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**ALFRED STREET BAPTIST CHURCH
TRAFFIC IMPACT STUDY
CITY OF ALEXANDRIA, VIRGINIA**

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October 27, 2015

Transportation Consultants
INNOVATION + SOLUTIONS

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Alfred Street Baptist Church

SECTION 1 INTRODUCTION

Study Scope

This report presents a Traffic Impact Study (TIS) for the Alfred Street Baptist Church project located in the City of Alexandria, Virginia.

The site is located within the Old Town Small Area Plan and is bounded by Duke Street to the north, Wolfe Street to the south, South Patrick Street to the west and South Alfred Street to the east. The subject site is currently occupied by a 48,350 SF church with an observed attendance of approximately 1,208 parishioners per service. Additionally, 22 affordable townhouses are located on the southern portion of the site that are currently built and occupied. The site location is shown generally on Figure 1-1.

The applicant proposes to raze the townhomes and redevelop and expand the existing church with approximately 181,150 total square feet of church space (from 1,208 to 2,163 seats) and a structured parking garage. Parking would be provided via a proposed two level below-grade parking garage on site (226 spaces), a two level below-grade parking garage across South Patrick Street from the site (190 spaces), and a surface lot across of South Patrick Street (49 spots) totaling 465 spaces. A total of 20 bicycle parking spaces will be provided at grade and/or within the below grade parking garage. Access to the parking garage would respectively be located on opposite sides of South Patrick Street just north of the U-turn connection between South Henry Street and South Patrick Street. An additional entrance to the below-grade garage under the church would be located on S. Alfred Street, with an internal connection to the site entrance on S. Patrick Street. Exiting vehicles would only be able to utilize the site access point on S. Alfred Street. A service entrance and exit will be located along Wolfe Street to the south of the site.

The scope of this traffic study was established in consultation with the City of Alexandria Transportation & Environmental Services (T&ES) staff, and the study evaluates existing 2015 conditions and future 2022 traffic conditions without and with the proposed development, and build-out plus six (6) years with the proposed development.

Based on the trip generation analyses, the development would not meet the 5,000 daily vehicle trip threshold for a formal Virginia Department of Transportation (VDOT) Chapter 870 review.

Purpose

The purpose of this traffic study is to evaluate the adequacy of the existing transportation network in conjunction with the proposed development and identify potential mitigation measures to offset the development's traffic impacts.

This study was conducted in accordance with guidelines set forth in the City of Alexandria's Zoning Ordinance, Section 11-700. The proposed development is classified as a Large Development per the *Transportation Planning Administrative Guidelines, Multi-modal Transportation Studies*, dated March 25, 2013. The study area and scope was determined with City staff based on a review of key study intersections and roadways that potentially would be affected by the proposed development and accounting for the number of new trips expected to be generated by the site. The approved study agreement is included as Appendix A.

Based on discussions with City staff, the project is exempt from creating a Transportation Demand Management (TDM) in order to satisfy the need for the Transportation Management Plan (TMP).

Study Objective/Methodology

Tasks undertaken in this study included the following:

- Confirmation of the traffic study scope and parameters from the City of Alexandria Transportation & Environmental Services (T&ES) that must be addressed in this study.
- Review of the proposed development plans, development schedule, parking plans, and other background materials.
- A field reconnaissance of the subject site, adjacent properties, surrounding public roadways, and traffic conditions.
- Collection of AM and PM peak hour traffic counts on a typical weekday from 6:30 to 9:30 AM and from 4:30 AM to 7:30 PM at key off-site intersections. Peak hour traffic counts were also conducted on a typical Sunday from 7:00AM-3:00PM.
- Collection of the on-street parking occupancy from 4:30 to 7:30 PM on one (1) typical weekday (Tuesday, Wednesday or Thursday), and on two (2) Sundays from 7:00 AM to 3:00 PM within a two (2) block radius of the site.
- Obtained existing traffic signal phasing/timing plans and electronic analysis files from T&ES.

- Compiled an inventory of transit services and other non-auto facilities in the site vicinity.
- Calculation of the existing weekday AM, weekday PM, and Sunday midday peak hour levels of service and 50th and 95th percentile queues at key study intersections.
- Estimated of the number of weekday AM, weekday PM, and Sunday midday peak hour trips that would be generated by the pipeline developments and the proposed development based on standard Institute of Transportation Engineers (ITE), Trip Generation Manual, 9th Edition rates and equations.
- Identification of near-term background traffic volumes for the study area based on the existing traffic counts, ambient traffic growth, and un-built developments (pipeline developments) adjacent to the site.
- Analysis of future intersection levels of service and 50th and 95th percentile queues in 2022 without and with the proposed development.
- Analysis of future intersection levels of service and 50th and 95th percentile queues in 2028 with the proposed development (buildout plus six (6) years).
- Identification of traffic operations and potential road improvements required to adequately accommodate total future traffic forecasts in 2022.
- Identification of the number of parking spaces required based on the proposed development and a parking demand study based on the surrounding street network as agreed during the scoping process.

Sources of data for this study included information provided by the City of Alexandria; VDOT; traffic data collected and field surveys conducted by Wells + Associates Inc.; Institute of Traffic Engineers (ITE); the Highway Capacity Manual (HCM); Alfred Street Baptist Church, Christopher Consultants, Kerns Group Architects, and the files of Wells + Associates Inc.

Study Area

This traffic study includes the following existing and planned intersections listed below. The traffic impacts were evaluated for existing conditions, at project buildout in 2022 and in 2028 (project buildout plus 6 years).

1. Cameron Street/S. Alfred Street
2. S. Henry Street/King Street
3. S. Patrick Street/King Street
4. S. Alfred Street/King St.
5. S. Washington Street/King Street
6. S. Henry Street/Prince Street
7. S. Alfred Street/Prince Street
8. S. Henry Street/Duke Street
9. S. Patrick Street/Duke Street
10. S. Alfred Street/Duke Street
11. S. Columbus Street/Duke Street
12. S. Washington Street/Duke Street
13. Turn Movements from S. Henry Street/South Patrick Street
14. S. Alfred Street/Wolfe Street
15. S. Patrick Street/Gibbon Street
16. S. Alfred Street/Gibbon Street
17. S. Patrick Street/Franklin Street
18. One (1) existing garage driveway, and
19. One (1) proposed garage driveways



Figure 1-1
 Site Location Map
 Alfred Baptist Church
 City of Alexandria, Virginia

SECTION 2 BACKGROUND INFORMATION

Description of Proposed Development

The Applicant (Alfred Street Baptist Church) proposes to redevelop an existing 48,350 GSF church and 22 affordable townhomes into a 181,150 GSF church facility and parking structure. The site is generally located in the southeast quadrant of the S. Patrick Street/Duke Street intersection in the Old Town area of the City of Alexandria, Virginia.

The site would be served by approximately 416 below-grade parking spaces and 49 above grade parking spaces for church use. A total of 20 bicycle parking spaces will be provided at grade and within the below grade parking garage. Vehicular access to parking and the site would be provided via S. Patrick Street, directly opposite of the existing parking garage utilized on the western side of the roadway, and S. Alfred Street with an internal connecting driveway segment between the two curb cuts.

For purposes of this study, the entire development was assumed to be fully built and occupied by 2022.

Site Location

The existing site is bounded by Duke Street to the north, Wolfe Street to the south, S. Patrick Street to the west and S. Alfred Street to the east, as shown on Figure 1-1. The existing site is currently occupied by a 48,350 SF church and 22 townhomes.

Description of Parcel

The parcels are identified as Tax Map Numbers 074.03-04-01 and 074.03-04-02. The site is currently zoned RM (Townhouse Zone). As proposed, the site would be expanded and redeveloped. The Concept I Plan is shown on Figure 2-2.

Old Town Small Area Plan

The Old Town Small Area Plan (OT SAP) is located in Planning District I in the central third of the City and is bound by the Potomac River on the east, Oronoco Street to the north, Washington Street generally to the west with an extension along King and Duke Streets to West Street, and the Capitol Beltway (I-395) to the south. The OT SAP was adopted in 1992 (Ordinance 3576) and has been amended through November 15, 2014. Old Town consists of primarily residential uses.

Washington Street, Henry Street, and Patrick Street are the major north/south roadways which connect Alexandria to National Airport and Washington D.C. and serve regional traffic from other Northern Virginia jurisdictions and Maryland. As noted, it is planned that most north/south traffic utilize these roadways and carpool traffic uses the HOV lanes on all three of the roadways. As a result, Washington Street, Henry Street, and Patrick Street are all heavily traveled in the morning and evening by commuters.

Roadway Network

Regional access to the subject site is provided by Washington Street, US Route 1 (S. Henry Street and S. Patrick Street), King Street and Duke Street which provide connections to Interstate 495/95 and Interstate 395 to the north, west and south. Local access to the site is provided via signalized intersections along Duke Street at S. Patrick Street and S. Alfred Street. Direct access to the existing and proposed parking garages is provided along S. Patrick Street and S. Alfred Street.

US Route 1 (Henry Street/ Patrick Street) are south/north one-way urban principal arterial roads typically with three (3) lanes in their respective directions. The roads have posted speed limits of 25 mph.

Washington Street is a four-lane urban principal arterial with a posted speed limit of 25 mph that serves local land uses with traffic signals located at major intersections. The curb lane in the northbound direction from 7:00 to 9:00 AM and in the southbound direction from 4:00 to 6:00 PM is restricted to HOV 2+ only. On-street parking is permitted in northbound curb lanes except between 7:00 to 9:00 AM and in the southbound curb lanes except for between 4:00 to 6:00 PM.

Alfred Street is a local two-way street with one travel lane in both the northbound and southbound directions. It has a posted speed limit of 25 mph. On-street parking is provided on most block faces with varying restrictions.

Wolfe Street is a local road that operates one lane in each direction near the proposed site. It has a posted speed limit of 25 mph. Two-hour parking is provided along both sides of Wolfe Street. It currently terminates before S. Patrick Street along the southern portion of the site frontage.

The existing lane use and traffic control are shown on Figure 2-3. The following study intersections currently operate under signal control:

- Cameron Street/S. Alfred Street
- S. Henry Street/King Street
- S. Patrick Street/King Street
- Alfred Street/King Street
- S. Washington Street/King Street
- S. Henry Street/Prince Street
- S. Alfred Street/Prince Street
- S. Henry Street/Duke Street
- S. Patrick Street/Duke Street
- S. Alfred Street/Duke Street
- S. Columbus Street/Duke Street
- S. Washington Street/Duke Street
- S. Patrick Street/Gibbon Street
- S. Alfred Street/Gibbon Street
- S. Patrick Street/Franklin Street

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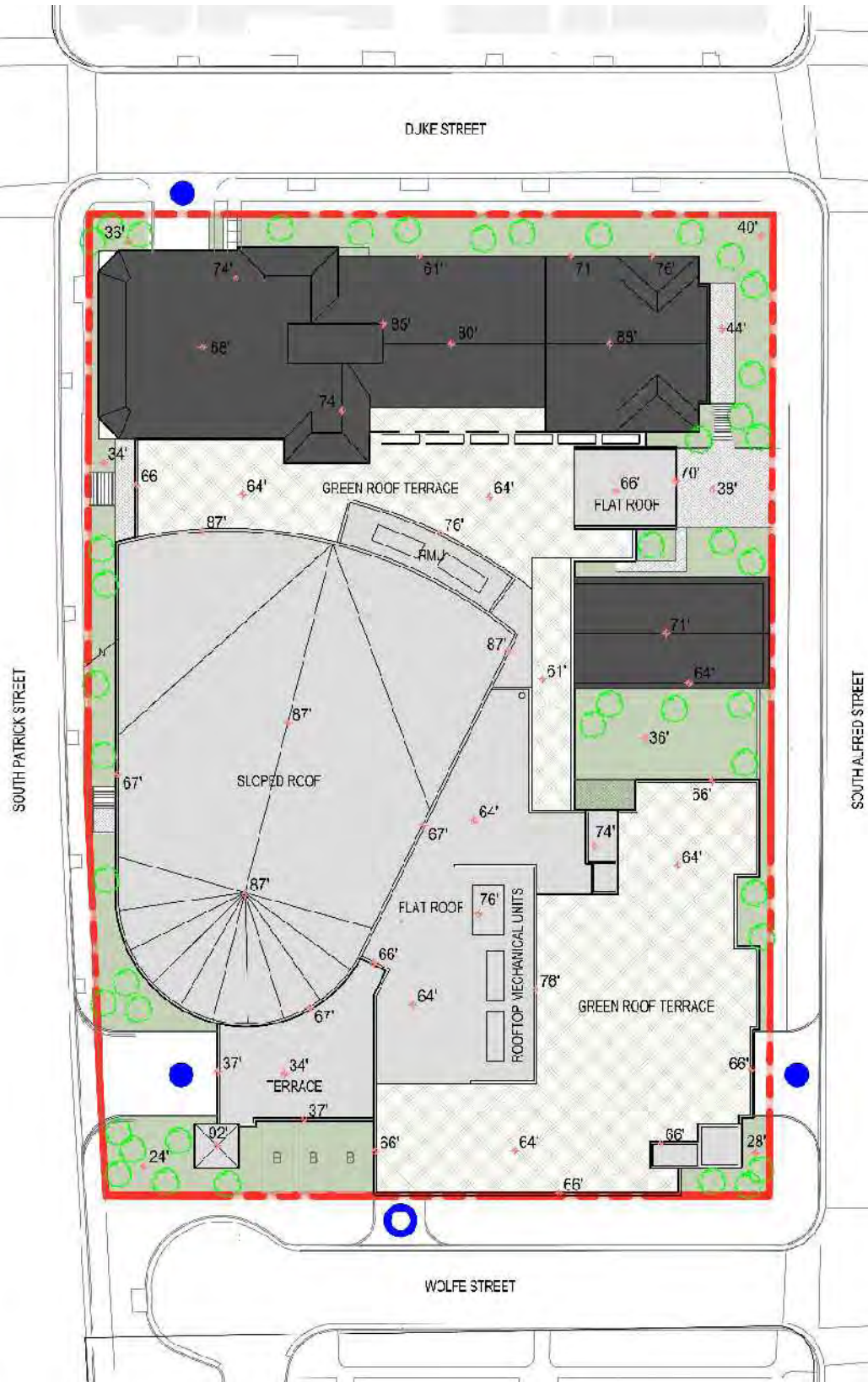


Figure 2-1
Conceptual Development Plan

Alfred Baptist Church
City of Alexandria



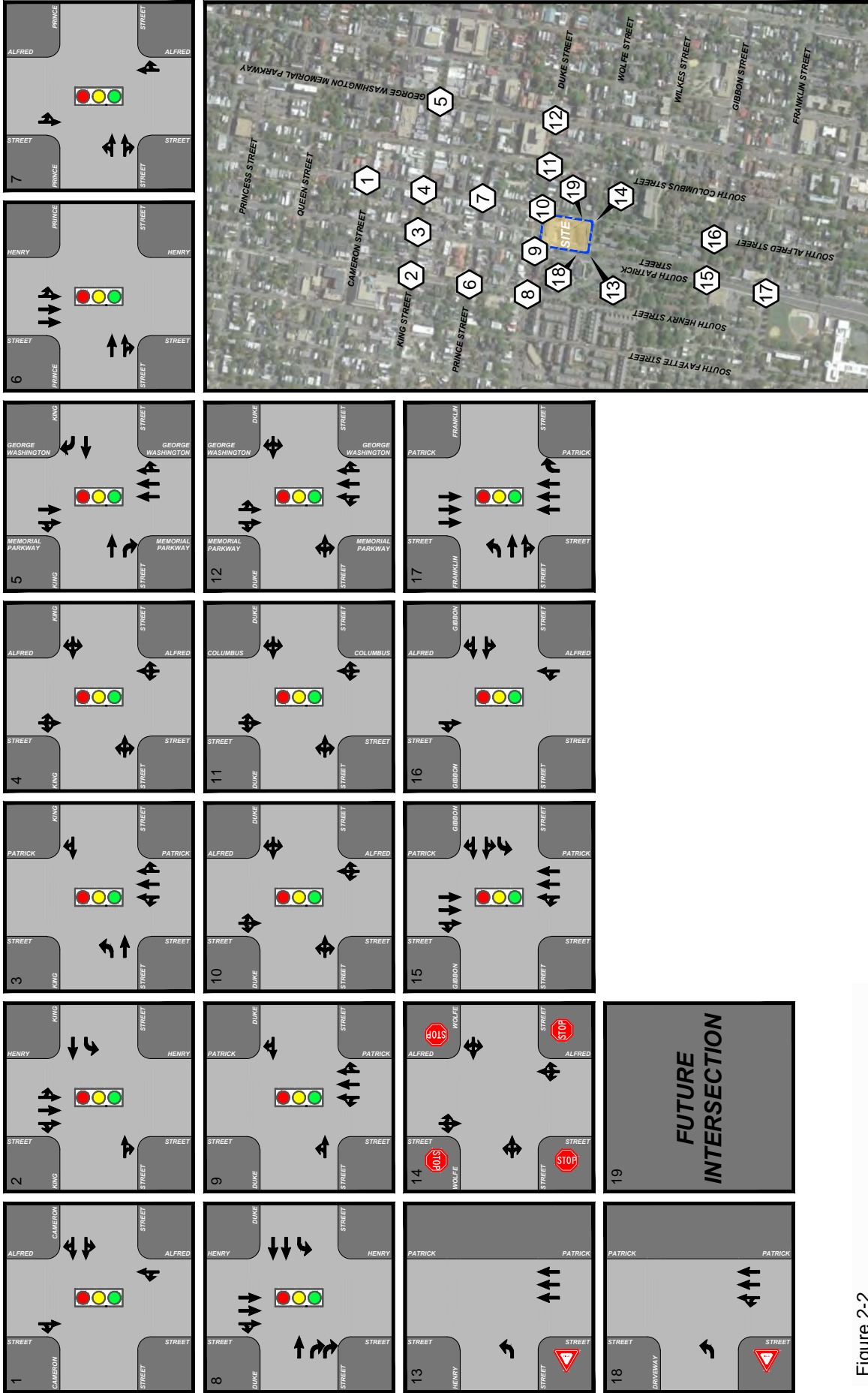
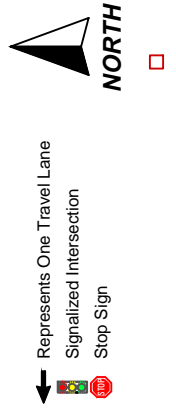


Figure 2-2
Existing Lane Use and Traffic Controls

Alfred Baptist Church
City of Alexandria, Virginia



SECTION 3 ANALYSIS OF EXISTING CONDITIONS

Traffic Volumes

Wells + Associates conducted weekday vehicular, pedestrian and bicycle counts on Tuesday, May 19, 2015 and Wednesday May 20, 2015 from 6:30 to 9:30 AM and 4:30 to 7:30 PM and on Sunday May 31, 2015 from 7:00 AM to 3:00 PM at the following intersections:

- Cameron Street/S. Alfred Street
- S. Henry Street/King Street
- S. Patrick Street/King Street
- Alfred Street/King St.
- S. Washington Street/King Street
- S. Henry Street/Prince Street
- S. Alfred Street/Prince Street
- S. Henry Street/Duke Street
- S. Patrick Street/Duke Street
- S. Alfred Street/Duke Street
- S. Columbus Street/Duke Street
- S. Washington Street/Duke Street
- Turn Movements from S. Henry Street/South Patrick Street
- S. Alfred Street/Wolfe Street
- S. Patrick Street/Gibbon Street
- S. Alfred Street/Gibbon Street
- S. Patrick Street/Franklin Street

The existing peak hour vehicular volumes are shown in Figure 3-1 and 3-2. The peak hour pedestrian and bicycle volumes are shown in Section 7 of the report. The count worksheets are included in Appendix B. For purposes of this traffic analysis and in the interest of conservatism, the peak hours of individual intersections were utilized. Intersections without gaps or other development were balanced up so that the total segment traffic volumes were within 10%.

Figure 3-1 indicates that S. Alfred Street south Duke Street presently carries 428 AM peak hour trips, 384 PM peak hour trips, and 192 Sunday peak hour trips. Duke Street east of South Patrick Street presently carries 920 AM peak hour trips, 930 PM peak hour trips, and 984 Sunday peak hour Trips.

S. Patrick Street which runs only in the northbound direction carries approximately 2,204 AM peak hour trips, 1,559 PM peak hour trips, and 1,815 Sunday peak hour trips south of

Duke Street. South Henry Street, which runs only in the southbound direction presently carries 1,530 AM peak hour trips, 2,316 PM peak hour trips, and 2,016 Sunday peak hour trips south of Duke Street. The count data shows that the majority of traffic regionally traveling northbound into Alexandria during the AM peak hour, southbound out of Alexandria during the PM peak hour, and relatively equally northbound and southbound during the Sunday peak hour.

Operational Analysis

Existing peak hour levels of service (LOS) and the 50th and 95th percentile queues were calculated at key study intersections based on the existing lane use and traffic control shown on Figure 2-3; existing traffic signal phasing/timings obtained from T&ES; peak hour traffic, pedestrian and bicycle volumes shown in Figures 7-7 and 7-8, the Highway Capacity Manual (HCM) 2000 methodologies, and HCM 2010 methodologies, as reported by Synchro 9. The base Synchro files were provided by T&ES. The files were reviewed and account for the effects of the HOV lane on N. Washington Street, on-street parking maneuvers, bus blockages, and lane restrictions during the peak periods. Additionally, peak hour factors between 0.85 and 0.92 were used based on the existing peak hour traffic counts.

In addition, it is noted that the Central Business District (CBD) factor was used for the analysis for weekday AM and PM conditions to accurately reflect conditions experienced along the heavily traveled corridors in the study area. Field observations indicate that queueing between the closely spaced intersections reduces capacity during the weekday AM and PM periods. The CBD factor reduces the saturated flow rate and better accounts for the delay and queuing effects of closely spaced signalized intersections.

Levels of Service. The existing LOS results are summarized in Table 3-1 and indicate the following:

- All signalized study intersections currently operate at overall acceptable LOS “D” or better during the weekday AM and PM peak hours except Patrick Street/King Street and S. Washington Street/Duke Street during the AM peak hour, and Henry Street/King Street during the PM peak hour which all operate near capacity at LOS “E”. Some specific turning movements along U.S. Route 1 (S. Patrick Street and S. Henry Street) currently operate at near or at capacity (LOS “E” or LOS “F”) during the weekday AM and PM peak hours.
- All of the approaches at the stop controlled study intersections currently operate at acceptable levels of service (LOS “D” or better) during the AM and PM hours.
- All signalized study intersections currently operate at acceptable levels of service (LOS “D” or better) during the Sunday midday peak hour.

The existing LOS Synchro worksheets are included in Appendix C.

Queues. The 50th and 95th percentile queues of existing conditions are used to establish a datum against which to compare future conditions. The 50th percentile (or average) queue is defined as the maximum back of queue associated with a typical signal cycle. The 95th percentile queue is defined as the maximum back of queue with 95th percentile traffic volumes. The 95th percentile queue is not necessarily ever observed, it is simply based on statistical calculations.

As shown on Table 3-2, peak hour queueing along both S. Henry Street and S. Patrick Street for thru movements at study intersections is consistent with commuter travel patterns. Longer queues were observed in the northbound direction during the AM peak hour and in the southbound direction during the PM peak hour. The estimated 95th percentile queue exceeded available storage for the eastbound right movement on Duke Street at S. Henry Street (weekday PM Peak Hour).

Table 3-1
Alfred Street Baptist Church
Existing Conditions Intersection Level of Service Summary ⁽¹⁾

Intersection	Control	Approach/ Movement	Existing Conditions					
			AM Peak Hour		PM Peak Hour		Sunday Peak Hour	
			LOS	Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)
1. Alfred Street/Cameron Street	Signalized	WBLTR	B	14.5	B	19.6	B	15.4
		NBLT	A	6.0	A	7.7	A	7.9
		SBTR	B	12.4	C	21.5	B	11.7
		Overall	A	9.6	B	18.8	B	12.5
2. Henry Street/King Street	Signalized	EBTR	C	26.6	D	50.3	D	36.1
		WBL	A	9.0	B	15.3	B	17.5
		WBT	B	10.9	B	17.1	B	16.2
		SBLTR	D	46.4	F	87.0	C	23.5
		Overall	D	38.7	E	72.3	C	23.9
3. Patrick Street/King Street	Signalized	EBL	C	22.2	B	10.4	B	14.7
		EBT	B	18.9	B	14.0	B	15.4
		WBTR	C	21.6	C	22.1	C	21.3
		NBLTR	F	92.0	B	12.8	B	10.1
		Overall	E	78.8	B	14.4	B	12.5
4. Alfred Street/King Street	Signalized	EBLTR	A	6.4	A	6.9	B	11.8
		WBLTR	A	9.8	B	15.3	B	11.2
		NBLTR	B	18.5	A	9.8	A	4.8
		SBLTR	B	11.6	C	21.5	B	11.9
		Overall	B	13.6	B	14.9	B	10.6
5. Washington Street/King Street	Signalized	EBT	D	35.1	C	32.4	C	27.6
		EBR	C	31.1	C	28.7	C	22.4
		WBT	C	33.8	D	36.1	C	26.6
		WBR	C	30.9	C	28.1	C	23.2
		NBTR	A	3.3	A	9.3	B	16.9
		SBTR	A	9.6	C	34.5	C	28.4
		Overall	A	6.7	C	27.3	C	23.3
		Overall	A	6.7	C	27.3	C	23.3
6. Henry Street/Prince Street	Signalized	EBTR	B	14.8	E	55.9	B	16.9
		SBLT	A	4.4	A	4.3	A	4.5
		Overall	A	7.7	C	27.5	A	7.0
7. Alfred Street/Prince Street	Signalized	EBLTR	A	1.3	A	3.9	A	1.5
		NBTR	B	11.2	B	12.6	B	13.9
		SBLT	B	14.9	C	26.5	B	11.2
		Overall	A	6.5	B	12.8	A	6.4
8. Henry Street/Duke Street *Southbound left turn only available on Sunday	Signalized	EBT	C	24.8	D	15.8	D	40.3
		EBR	B	18.6	E	34.8	C	29.2
		WBL	A	6.9	B	4.5	B	18.7
		WBT	A	6.6	B	0.6	B	12.7
		SBLTR*	B	16.6	D	25.2	A	5.0
		Overall	B	15.7	D	37.0	B	13.3
9. Patrick Street/Duke Street	Signalized	EBT	C	28.3	B	19.9	B	17.3
		WBTR	E	73.7	C	23.6	C	24.1
		NBLTR	D	45.2	D	43.1	B	19.2
		Overall	D	47.4	D	35.3	C	20.0
10. Alfred Street/Duke Street	Signalized	EBLTR	B	12.8	A	7.5	A	8.4
		WBLTR	A	9.2	A	9.4	A	9.6
		NBLTR	D	52.9	B	19.6	B	19.8
		SBLTR	A	6.8	C	28.8	B	14.7
		Overall	C	23.8	B	15.0	B	10.9
11. Columbus Street/Duke Street	Signalized	EBLTR	A	9.0	B	18.3	B	16.2
		WBLTR	C	21.4	C	23.9	B	15.9
		NBLTR	D	39.9	B	15.4	C	20.7
		SBLTR	A	5.2	C	26.5	B	14.1
		Overall	C	24.5	C	22.6	B	16.6
12. Washington Street/Duke Street	Signalized	EBLTR	F	98.9	D	45.2	C	32.8
		WBLTR	D	36.2	C	32.8	C	28.9
		NBTR	E	65.1	B	18.7	E	57.5
		SBLTR	A	7.0	B	10.6	C	22.2
		Overall	E	57.1	B	17.3	D	36.9
13. Patrick Street/U-Turns from Henry Street	Unsignalized	EBL	B	11.0	A	9.7	A	9.8
		NBTR	A	0.0	A	0.0	A	0.0
14. Alfred Street/Wolfe Street	Unsignalized	EBLTR	A	8.3	A	8.2	A	7.6
		WBLTR	A	7.9	A	9.3	A	7.6
		NBLTR	B	10.6	A	8.1	A	7.8
		SBLTR	A	7.9	B	10.3	A	8.0
15. Patrick Street/Gibbon Street	Signalized	WBL	F	82.0	F	126.0	C	28.3
		WBLTR	D	49.7	C	25.6	C	20.7
		NBLT	B	10.2	B	18.6	B	11.3
		SBTR	A	5.6	C	30.3	A	5.7
		Overall	B	15.3	D	36.9	B	10.5
16. Alfred Street/Gibbon Street	Signalized	WBLTR	B	15.6	B	12.0	A	8.9
		NBLT	C	23.0	D	49.3	B	12.5
		SBTR	B	12.5	B	14.8	A	9.4
		Overall	B	19.0	B	19.2	A	9.7
17. Patrick Street/Franklin Street	Signalized	EBLT	E	65.3	E	63.1	E	65.5
		EBR	E	67.7	E	67.0	E	67.5
		NBT	A	7.7	A	4.2	A	2.9
		NBR	E	57.8	A	5.4	A	3.2
		SBT	A	2.5	C	26.1	A	3.3
		Overall	B	19.1	B	19.1	A	4.5
18. Existing Garage Driveway/Patrick Street/ *Northbound right future movement only	Unsignalized	EBL	A	9.9	A	9.5	D	31.0
		NBLTR*	A	0.4	A	0.6	A	0.0

Notes:

(1) Capacity analysis based on Highway Capacity Manual methodology, using Synchro 9.0.

