Final Environmental Assessment

For the National Foreign Affairs Training Center (NFATC) 2017 Master Plan Update

Prepared by:
The U.S. General Services Administration

April 2017

APPENDIX D. NFATC TRAFFIC ANALYSIS

NOVEMBER 18, 2016

DRAFT TRAFFIC STUDY

NATIONAL FOREIGN AFFAIRS TRAINING CENTER: MASTER PLAN UPDATE

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1. Introduction

The U.S. Department of State (DOS) is updating its 2005 Master Plan for the George P. Shultz National Foreign Affairs Training Center (NFATC), at Arlington Hall in Arlington, Virginia (Figure 1-1). NFATC is the headquarters for the Foreign Service Institute (FSI). The Master Plan Update will document the physical requirements and architectural and engineering intent for improvements to this campus for classroom training and distance learning for DOS. The programs and support offered through NFATC equip DOS professionals with the knowledge and skills needed to carry out the department's diplomatic mission throughout the world. World events and maintenance of U.S. diplomatic leadership place increasing demands on U.S. diplomatic professionals. The Master Plan Update lays the groundwork for phased improvements to this essential facility needed to accommodate its evolving training mission, as well as its expanding population (on-site and distance learners) over the next decade.

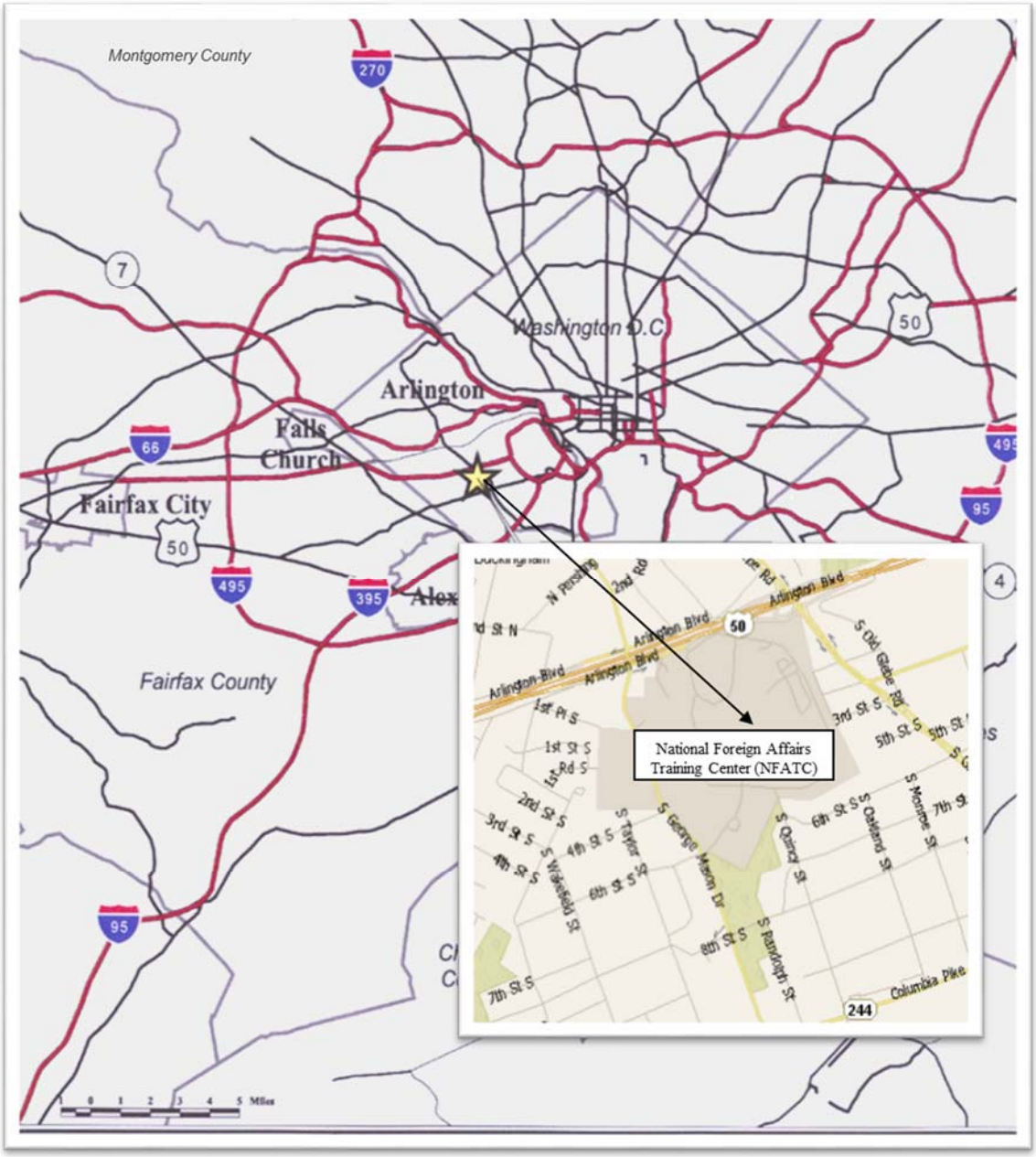
As part of the Master Plan Update, a traffic study was conducted to determine the impacts associated with the additional traffic volumes generated by the NFATC installation expansion. The following sections will discuss the existing traffic operations within the study area as well as the projected future traffic volumes and operations.

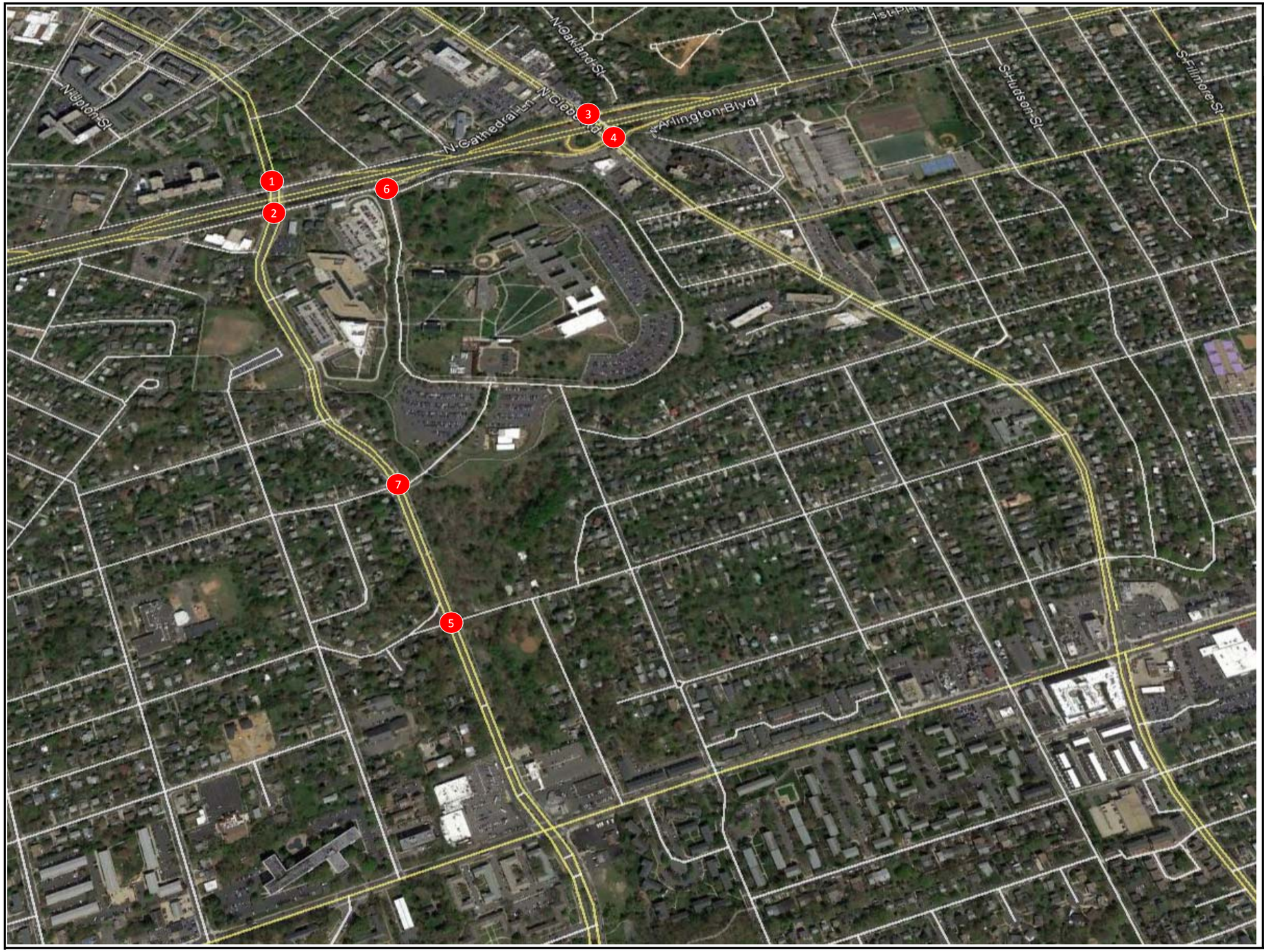
2. Study Area

The study area for this traffic study was developed based on the study area shown in the 2005 Master Plan traffic study. The following intersections are included in the study area and shown on an aerial map in Figure 2-1:

1. George Mason Drive @ Route 50 North
2. George Mason Drive @ Route 50 South
3. Glebe Road @ Route 50 North
4. Glebe Road @ Route 50 South
5. George Mason Drive @ 8th Street
6. Route 50 Eastbound Frontage Road and North Gate Access
7. George Mason Drive / 6th Street Gate Access (South Gate)

Figure 1-1: NFATC Project Location





NFATC Traffic Study

Figure 2-1

NFATC Study Area

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Study Intersections

1. George Mason Drive @ Route 50 North
2. George Mason Drive @ Route 50 South
3. Glebe Road @ Route 50 North
4. Glebe Road @ Route 50 South
5. George Mason Drive @ 8th Street
6. Route 50 Eastbound Frontage Road & North Gate Access
7. George Mason Drive / 6th Street Gate Access (South Gate)

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3. Existing Conditions

3.1 Existing Conditions Traffic Volumes

Vehicular turning movement counts were collected at the study area intersections to conduct the existing conditions traffic analysis. The counts were conducted during fiscal year 2015, Tuesday through Thursday during the week of November 17, 2014 during the AM peak period (7-9 AM) and PM peak period (4:30-6:30 PM). The adjacent roadways peak hours were determined to be 7:30 to 8:30 AM and 4:30 to 5:30 PM. The existing traffic volumes for the AM/PM peak hours are shown in Figure 3-1.

3.2 Existing Conditions Operational Analysis

The operational analysis for the existing conditions was conducted using the HCM 2000 module of the Synchro v8.0 software as specified by the VDOT Traffic Operations Analysis Tool Guidebook. The results of the analysis are shown in Figure 3-2 for both the AM and PM peak hours.

The results of the analysis show that all of the intersections included in the study currently operate at LOS C or better during the AM peak hour. Individual turning movements or approaches that operate at LOS E or LOS F during the AM peak hour are listed below:

1. George Mason Drive @ Route 50 North – None
2. George Mason Drive @ Route 50 South – None
3. Glebe Road @ Route 50 North – Westbound approach from Route 50 westbound off ramp
4. Glebe Road @ Route 50 South – Eastbound approach from Route 50 eastbound off ramp
5. George Mason Drive @ 8th Street – Eastbound approach from 8th Street
6. Route 50 Eastbound Frontage Road and North Gate Access – None
7. George Mason Drive / 6th Street (South Gate) – Eastbound and Westbound approaches

During the PM peak hour, all of the study intersections currently operate with an overall LOS C or better with the exception of the unsignalized intersection of George Mason and 6th Street which operates at LOS F. The significant delay results from large northbound and southbound traffic volumes containing very few traffic flow gaps to allow for the turning movements from the eastbound and westbound approaches. Individual turning movements or approaches that operate at LOS E or LOS F during the PM peak hour are listed below:

1. George Mason Drive @ Route 50 North – None
2. George Mason Drive @ Route 50 South – None
3. Glebe Road @ Route 50 North – Westbound through movement and left turn from Route 50 westbound off ramp
4. Glebe Road @ Route 50 South – Eastbound approach from Route 50 eastbound off ramp
5. George Mason Drive @ 8th Street – Westbound approach from 8th Street
6. Route 50 Eastbound Frontage Road and North Gate Access – None
7. George Mason Drive / 6th Street Gate Access (South Gate) – Eastbound and Westbound approaches

NFATC Traffic Study

Figure 3-1

2014 (Existing) Peak Hour Volumes

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1

N

George Mason Dr

(70) (1027)
44 595

Rt 50 WB off ramp

Overall Intersection
2562
(2631)

197 (160)
54 (82)
511 (398)

Rt 50 EB on ramp

131 1030
(153) (741)

On Loop Ramp

George Mason Dr

2

N

George Mason Dr

(1287) (162)
691 435

Rt. 50 Frontage Rd

(120) 337
(53) 327
(182) 109

Overall Intersection
2953
(2810)

Rt. 50 Frontage Rd

826 227
(779) (227)

George Mason Dr

7

N

George Mason Dr

(5) (1324) (12)
20 620 160

Main Gate Access

(10) 5
(0) 2
(5) 20

Overall Intersection
2071
(2445)

8 (108)
0 (0)
7 (131)

6th St

5 1082 142
(10) (827) (13)

George Mason Dr

5

N

George Mason Dr

(46) (1334) (80)
26 558 48

8th St

(31) 46
(24) 61
(22) 31

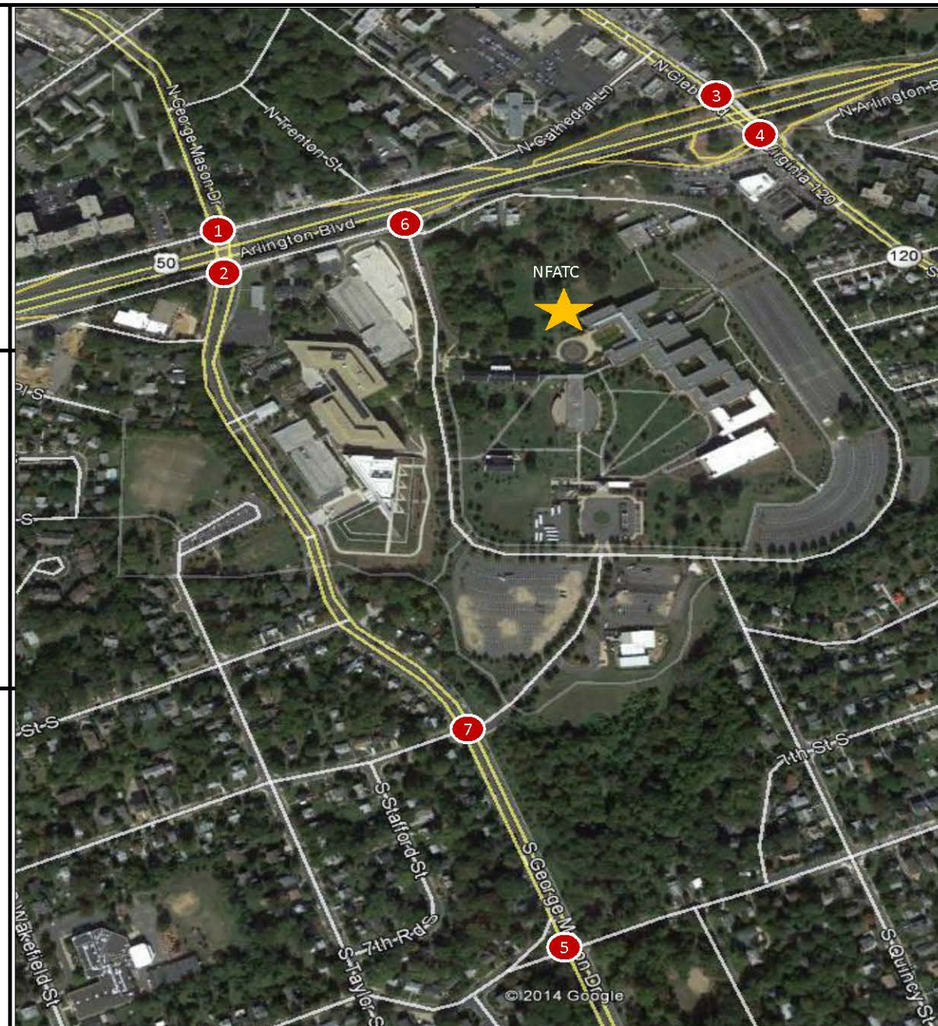
Overall Intersection
2076
(2491)

