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For Technical Reviewer

Traffic Impact Study

Temple Baptist Church

Loudoun County, Virginia



July 29, 2009
Revised December 4, 2009

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TABLE OF CONTENTS

Executive Summary	iii
Scope of Study	4
Existing Conditions (2009)	5
Existing Roadway Network	5
Hazardous Locations	6
Existing Traffic Volumes	6
Existing Conditions Capacity Analysis	9
Future Conditions without Development (2012)	13
Planned Roadway/Transportation Improvements (2012)	13
Future without Development Traffic Volumes	13
Future without Development Capacity Analysis	16
Future Conditions with Development (2012)	21
Site Description and Site Access	21
Site Generated Volumes	21
Direction of Approach and Future Conditions with Development (2012) Volumes	22
Future with Development Capacity Analysis (2012)	27
Conclusions	33



LIST OF FIGURES

Figure 1: Area Map and Site Location 2

Figure 2: Proposed Development Plan 3

Figure 3: Zoning Map 4

Figure 4: Existing (2009) Lane Configuration and Traffic Control 7

Figure 5: Balanced Existing (2009) Peak Hour Traffic Volumes..... 8

Figure 6: Existing (2009) Levels of Service..... 12

Figure 7: Location of Background Developments 14

Figure 8: Future Background (2012) Traffic Volumes..... 15

Figure 9: Future Conditions without Development (2012) Levels of Service..... 19

Figure 10: Future Conditions without Development (2012) Recommended Improvements 20

Figure 11A: Site Generated (2012) Traffic Volumes – Church and Private School Use..... 23

Figure 11B: Site Generated (2012) Traffic Volumes – Retail Use 24

Figure 11C: Pass-By Trips (2012)..... 25

Figure 12: Total Future (2012) Traffic Volumes 26

Figure 13: Future Conditions with Development (2012) Peak Hour Levels of Service 31

Figure 14: Future Conditions with Development (2012) Recommended Improvements 32

LIST OF TABLES

Table 1: Existing (2009) Intersection Capacity Analysis 9

Table 2: Existing (2009) Queuing Analysis..... 11

Table 3: Future Conditions without Development (2012) Intersection Capacity Analysis 16

Table 4: Future Conditions without Development (2012) Queuing Analysis..... 18

Table 5A: Site Trip Generation..... 21

Table 5B: Trip Generation Comparison (Permitted Vs Proposed)..... 22

Table 6: Site Trip Distribution..... 22

Table 7: Future Conditions with Development (2012) Intersection Capacity Analysis 27

Table 8: Future Conditions with Development (2012) Queuing Analysis 30



EXECUTIVE SUMMARY

The following report presents the findings of a traffic impact analysis for the proposed Temple Baptist Church development in Loudoun County, Virginia. The site is located west of Route 2020 (Ashburn Village Boulevard), north of Route 625 (Waxpool Road) and south of Route 640 (Farmwell Road). The project site consists of approximately 21 acres of developable land currently zoned for “commercial center district” use (PD-CC (CC)). Two access points will serve the site; one primary access will be on Ashburn Village Boulevard and the second access will be a right-in-right out access along Waxpool Road.

The analysis presented in this report supports the following major conclusions:

- The proposed development plan calls for the construction of a Church, Private School (K-12) and retail.
- The proposed development is anticipated to be open by 2012.
- The proposed development will generate approximately 543 new trips in the weekday morning peak hour, 238 new trips in the weekday afternoon peak hour and approximately 1,040 new trips on the Sunday peak hour by 2012. Daily total traffic volumes for weekday and Sunday are 3,549 and 3,351 respectively.
- Except for Sunday peak hour, the proposed uses will generate far less trips than the permitted uses for the property, approx. 121 less trips during the AM peak hour, 1,033 less trips during the PM peak hour, 8,447 less daily trips and 3,722 less trips on Sunday.
- The following is a summary of the improvements/mitigations required to accommodate existing and future regional and local traffic:
 - **Existing Conditions (2009):**
 - *The intersection of Ashburn Village Boulevard with Waxpool Road and Ashburn Village Boulevard with Farmwell Road operate under unacceptable levels of service under existing conditions. However, no mitigations were recommended under the existing conditions.*
 - **Future Conditions without Development (2012):**
 - The following planned improvements anticipated to be in place by 2012 (as discussed at the scoping meeting) were considered in the analysis:*
 - 1. *Ashburn Village Boulevard As part of the approved Morley Corner residential development, planned to be constructed as a four-lane road across the property frontage; turn lanes will be provided in all directions at the Morley Corner Site entrance.*
 - 2. *Loudoun County in conjunction with VDOT is in the process of widening the existing two-lane section from Faulkner Parkway to Unbridled Way to a four-lane median-divided road. As part of this planned widening, a traffic signal is also planned at the intersection of Waxpool Road and Ashburn Village Boulevard. The signal design is currently under review.*



- With the improvements listed above in place, all study intersections operate at acceptable levels of service except for the intersection of Ashburn Village Boulevard and Farmwell Road.

○ **Future Conditions with Development (2012):**

The following improvements have been proposed under the future with development conditions with the proposed development in place:

1. Installation of a traffic signal at the intersection of Ashburn Village Boulevard and Red Rum Drive / Site Entrance
2. Addition of a northbound left turn lane and southbound right turn lane at the primary site entrance along Ashburn Village Boulevard
3. Addition of a right turn bay into the secondary (right in right out entrance) along Waxpool Road

- With the improvements listed above in place, all study intersections operate at acceptable levels of service except for the intersection of Ashburn Village Boulevard and Farmwell Road. The site generated traffic constitutes only approximately 5% and 2% of the total traffic volume in the AM and PM peak hour periods, respectively; therefore, no mitigations were recommended for this intersection. As shown in the table below, the impacts to this intersection from the proposed development are negligible.

Table: Ashburn Village Boulevard and Farmwell Road: Site Percentages

	AM	PM
Site Volumes	214	110
Total Volumes (2012)	4,183	5,634
Site Percentage	5%	2%

- The results of the study have identified that the planned roadway improvements in the study area along with the installation of a traffic signal at Ashburn Village Road and Red Rum Road/Primary Site Entrance will accommodate the traffic generated by the proposed development.
- Figure A on the next page shows the summary of the planned/recommended improvements for the study intersections.