Table 3-2
Alfred Street Baptist Church
Existing Conditions Intersection Queue Summary ⁽¹⁾

Intersection	Intersection Control	Approach/Movement	Storage Length (ft)	Existing Conditions					
				AM Peak Hour		PM Peak Hour		Sunday Peak Hour	
				50th	95th	50th	95th	50th	95th
1. Alfred Street/Cameron Street	Signalized	WBLTR	-	48	72	134	187	45	72
		NBLT	-	19	m22	25	m39	29	m46
		SBTR	-	13	37	173	291	21	46
2. Henry Street/King Street	Signalized	EBTR	-	143	221	179	#357	131	#238
		WBL	100	16	m15	47	m53	44	m52
		WBT	-	89	m104	127	m159	121	m162
		SBLTR	-	~284	#394	~532	#586	310	383
3. Patrick Street/King Street	Signalized	EBL	100	55	m77	17	m18	30	m34
		EBT	-	92	m136	140	m150	123	m173
		WBTR	-	80	m56	42	#235	99	138
		NBLTR	-	~1310	m#827	55	#357	49	76
4. Alfred Street/King Street	Signalized	EBLTR	-	23	m28	26	m37	62	m78
		WBLTR	-	41	m58	70	m98	49	76
		NBLTR	-	32	m#457	21	34	13	21
		SBLTR	-	9	21	102	197	23	41
5. Washington Street/King Street	Signalized	EBT	-	68	111	89	143	153	221
		EBR	100	0	17	10	34	2	23
		WBT	-	50	93	141	205	128	195
		WBR	-	0	8	0	24	16	43
		NBTR	-	30	m25	98	146	150	172
		SBTR	-	88	108	604	#789	376	482
6. Henry Street/Prince Street	Signalized	EBTR	-	111	156	~351	#478	78	115
		SBLT	-	15	m15	35	m30	26	30
7. Alfred Street/Prince Street	Signalized	EBLTR	-	7	m7	25	31	5	7
		NBTR	-	68	m71	26	m49	32	60
		SBLT	-	26	49	150	226	40	m63
8. Henry Street/Duke Street	Signalized	EBT	-	178	267	155	#261	160	#285
		EBR	125	79	113	~177	#252	79	120
		WBL	-	8	m8	40	m44	42	m54
		WBT	-	60	m55	81	m90	82	m106
		SBLTR*	-	36	m#320	~440	m#496	24	31
9. Patrick Street/Duke Street	Signalized	EBT	-	94	184	98	m140	75	m134
		WBTR	-	~287	m#449	140	#458	112	#482
		NBLTR	-	~654	#740	330	#413	209	285
10. Alfred Street/Duke Street	Signalized	EBLTR	-	50	m65	36	m42	52	m49
		WBLTR	-	78	m132	90	m128	90	117
		NBLTR	-	226	#419	30	60	38	73
		SBLTR	-	3	10	88	#295	11	36
11. Columbus Street/Duke Street	Signalized	EBLTR	-	51	m103	73	m83	106	114
		WBLTR	-	120	189	150	226	145	211
		NBLTR	-	268	#489	57	100	77	128
		SBLTR	-	8	28	180	m242	19	46
12. Washington Street/Duke Street	Signalized	EBLTR	-	~282	#428	187	#325	212	324
		WBLTR	-	123	183	154	221	210	283
		NBTR	-	~851	#925	217	261	~394	#499
		SBLTR	-	38	50	37	m#54	118	#638
13. Patrick Street/U-Turns from Henry Street	Unsignalized	EBL	115	-	15	-	6	-	10
		NBTR	-	-	0	-	0	-	0
14. Alfred Street/Wolfe Street	Unsignalized	EBLTR	-	-	3	-	3	-	3
		WBLTR	-	-	5	-	23	-	5
		NBLTR	-	-	55	-	5	-	10
		SBLTR	-	-	8	-	45	-	15
15. Patrick Street/Gibbon Street	Signalized	WBL	-	297	#470	~467	m#643	125	239
		WBT	-	139	201	159	m#246	70	100
		NBLT	-	720	13	230	392	198	315
		SBTR	-	106	112	~205	m26	26	517
16. Alfred Street/Gibbon Street	Signalized	WBLTR	-	81	118	76	125	49	81
		NBLT	-	193	295	55	#159	33	67
		SBTR	-	5	21	46	106	5	29
17. Patrick Street/Franklin Street	Signalized	EBLT	-	5	16	22	47	8	22
		EBR	-	49	68	95	122	51	68
		NBT	-	358	951	140	260	92	229
		NBR	-	~1585	#1831	0	22	0	20
		SBT	-	71	270	~1494	m#1465	32	603
18. Existing Garage Driveway/Patrick Street	Unsignalized	EBL	-	-	3	-	2	-	84
		NBLTR	-	-	1	-	1	-	0

Notes:

- (1) Queue length is based on the 50th and 95th percentile queues in feet as reported by Synchro, Version 9.
- (2) "~" - 50th percentile volume exceeds capacity, queue may be longer than shown.
- (3) "#" - 95th percentile volume exceeds capacity, queue may be longer than shown.
- (4) "m" - Volume for 95th percentile queue is metered by upstream signal.

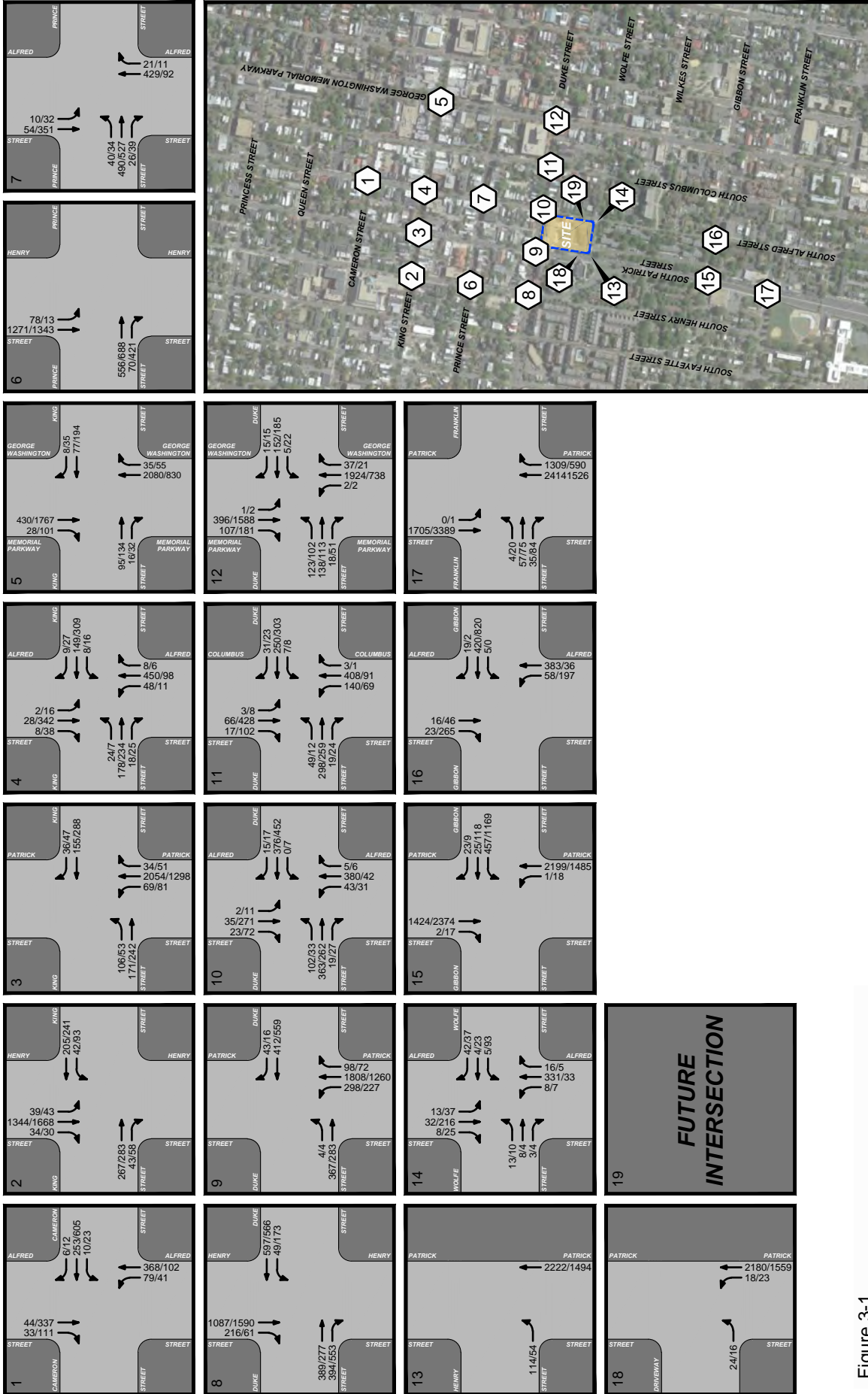
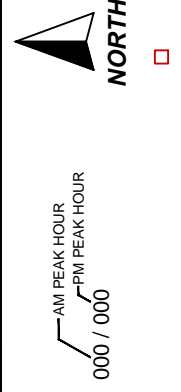


Figure 3-1 Existing Peak Hour Vehicular Traffic Volumes (Weekday)



Alfred Baptist Church
City of Alexandria, Virginia

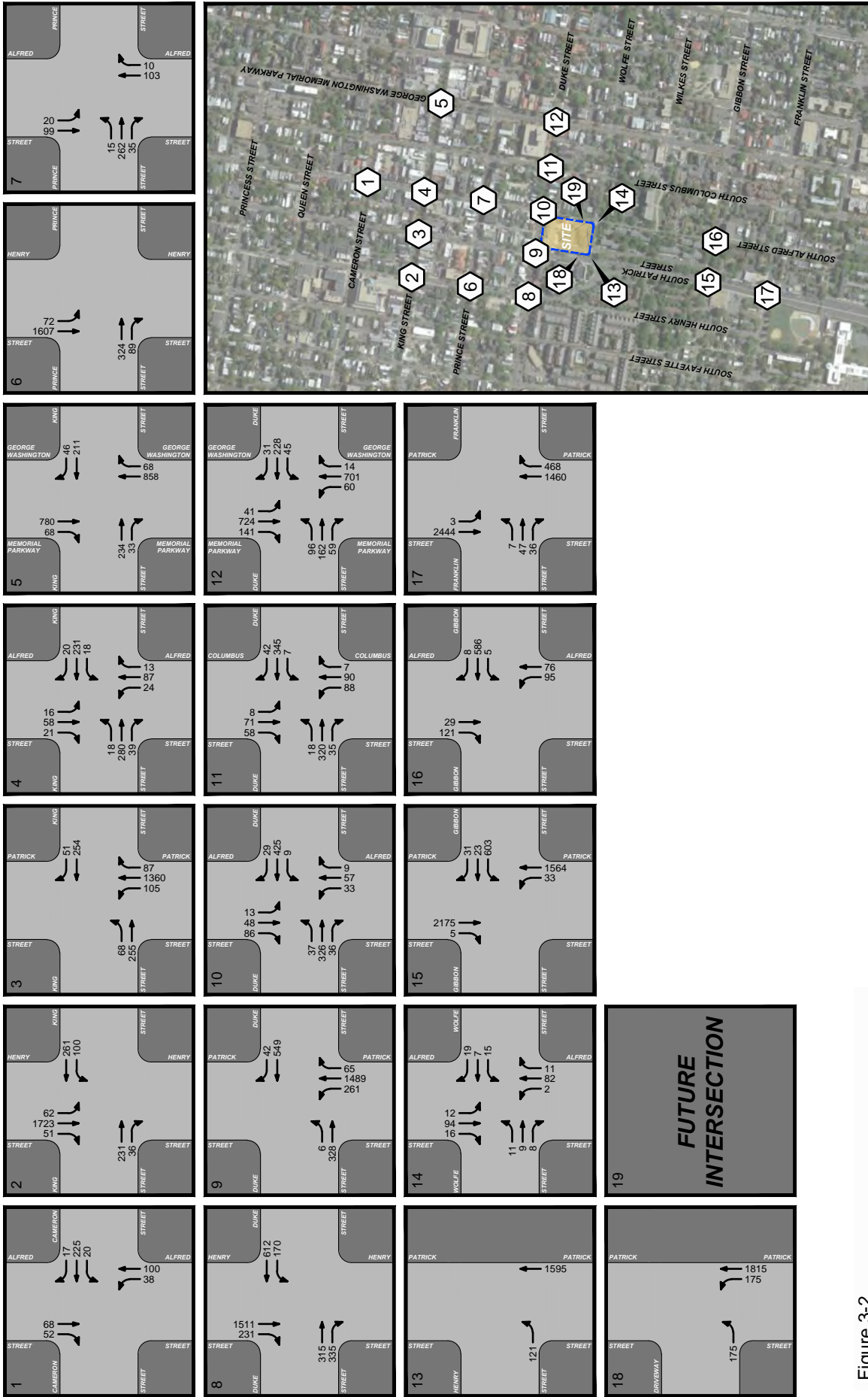


Figure 3-2 Existing Peak Hour Vehicular Traffic Volumes (Sunday)



Alfred Baptist Church
City of Alexandria, Virginia

SECTION 4 ANALYSIS OF FUTURE CONDITIONS WITHOUT DEVELOPMENT

Traffic Volumes

This section presents an analysis of future transportation conditions including projections of 2022 and 2028 future traffic forecasts without the proposed development, as well as capacity and queuing analyses.

Methodology/Assumptions. It was assumed that the proposed development would be complete and fully occupied by 2022 as specified in the traffic scoping document. Future traffic forecasts without the proposed development were derived based on baseline traffic counts, regional traffic growth and traffic generated by two (2) pipeline projects.

Regional Growth. An increase in traffic associated with regional growth from 2015 to 2022 was estimated at 0.5 percent per year compounded annually for all roadways. This conservative growth rate was applied to all turning movements and accounts for increases in traffic resulting from potential development and influences outside of the immediate study area. Baseline volumes were grown for seven (7) years, with the resultant growth in trips are shown on Figure 4-1 and 4-2. Baseline Traffic Volumes were grown for thirteen years at 0.5 percent per year for the 2028 total future condition and the resulting growth is shown on Figure 4-3 and 4-4.

Pipeline Developments. Traffic expected to be generated by the two (2) pipeline developments was included as part of this study and is shown on Figure 4-5. The two (2) pipeline developments included herein are:

- Carr Hotel (220 S. Union Street)
- Robinson Terminal South

As shown in Table 4-1, the two (2) pipeline developments are expected to generate a total of 160 AM peak hour trips, 171 PM peak hour trips and 211 Sunday peak hour trips upon completion. The peak hour traffic forecasts of the combined developments are shown on Figure 4-6 and 4-7. The peak hour traffic forecasts for each pipeline development are included in Appendix D.

2022 Future Traffic Volumes without Development. Future traffic forecasts without the proposed development were prepared for 2022 based on existing traffic counts, regional traffic growth (2015 to 2022), and the two (2) pipeline developments. The future traffic forecasts without development are shown on Figure 4-8 and 4-9.

Operational Analysis

Future peak hour levels of service without the proposed development in 2022 were calculated at the key study intersections based on the existing lane use and traffic control shown on Figure 2-3; the future traffic forecasts without the proposed development shown on Figure 4-3; the existing traffic signal phasings/timings obtained from the City of Alexandria T&ES; and the Highway Capacity Manual (HCM) 2000 methodology, HCM 2010 methodology, using Synchro 9.

Levels of Service. The 2022 LOS results without the proposed development and the addition of regional growth and the two (2) pipeline developments are summarized in Table 4-2 and indicate the following:

All signalized study intersections would continue to operate at overall acceptable LOS “D” or better during the AM, PM, and Sunday peak hours except for the following intersections:

- S. Henry Street/King Street operates at LOS “E” during the weekday PM peak hour
- S. Patrick Street/King Street operates at LOS “F” during the weekday AM peak hour
- S. Patrick Street/Duke Street operates at LOS “E” during the weekday AM peak hour
- Washington Street/Duke Street operates at LOS “E” during the weekday AM peak hour

Some turning movements along U.S. Route 1 (S. Patrick Street and S. Henry Street) currently operate at LOS “E” or “F” during the AM, PM, and/or Sunday peak hours. Additionally, the northbound left, right, and thru movements drop to an LOS “E” with a delay of 57.6 seconds.

- All signalized study intersections continue to operate at acceptable levels of service (LOS “D” or better) during the Sunday midday peak hour.
- All of the approaches at the stop controlled study intersections would continue to operate at acceptable levels of service (LOS “D” or better) during the weekday AM, PM, and Sunday peak hours.

Capacity analysis worksheets for the future conditions without the proposed development are included in Appendix E.

Queues. The future peak hour queue results without the proposed development for the turning movements are presented in Appendix E and summarized in Table 4-3. As shown in Table 4-3, the estimated 50th and 95th percentile queues at study intersections would increase marginally with the addition of the two (2) pipeline developments and regional growth. Consistent with existing conditions, the estimated 95th percentile queues for the eastbound right turns at Henry Street/Duke Street would extend beyond the available storage during the PM peak hour. Consistent with the existing condition, peak hour queueing along both S. Henry Street and S. Patrick Street for thru movements at study intersections is consistent with commuter travel patterns. Longer queues were observed in the northbound direction during the AM peak hour and in the southbound direction during the PM peak hour.

Table 4-1
Alfred Street Church
Pipeline Trip Generation Analysis ¹

Land Use (ITE Code)	ITE Land Use Code	Size	Units	AM Peak Hour		PM Peak Hour		ADT Total	Sunday		Sunday ADT Total	
				In	Out	In	Out		In	Out		
220 South Union Street												
Hotel	310	120	Rooms	46	34	41	43	84	45	45	90	714
220 South Union Street Total Trips				46	34	41	43	84	45	45	90	714
Robinson Terminal South Existing Uses												
Office	710	4,750	SF	6	1	1	6	7	1	0	1	5
Warehouse	150	89,650	SF	21	6	7	22	29	3	3	6	70
Total Existing Trips				27	7	8	28	36	4	3	7	75
Proposed Uses												
Residential Condominium/Townhouse	230	96	DU	9	41	39	19	58	29	30	59	658
Residential Non-Auto Mode Adjustment - 10%				-1	-4	-4	-2	-6	-3	-3	-6	-66
Net New Residential				8	37	35	17	52	26	27	53	592
Specialty Retail	826	5,299	SF	18	2	15	19	34	5	6	11	108
High-Turnover Sit Down Restaurant	932	6,174	SF	37	30	37	24	61	63	51	114	814
Retail Non-Auto Mode Adjustment - 25% Weekday & 40% Sunday				-14	-8	-13	-11	-24	-27	-23	-50	-204
Net New Retail Trips				41	24	39	32	71	41	34	75	718
Total Proposed Trips				49	61	74	49	123	67	61	128	1,310
Robinson Terminal Net New Trips				22	54	66	21	87	63	58	121	644
Total Pipeline Trips				68	88	107	64	171	108	103	211	1,358

Notes:

(1) All trip number were taken from the Robinson Terminal South TIA, dated October 21, 2014 by Wells + Associates.



Table 4-2
 Alfred Street Baptist Church
 Total Future without Development Intersection Level of Service Summary⁽¹⁾

Intersection	Intersection Control	Approach/Movement	Existing Conditions						2022 Future Conditions without Development					
			AM Peak Hour		PM Peak Hour		Sunday Peak Hour		AM Peak Hour		PM Peak Hour		Sunday Peak Hour	
			LOS	Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)
1. Alfred Street/Cameron Street	Signalized	WBLTR NBLT SBTR Overall	B A B A	14.5 6.0 12.4 9.6	B A C B	19.6 7.7 21.5 18.8	B A B B	15.4 7.9 11.7 12.5	B A B A	14.4 6.0 12.5 9.5	B A C B	19.9 7.8 21.9 19.2	B A B B	15.5 8.0 11.7 12.6
2. Henry Street/King Street	Signalized	EBTR WBL WBT SBLTR Overall	C A B D D	26.6 9.0 10.9 46.4 38.7	D B B F E	50.3 15.3 17.1 87.0 72.3	D B B C C	36.1 17.5 16.2 23.5 23.9	C A B D D	25.6 9.1 11.0 54.4 44.5	D B B E E	54.2 15.3 16.8 76.2 65.0	D B B C C	36.1 18.0 16.5 26.2 25.9
3. Patrick Street/King Street	Signalized	EBL EBT WBTR NBLTR Overall	C B C F E	22.2 18.9 21.6 92.0 78.8	B B C B B	10.4 14.0 22.1 12.8 14.4	B B C B B	14.7 15.4 21.3 10.1 12.5	C B C F A	22.6 19.3 21.1 107.0 91.6	B C B B B	10.2 13.7 21.8 14.5 15.5	B B B B B	14.8 15.7 19.1 11.9 13.4
4. Alfred Street/King Street	Signalized	EBLTR WBLTR NBLTR SBLTR Overall	B A B B B	6.4 9.8 18.5 11.6 13.6	A B A C B	6.9 15.3 9.8 21.5 14.9	B B A B B	11.8 11.2 4.8 11.9 10.6	C A A B B	5.8 9.6 26.6 11.5 18.0	A B B C B	7.4 15.2 10.1 22.3 15.3	B B A B B	10.9 11.3 4.8 11.8 10.2
5. Washington Street/King Street	Signalized	EBT EBR WBT WBR NBTR SBTR Overall	D C C C A A A	35.1 31.1 33.8 30.9 3.3 9.6 6.7	C D C C A C C	32.4 28.7 36.1 28.1 9.3 34.5 27.3	C C C C B C C	27.6 22.4 26.6 23.2 16.9 28.4 23.3	C C C C B A B	34.8 31.1 34.0 31.0 10.6 9.6 12.1	C C D C A D C	32.4 28.7 35.6 28.1 9.1 42.7 31.9	C C C C B C C	27.5 22.4 26.8 23.7 17.5 30.4 24.3
6. Henry Street/Prince Street	Signalized	EBTR SBLT Overall	B A A	14.8 4.4 7.7	E C C	55.9 4.3 27.5	B A A	16.9 4.5 7.0	B A A	15.0 3.6 7.2	E C C	64.5 4.8 31.5	B A A	16.9 4.9 7.2
7. Alfred Street/Prince Street	Signalized	EBLTR NBTR SBLT Overall	A B B A	1.3 11.2 14.9 6.5	A B C B	3.9 12.6 26.5 12.8	A B B A	1.5 13.9 11.2 6.4	A A B A	1.2 9.4 14.9 5.4	A B C B	5.0 12.7 25.6 12.9	A B B A	1.6 14.1 11.0 6.1
8. Henry Street/Duke Street *Southbound left turn only available on Sunday	Signalized	EBT EBR WBL WBT SBLTR* Overall	C B A A B B	24.8 18.6 6.9 6.6 16.6 15.7	D E B B D D	15.8 34.8 4.5 0.6 25.2 37.0	D C B B A B	40.3 29.2 18.7 12.7 5.0 13.3	C B A B C B	25.0 18.5 6.8 6.4 21.0 17.7	D E E B C C	44.7 57.6 18.8 13.5 32.0 33.5	D C C B A B	44.8 29.6 21.9 12.8 5.3 14.3
9. Patrick Street/Duke Street	Signalized	EBT WBTR NBLTR Overall	C E D D	28.3 73.7 45.2 47.4	B C D D	19.9 23.6 43.1 35.3	B C B C	17.3 24.1 19.2 20.0	D F E E	36.1 97.8 55.9 60.0	B D D D	20.0 21.3 49.1 38.8	B C C C	19.9 34.2 20.1 23.2
10. Alfred Street/Duke Street	Signalized	EBLTR WBLTR NBLTR SBLTR Overall	B A D A C	12.8 9.2 52.9 6.8 23.8	A A B C B	7.5 9.4 19.6 28.8 15.0	A A B B B	8.4 9.6 19.8 14.7 10.9	B A E A C	14.4 9.4 57.2 6.4 25.7	A A B C B	7.5 9.9 19.5 30.4 15.6	A A B B B	8.3 9.2 19.6 14.2 10.4
11. Columbus Street/Duke Street	Signalized	EBLTR WBLTR NBLTR SBLTR Overall	A C D A C	9.0 21.4 39.9 5.2 24.5	B C C C B	18.3 23.9 15.4 26.5 22.6	B B C B B	16.2 15.9 20.7 14.1 16.6	B C D A C	10.2 22.1 45.0 4.0 27.0	B C C C C	19.6 24.1 15.1 29.8 24.3	B B C B B	15.7 16.2 20.4 13.6 16.4
12. Washington Street/Duke Street	Signalized	EBLTR WBLTR NBTR SBLTR Overall	F D E A E	98.9 36.2 65.1 7.0 57.1	D C B B B	45.2 32.8 18.7 10.6 17.3	C C E C D	32.8 28.9 57.5 22.2 36.9	F D E A E	123.6 39.7 63.4 7.2 57.7	D D E C C	54.7 35.7 18.3 15.7 21.5	D C D C D	36.7 32.1 54.6 28.2 38.5
13. Patrick Street/U-Turns from Henry Street	Unsignalized	EBL NBTR	B A	11.0 0.0	A A	9.7 0.0	A A	9.8 0.0	B A	11.1 0.0	A A	9.8 0.0	A A	9.9 0.0
14. Alfred Street/Wolfe Street	Unsignalized	EBLTR WBLTR NBLTR SBLTR	A A B A	8.3 7.9 10.6 7.9	A A A B	8.2 9.3 8.1 10.3	A A A A	7.6 7.6 7.8 8.0	A A B A	8.3 7.9 10.7 7.9	A A A B	8.1 9.2 8.1 10.2	A A A A	7.6 7.6 7.8 7.9
15. Patrick Street/Gibbon Street	Signalized	WBL WBLTR NBLT SBTR Overall	F D B A B	82.0 49.7 10.2 5.6 15.3	F C B C D	126.0 25.6 18.6 30.3 36.9	C C B A B	28.3 20.7 11.3 5.7 10.5	F D B A B	81.3 49.0 11.8 5.0 15.8	F C B D D	139.6 27.1 20.6 41.8 44.6	C C B A B	28.4 20.3 13.2 7.5 12.0
16. Alfred Street/Gibbon Street	Signalized	WBLTR NBLT SBTR Overall	B C B B	15.6 23.0 12.5 19.0	B D A B	12.0 49.3 14.8 19.2	A B A A	8.9 12.5 9.4 9.7	B C B B	15.7 22.8 12.4 18.9	B D C C	12.6 53.3 15.5 20.2	A B A A	9.0 12.1 9.3 9.6
17. Patrick Street/Franklin Street	Signalized	EBLT EBR NBT NBR SBT Overall	E E A E A B	65.3 67.7 7.7 57.8 2.5 19.1	E E A A C B	63.1 67.0 4.2 5.4 26.1 19.1	E E A A A A	65.5 67.5 2.9 3.2 3.3 4.5	E E A E A C	65.3 67.7 8.2 66.4 2.4 21.2	E E A A D D	63.1 67.0 4.2 5.4 37.1 25.8	E E A A A A	65.6 67.5 2.8 3.2 3.6 4.6
18. Existing Garage Driveway/Patrick Street/ *Northbound right future movement only	Unsignalized	EBL NBLTR*	A A	9.9 0.4	A A	9.5 0.6	D A	31.0 0.0	B A	10.1 0.4	A A	9.6 0.6	D A	26.8 3.2

Notes:

(1) Capacity analysis based on Highway Capacity Manual methodology, using Synchro 9.0.