82 (95)
29 (57)
23 (23)

8th St

22 1101 49
(13) (724) (42)

George Mason Dr



3

N

Glebe Rd

(164) (1386)
127 852

Rt 50 WB off ramp

Overall Intersection
3109
(2991)

220 (135)
4 (2)
46 (79)

Rt 50 WB on ramp

349 1511
(317) (908)

Glebe Rd

4

N

Glebe Rd

(219) (1241)
160 774

Rt 50 EB on ramp

(173) 142
(278) 271

Overall Intersection
3188
(3012)

Rt 50 EB off ramp

1736 105
(1025) (76)

Glebe Rd

6

N

Rt 50 EB on ramp

Overall Intersection
1018
(698)

(404) 739
(38) 250

Rt. 50 Frontage Rd

29
(256)

Gate Access

Legend

xxx	AM Peak Hour Volume 7:30-8:30 AM
(xxx)	PM Peak Hour Volume 4:30-5:30 PM
↱ ↰	Northbound and Southbound Left Turn Lanes Include U-Turns

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NFATC Traffic Study

Figure 3-2

2014 (Existing) Peak Hour Level of Service

Sheet 1 of 1

1

N

George Mason Dr

(32.3 - C) (32.3 - C)
33.7 - C 33.7 - C

Rt 50 WB off ramp

Overall Intersection
21.1 - C
(23.6 - C)

38.4 - D (35.7 - D)
38.4 - D (35.7 - D)
42.5 - D (37 - D)

Rt 50 EB on ramp

1.2 - A 0.8 - A
(17.9 - B) (0.8 - A)

George Mason Dr

2

N

George Mason Dr

(2 - A) (20.1 - C)
1.4 - A 49 - D

Rt. 50 Frontage Rd

(48.2 - D) 41.5 - D
(47.6 - D) 38.7 - D
(47.6 - D) 38.7 - D

Overall Intersection
32.3 - C
(19.5 - B)

Rt. 50 Frontage Rd

40.2 - D 40.2 - D
(31.4 - C) (31.4 - C)

George Mason Dr

7

N

George Mason Dr

(0 - A) (0 - A) (0.5 - A)
0 - A 0 - A 9.5 - A

Main Gate Access

(145.9 - F) 39.7 - E
(145.9 - F) 39.7 - E
(145.9 - F) 39.7 - E

Overall Intersection
2.8 - A
(66.4 - F)

79.3 - F (656.5 - F)
79.3 - F (656.5 - F)
79.3 - F (656.5 - F)

6th St

0.2 - A 0 - A 0 - A
(0.8 - A) (0 - A) (0 - A)

George Mason Dr

5

N

George Mason Dr

(8.5 - A) (8.5 - A) (8.5 - A)
5.5 - A 5.5 - A 5.5 - A

8th St

(53.4 - D) 94.9 - F
(53.4 - D) 94.9 - F
(53.4 - D) 94.9 - F

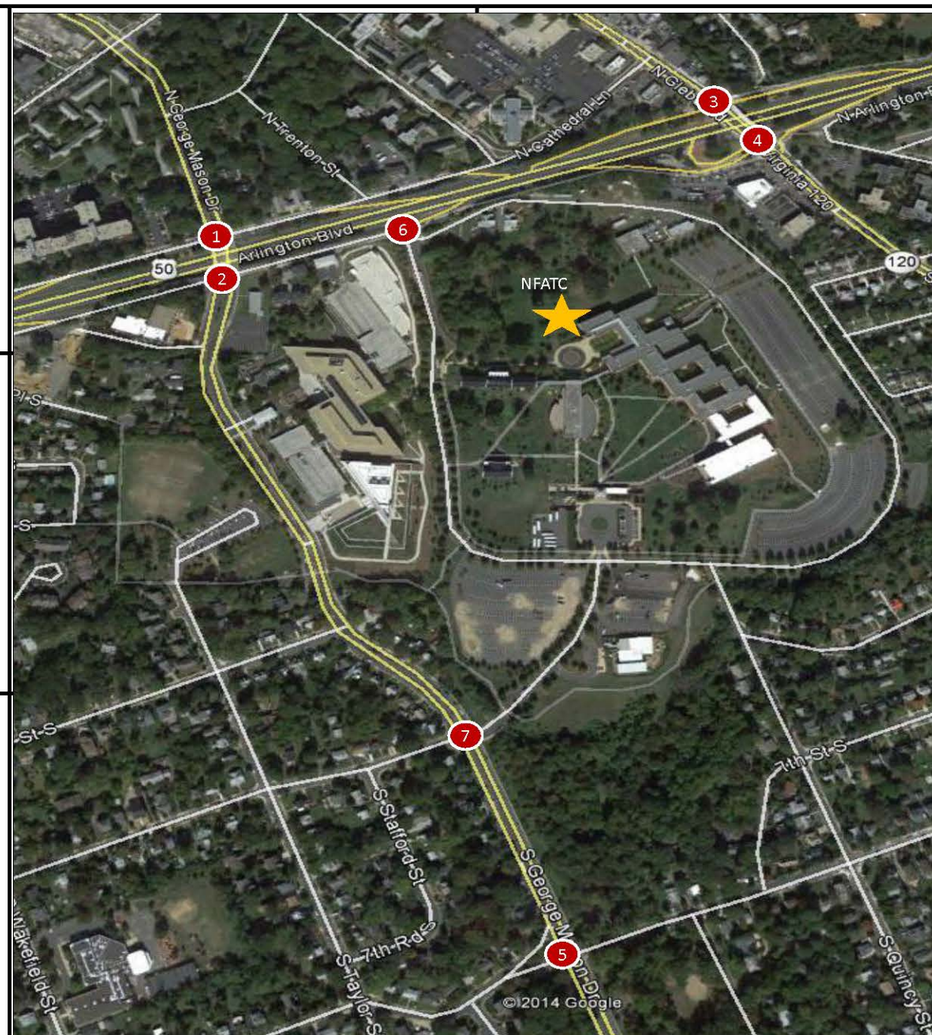
Overall Intersection
16.8 - B
(12.9 - B)

50.4 - D (63.9 - E)
50.4 - D (63.9 - E)
50.4 - D (63.9 - E)

8th St

6.7 - A 6.7 - A 6.7 - A
(4.7 - A) (4.7 - A) (4.7 - A)

George Mason Dr



3

N

Glebe Rd

(15.7 - B) (26.7 - C)
17.2 - B 23.7 - C

Rt 50 WB off ramp

Overall Intersection
33.4 - C
(28.9 - C)

56.7 - E (53.7 - D)
59.2 - E (60.9 - E)
59.2 - E (60.9 - E)

Rt 50 WB on ramp

45.2 - D 33.3 - C
(44.9 - D) (20.8 - C)

Glebe Rd

4

N

Glebe Rd

(3.1 - A) (3.1 - A)
2.5 - A 2.5 - A

Rt 50 EB on ramp

(56.9 - E) 60 - E
(73.3 - E) 58.9 - E

Overall Intersection
13.5 - B
(13.6 - B)

Rt 50 EB off ramp

8.6 - A 8.6 - A
(5.6 - A) (5.6 - A)

Glebe Rd

6

N

Rt 50 EB on ramp

Overall Intersection
0.4 - A
(5.6 - A)

(0 - A) 0 - A
(0 - A) 0 - A

Rt. 50 Frontage Rd

16 - C
(15 - B)

Gate Access

Legend

x.x - A	AM Peak Hour Delay (seconds) - LOS 7:30-8:30 AM
(x.x - A)	PM Peak Hour Delay (seconds) - LOS 4:30-5:30 PM
	Northbound and Southbound Left Turn Lanes Include U-Turns

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4. Future Conditions

4.1 Study Area Background Growth

The future conditions for the NFATC study area were analyzed for an interim year, 2017 and a build-out year, 2025. For each future year, a no-build and full build-out condition were analyzed. For both conditions, the daily staff and faculty remained unchanged from the existing condition at a daily on-site rate of 1400 faculty members. Also for both scenarios, the daily student population includes an annual increase of three percent. The only difference between the no-build and build condition is the number of daily students that will be on site within the NFATC study area; for the no-build conditions, 450 of the daily students will be off-site while in the build conditions, all students will remain on site.

To develop future background traffic volumes, a 0.5 percent compounded annual growth rate was applied (as directed by Arlington County) to the existing traffic volumes shown previously in Figure 3-1. This growth rate was not applied to individual turning movements into and out of neighborhoods because the land is already built-out and no further growth is expected for these movements. The background growth rate was also not applied to the turning movements into and out of the NFATC facility; these traffic volumes will be calculated using a trip generation procedure. The resulting future traffic volumes to be added to the existing traffic volumes are shown in Figure 4-1 for the year 2017, and Figure 4-2 for the year 2025.

4.2 NFATC Expansion

There are three build options being evaluated in the Environmental Assessment (EA) for the NFATC Master Plan Update. These are discussed in detail in the EA and a summary of each is presented in Table 4-1. Although the three site plans differ slightly, the type of development in each site plan is the same. Depending on the build option, the proposed improvements under consideration include a new or expanded Visitor Center, a new building for classes (Building B), and the expansion of Buildings F, K, and the Child Care Facility. These new and/or expanded facilities are needed to accommodate projected student growth and changing teaching needs.

Table 4-1: NFATC Master Plan Build-Out Scenario Summary

Building ID	Existing Building Name	Existing Condition / No-Action Alternative	Build Alternative 1	Build Alternative 2	Build Alternative 3
		gsf	*gsf*	*gsf*	*gsf*
A	Visitor Center	9,600	9,600	9,600	-
C	Cafeteria & Dining	43,900	43,900	43,900	43,900
D	Gym	12,480	12,480	12,480	12,480
E	Old Main Building	43,000	43,000	43,000	43,000
F	Classroom & Administration	391,450	391,450	391,450	391,450
G	Central Plant	6,400	6,400	6,400	6,400
H	Cottage 50	5,760	5,760	5,760	5,760
I	Cottage 51	5,760	5,760	5,760	5,760
J	Facility Management Office	6,456	6,456	6,456	6,456
K	Multipurpose Building	87,850	87,850	87,850	87,850
L	Childcare Center	10,891	10,891	10,891	10,891
	Subtotal of Existing Building Square Footage	***623,547***	***623,547***	***623,547***	***613,947***
Building ID	**Proposed New or Expansion Building Name**	**Existing Condition / No-Action Alternative**	**Build Alternative 1**	**Build Alternative 2**	**Build Alternative 3**
		gsf	*gsf*	*gsf*	*gsf*
A	New - Visitor Center	-	-	-	6,010
A	Expansion - Visitors Center	-	6,800	5,078	-
B	New - Building B (5 floors)	-	200,797	200,797	200,797
F	North Expansion - Classroom & Administration (4 floors)	-	75,000	75,284	-
G	Expansion - Central Plant	-	6,165	6,165	-
K	Expansion - Auditorium		12,000	13,013	-
K	Vertical Expansion - Auditorium	-	-	25,452	-
F&K	New - Consolidate Buildings F&K (5 floors)	-	-	-	113,201
L	Expansion - Childcare Center	-	10,000	10,000	10,000
	Subtotal of Proposed Building GrossSquare Footage	***0***	***310,762***	***335,789***	***330,008***
	Total Existing and New/Expansion Square Footage	***623,547***	***934,309***	***959,336***	***943,955***

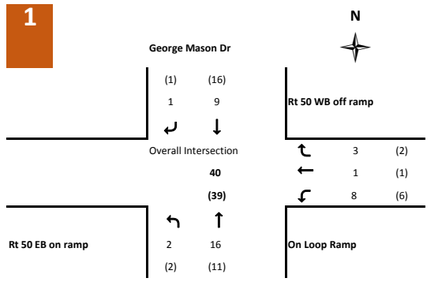
NFATC Traffic Study

Figure 4-1

2017 Background Growth Traffic Volumes

Sheet 1 of 1

1



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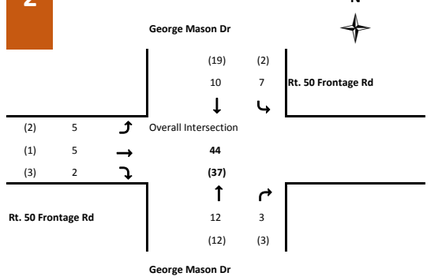

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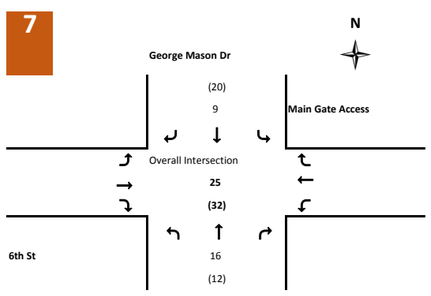

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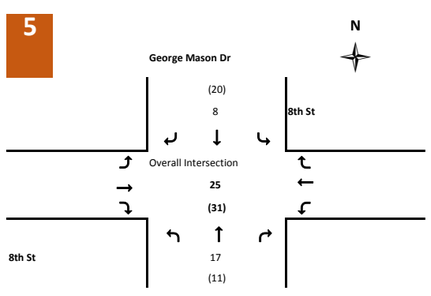

