 123 experiences reduced speeds of 40 mph due to friction caused by the option lane to Route 123 and high densities on the off-ramp. The southbound approach to the Roberts Parkway/Karmich Street intersection experiences reduced speeds of 22 mph due to the signalized operation at the intersection.

Table 2-6a: PM Peak Hour Northbound Fairfax County Parkway Speed and Density by Segment (2046 Build)

Segment-Lane	Length (ft)	Location	Type	Volume Input	Volume Throughput		Percent Unreserved	Lane Speed (mph)	Average Speed (mph)	Lane Density (vpmpf)	Average Density (vpmpf)
477-1	1115	NB FCP between Roberts Pkwy/Karmich St and New Rd start of turn lane	Mainline	2782	1346	2723	-2%	49	49	28	28
477-2	1115				1377			49		28	
476-1	319	NB FCP between New Rd start of turn lane and intersection	Mainline	2749	1343	2689	-2%	51	51	27	27
476-2	319				1347			50		27	
469-1	2696	NB FCP between New Rd and Freds Oak Rd start of turn lanes	Mainline	2757	1362	2699	-2%	50	49	27	27
469-2	2696				1337			49		27	
470-1	356	NB FCP between Freds Oak Rd start of turn lanes and intersection	Mainline	2702	1393	2642	-2%	48	49	29	27
470-2	356				1249			50		25	
261-1	749	NB FCP between Freds Oak Rd and diverge to Rt 123	Mainline	2738	1398	2666	-3%	49	49	29	27
261-2	749				1268			50		25	
882-1	365	NB FCP diverge to Rt 123	Diverge	2738	234	2676	-2%	51	50	5	18
882-2	365				1186			49		24	
882-3	365				1256			49		26	
885-1	1337	NB FCP between diverge to Rt 123 and on-ramp from NB Rt 123	Mainline	2388	1123	2333	-2%	51	50	22	23
885-2	1337				1210			50		24	
851-1	1016	NB FCP between on-ramp from NB Rt 123 and merge from SB Rt 123	Mainline	3592	1033	3488	-3%	51	51	20	23
851-2	1016				1263			51		25	
851-3	1016				1192			50		24	
552-1	248	NB FCP merge from SB Rt 123	Merge	3612	11	3514	-3%	26	45	0	17
552-2	248				1056			51		21	
552-3	248				1261			51		25	
552-4	248				1186			50		24	
221-1	2370	NB FCP between merge from SB Rt 123 and Burke Centre Pkwy start of turn lane	Mainline	3612	1117	3517	-3%	44	44	25	27
221-2	2370				1240			45		28	
221-3	2370				1159			44		27	
222-1	455	NB FCP between Burke Centre Pkwy start of turn lane and intersection	Mainline	3594	1151	3510	-2%	18	18	66	66
222-2	455				1196			18		67	
222-3	455				1164			18		66	
455-1	1529	NB FCP merge from Burke Centre Pkwy	Merge	4283	147	4201	-2%	35	45	4	22
455-2	1529				1435			47		31	
455-3	1529				1374			50		28	
455-4	1529				1244			50		25	
41-1	2521	NB FCP between merge from Burke Centre Pkwy and RCUT	Mainline	4283	1415	4205	-2%	50	50	28	28
41-2	2521				1447			50		29	
41-3	2521				1343			50		27	
62-1	1015	NB FCP between RCUT and Ladues End Ln/Nomes Ct start of turn lanes	Mainline	4284	0	4208	-2%	43	50	0	28
62-2	1015				1399			49		28	
62-3	1015				1446			50		29	
62-4	1015	1362	50	27							
456-1	196	NB FCP between Ladues End Ln/Nomes Ct start of turn lanes and intersection	Mainline	4282	1392	4210	-2%	49	50	28	28
456-2	196				1451			50		29	
456-3	196				1367			50		27	
453-1	1057	NB FCP north of Ladues End Ln/Nomes Ct	Mainline	4283	1	4204	-2%	34	50	0	28
453-2	1057				1389			49		28	
453-3	1057				1465			50		29	
453-4	1057				1349			50		27	
58-1	1912	NB FCP between acceleration lane from Ladues End Ln/Nomes Ct and diverge to Popes Head Rd/ Shirley Gate Rd	Mainline	4283	1470	4205	-2%	48	49	31	29
58-2	1912				1420			49		29	
58-3	1912				1315			50		26	
10116-1	523	NB FCP diverge to Popes Head Road/Shirley Gate Rd	Diverge	4283	261	4196	-2%	51	47	5	23
10116-2	523				1253			45		28	
10116-3	523				1357			45		30	
10116-4	523				1326			46		29	
10563-1	2640	NB FCP between diverge to Popes Head Rd/Shirley Gate Rd and merge from Popes Head Rd/Shirley Gate Rd	Mainline	3917	1195	3842	-2%	50	50	24	26
10563-2	2640				1346			50		27	
10563-3	2640				1301			50		26	
10118-1	651	NB FCP merge from Popes Head Rd/Shirley Gate Rd	Merge	4036	43	3957	-2%	38	47	1	20
10118-2	651				1279			49		26	
10118-3	651				1414			50		28	
10118-4	651				1222			50		25	
10119-1	3541	NB FCP between merge from Popes Head Rd/Shirley Gate Rd and diverge to Braddock Rd	Mainline	4036	1492	3961	-2%	48	50	31	27
10119-2	3541				1305			50		26	
10119-3	3541				1164			51		23	
430-1	445	NB FCP diverge to Braddock Rd	Diverge	4036	586	3957	-2%	50	48	12	21
430-2	445				1003			46		22	
430-3	445				1192			47		25	
430-4	445				1176			48		24	
437-1	1127	NB FCP between diverge to Braddock Rd and merge from Braddock Rd	Mainline	3223	892	3152	-2%	51	51	18	21
437-2	1127				1141			51		22	
437-3	1127				1119			50		22	
935-1	3604	NB FCP between merge from Braddock Rd and south of US 29 diverge	Mainline	4094	864	4030	-2%	52	51	17	20
935-2	3604				999			52		19	
935-3	3604				1108			51		22	
935-4	3604				1060			51		21	
558-1	1384	NB FCP off-ramp to Rt 123	Ramp	350	343	343	-2%	35	35	10	10
551-1	1728	NB FCP on-ramp from NB Rt 123	Ramp	1204	1169	1169	-3%	23	23	50	50
258-1	1821	NB FCP on-ramp from SB Rt 123	Ramp	20	21	21		41	41	1	1
10561-1	684	NB FCP off-ramp to Popes Head Rd/Shirley Gate Rd	Ramp	366	356	356	-3%	50	50	7	7
10129-1	1197	NB FCP on-ramp from Popes Head Rd/Shirley Gate Rd	Ramp	119	114	114	-5%	36	36	3	3
569-1	1153	NB FCP off-ramp to Braddock Rd	Ramp	813	800	800	-2%	35	35	23	23
319-1	455	NB FCP on-ramp from Braddock Rd	Ramp	871	873	873		32	32	28	28

Table 2-6b: PM Peak Hour Southbound Fairfax County Parkway Speed and Density by Segment (2046-Build)

Segment-Lane	Length (ft)	Location	Type	Volume Input	Volume Throughput		Percent Unserved	Lane Speed (mph)	Average Speed (mph)	Lane Density (vpmp)	Average Density (vpmp)
69-1	1595	SB FCP weave between US 29 and Braddock Rd (part 1)	Weave	5050	1337	5060		50	51	27	25
69-2	1595				1320			51		26	
69-3	1595				1239			51		24	
69-4	1595				1164			51		23	
420-1	2151	SB FCP weave between US 29 and Braddock Rd (part 2)	Weave	5050	868	4854	-4%	42	48	21	25
420-2	2151				1415			49		29	
420-3	2151				1380			50		27	
420-4	2151				1191			51		23	
431-1	2195	SB FCP between diverge to Braddock Rd and merge from Braddock Rd	Mainline	4453	1463	4440		50	50	29	29
431-2	2195				1534			51		30	
431-3	2195				1443			51		29	
429-1	749	SB FCP merge from Braddock Rd	Merge	4948	341	4947		44	48	8	25
429-2	749				1520			48		32	
429-3	749				1609			50		33	
429-4	749				1476			50		29	
10540-1	1788	SB FCP between merge from Braddock Rd and diverge to Popes Head Rd/Shirley Gate Rd	Mainline	4948	1685	4948		49	50	34	33
10540-2	1788				1696			51		34	
10540-3	1788				1567			51		31	
10121-1	518	SB FCP diverge to Popes Head Rd/Shirley Gate Rd	Diverge	4948	125	4942		52	49	2	25
10121-2	518				1568			48		33	
10121-3	518				1643			48		34	
10121-4	518				1606			49		33	
10120-1	2688	SB FCP between diverge to Popes Head Rd/Shirley Gate Rd and merge from Popes Head Rd/Shirley Gate Rd	Mainline	4772	1529	4770		50	50	31	32
10120-2	2688				1643			51		33	
10120-3	2688				1598			51		32	
10560-1	566	SB FCP merge from Popes Head Rd/Shirley Gate Rd	Merge	5248	218	5245		32	45	7	27
10560-2	566				1702			47		36	
10560-3	566				1706			50		34	
10560-4	566				1618			51		32	
72-1	2620	SB FCP between merge from Popes Head Rd/Shirley Gate Rd and Ladues End Ln/Nomes Ct start of turn lanes	Mainline	5248	1710	5243		49	50	35	35
72-2	2620				1815			50		36	
72-3	2620				1719			50		34	
452-1	558	SB FCP between Ladues End Ln/Nomes Ct start of turn lanes and intersection	Mainline	5244	1697	5231		49	50	35	35
452-2	558				1801			50		36	
452-3	558				1733			50		35	
457-1	582	SB FCP between Ladues End Ln/Nomes Ct and end of acceleration lane	Mainline	5247	0	5237		24	50	0	35
457-2	582				1698			49		35	
457-3	582				1803			50		36	
457-4	582				1736			50		35	
59-1	90	SB FCP between acceleration lane from Ladues End Ln/Nomes Ct and RCUT start of turn lane	Mainline	5247	1698	5237		49	50	35	35
59-2	90				1803			50		36	
59-3	90				1736			50		35	
82-1	497	SB FCP between RCUT start of turn lane and RCUT	Mainline	5247	1616	5232		49	49	33	35
82-2	497				1858			49		38	
82-3	497				1758			50		35	
82-4	497				0			34		0	
81-1	3272	SB FCP between RCUT and Burke Centre Pkwy start of turn lanes	Mainline	5246	1626	5236		48	48	34	37
81-2	3272				1770			48		37	
81-3	3272				1840			48		39	
64-1	961	SB FCP between Burke Centre Pkwy start of turn lanes and intersection	Mainline	4752	1612	4734		48	49	33	32
64-2	961				1665			49		34	
64-3	961				1457			50		29	
220-1	4421	SB FCP between Burke Centre Pkwy and diverge to Rt 123	Diverge	4752	1448	4739		38	40	39	40
220-2	4421				1878			39		49	
220-3	4421				1413			43		33	
884-1	1278	SB FCP between diverge to Rt 123 and merge from Rt 123	Mainline	2225	958	2216		51	51	19	22
884-2	1278				1259			51		25	
259-1	451	SB FCP weave between Rt 123 and Freds Oak Rd start of turn lanes	Weave	2395	78	2388		39	46	2	16
259-2	451				1082			50		22	
259-3	451				1229			50		25	
260-1	434	SB FCP between Freds Oak Rd start of turn lanes and intersection	Mainline	2353	1110	2336	-1%	51	51	22	23
260-2	434				1226			51		24	
467-1	2716	SB FCP between Freds Oak Rd and New Rd start of turn lane	Mainline	2375	1147	2360	-1%	51	51	22	23
467-2	2716				1213			51		24	
468-1	332	SB FCP between New Rd start of turn lane and intersection	Mainline	2369	1143	2348	-1%	50	50	23	23
468-2	332				1205			50		24	
473-1	897	SB FCP between New Rd and Roberts Pkwy/Karmich St start of turn lanes	Mainline	2388	1117	2369	-1%	42	42	27	28
473-2	897				1252			42		30	
480-1	595	SB FCP between Roberts Pkwy/Karmich St start of turn lanes and intersection	Mainline	2206	1100	2194	-1%	22	22	51	51
480-2	595				1094			22		51	
432-1	580	SB FCP off-ramp to Braddock Rd	Ramp	615	606	606	-2%	44	44	14	14
436-1	719	SB FCP on-ramp from Braddock Rd	Ramp	513	509	509	-1%	40	40	13	13
10122-1	1461	SB FCP off-ramp to Popes Head Rd/Shirley Gate Rd	Ramp	176	175	175		38	38	5	5
10136-1	417	SB FCP on-ramp from Popes Head Rd/Shirley Gate Rd	Ramp	476	472	472	-1%	46	46	10	10
542-1	302	SB FCP off-ramp to Rt 123	Ramp	2527	1356	2475	-2%	18	17	76	75
542-2	302				1119			15		74	
543-1	1011	SB FCP on-ramp from Rt 123	Ramp	170	169	169	-1%	35	35	5	5

2.6.3 Arterial Intersections Operations

Table 2-7 depicts overall intersection delay for both signalized and unsignalized intersections within the study area for the AM and PM peak hours for 2046 No Build and Build conditions. Vast improvements in intersection operations are observed under Build conditions compared to No Build conditions during both the AM and PM peak hours as no intersections operate under overall severe levels of congestion and only one intersection in the AM peak hour and three intersections in the PM peak hour operate with overall heavy congestion. **Table 2-8** depicts movement maximum queue lengths as well as delays by movement, approach and the overall intersection for the roundabouts serving the Popes Head Road interchange during the 2046 Build AM and PM peak hours.

AM Peak Hour: During the AM peak hour, the intersection of Fairfax County Parkway at Burke Centre Parkway improves from severe congestion (418 seconds of delay) under signalized operation under 2046 No Build conditions to light traffic (10 seconds of delay) under unsignalized operations under 2046 Build conditions. Also, because the westbound right turn movement from Burke Centre Parkway to northbound Fairfax County Parkway becomes channelized and uninterrupted under Build conditions, the operations for this movement improves from severe congestion and queues extending upstream through the Fairview Woods Drive intersection under No Build conditions to light traffic and the elimination of the westbound queues altogether under Build conditions.