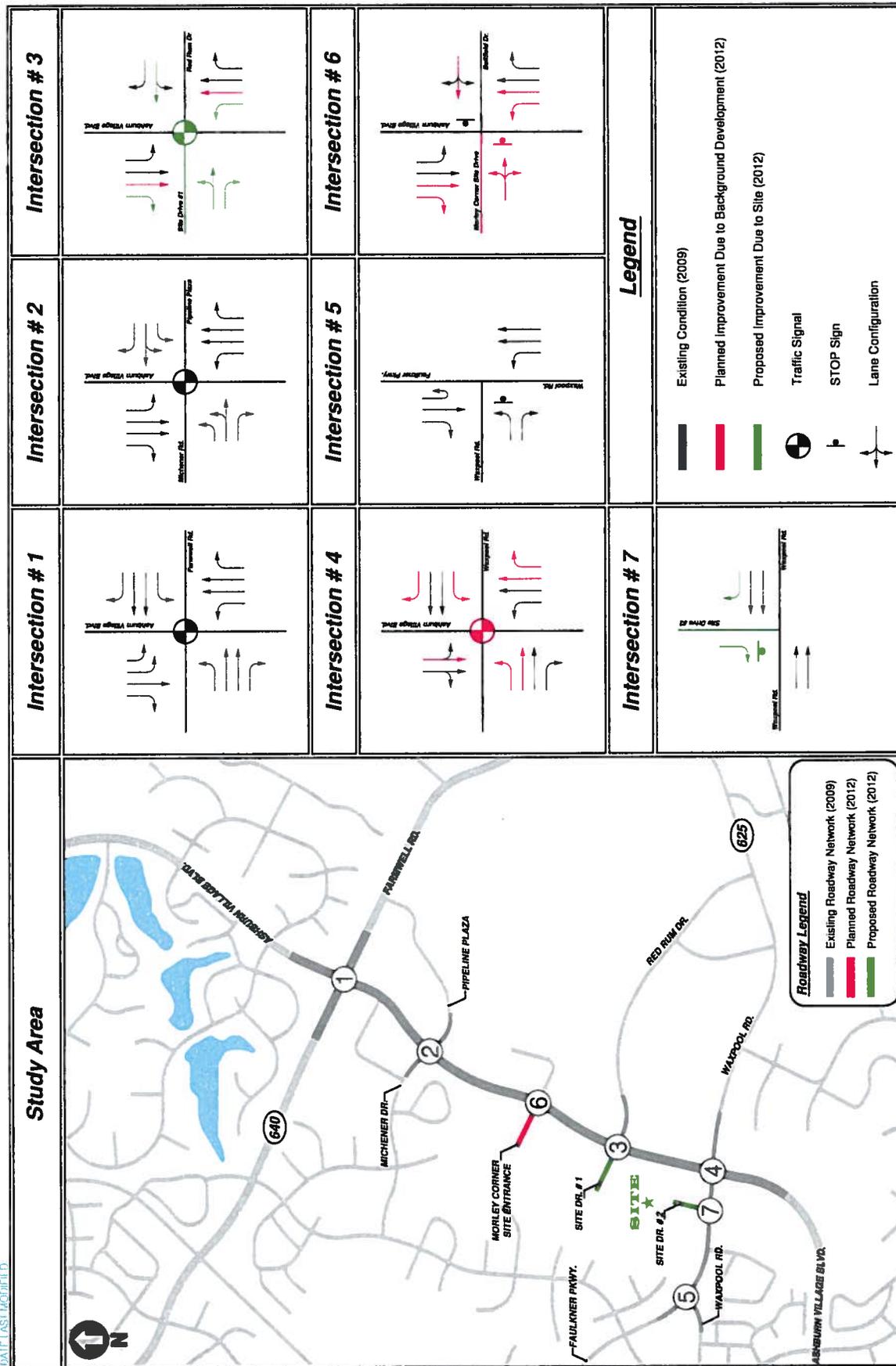


Figure A
Planned and Recommended Improvements



INTRODUCTION

This report presents the findings of a traffic impact analysis for the proposed Temple Baptist Church development in Loudoun County, Virginia. The site is located west of Route 2020 (Ashburn Village Boulevard), north of Route 625 (Waxpool Road) and south of Route 640 (Farmwell Road). The project site consists of approximately 21 acres of developable land currently zoned for “commercial center district” use (PD-CC (CC)). Two access points will serve the site; one primary access will be on Ashburn Village Boulevard and the second access will be a right-in-right out access along Waxpool Road.

The following tasks were completed as a part of this study:

- A scoping meeting (Per VDOT’s chapter 527 regulations) was held on May 27, 2009 with representatives from Virginia Department of Transportation (VDOT) and Loudoun County, which included discussions about the parameters of the study and relevant background information. A copy of the signed scoping letter confirming the parameters and assumptions used in the traffic impact study is included in the Technical Appendix C.
- Field reconnaissance in the vicinity of the site was performed to collect information related to existing traffic controls, roadway geometry, and traffic flow characteristics.
- Traffic counts were conducted in May and June of 2009 during the morning, afternoon and Sunday peak hours at the intersections located within the study area.
- Future traffic conditions were estimated based on projected regional growth, other approved background developments located within the study area, and the proposed development plan.
- Site traffic volumes were generated based on the methodology outlined in the Institute of Transportation Engineers’ (ITE) Trip Generation, 8th Edition.
- Intersection capacity analyses were performed using *Synchro, version 7.0* based on the Highway Capacity Manual data and methodology. The HCM worksheets are included in the Technical Appendices D, E and F for existing (2009) and future with and without development (2012) conditions, respectively.
- Traffic analyses were performed at the intersections contained within the study area for the existing (2009) and future with and without the proposed development (2012) conditions.

Sources of data for this study include Loudoun County, VDOT, Loudoun Station Traffic Impact Study (by *Wells and Associates*) and the office files and field reconnaissance efforts of Grove/Slade Associates, Inc.

Figures 1, 2 and 3 show the area map and site location, the proposed development plan and the zoning map respectively.