Table 4-3
 Alfred Street Baptist Church
 Total Future without Development Conditions Intersection Queue Summary⁽¹⁾

Intersection	Intersection Control	Approach/Movement	Storage Length (ft)	Existing Conditions						2022 Future Conditions without Development					
				AM Peak Hour		PM Peak Hour		Sunday Peak Hour		AM Peak Hour		PM Peak Hour		Sunday Peak Hour	
				50th	95th	50th	95th	50th	95th	50th	95th	50th	95th	50th	95th
1. Alfred Street/Cameron Street	Signalized	WBTR	-	48	72	134	187	45	72	47	73	140	194	46	73
		NBLTR	-	19	m22	25	m39	29	m46	19	m20	25	m40	29	m48
		SBTR	-	13	37	173	291	21	46	13	38	177	298	19	49
2. Henry Street/King Street	Signalized	EBTR	-	143	221	179	#357	131	#238	134	228	~195	#371	131	#243
		WBL	100	16	m15	47	m53	44	m52	16	m16	45	m49	46	m55
		WBT	-	89	m104	127	m159	121	m162	89	m108	122	m149	123	m170
3. Patrick Street/King Street	Signalized	EBL	100	55	m77	17	m18	30	m34	56	m85	16	m17	31	m36
		EBT	-	92	m136	140	m150	123	m173	93	m142	135	m141	127	m176
		WBTR	-	80	m56	42	#235	99	138	77	m58	42	m#304	92	#140
4. Alfred Street/King Street	Signalized	NBLTR	-	~1310	m#827	55	#357	49	76	~1395	m#822	54	#383	68	#90
		EBLTR	-	23	m28	26	m37	62	m78	20	m26	28	m40	54	m72
		WBTR	-	41	m58	70	m98	49	76	39	m58	63	89	50	77
5. Washington Street/King Street	Signalized	NBLTR	-	32	m#457	21	34	13	21	51	#507	20	35	12	22
		SBTR	-	9	21	102	197	23	41	8	22	109	206	22	43
		EBT	-	68	111	89	143	153	221	64	114	88	147	151	225
6. Henry Street/Prince Street	Signalized	EBR	100	0	17	10	34	2	23	0	18	10	36	1	24
		WBT	-	50	93	141	205	128	195	51	96	134	211	133	202
		WBR	-	0	8	0	24	16	43	0	18	0	26	23	54
7. Alfred Street/Prince Street	Signalized	NBTR	-	30	m25	98	146	150	172	~50	m26	100	142	166	190
		SBTR	-	88	108	604	#789	376	482	88	117	~746	#857	419	534
		EBTR	-	111	156	~351	#478	78	115	116	164	~375	#504	80	117
8. Henry Street/Duke Street	Signalized	SBLT	-	15	m15	35	m30	26	30	15	m14	38	m33	27	m30
		EBLTR	-	7	m7	25	31	5	7	5	m6	32	42	6	8
		NBTR	-	68	m71	26	m49	32	60	65	m67	25	m50	31	m62
*Southbound left turn only available on Sunday	Signalized	SBLT	-	26	49	150	226	40	63	25	51	139	233	39	m64
		EBT	-	178	267	155	#261	160	#285	181	286	155	#289	176	#320
		EBR	125	79	113	~177	79	120	77	115	155	#260	82	124	
9. Patrick Street/Duke Street	Signalized	WBL	-	8	m8	40	m44	42	m54	9	m8	44	m48	49	m55
		WBT	-	60	m55	81	m90	82	m106	60	m51	91	m100	92	m100
		SBLTR*	-	36	m#320	~440	m#496	24	31	41	m#121	~432	m#480	25	32
10. Alfred Street/Duke Street	Signalized	EBT	-	94	184	98	m140	75	m134	102	#341	98	m140	91	m134
		WBTR	-	~287	m#449	140	#458	112	#482	~334	m#496	131	m#490	129	#545
		NBLTR	-	~654	#740	330	#413	209	285	~734	#629	~354	#464	197	278
11. Columbus Street/Duke Street	Signalized	EBLTR	-	50	m65	36	m42	52	m49	52	m83	36	m46	52	m41
		WBTR	-	78	m132	90	m128	90	117	78	m148	97	m137	87	119
		NBLTR	-	226	#419	30	60	38	73	235	#435	29	63	36	74
12. Washington Street/Duke Street	Signalized	SBLTR	-	3	10	88	#295	11	36	3	10	97	#310	10	38
		EBLTR	-	51	m103	73	m83	106	114	59	12	80	m92	105	112
		WBTR	-	120	189	150	226	145	211	129	25	152	250	150	240
13. Patrick Street/U-Turns from Henry Street	Unsignalized	NBLTR	-	268	#489	57	100	77	128	287	57	54	103	73	131
		SBLTR	-	8	28	180	m242	19	46	6	3	183	m#406	18	41
		EBLTR	-	~282	#428	187	#325	212	324	~305	#492	216	#388	242	372
14. Alfred Street/Wolfe Street	Unsignalized	WBTR	-	123	183	154	221	210	283	161	250	186	285	261	378
		NBTR	-	~851	#925	217	261	~394	#499	~841	#953	207	268	372	#530
		SBLTR	-	38	50	37	m#54	118	#638	44	57	~49	m#715	139	#705
15. Patrick Street/Gibbon Street	Signalized	EBL	115	-	15	-	6	-	10	-	16	-	6	-	14
		NBTR	-	-	0	-	0	-	0	-	0	-	0	-	0
		EBLTR	-	-	3	-	3	-	3	-	3	-	3	-	3
16. Alfred Street/Gibbon Street	Signalized	WBTR	-	-	5	-	23	-	5	-	5	-	23	-	5
		NBLTR	-	-	55	-	5	-	10	-	60	-	5	-	10
		SBLTR	-	-	8	-	45	-	15	-	5	-	45	-	13
17. Patrick Street/Franklin Street	Signalized	WBL	-	297	#470	~467	m#643	125	239	0	#490	~494	m#672	127	267
		WBT	-	139	201	159	m#246	70	100	0	206	166	m#292	71	103
		NBLT	-	720	13	230	392	198	315	0	13	257	426	226	345
18. Existing Garage Driveway/Patrick Street	Unsignalized	SBTR	-	106	112	~205	m26	26	517	0	96	~244	m39	339	539
		WBTR	-	81	118	76	125	49	81	84	123	80	133	50	83
		NBLT	-	193	295	55	#159	33	67	190	303	55	#165	31	70
*Northbound right movement in future conditions only.	Unsignalized	SBTR	-	5	21	46	106	5	29	5	22	50	#120	5	31
		EBLT	-	5	16	22	47	8	22	4	15	22	47	8	23
		EBR	-	49	68	95	122	51	68	47	71	95	125	49	70
Notes:		NBT	-	358	951	140	260	92	229	382	1029	135	267	86	234
		NBR	-	~1585	#1831	0	22	0	20	~1672	#1915	0	30	0	28
		SBT	-	71	270	~1494	m#1465	32	603	64	264	~1603	m#1480	92	696
EBL	-	-	3	-	2	-	84	-	3	-	2	-	74		
NBLTR	-	-	1	-	1	-	0	-	1	-	1	-	10		

Notes:
 (1) Queue length is based on the 50th and 95th percentile queues in feet as reported by Synchro, Version 9
 (2) "~" - 50th percentile volume exceeds capacity, queue may be longer than shown
 (3) "#" - 95th percentile volume exceeds capacity, queue may be longer than shown
 (4) "m" - Volume for 95th percentile queue is metered by upstream signal

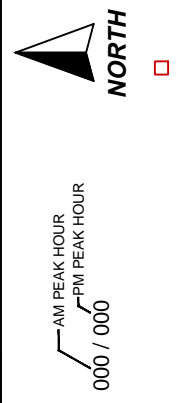
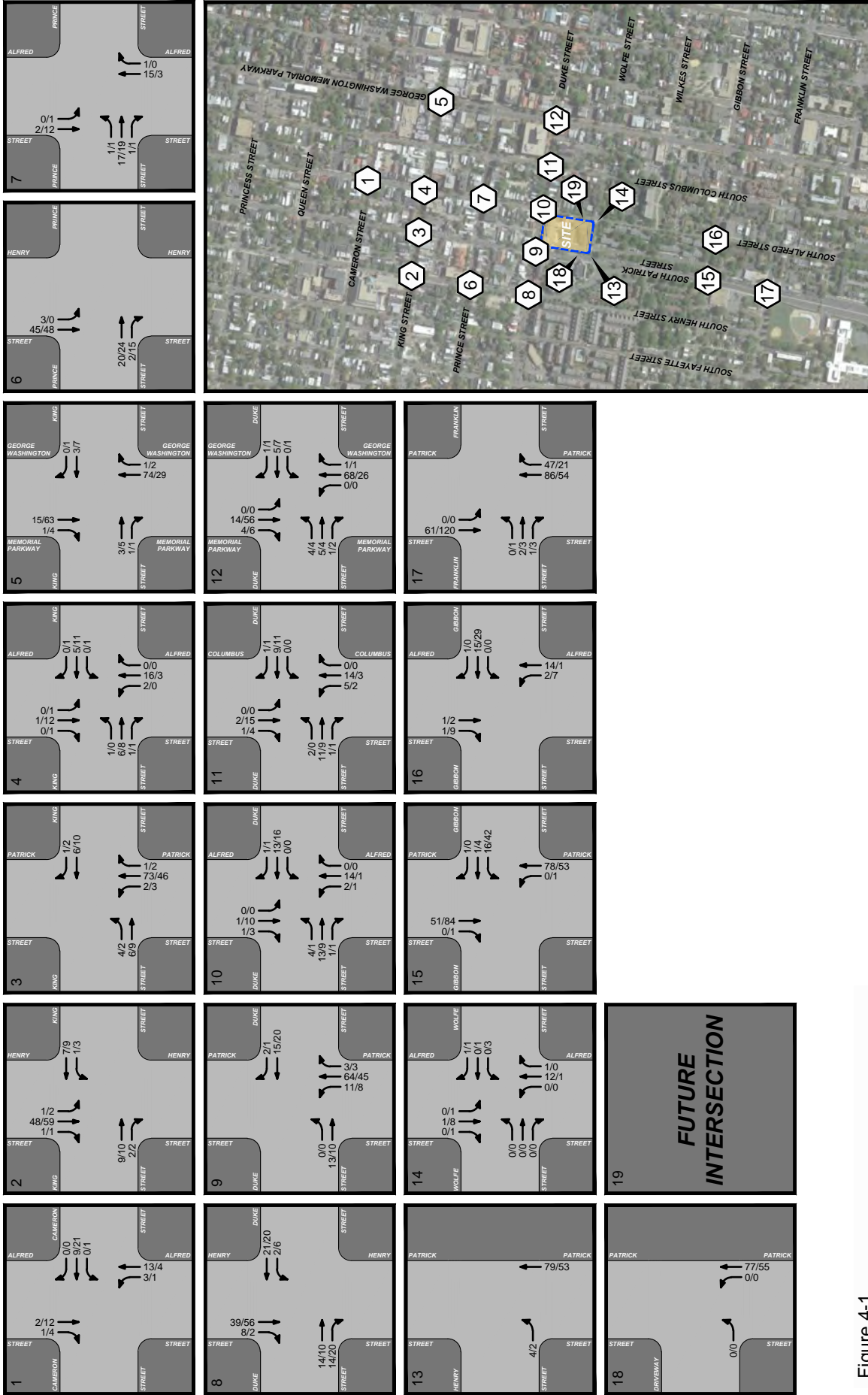


Figure 4-1
Regional Growth 1 (2015 - 2022) (Weekday)

Alfred Baptist Church
City of Alexandria, Virginia

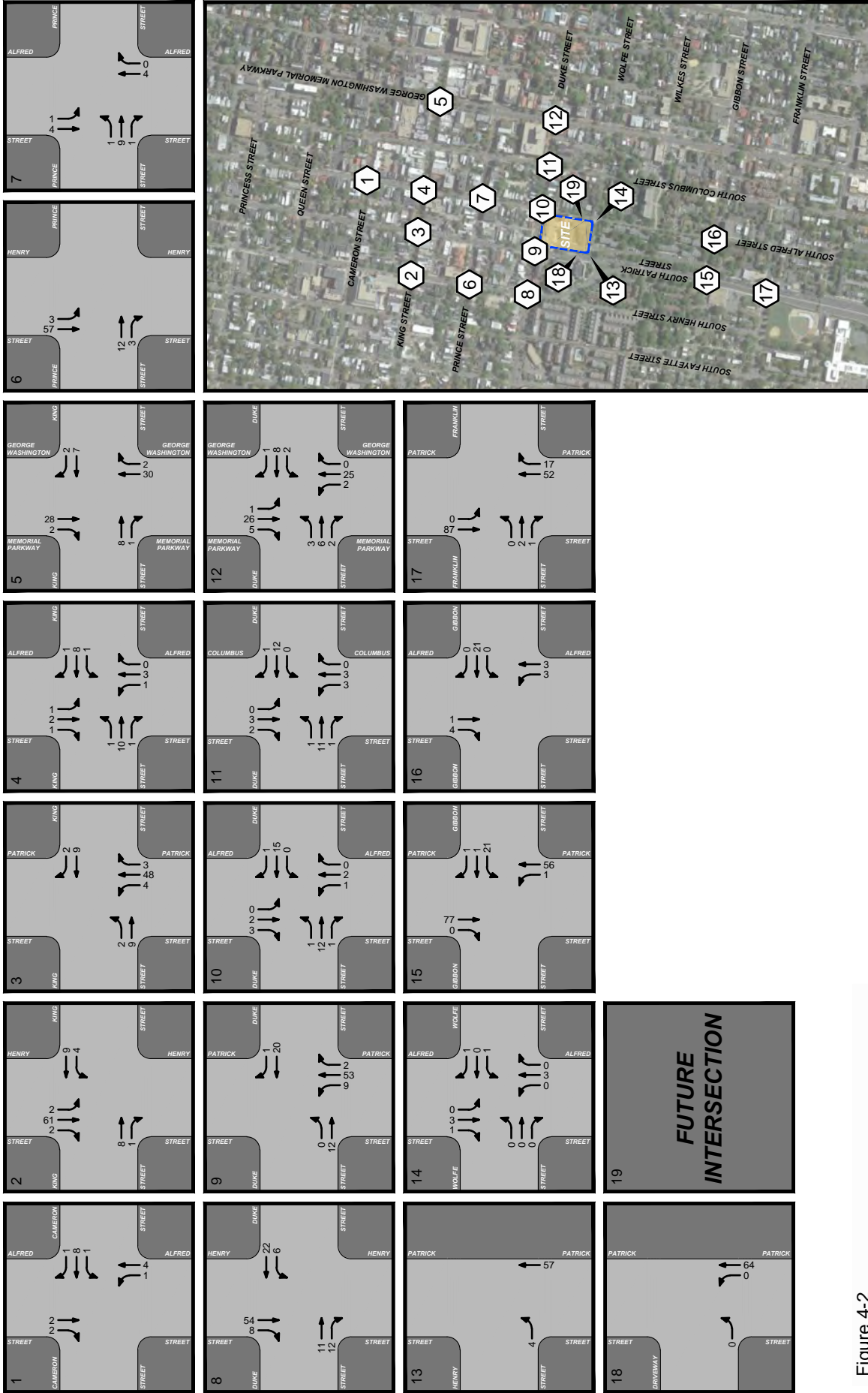


Figure 4-2
Regional Growth 1 (2015 - 2022) (Sunday)

Alfred Baptist Church
City of Alexandria, Virginia

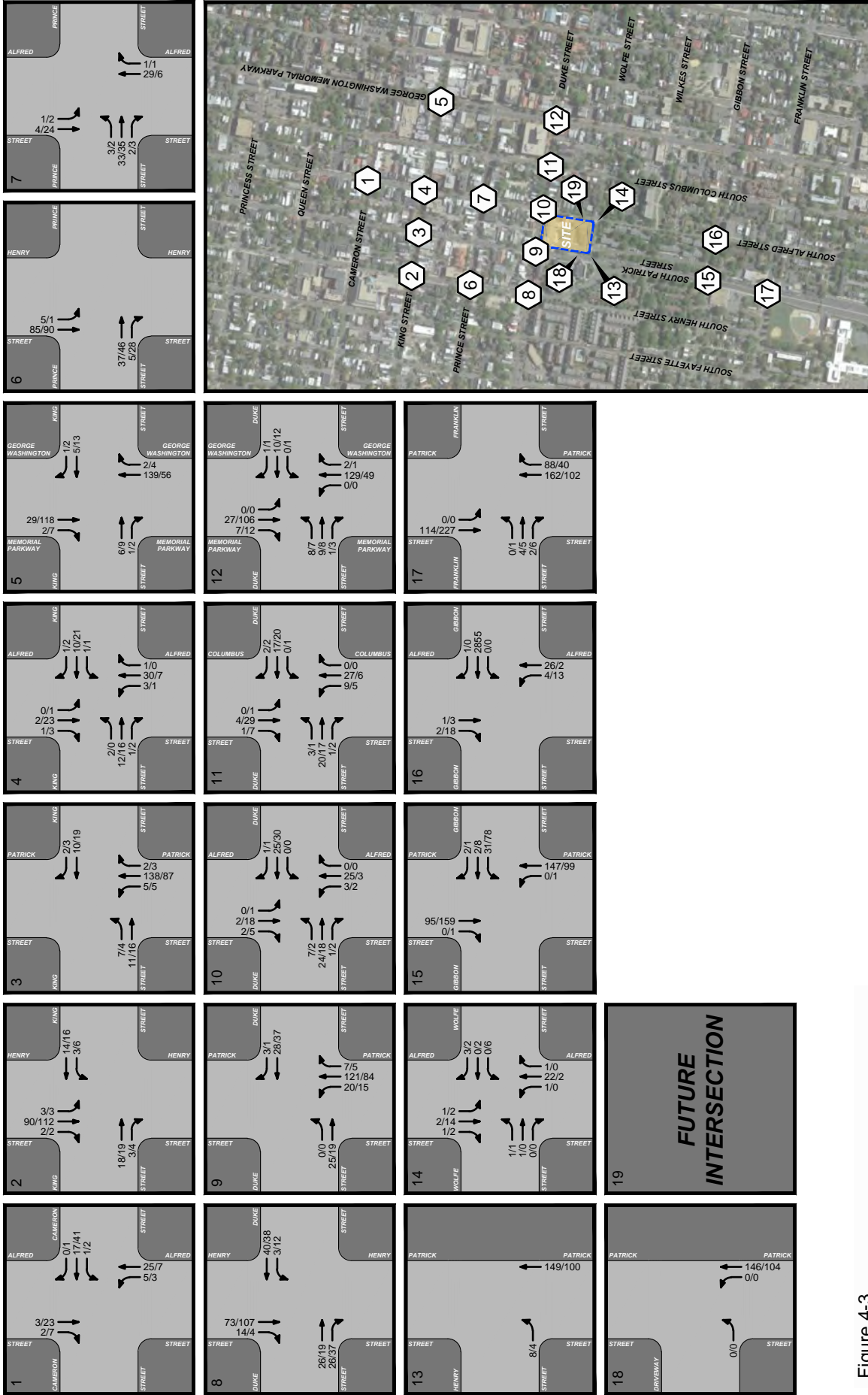


Figure 4-3
Regional Growth 2 (2015 - 2028) (Weekday)



Alfred Baptist Church
City of Alexandria, Virginia

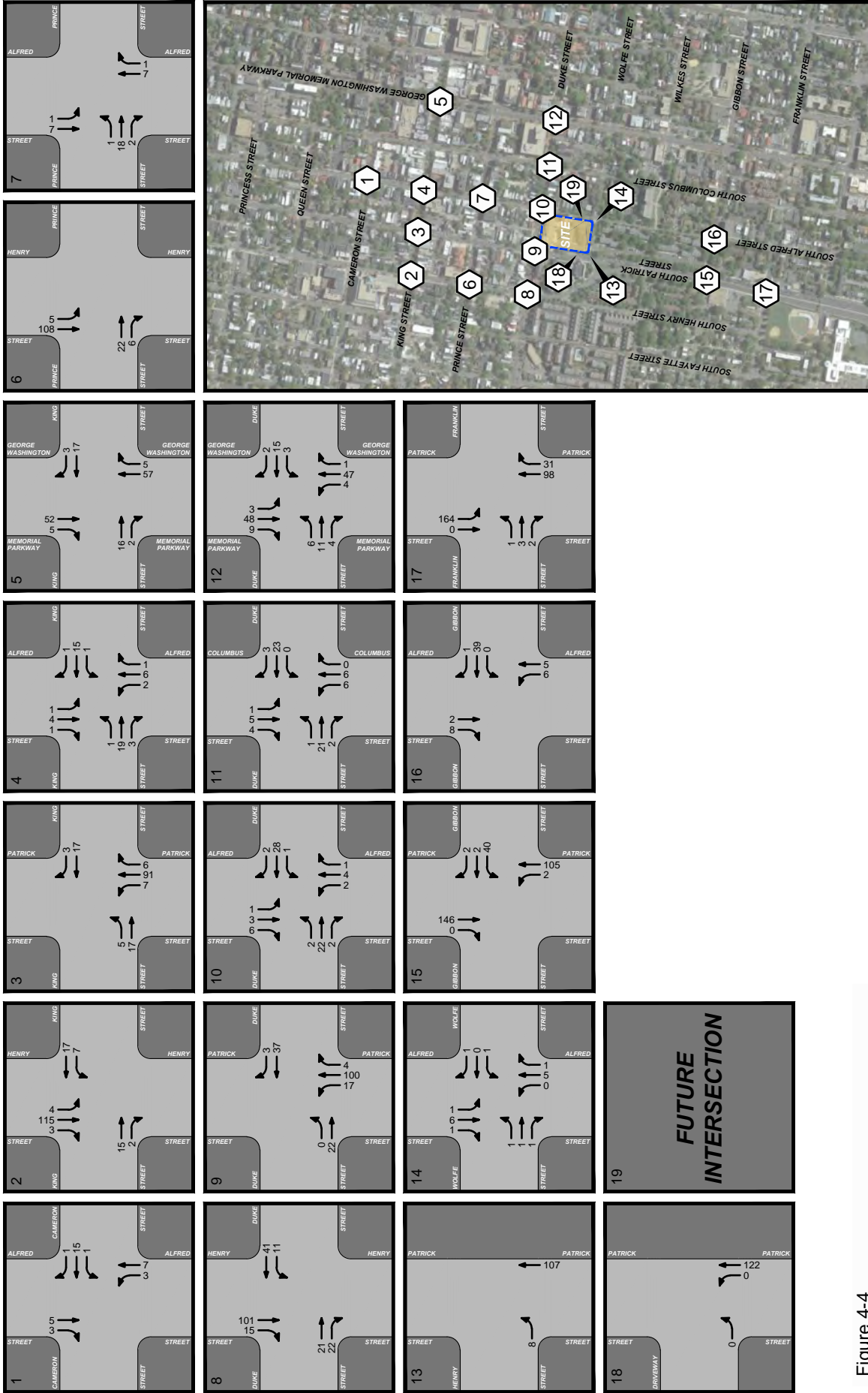


Figure 4-4
Regional Growth 2 (2015 - 2028) (Sunday)