Under Build conditions, the signalized intersection of Fairfax County Parkway at Popes Head Road is replaced by an interchange consisting of three roundabouts which all operate with light traffic conditions (3 seconds or less delay). Of the three roundabouts, the maximum delay experienced on any of the approaches is 8 seconds and maximum queues at each roundabout do not extend to adjacent roundabouts or onto Fairfax County Parkway. The maximum observed queue on the approach to any of the three roundabouts is 205 feet. Another improvement occurs on the westbound Popes Head Road approach to Fairfax County Parkway. Under No Build conditions, the westbound right-turn movement experiences severe congestion (490 seconds of delay) and the maximum queue extends upstream through the Lewisham Road intersection. With the proposed interchange at Popes Head Road, the westbound right movement from Popes Head Road to northbound Fairfax County Parkway experiences a maximum delay of no more than 4 seconds at each of the roundabouts.

In the AM peak hour, none of the study intersections experience severe congestion and only one intersection experiences heavy congestion. The signalized intersection of Fairfax County Parkway at Roberts Parkway/Karmich Street, which is located south of the project limits, operates with heavy congestion (74 seconds of delay) compared to severe congestion (90 seconds of delay) under No Build conditions primarily due to lower delays on the northbound approach under Build conditions. The elimination of the signals at Popes Head Road and Burke Centre Parkway during the AM peak hour reduce the northbound congestion along the Fairfax County Parkway which results in reductions to the northbound approach delays at intersections throughout the corridor.

On Route 123, the signalized intersection at the Fairfax County Parkway southbound ramps/Robert Carter Road improves from severe congestion under No Build conditions to moderate traffic under Build conditions due to improvements on the westbound approach to the intersection from the southbound off-ramp from Fairfax County Parkway in conjunction with the widening of Route 123 from four to six lanes.

PM Peak Hour: During the PM peak hour, the intersection of Fairfax County Parkway at Burke Centre Parkway improves from severe congestion (306 seconds of delay) under No Build conditions to light traffic (27 seconds of delay) under Build conditions. On the northbound approach under No Build conditions, the maximum queue length extends beyond the Route 123 interchange; however, under Build conditions, the northbound maximum queue length is reduced by 75 percent (approximately 5,140 feet) to the Clara Barton Drive overpass. Northbound delays are also reduced under Build conditions by as much as 3.3 minutes from approximately 3.8 minutes under No Build conditions to 0.5 minutes under Build conditions. The westbound right-turn movement from Burke Centre Parkway to northbound Fairfax County Parkway becomes channelized and uninterrupted under Build conditions, causing the operation of this movement to improve from severe congestion under No Build conditions to light traffic under Build conditions.

Under Build conditions, the signalized intersection of the Fairfax County Parkway at Popes Head Road is replaced by an interchange consisting of three roundabouts which all operate with light traffic conditions (3 seconds or less delay). Of the three roundabouts, the maximum delay experienced on any of the approaches is 9 seconds and maximum queues at each roundabout do not extend to adjacent roundabouts or onto Fairfax County Parkway. The maximum observed queue on the approach to any of the three roundabouts is 108 feet. Another improvement occurs on the westbound Popes Head Road approach to the Fairfax County Parkway. Under No Build conditions, the westbound right-turn movement experiences severe congestion (1,200 seconds of delay) and the maximum queue extends upstream through the Lewisham Road intersection. With the proposed interchange at Popes Head Road, the westbound right movement from Popes Head Road to northbound Fairfax County Parkway experiences a maximum delay of no more than 3 seconds at each of the roundabouts.

During the PM peak hour, the signalized intersection of Fairfax County Parkway at Roberts Parkway/Karmich Street operates with heavy congestion (66 seconds of delay) compared to light traffic (33 seconds of delay) under No Build conditions. This is due to higher northbound traffic demand entering the corridor south of Roberts Parkway/Karmich Street as well as additional vehicles making a southbound left-turn movement onto Roberts Parkway under Build conditions. The higher southbound left-turn volume can be attributed to Fairfax County Parkway being a more attractive southbound travel route under Build conditions whereas under No Build conditions, motorists may take alternate routes (e.g., Route 123 and Burke Centre Parkway) to access Roberts Parkway. A second southbound left-turn lane from Fairfax County Parkway to eastbound Roberts Parkway is proposed as part of a separate project to provide additional capacity for this movement and is assumed to be complete as part of the analysis.

The signalized intersection of Route 123 at the Fairfax County Parkway southbound ramps/Robert Carter Road improves from severe congestion under No Build conditions to heavy congestion

under Build conditions. Build improvements on the southbound Fairfax County Parkway off-ramp including creating an option lane from the Fairfax County Parkway to the off-ramp and an additional westbound left-turn lane from the off-ramp to southbound Route 123 reduces the westbound delay from 384 seconds under No Build conditions to 86 seconds under Build conditions. However, the maximum queue lengths on the off-ramp approach to the signal would continue to extend beyond the off-ramp and onto Fairfax County Parkway.

The southbound Fairfax County Parkway U-turn at the Ladues End Lane/Nomes Court RCUT operates with heavy congestion and with a 39 second delay due to vehicles having to find a gap in heavy northbound Fairfax County Parkway traffic to cross the northbound lanes and enter the acceleration lane on the east side of Fairfax County Parkway. However, it should be noted that only 1 vehicle is forecasted to make this movement during the PM peak hour which results in high variability in the model results. If drivers have difficulty finding a gap in northbound traffic and using the RCUT, they are able to continue southbound on Fairfax County Parkway and make a U-turn at either the Burke Centre Parkway intersection or the Route 123 interchange.

Table 2-7: Intersection Delay Summary (2046 Conditions)

Intersection		Intersection Control		Average Delay (seconds)			
		Existing/No Build Operation	Build Operation	2046 No Build		2046 Build	
				AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
1	Fairfax County Pkwy & Roberts Pkwy/ Karmich St	Signalized	Signalized	90	33	74	66
2	Fairfax County Pkwy & New Rd	Stop	Stop	38	1	8	2
3	Fairfax County Pkwy & Freds Oak Rd	Stop	Stop	104	7	3	3
4	Route 123 & Chapel Rd	Signalized	Signalized	28	27	28	28
5	Route 123 & Fairfax County Pkwy SB Ramps/ Robert Carter Rd	Signalized	Signalized	106	148	49	77
6	Route 123 & Fairfax County Pkwy NB Ramps	Signalized	Signalized	11	9	4	9
7	Route 123 & Clara Barton Dr	Signalized	Signalized	10	7	11	7
8	Fairfax County Pkwy & Burke Centre Pkwy	Signalized	Stop (AM) Signalized (PM)	418	306	10	27
9	Burke Centre Pkwy & Fairview Woods Dr West	Stop	Stop	26	16	11	4
10	Burke Centre Pkwy & Fairview Woods Dr East	Stop	Stop	1	1	1	1
11	Burke Centre Pkwy & Route 123	Signalized	Signalized	34	34	34	33
12	Fairfax County Pkwy & Ladues End Ln/ Nomes Ct	Stop	Stop	95	99	2	3
12A	Fairfax County Pkwy & Ladues End Ln/ Nomes Ct RCUT	N/A	Stop	N/A	N/A	24	39
13	Fairfax County Pkwy & Colchester Meadow Ln	Stop	N/A	47	50	N/A	N/A
14	Fairfax County Pkwy & Popes Head Rd	Signalized	N/A	217	278	N/A	N/A
14A	Fairfax County Pkwy SB ramps & Popes Head Rd Roundabout	N/A	Roundabout	N/A	N/A	2	1
14B	Fairfax County Pkwy SB ramps & Shirley Gate Rd Roundabout	N/A	Roundabout	N/A	N/A	2	3
14C	Fairfax County Pkwy NB ramps & Shirley Gate Rd Roundabout	N/A	Roundabout	N/A	N/A	3	3
14D	Popes Head Rd & Colchester Meadow Ln	N/A	Stop	N/A	N/A	1	1
15	Popes Head Rd & Revercomb Ct	Stop	Stop	1	2	1	1
16	Popes Head Rd & Lewisham Rd	Stop	Stop	50	293	1	1
17	Fairfax County Pkwy SB Ramps & Braddock Rd	Signalized	Signalized	54	67	28	17
18	Fairfax County Pkwy NB Ramps & Braddock Rd	Signalized	Signalized	11	13	10	13

Table 2-8: Popes Head Road Interchange Roundabouts Summary (2046 Build Conditions)

2046 Build AM Peak Hour							
Approach	Approach Delay (sec/veh)	Movement	Delay (sec/veh)	Max Queue Length (feet)	Storage	Intersection Delay (sec/veh)	
Fairfax County Parkway SB Ramps and Future Shirley Gate Rd (Roundabout)							
SB	4.0	SB Left	4.6	38	1460	2.2	
		SB Through	0.0	38	1460		
		SB Right	3.8	38	1460		
EB	2.4	EB Through	2.5	205	420		
		EB Right	2.1	205	420		
WB	0.2	WB Left	0.2	0	180		
		WB Through	0.1	0	180		
Fairfax County Parkway NB Ramps and Future Shirley Gate Rd (Roundabout)							
NB	5.0	NB Left	7.9	29	1430		2.7
		NB Through	0.0	29	1430		
		NB Right	4.9	0	1430		
EB	1.0	EB Left	1.2	0	180		
		EB Through	0.5	0	180		
WB	3.0	WB Through	3.2	74			
		WB Right	1.9	31			
Fairfax Co Pkwy SB Ramps & Popes Head Rd (Roundabout)							
NB	0.9	NB Left	0.0	4		2.3	
		NB Through	0.9	4			
		NB Right	0.0	4			
SB	0.8	SB Left	0.9	38	420		
		SB Through	0.6	38	420		
		SB Right	0.6	38	420		
EB	1.4	EB Left	1.4	53			
		EB Through	1.3	53			
		EB Right	0.0	53			
WB	3.5	WB Left	0.0	0			
		WB Through	3.4	179			
		WB Right	3.5	179			
2046 Build PM Peak Hour							
Approach	Approach Delay (sec/veh)	Movement	Delay (sec/veh)	Max Queue Length (feet)	Storage	Intersection Delay (sec/veh)	
Fairfax County Parkway SB Ramps and Future Shirley Gate Rd (Roundabout)							
SB	8.6	SB Left	9.1	91	1460	2.8	
		SB Through	0.0	91	1460		
		SB Right	8.5	91	1460		
EB	3.3	EB Through	3.3	108	420		
		EB Right	3.3	108	420		
WB	1.8	WB Left	0.7	0	180		
		WB Through	2.4	102	180		
Fairfax County Parkway NB Ramps and Future Shirley Gate Rd (Roundabout)							
NB	5.1	NB Left	5.4	29	1430		3.1
		NB Through	0.0	29	1430		
		NB Right	5.0	0	1430		
EB	2.6	EB Left	0.4	0	180		
		EB Through	3.3	108	180		
WB	2.3	WB Through	2.4	102			
		WB Right	0.1	0			
Fairfax Co Pkwy SB Ramps & Popes Head Rd (Roundabout)							
NB	0.9	NB Left	0.0	2		1.0	
		NB Through	1.1	2			
		NB Right	0.8	2			
SB	0.8	SB Left	0.9	40	420		
		SB Through	0.4	40	420		
		SB Right	0.7	40	420		
EB	1.3	EB Left	1.3	39			
		EB Through	1.8	39			
		EB Right	0.0	39			
WB	1.4	WB Left	0.0	52			
		WB Through	1.4	52			
		WB Right	1.3	52			

2.6.4 Traffic Analysis Findings

The traffic analysis for the Fairfax County Parkway Widening and Interchange at Popes Head Road project demonstrates that the Preferred Alternative would improve operations along the Fairfax County Parkway corridor compared to No Build conditions under 2046 Build conditions based on a review of corridor travel times, speeds, densities, vehicle throughputs, and arterial intersection operation results of the microsimulation analysis. **Figures 2-32 and 2-33** summarize overall travel time savings with the proposed Preferred Alternative.

Figure 2-32: AM Peak Hour – Fairfax County Parkway Cumulative Travel Times

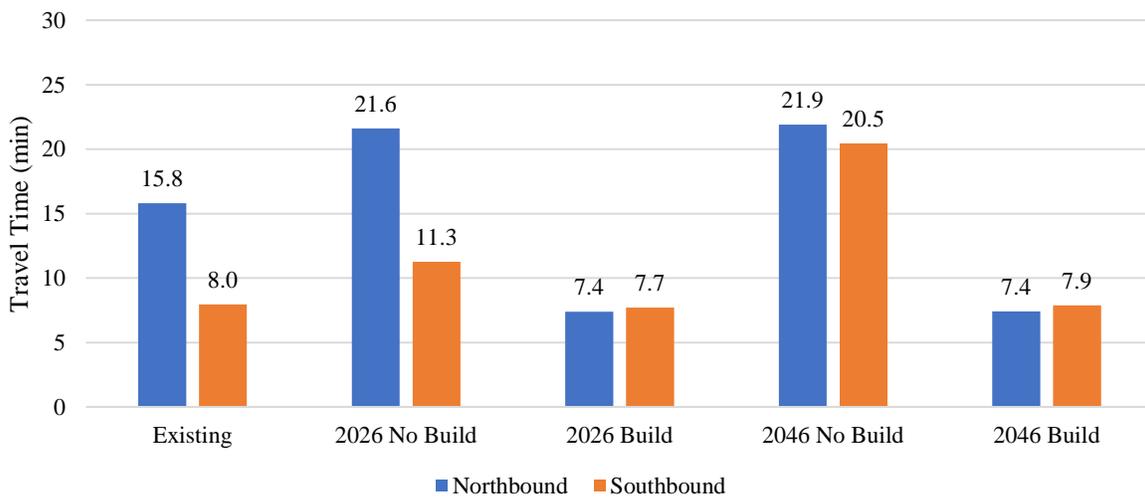
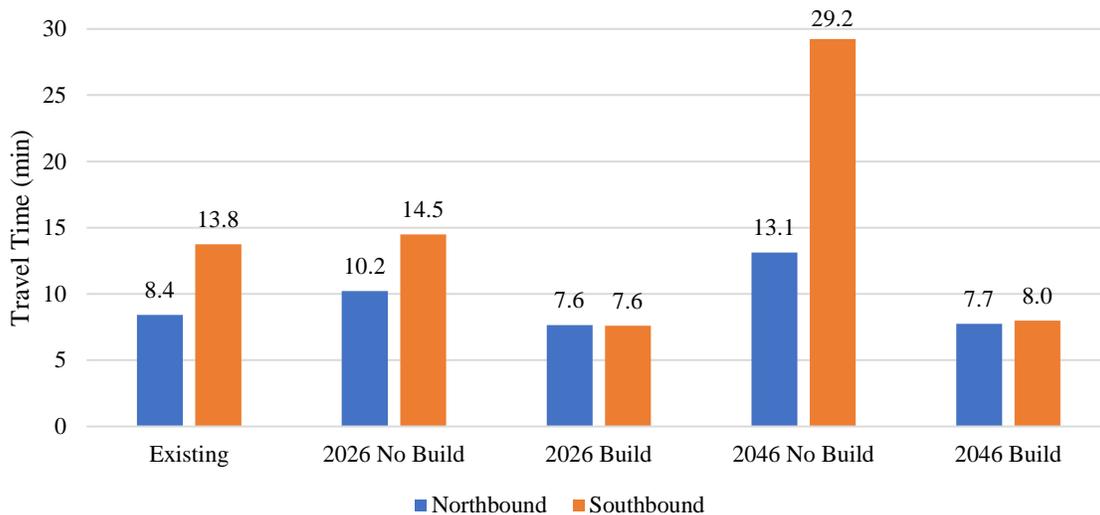


Figure 2-33: PM Peak Hour – Fairfax County Parkway Cumulative Travel Times



2046 Conditions

Under 2046 Build conditions, travel times along northbound Fairfax County Parkway are 14.5 minutes less than No Build conditions during the AM peak hour. Southbound Fairfax County Parkway travel times are 21.3 minutes less than No Build conditions during the PM peak hour.