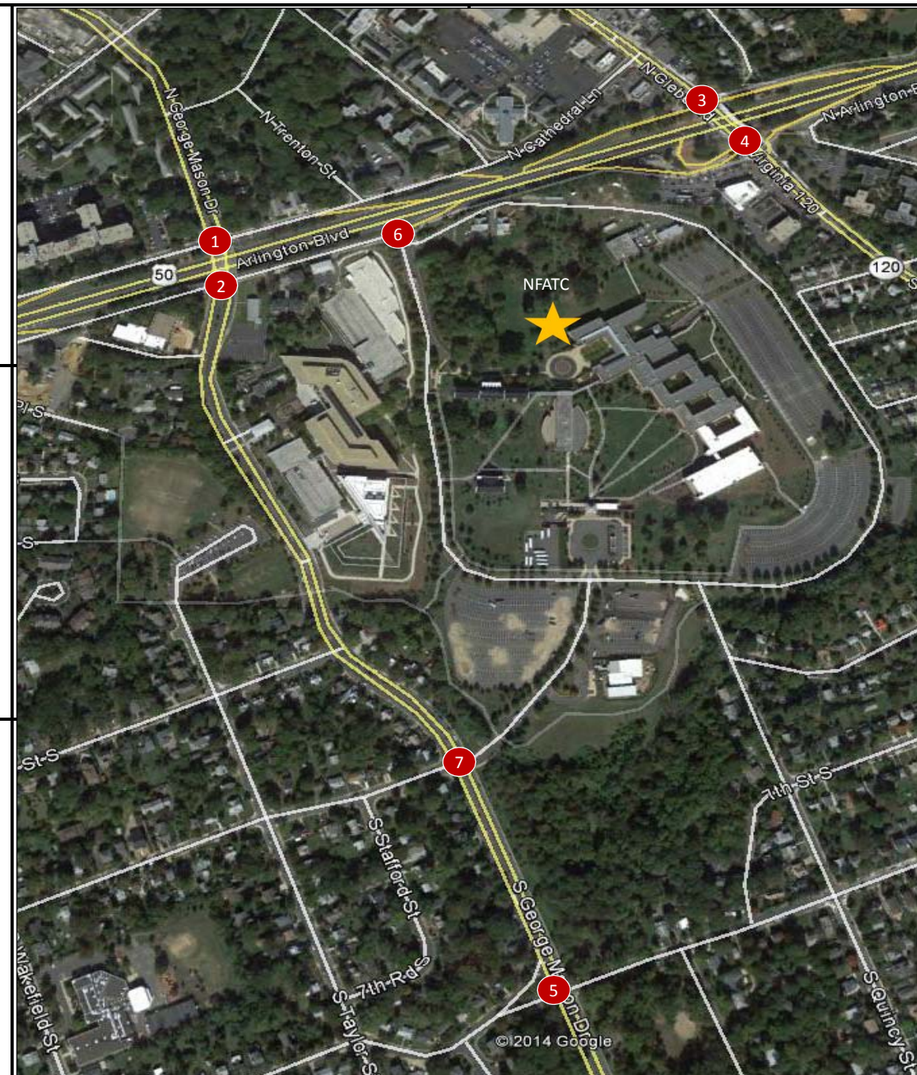

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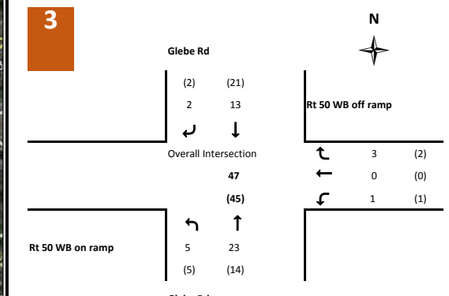

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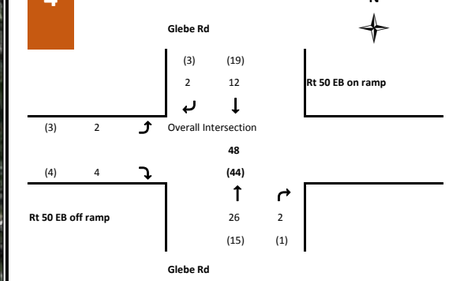

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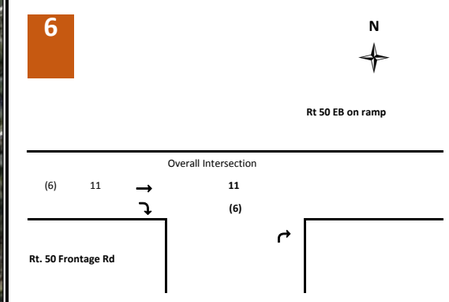

Legend

xxx	AM Peak Hour Volume 7:30-8:30 AM
(xxx)	PM Peak Hour Volume 4:30-5:30 PM
↰ ↱	Northbound and Southbound Left Turn Lanes Include U-Turns

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NFATC Traffic Study

Figure 4-2

2025 Background Growth Traffic Volumes

Sheet 1 of 1

1

N

George Mason Dr

(4) (58)
2 34

Rt 50 WB off ramp

Overall Intersection
144
(149)

11 (9)
3 (5)
29 (22)

Rt 50 EB on ramp

7 58
(9) (42)

On Loop Ramp

George Mason Dr

2

N

George Mason Dr

(73) (9)
39 25

Rt. 50 Frontage Rd

(7) 19
(3) 18
(10) 6

Overall Intersection
167
(137)

Rt. 50 Frontage Rd

47 13
(44) (13)

George Mason Dr

7

N

George Mason Dr

(75)
35

Main Gate Access

Overall Intersection
96
(122)

6th St

61
(47)

George Mason Dr

5

N

George Mason Dr

(75)
31

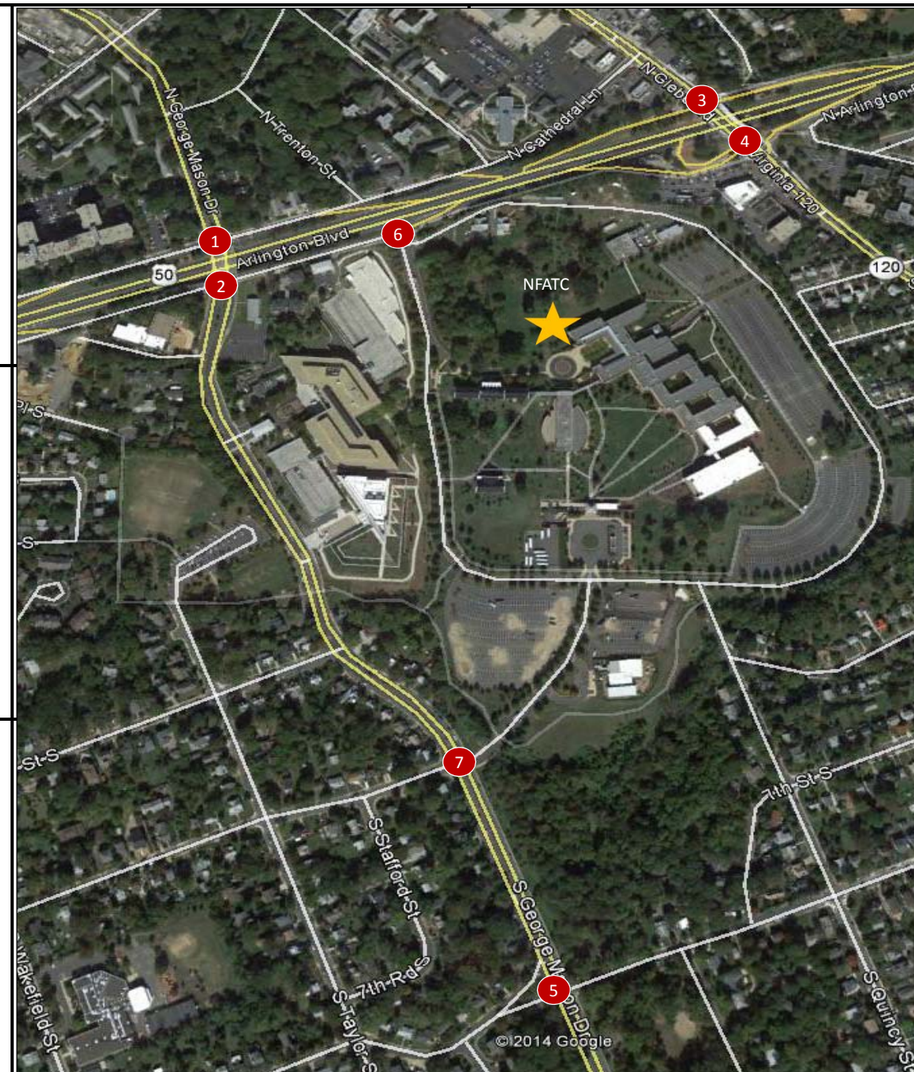
8th St

Overall Intersection
93
(116)

8th St

62
(41)

George Mason Dr



3

N

Glebe Rd

(9) (78)
7 48

Rt 50 WB off ramp

Overall Intersection
175
(168)

12 (8)
0 (0)
3 (4)

Rt 50 WB on ramp

20 85
(18) (51)

Glebe Rd

4

N

Glebe Rd

(12) (70)
9 44

Rt 50 EB on ramp

(10) 8
(16) 15

Overall Intersection
180
(166)

Rt 50 EB off ramp

98 6
(58) (4)

Glebe Rd

6

N

Rt 50 EB on ramp

Overall Intersection
42
(23)

(23) 42

Rt. 50 Frontage Rd

Gate Access

Legend

xxx	AM Peak Hour Volume 7:30-8:30 AM
(xxx)	PM Peak Hour Volume 4:30-5:30 PM
	Northbound and Southbound Left Turn Lanes Include U-Turns

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4.3 Future Student and Faculty Population projections

The expansion of the current NFATC installation is being evaluated to accommodate changing teaching techniques and future student attendance projections, which were provided by NFATC and as shown in Table 4-2. NFATC has stated that the number of students will increase at a three percent growth rate through 2025 with or without a site expansion. However, without the site expansion, NFATC has stated that 450 students will attend a different off-site facility and will not be part of the daily on-site population. It was also stated that the faculty (teaching) staff is not expected to increase along with the student population and will remain at a constant daily on-site attendance of 1400 starting in 2018. Table 4-2 presents the percent increase in total on-campus population in the far right column. This rate was used to develop the vehicle trips generated by the NFATC installation for each of the analysis years. As shown in the table, for the 2017 no-build condition, the total on-campus population is approximately 11 percent less than the 2015 population due to the daily off-campus population.

Table 4-2: Annual Student Population Increase

No-Build Condition						
Fiscal Year	Daily Off-Campus Population	Daily On-Campus Population				
		Students	Student Population Increase from Fiscal Year 2015	Faculty	Total	**Total Population Increase from Fiscal Year 2015**
FY2015	0	1,765	0	1,400	3,165	**0**
FY2017	450	1,452	-18%	1,370	2,822	**-11%**
FY2025	450	1,959	11%	1,400	3,359	**6%**

Build Condition						
Fiscal Year	Daily Off-Campus Population	Daily On-Campus Population				
		Students	Student Population Increase from Fiscal Year 2015	Faculty	Total	**Total Population Increase from Fiscal Year 2015**
FY2015	0	1,765	0	1,400	3,165	**0**
FY2017	0	1,902	8%	1,370	3,272	**3%**
FY2025	0	2,409	37%	1,400	3,809	**20%**

4.4 Planned Transportation Improvements

The following planning documents were reviewed to note any planned transportation improvements in the vicinity of the NFATC installation:

- National Capital Region Transportation Planning Board 2015 Amendment - Financially Constrained Long-Range Transportation Plan for the National Capital Region
- Arlington County, VA Transportation Master Plan, updated April 2016
- Washington Area Bicyclist Association Advocacy Priorities, 2013

- Arlington County, VA, Budget and Finance – Adopted FY 2015 – FY 2024 Capital Improvement Plan
- Arlington County, VA, Budget and Finance – Proposed FY 2017 – FY 2026 Capital Improvement Plan
- Arlington County, VA, Projects and Planning - Private Development Projects, 2016

The Arlington County, VA Transportation Master Plan (ACTMP) was last updated in April 2016 and includes a comprehensive list of transportation projects envisioned for the entire county. According to the ACTMP, intersection roadway improvements are planned for the intersection of Arlington Boulevard (Route 50) and Glebe Road. The project is not yet completely defined or programmed into the county's adopted FY 2015 – FY 2024 Capital Improvement Plan (CIP) or the proposed FY 2017 – FY 2026 CIP; however, both the adopted and proposed CIPs' "Metro and Transportation" sections include Arlington Boulevard as a focus area for the implementation of Arlington's complete streets program. The complete streets program includes projects designed to provide accessible walking routes, adequate transit stops, curbside parking and loading areas, and safe accommodations for bicycling. As a component of the Complete Streets Program, the Washington Area Bicyclist Association (WABA) plans to work with Arlington and Fairfax Counties to complete the planning and development of a 22-mile long bike path along the Route 50 corridor. Currently, the portion of Arlington Boulevard adjacent to NFATC is considered not "bike-friendly," and represents a focus area for future bicycle infrastructure development.

4.5 Trip Generation

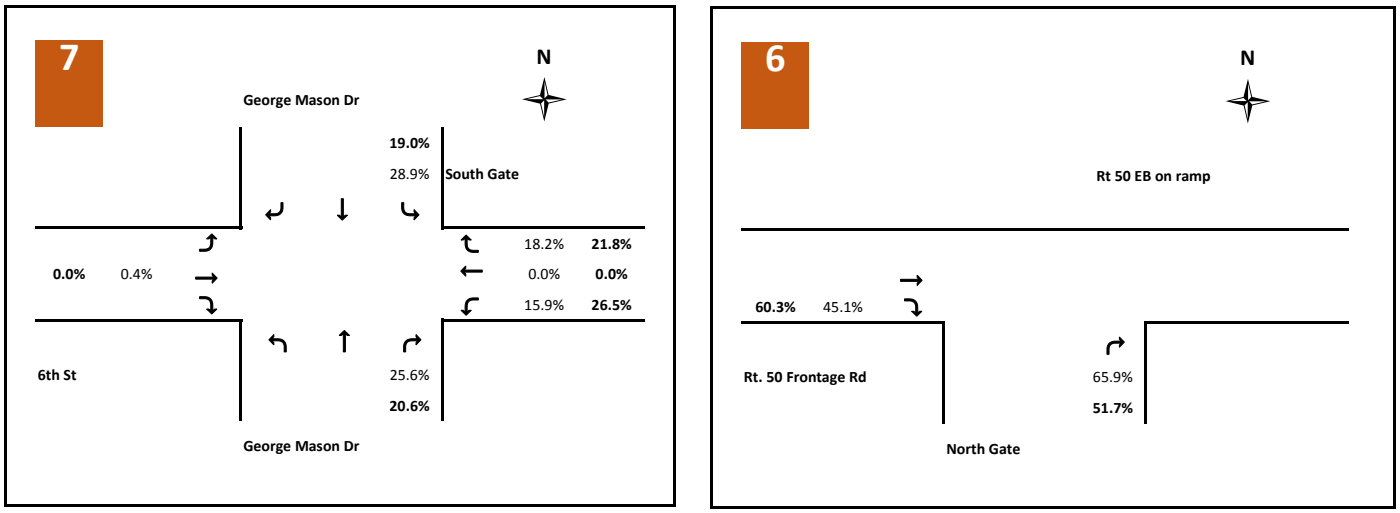
The traffic volumes used in the operational analysis for the future build options were calculated using a 0.5 percent annual compounded background growth rate as directed by Arlington County in addition to the future vehicle trips generated by the NFATC site. As discussed previously, FSI officials have stated that the number of students will increase, as shown in Table 4-2, and that without the site improvements, 450 students will attend an off-site location. Therefore, the future trip generation was calculated based on the total on-campus population increase percentage rather than from the overall square footage of the NFATC. The list below shows the assumptions used in the trip generation calculations:

- For future scenarios, the same percentage of students will enter/exit during the AM and PM peak hours as in the existing conditions.
- For future scenarios, the mode share and entry/exit locations for students will remain constant with the existing conditions.
- For future scenarios, no trip reduction techniques will be applied to the trip generation traffic volumes.