Alfred Baptist Church
City of Alexandria, Virginia



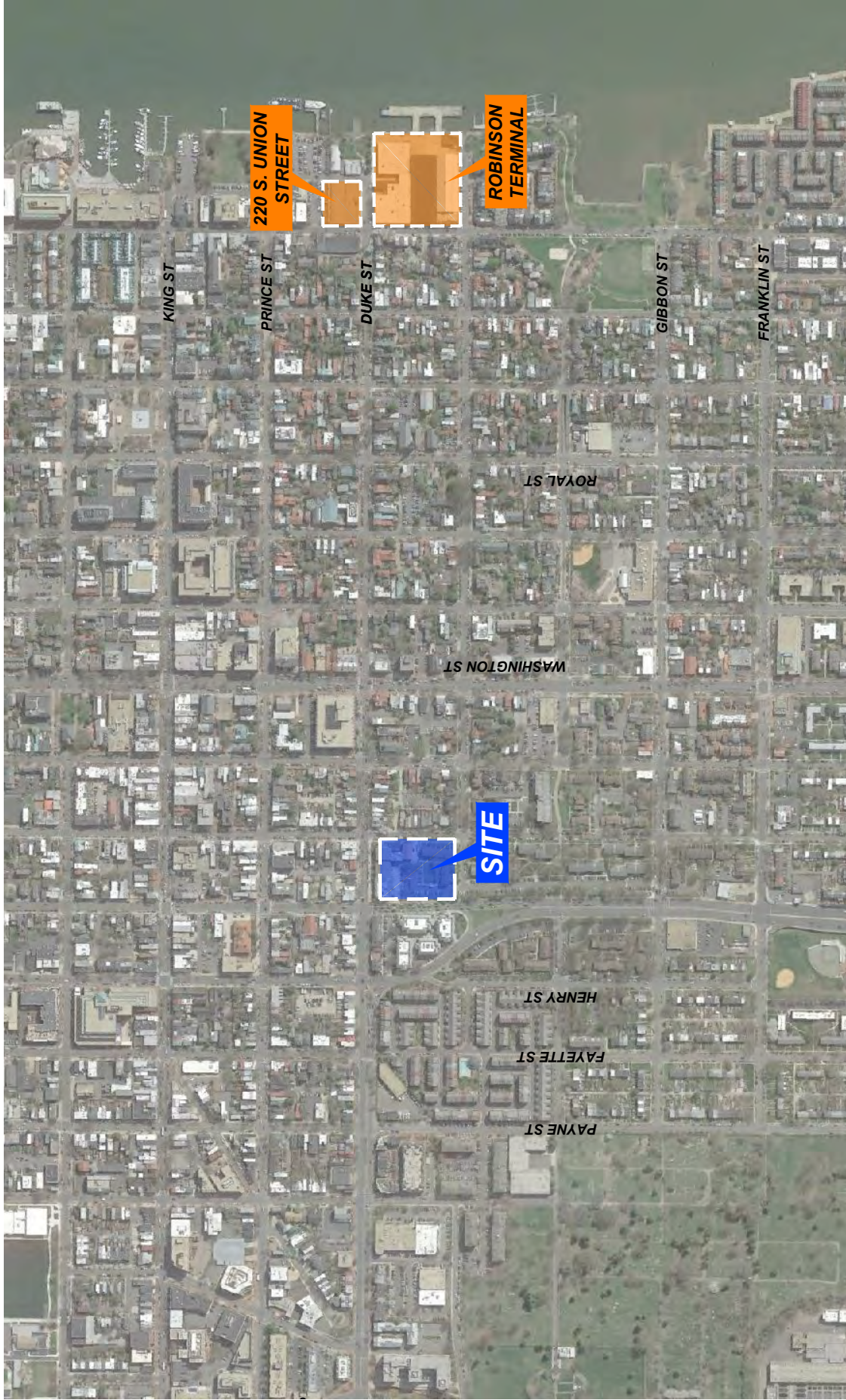


Figure 4-5
Pipeline Development Locations

Alfred Baptist Church
City of Alexandria, Virginia



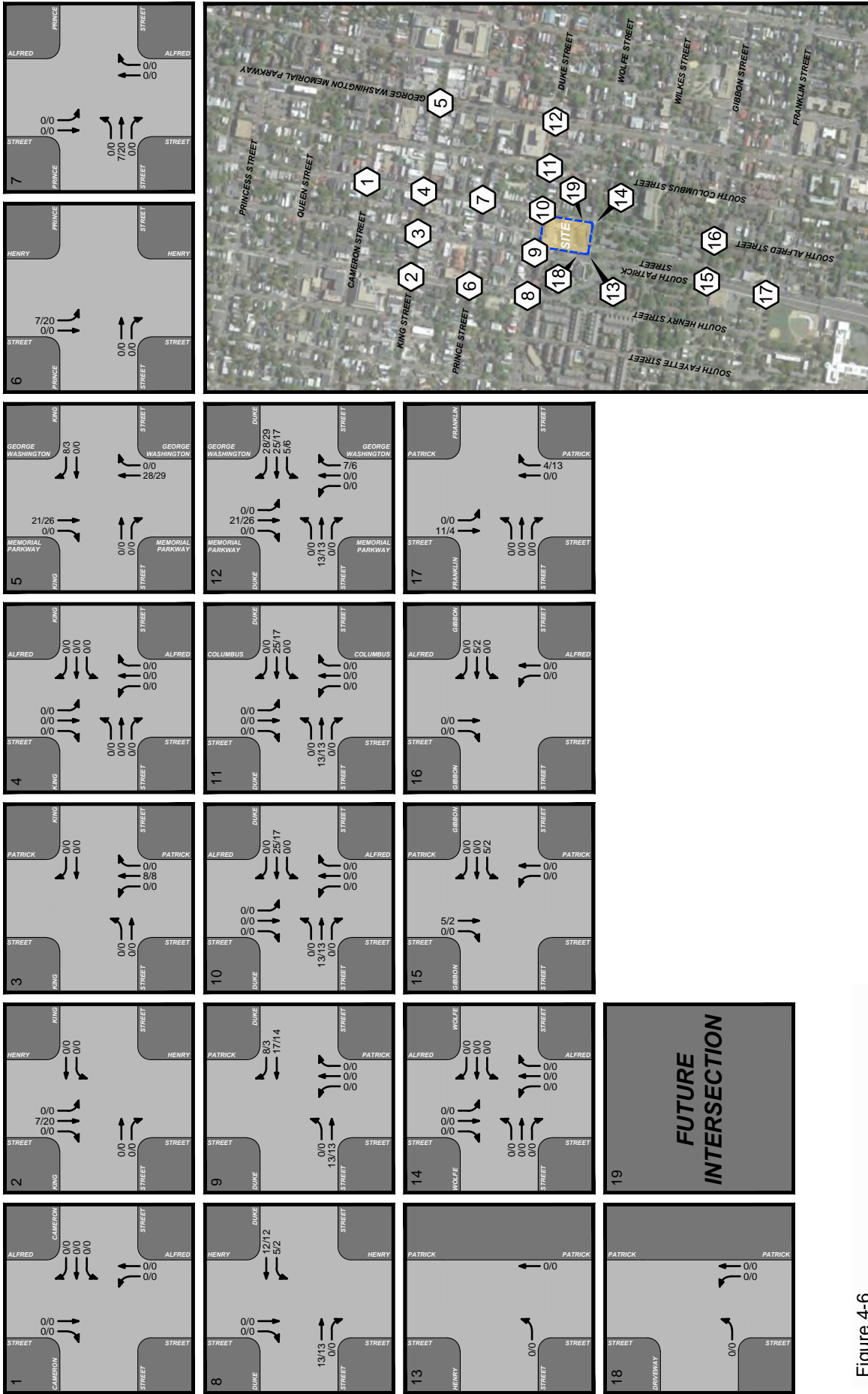


Figure 4-6
Total Pipeline Development Peak Hour Traffic Forecasts (Weekday)

Alfred Baptist Church
City of Alexandria, Virginia

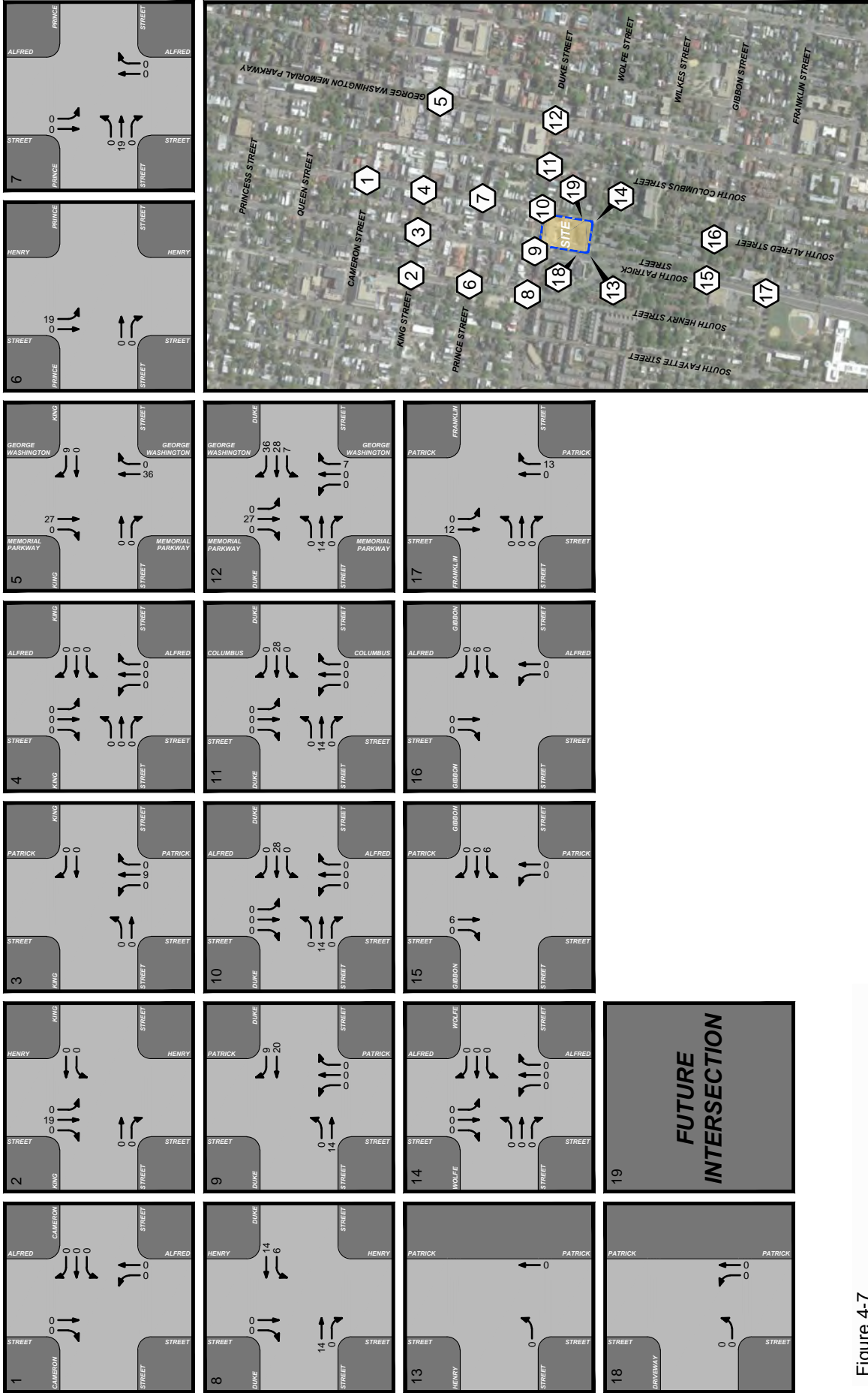


Figure 4-7
Total Pipeline Development Peak Hour Traffic Forecasts (Sunday)

Alfred Baptist Church
City of Alexandria, Virginia

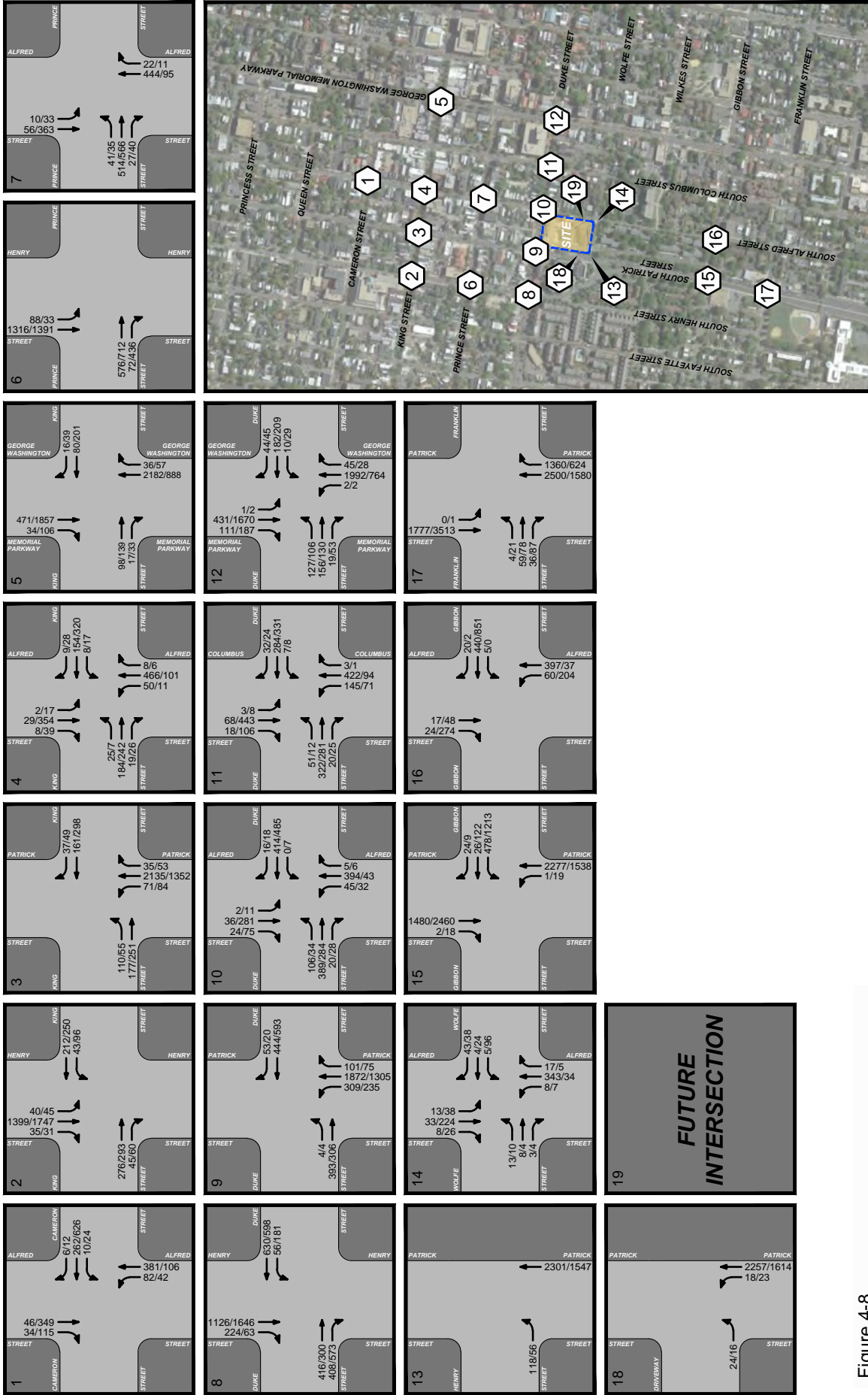


Figure 4-8
 Future Peak Hour Traffic Forecasts
 Without Development (2022) - Weekday
 Alfred Baptist Church
 City of Alexandria, Virginia



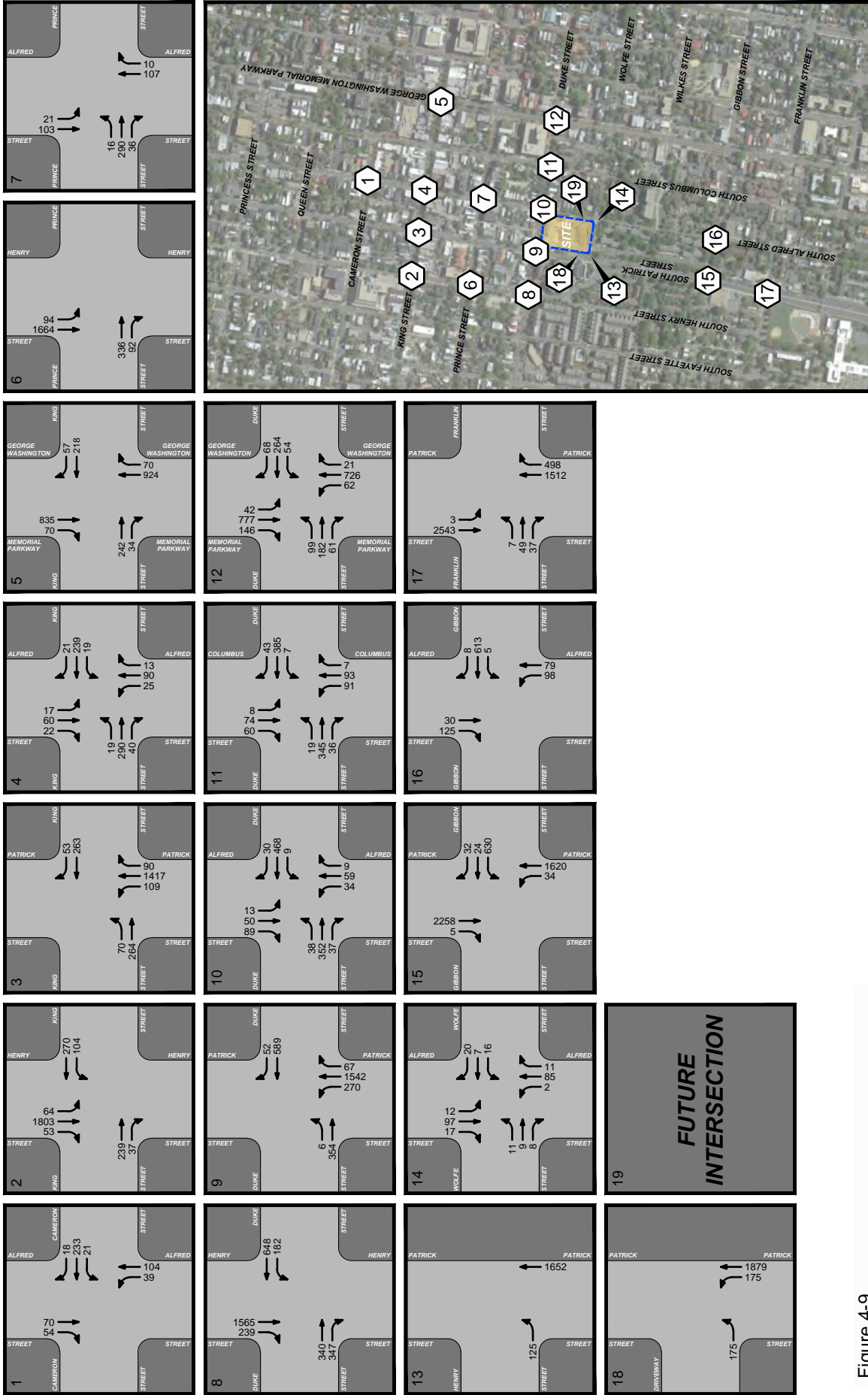


Figure 4-9
Future Peak Hour Traffic Forecasts
Without Development (2022) - Sunday
 Alfred Baptist Church
 City of Alexandria, Virginia



**SECTION 5
TRIP GENERATION, DISTRIBUTION AND ASSIGNMENT**

Trip Generation

The number of AM, PM, and Sunday peak hour trips that would be generated by the proposed development were estimated based on the Institute of Transportation Engineers Trip Generation Manual, 9th Edition trip rates and equations.

As shown in Table 5-1, the proposed development (181,150 GSF Church with 2,163 seats) is expected to generate 45 weekday AM peak hour trips, 19 weekday PM peak hour trips, 401 Sunday peak hour trips, 1,579 weekday daily (24-hour) trips, and 3,619 total Sunday (24-hour) trips upon completion and full occupancy by 2022. These estimates account for a 10 percent non-auto mode split reduction as agreed during the scoping process. The non-auto reduction was based on the subject site’s distance to King Street Metro station, shuttle service available to the church, and the primarily residential area surrounding the church facilities.

Site Trip Distribution

The distribution of peak hour trips generated by the proposed development was based on a review of existing traffic patterns in the study area, local knowledge, and previously prepared traffic study in the vicinity. The following distributions, as agreed upon during the scoping process, were used in this study:

<u>Direction (To/From)</u>	<u>Residential</u>
North via S. Washington Street	30%
North via U.S. Route 1 (S. Patrick Street)	5%
West via Duke Street	10%
East via Duke Street	5%
South via S. Washington Street	10%
South via U.S. Route 1 (S. Henry Street)	40%
Total	100%

Patrons will be able to take advantage of the grid street system in Old Town North in order to access the site from the north and south. Depending on the time of day, patrons will need to take slightly different routes to available parking in due to turning movement restrictions along S. Washington Street.



Site Access

The subject site is bounded by Duke Street to the north, Wolfe Street to the south, S. Patrick Street to the west and S. Alfred Street to the east. Direct access to the below grade parking garage is proposed on S. Patrick Street and at S. Alfred Street as shown on Figure 2-2. Access to the loading area is proposed on Wolfe Street, to the south of the proposed site. A truck would enter Wolfe Street, a dead-end street, and back into the designated service entrance. Trucks would exit the property onto S. Alfred Street by turning right and heading southbound, then turn right onto Gibbon Street and use U.S. Route 1 to head either north or south.

Rerouted Traffic Volumes

Traffic volumes were rerouted to the proposed garage entrance and exit from the garage across S. Patrick Street in order to reflect proper traffic flow once the development has been completed. All weekday vehicle trips will utilize the proposed garage underneath the site during weekday peak hours. Rerouted weekday AM and PM peak hour traffic volumes are shown on Figure 5-1. Sunday traffic will continue to utilize the existing garage in the future conditions.

Site Trip Assignments

The peak hour vehicle-trips shown in Table 5-1 were assigned to the public road network according to the directional distribution described above. All new trips were directed to the proposed on-site garage, as the number of net-new trips would fill the proposed garage to capacity. The existing trips would remain on the network and utilize the several available off-site parking locations as under current conditions. These net-new site generated traffic assignments for the proposed development are shown on Figures 5-2 and 5-3.

The synergy that would occur between the proposed development and adjacent mix of uses in Old Town was included in the 10% non-auto reduction. Therefore, the results of this study should be considered conservative.

Table 5-1
 Alfred Street Baptist Church
 Site Trip Generation Analysis⁽¹⁾

Land Use	ITE Land Use Code	Size	Units	AM Peak Hour			PM Peak Hour			Weekday ADT ⁽²⁾	Sunday Peak Hour			Sunday ADT
				In	Out	Total	In	Out	Total		In	Out	Total	
Existing⁽²⁾														
Church	560	48,350	SF	15	12	27	11	11	22	441	369	369	737	2,235
Townhomes	230	1,208	seats	3	12	15	11	6	17	172	27	28	55	106
		22	DU	18	24	42	22	17	39	613	396	397	792	2,341
Existing Subtotal														
Proposed Development														
Church	560	181,150	SF	56	45	101	32	35	67	1,651	660	660	1,320	4,002
<i>10% Non-auto Reduction</i>		2,163	seats	(6)	(5)	(10)	(3)	(4)	(7)	(165)	(66)	(66)	(132)	(400)
Total Proposed Site Trips				50	40	91	29	31	60	1,486	594	594	1,188	3,602
NET NEW TRIPS (Proposed vs. Existing)				32	16	49	7	14	21	873	199	198	396	1,261

Notes: (1) Traffic estimates based on Institute of Transportation Engineers (ITE) Trip Generation, Ninth Edition.

(2) Existing seat count was quantified using attendance recorded during a typical Sunday service.