Under Build conditions during the AM peak hour, northbound and southbound Fairfax County Parkway within the limits of the proposed improvements operates with light or moderate traffic conditions including all merge and diverge junctions serving the Popes Head Road interchange.

During the PM peak hour, northbound Fairfax County Parkway within the limits of the proposed improvements operates with light or moderate traffic conditions including the merge and diverge junctions serving the Popes Head Road interchange with the exception of the northbound approach to the Burke Centre Parkway signalized intersection, which has delays due to the signalized operation. During the PM peak hour, southbound Fairfax County Parkway within the limits of the proposed improvements operates with light or moderate traffic conditions including the merge and diverge junctions serving the Popes Head Road interchange with the exception of heavy congestion south of the Popes Head Road interchange to the diverge to the Route 123 interchange due to the high exiting volumes to southbound Route 123. Although southbound Fairfax County Parkway is projected to have heavy congestion in this area, average travel speeds are 45 mph or greater with the exception of 40 mph within the diverge to Route 123.

Along northbound Fairfax County Parkway during the AM peak hour, volume throughput increases compared to No Build conditions by as much as 1,220 vehicles (52 percent). Along southbound Fairfax County Parkway during the PM peak hour, volume throughput increases by as much as 2,810 vehicles (115 percent) compared to No Build conditions.

The removal of the traffic signal at the Fairfax County Parkway at Popes Head Road intersection would reduce delays along both Fairfax County Parkway and Popes Head Road and eliminate the northbound Fairfax County Parkway queues which extend beyond the Roberts Parkway intersection during the AM peak hour and the southbound Fairfax County Parkway queues which extend beyond US 29 during the PM peak hour. The proposed Popes Head Road interchange roundabouts would operate with no more than 3 seconds of overall delay and all queues are accommodated within the proposed storage lengths during both the AM and PM peak hours. The intersection improvements at the Fairfax County Parkway and at the Burke Centre Parkway would eliminate southbound delays, eliminate northbound delays during the AM peak period, and reduce northbound delays on the Fairfax County Parkway approaching Burke Centre Parkway at other times of the day (PM peak and off-peak hours). Overall, all study intersections operating with severe congestion under No Build conditions improve to heavy congestion, moderate traffic, or light traffic conditions under Build conditions.

2.6.5 Crash Analysis Findings

Overall it can be concluded that the proposed Preferred Alternative would have a positive impact on safety along the Fairfax County Parkway corridor. Recurring daily congestion due to heavy commuter traffic during both the morning and evening peak periods creates the potential for

crashes along the Fairfax County Parkway, specifically at the Burke Centre Parkway and Popes Head Road intersections. The predominant crash type is rear end crashes, which account for 57 percent of all crashes and are frequently attributed to congestion. The proposed Build conditions would eliminate the traffic signal at Popes Head Road and at Burke Centre Parkway during the AM peak hour when crash frequency at this intersection is greatest thereby reducing the potential for congestion-related crashes and improving safety along the corridor compared to No Build conditions.

The Preferred Alternative would reduce the number of conflict points from 107 to 21 conflict points along Fairfax County Parkway, an 80 percent reduction compared to No Build conditions. Additionally, 48 of the 51 crossing conflict points typically resulting in angle crashes, the most severe type of crashes, would be eliminated.

A quantitative crash analysis using Highway Safety Manual (HSM) methodologies was performed to document the safety impacts associated with the modifications to the Fairfax County Parkway at Popes Head Road and Burke Centre Parkway intersections in addition to widening of the Fairfax County Parkway from four to six lanes. Based on a review of available Crash Modification Factors (CMF), a reduction of 6 crashes per year (42 percent reduction) is predicted at the Fairfax County Parkway and at Popes Head Road intersection with the construction of an interchange. A reduction of 1 crash per year is predicted at the Fairfax County Parkway and at Burke Centre Parkway intersection with the proposed intersection improvements during the AM peak period. Additionally, a reduction of 13 crashes per year (15 percent) is predicted along the Fairfax County Parkway from north of US 29 to the Route 123 interchange due to the widening of the Fairfax County Parkway from four to six lanes.

2.7 ABILITY TO MEET NEEDS

Based on the above findings, traffic operations under the Preferred Alternative are expected to improve over the existing and 2046 No Build conditions. The Preferred Alternative therefore addresses the purpose and need for the project as described in **Section 1**.

SECTION 3

ENVIRONMENTAL CONSEQUENCES

The purpose of this section is to identify and analyze the consequences of any social, economic and environmental impacts resulting from the proposed project.

3.1 OVERVIEW OF ENVIRONMENTAL ISSUES

The environmental resources listed in Table 3.1 were identified as having the potential to be affected by the proposed project and have been analyzed to determine the presence of impacts. Table 3.2 further quantifies these impacts associated with the proposed project. For the most part, project related activities are expected to have a minimal or negligible effect on the surrounding resources described in the subsequent tables. Environmental issues of particular concern or anticipated consequences are described in the text which follows the tables. Except where described in this section, the No-Build Alternative would have no impact on environmental resources. A discussion of construction effects, indirect effects, and cumulative effects follows the discussion of environmental issues.

TABLE 3.1: Environmental Issues

Resource/Issues	Comments
Land Use and Socioeconomics	<p>The project is consistent with community goals, and land use along this segment of the corridor is primarily low-density residential. The project would not disrupt a community or planned development. Planned land uses in this area include public facilities, private open space, 0.1-0.2 dwelling units (du)/acre (ac), 0.2-0.5 du/ac, 1-2 du/ac, and public parks. Additionally, there are Resource Protection Areas (RPAs), Environmental Quality Corridors (EQCs), floodplains, and a Water Supply Protection Overlay District (WSPOD). These resource areas are established by local county policy or ordinance.</p> <p>As part of the project scoping and environmental analysis, it was determined that this action does not have the potential for substantial land use or socioeconomic impacts. No further discussion is included in the document.</p> <p>See Appendix 10 Scoping Letters and Agency Comments for more information.</p>

<p>Right of Way and Relocations</p>	<p>The preliminary estimate of total right of way (RW) to be acquired for this project is 23.5 acres including three total takes amounting to 6.72 acres. Permanent easements amounting to 4.0 acres and temporary easements amounting to 7.0 acres would be required. According to the Right of Way – Stage 1 Relocation Assistance Report, the proposed project would potentially displace three (3) families. The total number of residents is unknown at this time. There are no farms or businesses being displaced by this project. All precautions would be followed to assure an orderly displacement occurs.</p> <p>See 3.2.1 Right of Way/Relocations for a discussion of relocation impacts and Appendix 6 Right of Way/Relocations for more information.</p>
<p>Environmental Justice</p>	<p>The minority population of the environmental justice study area exceeds 50 percent in Tract 491705, Block Group 1, and the percentage of minority population is above the Environmental Justice (EJ) evaluator factor which is 40 percent in that Tract and in Tract 491701, Block Group 1. There is a possibility that three potentially displaced families are members of a minority group. Fairfax County Department of Fire and Rescue has no concerns, and the proposed project would not affect school bus routes and schedules. Although an EJ population is present there are no disproportionately high and adverse effects to the EJ population. No low-income populations have been identified that would be adversely impacted by the proposed project. Therefore, in accordance with the provisions of E.O. 12898 and FHWA Order 6640.23 no further EJ analysis is required.</p> <p>See 3.2.2 Environmental Justice for a discussion of Environmental Justice and Appendix 9 Environmental Justice for more information.</p>

<p>Parks and Recreation Areas</p>	<p>According to The United States Department of Interior, National Park Service, Land and Water Conservation Fund Properties table, which gives a detailed listing of Section 6(f) grants by state, there are no Section 6(f) resources in the project area; therefore, the project would have no impact on Section 6(f) properties. Patriot Park and Popes Head Park are existing local parks or recreational areas that would be impacted. Popes Head Park-Nike Launcher Site on parcels 22, 23, and 25 of Popes Head Park is a nearby Federal Lands to Parks Program (FLTP) site; right-of-way acquisitions from FLTP sites are treated with a process similar to Section 6(f). The project would use these Section 4(f) resources. Approximately 5.3 acres of fee take, 0.2 acres of permanent easement, and 0.8 acres of temporary construction easement would be needed from Patriot Park, inclusive of the new vehicular entrance requested by the Fairfax County Park Authority (FCPA). Approximately 0.2 acres of fee take, 0.4 acres of permanent easement, and 0.1 acres of temporary construction easement would be needed from Popes Head Park. Throughout the planning process, VDOT worked to minimize impacts to these parks. The FCPA responded to VDOT’s significance determination, temporary occupancy, and <i>de minimis</i> impacts preliminary concurrence request with a letter dated 05/20/19. No wildlife or waterfowl refuges are located in the project area.</p> <p>See Section 3.2.3 Parks and Recreation for a discussion of Section 4(f) and Appendix 5 Parks and Recreation for more information.</p>
<p>Water Quality</p>	<p>Stormwater management facilities as well as erosion and sediment control (ESC) would be located within the project footprint. These facilities would be implemented to minimize long-term effects of the project on water quality. There is one public groundwater well within a 1-mile radius of the project. This well is owned by Fairfax County, and the facility is named Friends of Fairfax Station. No impacts to this well are anticipated. There are no surface water intakes within a 5-mile radius of the project.</p> <p>See 3.2.4 Water Quality for a description of the proposed stormwater management facilities and ESC and Appendix 10 - Scoping Letters and Agency Comments for more information.</p>

<p>Floodplains</p>	<p>Executive Order 11988, and the amendments included in Executive Order 13690, regulates the management of floodplains to minimize the impacts of floods, preserve the natural and beneficial values of floodplains, and increase infrastructure resilience against flooding. Encroachments on floodplains designated by the Federal Emergency Management Agency (FEMA) would be minimal for the Preferred Alternative, occurring almost entirely within the existing right of way. Federal regulations and VDOT roadway design standards would minimize potential effects to floodplains. The identification and potential impact analysis of 100-year floodplains proximal to the project study area is included in the Natural Resources Technical Report.</p> <p>See Section 3.2.5 Natural Resources for a discussion of floodplains and Appendix 3 Natural Resources for more information.</p>
--------------------	--

<p>Waters of the U.S., including Wetlands</p>	<p>Wetlands and streams have been identified within the project study area. A total of approximately 22,188 linear feet of streams, including 2,671 linear feet of culverted streams, and approximately 0.65 acres of Palustrine Open Water (POW) were delineated in the Environmental Study Area. A total of approximately 5.40 acres of wetlands exist within the Environmental Study Area, as shown in Table 3.4, which describes the wetland acreages by type.</p> <p>See Section 3.2.5 Natural Resources for a discussion of waters of the U.S., including wetlands and Appendix 3 Natural Resources for more information.</p>
<p>Permits</p>	<p>Anticipated impacts to aquatic resources are proposed to occur primarily within the existing VDOT right of way. Impacts to Waters of the U.S. would require submittal of a Joint Permit Application to regulatory agencies. Based on preliminary conceptual design information, it is anticipated that the project would be authorized to impact waters of the U.S. under an Army Corps of Engineers Individual Permit, a Virginia Department of Environmental Quality General Permit and a Virginia Marine Resource Commission VGP-1 Permit. Potential opportunities to avoid and minimize impacts to these aquatic resources may be identified through the final design and permitting process; however, suitable mitigation would be provided, as required, for unavoidable impacts. Adequate mitigation to compensate for any unavoidable wetland impacts would be developed in coordination with the aforementioned agencies, as well as the EPA, during the permitting process. In most situations, mitigation is typically required within the same eight-digit hydrologic unit code (HUC) watershed.</p> <p>See Section 3.2.5 Natural Resources for a discussion of permits and Appendix 3 Natural Resources for more information.</p>

<p>Agricultural and Forestal Districts, Prime Farmland and Soils</p>	<p>According to GIS there is an Agricultural or Forestal District within the study area. No impacts to this Agricultural or Forestal District are anticipated. The project would not affect any prime or unique farmland in the project area since the project area is already committed to urban use which is mainly residential. As part of the project scoping and environmental analysis, it was determined that this action does not have the potential to impact these resources. No further discussion is included in the document.</p> <p>See Appendix 10 Scoping Letters and Agency Comments for more information.</p>
<p>Threatened and Endangered Species</p>	<p>A review of the U.S. Fish and Wildlife Service's (USFWS) Online Information, Planning, and Conservation (IPaC) system, as well as state maintained databases, indicate that there is one species that is either federally or state-listed threatened or endangered species, or designated special status, potentially proximal to the study area. The federally listed species, the northern long-eared bat (NLEB), may be affected by the project. However, the project is not within the USFWS designated critical area of a hibernacula or known summer roost tree. The findings contained within the July 15, 2019 USFWS Consistency Letter state the project may affect the northern long-eared bat; however, any take that may occur as a result of the Action is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR §17.40(o).</p> <p>See Section 3.2.5 Natural Resources for a discussion of Threatened and Endangered Species and Appendix 3 Natural Resources for more information.</p>