4.6 Trip Distribution

Based on the aforementioned assumptions, the vehicle trip distribution for the projected student population is also expected to remain constant with the existing conditions. The observed trip distribution percentages for the north and south gate intersections were applied to the future vehicle trips for the no-build and build scenarios and are shown in Figure 4-3 (PM peak hour percentages are shown in bold). Figure 4-4 and Figure 4-5 show how the future trips will be distributed throughout the study area roadway network for the 2017 no-build and build scenarios. Figure 4-6 and 4-7 show the future trip distribution for the 2025 no-build and build scenarios.

Figure 4-3: Future Year Trip Distribution at NFATC Gates

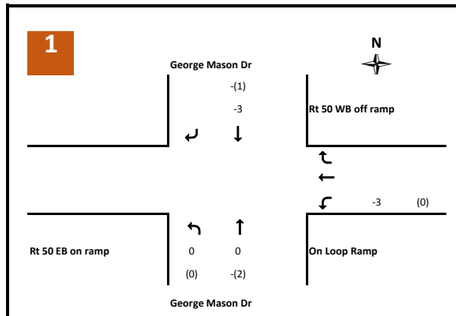


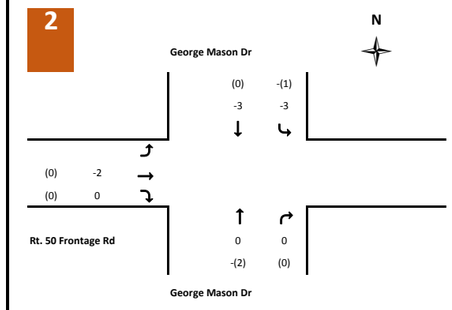
NFATC Traffic Study

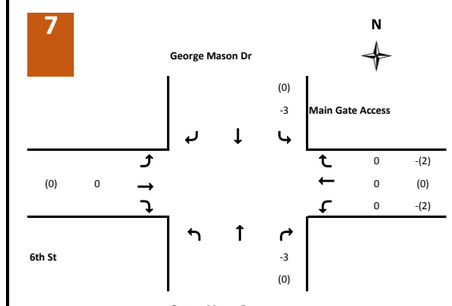
Figure 4-4

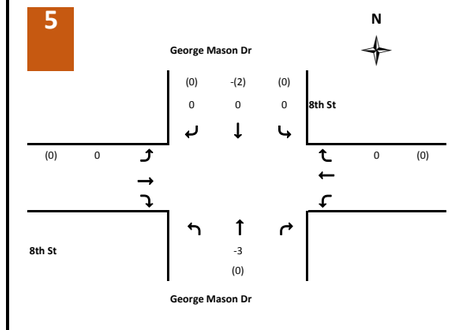
2017 No-Build Trip Distribution Traffic Volumes

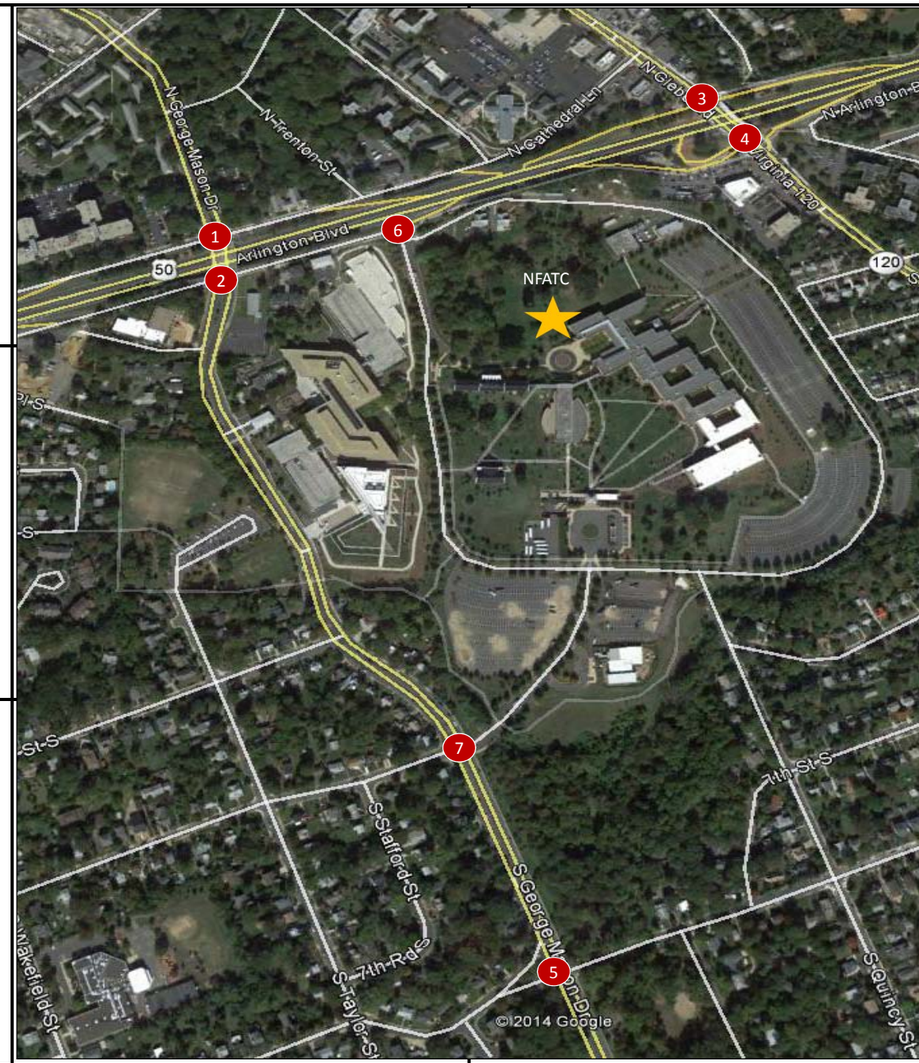
Sheet 1 of 1

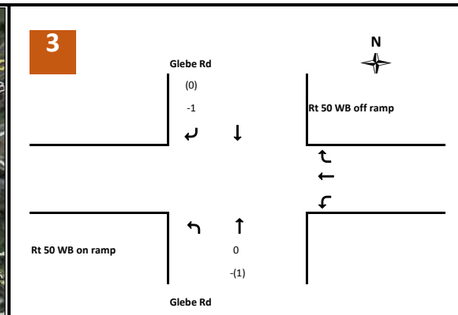


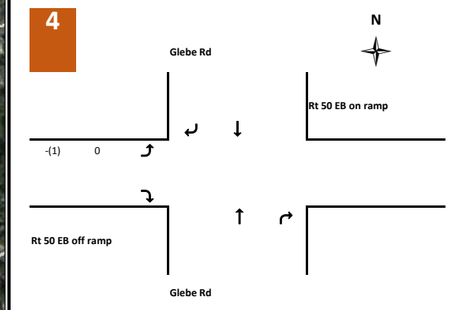


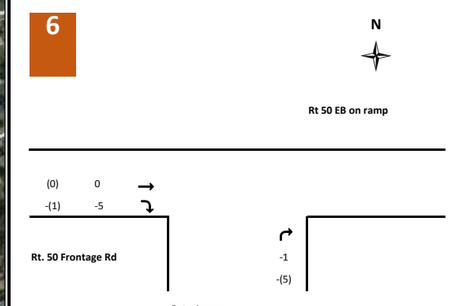












Legend

xxx	AM Peak Hour Volume Generation Volume 7:30-8:30 AM
(xxx)	PM Peak Hour Volume Generation Volume 4:30-5:30 PM
↱ ↰	Northbound and Southbound Left Turn Lanes Include U-Turns

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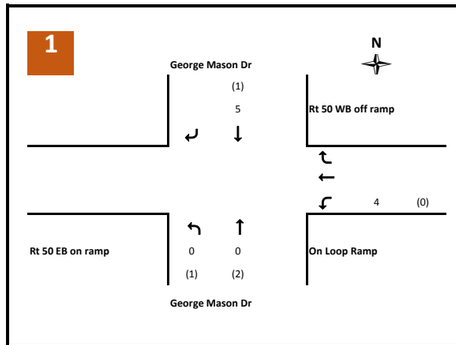
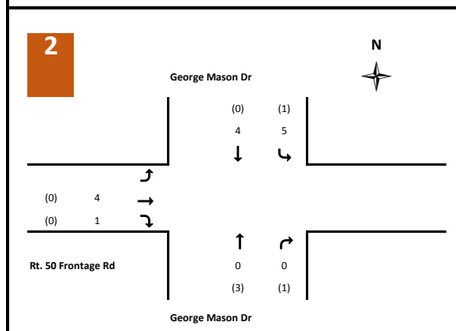
NFATC Traffic Study

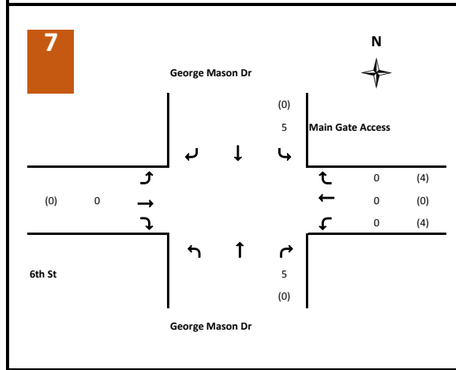
Figure 4-5

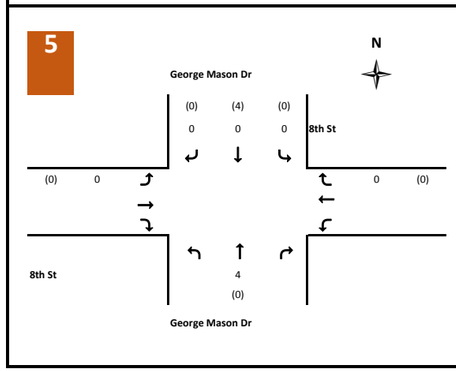
2017 Build Trip Distribution Traffic Volumes

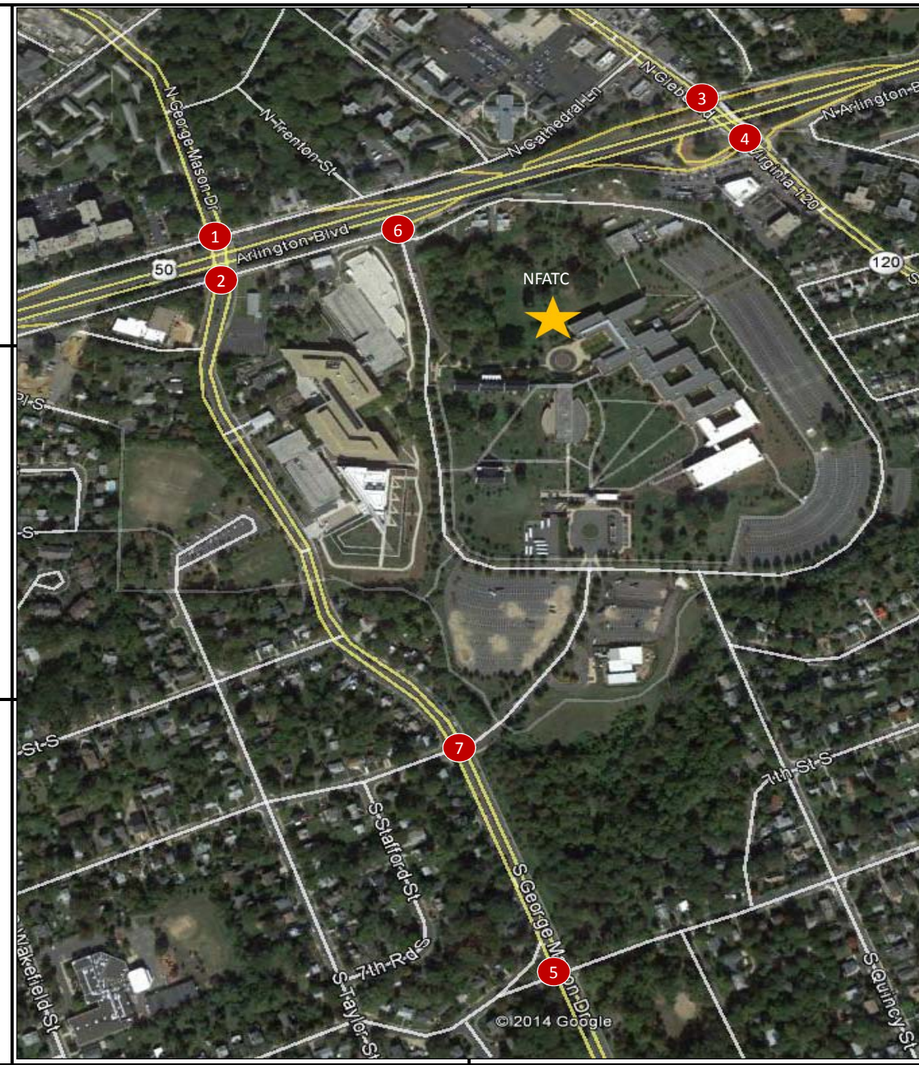
Sheet 1 of 1

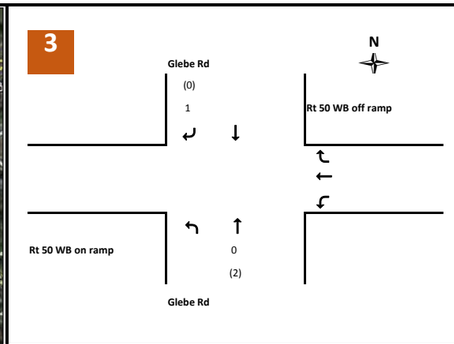


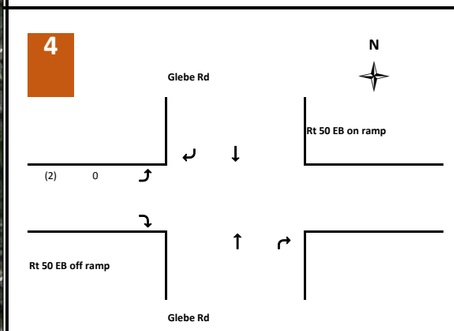


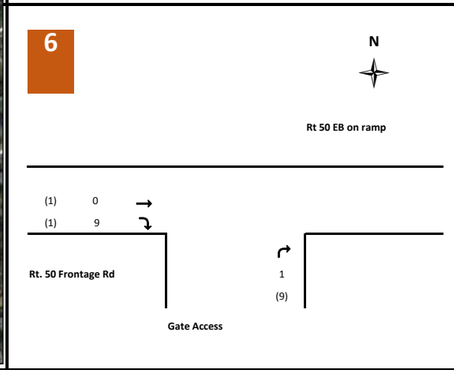












Legend

xxx	AM Peak Hour Volume Generation Volume 7:30-8:30 AM
(xxx)	PM Peak Hour Volume Generation Volume 4:30-5:30 PM
⤴ ⤶	Northbound and Southbound Left Turn Lanes Include U-Turns

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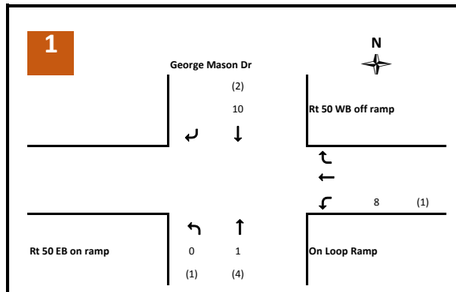
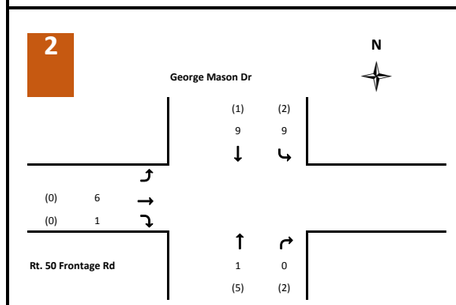
NFATC Traffic Study