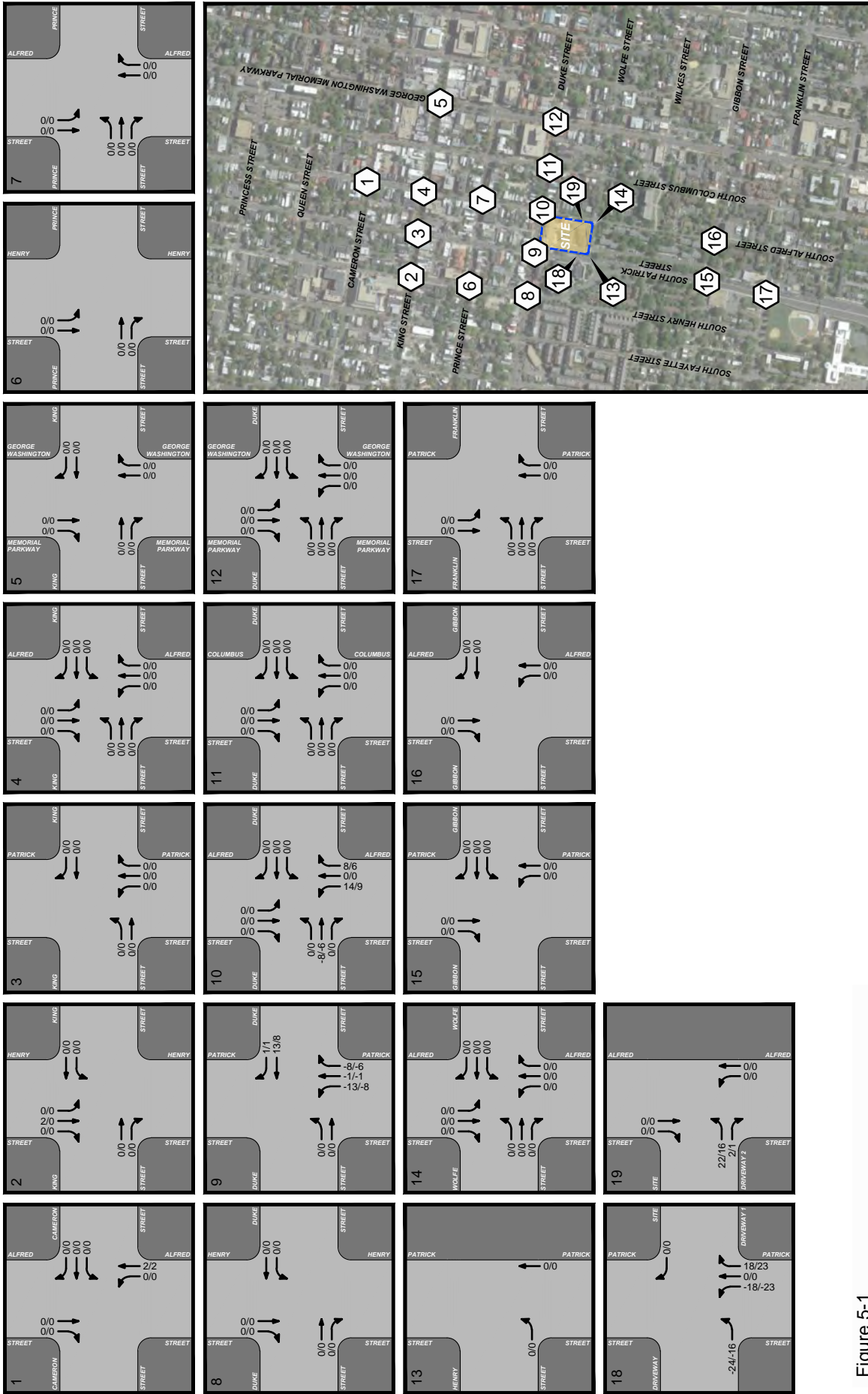


Figure 5-1
Existing Rerouted Weekday Traffic (Weekday)

Alfred Baptist Church
City of Alexandria, Virginia

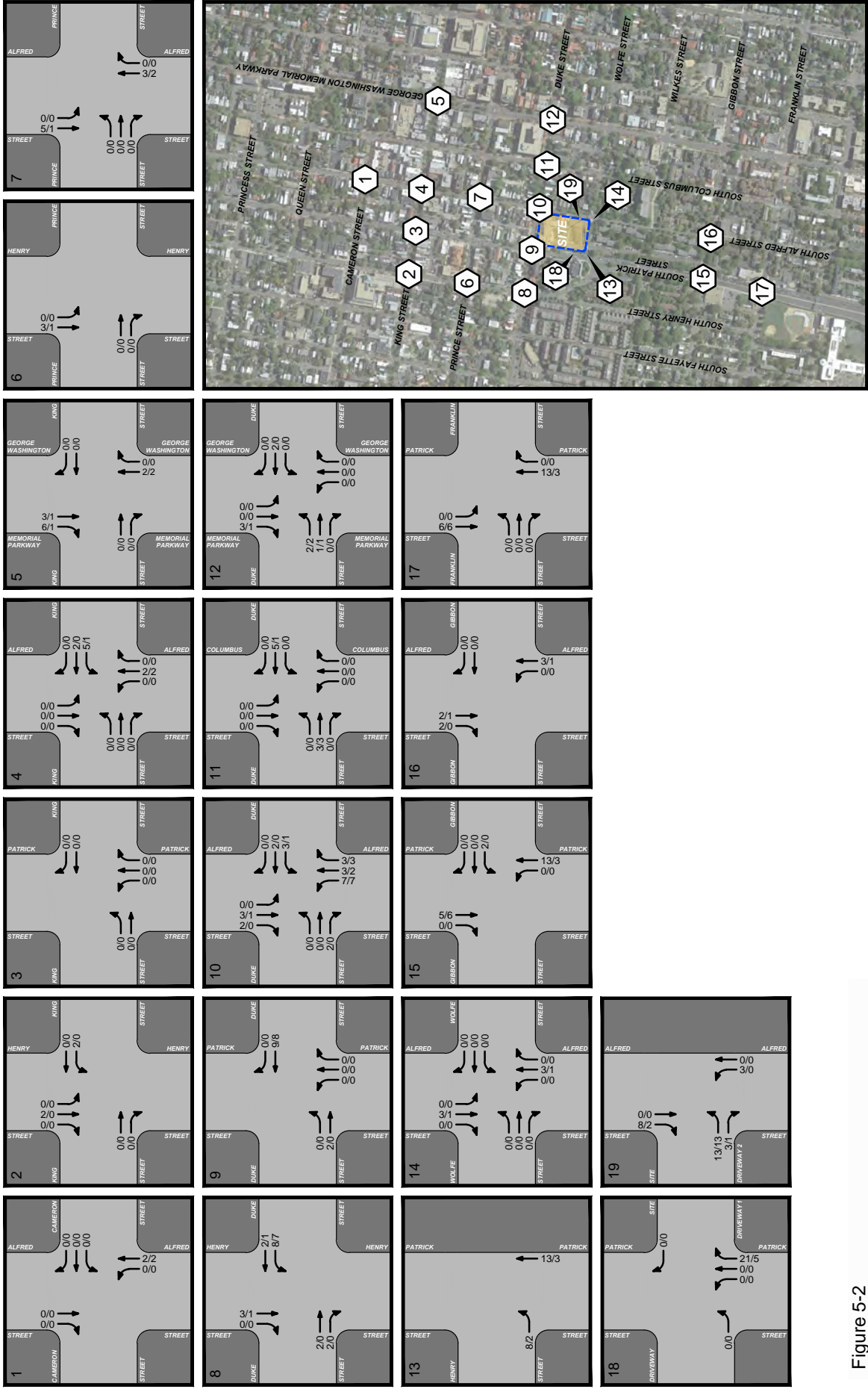


Figure 5-2
Site Generated Peak Hour Traffic Forecasts (Weekday)



AM PEAK HOUR
PM PEAK HOUR
000 / 000

Alfred Baptist Church
City of Alexandria, Virginia

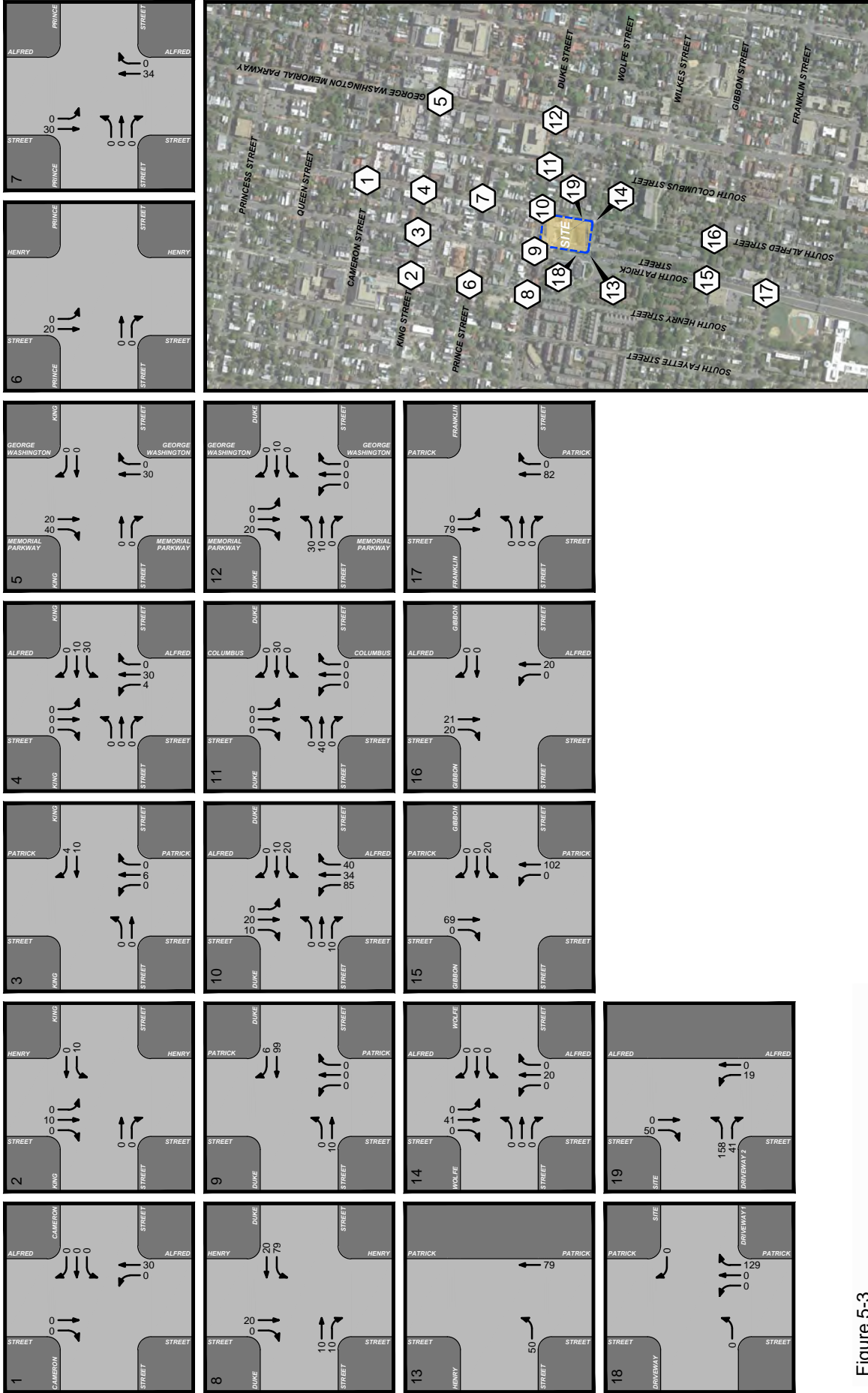


Figure 5-3
Site Generated Peak Hour Traffic Forecasts (Sunday)



Alfred Baptist Church
City of Alexandria, Virginia

SECTION 6 ANALYSIS OF FUTURE CONDITIONS WITH DEVELOPMENT

Traffic Volumes

Future traffic forecasts with the proposed development were developed based on a composite of existing peak hour traffic volumes, regional growth and the proposed developments primary trips. Future lane-use including proposed site driveways is shown on Figure 6-1. The future peak hour traffic forecast for year 2022 (project build-out) are shown on Figure 6-2 and 6-3, and for year 2028 (build-out plus six years) are shown on Figure 6-4 and 6-5.

Capacity Analysis

Future peak hour levels of service and 50th and 95th percentile queues with the proposed development are summarized in Tables 6-1 and 6-2, respectively. The results were identified for the key study intersections based on the future traffic forecasts shown on Figures 6-1 and 6-2, and the Highway Capacity Manual 2000 methodology using Synchro 9.

Levels of Service. The 2022 LOS results with the proposed development are summarized in Table 6-1 and indicate the following:

- All signalized study intersections would continue to operate at overall acceptable LOS “D” or better during the AM, PM, and Sunday peak hours except for the following intersections:
 - S. Henry Street/King Street which operates at LOS “E” during the weekday PM peak hour
 - S. Patrick Street/King Street which operates at LOS “F” during the weekday AM peak hour
 - S. Patrick Street/Duke Street which operates at LOS “E” during the weekday AM peak hour
 - Washington Street/Duke Street which operates at LOS “E” during the weekday AM peak hour

Some turning movements along Route 1 (S. Patrick Street and S. Henry Street) would continue to operate at LOS “E” or “F” during the AM, PM, and/or Sunday peak hours, consistent with future conditions without development. In addition, the westbound thru/right lane at the intersection of S. Patrick Street/Duke Street deteriorates from LOS “C” to LOS “E” during the Sunday peak hour. The eastbound approach and northbound thru/right lane at the intersection of Duke Street/S. Washington Street both deteriorate from LOS “D” to LOS “E” during the PM and Sunday peak hours. The overall LOS at both the S. Patrick Street/Duke Street and S. Washington Street/Duke Street are consistent between the conditions with and without development.

- When compared to future conditions without development, the overall delay per vehicle at each of the signalized study intersections would increase by less than six (6) seconds during the AM or PM peak hours, and eleven (11) seconds during the Sunday peak hour. Thus, the proposed development would have only a minor impact on overall traffic operations in the area.
- All of the approaches at the stop controlled study intersections would continue to operate at acceptable levels of service (LOS “D” or better) during the AM, PM, and Sunday peak hours with the proposed development.
- The eastbound left movement out of the existing garage opposite of the church across S. Patrick Street would continue to operate at an LOS “D” with the redevelopment. The proposed garage would operate at an LOS “B” during the AM, PM, and Sunday peak hours.

The LOS results for build-out plus six (6) years (2028) are also summarized in Table 6-1. As shown in Table 6-1, with an additional six (6) years of regional growth both signalized and stop controlled study intersections would operate at levels of service consistent with build-out conditions (2022).

Given the magnitude of regional traffic along U.S. Route 1 and Washington Street and the modest impact of development-related traffic, no vehicular geometric improvements are recommended at the study intersections.

Capacity analysis worksheets for 2022 and 2028 conditions with development are included in Appendix F.

Queues. The future peak hour queue results with the proposed development for the turning movements are presented in Appendix F and summarized in Table 6-2. As shown in Table 6-2, the estimated 50th and 95th percentile queues at study intersections would operate generally consistent with future conditions without development along throughout the study area and along U.S. Route 1 (S. Patrick Street and S. Henry Street). Consistent with existing and future conditions without development the 95th percentile queues of eastbound right turns at S. Henry Street/Duke Street could exceed the available storage.

Table 6-1
Alfred Street Baptist Church

Total Future with Development Intersection Level of Service Summary ⁽¹⁾

Intersection	Intersection Control	Approach/Movement	Existing Conditions			2022 Future Conditions without Development			2022 Future Conditions with Development			2028 Future Conditions with Development		
			AM Peak Hour Delay (sec.)	PM Peak Hour Delay (sec.)	Sunday Peak Hour Delay (sec.)	AM Peak Hour Delay (sec.)	PM Peak Hour Delay (sec.)	Sunday Peak Hour Delay (sec.)	AM Peak Hour Delay (sec.)	PM Peak Hour Delay (sec.)	Sunday Peak Hour Delay (sec.)	AM Peak Hour Delay (sec.)	PM Peak Hour Delay (sec.)	Sunday Peak Hour Delay (sec.)
			LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS
1. Alfred Street/Cameron Street	Signalized	WBLTR	B 14.5	B 19.6	B 15.4	B 14.4	B 19.9	B 15.5	B 14.4	B 19.9	B 15.5	B 14.4	B 19.9	B 15.5
		NBLT	A 6.0	A 7.7	A 7.9	A 6.0	A 7.8	A 8.0	A 5.9	A 7.8	A 7.1	A 5.9	A 7.9	A 7.1
		SBTR	B 12.4	C 21.5	B 11.7	B 12.5	C 21.9	B 11.7	B 12.5	C 21.9	B 11.7	B 12.5	C 22.7	B 11.7
		Overall	A 9.6	B 18.8	B 12.5	A 9.5	B 19.2	B 12.6	A 9.4	B 19.2	B 12.1	A 9.5	B 19.7	B 12.1
2. Henry Street/King Street	Signalized	EBTR	C 26.6	D 50.3	D 36.1	C 25.6	D 54.2	D 36.1	C 25.6	D 54.2	D 36.1	C 26.3	E 58.7	D 37.1
		WBLT	A 9.0	B 15.3	B 17.5	A 9.1	B 15.3	B 18.0	A 9.2	B 15.3	B 18.3	A 9.3	B 15.6	B 18.6
		WBTR	A 10.9	B 17.1	B 16.2	A 11.0	B 16.8	B 16.5	A 11.1	B 16.8	B 16.3	A 11.1	B 16.9	B 16.5
		Overall	D 46.4	F 87.0	C 23.5	D 54.4	E 76.2	C 26.2	D 54.7	E 76.2	C 26.6	E 62.1	F 86.0	C 29.3
3. Patrick Street/King Street	Signalized	EBL	C 22.2	B 10.4	B 14.7	C 22.6	B 10.2	B 14.8	C 22.6	B 10.2	B 15.0	C 22.5	B 10.2	B 15.2
		EBT	B 18.9	B 14.0	B 15.4	B 19.3	B 13.7	B 15.7	B 19.3	B 13.7	B 15.7	B 19.2	B 13.7	B 15.8
		WBTR	C 21.6	C 22.1	C 21.3	C 21.1	C 21.8	B 19.1	C 20.9	C 21.8	C 21.2	C 21.3	C 23.2	C 22.0
		Overall	F 92.0	B 12.8	B 10.1	F 107.0	B 14.5	B 11.9	F 107.0	B 14.6	B 12.2	F 118.9	B 17.1	B 14.3
4. Alfred Street/King Street	Signalized	EBLTR	A 6.4	A 6.9	B 11.8	A 5.8	A 7.4	B 10.9	A 5.8	A 7.4	B 10.9	A 6.0	A 7.7	B 11.3
		WBLTR	A 9.8	B 15.3	B 11.2	A 9.6	B 15.2	B 11.3	A 9.7	B 15.4	B 11.4	A 9.9	B 16.5	B 14.4
		NBLTR	B 18.5	A 9.8	A 4.8	C 26.6	B 10.1	A 4.8	C 26.9	A 9.9	A 6.5	C 30.8	B 10.1	A 6.7
		Overall	B 13.6	B 14.9	B 10.6	B 18.0	B 15.3	B 10.2	B 18.2	B 15.4	B 11.3	C 30.3	B 16.1	B 11.6
5. Washington Street/King Street	Signalized	EBT	D 35.1	C 32.4	C 27.6	C 34.8	C 32.4	C 27.5	C 34.8	C 32.4	C 27.5	C 35.0	C 32.5	C 27.8
		EBR	C 31.1	C 28.7	C 22.4	C 31.1	C 28.7	C 22.4	C 31.1	C 28.7	C 22.4	C 31.1	C 28.8	C 22.4
		WBTR	C 33.8	D 36.1	C 26.6	C 34.0	D 35.6	C 26.8	C 34.0	D 35.6	C 26.8	C 34.0	D 36.0	C 27.1
		Overall	C 30.9	C 28.1	C 23.2	C 31.0	C 28.1	C 23.7	C 31.0	C 28.1	C 23.7	C 31.0	C 28.1	C 23.8
6. Henry Street/Prince Street	Signalized	NBTR	A 3.3	A 9.3	B 16.9	B 10.6	A 9.1	B 17.5	B 10.8	A 9.1	B 17.9	B 18.9	A 9.7	B 19.1
		SBTR	A 9.6	C 34.5	C 28.4	A 9.6	D 42.7	C 30.4	A 9.6	D 42.8	C 34.5	A 9.7	D 48.9	D 36.2
		Overall	A 6.7	C 27.3	C 23.3	B 12.1	C 31.9	C 24.3	B 12.2	C 32.0	C 26.1	B 18.4	D 35.8	C 27.3
		EBTR	B 14.8	E 55.9	B 16.9	B 15.0	E 64.5	B 16.9	B 15.0	E 64.5	B 16.9	B 15.3	E 73.0	B 17.0
7. Alfred Street/Prince Street	Signalized	NBLT	A 4.4	A 4.3	A 4.5	A 3.6	A 4.8	A 4.9	A 3.7	A 4.8	A 5.2	A 4.2	A 5.3	A 5.6
		SBLT	A 7.7	C 27.5	A 7.0	A 7.2	C 31.5	A 7.2	A 7.3	C 31.5	A 7.5	A 7.7	D 35.5	A 7.8
		Overall	A 6.5	B 12.8	A 6.4	A 5.4	B 12.9	A 6.1	A 4.4	B 12.9	A 6.2	A 4.6	B 13.3	A 6.2
		EBLTR	A 1.3	A 3.9	A 1.5	A 1.2	A 5.0	A 1.6	A 1.2	A 5.0	A 1.6	A 1.3	A 5.4	A 1.6
8. Henry Street/Duke Street	Signalized	NBTR	B 11.2	B 12.6	B 13.9	A 9.4	B 12.7	B 14.1	A 6.7	B 12.6	B 10.8	A 7.0	B 12.5	B 10.9
		SBLT	B 14.9	C 26.5	B 11.2	B 14.9	C 25.6	B 11.0	B 14.9	C 25.6	B 11.9	B 14.8	C 26.2	B 11.9
		Overall	A 6.5	B 12.8	A 6.4	A 5.4	B 12.9	A 6.1	A 4.4	B 12.9	A 6.2	A 4.6	B 13.3	A 6.2
		EBT	C 24.8	D 15.8	D 40.3	C 25.0	D 44.7	D 44.8	C 25.1	D 44.7	D 46.8	C 25.8	D 46.8	D 49.3
*Southbound left turn only available on Sunday	Signalized	EBR	B 18.6	E 34.8	C 29.2	B 18.5	E 37.6	C 29.6	B 18.5	E 37.6	C 29.9	B 18.7	E 39.5	C 30.2
		WBL	A 6.9	B 4.5	B 18.7	A 6.8	B 18.8	C 21.9	A 6.5	B 19.0	C 34.3	A 6.6	C 20.2	D 36.8
		WBTR	A 6.6	B 0.6	B 12.7	A 6.4	B 13.5	B 12.8	A 6.0	B 13.1	B 12.9	A 6.1	B 13.2	B 13.0
		Overall	B 15.7	D 37.0	B 13.3	B 17.7	C 33.5	B 14.3	B 17.8	C 33.5	B 15.8	C 20.5	D 38.7	B 16.5
9. Patrick Street/Duke Street	Signalized	EBT	C 28.3	B 19.9	B 17.3	D 36.1	B 20.0	B 19.9	D 45.8	B 20.0	C 29.7	E 59.5	C 20.4	C 33.2
		WBTR	E 73.7	C 23.6	C 24.1	F 97.8	C 21.3	C 34.2	F 111.6	C 23.6	E 68.1	F 120.4	C 25.7	E 75.6
		NBLTR	D 45.2	D 43.1	B 19.2	E 55.9	D 49.1	C 20.1	D 52.9	D 47.5	C 20.2	E 62.6	D 53.4	C 21.9
		Overall	D 47.4	D 35.3	C 20.0	E 60.0	D 38.8	C 23.2	E 61.6	D 38.2	C 33.3	E 71.7	D 42.5	D 36.6
10. Alfred Street/Duke Street	Signalized	EBLTR	B 12.8	A 7.5	A 8.4	B 14.4	A 7.5	A 8.3	A 9.4	A 7.0	A 5.0	A 9.0	A 7.4	A 4.6
		WBLTR	A 9.2	A 9.4	A 9.6	A 9.4	A 9.9	A 9.2	A 9.6	A 9.9	A 9.6	A 9.8	B 10.1	B 10.1
		NBLTR	D 52.9	B 19.6	B 19.8	E 57.2	B 19.5	B 19.6	E 77.6	C 21.2	C 34.7	F 83.2	C 21.5	D 35.6
		Overall	C 23.8	B 15.0	B 10.9	C 25.7	B 15.6	B 10.4	C 31.3	B 15.8	B 13.3	C 32.9	B 16.4	B 13.5
11. Columbus Street/Duke Street	Signalized	EBLTR	A 9.0	B 18.3	B 16.2	B 10.2	B 19.6	B 15.7	B 11.5	C 20.5	B 15.7	B 11.9	C 20.5	B 15.6
		WBLTR	C 21.4	C 23.9	B 15.9	C 22.1	C 24.1	B 16.2	C 22.3	C 24.1	B 17.0	C 22.8	C 24.8	B 17.4
		NBLTR	D 39.9	B 15.4	C 20.7	D 45.0	B 15.1	C 20.4	D 45.0	B 15.1	C 20.4	D 50.2	B 15.6	C 20.6
		Overall	C 24.5	C 22.6	B 16.6	C 40.0	C 24.3	B 16.4	C 27.4	C 24.5	B 16.7	C 29.8	C 32.4	B 16.8
12. Washington Street/Duke Street	Signalized	EBLTR	F 98.9	D 45.2	C 32.8	F 123.6	D 54.7	D 36.7	F 127.4	E 56.2	D 49.8	F 140.3	E 62.1	D 53.4
		WBLTR	D 36.2	C 32.8	C 28.9	D 39.7	D 35.7	C 32.1	D 39.9	D 35.7	C 33.0	D 40.3	D 36.1	C 33.6
		NBTR	E 65.1	B 18.7	E 57.5	E 63.4	B 18.3	D 54.6	E 63.4	B 18.3	E 56.8	E 72.5	B 18.7	E 68.1
		Overall	E 57.1	B 17.3	D 36.9	E 57.7	C 21.5	D 38.5	E 58.0	C 21.8	D 42.9	E 65.3	C 26.7	D 50.6
13. Patrick Street/U-Turns from Henry Street	Unsignalized	EBL	B 11.0	A 9.7	A 9.8	B 11.1	A 9.8	A 9.9	B 11.2	A 9.9	B 10.7	B 11.3	A 9.9	B 10.9
		NBTR	A 0.0	A 0.0	A 0.0	A 0.0	A 0.0	A 0.0	A 0.0	A 0.0	A 0.0	A 0.0	A 0.0	A 0.0
14. Alfred Street/Wolfe Street	Unsignalized	EBLTR	A 8.3	A 8.2	A 7.6	A 8.3	A 8.1	A 7.6	A 8.3	A 8.2	A 7.8	A 8.3	A 8.2	A 7.8
		WBLTR	A 7.9	A 9.3	A 7.6	A 7.9	A 9.2	A 7.6	A 7.9	A 9.2	A 7.7	A 7.9	A 9.1	A 7.7
		NBLTR	B 10.6	A 8.1	A 7.8	B 10.7	A 8.1	A 7.8	B 10.8	A 8.1	A 8.0	B 11.1	A 8.3	A 8.0
		Overall	A 7.9	B 10.3	A 8.0	A 7.9	B 10.2	A 7.9	A 7.9	B 10.3	A 8.3	A 7.9	B 10.4	A 8.4
15. Patrick Street/Gibbon Street	Signalized	WBL	F 82.0	F 126.0	C 28.3	F 81.3	F 139.6	C 28.4	F 82.2	F 139.6	C 29.3	F 84.0	F 151.1	C 29.8
		WBLTR	D 49.7	C 25.6	C 20.7	D 49.0	C 27.1	C 20.3	D 49.2	C 27.1	C 20.3	D 49.0	C 28.7	C 20.3
		NBLT	B 10.2	B 18.6	B 11.3	B 11.8	C 20.6	B 13.2	B 12.1	C 20.7	B 15.5	B 14.2	C 22.8	B 17.2
		Overall	A 5.6	C 30.3	A 5.7	A 5.0	D 41.8	A 7.5	A 5.0	D 42.5	A 8.7	A 5.3	D 52.2	B 10.1
16. Alfred Street/Gibbon Street	Signalized	WBLTR	B 15.6	B 12.0	A 8.9	B 15.7	B 12.6	A 9.0	B 15.7	B 12.6	A 9.0	B 15.9	B 13.1	A 9.1
		NBLT	C 23.0	D 49.3	B 12.5	C 22.8	D 53.3	B 12.1	C 22.9	D 53.9	B 12.8	C 23.7	E 65.6	B 13.0
		SBTR	B 12.5	B 14.8	A 9.4	B 12.4	B 15.5	A 9.3	B 12.5	B 15.5	A 9.7	B 12.5	B 16.3	A 9.9
		Overall	B 19.0	B 19.2	A 9.7	B 18.9	C 20.2	A 9.6	B 19.0	C 20.3	A 9.9	B 19.4	C 22.8	B 10.0
17. Patrick Street/Franklin Street	Signalized	EBLT	E 65.3	E 63.1	E 65.5	E 65.3	E 63.1	E 65.6	E 65.3	E 63.1	E 65.6	E 65.1	E 62.9	E 65.6
		NBT	A 7.7	A 4.2	A 2.9	A 8.2	A 4.2	A 2.8	A 8.4	A 4.2	A 2.9	A 9.4	A 4.3	A 3.0
		NBR	E 57.8	A 5.4	A 3.2	E 66.4	A 5.4	A 3.2	E 66.5	A 5.4	A 3.2	E 76.9	A 5.6	A 3.2
		Overall	B 19.1	B 19.1	A 4.5	C 21.2	C 25.8	A 4.6	C 21.3	C 26.2	A 4.7	C 24.2	C 32.4	A 4.9
18. Existing Garage Driveway/Patrick Street/ *Northbound right future movement only	Unsignalized	EBL	A 9.9	A 9.5	D 31.0	B 10.1	A 9.6	D 26.8	A 0.0	A 0.0	D 31.8	A 0.0	A 0.0	D 34.1
		NBLTR*	A 0.4	A 0.6	A 0.0	A 0.4	A 0.6	A 0.4	A 0.0	A 0.0	A 0.9	A 0.0	A 0.0	A 2.9
19. Proposed Site Driveway/S. Alfred Street														