Invasive Species	<p>In accordance with Executive Order 13112, Invasive Species, the potential for the establishment of invasive terrestrial or aquatic animal or plant species during construction of the proposed project would be minimized by following the provisions in VDOT's <i>Road and Bridge Specifications</i>. These provisions require prompt seeding of disturbed areas with mixes that are tested in accordance with the Virginia Seed Law and VDOT's standards and specifications to ensure that seed mixes are free of noxious species. While the proposed right of way is vulnerable to the colonization of invasive plant species from other portions of the site and from adjacent properties, implementation of the stated provisions would reduce the potential for the establishment and proliferation of invasive species.</p>
Pedestrian and Bicycle Considerations	<p>There is an existing 8-foot wide asphalt path along the Fairfax County Parkway between Route 29 and Burke Centre Parkway. The asphalt path is located on the east side of Fairfax County Parkway between Route 29 and Braddock Road and on the west side of Fairfax County Parkway between Route 29 and Burke Centre Parkway. The Preferred Alternative would upgrade this path in places while constructing new path in other places along the corridor.</p> <p>See Section 3.2.6 Pedestrian and Bicycle Accommodations for a discussion of pedestrian and bicycle considerations.</p>

<p>Hazardous Materials</p>	<p>Consideration regarding hazardous materials relates to the potential for acquisition of properties at which petroleum products have previously been or are currently stored, and where leaks of spills may have occurred at those sites. An ASTM Phase I Environmental Site Assessment (ESA) was performed to identify Recognized Environmental Conditions (RECs) for the proposed construction of additional travel lanes on the approximate 8-mile section of Route 286 in Fairfax County. Site inspections, records reviews, and historical aerial photography reviews were completed in April, 2018, to evaluate the potential for environmental concerns. No RECs were identified in connection with the subject corridor.</p> <p>As part of the project scoping and environmental analysis, it was determined that this action does not have the potential for hazardous materials impacts. No further discussion is included in the document.</p> <p>See Appendix 4 Hazardous Materials for more information.</p>
<p>Air Quality</p>	<p>The proposed improvements were assessed for potential air quality impacts and conformity consistent with all applicable air quality regulations and guidance. All models, methods and assumptions applied in modeling and analyses are consistent with those provided or specified in the VDOT Resource Document. This project level assessment would meet all applicable federal and state transportation conformity regulatory requirements as well as air quality guidance under the National Environmental Policy Act (NEPA). As such, the project would not cause or contribute to a new violation of the National Ambient Air Quality Standards (NAAQS) established by the US Environmental Protection Agency (US EPA). Additional detail on the analyses conducted for this project is provided below.</p> <p>See 3.2.7 Air Quality for a discussion of Air Quality and Appendix 8 Air Quality for more information.</p>

Noise	<p>The noise impacts of the project were assessed in accordance with 23 CFR Part 772.1 and <i>VDOT Highway Traffic Noise Impact Analysis Guidelines</i>. A Preliminary Noise Analysis was prepared for this project in October 2018 to predict noise impacts at noise sensitive land uses in 2046 Design Year No-Build/Build conditions and then evaluated for potential noise abatement consideration. Three build alternative options (1A, 2 and 2D) for the proposed Popes Head Road interchange were included in the analysis. A total of 22 barriers to minimize noise impacts were evaluated throughout the project corridor. Five of these barriers (Barrier F-2 Replacement, Barrier U, Barrier W, Barrier X, and Barrier Y) were found to be feasible and reasonable at this time. Option 1A was initially the preferred alternative but has since been eliminated (due to cost) in favor of Option 1 inclusion in the project's Preferred Alternative. Since Option 1 has similar traffic to Option 1A and there are no design changes on Fairfax County Parkway (which is the dominant noise source) a qualitative evaluation memo was prepared to verify the conclusions of the October 2018 Preliminary Noise Analysis remain valid for Option 1 as well as for the modified preferred alternative for the Ladues End Lane/Nomes Court intersection.</p> <p>See Section 3.2.8 Noise for a discussion of noise and Appendix 7 Noise for more information.</p>
-------	---

<p>Cultural Resources</p>	<p>Cultural Resource studies were completed as part of the Section 106 process of the National Historic Preservation Act. A Phase I Cultural Resources Survey of the area of potential effects (APE) was completed in August 2018 which included limited historic background research, a reconnaissance architectural survey, and an archeological survey. The APE for archaeology is the extent of new Right of Way/ easements, and the APE for standing structures is areas where setting and feeling would be changed. A Supplemental Archaeological Survey for the Fairfax County Parkway (Route 286) Widening Project was completed in February, 2019. The supplemental archaeological survey tested an extension of the APE along Popes Head Road, west of the Fairfax County Parkway, to Quiet Brook Road. The Department of Historic Resources (DHR) concurred on 09/12/18 that No Historic Properties were located in the APE. The DHR concurred on 10/10/18 that the project would have No Effect on Historic Properties. The DHR concurred on 03/27/19 that a supplemental cultural resource survey for additional areas added to the project footprint resulted in No Historic Properties Present and the No Effect determination is still consistent with the undertaking.</p> <p>See Appendix 2 Cultural Resources for more information.</p>
---------------------------	--

TABLE 3.2: Summary of Impacts

Category	Impact
Owner Families Displaced*	2
Tenant Families Displaced*	1
Businesses Displaced*	0
Schools Displaces*	0
Non-Profit Business (tenant)*	0
Other Community Facilities	0
4(f) Property Use (acres)	6.1
Wetland Impacts (acres)	0.33
Stream impacts (linear feet)	6,159
Floodplains (acres)	3.33
Threatened and Endangered Species	1
Cultural Resources	0
Forest Land Displaced (acres)	0
Farmland Displaced (acres)	0
Impacted Noise Receptors	97
Hazardous Materials Sites Impacted	0

*The acquisition of property and the relocation of residents, businesses, farms, and non-profit organizations would be conducted in accordance with all applicable Federal laws, regulations and requirements, including but not limited to, 23 CFR Part 710, the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended and its implementing regulations found in 49 CFR Part 24. All persons displaced on Federally-assisted projects would be treated fairly, consistently, and equitably so that they do not suffer disproportionate injuries as a result of projects that are designed for the benefit of the public as a whole. Relocation resources would be available to all residential and business relocatees without discrimination.

3.2 DISCUSSION OF ENVIRONMENTAL ISSUES

3.2.1 Right of Way and Relocations

According to the Right of Way – Stage 1 Relocation Assistance Report, the proposed project would potentially displace three (3) families. The total number of residents is unknown at this time. There are no farms or businesses being displaced by this project. The length of tenancy of the residential occupants of the affected property is unknown at this time. The three potential displacements are:

- Parcel 61 - 11625 Popes Head Road - A review of the real estate records available indicated the property is a two-story, single-family home built in 1925. There are possibly 8 residents. The family potentially being displaced appears to be tenants.
- Parcel 56 - 11700 Popes Head Road - A review of the real estate records available indicated the property is a one-story, single-family home built in 1955. There are possibly 6 residents. The family potentially being displaced appears to be owners.

- Parcel 60 - 11629 Popes Head Road - A review of the real estate records available indicated the property is a split-level, single-family home built in 1978. There are possibly 7 residents. The family potentially being displaced appears to be owners.

The average salary in Fairfax is estimated to be \$62,784 and the median household income is \$118,279 (www.simplyhired.com). The commercial businesses affected by the project are estimated to have an annual net income between \$50,000 and \$300,000.

There is a possibility that some of the affected properties are being occupied by members of a minority group. VDOT would assure that proper attention is given to the families and businesses as encountered, in accordance with The Uniform Relocation Assistance and Real Property Acquisition Act.

VDOT is not aware of any handicapped-owned or operated businesses, or handicapped persons being relocated on the project. However, special attention would be given to any such person in order to meet their special needs or circumstances.

VDOT is not aware of any elderly persons or large families being relocated on this project. However, special attention would be given to any elderly person or large families in order to meet their special needs.

The acquisition and construction of this project would have only minor effects upon the Fairfax citizens. The project would not hinder the accessibility of the general public to any of the essential services such as schools, churches, shopping or medical facilities.

The displacement of the residential tenants should have no impact on a neighborhood or local real estate market.

VDOT anticipates that housing of last resort would be needed for the displaced families. Assurance is given that we would not hesitate to implement this program to provide replacement facilities for any displaced family.

In the area of the project, there is more than an ample supply of decent, safe and sanitary housing available on the open market. The available replacement housing in this general area ranges from older style homes that stand alone, to numerous townhouse and apartment communities within several miles of the project. Rents for possible replacement single-family dwellings range from \$1,295 per month to \$3,900 per month depending on room count and location (MRIS 5/1/2019). Utilities for these types of single-family dwellings run from \$200 to \$300 per month depending on size and occupancy. Apartments in the area range from \$1,500 per month to \$2,400 per month, depending on room count and location (MRIS 5/1/2019). The approximate utility costs for these apartments run from \$100 to \$200 per month. Available real estate listings in this area

of Fairfax indicate single-family homes are available for sale and range from \$550,000 to \$900,000 (MRIS 5/1/2019).

See Appendix 6 Right of Way/Relocations for more information.

3.2.2 Environmental Justice

Fairfax County has a minority population of over 410,000 and a total population of over 1,110,000 according to the 2010 Census. This represents an approximate 37 percent minority percentage. Minority percentages were calculated for 10 census block groups encompassing the study area. Minority percentages ranged from about 14 percent to 57 percent.

The minority population of the environmental justice study area exceeds 50 percent in Tract 491705, Block Group 1, and the percentage of minority population is above the Environmental Justice (EJ) evaluator factor which is 40 percent in the Tract previously mentioned and in Tract 491701, Block Group 1. The EJ evaluator factor is 1.1 times the minority percentage in Fairfax County.

The proposed project would potentially displace three (3) families. The total number of residents is unknown at this time. There are no farms or businesses being displaced by this project. There is a possibility that some of the affected properties are being occupied by members of a minority group. VDOT would assure that proper attention is given to the families and businesses as encountered, in accordance with The Uniform Relocation Assistance and Real Property Acquisition Act. These three displacements do not represent a disproportionate impact to minority/low income populations as long as VDOT assures proper attention in accordance with the Uniform Relocation Assistance and Real Property Acquisition Act.

See 3.2.1 Right of Way/Relocations for more information on relocation impacts.

Fairfax County Department of Fire and Rescue does not anticipate any problems with hydrant availability or access to the area for emergency incidents. There are no concerns associated with the construction of the project regarding the overall functions of the Fairfax County Department of Fire and Rescue. The proposed project would not affect school bus routes and schedules.

Although an EJ population is present there are no disproportionate impacts to the EJ population. No low-income populations have been identified that would be adversely impacted by the proposed project. Therefore, in accordance with the provisions of E.O. 12898 and FHWA Order 6640.23 no further EJ analysis is required.

See Appendix 9 Environmental Justice for more information.

3.2.3 Parks and Recreation

Under Section 4(f) of the Department of Transportation Act of 1996, FHWA may approve a transportation project requiring the use of a public park or land of a historic site that is listed on or eligible for listing on the National Register of Historic Places (NRHP) only if: (1) there is no prudent and feasible alternative to using that land and (2) the project includes all possible planning to minimize harm to the park or historic site resulting from the use, or the use of the property would have a *de minimis* impact.

VDOT evaluated the effect on eligible or listed NHP resources associated with the widening of Fairfax County Parkway and coordinated with the State Historic Preservation Office for compliance with Section 106 of the National Historic Preservation Act (NHPA). This project would have No Effect on historic properties and the Virginia Department of Historic Resources concurred with this effect determination on 10/10/18. See Appendix 2 for more information.

Patriot Park and Popes Head Park are existing parks or recreational areas in the study area that would be impacted. Patriot Park is located at the intersection of Braddock Road and Fairfax County Parkway. It is approximately 130 acres. Amenities include trails and four lit rectangular fields. Popes Head Park is located off of Rivercomb Court. It is approximately 75 acres. Amenities include a playground, three unlit rectangular fields, two unlit tennis courts, one full unlit basketball court, and picnic tables.

The project would use these Section 4(f) resources. Approximately 5.3 acres of fee take, 0.2 acres of permanent easement, and 0.8 acres of temporary construction easement would be needed from Patriot Park inclusive of the new vehicular entrance requested by the FCPA. Approximately 0.2 acres of fee take, 0.4 acres of permanent easement, and 0.1 acres of temporary construction easement would be needed from Popes Head Park. These impacts are associated with the proposed Preferred Alternative. They are based upon conceptual design; a more definitive calculation of FCPA parkland use would be completed when additional final design details are available.

Throughout the planning process, the project team worked to minimize impacts to Patriot Park and Popes Head Park. One reason this Preferred Alternative was selected was the minimization of right of way takes from adjacent parcels. VDOT worked to avoid the vernal pool on Patriot Park. VDOT modified the ramp to northbound Fairfax County Parkway on Patriot Park to reduce impacts to the park. A shared use path would not be built on the east side of Fairfax County Parkway in Patriot Park to minimize impacts to Patriot Park. The current Preferred Alternative uses 2:1 slopes to tie into existing land in order to reduce impacts to the parks.

Preliminary concurrence from the FCPA was sought in a letter dated 03/22/19: VDOT's significance determination, temporary occupancy, and *de minimis* impacts preliminary

concurrence request. Preliminary concurrence was sought for the significance of Fairfax County Park Authority (FCPA) lands as well as compliance with Section 4(f) of the Department of Transportation Act, namely, (1) that Patriot Park and Popes Head Park are significant resources and (2) (a) that the temporary occupancy on these parks in the form of temporary construction easement associated with the widening of Fairfax County Parkway would be minor and not permanently adverse and (b) that the fee taking and permanent easement associated with the widening of Fairfax County Parkway would not adversely affect activities, features, and attributes of these properties for protection under Section 4(f) as publicly owned parks.

The FCPA responded to VDOT's Preliminary Concurrence Request in a letter dated 05/20/19. The FCPA recognizes that the documents provided by VDOT are only concept plans, and as further engineering is necessary before the full impact of grading, utilities, and travel lane impacts can be fully determined before the Park Authority can provide final De Minimis concurrence under Section 4(f). The FCPA can concur with the draft Section 4(f) preliminary De Minimis signature block provided as Attachment 2, if VDOT provides assurance to utilize the specific mitigation strategies provided in Attachment 1. Attachment 1 and signed Attachment 2 were provided with the FCPA letter of 05/20/19.

In Attachment 1, the FCPA identified impacts and opportunities for Patriot Park, Piney Branch Stream Valley Park, and Popes Head Park. Specific mitigation strategies were outlined FCPA's letter.