Figure 1: Area Map and Site Location

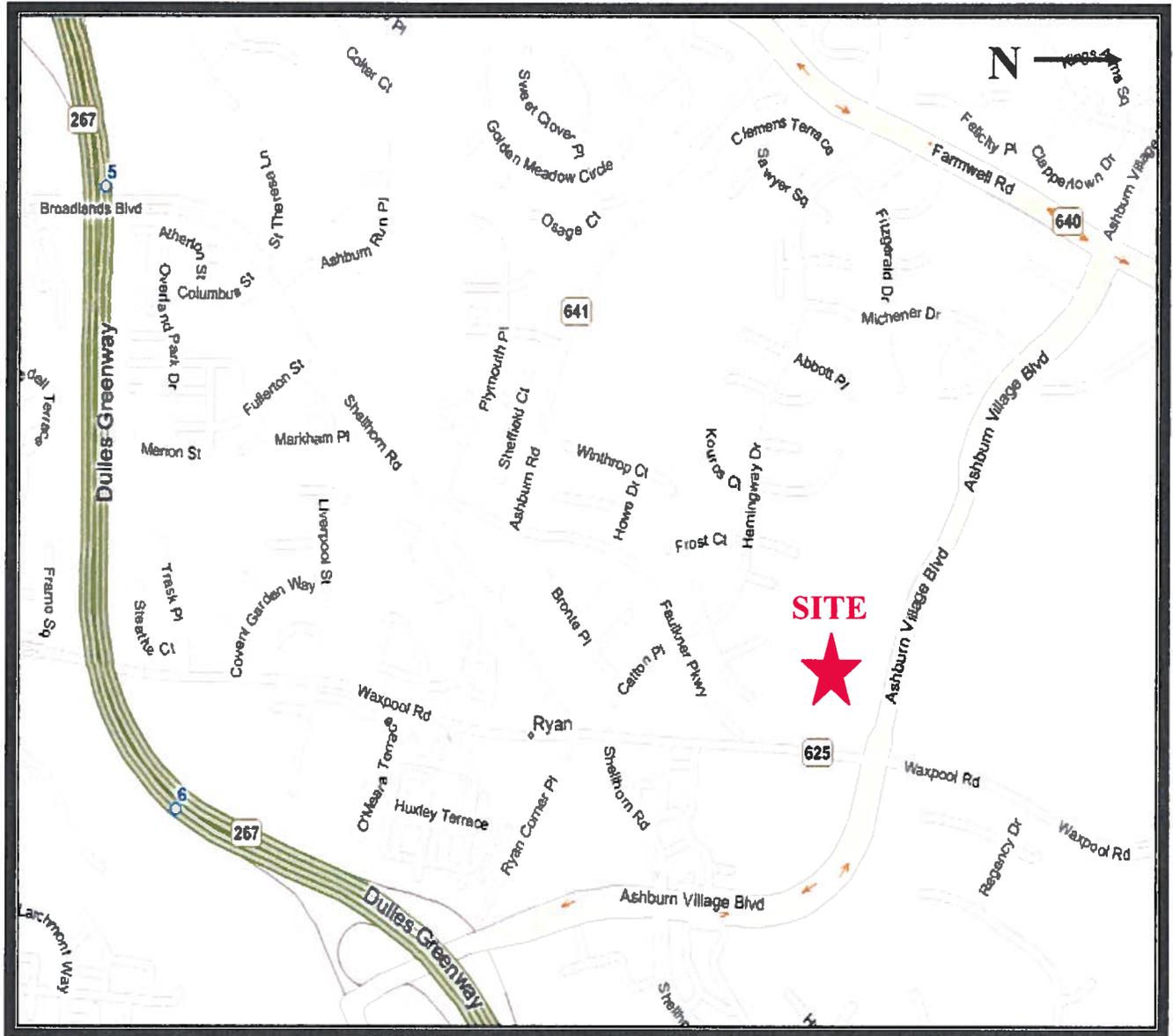




Figure 2: Proposed Development Plan

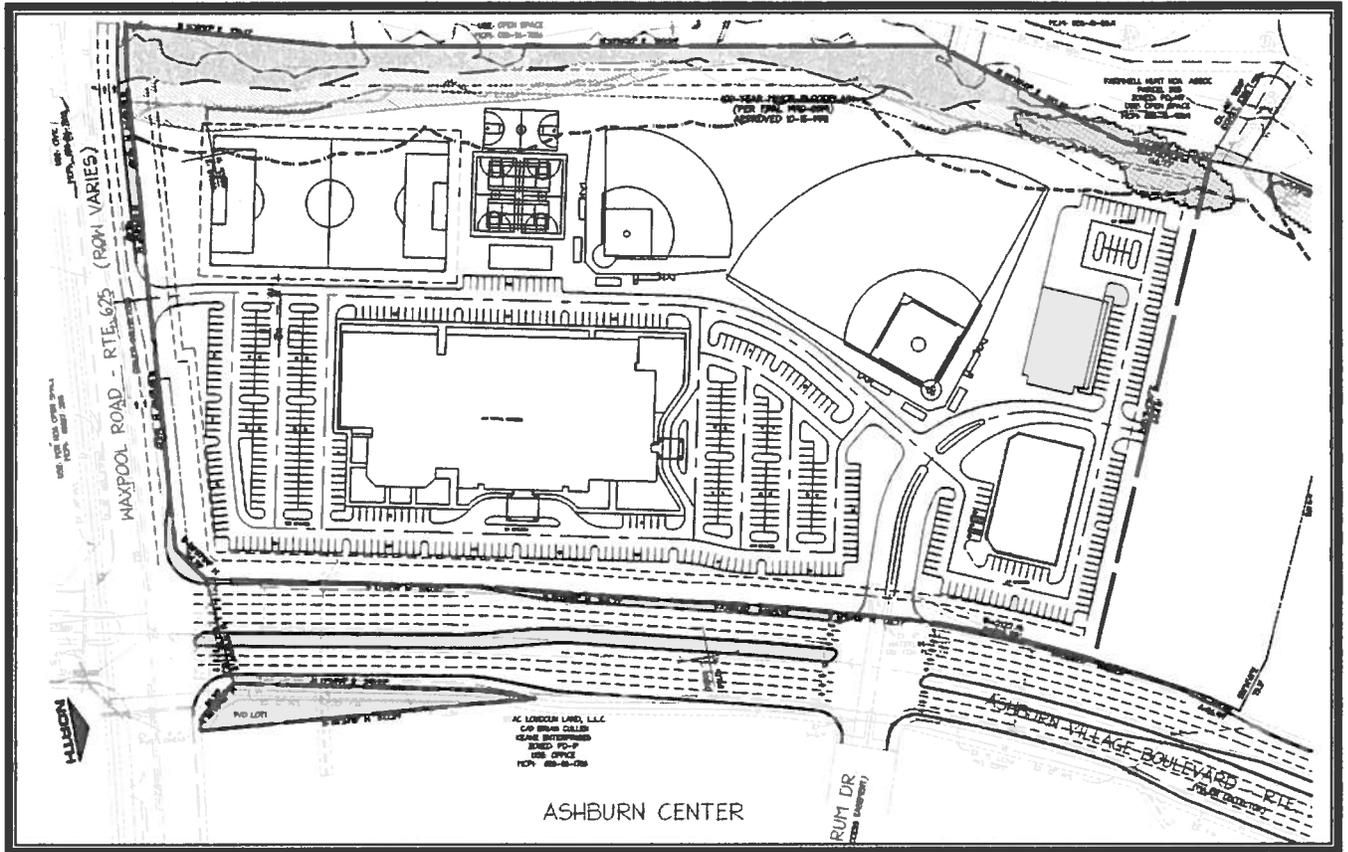
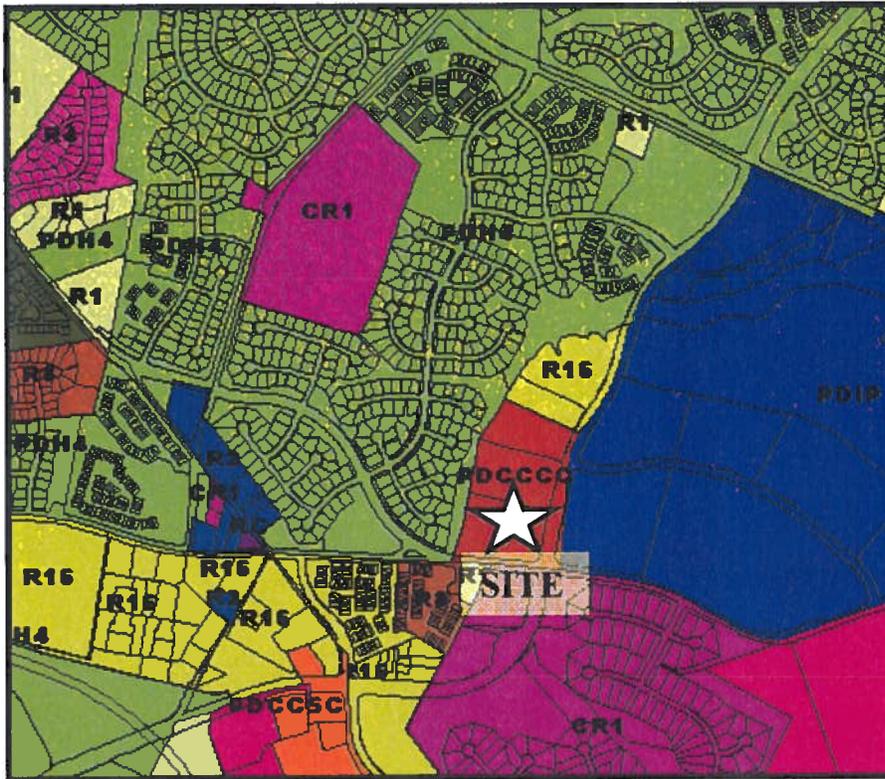




Figure 3: Zoning Map



Zoning Current			
CR1	PDH4	R1	R8
PDOP	PDIP	R16	RC
PDCCSC	PDOP	R2	
PDH3	PDTRC	R4	

Scope of Study

The following intersections were identified for inclusion in this study.