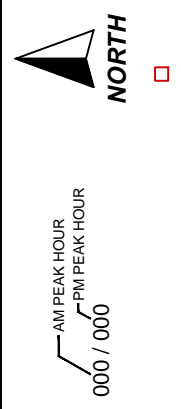
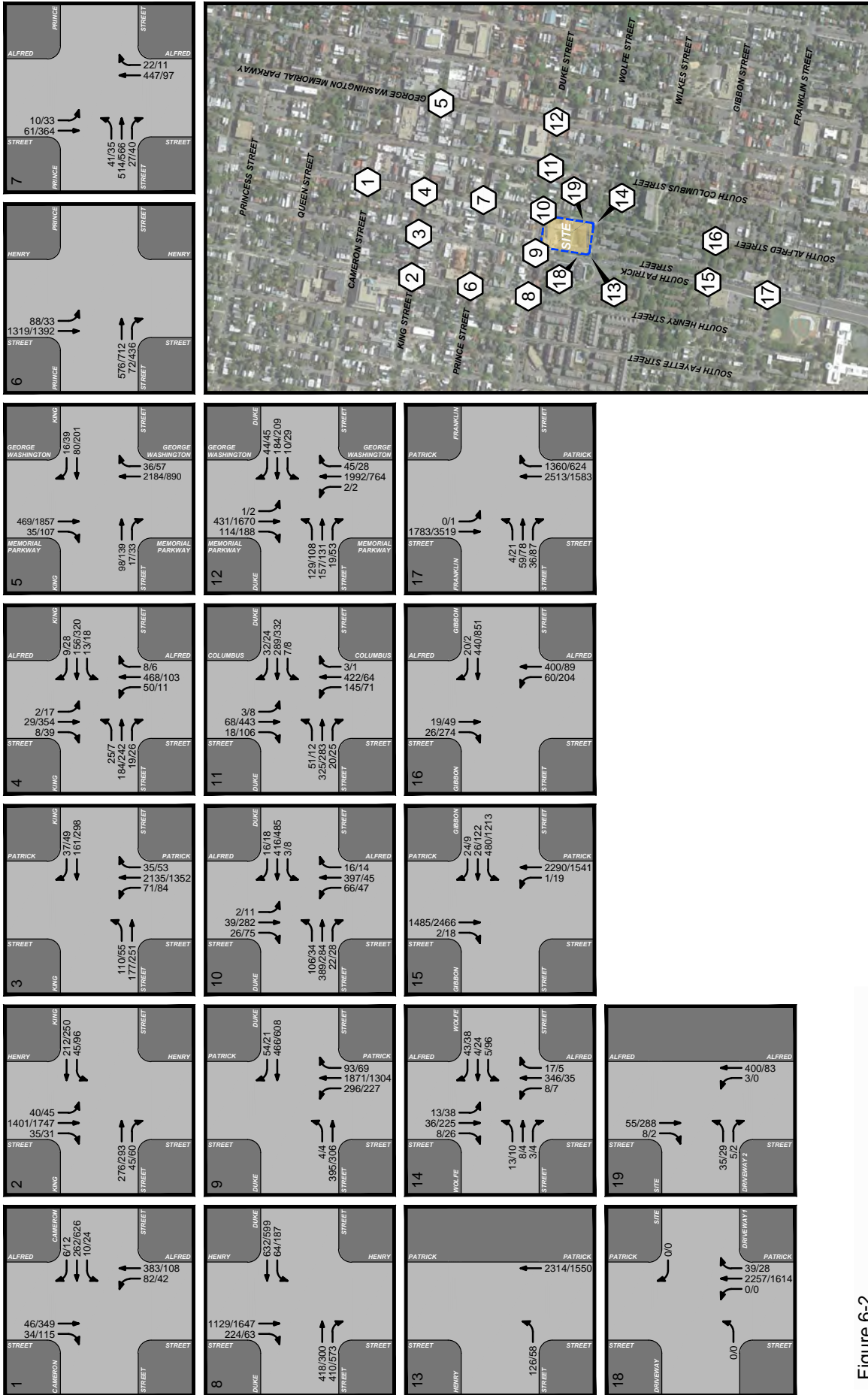


Figure 6-2
Future Peak Hour Traffic Forecasts
With Development (2022) - Weekday
Alfred Baptist Church
City of Alexandria, Virginia

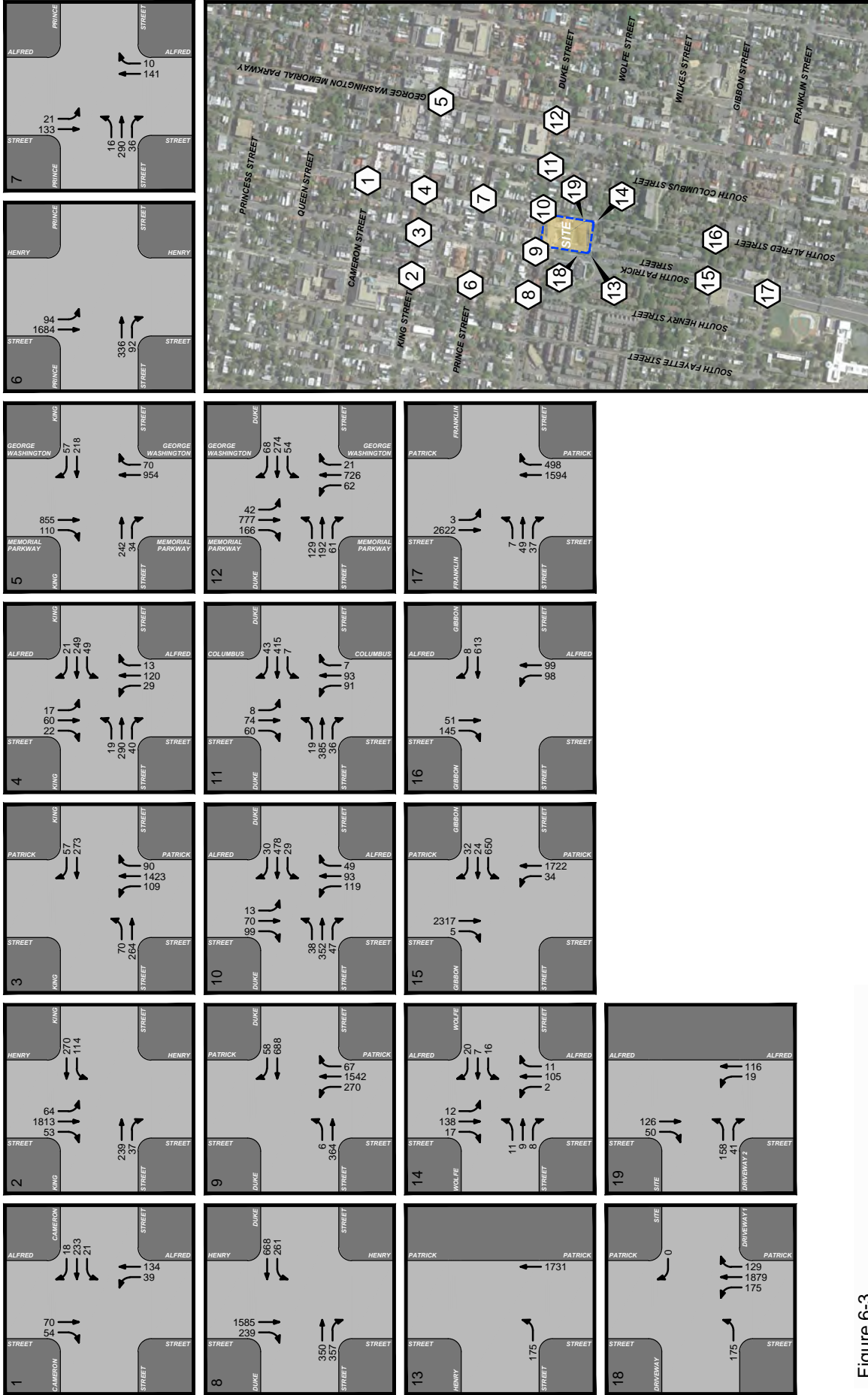


Figure 6-3
Future Peak Hour Traffic Forecasts
With Development (2022) - Sunday
 Alfred Baptist Church
 City of Alexandria, Virginia

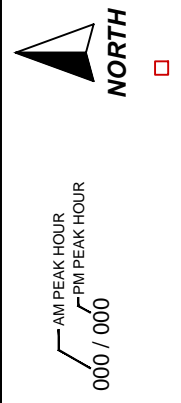
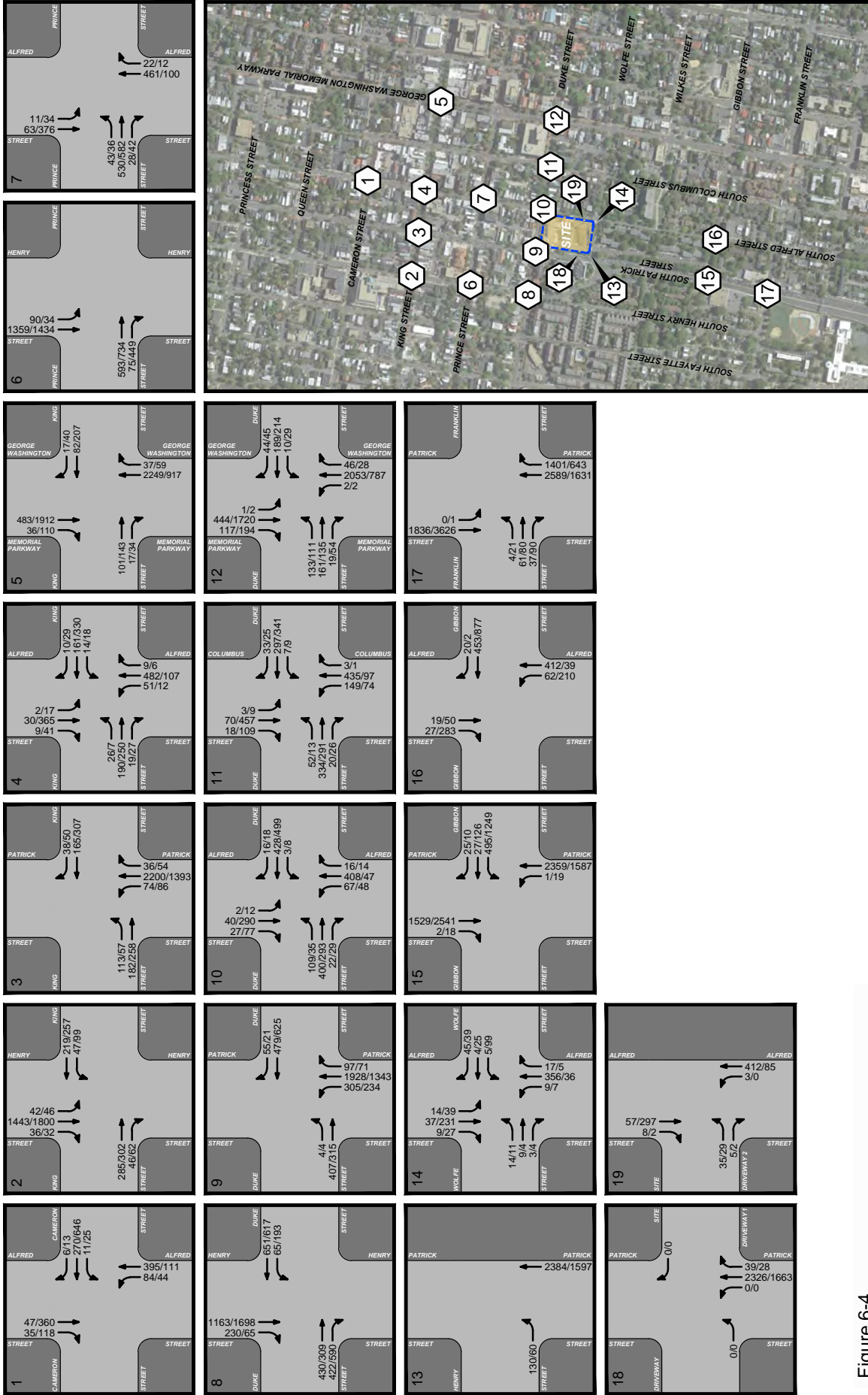


Figure 6-4
 Future Peak Hour Traffic Forecasts
 With Development (2028) - Weekday
 Alfred Baptist Church
 City of Alexandria, Virginia

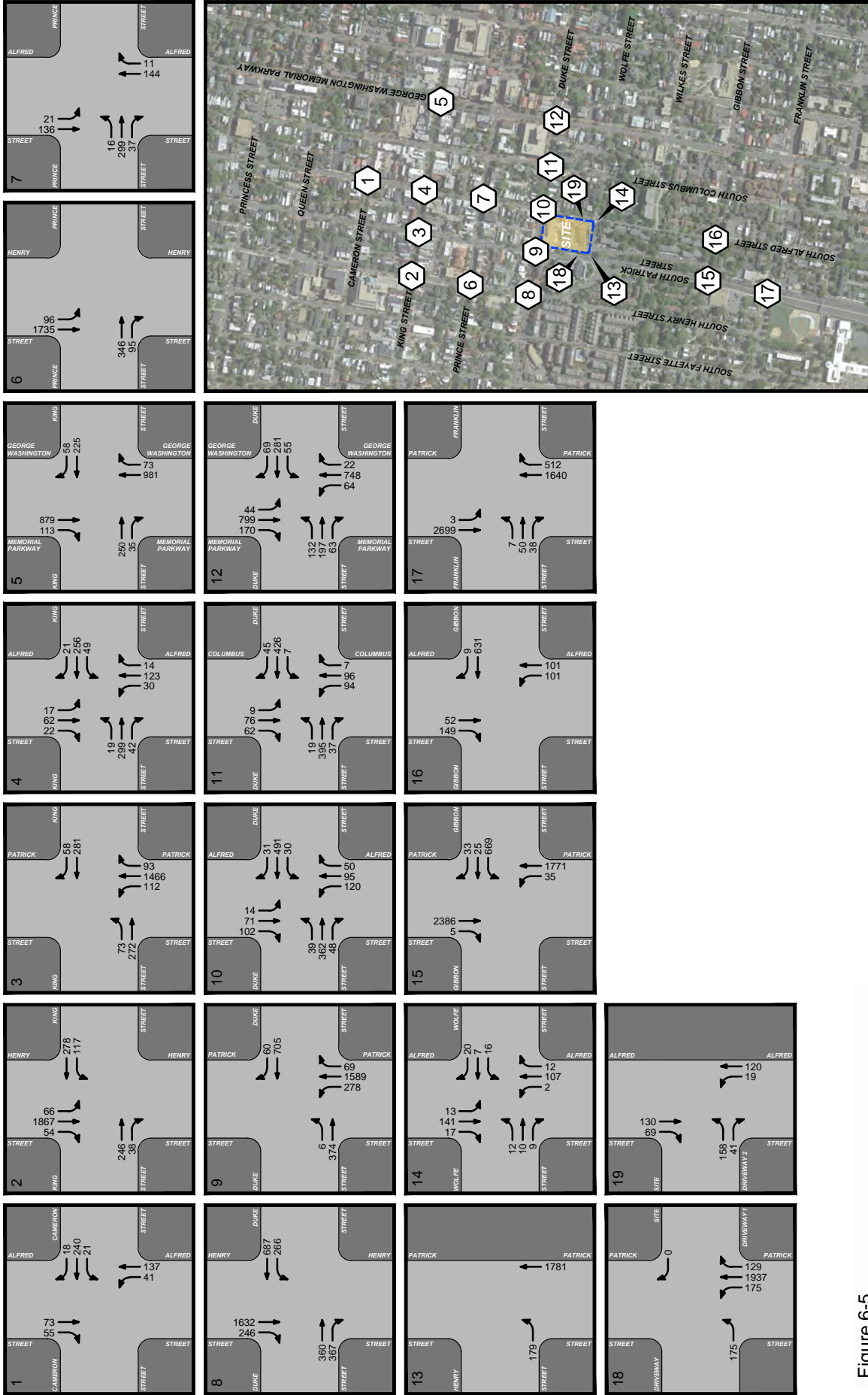


Figure 6-5
Future Peak Hour Traffic Forecasts
With Development (2028) - Sunday
 Alfred Baptist Church
 City of Alexandria, Virginia

SECTION 7 NON-AUTO FACILITIES EVALUATION

Introduction

This section evaluates the non-auto facilities within the site vicinity. It includes the safe and efficient pedestrian and bicycle access and circulation and identifies transit service in the area. It is a goal of the City of Alexandria to create an integrated, multimodal transportation system that is accessible and safe for all users, including pedestrians and bicyclists. To help achieve this goal, the City Council adopted a Complete Streets Policy in 2010. The term Complete Streets describes a comprehensive, integrated transportation network with infrastructure and design that allows safe and convenient travel along and across streets for all users. The policy is intended to promote equality for pedestrians, bicyclists, riders and drivers of public transportation, as well as drivers of other motor vehicles, and people of all ages and abilities, including children, older adults, and individuals with disabilities.

Per the City's Guidelines, the bicycle and pedestrian study area is based on the size of the proposed development. As agreed during the scoping process the study area includes bicycle and pedestrian data, analysis and reporting of infrastructure and deficiencies within a ½ mile radius from the site.

Existing Conditions

The Old Town area has a connected network of sidewalks that provides the safe and efficient movement of pedestrians between residences, places of employment, retail shops, open space, transit facilities and other destinations within the area. A review of existing conditions confirms that within ½ mile from the subject site, sidewalks are present along both sides of all streets with the following exceptions, as shown on Figure 7-1 through 7-5.

- West side of S. Payne Street from Wilkes Street to the end of roadway.

A total of 53 signalized intersections are located within the pedestrian and bicycle study area. A review of the existing signalized intersections confirms that crosswalks are provided on all legs of the intersections where pedestrian ramps are located connecting to the sidewalk. Pedestrian countdown signal heads are provided for each marked crosswalk at the signalized intersections with exception of the following intersections or leg of an intersection as noted below and shown on Figure 7-1 through 7-5:

- N. Henry Street/Princess Street
- N. Alfred Street/Cameron Street
- N. St Asaph Street/Cameron Street
- Peyton Street/King Street

- West Street/King Street
- S. Alfred Street/Duke Street
- S. Columbus Street/Duke Street
- S. Columbus Street/Gibbon Street
- S. Patrick Street/Gibbon Street

Public Transit Service

The Old Town area is well served by transit as shown on Figure 7-6. This includes bus, Bus Rapid Transit (BRT) and Metrorail. Boarding and alighting information for certain bus lines, as provided by the City of Alexandria, are summarized in Table 7-1.

DASH Service. DASH service is provided by lines AT2, AT3-4, AT5, AT7, AT8, and KST in the vicinity of the site as shown on Figure 7-6. Line AT2 provides service from the Landmark Plaza to the Braddock Road Metrorail stations; additional stops include Mark Center, the King Street Metro station, City Hall and Old Town. In the vicinity of the site the line travels along King Street. Line AT3-4 Loop provides service to and from Old Town Alexandria. Major stops along this route include Parkfairfax, Braddock Metro Station, and City Hall. In the vicinity of the site the line travels along Royal Street. Line AT5 provides service between the Van Dorn Metrorail station and the Braddock Metrorail station; additional stops include Landmark Mall, George Washington Masonic National Memorial, King Street Metrorail station, and City Hall. In the vicinity of the site the line travels along King Street. Line AT7 provides service between the Landmark Mall and Nannie J. Lee Center. Additional stops along this line include the Van Dorn Metrorail station, the Eisenhower Metrorail station, the U.S. Federal Courthouse, and the King Street Metrorail station. The line runs along Duke Street in the vicinity of the site. Line AT8 provides service between the Van Dorn Metrorail station and Old Town Alexandria; including stops at the Landmark Mall, Cameron Station, and the King Street Metrorail station. In the vicinity of the site the line runs along Duke Street. The KST (King Street Trolley) provides local service to and from the King Street Metrorail station to Potomac Yard. The King Street trolley serves all of the major attractions along King Street. It should be noted that all of the bus lines listed above serve the area 7 days a week, with the exception of AT7, which only runs on weekdays. Refer to Figure 7-6 for the location of existing bus stops, metrorail, and bus lines.

Metrorail Service. The King Street-Old Town Metrorail station is located approximately 0.6 miles (straight line distance) west of the subject site. This station is served by the Yellow, Green, and Blue Lines. These metro lines provide regional access to Arlington County, Fairfax County, Washington DC, Montgomery County, and Prince Georges County. The subject property is located just outside the ½ mile walkshed from the station based on the City of Alexandria Metro Station Walkshed Map. Refer to Figure 7-6 for the location of existing bus stops, metrorail, and bus lines. Alfred Street Baptist Church provides a shuttle

service to the closest Metrorail station and off-site parking. The shuttle route is provided on Figure 7-9.

Metrobus Service. Metrobus service is provided by lines 9A, 10A, and 11Y which run along Washington Street. Line 9A operates seven (7) days a week and provides service between the Huntington Avenue and Pentagon Metro stations. Line 10A operates seven (7) days a week and provides service to the Pentagon Metrorail station and Hunting Point. Line 11Y operates Monday through Friday and provides service from Mount Vernon to Potomac Park in Washington, D.C. In the vicinity of the site all of the Metrobus lines run along Washington Street. Refer to Figure 7-6 for the location of existing bus stops, metrorail, and bus lines.

Pedestrian and Bicycle Traffic Volumes

Pedestrian and bicycle counts were conducted on Tuesday, May 19, 2015 from 6:30 to 9:30 AM and 4:30 to 7:30 PM at each study intersection. Pedestrian and bicycle counts were also conducted for Sunday conditions on Sunday, May 31, 2015 from 7:00 AM to 3:00 PM. Existing peak hour pedestrian and bicycle counts are shown in Figures 7-7 and 7-8, respectively and are summarized in Appendix B.

Bicycle Network

There are few dedicated bicycle lanes within the Old Town North area. Many riders simply utilize the travel lanes since vehicle speeds are relatively low in this area. The lack of bike lanes is primarily due to the existing street geometry with narrow lane widths and the inability to remove curb parking for dedicated bike lanes.

As shown on Figure 7-10, within vicinity of the site S. Henry Street (to the west) is classified as a shared roadway. Wilkes Street (to the south) is classified as a shared roadway with some trails where the roadway does not continue. S. Columbus Street (to the east) is classified as a shared roadway, as well. Prince Street (to the north) has dedicated bike lanes. King Street (to the north) has dedicated bike lanes and some shared roadway segments. Access to the Mount Vernon trail running along the Potomac River can be gained through Wilkes Street. The Mount Vernon Trail connects to Arlington County to the north and Fairfax County to the south.

The closest Capital Bikeshare station is at the intersection of King Street & Patrick Street, two blocks north of the Alfred Street Baptist Church. Additional Capital Bikeshare stations can be found along King Street and also at the King Street Metrorail station. Refer to Figure 7-5 for locations of Capital Bikeshare stations, in the vicinity of the site.

As mentioned previously, a total of 20 bicycle parking spaces will be provided at grade and within the below grade parking garage serving the proposed development.

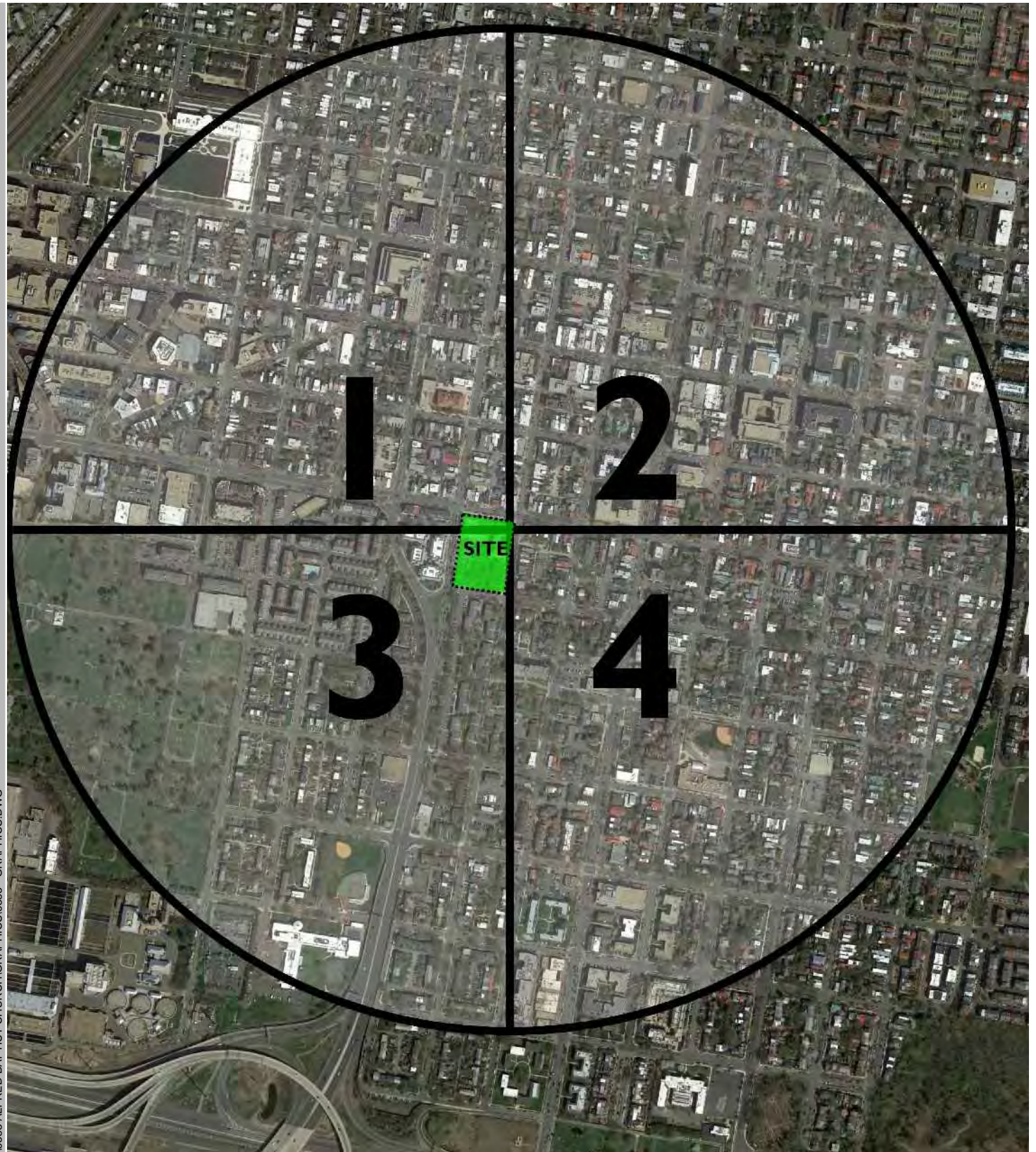
Pedestrian Access

Access for pedestrians are facilitated by marked crosswalks and ramps at the intersections of Duke Street/Patrick Street, Duke Street/S. Alfred Street, and Wolfe Street/S. Alfred Street. Ramps exist on all quadrants of the intersections with marked crosswalks. All three of the immediate intersections surrounding the site, mentioned previously, have pedestrian signals with the exceptions of the Duke Street/S. Alfred Street intersection.