For Patriot Park, these mitigation strategies include:

- Minimize impacts to parkland through a designed reduction in needed right-of-way — (Currently in planning consideration by VDOT/FCDOT),
- Avoid impacts to vernal pools and other wetlands — (Currently in planning consideration by VDOT/FCDOT),
- Use natural design with grade control for all stormwater management facilities,
- Mitigate lost woodland, shrubland, grassland, and wetlands on site — (Currently in planning consideration by VDOT/FCDOT),
- Use only native plants with a 3-year warranty (plant list to be approved by the Park Authority) — (Currently in planning consideration by VDOT/FCDOT),
- Provide invasive plant management for impacted areas with a 3-year warranty,
- Provide a new park vehicular entrance to Patriot Park as part of Popes Head Road - Fairfax County Parkway interchange — (Currently in planning consideration by VDOT/FCDOT),
- Provide safe bicycle and pedestrian access to the park through connections along the Fairfax County Parkway with connections to the planned bicycle and pedestrian network,

- Provide safe pedestrian crossings of Fairfax County Parkway and feeder roads where possible at intersections,
- Replace all impacted park signage and fences,
- Provide natural interpretation features as specified by Park Authority, and
- Provide full extent of planned land needed for the Popes Head Road — Fairfax County Parkway Interchange so that Park Authority staff can proceed with the master plan revision for Patriot Park.

For Popes Head Park, these mitigation strategies include:

- Minimize impacts to parkland through the designed reduction in needed right-of-way — (Currently in planning consideration by VDOT/FCDOT),
- Use natural design with grade control for all stormwater management facilities,
- Mitigate lost woodland, shrubland, grassland, and wetlands on site — (Currently in planning consideration by VDOT/FCDOT),
- Use only native plants with a 3-year warranty (plant list to be approved by the Park Authority) — (Currently in planning consideration by VDOT/FCDOT),
- Provide invasive plant management for impacted areas with a 3-year warranty,
- Provide vehicular entrance improvements from Popes Head Road — (Currently in planning consideration by VDOT/FCDOT),
- Provide safe bicycle and pedestrian access to the park through connections along the Fairfax County Parkway with connections to the planned bicycle and pedestrian network,
- Provide pedestrian crossings of Fairfax County Parkway and feeder roads where possible at intersections,
- Provide natural interpretation features as specified by the Park Authority, and
- Schedule road and park entrance work to avoid impacts to park use during peak periods of playing field use.

No wildlife or waterfowl refuges are located in the project area.

See Appendix 5 Parks and Recreation for more information.

3.2.4 Water Quality

Stormwater Management Facilities

Based on the Virginia Stormwater Management Regulations and latest VDOT Post-Development Stormwater Management guidance in IIM-LD-195.10 dated June 21, 2018, water quality treatment is required for this project due to the amount of land disturbance. This project must satisfy the Virginia Stormwater Management Program (VSMP) Part II-B technical criteria;

therefore, the Virginia Runoff Reduction Method (VRRM) (Version 3.0) and technical criteria were used to determine the required pollutant removal rate.

The project would be phased for construction. Funding for the construction of Phase 1 (Popes Head Road interchange) has been secured. Phase 2 (Fairfax County Parkway widening) is not fully funded for construction and would be constructed when funding for construction is secured. Thus, the two phases of construction of the project would proceed as two separate projects. Each individual phase (or project) is required to independently meet the VSMP regulations. At least 75% of the required pollutant load would be satisfied with onsite treatment. The remaining pollutant load would be achieved through purchasing nutrient credits.

Phase 1: Popes Head Road Interchange

The entire interchange project is located within the Lower Bull Run HUC (PL46). Five (5) stormwater management detention basins are proposed for the Popes Head Road interchange (Phase 1). The proposed stormwater management ponds are primarily required to satisfy the quantity control requirements (Energy Balance) of the VSMP. To meet the VSMP criteria for this separate and independent Phase 1 interchange project, the five basins are proposed to be wet ponds, under the Virginia Stormwater Best Management Practice Clearinghouse design specifications, providing quality treatment as permanent wet pool storage.

Two of the proposed stormwater management basins are to be located adjacent to the proposed interchange ramps on the west side of Fairfax County Parkway. The other three proposed stormwater management basins are to be located approximately 2,000 feet south of Popes Head Road; two basins to be located on the east side of Fairfax County Parkway and one basin to be located on the west side of Fairfax County Parkway.

Phase 2: Fairfax County Parkway Widening

There are two 6th Order HUC watershed boundaries within the widening project limits. Most of the project is located within Lower Bull Run HUC (PL46). There are two outfalls (Sta. 62+50 RT and 1026+50 RT) on the southern end of the project within the Pohick Creek HUC (PL29). The Pohick Creek HUC project area would use nutrient credit purchase solely for meeting the VSMP water quality treatment requirements. There are five (5) existing stormwater management basins located in the northern portion of the Phase 2 Fairfax County Parkway Widening project. These are being evaluated for their capacity to provide both quantity detention and quality treatment. These basins were assumed to have been designed and built as part of the original Fairfax County Parkway construction approximately 25 years ago. No hydraulic study reports have been found for these basins to understand their original purpose; therefore, they are being evaluated now under their as-built condition.

According to survey, at present these basins are functioning as dry extended detention; the surveyed orifice elevations are consistent with the basin bottom elevations. They are all outfitted with riser structures on which the orifices are located, and they are connected to an outlet pipe. They all appear to be in good operating condition. The existing ponds provide significant storage such that the routed flows are much less than incoming. The basins were designed to intercept the entire VDOT right-of-way areas as well as the entire offsite watershed.

Four existing ponds (VDOT SWM #29010, VDOT SWM #29011, VDOT SWM #29012, and VDOT SWM #29018) would be modified to wet ponds to satisfy the required pollutant load reductions. The existing stormwater management ponds are located on the east side of Fairfax County Parkway between Braddock Road and I-66.

A wet pond is proposed to be located on the west side of Fairfax County Parkway south of Norfolk Southern railway for quality and quantity control. A bioretention basin is proposed to be located on the east side of Fairfax County Parkway just south of Clara Barton Drive for quality and quantity control for this outfall. A detention pond is proposed within the loop ramp south of Fairfax County Parkway at Route 123 to provide quality and quantity control for this outfall.

There are several smaller outfalls that drain to natural channels before reaching the one percent point of analysis. Linear facilities (dry swales) are proposed at these locations to minimize the property impacts. At least 75% of the required pollutant load for the Fairfax County Parkway widening project within the Lower Bull Run HUC would be satisfied with onsite treatment.

The computed pollutant removal requirement for the Pohick Creek portion of this project is less than 10 pounds per year; therefore, nutrient credit purchase is proposed to satisfy all water quality requirements within this HUC as alternative non-BMP offsite option is allowed under the regulations. The 4th Order (8-digit) HUC for purposes of nutrient credit purchase for this project is 02070010.

Erosion and Sediment Control Measures

The project proposes to employ several erosion and sediment control measures in order to prevent sedimentation and soil erosion caused by the construction's land-disturbing activities. Temporary silt fence, inlet protection, and rock dams would be used to prevent runoff from disturbed areas would filter sediment prior to entering the existing or proposed storm sewer system or open-channel systems. Temporary diversion dikes would be used to redirect "clean" runoff from entering the disturbed areas by diverting them around the land-disturbing activities area. In addition, the proposed stormwater management basins would be used as temporary sediment basins during construction.

See Appendix 10 Scoping Letters and Agency Comments for more information.

3.2.5 Natural Resources

Floodplains

Two 100-year floodplains exist within the Environmental Inventory Corridor, associated with Popes Head Creek and Piney Branch Stream. As indicated below in Table 3.3, approximately 137.31 acres of 100-year floodplain are located within the Environmental Inventory Corridor.

TABLE 3.3: 100-Year Floodplains within the Environmental Inventory Corridor

Associated Stream	Floodplain Acres	Orientation to Fairfax County Parkway
Piney Branch	58.94	Perpendicular Crossing
Popes Head Creek	78.37	Perpendicular Crossing
TOTAL	137.31	

Source: FEMA, 2015

For the purpose of this impact analysis, it is assumed that all 100-year floodplain areas within the LOD have the potential to be impacted by the Preferred Alternative. 3.33 acres of floodplains would potentially be impacted under the Preferred Alternative. These potential impacts primarily occur within the 100-year floodplains associated with Piney Branch and Popes Head Creek within the existing right of way.

The project design for the Preferred Alternative would be consistent with federal policies and procedures for the location and hydraulic design of highway encroachments on floodplains contained in 23 CFR §650 Subpart A. The proposed project would not, therefore, increase flood levels and would not increase the probability of flooding or the potential for property loss and hazard to life. Further, the proposed project would not be expected to have substantial effects on natural and beneficial floodplain values. The proposed project would be designed so as not to encourage, induce, allow, serve, support, or otherwise facilitate incompatible base floodplain development. It is anticipated that the potential floodplain encroachments would not be a “significant encroachment” (as defined in 23 CFR §650.105(q)) because:

- It would pose no significant potential for interruption or termination of a transportation facility that is needed for emergency vehicles or that provides a community's only evacuation route;

- It would not pose significant flooding risks; and
- It would not have significant adverse impacts on natural and beneficial floodplain values.

Sections 107 and 303 of VDOT's specifications require the use of stormwater management practices to address concerns such as post-development storm flows and downstream channel capacity. These standards require that stormwater management be designed to reduce stormwater flows to preconstruction conditions for up to a 10-year storm event. As a part of these regulations, the capture and treatment of the first half-inch of run-off in a storm event is required, and all stormwater management facilities must be maintained in perpetuity. During project design, a detailed hydraulic survey and study would evaluate specific effects on stormwater discharges. This evaluation would adhere to the aforementioned specifications to prevent substantial increases of flood levels.

Waters of the U.S., including Wetlands

Water resources are controlled under the federal Clean Water Act (33 USC § 1251 et seq.), which is administered by the Environmental Protection Agency (EPA) and regulated by the U.S. Army Corps of Engineers (USACE), in coordination with VDEQ and the Virginia Marine Resources Commission (VMRC). Section 404 of the Clean Water Act regulates discharges of fill into Waters of the United States (WOUS). WOUS can be generally defined as all navigable waters and waters that have been or can be used for interstate or foreign commerce, their tributaries, and any waters that, if impacted, could affect the former. WOUS include surface waters (streams, lakes, ponds, bays, etc.) and their associated wetlands (inundated or saturated areas that support vegetation adapted for life in wet soils).

WOUS along the Fairfax County Parkway corridor were identified based on a combination of GIS databases, aerial photography, published lists maintained by federal and state agencies, and field surveys. A detailed delineation of WOUS subject to USACE jurisdiction was conducted by qualified biologists in the field. VDOT is currently seeking to acquire a USACE Preliminary Jurisdictional Determination (PJD) to confirm the limits of WOUS within the Environmental Study Area, as identified through the wetland delineation effort.

The Environmental Inventory Area is located within the Potomac-Shenandoah River Basin, which encompasses a total of approximately 5,702 square miles in Virginia and extends into adjacent states, including portions of Maryland, Pennsylvania, West Virginia, and Washington, D.C. This larger drainage area can be further subdivided into hierarchical hydrologic units. Within this river basin, the study area is located entirely within one eight-digit hydrologic unit code (HUC) boundary; the Middle Potomac-Anacostia-Occoquan subbasin (HUC 02070010). Included within the subbasin are more localized watersheds and subwatersheds. Portions of the following two 12-digit HUC subwatersheds are within the study area:

- Lower Bull Run-Potomac River (HUC 020700100705); and
- Pohick Creek-Potomac River (HUC 020700100401).

Fairfax County Parkway crosses two named streams within the Environmental Study Area, Piney Branch and Popes Head Creek. Piney Branch Stream crosses the Environmental Study Area through a triple box culvert. A separated bridge crossing is provided over Popes Head Creek.

These hydrologic features were field verified within the Environmental Study Area to develop a more informed understanding of the potential impacts to wetlands and streams. The results of the project-specific delineation are shown in the Natural Resource Technical Report. A total of approximately 22,188 linear feet of streams, including 2,671 linear feet of culverted streams, and approximately 0.65 acres of Palustrine Open Water (POW) were delineated in the Environmental Study Area. A total of approximately 5.40 acres of wetlands exist within the Environmental Study Area, as shown in the Table below, which describes the wetland acreages by type. The predominant wetland type is palustrine forested. The majority of these wetlands (3.86 acres) are located within the floodplain areas of named and unnamed tributaries.

TABLE 3.4: Wetlands within WOUS Survey Area

Waterbody	Acreage within Environmental Study Area
Palustrine Forested (PFO)	3.86
Palustrine Scrub Shrub (PSS)	0.55
Palustrine Emergent (PEM)	0.99
Total	5.40

Source: WOUS Delineation for the Fairfax County Parkway Widening Project (VDOT, 2019)

Permits

Limits of disturbance (LOD) have been estimated to reflect the anticipated impacts of the Preferred Alternative, and they have been used to calculate predicted direct effects of the project. The LOD are based on preliminary engineering and design, which has been developed to include both temporary and permanent impacts, including stormwater management facilities and construction access. The locations of delineated Waters of the U.S. within the Environmental Study Area are provided in the Natural Resource Technical Report, and Table 3.5 lists the potential impacts to Waters of the U.S. under the Preferred Alternative.

TABLE 3.5: Impacts within Preferred Alternative LOD

Category	Potential Impacts within Preferred Alternative LOD
Limits of Disturbance (acres)	204.25
Number of Potentially Impacted Streams	19
Length of Streams [Culvert] (linear feet)	
Ephemeral	1,298 [15]
Intermittent	1,629 [911]
Perennial	3,232 [1,036]
Total	6,159 [1,962]
Wetlands (acres)	
Palustrine Forested	0.17
Palustrine Shrub Scrub	0.08
Palustrine Emergent	0.07
Total	0.32
Floodplains (acres)	
Total	3.33

Potential Waters of the U.S. impacts for the Preferred Alternative were quantified using GIS and stream mapping obtained from the WOUS delineation. As indicated above, approximately 3,232 linear feet of perennial stream and approximately 1,629 linear feet of intermittent stream are located within the LOD. However, approximately 1,947 linear feet of stream within the LOD are culverted streams that have already been previously impacted. Total impacts to wetlands within the LOD under the Preferred Alternative amount to approximately 0.33 acres of impacted wetlands. A more detailed analysis of impacts based on proposed limits of grading for the

Preferred Alternative would be conducted as project design advances. Opportunities to avoid and minimize potential impacts may be identified as the proposed limits of grading for the Preferred Alternative are refined during detailed project design and permitting.

It is important to note that impact analysis for the EA does not distinguish between temporary or permanent impacts. Temporary and permanent impacts would be quantified during the final design phase. Measures to avoid and minimize wetland impacts would also be developed during the final design phase. These measures may include, but are not limited to, steeper side slopes and retaining walls.