2. Ashburn Village Boulevard and Farmwell Road;
3. Ashburn Village Boulevard and Michener Drive/Pipeline Plaza;
4. Ashburn Village Boulevard and Red Rum Drive;
5. Ashburn Village Boulevard and Waxpool Road;
6. Waxpool Road and Faulkner Parkway; and
7. All future access points to the proposed Church.

This report presents the findings of analyses performed for the following conditions:



- **Existing Conditions (2009):** Considers existing traffic volumes and existing roadway lane configurations.
- **Future Conditions without Development (2012):** Considers future traffic conditions with the background growth and other approved developments within the vicinity but without the proposed development.
- **Future Conditions with Proposed Development (2012):** Considers future traffic conditions for the year 2012 with the background growth, other approved background developments and the proposed development.

The results of the analysis and the traffic impacts associated with the proposed Church are presented in the conclusion section of this report.

EXISTING CONDITIONS (2009)

Existing Roadway Network

A description of the major roadways within the immediate vicinity of the site is presented below. The existing lane configuration and traffic control in the study area is shown in **Figure 4**.

- ◆ **Ashburn Village Boulevard (Route 2020)** is a, local access, divided, major collector with left and right turns at all intersections. Ashburn Village Boulevard varies between two and four lanes along the proposed site frontage; the existing configuration is a four lane collector road from Farmwell Road to approximately 500 feet south of Michener Drive; from this point the road drops to two lanes and just south of Waxpool Road resumes as a four lane, median divided road. The current posted speed limit of 35 mph within the vicinity of the project site.
- ◆ **Waxpool Road (Route 625)** is a four-lane median divided road between Farmwell Road and Faulkner Parkway, however a small section between Faulkner Parkway and Unbridled Way is two-lanes. Loudoun County in conjunction with VDOT is in the process of widening this section to its ultimate condition, a four-lane median-divided major collector with turn lanes at intersections. As part of this planned widening, a traffic signal is also planned at the intersection of Waxpool Road and Ashburn Village Boulevard. The current posted speed limit on this road is 35 mph within the vicinity of the project site.
- ◆ **Farmwell Road (Route 640)** is a four-lane, controlled access, divided, major collector with single left and right turn lanes at all intersections. The current posted speed limit on this road is 45 mph within the vicinity of the project site.



Hazardous Locations

A field reconnaissance was conducted on the roadways and intersections within the vicinity of the Temple Baptist Church development site. No hazardous conditions were found as a result of the field inspection.

Existing Traffic Volumes

In order to determine the weekday morning and afternoon peak hour turning movement volumes, traffic counts were conducted on Thursday, May 14, 2009 from 6:00 AM to 9:00 AM 4:00 PM to 7:00 PM. To determine the Sunday peak period, counts were conducted on Sunday, May 31, 2009 from 8:00 AM to 12:00 PM at the intersections contained within the study area. Analysis of the existing traffic data determined the peak hours shown below:

- 7:45 AM to 8:45 AM (Weekday)
- 5:30 PM to 6:30 PM (Weekday)
- 10:15 AM to 11:15 AM (Sunday)

The existing lane configurations and peak hour traffic volumes for the intersections contained within the study area are shown in **Figures 4 and 5**. The traffic counts data collected for the study intersections was reviewed and balanced on the higher side (to be conservative), wherever applicable, in order to eliminate any manual data entry errors. Figure 5 reflects the balanced existing traffic volumes. The existing counts are included in Technical Appendix A.