The nearest transit stops are located on the north side of the property along Duke Street where DASH service can be found via line AT7 and AT8. The King Street Metro station is approximately 0.6 miles west of the site and is accessible via a connected grid of sidewalks or via one of the nearby transit lines. Also as noted previously the church operates shuttles on Sundays providing access to additional parking areas and the King Street Metro station.

Table 7-1
 Alfred Street Baptist Church
 Boarding and Alighting Information

On Street	X Street	Direction	Average Daily On	Average Daily Off
Duke	S Alfred	EB	0	13
Duke	S Alfred	WB	29	2
Duke	S Payne	EB	3	10
Duke	S Washington	EB	1	18
Duke	S Washington	WB	3	0
Duke	Henry	WB	8	0
S Washington	Prince	SB	11	8
S Washington	Duke	SB	7	21
S Washington	Duke	NB	28	12
S Washington	King	NB	243	189
S Washington	King	SB	155	80
S Washington	Wilkes	SB	17	45
S Washington	Wilkes	NB	67	22
King	S. Washington	EB	15	76
King	S. Washington	WB	46	14
King	Columbus	EB	18	109
King	Columbus	WB	154	22
King	Alfred	EB	1	26
King	Alfred	WB	28	4

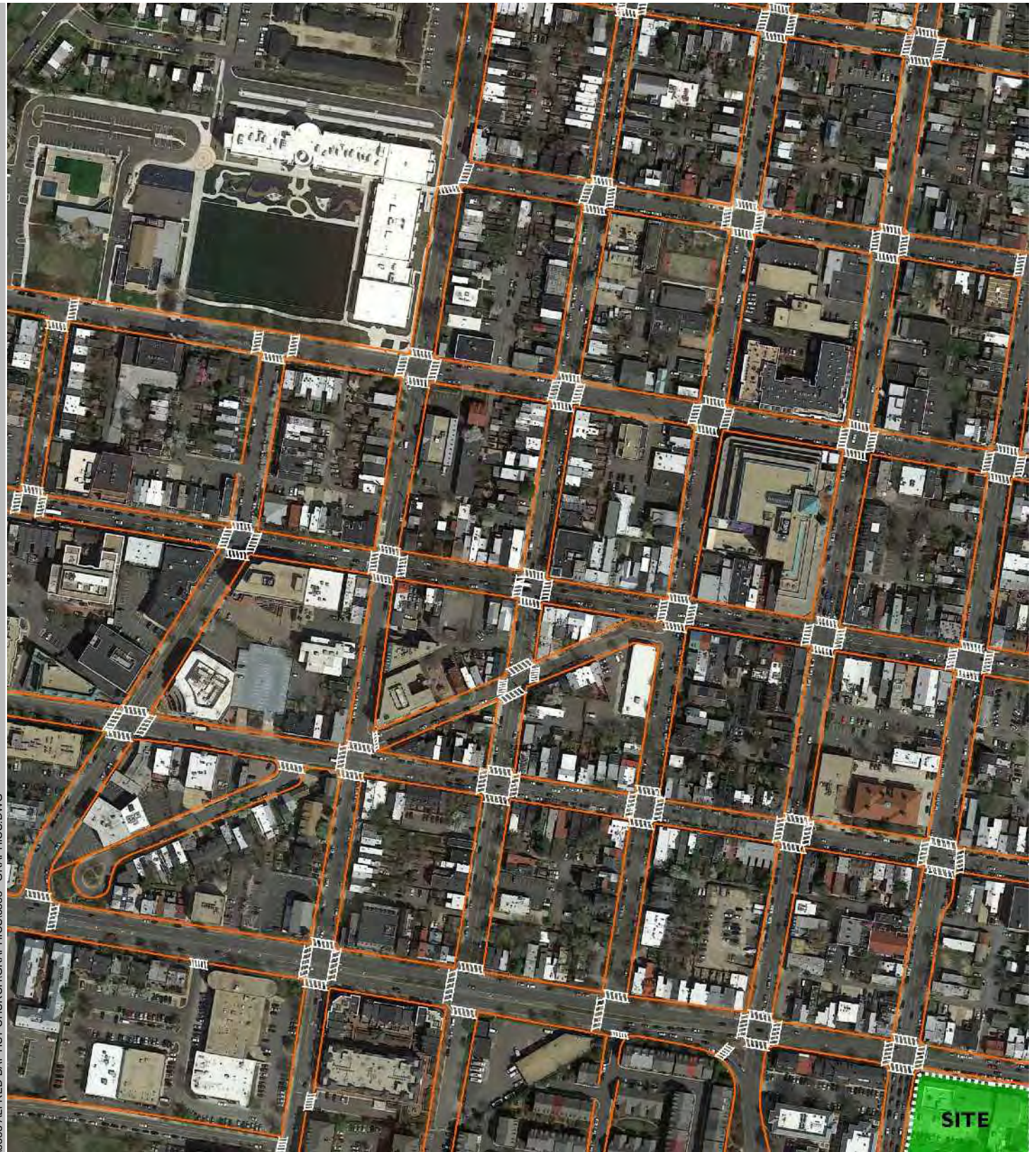


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Figure 7-1
Sidewalk & Crosswalk Inventory

Alfred Baptist Church
City of Alexandria



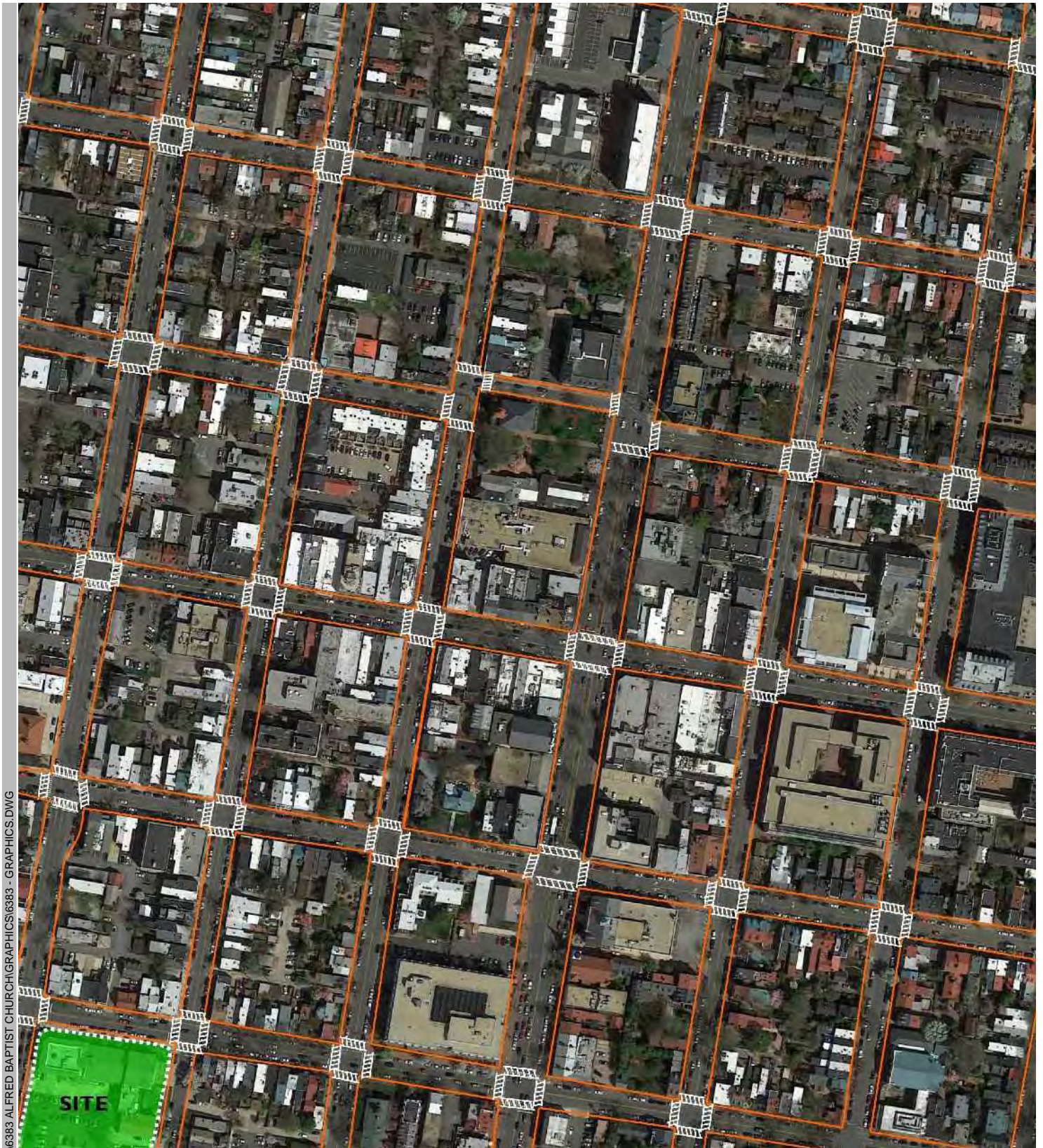


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Figure 7-2
Area 1 Sidewalk & Crosswalk Inventory

Alfred Baptist Church
City of Alexandria





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Figure 7-3
Area 2 Sidewalk & Crosswalk Inventory

Alfred Baptist Church
City of Alexandria



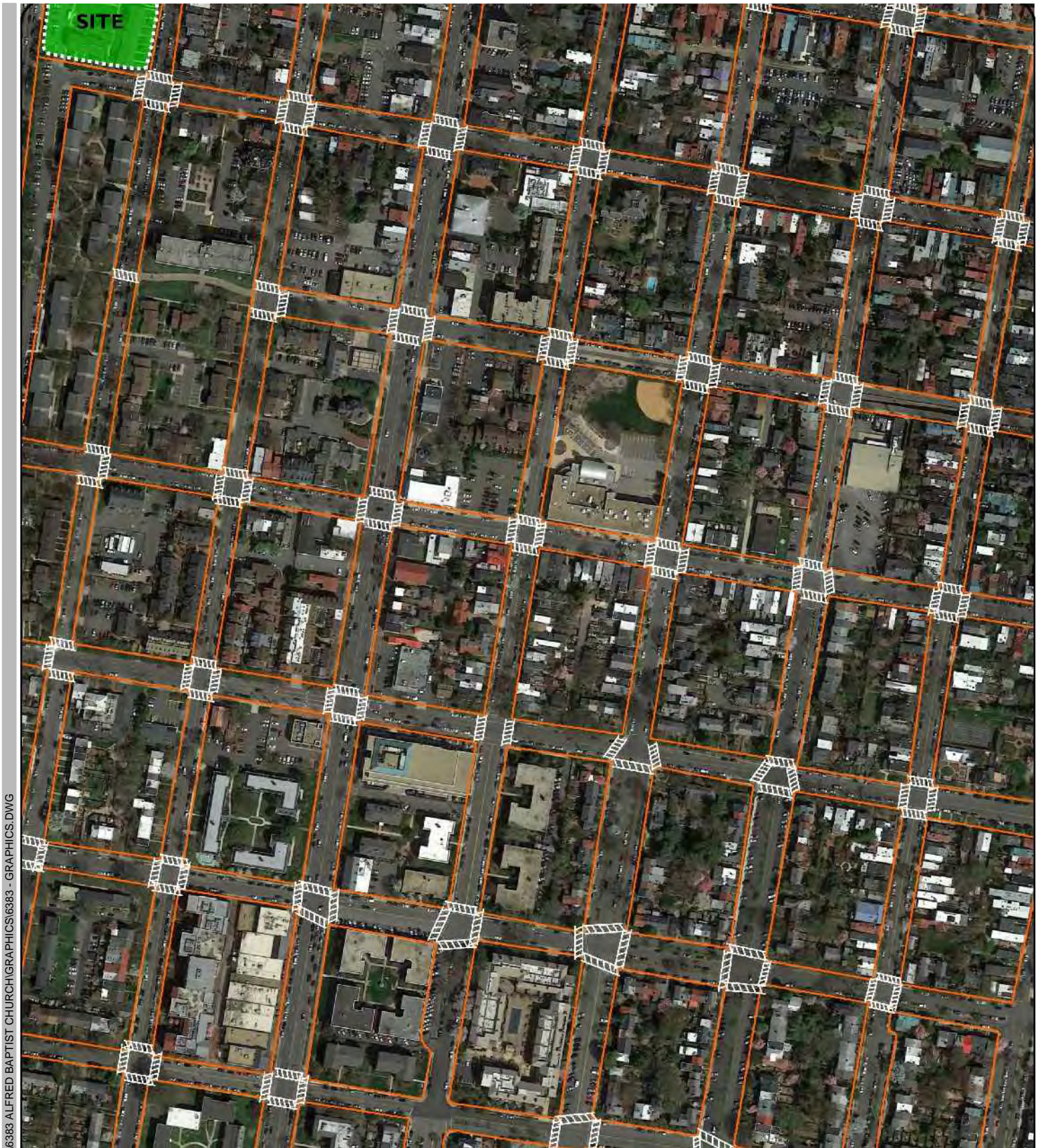


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Figure 7-4
Area 3 Sidewalk & Crosswalk Inventory

Alfred Baptist Church
City of Alexandria





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Figure 7-5
Area 4 Sidewalk & Crosswalk Inventory

Alfred Baptist Church
City of Alexandria



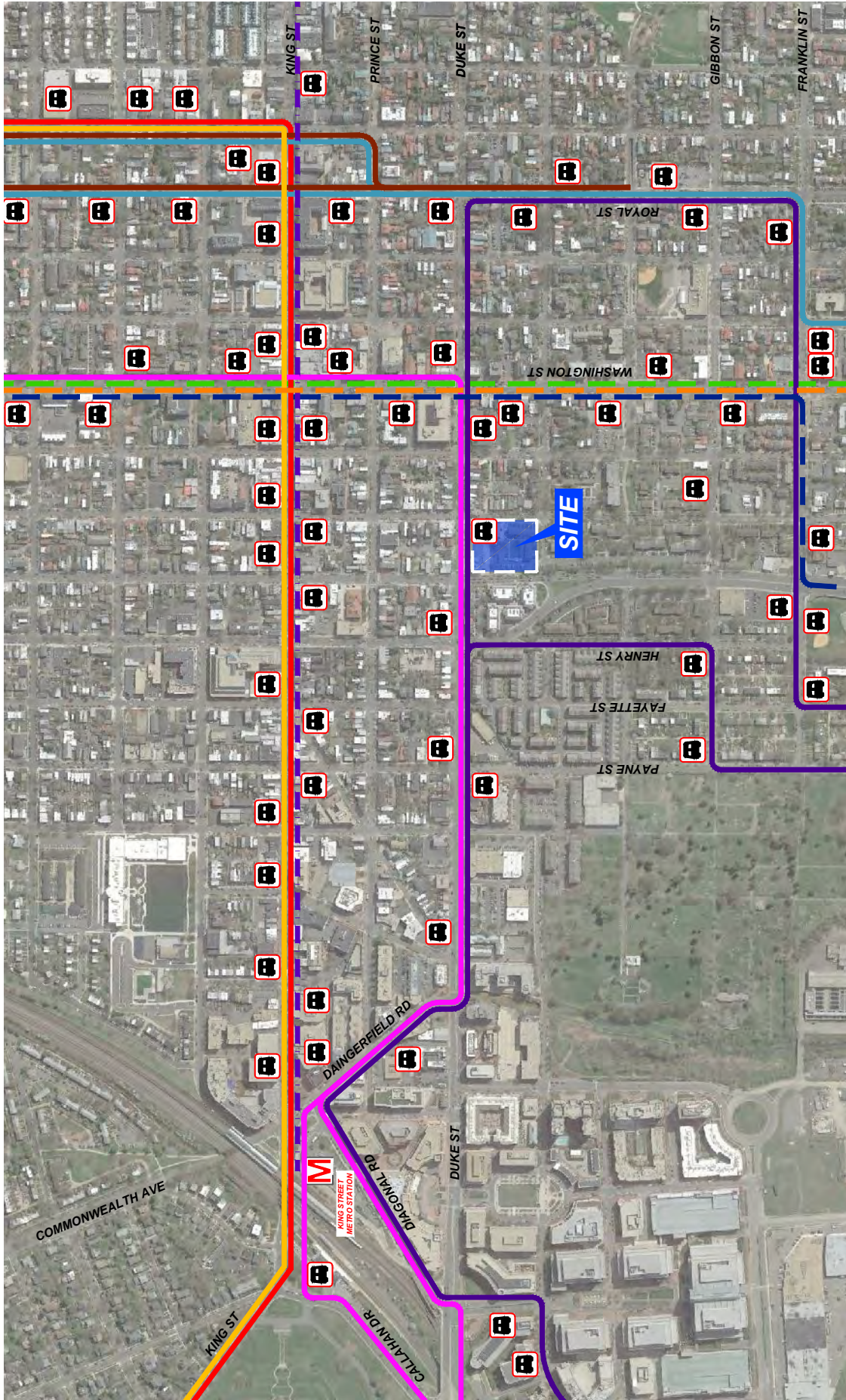
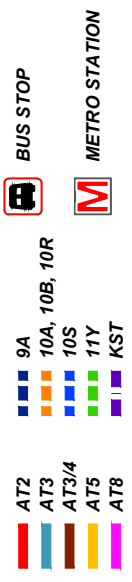


Figure 7-6
Existing Bus Stops/Metro Rail/Bus Lines



Alfred Baptist Church
City of Alexandria, Virginia

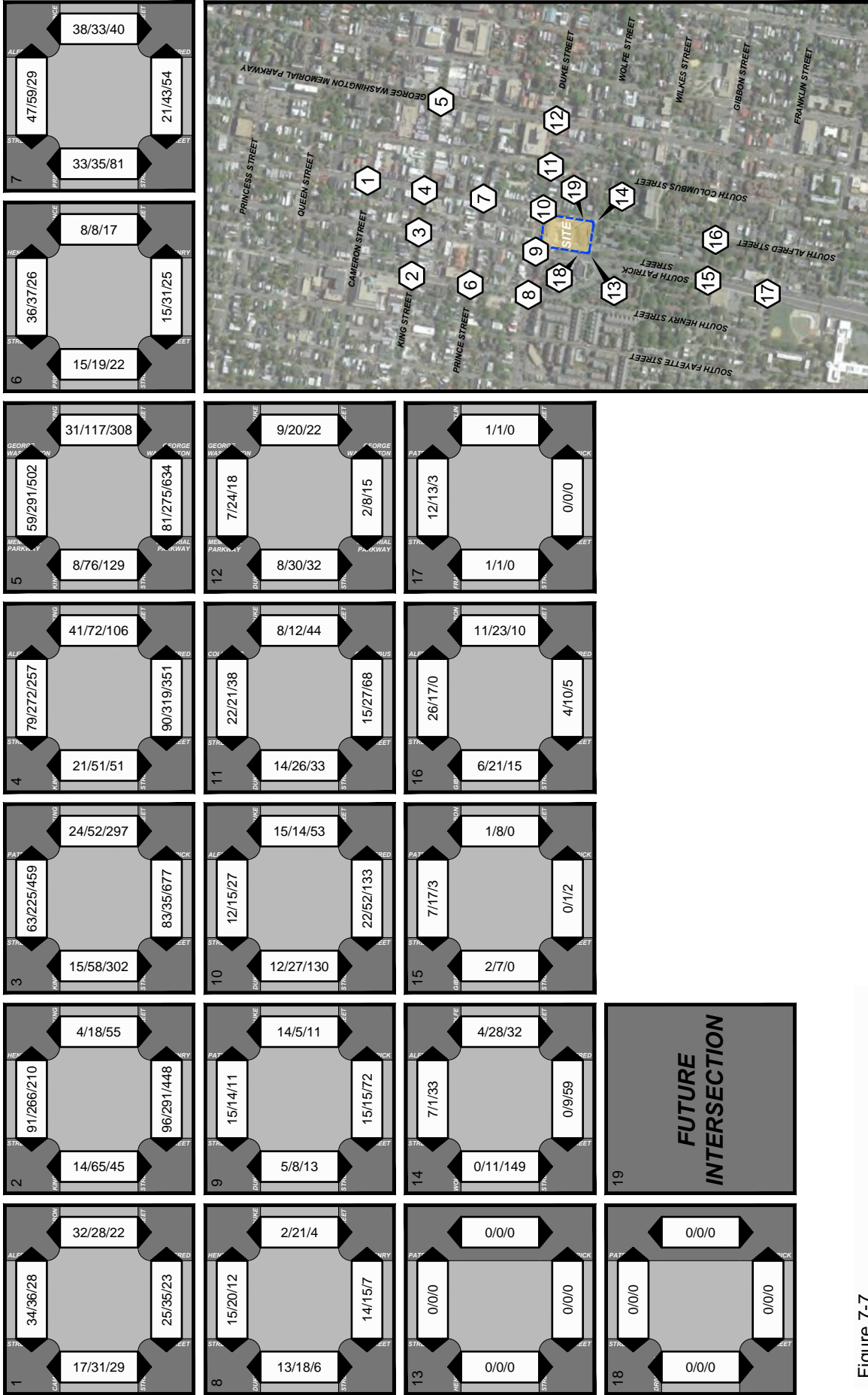
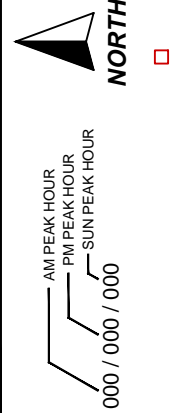


Figure 7-7 Existing Pedestrian Traffic Volumes

Alfred Baptist Church
City of Alexandria, Virginia



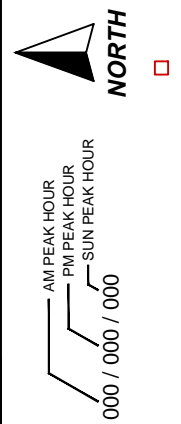
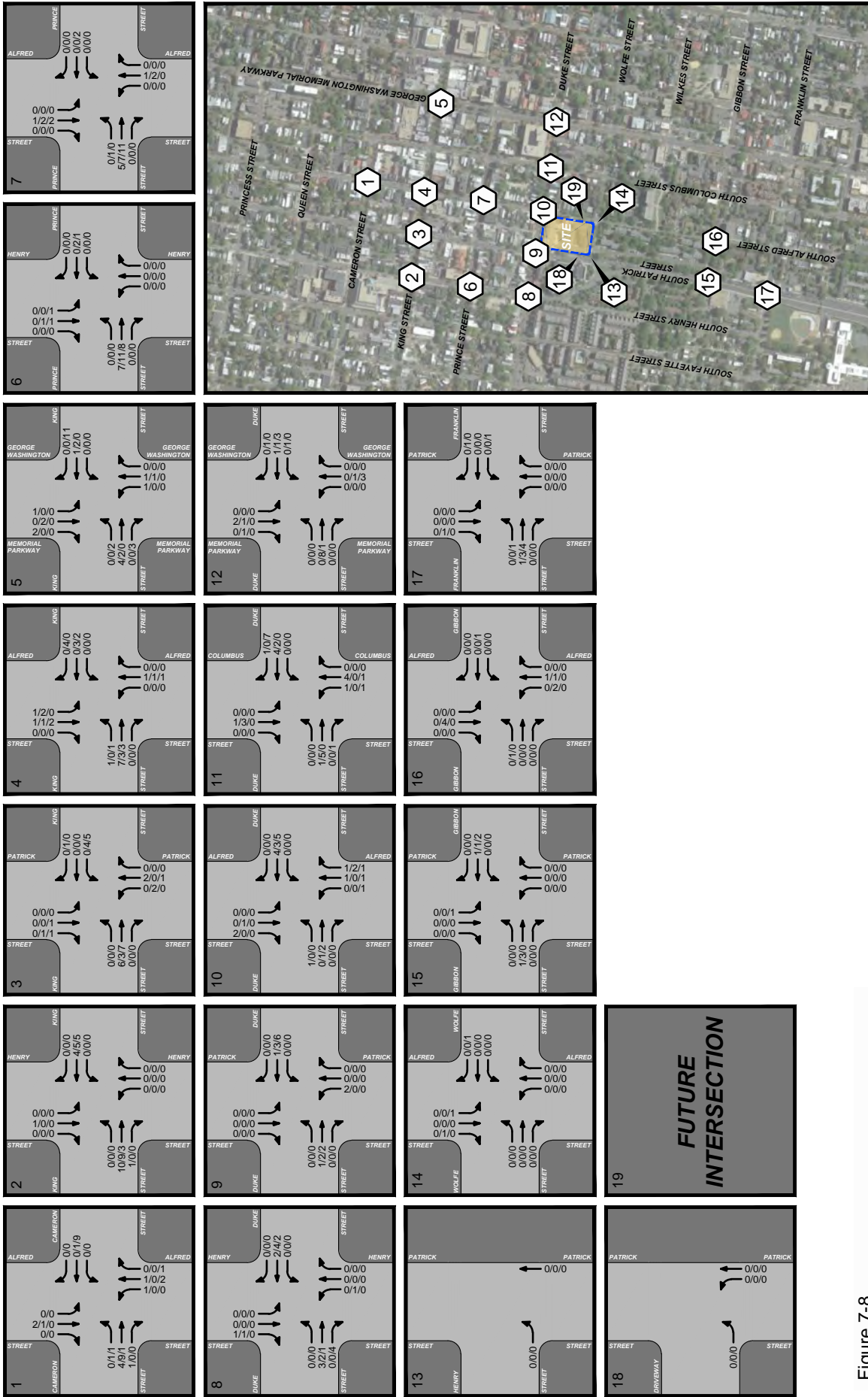


Figure 7-8
Existing Bicycle Traffic Volumes

Alfred Baptist Church
City of Alexandria, Virginia



Figure 7-10
Alexandria Bike Master Plan

Alfred Baptist Church
City of Alexandria

Bike Facility Group	Existing Facilities	Metro Station
Enhanced Bicycle Corridor	Bike Lane	Metro Station
Shared Roadway	Sharrow	Metroway Stop
Trail	Trail	Future Street
Climbing Lane	Unpaved Nature Trail	



SECTION 8 PARKING DEMAND ANALYSIS

Overview

This section provides an evaluation of the observed parking occupancy characteristics of the existing church parking facilities and surrounding area. Also included are details regarding the existing shuttle service that will remain in operation subsequent to the redevelopment, an on-street parking occupancy survey along the adjacent roadways, and a parking management plan to serve the site.