Impacts to Waters of the U.S. would require submittal of a Joint Permit Application to the US Army Corps of Engineers (USACE), Virginia Department of Environmental Quality (VDEQ), and Virginia Marine Resource Commission (VMRC). Due to the linear nature and size of the Preferred Alternative, however, unavoidable impacts are anticipated. Analysis of impact quantities based on the preliminary conceptual design indicates the project can anticipate being authorized to impact Waters of the U.S. under an USACE Individual Permit, a VDEQ General Permit and a VMRC VGP-1 Permit. Adequate mitigation to compensate for any unavoidable wetland impacts would be developed in coordination with the aforementioned agencies, as well as the EPA, during the permitting process. Use of credits from an approved mitigation bank, or payments to the Virginia Aquatic Resources Trust Fund is the anticipated form of wetlands mitigation for the project.

Wetland mitigation requirements vary by wetland type: 1:1 for palustrine emergent, 1:1½ for palustrine scrub-shrub, and 1:2 for palustrine forested. These ratios are typical; however, compensation is approved on a case-by-case basis and requirements may vary. In most situations, mitigation is typically required within the same eight-digit HUC watershed.

Threatened and Endangered Species

Federally Listed Species

The USFWS is responsible for listing, protecting, and managing federally listed threatened and endangered species under the Endangered Species Act of 1973, as amended (ESA). The USFWS defines an endangered species as one that is in danger of extinction throughout all or in a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future (ESA, 1973).

Information regarding threatened and endangered species that may be affected by the proposed project was requested from the USFWS via the Information, Planning, and Conservation online system (IPaC) on July 15, 2019. The IPaC system aims to streamline the environmental review process associated with Section 7 of the ESA. Based on an official species list received from the USFWS in response to an IPaC request for the project, and listed below, one (1) federally listed

species, the northern long-eared bat (*Myotis septentrionalis*), was identified with the potential to occur within the Environmental Study Area (USFWS, 2019). In addition, the USFWS IPaC response references the project's responsibility to comply with the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.) Actions taken to comply with this regulation are discussed in greater detail below. Additional threatened and endangered species coordination information is provided in the Natural Resource Technical Report.

TABLE 3.6: Special Status Species Potentially Occurring within the Environmental Inventory Corridor

Common Name	Scientific Name	Status	Habitat
Northern Long-eared Bat (Mammal)	<i>Myotis septentrionalis</i>	Federally listed Threatened	Caves and cave-like structures (hibernacula), forests, trees (roosting and foraging)
Bald Eagle (Bird)	<i>Haliaeetus leucocephalus</i>	Not Listed, Protected By Bald and Golden Eagle Protection Act	Tall hardwood trees with open canopies in close proximity to water bodies where they forage

Source: USFWS, 2019; VDCR, 2019; VDGIF Species Observation Database (VDOT, 2019)

Northern Long Eared Bat

There are no known northern long eared bat (NLEB) hibernacula in the vicinity of the Environmental Inventory Corridor. Wooded areas near the Environmental Inventory Corridor could potentially provide suitable summer roosting and foraging habitat for the species; however, there are no known occurrences of summer roosting or foraging northern long-eared bats within the vicinity of the Environmental Inventory Corridor (VDOT, 2019). According to the U.S. Geological Survey National Land Cover Dataset, of the 706.9 acres that make up the Environmental Study Area, 431.4 acres are developed or non-forested (high, medium, and low intensity, development, developed open space, barren land, herbaceous and hay/pasture) and 277.8 acres are characterized as forested (mixed, evergreen, scrub/shrub, and deciduous) or woody wetlands (NLCD, 2016). As suggested by these amounts, the Environmental Inventory Corridor is largely developed, containing residential communities with manicured landscaping and fragmented forests; as well as some common areas and green spaces, small parks, stream valleys, forested areas adjacent to the Fairfax County Parkway interchanges, and narrow linear areas between the existing Fairfax County Parkway roadway and right of way limits.

VDOT utilized the USFWS NLEB 4(d) Rule Determination Key to assist with the determination as to whether the proposed actions of the project are consistent with those analyzed in the USFWS's Programmatic Biological Opinion (PBO) dated January 5, 2016. The USFWS determined that the project may rely on the January 5, 2016, PBO on Final 4(d) Rule for the NLEB and Activities Exempted from Take Prohibitions to fulfill its Section 7(a)(2) consultation obligation. As a result, VDOT, on behalf of FHWA, has completed the appropriate coordination and due diligence under Section 7 of the ESA and no further action or coordination is required.

Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) is not federally listed as threatened or endangered but is nevertheless protected by the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq). Therefore, it is often included in discussions of threatened and endangered species. In Virginia, bald eagles are most commonly found along the James, Rappahannock, and Potomac Rivers. The nearest known bald eagle nest is approximately 2.0 miles from the LOD. In the Bald and Golden Eagle Protection Act, the USFWS recommends an avoidance radius buffer of 660 feet around bald eagle nests for proposed clearing, construction and landscaping activities (USFWS, 2007b).

State Protected Species

The Commonwealth of Virginia maintains a listing of state endangered or threatened species. VDCR and VDGIF are responsible for listing, protecting, and managing state-listed threatened and endangered species. No state listed threatened or endangered species were identified within a 2-mile search of the project corridor. The VDGIF's Species Observation Database contains no known occurrences of federal or state listed wildlife species within the Environmental Inventory Corridor.

3.2.6 Pedestrian and Bicycle Accommodations

There is an existing 8-foot wide asphalt path along the Fairfax County Parkway between Route 29 and Burke Centre Parkway. The asphalt path is located on the east side of Fairfax County Parkway between Route 29 and Braddock Road and on the west side of Fairfax County Parkway between Route 29 and Burke Centre Parkway. As part of the scope of the Popes Head Road Interchange project, a 10-foot shared use path is proposed along the west side of Fairfax County Parkway where the existing 8-foot wide asphalt path is being impacted by the construction of the interchange. The Fairfax County Parkway Widening project includes a continuous upgraded or new 10-foot wide shared use path along the project limits. Between Route 29 and Braddock Road, the existing asphalt path along the east side of Fairfax County Parkway would be upgraded to a 10-foot wide shared use path. Between Braddock Road and the limits of the Popes Head Road interchange project, the existing asphalt path along the west side of Fairfax County Parkway would be upgraded to a 10-foot wide shared use path. Between the limits of the Popes Head

Road Interchange project and Burke Centre Parkway, the existing asphalt path along the west side of Fairfax County Parkway would be upgraded to a 10-foot wide shared use path. A new 10-foot wide shared use path would be constructed along Fairfax County Parkway between Burke Centre Parkway and Route 123. The preliminary design includes a new 10-foot wide shared use path between Burke Centre Parkway and Route 123 on the east side of Fairfax County Parkway, but the final location has not been finalized.

The upgraded shared use path would have at-grade crossings at several existing locations within the project limits at the Route 29 interchange, the Braddock Road interchange, and Route 123 interchange. A grade-separated bike/pedestrian crossing is proposed near the Burke Centre Parkway intersection to improve safety and accessibility to existing bike/pedestrian facilities. All existing at-grade crossings of the Fairfax County Parkway would be eliminated by the widening project.

The existing shared use path is located on the west side of Fairfax County Parkway and terminates at the intersection of Fairfax County Parkway and Burke Centre Parkway with an at-grade pedestrian crossing of Fairfax County Parkway at the existing traffic signal at Burke Centre Parkway. The existing at-grade pedestrian crossing is being removed by providing a grade separated crossing by utilizing the existing Fairfax County Parkway bridge spanning Fairfax Station Road and Norfolk Southern Railway. The shared use path alignment would be modified to ramp down from Fairfax County Parkway to run under the Fairfax County Parkway adjacent to the railroad tracks (separated by a proposed fence) and then ramp back up to Fairfax County Parkway on the east side and continue south along the east side of Fairfax County Parkway to Route 123. The preferred alternative minimizes construction cost, future maintenance cost and visual impacts of the proposed pedestrian grade separated crossing of Fairfax County Parkway by utilizing the existing bridge over Fairfax Station Road.

3.2.7 Air Quality

The proposed improvements were assessed for potential air quality impacts and conformity consistent with all applicable air quality regulations and guidance. All models, methods and assumptions applied in modeling and analyses are consistent with those provided or specified in the VDOT Resource Document. This project level assessment meets all applicable federal and state transportation conformity regulatory requirements as well as air quality guidance under the National Environmental Policy Act (NEPA). The project would not cause or contribute to a new violation of the National Ambient Air Quality Standards (NAAQS) established by the US Environmental Protection Agency (US EPA).

Carbon Monoxide (CO): As the project is located in a region that is attainment of the CO NAAQS, only NEPA applies. EPA project-level (“hot-spot”) transportation conformity requirements do not apply.

For purposes of NEPA, worst-case emission and dispersion modeling for CO was conducted for the project for intersections exhibiting levels of service of D or worse in the 2046 Build scenario, namely Route 123/Fairfax County Pkwy SB Ramps at Robert Carter Rd and Fairfax County Pkwy/Roberts Pkwy at Karmich St. The worst-case modeling assumptions are consistent with EPA and FHWA guidance as well as the VDOT Resource Document and included:

For emission factor modeling:

- Regional registration (age) distributions were applied that were not adjusted (as a limitation of the EPA MOVES model) for mileage accumulation rates that generally decline with age. This assumption effectively weights older higher-emitting vehicles the same as newer lower-emitting vehicles, resulting in higher estimates for fleet-average emission factors.
- Worst-case emission factor selected as that for the maximum (or higher) road grade for each link.
- Although the project is located in an area (northern Virginia) in which it is subject to emission inspection and maintenance (I&M) program requirements, I&M benefits were not incorporated into the emission modeling for this project.

For dispersion modeling:

- Traffic volumes representing LOS E conditions, which typically exceeds actual opening and design year ADT forecasts for build scenarios by substantial margins. Also additional through lane(s) were added to account for auxiliary lanes or ramps.
- Worst-case receptor locations on the edge of the roadway right-of-way, i.e., at the closest possible point to roadway.
- Worst-case geometric assumptions that serve to concentrate traffic, emissions and concentrations to the greatest extent possible:
 - Zero median widths for arterial streets and minimum distance for freeways
 - Lane widths of 12 ft
- Other federal default data for most model inputs (e.g., low wind speeds, surface roughness, and stability class), which result in higher modeled estimates of ambient concentrations than are expected to occur in practice.

Mobile Source Air Toxics (MSATs): Federal Highway Administration (FHWA) guidance

(2016) states that “EPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers or contributors and

non-cancer hazard contributors from the 2011 National Air Toxics Assessment (NATA). These are 1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter.” The FHWA guidance specifies three possible tiers of MSAT analysis and associated traffic volumes and other criteria, based on which this project was categorized as one with low potential MSAT effects based primarily on the forecast traffic volumes for this project. A qualitative assessment was therefore conducted for the project, following FHWA guidance for projects with low potential impacts.

Overall, best available information indicates that, nationwide, regional levels of MSATs are expected to decrease in the future due to ongoing fleet turnover and the continued implementation of increasingly more stringent emission and fuel quality regulations. Nonetheless, technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects effectively limit meaningful or reliable estimates of MSAT emissions and effects of this project at this time. While it is possible that localized increases in MSAT emissions may occur as a result of this project, emissions would likely be lower than present levels in the design year of this project as a result of EPA's national control programs that are projected to reduce annual MSAT emissions by over 80 percent between 2010 and 2050. Although local conditions may differ from these national projections in terms of fleet mix and turnover, vehicle-miles-travelled (VMT) growth rates, and local control measures, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

Indirect Effects and Cumulative Impacts (IECI): A qualitative assessment of the potential for indirect effects and cumulative impacts attributable to this project was conducted. It concluded that the potential effects or impacts are not expected to be significant given available information from pollutant-specific analyses (CO and MSATs) and regional conformity analyses.

More specifically, the quantitative assessments conducted for project-specific CO, qualitative analyses for MSAT impacts and the regional conformity analysis conducted for ozone can all be considered indirect effects analyses because they look at air quality impacts attributable to the project that occur in the future. These analyses demonstrate that, in the future: 1) air quality impacts from CO would not cause or contribute to violations of the CO NAAQS; 2) MSAT emissions would be significantly lower than they are today; and 3) the mobile source emissions budgets established for the region for purposes of meeting the ozone NAAQS would not be exceeded.

Regarding the potential for cumulative impacts, the annual regional conformity analysis conducted by the National Capital Region Transportation Planning Board (NCRTPB, which is the Metropolitan Planning Organization or MPO for the Washington, D.C. metropolitan nonattainment area for ozone) represents a cumulative impact assessment for purposes of regional air quality. The conformity analysis quantifies the amount of mobile source emissions

for which the area is designated nonattainment that would result from the implementation of all reasonably foreseeable regionally significant transportation projects in the region (i.e. those proposed for construction funding over the life of the region's transportation plan). The most recent conformity analysis was completed in October 2018, with FHWA and FTA issuing a conformity finding on December 18, 2018 for the Transportation Improvement Program and Constrained Long-Range Transportation Plan covered by that analysis. The analysis demonstrated that the incremental impact of the proposed project on mobile source emissions, when added to the emissions from other past, present, and reasonably foreseeable future actions, is in conformance with the State Implementation (Air Quality) Plan (SIP) and would not cause or contribute to a new violation, increase the frequency or severity of any violation, or delay timely attainment of the NAAQS established by EPA.

Mitigation: Emissions may be produced in the construction of this project from heavy equipment and vehicle travel to and from the site, as well as from fugitive sources. Construction emissions are short term or temporary in nature. To mitigate these emissions, all construction activities are to be performed in accordance with VDOT *Road and Bridge Specifications*.

The Virginia Department of Environmental Quality (VDEQ) provides general comments for projects by jurisdiction. Their comments in part address mitigation. For Fairfax county, VDEQ comments relating to mitigation are *"...all reasonable precautions should be taken to limit the emissions of VOC and NOx. In addition, the following VDEQ air pollution regulations must be adhered to during the construction of this project: 9 VAC 5-130, Open Burning restrictions; 9 VAC 5-45, Article 7, Cutback Asphalt restrictions; and 9 VAC 5-50, Article 1, Fugitive Dust precautions."*

Project Status in the Regional Transportation Plan and Program: Federal conformity requirements, including specifically 40 CFR 93.114 and 40 CFR 93.115, apply as the area in which the project is located is designated as nonattainment for ozone. Accordingly, there must be a currently conforming transportation plan and program at the time of project approval, and the project must come from a conforming plan and program (or otherwise meet criteria specified in 40 CFR 93.109(b)).