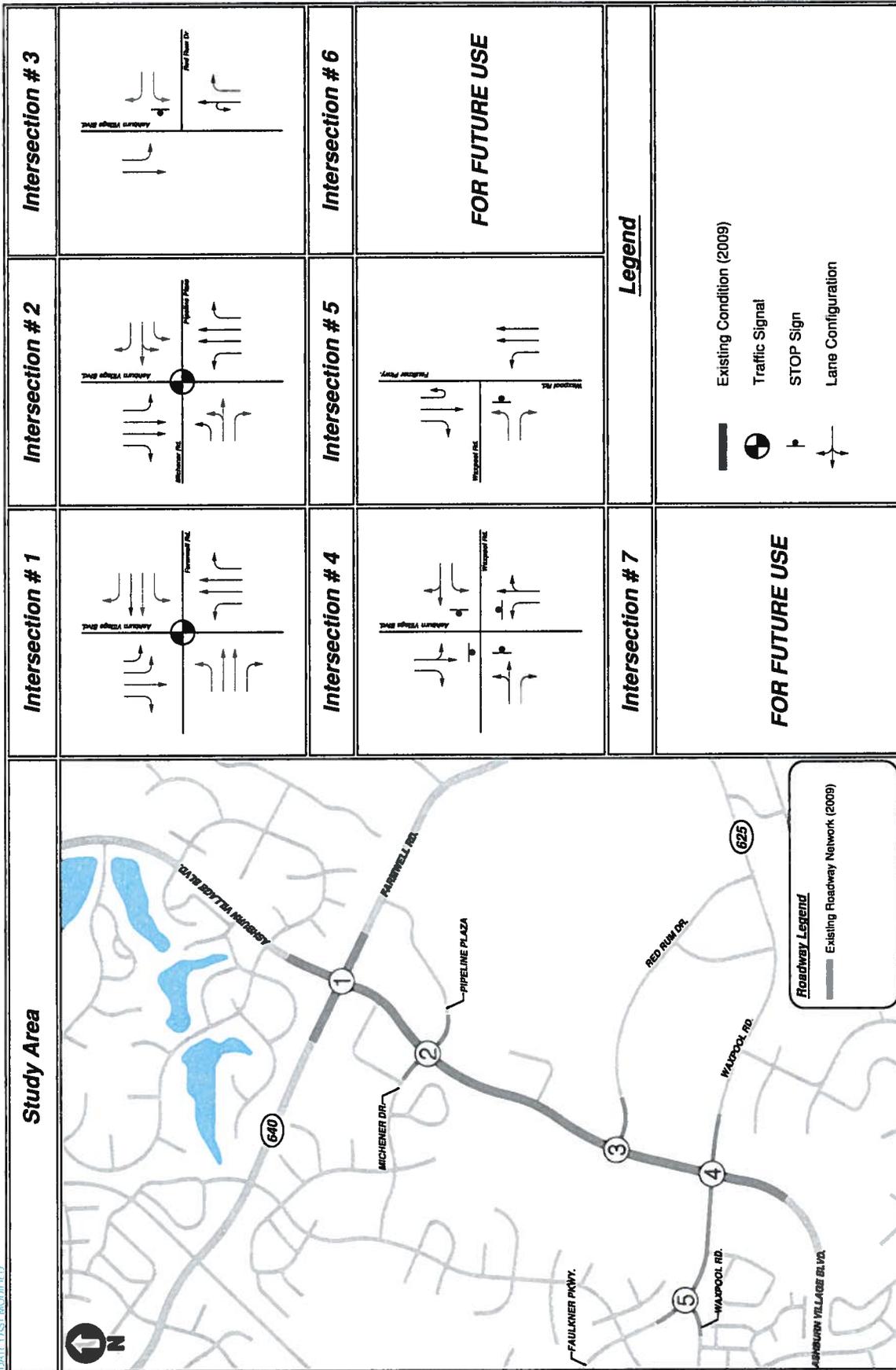
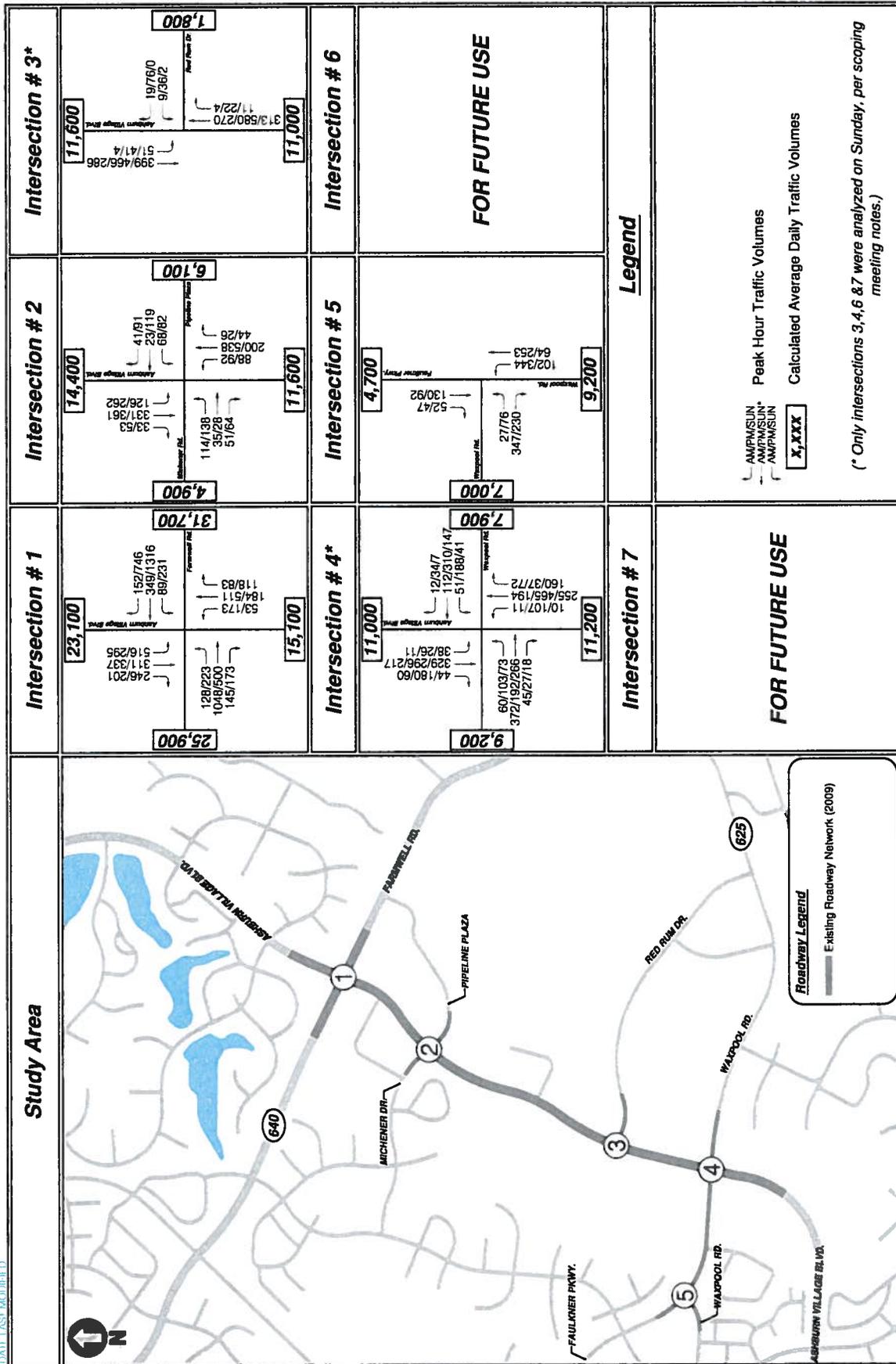


Figure 4
Existing Roadway Network (2009)



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Figure 5
Existing Conditions (2009)
Balanced Peak Hour Traffic Volumes



Existing Conditions Capacity Analysis

Capacity analyses were performed at the intersections contained within the study area during the weekday morning, afternoon and Sunday peak hours under the existing conditions. Intersection capacity analyses were performed using *Synchro, version 7.0* based on the latest Highway Capacity Manual (HCM 2000) data and methodology.

The results of the intersection capacity analyses are presented in **Table 1**, and are expressed in terms of level of service (LOS) and delay (seconds per vehicle). A description of the different LOS and delay and the detailed analysis worksheets for the existing conditions are included in Technical Appendix D.

Table 1: Existing (2009) Intersection Capacity Analysis

Intersection/Approach/Movement	Existing Conditions (2009)								
	AM Peak Hour			PM Peak Hour			Sunday Peak Hour		
	LOS	Delay	Overall LOS/Delay	LOS	Delay	Overall LOS/Delay	LOS	Delay	Overall LOS/Delay
<i>Ashburn Village Blvd and Farmwell Rd</i>									
Overall Intersection	D	47.6		D	52.1				
Eastbound Left	B	15.2		E	74.4				
Eastbound Through	C	31.4	C/28.9	C	30.5	D/40.7			
Eastbound Right	C	23.2		C	28.7				
Westbound Left	C	22.0		C	21.0				
Westbound Through	C	23.5	C/23.0	D	49.6	D/49.8			Intersection not analyzed, per scoping meeting notes
Westbound Right	C	22.5		E	62.0				
Northbound Left	F	86.6		F	93.1				
Northbound Through	F	81.5	F/80.9	E	57.7	E/64.1			
Northbound Right	E	76.5		D	47.3				
Southbound Left	E	75.0		E	63.0				
Southbound Through	E	76.3	E/70.6	E	68.0	E/60.6			
Southbound Right	E	58.5		D	45.2				
<i>Ashburn Village Blvd and Michener Dr</i>									
Overall Intersection	B	19.6		C	25.8				
Eastbound Left	C	24.9		D	37.6				
Eastbound Left/Through	C	24.9	C/22.1	D	37.5	C/34.0			
Eastbound Right	B	13.3		C	24.5				
Westbound Left	C	28.0		C	33.4				Intersection not analyzed, per scoping meeting notes
Westbound Left/Through	C	28.0	C/24.5	D	35.4	C/29.0			
Westbound Right	B	16.1		B	15.9				
Northbound Left	B	12.2		B	18.2				
Northbound Through	C	21.3	B/17.6	C	31.9	C/28.4			
Northbound Right	B	12.5		B	13.4				
Southbound Left	B	11.3	B/17.9	B	17.7	B/19.1			



Intersection/Approach/Movement	Existing Conditions (2009)								
	AM Peak Hour			PM Peak Hour			Sunday Peak Hour		
	LOS	Delay	Overall LOS/Delay	LOS	Delay	Overall LOS/Delay	LOS	Delay	Overall LOS/Delay
Southbound Through	C	21.5		C	21.7				
Southbound Right	A	9.2		B	10.9				
<i>Ashburn Village Blvd and Red Run Dr</i>									
Overall Intersection	N/A			N/A			N/A		
Westbound Approach	B	11.9		C	18.8		B	11.1	
Southbound Left	A	8.3		A	9.0		A	7.9	
<i>Ashburn Village Blvd and Waxpool Rd</i>									
Overall Intersection	F	75.0		F	104.3		C	17.8	
Eastbound Approach	F	88.7		F	61.3		C	23.9	
Westbound Approach	C	15.9		F	57.6		B	12.3	
Northbound Approach	F	98.5		F	223.7		C	16.8	
Southbound Approach	F	60.3		E	43.4		B	14.8	
<i>Waxpool Rd and Faulkner Pkwy*</i>									
Overall Intersection	N/A			N/A			Intersection not analyzed, per scoping meeting notes		
Eastbound Approach	B	13.0		C	15.4				
Northbound Left	A	8.0		A	8.3				

*Northbound approach is along Waxpool Road, Eastbound approach is along Waxpool Road, Southbound approach is along Faulkner Parkway

According to the Loudoun County's Facilities Standards Manual (FSM), it is desirable to achieve an overall and per approach level of service (LOS) D or better at each intersection. The above **Table 3** presents the results of the intersection capacity analysis.