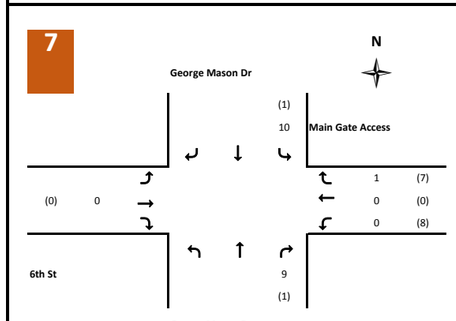
Figure 4-6

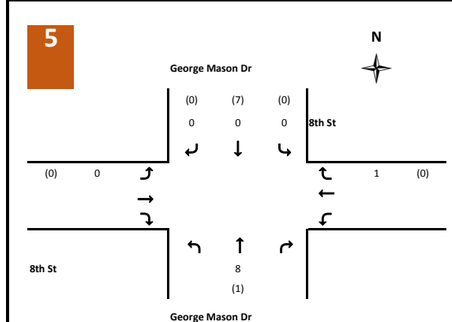
2025 No-Build Trip Distribution Traffic Volumes

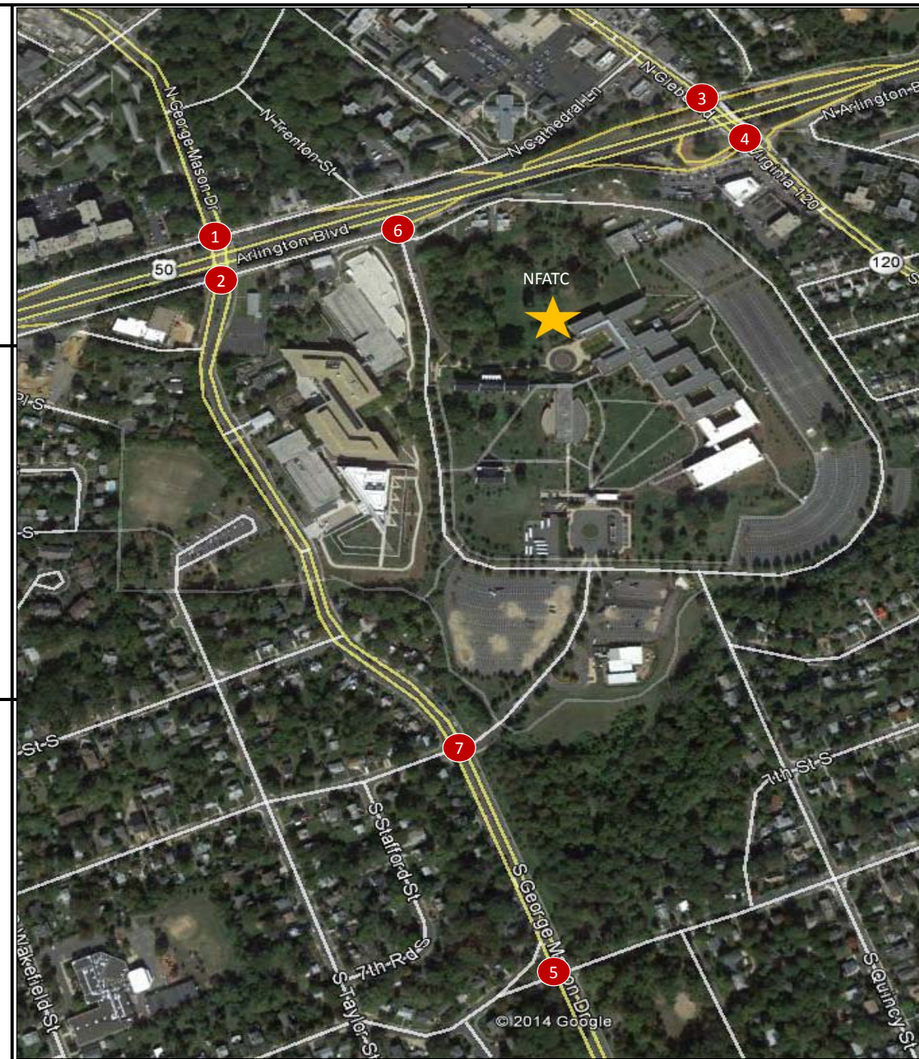
Sheet 1 of 1

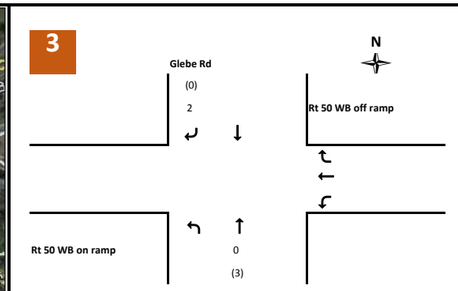


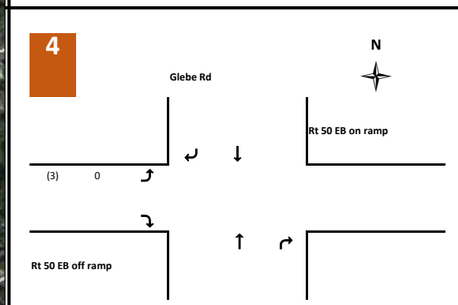


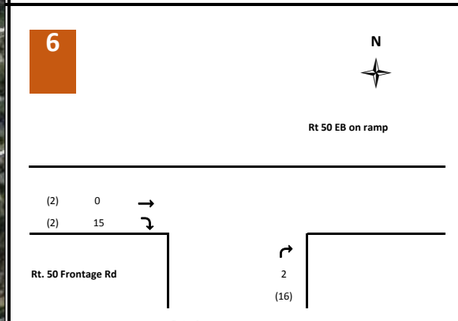












Legend

xxx	AM Peak Hour Volume Generation Volume 7:30-8:30 AM
(xxx)	PM Peak Hour Volume Generation Volume 4:30-5:30 PM
⤴ ⤶	Northbound and Southbound Left Turn Lanes Include U-Turns

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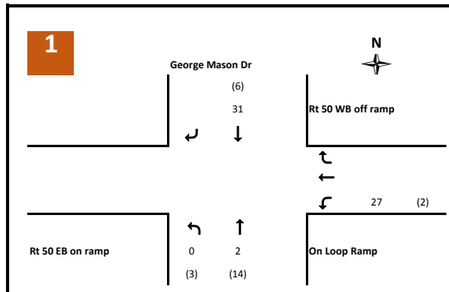
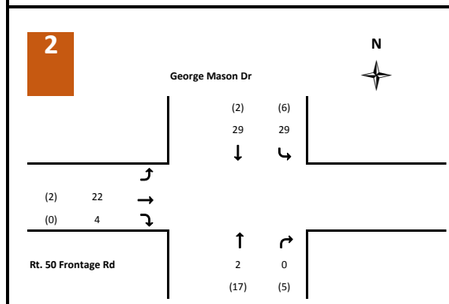
NFATC Traffic Study

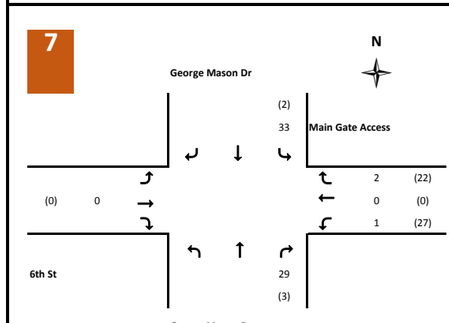
Figure 4-7

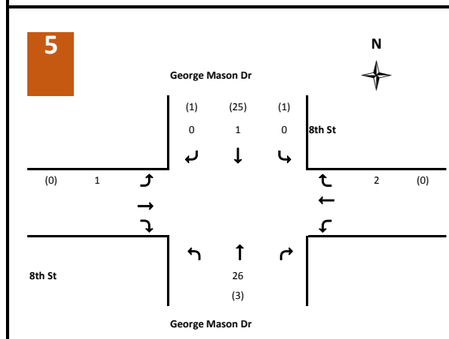
2025 Build Trip Distribution Traffic Volumes

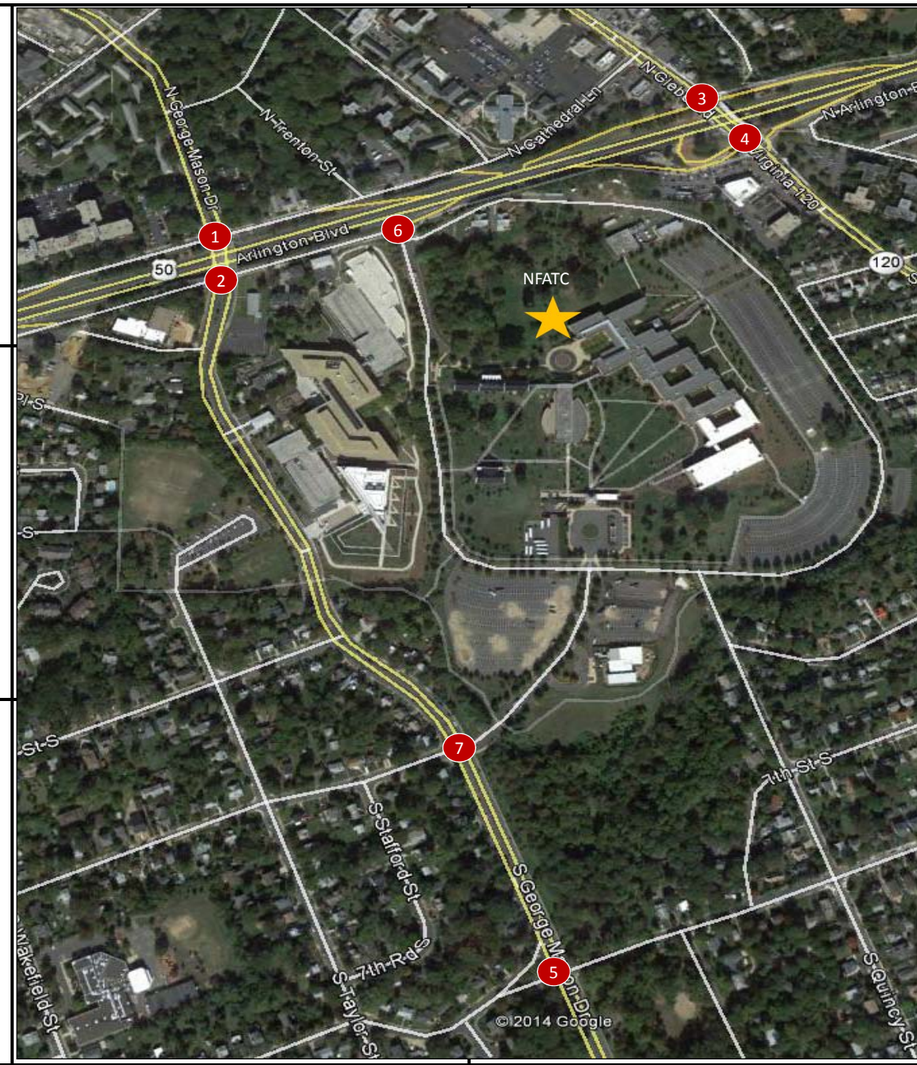
Sheet 1 of 1

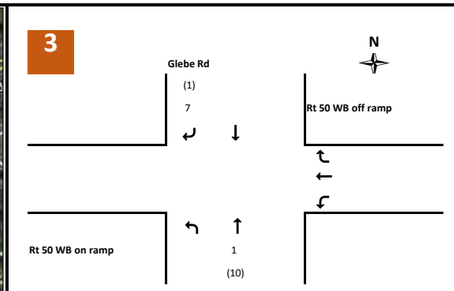


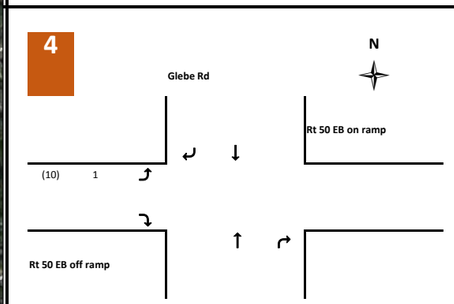


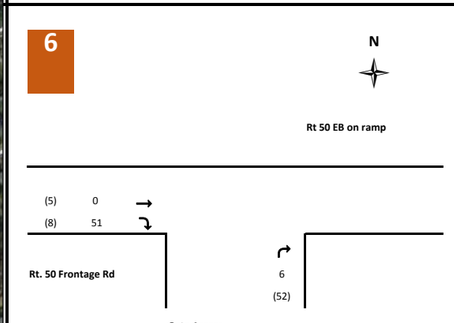












Legend

xxx	AM Peak Hour Volume Generation Volume 7:30-8:30 AM
(xxx)	PM Peak Hour Volume Generation Volume 4:30-5:30 PM
⤴ ⤶	Northbound and Southbound Left Turn Lanes Include U-Turns

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4.7 Future Year 2017 Operational Analysis

The vehicle trips generated by the NFATC facility for the year 2017 were developed by applying the growth rate shown in Table 4-2 for each scenario to the existing traffic volumes entering and exiting the NFATC installation. The resulting traffic volumes for the 2017 no-build condition show a reduction of ten vehicles entering and one vehicle exiting the facility during the AM peak hour. For the PM peak hour, the reduction in vehicles for the no-build scenario were calculated to be one vehicle entering and nine vehicles exiting the facility. The traffic volumes for the 2017 build condition show an additional 19 vehicles entering and one vehicle exiting during the AM peak hour. For the PM peak hour, there are expected to be an additional two vehicles entering the site and 17 vehicles exiting. These volumes were distributed to the NFATC gates based on the trip distribution percentages shown in Figure 4-3. The resulting total traffic volumes, including the background growth traffic volumes, for the 2017 analysis year are shown in Figure 4-8 for the no-build scenario and Figure 4-9 for the build scenario.

The study intersections were analyzed using the same procedures as the existing conditions analysis. The resulting delay and Level of Service (LOS) for the 2017 no-build scenario for the AM and PM peak hours are shown in Figure 4-10 for individual turning movements as well as each overall intersection. The results for the 2017 build condition are shown in Figure 4-11. Ingress and egress queue lengths for both scenarios for the intersections leading to each gate are shown in Table 4-3 for both peak hours.

Table 4-3: Year 2017 NFATC Gate Queue Lengths

Intersection	Turning Movement	No-Build		Build	
		AM Queue Length (ft)	PM Queue Length (ft)	AM Queue Length (ft)	PM Queue Length (ft)
George Mason Dr & South Gate	southbound left	34	1	36	1
	westbound left/thru/right	24	556	25	597
Arlington Blvd EB on-ramp & North Gate	northbound right	7	55	8	56

The results of the 2017 no-build operational analysis show that the intersections within the study area will operate with similar delays and LOS when compared to the existing conditions. During the AM peak hour, all of the study intersections will continue to operate at a LOS C or better. However, the individual turning movements that are operating with a LOS E or LOS F in the existing conditions will continue to operate at those service levels. The queue length analysis shows acceptable queue lengths for all intersection movements. The results for the 2017 no-build PM peak hour also show similar operations to the existing condition. All intersections are expected to operate at a LOS C or better except the intersection of George Mason and 6th Street (Intersection 7) which is expected to operate at a LOS E; similar to the existing conditions. The queue lengths for the PM peak hour are all acceptable except the westbound movement at the South Gate. This queue length is approximately 550 feet, which would extend back beyond the parking lot entrances to the east.