As of the date of preparation of this analysis, the project is included in the currently conforming FY 2019-2024 Transportation Improvement Program (TIP) and 2045 Long Range Transportation Plan (LRTP). The LRTP and TIP are developed by the metropolitan planning organization (MPO) for the region, whose members include VDOT.

3.2.8 Noise

For the purposes of this preliminary design noise analysis, three separate build alternatives were analyzed and included in the Preliminary Noise Analysis.

The methodologies applied to the noise analysis for the Fairfax County Parkway Project are in accordance with VDOT's "State Noise Abatement Policy" effective July 13, 2011 and the "Highway Traffic Noise Impact Analysis Guidance Manual", updated February 20, 2018. VDOT guidelines are based on Title 23 of the Code of Federal Regulations, Part 772 and the Procedures for Abatement of Highway Traffic Noise and Construction Noise, (23 CFR 772).

The Preliminary Noise Analysis focuses solely on Common Noise Environments, referred to as CNEs. Noise sensitive receptors that are within approximately 500 feet of the proposed improvements were included for this evaluation. This report documents the predicted Existing (2018), No-Build (2046) and Design Year (2046) Build noise levels associated with the Fairfax County Parkway Improvements Project. A project field reconnaissance was performed to thoroughly review the project area. During this field view, major sources of acoustic shielding (e.g., terrain lines, building rows, etc.) adjacent to the project corridor were noted for inclusion in the noise modeling. Noise monitoring was performed at 29 locations, while noise modeling was conducted for 478 additional sites to gain a thorough understanding of the existing noise environment and to determine how the proposed improvements would change the noise levels throughout the project area. Monitored sites were used solely for noise model validation and not for the purposes of predicting Existing (2018), No-Build (2046) and or Design Year (2046) Build noise impacts.

Coordination with Fairfax County was completed in March 2018 to determine whether any undeveloped permitted land uses were present within the project corridor, including Category G. Category G represents undeveloped lands with no permits. It was determined that there was one active/approved building permit within 600 feet of the project area. This coordination would occur again in Final Design to ensure that no new permitted developments have been approved between the time of the approval of the preliminary design noise report and NEPA approval (Date of Public Knowledge).

Noise modeling was completed for Existing (2018), No-Build (2046), and predicted Design Year (2046) Build conditions. Design Year (2046) Build noise levels were predicted at each modeled receptor site and are specific to each of the proposed build scenarios. Additionally, during the Final Design noise analysis, VDOT's Environmental Traffic Data (ENTRADA) tool would be used to develop final traffic data in support of this project. Under Design Year (2046) Alternative 1A Build conditions, a total of 97 receptors representing 86 residences, one soccer field (three grid units), one baseball field (one grid point), one playground and one trail (six grid units) are predicted to experience noise impacts. Under Design Year (2046) Alternative 2 Build conditions, a total of 96 receptors representing 85 residences, one soccer field (three grid units), one baseball field (one grid point), one playground, and one trail (six grid units) are predicted to experience noise impacts. Under Design Year (2046) Alternative 2D Build conditions, a total of 96 receptors

representing 85 residences, one soccer field (three grid units), one baseball field (one grid point), one playground, and one trail (six grid units) are predicted to experience noise impacts. Impacts for each alternative are summarized in Table 3.7 below.

TABLE 3.7: Noise Impact Summary by Alternative

Table E.S. 1 <i>Fairfax County Parkway Improvements Project</i> <i>Alternatives Impact Summary</i>		
Alternative 1A Impacts Summary	Alternative 2 Impacts Summary	Alternative 2D Impacts Summary
86 Residences, One Soccer Field (three grid units), One Baseball Field (one grid unit), One playground, One Trail (six grid units)	85 Residences, One Soccer Field (three grid units), One Baseball Field (one grid unit), One playground, One Trail (six grid units)	85 Residences, One Soccer Field (three grid units), One Baseball Field (one grid unit), One playground, One Trail (six grid units)

Three existing noise barriers are present within the southern portion of the project area and were evaluated using VDOT’s Highway Traffic Noise Impact Analysis Guidance Manual “in-kind” replacement as detailed in Section 6.3.6. All three existing barriers are not physically impacted by the proposed build alternatives. However, the existing noise barrier protecting the sensitive land uses for CNE F (Existing Barrier F-2) was evaluated and is proposed to be replaced in-kind. The existing noise barriers within CNE E (Existing Barrier E) and CNE F (Existing Barrier F-1) did not warrant evaluation since no noise impacts were predicted at their protected noise sensitive receptors.

A total of 22 barriers were evaluated throughout the project corridor. Five of these barriers (Barrier F-2 Replacement, Barrier U, Barrier W, Barrier X, and Barrier Y) were found to be feasible and reasonable at this time. A summary of the barriers found to be feasible and reasonable is shown below in Table 3.8.

TABLE 3.8: Summary of Barriers found to be Feasible and Reasonable

TABLE E.S. 2 <i>Fairfax County Parkway Improvements Project</i> <i>Feasible and Reasonable Barrier Summary</i>							
Barrier I.D.	Combined Noise Barrier Length (ft.)	Average Noise Barrier Height (ft.)	Square Footage (SF)	Net SF per Benefited Receptor	Barrier Cost	Feasible?	Reasonable?
Barrier F2 (Replacement)	2,150	15.00	32,252	1,195	\$1,354,584	Yes	Yes
Additional SF			8,364	492			
Barrier U	1,167	14.57	17,005	1,546	\$714,210	Yes	Yes
Barrier W	2,100	15.83	33,256	1,584	\$1,396,752	Yes	Yes
Barrier X	1,650	12.55	20,706	1,593	\$869,652	Yes	Yes
Barrier Y	3,000	15.00	44,997	417	\$1,889,874	Yes	Yes

No considerable, long-term construction related noise impacts are anticipated. Any noise impacts that do occur as a result of roadway construction measures are anticipated to be temporary in nature and would cease upon completion of the project construction phase.

The findings in the Preliminary Noise Analysis are based on conceptual information. Therefore, noise barriers that are found to be feasible and/or reasonable during the Preliminary Noise Analysis may not be found to be feasible and/or reasonable during the Final Design Noise Analysis. Conversely, noise barriers that were not considered feasible and/or reasonable may meet the established criteria and be recommended for construction. A Final Design Noise Analysis would be performed for this project based on detailed engineering information. Thus, any conclusions derived in the Preliminary Noise Analysis should be considered preliminary in nature and subject to change.

Since the Preferred Alternative, Option 1, has similar traffic and there are no design changes on Fairfax County Parkway which is the dominant noise source, when compared with Option 1A, a qualitative memo was written to update the Preliminary Noise Analysis for Option 1. The Preferred Alternative, Option 1, is not anticipated to change the conclusions of the Preliminary Noise Analysis. This includes the modification to Option 1 of the Ladues End Lane Extension.

See Appendix 7 Noise for more information

3.3 CONSTRUCTION

During construction, temporary environmental impacts usually can be controlled, minimized, or mitigated through careful attention to prudent construction practices and methods. Potential temporary construction impacts and preventive practices are summarized below.

3.3.1 Water Quality

During construction, non-point source pollutants could possibly enter groundwater or surface water from stormwater runoff. To minimize these impacts, appropriate erosion and sediment control practices would be implemented in accordance with VDOT's most current Road and Bridge Specifications. These specifications also prohibit contractors from discharging any contaminant that may affect water quality. In the event of accidental spills, the contractor is required to immediately notify all appropriate local, state, and federal agencies and to take immediate action to contain and remove the contaminant.

3.3.2 Air

Air quality impacts from construction, consisting of emissions from diesel-powered construction equipment, burning of debris, fugitive dust, and the use of cutback asphalt (particularly during the months of April through October), would be temporary. This project would comply with all

applicable local, state, and federal regulations, including the Virginia Environmental Regulation 9 VAC 5-40-5600 *et seq.* regarding open burning, 9 VAC 5-50-60 *et seq.* regarding fugitive dust emissions, and 9 VAC 5-40-5490 *et seq.* regarding cutback asphalt. To control dust, measures would be taken to minimize exposed earth by stabilizing with grass, mulch, pavement, or other cover as early as possible. Other measures would be implemented per VDOT's most current *Road and Bridge Specifications* to minimize air pollution.

3.3.3 Noise

Land uses that would be sensitive to traffic noise would also be sensitive to construction noise. A method of controlling construction noise is to establish the maximum level of noise that construction operations can generate. In view of this, VDOT has developed and FHWA has approved a specification that establishes construction noise limits. This specification can be found in VDOT's most current *Road and Bridge Specifications*. The contractor would be required to conform to this specification to reduce the impact of construction noise on the surrounding community.

3.3.4 Solid Waste and Hazardous Materials

All solid waste material resulting from clearing and grubbing, demolition, or other construction operations would be removed from the project and disposed of in an appropriate manner. If contaminated soils are encountered during construction, VDOT would develop and implement appropriate procedures for their proper management and coordinate the removal, disposal, and/or treatment of the soil, as necessary. If contaminated groundwater is encountered during construction, VDOT would implement appropriate specifications for proper management and treatment of the water as necessary.

3.3.5 Late Discoveries

During construction, should the discovery of archaeological, paleontological, or rare mineralogical articles occur, work would be suspended immediately. VDOT's *Road and Bridge Specifications* establish the protocol that would be followed should a "late discovery" occur.

3.4 INDIRECT EFFECTS

The Council on Environmental Quality (CEQ) defines indirect effects as "...effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable" (40 CFR 1508.8(b)). Indirect effects may include "growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems" (40 CFR 1508.8(b)). For the purposes of this EA, the methodology followed for analyzing indirect effects

is prescribed in the National Cooperative Highway Research Program (NCHRP) Report 466, Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects (TRB, 2002). The indirect effects analysis relies on planning judgment that is described in the NCHRP 25-25 program, Task 22, Forecasting Indirect Land Use Effects on Transportation Projects (TRB, 2007).

3.4.1 No-Build Alternative

Under the No-Build Alternative, increased traffic delays, congestion, and the lack of improved bicycle and pedestrian access would have an adverse indirect effect on community facilities, businesses, and residents. Proximity effects associated with the existing facility, including noise, air quality, and visual intrusions would continue to affect parks, historic resources, and wildlife. Potential indirect effects could be associated with petroleum from vehicles, and salt or chemicals due to road maintenance.

No induced growth would be expected as a result of the No-Build Alternative. The Indirect and Cumulative Effects (ICE) Study Areas and surrounding locality is already developed and built-out with mature infrastructure. Planned land use is generally consistent with current land uses.

3.4.2 Preferred Alternative

Indirect effects to neighborhood cohesion, community facilities, environmental justice populations, bike paths and recreational resources, and economics from the Preferred Alternative are expected to be minor during construction. Construction could cause temporary noise impacts, and increased travel times within the area, and increased emergency vehicle response times. However, the Preferred Alternative would have long-term beneficial effects such as reduced travel time and increased travel reliability. The Preferred Alternative would also provide an alternate transportation mode choice by providing better bicycle and pedestrian passage between communities, residents, neighborhoods and businesses, and safer interactions between motor vehicles and bicycles/pedestrians.

Potential indirect effects to waters, wetlands, and water quality could result from increased stormwater runoff due to increases in impervious surfaces. Implementation of strict erosion and sediment control and stormwater measures during construction would minimize permanent and temporary impacts to waters, wetlands and water quality, and thereby minimize indirect effects as well. Potential indirect effects to floodplains could occur if fill is placed into floodplains, changing the flood flow elevations. All construction activities would be designed to ensure that culverts and bridges are adequately sized and do not impede floodwater passage.

Indirect effects to wildlife and threatened, endangered, and special status species could be related to increased noise, human activity, dust associated with construction, potential for animal-vehicle collisions, potential for oil spills, potential for introduction of invasive species,

changes in vegetative composition due to changes in light and hydrologic regimes, and loss of habitat. New stormwater facilities and stormwater regulations would reduce or neutralize impacts to aquatic habitat. Since the Preferred Alternative would be on an existing alignment, habitat and wildlife corridor fragmentation is not expected to be an indirect effect. Existing culvert and bridge crossings would allow for the continued passage of wildlife beneath Route 286. During construction, the contractor would adhere to VDOT's Road and Bridge Specifications manual, Chapter 40 of Title 3.2 of the Code of Virginia, Virginia Administrative Code (VAC) 2VAC-5-390-20, and other applicable regulations to prevent the introduction and establishment of invasive species.

The ICE Study Areas and surrounding locality are built-out with mature infrastructure. Since the Preferred Alternative would not contribute to any conditions conducive to induced growth including transportation on new alignment, land use progression, or largely new infrastructure or economic advances that are not already planned in the ICE Study Areas, no induced growth would be expected as a result of the Preferred Alternative.

3.5 CUMULATIVE EFFECTS

CEQ defines cumulative effects (or impacts) as "...the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR § 1508.7). Cumulative effects include the total of all impacts, direct and indirect, experienced by a particular resource that have occurred, are occurring, and/or would likely occur as a result of any action or influence, including effects of a federal activity (Environmental Protection Agency (EPA), 1999). The cumulative effects analysis is based on the five-part evaluation process outlined in *Fritiofson v. Alexander*, 772 dF.2d 1225 (5th Cir. 1985), as described in FHWA's *Guidance: Questions and Answers Regarding the Consideration of Indirect and Cumulative Impacts in the NEPA Process* (FHWA, 2014).

Many of the past actions that have contributed to the baseline for this analysis occurred as part of the low-density residential development. This development transformed a rural landscape into a suburban environment, resulting in a loss of wildlife habitat and species, impacts to wetlands, streams, and floodplains; and increased levels of air and water pollution. The original development also formed the basis for the substantial level of population growth the region experienced. In association with this growth came an increase in employment and investment in the ICE Study Areas.

While the developments typically avoided stream corridors, many developments were constructed on the forested area adjacent to the streams, reducing the acreage of natural ecosystems associated with the streams (USGS, 2017b). The remaining natural areas are now largely restricted to the major stream corridors, which have received higher levels of protection since the 1980s.

3.5.1 No-Build Alternative

The No-Build Alternative would likely have a minor adverse cumulative effect on communities, businesses, and the population that lives along or that uses the Route 286 corridor due to increased congestion. Increased congestion could potentially cause residential and business relocations away from traffic congestion and air and noise impacts.

Existing stormwater facilities designed and built as part of the original Fairfax County Parkway construction approximately 25 years ago would not be improved under the No Build Alternative. Some of these features are outdated. Existing untreated or poorly treated stormwater runoff would continue.