Code Requirement and Proposed Parking Ratio

The City of Alexandria Code requires one (1) space per every five (5) seats for churches. As shown on Table 7-1, the existing church (920 seats, including the chapel) would require 184 spaces, and provides a total of 289 spaces on-site. This excludes the overflow spaces used on Sundays through agreements with other property owners provided in off-site facilities.

Based on the proposed development program of 2,163 seats, a total of 433 parking spaces are required. The proposed parking supply of 465 spaces would meet the required amount of on-site parking spaces. In addition to the requirement being met, the church will maintain the existing off-site overflow parking and shuttle service.

Parking Occupancy

In accordance with the City's guidelines, on-street parking occupancy data surrounding the site was collected for the area covering a two (2) block radius from the site. Figure 8-1 highlights the surveyed area. As agreed during the scoping process, the occupancy survey was conducted on Wednesday, May 20, 2015 from 6:30 to 9:30 AM and 4:30 to 7:30 PM and on Sunday, May 31 and Sunday June 7, 2015 from 7:00 AM to 3:00 PM.

Weekdays. The results of the weekday on-street parking survey are shown on Figures 8-2 and 8-3 and indicate that on-street parking is generally available during the AM and PM peak hours on weekdays. During the weekday AM peak hour, a maximum of 396 parked vehicles (or 51 percent occupied spaces) were observed at 9:30 AM. A maximum of 558 vehicles (or 72 percent occupied spaces) were observed at 7:00 PM.

Sundays. The results of the Sunday counts (average of both count days) of on-street parking are shown on Figure 8-4 and indicate that a maximum of 766 parked vehicles (or 99 percent occupied spaces) were observed at 12:30 PM.

The parking occupancy counts collected at the existing Coal Lot, 117 N. Alfred Street Garage, surface parking next to the Gateway Garage, and the Alexandria Gateway Garage are summarized on Figure 8-5, and indicate that a maximum of 357 parked vehicles (or 83 percent occupied spaces) were observed at 11:45 PM during the Sunday midday peak hour. This indicates that a surplus of approximately 72 spaces is available during this period. It is noted that the Alexandria Gateway Garage and its surface parking were beyond capacity during this period, but spaces were available in the other lots.

Detailed summaries of each of the parking areas surveyed are contained in Appendix F.

Parking Management Plan

The church currently utilizes an extensive parking management plan in order to accommodate parking demands on typical Sundays. These measures include traffic control personnel at key intersections, agreements for additional off-street parking, and shuttle service provided to the off-site parking facilities and metro. Church administration frequently updates parishioners of available parking and shuttle services in order to most effectively circulate traffic during peak service times. A non-auto reduction of 10 percent was used for the future trip generation calculations, and is assumed to increase as the church continues to grow.

As shown on Table 8-1, these of the off-site parking facilities would provide for 190 additional spaces, or a total of 655 parking spaces. The proposed parking supply is 222 more spaces than required by the zoning code. Further, the church has formal agreements for the use of these spaces. Thus, the additional parking provided on-site and use of the off-site parking facilities would adequately accommodate the parking demands of the church.

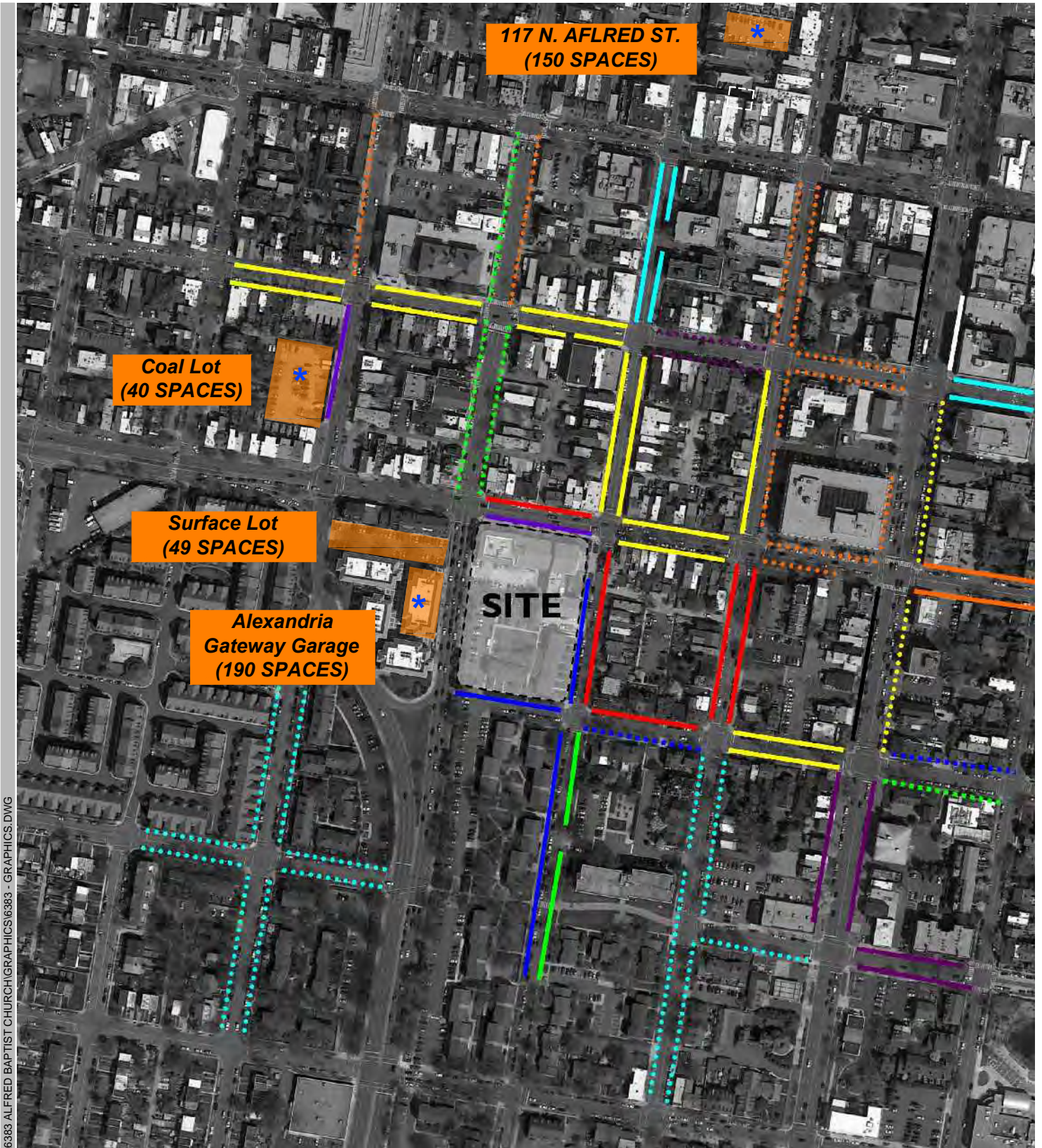
Table 8-1
 Alfred Street Baptist Church
 Existing and Proposed Parking Supply vs. Requirements

<u>Existing</u>		
Seats ⁽¹⁾	920	seats
Parking Requirement at 1 space / 5 seats ⁽²⁾	184	spaces
On-Site Parking Provided ⁽³⁾	289	spaces
<i>Difference</i>	<i>+105</i>	<i>spaces</i>
<u>Proposed</u>		
Seats ⁽¹⁾	2,163	seats
Parking Requirement at 1 space / 5 seats ⁽²⁾	433	spaces
On-Site Parking Provided	<u>465</u>	spaces
<i>Difference</i>	<i>+32</i>	<i>spaces</i>
Percent Over	7.39%	
<u>Additional Off-Street Parking Supply</u>		
Coal Lot	40	spaces
117 N. Alfred Street	<u>150</u>	spaces
<i>Total Additional Off-Site Parking</i>	<i>190</i>	<i>spaces</i>
Total Off-Street Proposed Supply (On and Off Site)	655	spaces
Surplus Parking Supply	222	spaces

(1) Seating number includes chapel seating separated from the main sanctuary.

(2) Zoning Ordinance Section 8-200

(3) Includes additional parking made addition for Tuesday night activities and Sunday services.



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Figure 8-1
On-Street Parking Restrictions

Alfred Baptist Church
City of Alexandria





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Figure 8-1
On-Street Parking Restrictions - Legends

Alfred Baptist Church
City of Alexandria



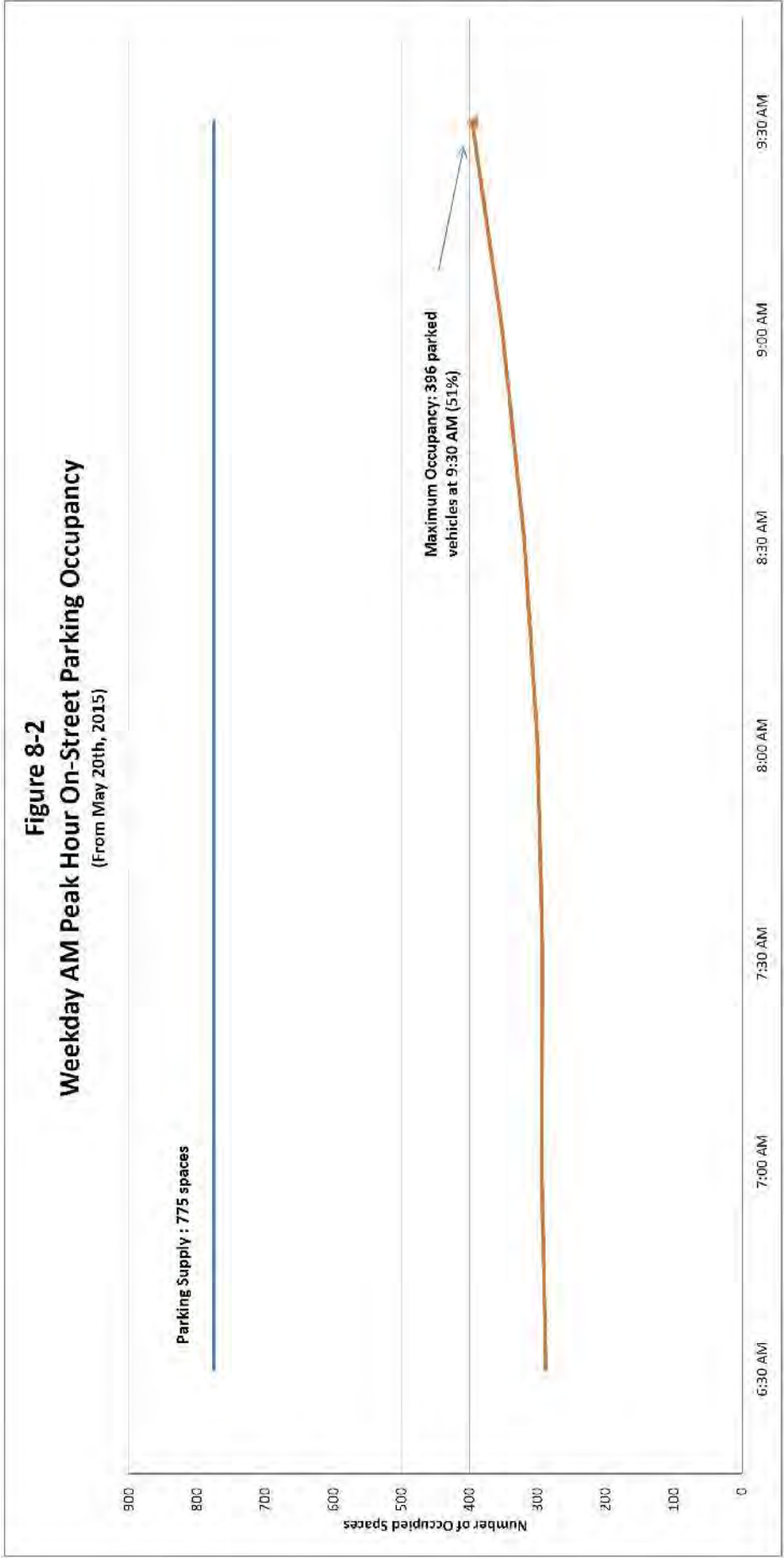


Figure 8-2
 Weekday AM Peak Hour On-Street Parking Occupancy

Alfred Baptist Church
 City of Alexandria, Virginia

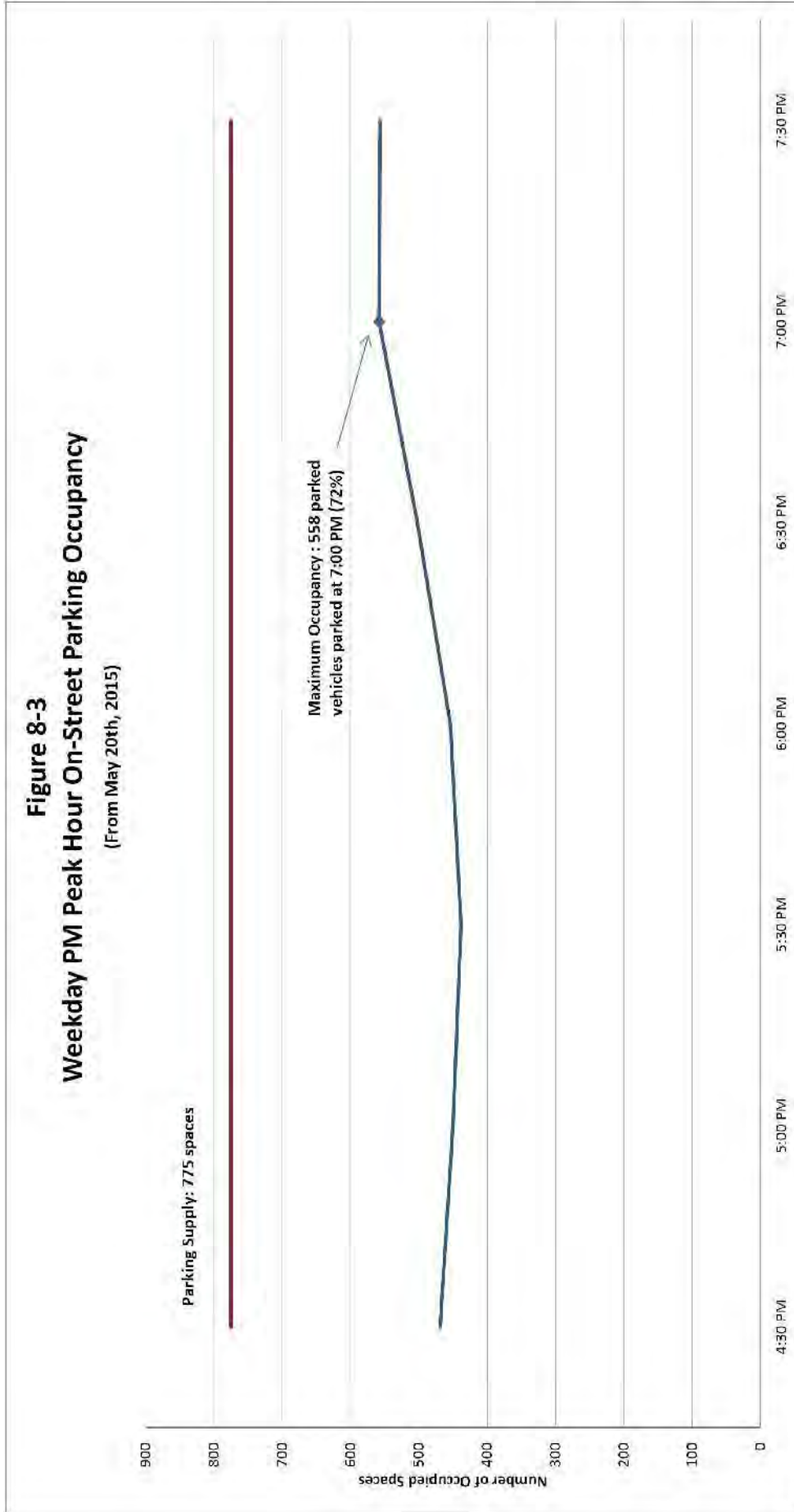


Figure 8-3
Weekday PM Peak Hour On-Street Parking Occupancy

Alfred Baptist Church
City of Alexandria, Virginia



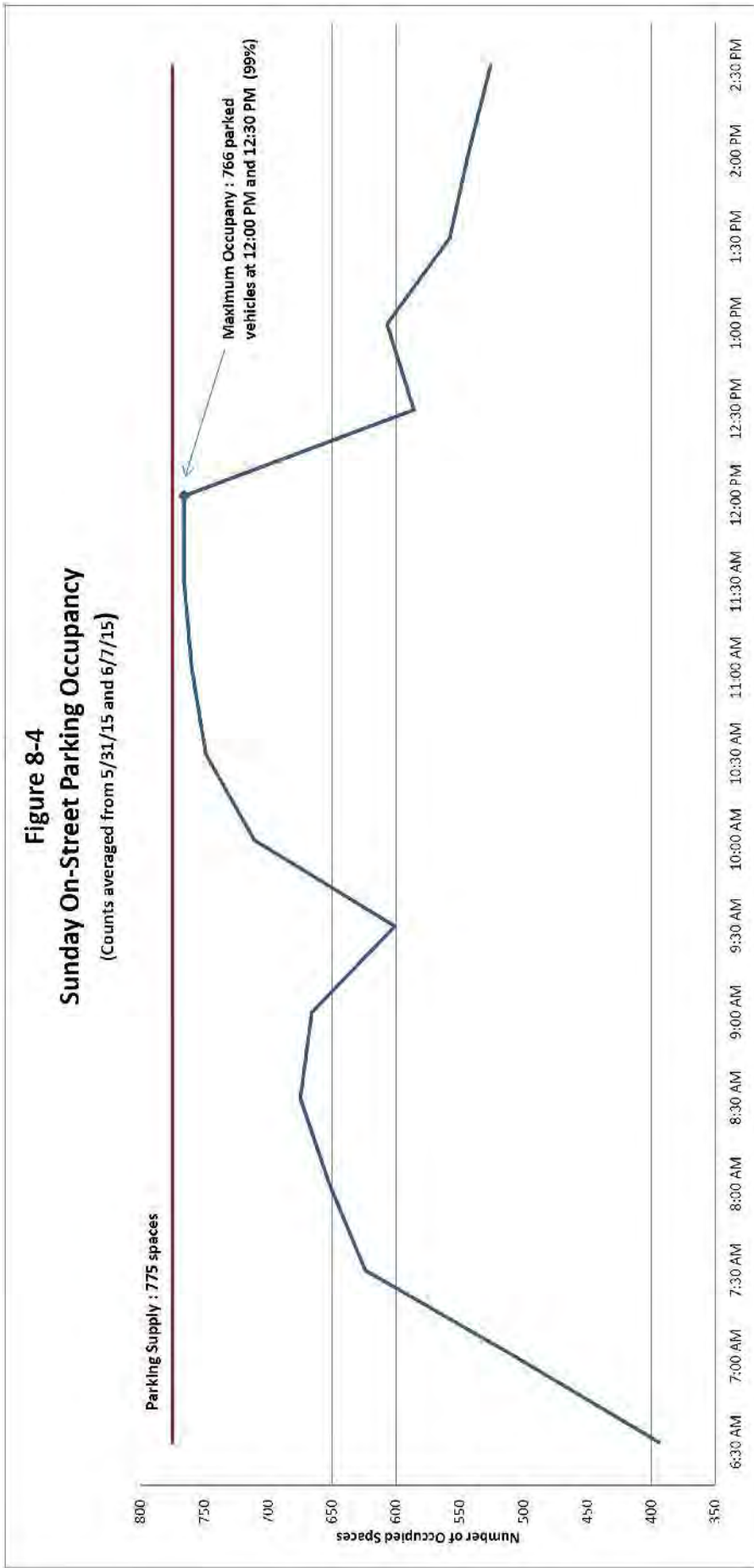


Figure 8-4
Sunday Peak Hour On-Street Parking Occupancy

Alfred Baptist Church
City of Alexandria, Virginia



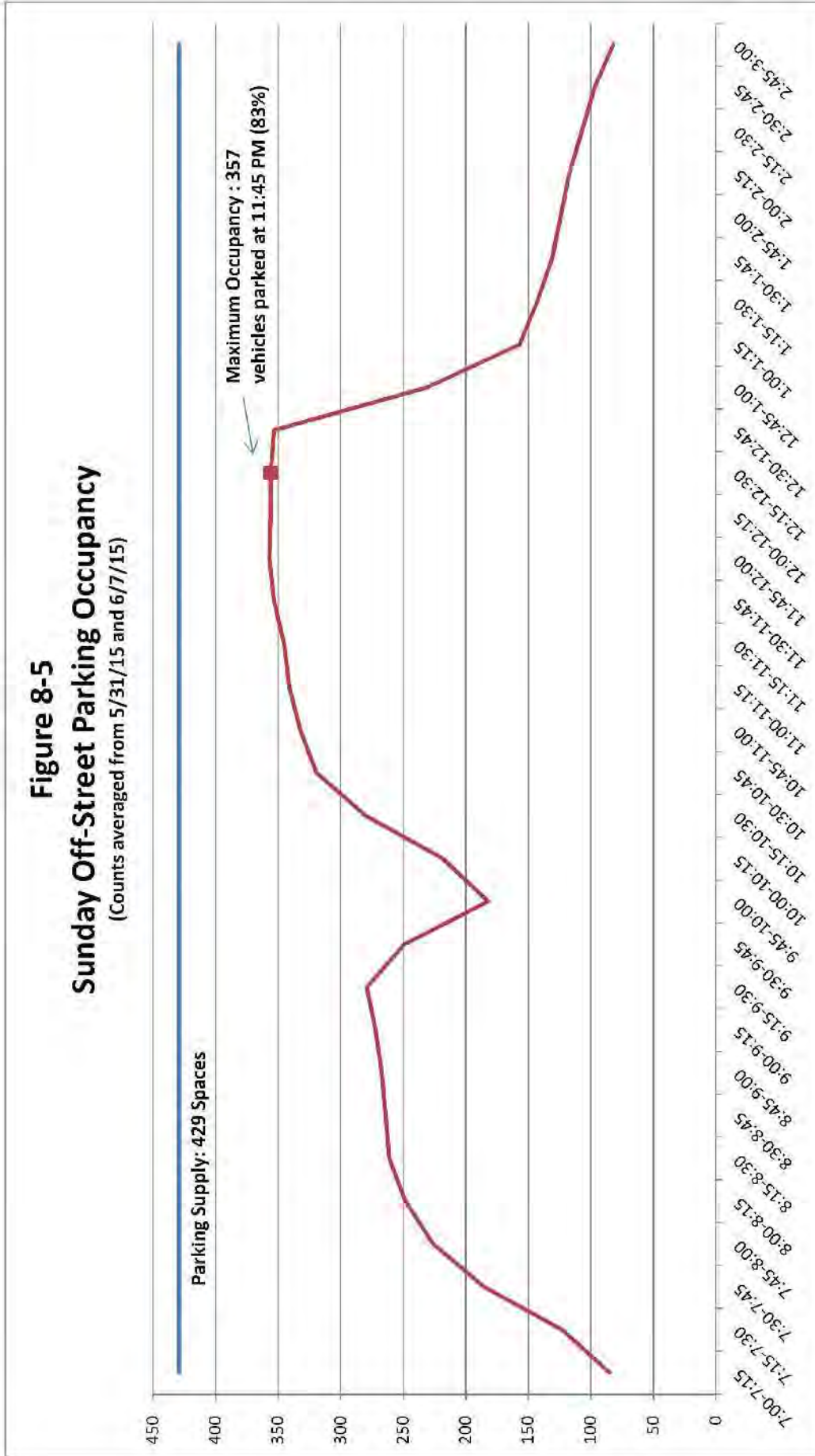


Figure 8-5
Sunday Peak Hour Off-Street Parking Occupancy

Allfred Baptist Church
City of Alexandria, Virginia



SECTION 9 CONCLUSIONS AND RECOMMENDATIONS

The conclusions of this traffic impact study are as follows:

1. The 15 signalized study intersections currently operate at overall acceptable levels of service (LOS “D” or better) during the weekday AM, weekday PM and Sunday midday peak periods with the exception of Henry Street/King Street (weekday PM peak), Patrick Street/King Street (weekday AM peak), and Washington Street/Duke Street (weekday AM peak) which operate at LOS “E”. Some minor street approaches at these intersections operate at LOS “E” or “F” during the AM, PM, and/or Sunday peak periods, this is in part due to long cycle lengths and the majority of time being allocated to mainline U.S. Route 1 (Henry Street and Patrick Street). All of the approaches at the stop controlled intersections currently operate at acceptable levels of service with minimal delay.
2. The results for 2022 conditions without development are generally consistent with those identified under existing conditions. The signalized intersections on Washington Street and U.S. Route 1 would continue to experience peak hour, peak direction congestion. The approaches at the stop controlled intersections would continue to operate at acceptable levels of service during peak periods with minimal delay.
3. The Alfred Street Baptist Church project (181,150 GSF Church with 2,163 seats) is expected to generate an additional 45 weekday AM peak hour trips, 19 weekday PM peak hour trips, 401 Sunday peak hour trips, 1,579 weekday daily (24-hour) trips, and 3,619 Sunday (24-hour) trips upon completion and full occupancy by 2022. These estimates account for a 10 percent non-auto mode split reduction. The non-auto mode split is related to the bus route that runs directly past the church’s main entrance and the existing shuttle service to the King Street Metrorail Station.
4. The results of the 2022 conditions with development indicate that the redevelopment of the site would have only a minor impact on overall delays at the study intersections. At all signalized study intersections, the overall delay would have a net increase of approximately five (5) seconds or less with addition of site generated traffic when compared to future conditions without development during peak periods with the exception of S. Patrick Street and Duke Street with a net increase of less than eleven (11) seconds. Approaches at the stop controlled intersections would realize little or no increase (less than five (5) seconds) in delay with the proposed development when compared to future conditions without development. Given the magnitude of regional traffic along U.S. Route 1 and Washington Street, and the minimal site impact, no vehicular geometric improvements are recommended at the study intersections.
5. The Applicant exceeds the parking requirement of 433 spaces with 465 proposed on-site parking spaces. Additional off-site parking and shuttle service is also offered during service periods.

6. The church is exempt from providing a formal Transportation Management Plan (TMP). However, the church provides an extensive traffic and parking program for typical Sundays. The plan includes traffic control personnel at key intersections, agreements for additional off-street parking, and shuttle service provided to the off-site parking facilities and metro. Church administration frequently updates parishioners of available parking and shuttle services in order to most effectively circulate traffic during peak service times. The continued use of this program would help increase the non-auto mode share and reduce traffic and parking impacts.

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