The following intersections operate at unacceptable levels of service for the existing conditions:

- Ashburn Village Blvd and Farmwell Rd (AM and PM)
- Ashburn Village Blvd and Waxpool Rd (AM and PM)

Figure 6 illustrates graphically the intersection capacity analysis results.



As per VDOT's request. The queuing results for left turning movements at the specified intersections are shown in Table 2 below:

Table 2: Existing (2009) Queuing Analysis

Intersection/Approach/Movement	Turn Bay Length (F)	Existing Conditions (2009)					
		AM Peak Hour Average Queue	AM Peak Hour 95% Queue	PM Peak Hour Average Queue	PM Peak Hour 95% Queue	Sunday Peak Hour Average Queue	Sunday Peak Hour 95% Queue
<i>Ashburn Village Blvd and Farmwell Rd</i>							
Eastbound Left	355	70	123	193	#359	Intersection not analyzed, per scoping meeting notes	
Westbound Left	390	50	88	176	169		
Northbound Left	375	97	116	180	#320		
Southbound Left	445	360	401	157	209		
<i>Ashburn Village Blvd and Michener Dr</i>							
Eastbound Left	305	60	65	57	121	Intersection not analyzed, per scoping meeting notes	
Westbound Left	70	25	57	54	98		
Northbound Left	410	32	52	38	66		
Southbound Left	390	34	77	117	181		
<i>Ashburn Village Blvd and Red Rum Dr</i>							
Westbound Left		N/A	2	N/A	14	N/A	0
Southbound Left	250	N/A	4	N/A	4	N/A	0
<i>Ashburn Village Blvd and Waxpool Rd</i>							
Eastbound Left/Through	..	N/A	N/A	N/A	N/A	N/A	N/A
Westbound Left	300	N/A	N/A	N/A	N/A	N/A	N/A
Northbound Left	..	N/A	N/A	N/A	N/A	N/A	N/A
Southbound Left/Through	..	N/A	N/A	N/A	N/A	N/A	N/A

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

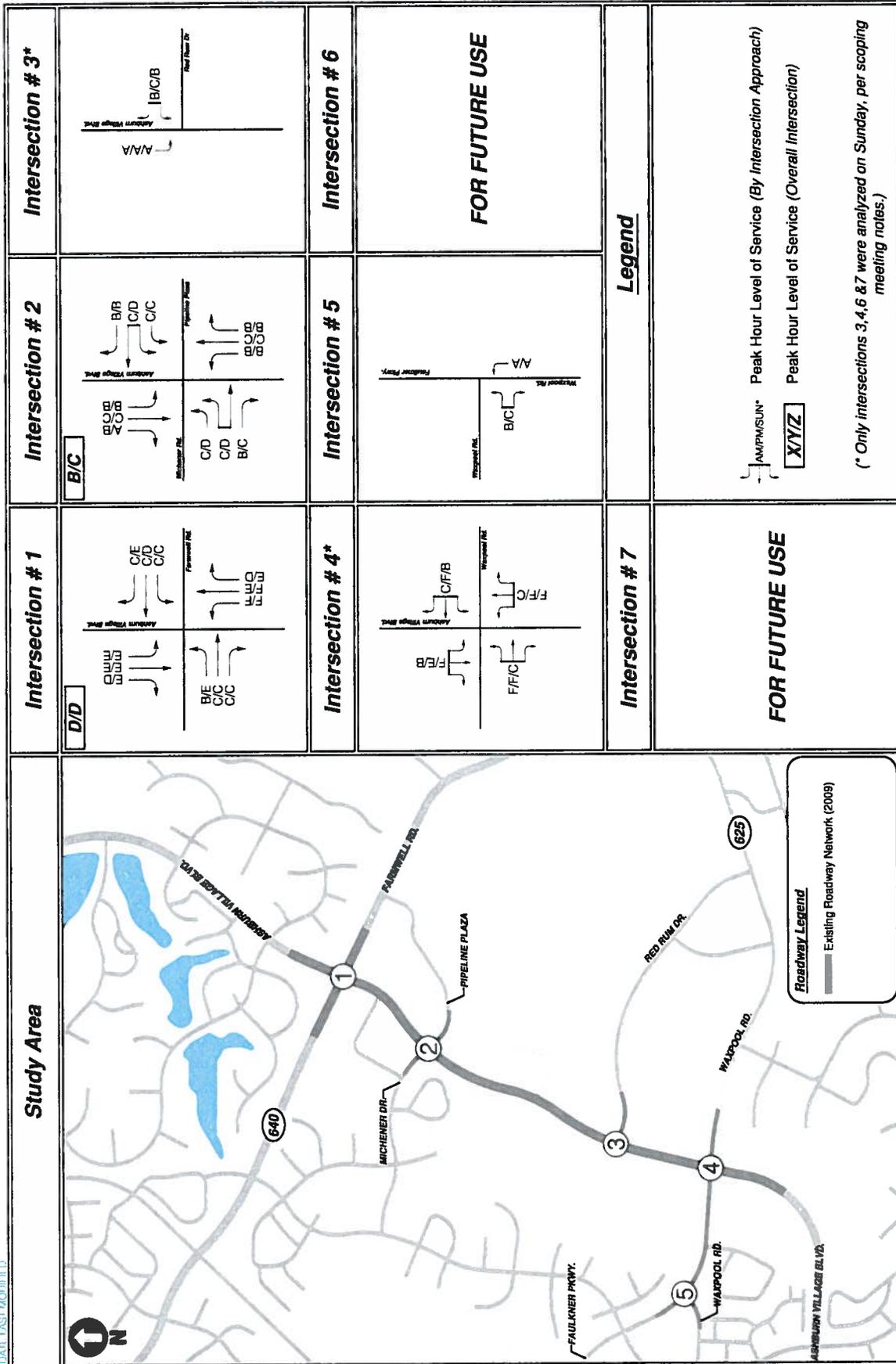


Figure 6
 Existing Conditions (2009)
 Peak Hour Levels of Service

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FUTURE CONDITIONS WITHOUT DEVELOPMENT (2012)

Planned Roadway/Transportation Improvements (2012)

The following planned and proposed roadway/transportation improvements in the vicinity of the site for the 2012 traffic conditions have been considered in the traffic study:

- ◆ **Ashburn Village Boulevard:** As part of the approved Morley Corner residential development, planned to be constructed as a four-lane road across the property frontage; turn lanes will be provided in all directions at the Morley Corner Site entrance.
- ◆ **Waxpool Road:** Loudoun County in conjunction with VDOT is in the process of widening the existing two-lane section from Faulkner Parkway to Unbridled Way to a four-lane median-divided road. As part of this planned widening, a traffic signal is also planned at the intersection of Waxpool Road and Ashburn Village Boulevard. The signal design is currently under review.
- ◆ **Ashburn Village Boulevard and Morley Corner Site Entrance:** This intersection currently forms a T-intersection, with the eastern leg serving the Ryan Bickel Fields ballpark. The western leg will be constructed to accommodate the approved Morley Corner residential development, which is planned to be in place by 2012. This entrance will also provide interparcel access to the proposed development. In addition, turn lanes will be provided to the Morley Corner residential development.