3.5.2 Preferred Alternative

The Preferred Alternative would widen an existing roadway and update bicycle and pedestrian facilities in a developed area that has been previously disturbed, limiting the effects of converting other land uses and limiting indirect effects to neighborhoods, community facilities, and environmental justice populations. Although this area has experienced land use conversions and increases in population in the past, these improvements would have a moderate beneficial cumulative impact by improving capacity of the roadway, relieving congestion, and providing an alternate mode of transportation for residents to access other neighborhoods and community facilities. The Preferred Alternative could have short-term minor adverse effects while the roadway and shared use path are under construction. However, the long-term beneficial effect of more jobs and associated expenditures resulting from the Preferred Alternative is expected to benefit the local communities.

The Preferred Alternative's impacts to waters, wetlands, and water quality; floodplains, wildlife habitat; and threatened species would contribute to the cumulative effects that have occurred in the past to natural resources within the study area; however, the effects should be minimized by implementation of best management practices and compensatory mitigation. Construction and post-construction of the Preferred Alternative would potentially contribute to minor, localized increases in pollutants and nutrients causing impairment to waterways. Since construction of the Preferred Alternative would upgrade and replace current stormwater management systems, implementation of the Preferred Alternative could improve roadway runoff water quality from current conditions.

Damage or loss of historic resources was far more prevalent from actions that occurred prior to the NHPA of 1966. The NHPA of 1966 combined with the establishment of historic resource protection objectives established at the local planning level, such as the Fairfax's Architectural Review Board and the History Commission, have reduced the rates of impacts to historic resources. However, conflicts between the protection of historic properties and development and transportation continue to occur. The Preferred Alternative would have no effect on historic resources and historic districts. Since the Preferred Alternative has no effect on historic resources, it does not contribute to cumulative effects on historic resources.

In summary, past and present actions have affected the current state of socioeconomic, natural, and historic resources within the associated ICE Study Areas, and future actions would continue to affect these resources irrespective of this project. However, since the region is already developed, cumulative effects of the Preferred Alternative are expected to be minimal. Additionally, current regulatory requirements and planning practices are helping to avoid or minimize the contribution of present and future actions to adverse cumulative effects for socioeconomic, natural, and historic resources.

Despite the dramatic changes in the landscape that have occurred over time due to human settlement in the surrounding area, the intensity of the incremental impacts of the project are considered small when viewed in the context of impacts from other past, present, and reasonably foreseeable future actions and would not rise to a level that would cause significant cumulative impacts.

3.6 Modifications to the Preferred Alternative

Given the robust public involvement thus far as part of the alternatives development process as described in Section 2 of this EA, further modifications to the Preferred Alternative are anticipated as the project proceeds forward to more detailed design. Refinements to the Preferred Alternative would be evaluated to determine if there are additional environmental impacts not already considered and whether the project's effect to resources would be significant. Modifications to the Preferred Alternative and any resulting impacts would be addressed in the Revised EA.

Section 4

COORDINATION AND COMMENTS

4.1 AGENCY COORDINATION

Early and continuing coordination with the general public and appropriate public agencies is an essential part of the environmental review process to determine the scope of environmental documentation, the level of analysis, potential impacts and mitigation measures and related environmental requirements. Agency consultation and public participation for this project have been accomplished through a variety of formal and informal methods, including: project development team meetings, interagency coordination meetings, public information meetings, HOA meetings, advertisements, social media, press releases, postcard mailers, and scoping letters. This chapter summarizes the results of the Department's efforts to fully identify, address, and resolve project-related issues through early and continuing coordination.

A list of agencies and entities coordinated with during the EA follows:

- Fairfax County Health Department
- Fairfax County Superintendent of Schools
- Fairfax County Department of Planning and Zoning
- Fairfax County Housing and Community Development
- Fairfax County Department of Transportation
- Fairfax County Department of Fire and Rescue
- Fairfax County Park Authority
- Fairfax County Public Schools Transportation
- Fairfax County Water Authority
- Virginia Department of Conservation and Recreation'
- Virginia Department of Environmental Quality
- Virginia Department of Forestry
- Virginia Department of Game and Inland Fisheries
- Virginia Department of Health
- Virginia Marine Resources Commission
- Virginia Outdoors Foundation
- US Department of Agriculture, Natural Resources Conservation Service

4.2 PUBLIC INVOLVEMENT

Public involvement opportunities for this project included Public Information Meetings and Home Owner Association (HOA) Meetings. The PIM's were advertised in the Washington Post, Connection Newspapers, and El Tiempo Latino, as well as social media, press releases, and postcard mailers. Property Access Letters were also sent to facilitate environmental and engineering studies. A detailed list of Public Information Meetings and HOA Meetings follows:

Public Information Meetings for a total of 809 attendees.

- 12/7/2017 PIM 1 (226 attendees) VDOT NoVA District office
 - Meeting to inform the public about the project design, budget, and schedule and to solicit input from the public and other stakeholders. Comment sheets were provided and the presentation was made available on the project website. The main concerns from citizens include:
 - Citizens asked about the proposed noise walls and how the noise analysis will be conducted. Citizens questioned when the noise analysis will be performed and the cost of the proposed noise walls. They also asked if the noise wall guidelines had any flexibility and questioned the 1600 SQ FT per benefitted receptor requirement.
 - Citizens asked about the Route 123 design and the likelihood of increased traffic. Citizens questioned how the increase in traffic will be handled and the impacts to Route 123 both north and south of the intersection. Pedestrian access at Route 123 was also a concern.
 - Truck traffic and whether it can be restricted on Route 286 was a concern. Citizens stated when the parkway was first built they were promised no truck traffic.
 - Adding a third lane along Route 286 was a concern. Citizens questioned whether additional Right-of-Way would be required for the widening and the impacts to Burke Centre Parkway. They were also concerned with back-ups when Route 286 goes back to four lanes from six lanes in the vicinity of Route 123.
- 9/25/2018 PIM 2 (81 attendees) Willow Springs Elementary School in Fairfax
- 9/27/2018 PIM 2 (67 attendees) Fairview Elementary School in Fairfax Station
- 10/3/2018 PIM 2 (75 attendees) Oak View Elementary School in Fairfax
 - The three PIM 2's were meetings to inform the public about the project status and to present design alternatives for the Popes Head Road Interchange and the Burke Centre Parkway Intersection. Comment sheets were provided and the presentation was made available on the project website. The main concerns from citizens include:
 - Burke Centre Parkway design and its impact to the community and surrounding roads were citizen concerns. They were concerned that businesses will be impacted and travel time for Burke Centre residents will increase. They were concerned that traffic will increase on Route 123, which is already congested and will impact the Clara Barton neighborhood.
 - Proposed Noise Walls and how the preliminary noise analysis was conducted were concerns. Citizens questioned how the noise model was calibrated and whether factors such as time of day, location, and duration, affect the outcome of the model. They also questioned the 66 dB limit and when the noise level readings will be made available to the public. They felt Noise Walls should be

constructed along the entire project. They asked about the completion date of the Environmental Study, and what it will include.

- Popes Head Road/Shirley Gate Road Interchange design was a concern. Citizens questioned the need for Shirley Gate Road and how it was taking funding away from Popes Head Road. Some citizens mentioned Popes Head Road should just be a “simple overpass” to prevent cut-through traffic. Many citizens are against Shirley Gate Road. Also, they asked if the curve along Popes Head Road westbound can be fixed.
- Citizens questioned whether HOV lanes are being considered and how it will impact Route 286. Also, they asked whether there will be any Right-of-Way impacts. Citizens believe having to cross 3 lanes of traffic to make a U-turn at Ladues End Lane will be too dangerous. They asked how will the proposed SWM Facility at Fred’s Oak Road impact traffic and will this area be included in this project since there will be an increase in truck traffic.
- 1/7/2019 PIM 3 (360 attendees) James W. Robinson, Jr. Secondary School in Fairfax
 - Meeting to update the public on the project status and to present preferred design for the Popes Head Road/Shirley Gate Road Interchange and the Burke Centre Parkway Intersection. Comment sheets were provided and the presentation was made available on the project website. The main concerns from citizens include:
 - Burke Centre Parkway design and its impact to the community and surrounding roads were concerns. Impacts to businesses and roads such as Roberts Parkway, Route 123 and Fred’s Oak Road receiving an increase in traffic and accidents were concerns.
 - Popes Head Road design and its connection to Shirley Gate Road were concerns. Citizens believe the Popes Head Road Interchange is being short-changed by Shirley Gate. Also, citizens asked if the curve along Popes Head Road westbound could be fixed.
 - Route 123 design and the likelihood of increased traffic were concerns. Citizens believed the issues at Route 123 aren’t being addressed and traffic will back-up onto Route 123.
 - Nomes Court/Ladues End Lane design was a concern. They were concerned that It will be difficult to access Route 286 when it becomes free-flow. Citizens believed safety was being compromised and a better solution is needed.
- 11/6/2019 PIM 4 James W. Robinson, Jr. Secondary School in Fairfax
 - The purpose of the public information meeting was to present the preferred design elements, provide a discussion forum between the public and project team, and obtain input and comments from the community. Comment sheets were provided and the presentation was made available on the project website following the meeting.

13 HOA Meetings with 543 attendees:

- 1/30/2018 Fairfax Station (98 attendees) Burke Centre Library in Burke
 - Meeting to inform the public on the project status, the major design features, and the impacts to Fairfax Station HOA. No comment sheets or handouts were provided. The main concerns from citizens were the Burke Centre Parkway design, the Route 123 intersection, and noise walls
- 2/6/2018 Ladues-Nomes (11 attendees) Burke Centre Library in Burke
 - Meeting to inform the public on the project status, the major design features, and the impacts to Fairfax Station HOA. No comment sheets or handouts were provided. The main concerns from citizens were the Burke Centre Parkway design, the Route 123 intersection, and noise walls.
- 2/13/2018 Fairview Woods (17 attendees) Rye Family residence
 - Meeting to discuss project design and impacts to Fairview Woods HOA. No comment sheets or handouts were provided. The main concerns from citizens were the Burke Centre Parkway intersection design and improvements to existing Route 123 interchange.
- 2/21/2018 Cannon Ridge etc. (28 attendees) VDOT NoVA District Office in Fairfax
 - Meeting to inform the public on the project status, the major design features, and the impacts to Cannon Ridge HOA. No comment sheets or handouts were provided. The main concern from citizens was the noise and community qualifications for new Noise Walls.
- 3/1/2018 Popes Head Road West (24 attendees) VDOT NoVA District Office in Fairfax
 - Meeting to inform the public on the project status, major design features, and to discuss the suggested priorities and design configuration submitted by the community west of Route 286 along Popes Head Road. No comment sheets or handouts were provided. The main concern from citizens was the Popes Head Road/Shirley Gate Road Interchange design.
- 3/6/2018 Colchester Meadow (15 attendees) VDOT NoVA District Office in Fairfax
 - Meeting to inform the public on the project status, major design features, and to discuss the suggested priorities and design configuration submitted by the community west of Route 286 along Popes Head Road. No comment sheets or handouts were provided. The main concern from citizens was the Popes Head Road/Shirley Gate Road Interchange design and access to Fairfax County Parkway.
- 3/13/2018 Ridges of Glendilough/Popes Head View (76 attendees) Oak View Elementary School in Fairfax
 - Meeting to inform the public on the project status, major design features, and to discuss the suggested priorities and design configuration submitted by the community west of Route 286 along Popes Head Road. No comment sheets or handouts were provided. The main concern from citizens was the Popes Head Road/Shirley Gate Road Interchange design and access to Fairfax County Parkway.
- 04/26/18 Popes Head Overall (77 attendees) VDOT NoVA District Office in Fairfax

- Follow-up of the March community meetings to inform the public on the project status, and additional concepts developed for the Popes Head Road and Shirley Gate Road interchange. Comment sheets were provided. The main concern from citizens was the Popes Head Road/Shirley Gate Road Interchange design.
- 11/27/2018 Buckner Forest (17 attendees) VDOT NoVA District Office in Fairfax
 - Meeting to discuss project design and preliminary Noise Barrier locations as it affects the Buckner Forest HOA. No comment sheets or handouts were provided. The main concerns from citizens include:
 - Proposed Noise Walls and how the preliminary noise analysis was conducted were concerns. Citizens questioned how the noise model was calibrated and whether factors such as time of day, location, and duration, affect the outcome of the model. They also questioned if future residential development was considered and if there are alternatives to noise walls such as berms.
- 12/13/2018 Burke Centre (109 attendees) the Woods Community Center in Burke
 - Meeting to discuss the preferred design for the Burke Centre Parkway Intersection. No comment sheets or handouts were provided. The main concerns from citizens include:
 - Burke Centre Parkway design and its impact to the community and surrounding roads were concerns. Businesses impacted and roads such as Roberts Parkway, Route 123 and Fred's Oak Road receiving an increase in traffic and accidents were concerns.
- 4/10/2019 Burke Centre (44 attendees) Terra Centre Elementary School in Burke
 - Meeting to discuss the revised design for the Burke Centre Parkway Intersection. No comment sheets or handouts were provided. The main concern from citizens was the Burke Centre Parkway design and its impact to the community.
- 5/1/2019 Fairview Woods (5 attendees) VDOT NoVA District Office in Fairfax
 - Meeting to discuss the revised design for the Burke Centre Parkway Intersection, the Popes Head Road/Shirley Gate Road Interchange, and the proposed shared use path adjacent to the Norfolk Southern Railroad. No comment sheets or handouts were provided. The main concerns from citizens include:
 - Burke Centre Parkway design and the Right-of-Way impacts were concerns. Citizens questioned whether eminent domain would be used to acquire Right-of-Way and if noise abatement options can be negotiated during the Right-of-Way Phase. They also asked if there are any other options to help reduce noise other than noise walls.
- 8/1/2019 Popes Head Road HOA Leaders (22 attendees) VDOT NoVA District Office in Fairfax
 - Meeting to inform the Popes Head Road HOA leaders of the current project status as it relates to the cost estimate increases, project delivery method, and a new option for the Popes Head Road & Shirley Gate Road Interchange. The main concerns from the citizens include:

- Popes Head Road and Shirley Gate Road Interchange design and the Right of Way impacts. Citizens questioned why Shirley Gate Road is still being designed with this project since it's a "Road to nowhere."

Location and Design Public Hearing:

- 12/12/2019 Location and Design Public Hearing
 - The purpose of the hearing will be to present the preliminary project design and findings of the Environmental Assessment (EA), provide a discussion forum between the public and project team, and obtain input and comments from the community. In addition, there will be a minimum of 30-day public comment period following notice of availability of the EA. Any comments received during the public hearing and comment period will become part of the public hearing record.