The results of the operational analysis shown in Figure 4-11 for the 2017 build condition show that the study area intersections will operate similarly to the 2017 no-build condition and the existing condition. This is due to the low student and background growth rates (discussed in Sections 4.1 and 4.3) which are expected to add a minimal amount of traffic to the roadway network for both 2017 scenarios. Similar to the operational results for the 2017 no-build scenario, all study intersections are projected to operate with a LOS C or better for both peak periods with the exception of the intersection of George Mason and 6th Street (Intersection 7) which is expected to operate at a LOS F. Although this location has a degraded LOS when compared to the 2017 no-build condition, the overall delay is only expected to increase approximately eight seconds. The queue lengths for the PM peak hour are all acceptable except the westbound movement at the South Gate. This queue length is approximately 600 feet, which would extend back beyond the parking lot entrances to the east.

NFATC Traffic Study

Figure 4-8

2017 No-Build Total Traffic Volumes

Sheet 1 of 1

1

N

George Mason Dr

(71) (1042)
45 601

Rt 50 WB off ramp

Overall Intersection
2596
(2667)

200 (162)
55 (83)
516 (404)

Rt 50 EB on ramp

133 1046
(155) (750)

On Loop Ramp

George Mason Dr

2

N

George Mason Dr

(1306) (163)
698 439

Rt. 50 Frontage Rd

(122) 342
(54) 330
(185) 111

Overall Intersection
2988
(2456)

838 230
(789) (230)

Rt. 50 Frontage Rd

George Mason Dr

7

N

George Mason Dr

(5) (1344) (12)
20 629 157

Main Gate Access

(10) 5
(0) 2
(5) 20

Overall Intersection
2090
2448

8 (106)
0 (0)
7 (129)

6th St

5 1098 139
(10) (839) (13)

George Mason Dr

5

N

George Mason Dr

(46) (1352) (80)
26 566 48

8th St

(31) 46
(24) 61
(22) 31

Overall Intersection
2098
(2398)

82 (95)
29 (57)
23 (23)

8th St

22 1115 49
(13) (735) (42)

George Mason Dr

3

N

Glebe Rd

(166) (1407)
128 865

Rt 50 WB off ramp

Overall Intersection
3155
(3035)

223 (137)
4 (2)
47 (80)

Rt 50 WB on ramp

354 1534
(322) (921)

Glebe Rd

4

N

Glebe Rd

(222) (1260)
162 786

Rt 50 EB on ramp

(175) 144
(282) 275

Overall Intersection
3236
(2979)

1762 107
(1040) (77)

Rt 50 EB off ramp

Glebe Rd

6

N

Rt 50 EB on ramp

Overall Intersection

(410) 750
(37) 245

1023
447

28
(251)

Rt. 50 Frontage Rd

Gate Access

Legend

xxx	AM Peak Hour Volume 7:30-8:30 AM
(xxx)	PM Peak Hour Volume 4:30-5:30 PM
↱ ↰	Northbound and Southbound Left Turn Lanes Include U-Turns

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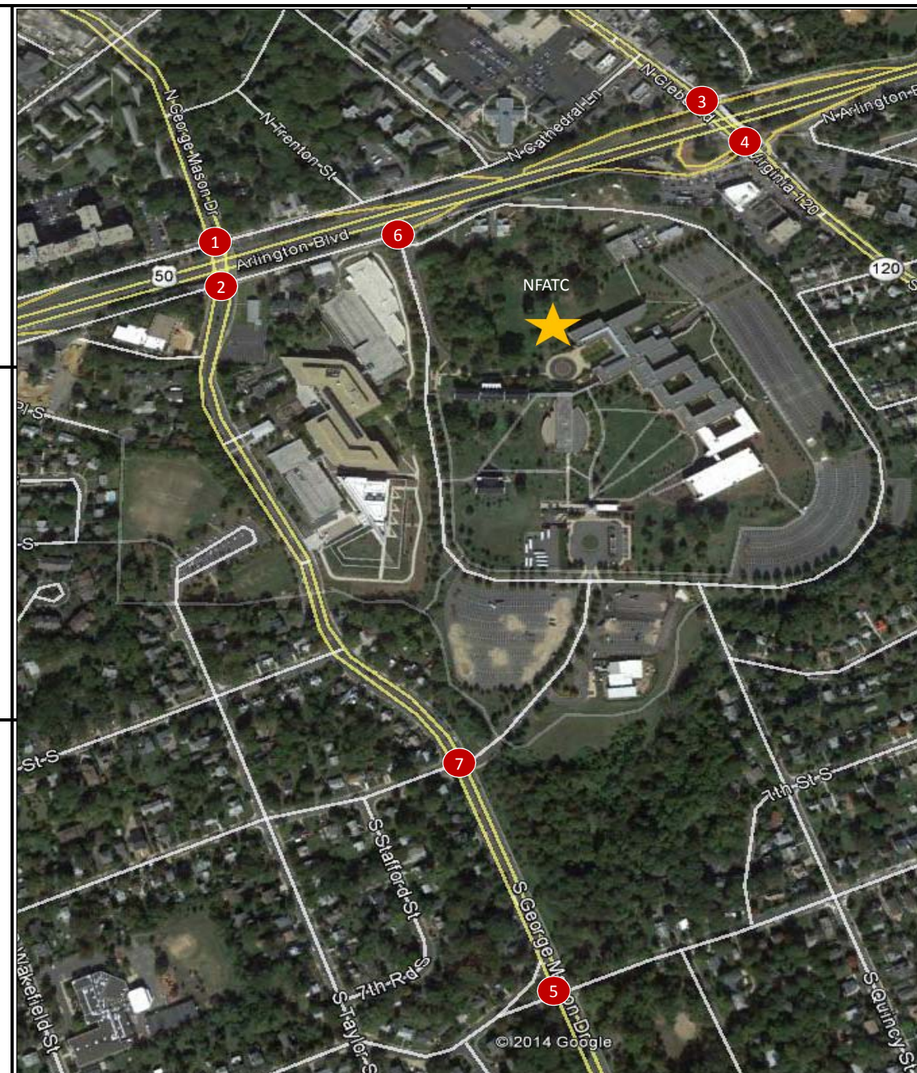
NFATC Traffic Study

Figure 4-9

2017 Build Total Traffic Volumes

Sheet 1 of 1



1

N

George Mason Dr

(71)	(1044)	
45	609	Rt 50 WB off ramp
	Overall Intersection	200 (162)
	2611	55 (83)
	(2674)	523 (404)
Rt 50 EB on ramp	133 1046	On Loop Ramp
	(156) (754)	

George Mason Dr

2

N

George Mason Dr

	(1306) (165)	
	705 447	Rt. 50 Frontage Rd
(122) 342	Overall Intersection	
(54) 336	3010	
(185) 112	(2461)	
Rt. 50 Frontage Rd	838 230	
	(794) (231)	

George Mason Dr

7

N

George Mason Dr

	(5) (1344) (12)	
	20 629 165	Main Gate Access
(10) 5	Overall Intersection	8 (112)
(0) 2	2106	0 (0)
(5) 20	2460	7 (135)
6th St	5 1098 147	
	(10) (839) (13)	

George Mason Dr

5

N

George Mason Dr

	(46) (1358) (80)	
	26 566 48	8th St
(31) 46	Overall Intersection	82 (95)
(24) 61	2105	29 (57)
(22) 31	(2404)	23 (23)
8th St	22 1122 49	
	(13) (735) (42)	

George Mason Dr

3

N

Glebe Rd

	(166) (1407)	
	130 865	Rt 50 WB off ramp
	Overall Intersection	223 (137)
	3157	4 (2)
	(3038)	47 (80)
Rt 50 WB on ramp	354 1534	
	(322) (924)	

Glebe Rd

4

N

Glebe Rd

	(222) (1260)	
	162 786	Rt 50 EB on ramp
(178) 144	Overall Intersection	
	3236	
(282) 275	(2982)	
Rt 50 EB off ramp	1762 107	
	(1040) (77)	

Glebe Rd

6

N

Rt 50 EB on ramp

	Overall Intersection	
(411) 750	1039	
(39) 259	450	
Rt. 50 Frontage Rd	30	
	(265)	

Gate Access

Legend

xxx	AM Peak Hour Volume 7:30-8:30 AM
(xxx)	PM Peak Hour Volume 4:30-5:30 PM
↱ ↰	Northbound and Southbound Left Turn Lanes Include U-Turns

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NFATC Traffic Study

Figure 4-10

2017 No-Build Delay and LOS

Sheet 1 of 1

1

N

George Mason Dr

(29.6-C) (29.6-C)
35-D 35-D
Rt 50 WB off ramp

Overall Intersection
20.3-C
(22.7-C)

35.2-D (36.5-D)
35.2-D (36.5-D)
37.7-D (37.9-D)

Rt 50 EB on ramp
1.8-A 0.9-A
(17.8-B) (0.8-A)
On Loop Ramp

George Mason Dr

2

N

George Mason Dr

(1.9-A) (18.3-B)
1.3-A 40.4-D
Rt. 50 Frontage Rd

(52.5-D) 50.8-D
(51.1-D) 44.6-D
(51.1-D) 44.6-D

Overall Intersection
33.7-C
(18.8-B)

Rt. 50 Frontage Rd
42.3-D 42.3-D
(28.6-C) (28.6-C)

George Mason Dr

7

N

George Mason Dr

(0-A) (0-A) (0.5-A)
0-A 0-A 9.3-A
Main Gate Access

(157.9-F) 37.6-E
(157.9-F) 37.6-E
(157.9-F) 37.6-E

Overall Intersection
2.7-A
(65.8-E)

81.2-F (669.6-F)
81.2-F (669.6-F)
81.2-F (669.6-F)

6th St
0.2-A 0.2-A 0-A
(0.8-A) (0-A) (0-A)

George Mason Dr

5

N

George Mason Dr

(9.9-A) (9.9-A) (9.9-A)
6.6-A 6.6-A 6.6-A
8th St

(55.8-E) 83.8-F
(55.8-E) 83.8-F
(55.8-E) 83.8-F

Overall Intersection
16.6-C
(13.9-B)

49.4-D (64.1-E)
49.4-D (64.1-E)
49.4-D (64.1-E)

8th St
7.9-A 7.9-A 7.9-A
(5.3-A) (5.3-A) (5.3-A)

George Mason Dr

3

N

Glebe Rd

(17.9-B) (31.5-C)
17.3-B 23.9-C
Rt 50 WB off ramp

Overall Intersection
34.6-C
(31.3-C)

56.7-E (62.3-E)
59.2-E (62.3-E)
59.2-E (54-D)

Rt 50 WB on ramp
42.7-D 36.1-D
(39.8-D) (22.7-C)

Glebe Rd

4

N

Glebe Rd

(3.8-A) (3.8-A)
2.4-A 2.4-A
Rt 50 EB on ramp

(54.3-D) 87.3-F
(71.9-E) 58.6-E

Overall Intersection
13.8-B
(13.9-B)

Rt 50 EB off ramp
6.9-A 6.9-A
(6.3-A) (6.3-A)

Glebe Rd

6

N

Rt 50 EB on ramp

Overall Intersection
(0-A) 0-A
(0-A) 0-A
0.4-A
(5.5-A)

Rt. 50 Frontage Rd
16.1-C
(15-C)

Gate Access

Legend

xx - A	AM Peak Hour Delay (seconds) LOS 7:30-8:30 AM
(xx - A)	PM Peak Hour Delay (seconds) LOS 4:30-5:30 PM
	Northbound and Southbound Left Turn Lanes Include U-Turns

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NFATC Traffic Study

Figure 4-11

2017 Build Delay and LOS

Sheet 1 of 1

1

N

George Mason Dr

(29.6-C) (29.6-C)
33.9-C 33.9-C

Rt 50 WB off ramp

Overall Intersection
21.9-C
(22.7-C)

40.1-D (36.5-D)
40.1-D (36.5-D)
45.5-D (37.9-D)

Rt 50 EB on ramp

1.4-A 0.7-A
(17.9-B) (0.8-A)

On Loop Ramp

George Mason Dr

2

N

George Mason Dr

(1.9-A) (19.1-B)
1.7-A 61-E

Rt. 50 Frontage Rd

(52.5-D) 43.4-D
(51.1-D) 39.7-D
(51.1-D) 39.7-D

Overall Intersection
34.5-C
(18.9-C)

Rt. 50 Frontage Rd

40.4-D 40.4-D
(28.6-C) (28.6-C)

George Mason Dr

7

N

George Mason Dr

(0-A) (0-A) (0.5-A)
0-A 0-A 9.8-A

Main Gate Access

(163.6-F) 39.6-E
(163.6-F) 39.6-E
(163.6-F) 39.6-E

Overall Intersection
2.9-A
(74.1-F)

86.3-F (720.2-F)
86.3-F (720.2-F)
86.3-F (720.2-F)

6th St

0.2-A 0-A 0-A
(0.8-A) (0.8-A) (0-A)

George Mason Dr

5

N

George Mason Dr

(9.9-A) (9.9-A) (9.9-A)
6.6-A 6.6-A 6.6-A

8th St

(55.8-E) 84.6-F
(55.8-E) 84.6-F
(55.8-E) 84.6-F

Overall Intersection
16.7-C
(13.9-B)

49.4-D (64.1-E)
49.4-D (64.1-E)
49.4-D (64.1-E)

8th St

8-A 8-A 8-A
(5.3-A) (5.3-A) (5.3-A)

George Mason Dr

3

N

Glebe Rd

(17.9-B) (31.5-C)
17.3-B 23.9-C

Rt 50 WB off ramp

Overall Intersection
33.6-C
(31.4-C)

56.5-E (62.3-E)
58.9-E (62.3-E)
58.9-E (54-D)

Rt 50 WB on ramp

47.3-D 33.1-C
(39.8-D) (22.8-C)

Glebe Rd

4

N

Glebe Rd

(3.8-A) (3.8-A)
2.6-A 2.6-A

Rt 50 EB on ramp

(54.7-E) 52.4-E
(71.9-E) 60.9-E

Overall Intersection
14.1-B
(14-B)

Rt 50 EB off ramp

9.4-A 9.4-A
(6.3-A) (6.3-A)

Glebe Rd

6

N

Rt 50 EB on ramp

Overall Intersection
0.4-A
(5.6-A)

(0-A) 0-A
(0-A) 0-A

Rt. 50 Frontage Rd

16.2-C
(15.1-C)

Gate Access

Legend

xx - A	AM Peak Hour Delay (seconds) LOS 7:30-8:30 AM
(xx - A)	PM Peak Hour Delay (seconds) LOS 4:30-5:30 PM
↱ ↰	Northbound and Southbound Left Turn Lanes Include U-Turns

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4.8 Future Year 2025 Operational Analysis

The trip generation for the year 2025 was developed using the same procedure used to calculate the vehicle trips generated for the year 2017. The growth rates shown in Table 4-2 were applied to the existing traffic volumes entering and exiting the NFATC installation. The resulting traffic volumes for the 2025 no-build condition show an additional 34 vehicles entering and three vehicles exiting the facility during the AM peak hour. For the PM peak hour, the additional vehicles for the no-build scenario were calculated to be four vehicles entering and 30 vehicles exiting the facility. The traffic volumes for the 2025 build condition show an additional 113 vehicles entering and nine vehicles exiting during the AM peak hour. For the PM peak hour, there are expected to be an additional 13 vehicles entering the site and 101 vehicles exiting. These volumes were distributed to the NFATC gates based on the trip distribution percentages shown in Figure 4-3. The resulting total traffic volumes, including the background growth traffic volumes, for the 2025 analysis year are shown in Figure 4-12 for the no-build scenario and Figure 4-13 for the build scenario.