Future without Development Traffic Volumes

Future traffic conditions were projected for the design year of 2012. These projections were based on a growth rate of two percent (2%) per year for three years. In addition to the regional growth, traffic generated by the following five (5) nearby future approved background developments was considered in this analysis based on previous studies performed in the area:

1. Ashburn Corporate Center
2. Beaumeade
3. Morley Corner
4. Ryan Park Center
5. Loudoun Station

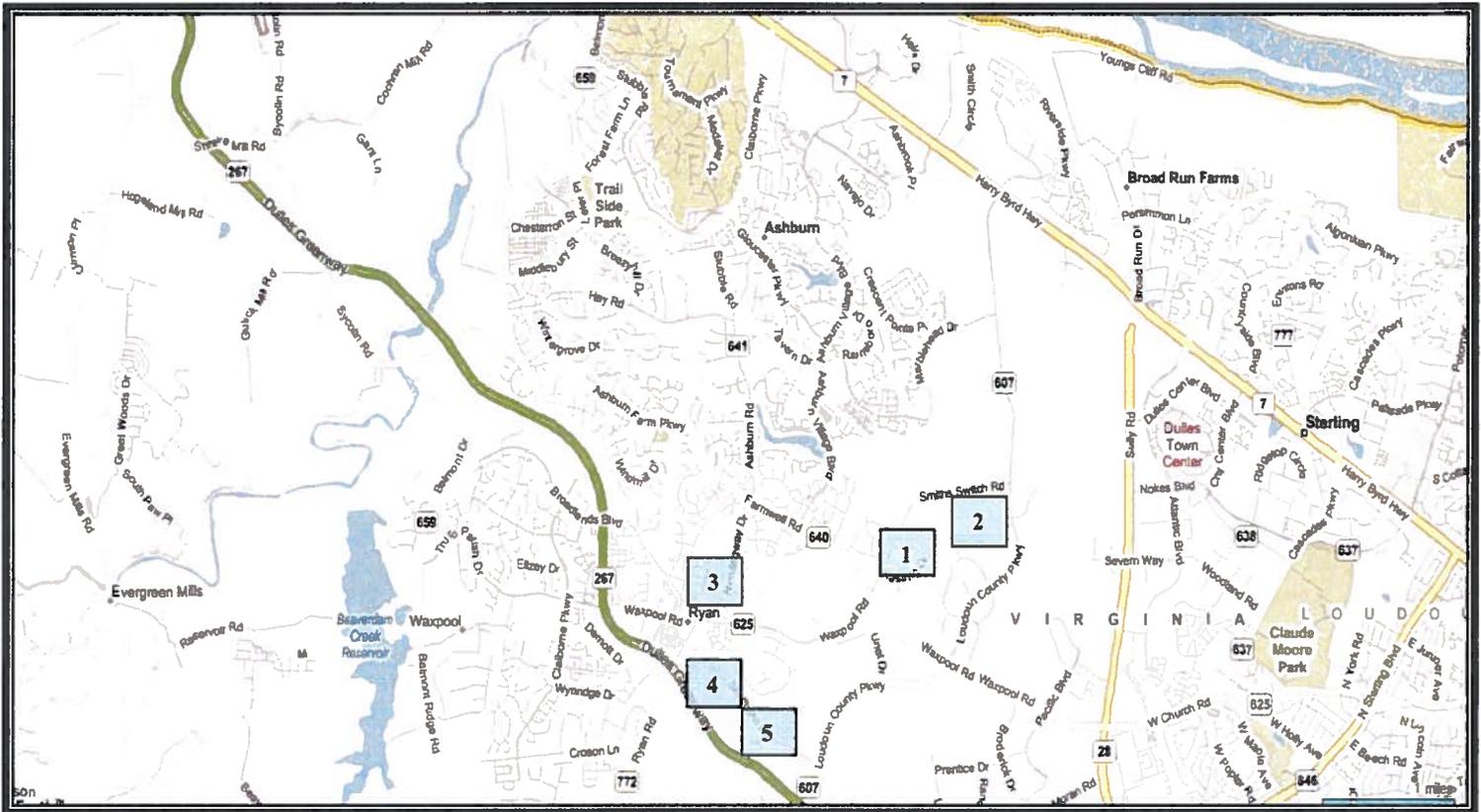
The information for the background developments was obtained from *Loudoun County's (2007) Annual Growth Summary*, *Kincora Traffic Impact Study (by Gorove/Slade Associates)*, and *Loudoun Station Traffic Impact Study (by Wells and Associates)*.

Detailed information about the trips associated with these background developments may be found in Technical Appendix G.



The location of these background developments is shown in **Figure 7**. The future volumes without development (2012) traffic volumes are illustrated in **Figure 8**. The location and the trips generated by the approved background developments are shown in Appendix G.