The study intersections were analyzed using the same procedures as the existing conditions analysis. The resulting delay and LOS for the 2025 no-build scenario for the AM and PM peak hours are shown in Figure 4-14 for individual turning movements as well as each overall intersection. The results for the 2025 build condition are shown in Figure 4-15. Ingress and egress queue lengths for both scenarios for the intersections leading to each gate are shown in Table 4-4 for both peak hours.

Table 4-4: Year 2025 NFATC Gate Queue Lengths

Intersection	Turning Movement	No-Build		Build	
		AM Queue Length (ft)	PM Queue Length (ft)	AM Queue Length (ft)	PM Queue Length (ft)
George Mason Dr & South Gate	southbound left	41	1	51	1
	westbound left/thru/right	30	649	40	>1200
Arlington Blvd EB on-ramp & North Gate	northbound right	9	65	10	82

The results of the 2025 no-build operational analysis show that the intersections within the study area will operate with similar LOS and slightly higher delays when compared to the existing and 2017 conditions. During the AM peak hour, all of the study intersections will continue to operate at a LOS C or better. The individual turning movements that are operating with a LOS E or LOS F in the existing and 2017 conditions will continue to operate at those service levels, albeit with slightly higher delays. The queue length analysis for the AM peak hour shows acceptable queue lengths for all intersection movements. The results for the 2025 no-build PM peak hour also show similar operations to the existing and 2017 conditions. All intersections are expected to operate at a LOS C or better except the intersection of George Mason and 6th Street (Intersection 7) which is expected to operate at a LOS F; similar to the 2017 build condition. The queue lengths for the no-build PM peak hour are all acceptable

except the westbound movement at the South Gate. This queue length is approximately 650 feet, which would extend back beyond the parking lot entrances to the east.

The results of the operational analysis shown in Figure 4-15 for the 2025 build condition show that the study area intersections will operate similarly to the 2025 no-build condition except for the intersection of George Mason and 6th Street (Intersection 7) which includes the southern access to the site as the eastern leg of the intersection. Due to the increased number of vehicles entering and exiting the site for the 2025 build condition, all movements from the minor approaches are expected to operate at a LOS F for both the AM and PM peak hours. The PM peak hour delay for the westbound movements (exiting vehicles) exceeds 999 seconds. The queue lengths for the 2025 build PM peak hour are all acceptable except the westbound movement at the South Gate. This queue length will exceed 1200 feet, which would extend back to the second grouping of parking lots on the east side of the site.

NFATC Traffic Study

Figure 4-12

2025 No-Build Total Traffic Volumes

Sheet 1 of 1

1

N

George Mason Dr

(74)	(1087)	
46	639	Rt 50 WB off ramp

Overall Intersection
2725
(2788)

208	(169)	
57	(87)	
548	(421)	
138	1089	Rt 50 EB on ramp
(163)	(787)	

On Loop Ramp

George Mason Dr

2

N

George Mason Dr

(1361)	(173)	
739	469	Rt. 50 Frontage Rd

(127)	356	
(56)	351	
(192)	116	

Overall Intersection
3145
(2564)

874	240
(828)	(242)

Rt. 50 Frontage Rd

George Mason Dr

7

N

George Mason Dr

(5)	(1399)	(13)
20	655	170

Main Gate Access

(10)	5	
(0)	2	
(5)	20	

Overall Intersection
2187
2557

9	(115)	
0	(0)	
7	(139)	
5	1143	151
(10)	(874)	(14)

6th St

George Mason Dr

5

N

George Mason Dr

(46)	(1416)	(80)
26	589	48

8th St

(31)	46	
(24)	61	
(22)	31	

Overall Intersection
2178
(2493)

83	(95)	
29	(57)	
23	(23)	
22	1171	49
(13)	(766)	(42)

8th St

George Mason Dr

3

N

Glebe Rd

(173)	(1464)	
136	900	Rt 50 WB off ramp

Overall Intersection
3286
(3162)

232	(143)	
4	(2)	
49	(83)	
369	1596	Rt 50 WB on ramp
(335)	(962)	

Glebe Rd

4

N

Glebe Rd

(231)	(1311)	
169	818	Rt 50 EB on ramp

(186)	150	
(294)	286	

Overall Intersection
3368
(3105)

1834	111
(1083)	(80)

Rt 50 EB off ramp

Glebe Rd

6

N

Rt 50 EB on ramp

Overall Intersection

(429)	781	1077
(40)	265	469

31	
(272)	

Rt. 50 Frontage Rd

Gate Access

Legend

xxx	AM Peak Hour Volume 7:30-8:30 AM
(xxx)	PM Peak Hour Volume 4:30-5:30 PM
↱ ↰	Northbound and Southbound Left Turn Lanes Include U-Turns

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NFATC Traffic Study

Figure 4-13

2025 Build Total Traffic Volumes

Sheet 1 of 1

1

N

George Mason Dr

(74)	(1091)	
46	660	Rt 50 WB off ramp
	Overall Intersection	208 (169)
	2766	57 (87)
	(2805)	567 (422)
Rt 50 EB on ramp	138 1090	On Loop Ramp
	(165) (797)	

George Mason Dr

2

N

George Mason Dr

	(1362) (177)	
	759 489	Rt. 50 Frontage Rd
(127) 356	Overall Intersection	
(58) 367	3205	
(192) 119	(2579)	
Rt. 50 Frontage Rd	875 240	
	(840) (245)	

George Mason Dr

7

N

George Mason Dr

	(5) (1399) (14)	
	20 655 193	Main Gate Access
(10) 5	Overall Intersection	10 (130)
(0) 2	2232	0 (0)
(5) 20	2591	8 (158)
6th St	5 1143 171	
	(10) (874) (16)	

George Mason Dr

5

N

George Mason Dr

	(47) (1434) (81)	
	26 590 48	8th St
(31) 47	Overall Intersection	84 (95)
(24) 61	2199	29 (57)
(22) 31	(2514)	23 (23)
8th St	22 1189 49	
	(13) (768) (42)	

George Mason Dr

3

N

Glebe Rd

(174)	(1464)	
141	900	Rt 50 WB off ramp
	Overall Intersection	232 (143)
	3292	4 (2)
	(3170)	49 (83)
Rt 50 WB on ramp	369 1597	
	(335) (969)	

Glebe Rd

4

N

Glebe Rd

	(231) (1311)	
	169 818	Rt 50 EB on ramp
(193) 151	Overall Intersection	
	3369	
(294) 286	(3112)	
Rt 50 EB off ramp	1834 111	
	(1083) (80)	

Glebe Rd

6

N

Rt 50 EB on ramp

Overall Intersection

(432) 781	1117	
(46) 301	478	
Rt. 50 Frontage Rd		35
		(308)

Gate Access

Legend

xxx	AM Peak Hour Volume 7:30-8:30 AM
(xxx)	PM Peak Hour Volume 4:30-5:30 PM
↱ ↰	Northbound and Southbound Left Turn Lanes Include U-Turns

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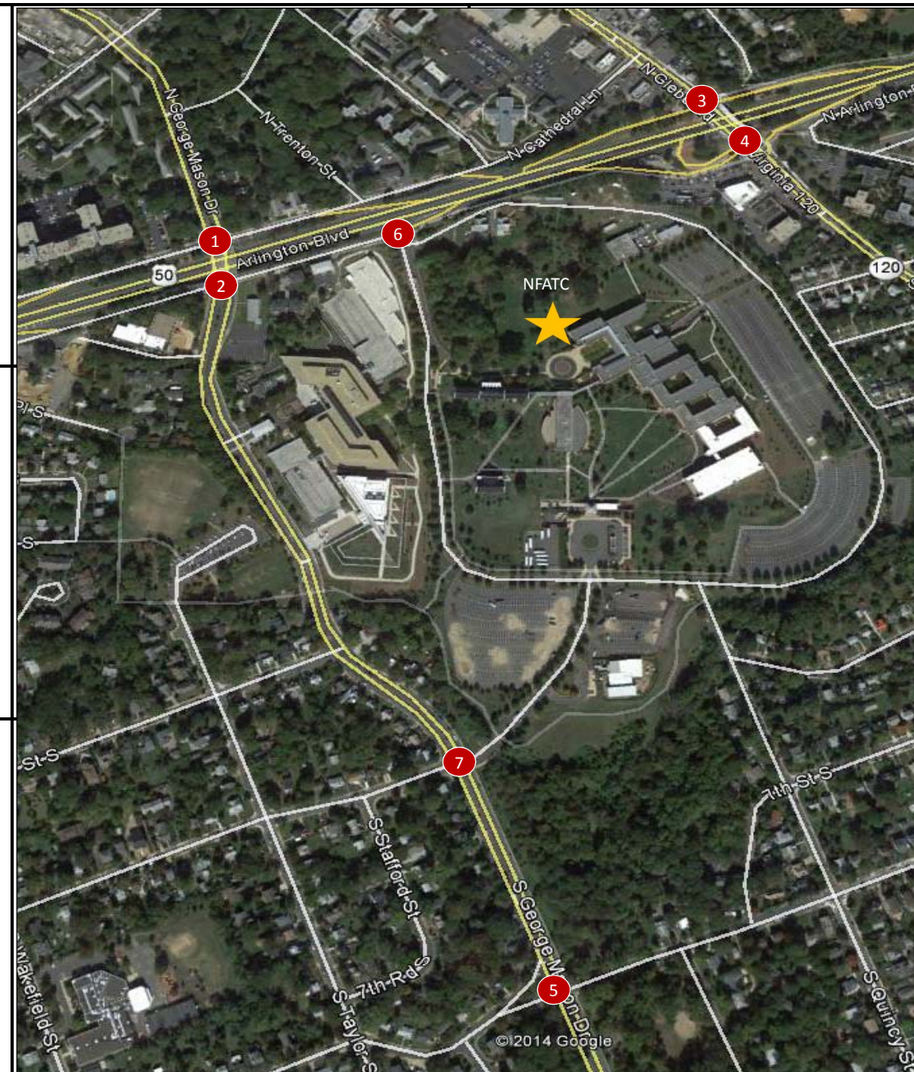
NFATC Traffic Study

Figure 4-14

2025 No-Build Delay and LOS

Sheet 1 of 1



1

N

George Mason Dr

(31.7-C) (31.7-C)
35.9-D 35.9-D

Rt 50 WB off ramp

Overall Intersection
20.6-C
(24-C)

35.4-D (37.8-D)
35.4-D (37.8-D)
38.1-D (39.7-D)

Rt 50 EB on ramp

2.1-A 0.9-A
(20-B) (0.7-A)

On Loop Ramp

George Mason Dr

2

N

George Mason Dr

(2.2-A) (21.8-C)
1.3-A 43.3-D

Rt. 50 Frontage Rd

(48.9-D) 50.2-D
(30.6-C) 44.1-D
(30.6-C) 44.1-D

Overall Intersection
34.8-C
(19.5-C)

Rt. 50 Frontage Rd

44.7-D 44.7-D
(30.6-C) (23.1-C)

George Mason Dr

7

N

George Mason Dr

(0-A) (0-A) (0.5-A)
0-A 0-A 10.7-B

Main Gate Access

(204.3-F) 45.9-E
(204.3-F) 45.9-E
(204.3-F) 45.9-E

Overall Intersection
3.3-A
(89.7-F)

103.8-F (884-F)
103.8-F (884-F)
103.8-F (884-F)

6th St

0.2-A 0-A 0-A
(0.9-A) (0-A) (0-A)

George Mason Dr

5

N

George Mason Dr

(10.7-B) (10.7-B) (10.7-B)
6.7-A 6.7-A 6.7-A

8th St

(55.8-E) 84.6-F
(55.8-E) 84.6-F
(55.8-E) 84.6-F

Overall Intersection
16.6-B
(14.2-B)

49.4-D (64.1-E)
49.4-D (64.1-E)
49.4-D (64.1-E)

8th St

8.2-A 8.2-A 8.2-A
(5.4-A) (5.4-A) (5.4-A)

George Mason Dr

3

N

Glebe Rd

(18-B) (33.3-C)
17.4-B 24.4-C

Rt 50 WB off ramp

Overall Intersection
36.9-D
(32.3-C)

56.4-E (62.5-E)
58.9-E (62.5-E)
58.9-E (53.9-D)

Rt 50 WB on ramp

48-D 39.7-D
(41.1-D) (23.1-C)

Glebe Rd

4

N

Glebe Rd

(4.6-A) (4.3-A)
2.7-A 2.7-A

Rt 50 EB on ramp

(52.9-D) 59.8-E
(72.4-E) 65.1-E

Overall Intersection
15.1-B
(14.5-B)

Rt 50 EB off ramp

10.5-B 10.5-B
(7.1-A) (7.1-A)

Glebe Rd

6

N

Rt 50 EB on ramp

Overall Intersection
0.5-A
(6-A)

(0-A) 0-A
(0-A) 0-A

Rt. 50 Frontage Rd

17.1-C
(16.1-C)

Gate Access

Legend

xx - A	AM Peak Hour Delay (seconds) LOS 7:30-8:30 AM
(xx - A)	PM Peak Hour Delay (seconds) LOS 4:30-5:30 PM
↱ ↰	Northbound and Southbound Left Turn Lanes Include U-Turns

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NFATC Traffic Study

Figure 4-15

2025 Build Delay and LOS

Sheet 1 of 1

1

N

George Mason Dr

(29.6-C) (29.6-C)
37.2-C 37.2-C
Rt 50 WB off ramp

Overall Intersection
20.6-C
(23.1-C)

33.1-C (38-D)
33.1-C (38-D)
35-D (39.9-D)

Rt 50 EB on ramp
3.3-A 1.2-A
(19.7-B) (0.7-A)
On Loop Ramp

George Mason Dr

2

N

George Mason Dr

(2-A) (21.1-C)
1.1-A 41.8-D
Rt. 50 Frontage Rd

(51.4-D) 61.8-E
(28.7-C) 48.9-D
(28.7-C) 48.9-D

Overall Intersection
37-D
(19-C)

Rt. 50 Frontage Rd
46.7-D 46.7-D
(28.7-C) (23.4-C)

George Mason Dr

7

N

George Mason Dr

(0-A) (0-A) (0.5-A)
0-A 0-A 12.5-B
Main Gate Access

(224-F) 57.8-F
(224-F) 57.8-F
(224-F) 57.8-F

Overall Intersection
4.2-A
(1118.8-F)

141.5-F (>999-F)
141.5-F (>999-F)
141.5-F (>999-F)

6th St
0.2-A 0-A 0-A
(0.4-A) (0-A) (0-A)

George Mason Dr

5

N

George Mason Dr

(11.3-B) (11.3-B) (11.3-B)
6.7-A 6.7-A 6.7-A
8th St

(55.1-E) 88.9-F
(55.1-E) 88.9-F
(55.1-E) 88.9-F

Overall Intersection
17-B
(14.6-B)

49.5-D (63.8-E)
49.5-D (63.8-E)
49.5-D (63.8-E)

8th St
8.3-A 8.3-A 8.3-A
(5.5-A) (5.5-A) (5.5-A)

George Mason Dr

3

N

Glebe Rd

(18-B) (33.3-C)
13.9-B 19.3-B
Rt 50 WB off ramp

Overall Intersection
31.3-D
(32.4-C)

59.2-E (62.5-E)
59.2-E (62.5-E)
59.2-E (53.9-D)

Rt 50 WB on ramp
63.5-E 27.5-C
(40.9-D) (23.4-C)

Glebe Rd

4

N

Glebe Rd

(4.3-A) (4.3-A)
2.3-A 2.3-A
Rt 50 EB on ramp

(53.7-E) 92.7-F
(72.4-E) 67.1-E

Overall Intersection
15.2-B
(14.6-B)

Rt 50 EB off ramp
7.7-B 7.7-B
(7.1-A) (7.1-A)

Glebe Rd

6

N

Rt 50 EB on ramp

Overall Intersection
(0-A) 0-A
(0-A) 0-A
0.5-A
(7-A)

Rt. 50 Frontage Rd
17.2-C
(17.6-C)

Gate Access

Legend

xx - A	AM Peak Hour Delay (seconds) LOS 7:30-8:30 AM
(xx - A)	PM Peak Hour Delay (seconds) LOS 4:30-5:30 PM
	Northbound and Southbound Left Turn Lanes Include U-Turns

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5. Recommendations

5.1 Warrants and Operational Analysis

Recommendations were developed to mitigate the traffic impacts associated with the NFATC expansion at the unsignalized intersections leading to the North and South gate entrances. A left-turn lane warrant analysis was conducted for the 2025 build scenario for the southbound left turn at the intersection of George Mason Drive and the South Gate intersection. The results are shown in Figure 5-1. Signal warrant analyses were also conducted for this intersection using the MUTCD peak hour warrant and four hour warrant. The results of the peak hour signal warrant analysis are shown in Figure 5-2 and the results of the four hour signal warrant analysis are shown in Figure 5-3.

Figure 5-1: 2025 Build Left Turn Lane Warrant at South Gate Intersection

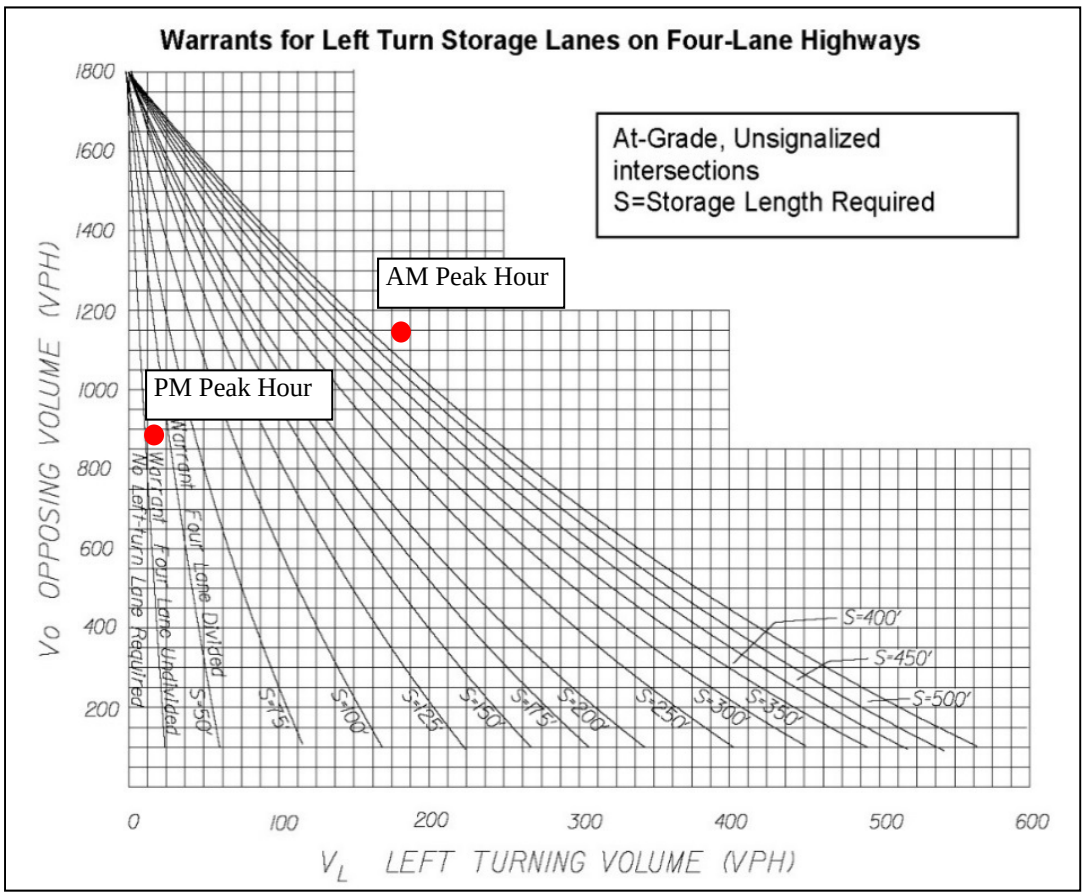


Figure 5-2: 2025 Build Peak Hour Signal Warrant Analysis at South Gate Intersection

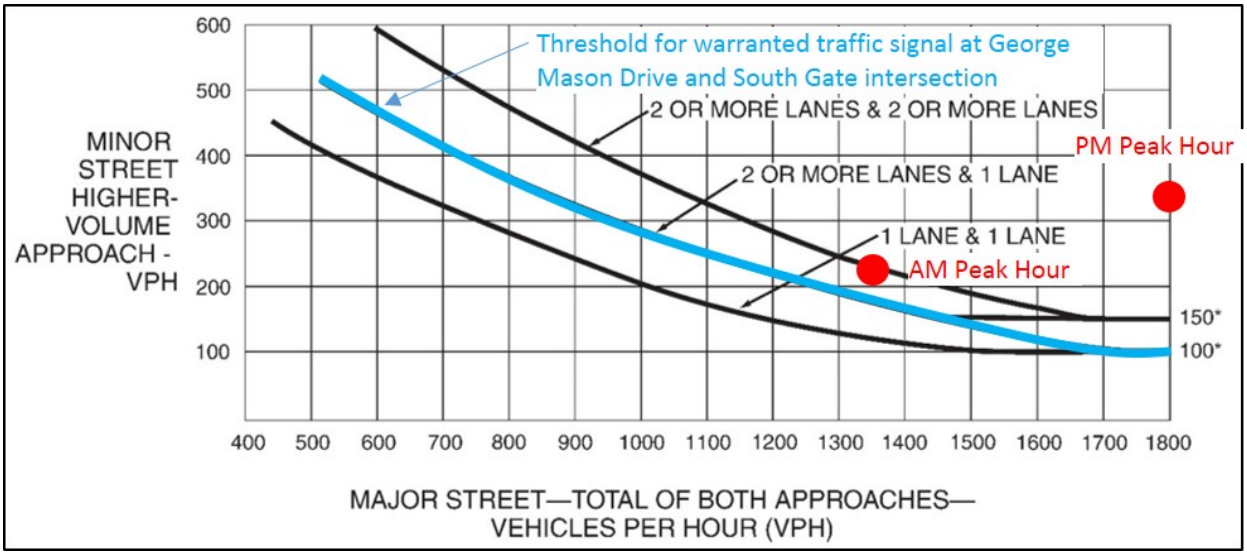
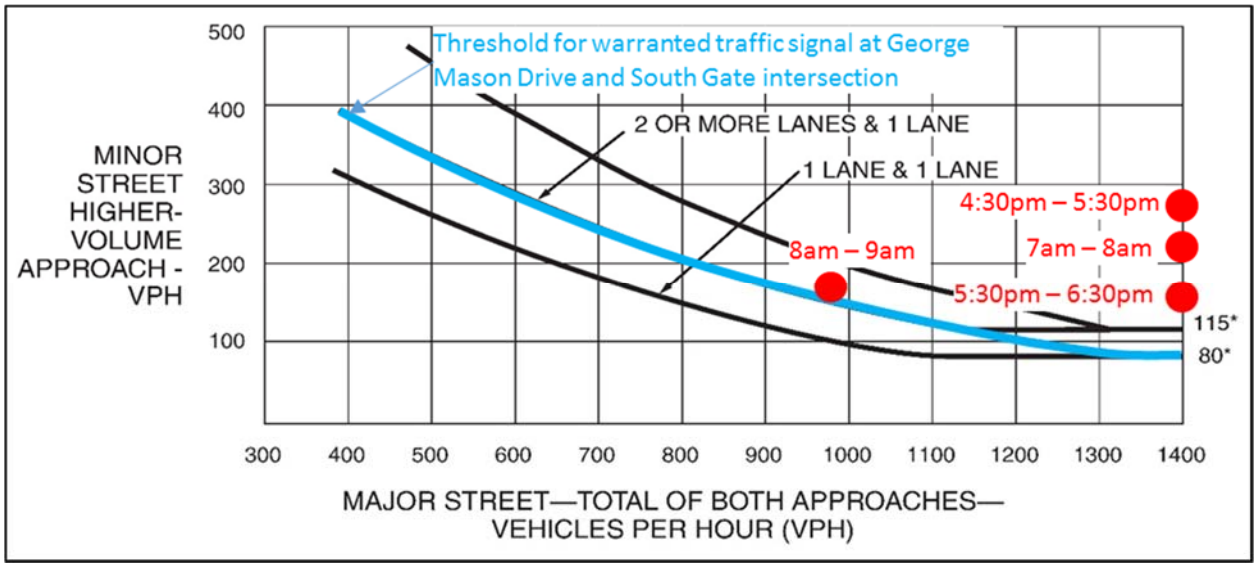


Figure 5-3: 2025 Build Four Hour Signal Warrant Analysis at South Gate Intersection



As shown in the previous figures, a southbound left-turn lane is warranted at the intersection of George Mason Drive and the Southern Gate Access. The volumes at the intersection also meet the peak hour and four-hour signal warrants as presented in 2009 MUTCD (Revisions 1 and 2). It is important to note that the left-turn warrant and peak hour signal warrants are also met in the existing conditions and 2017 condition. It is recommended that both a traffic signal and southbound left turn lane be constructed at this location. The VDOT minimum spacing standards between signals on a minor arterial with a 30 mph speed limit is 880 feet; while the spacing between the recommended signal and the signal at the intersection of George Mason Drive and 8th street is 830 feet. While the signal spacing would not meet spacing, it is possible a design waiver would be granted from VDOT considering the spacing is close to standard. Construction of the southbound left-turn lane would require a slight shift in the geometry of the northbound and southbound through lanes on George Mason Drive as well as the removal of the on-street parking along George Mason Drive between 6th Street and 4th Street. An analysis was conducted using the same process as previous operational analyses for a 2025 scenario with the southbound left turn lane and traffic signal in place. The delay and LOS results are shown in Figure 5-4 for both the AM and PM peak hours. The queue lengths are shown in Table 5-1.

Figure 5-4: Delay and LOS at South Gate Intersection with Recommendations

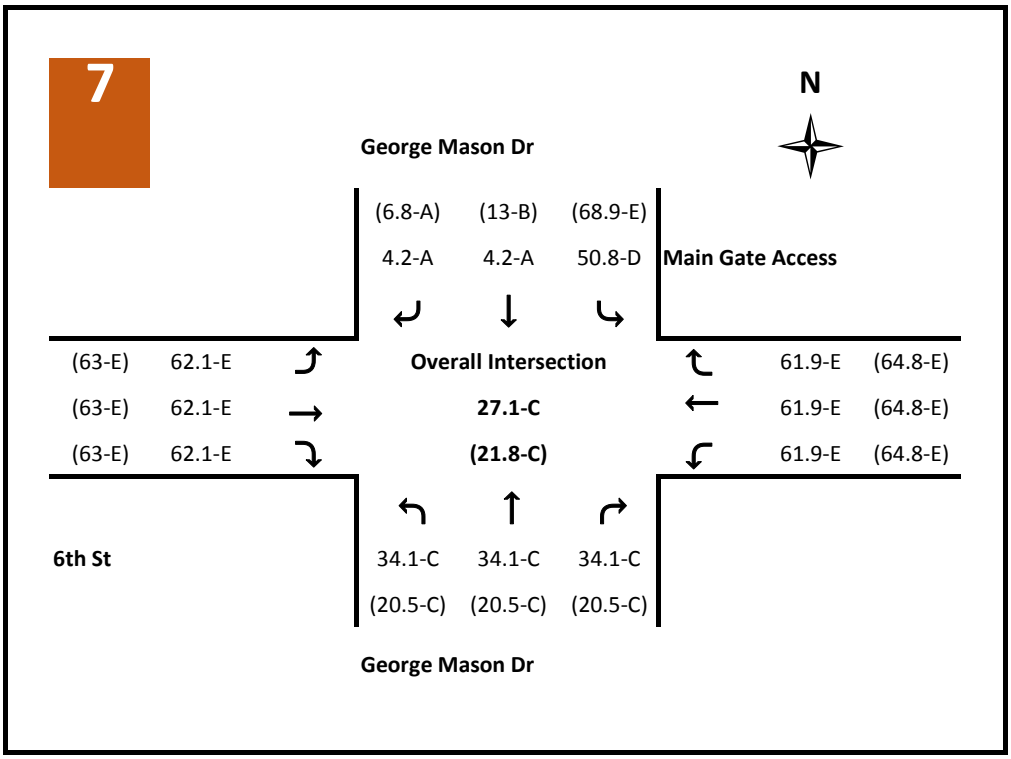


Table 5-1: 2025 Queue Lengths at South Gate Intersection with Recommendations

Intersection	Turning Movement	Build w/ Recommendations	
		AM Queue Length (ft)	PM Queue Length (ft)
George Mason Dr & South Gate	southbound left	245	37
	westbound left/thru/right	0	227

As shown in Figure 5-4 and Table 5-1, the installation of a traffic signal and construction of a southbound left-turn lane would allow the intersection to operate with a LOS C for both the AM and PM peak hour. While the overall delay for the AM peak hour increases slightly with the recommendations, the delay for the minor movements from the side streets decreases significantly. When comparing the overall delay for the PM peak hour, the results show a decrease of approximately 1200 seconds per vehicle with the construction of a southbound left-turn lane and traffic signal. It would be possible to improve the operations of the signalized intersection even more by restricting turning movements at the intersection (eastbound right-in/right-out) or by cul-de-sacking 6th Street.

5.2 Opinion of Cost

An opinion of cost was developed for the recommendations using the VDOT 2015 Planning Cost Estimate Tool Spreadsheet. The costs were calculated in 2016 construction dollars using the VDOT NOVA District dollar values. The spreadsheet tool provides a range of costs for each recommendation that include PE and construction contingencies which are shown below:

- Provide New Signal: $258,000 - $567,000
- Construct Left Turn Lane with 200’ of storage and 200’ taper: $240,000 - $330,000
- Cul-de-Sack 6th Street at the George Mason Drive intersection: $250,000 - $400,000
- Restricting turning movements at the 6th St./George Mason Dr. intersection: $200,000 - $300,000