Figure 7: Location of Background Developments



1. Ashburn Corporate Center
2. Beaumeade
3. Morley Corner (residential)
4. Ryan Park Center
5. Loudoun Station

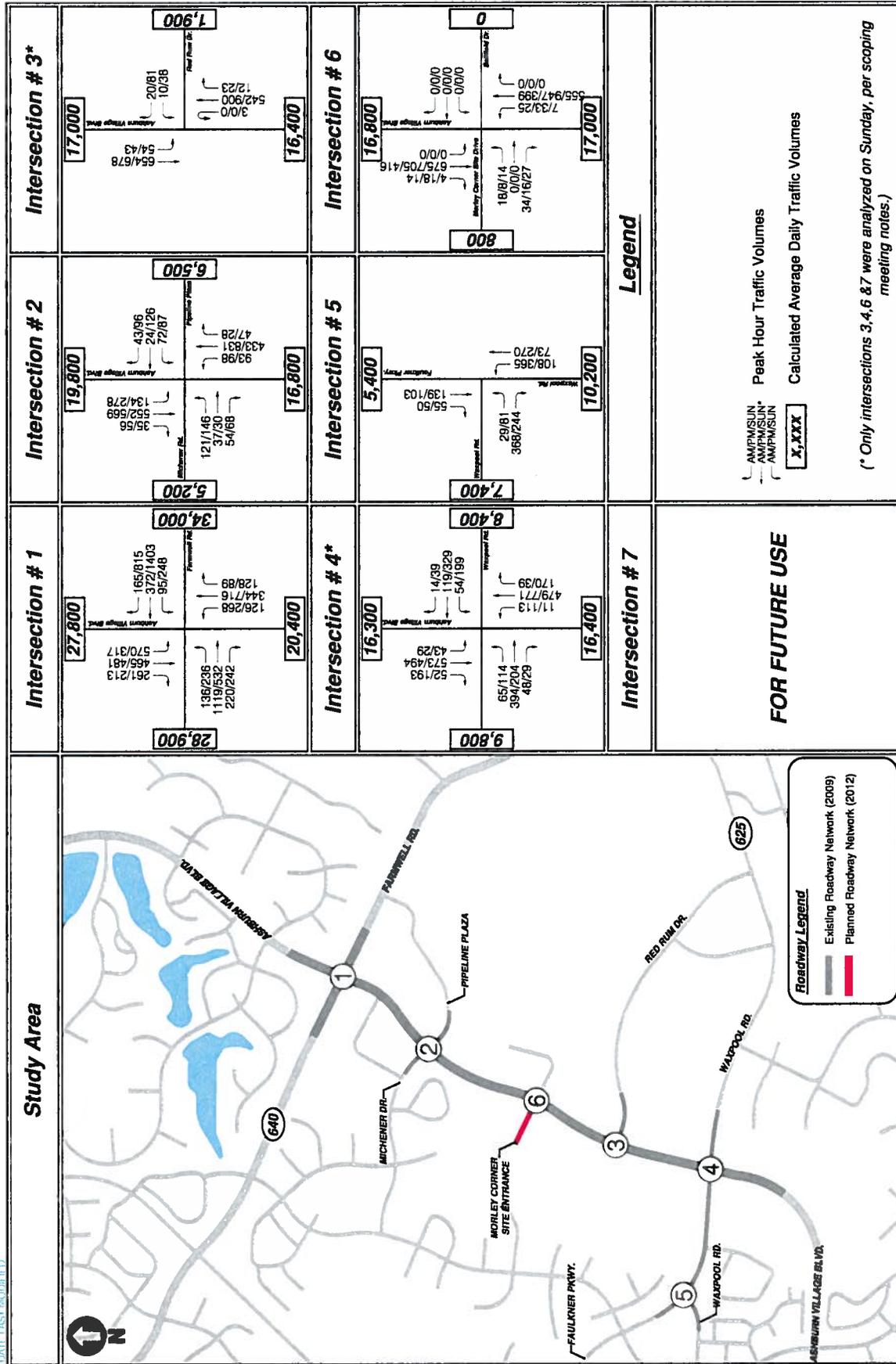


Figure 8
 Future Conditions without Development (2012)
 Peak Hour Traffic Volumes



Future without Development Capacity Analysis

Capacity analyses were performed at the existing and planned intersections contained within the study area during the weekday morning, afternoon and Sunday peak hours under the future background 2012 conditions. The results of the intersection capacity analyses under the future background 2012 conditions are presented in **Table 2**, and are expressed in terms of level of service (LOS) and delay (seconds per vehicle). The detailed analysis worksheets are contained in Technical Appendix E.

The intersection of Ashburn Village Boulevard and Waxpool Road is planned for improvements by the year 2012. These improvements include the installation of a traffic signal as well as changes to lane geometry and configurations for each approach; the planned improvements have been reflected in the analysis for 2012 conditions.

Table 3: Future Conditions without Development (2012) Intersection Capacity Analysis

Intersection/Approach/Movement	Future Conditions without Development (2012)								
	AM Peak Hour			PM Peak Hour			Sunday Peak Hour		
	LOS	Delay	Overall LOS/Delay	LOS	Delay	Overall LOS/Delay	LOS	Delay	Overall LOS/Delay
<i>Ashburn Village Blvd and Farmwell Rd</i>									
Overall Intersection	E	55.1		F	83.8				
Eastbound Left	C	21.3		F	81.1				
Eastbound Through	D	44.0	D/40.1	C	31.9	D/43.0			
Eastbound Right	C	31.6		C	30.3				
Westbound Left	C	31.9		C	20.2				
Westbound Through	C	32.3	C/31.7	E	79.4	F/82.0			Intersection not analyzed, per scoping meeting notes
Westbound Right	C	30.2		F	105.3				
Northbound Left	F	120.4		F	260.6				
Northbound Through	E	75.0	F/82.8	E	79.7	F/122.0			
Northbound Right	E	66.7		D	45.3				
Southbound Left	E	74.4		E	63.4				
Southbound Through	E	77.4	E/70.7	F	124.9	F/88.6			
Southbound Right	D	50.6		D	44.5				
<i>Ashburn Village Blvd and Michener Dr</i>									
Overall Intersection	B	18.5		C	28.6				
Eastbound Left	C	26.5		D	43.2				
Eastbound Left/Through	C	26.5	C/24.1	D	43.2	D/39.5			
Eastbound Right	B	17.3		C	30.0				Intersection not analyzed, per scoping meeting notes
Westbound Left	C	28.8		D	39.4				
Westbound Left/Through	C	28.8	C/25.0	D	41.4	C/34.5			
Westbound Right	B	16.7		C	20.7				
Northbound Left	B	12.0		B	16.7				
Northbound Through	C	20.3	B/18.2	C	33.2	C/30.9			
Northbound Right	B	11.0		B	12.3				



Intersection/Approach/Movement	Future Conditions without Development (2012)								
	AM Peak Hour			PM Peak Hour			Sunday Peak Hour		
	LOS	Delay	Overall LOS/Delay	LOS	Delay	Overall LOS/Delay	LOS	Delay	Overall LOS/Delay
Southbound Left	A	9.1		C	25.0				
Southbound Through	B	18.0	B/15.8	C	20.4	C/21.1			
Southbound Right	A	7.4		A	9.2				
<i>Ashburn Village Blvd and Red Rum Dr</i>									
Overall Intersection	N/A			N/A			N/A		
Westbound Approach	B	13.8		D	29.9		B	11.8	
Southbound Left	A	9.1		B	11.8		A	8.3	
<i>Ashburn Village Blvd and Waxpool Rd</i>									
Widen Ashburn Village Blvd, Widen Waxpool Road									
Overall Intersection (Signalized)	B	17.4		C	20.2		B	14.3	
Eastbound Left- Add left turn bay	B	15.2		C	22.2		B	11.6	
Eastbound Through	C	23.8	C/22.0	C	31.9	C/27.8	B	19.2	B/17.3
Eastbound Right	B	15.8		C	20.7		B	14.1	
Westbound Left- Add left turn bay	B	13.4		B	19.4		B	12.1	
Westbound Through	C	20.6	B/18.5	C	30.8	C/26.6	B	18.8	B/17.4
Westbound Right- Add right turn bay	B	20.0		C	27.6		B	17.9	
Northbound Left	B	10.6		B	11.1		A	9.0	
Northbound Through	B	11.1	A/9.5	B	11.2	B/10.8	A	9.5	A/8.6
Northbound Right- Add right turn bay	A	5.0		A	3.0		A	4.4	
Southbound Left-Through/Through-Right	C	21.4	C/21.4	C	23.7	C/23.7	B	15.9	B/15.9
<i>Waxpool Rd and Faulkner Pkwy*</i>									
Overall Intersection	N/A			N/A			Intersection not analyzed, per scoping meeting notes		
Eastbound Approach	B	12.6		C	20.9				
Northbound Left	A	7.9		A	8.6				
<i>Ashburn Village Blvd and Morley Corner Site Driveway</i>									
Overall Intersection (Unsignalized)	N/A	N/A		N/A	N/A		N/A	N/A	
Eastbound Approach	B	12.0		B	13.1		B	11.3	
Westbound Approach	A	0.0		A	0.0		A	0.0	
Northbound Left - Add left turn bay	A	8.9		A	9.1		A	8.4	
Southbound Left - Add right turn bay	A	0.0		A	0.0		A	0.0	

*Northbound approach is along Waxpool Road, Eastbound approach is along Waxpool Road, and Southbound approach is along Faulkner Parkway

It is desirable to achieve a minimum overall and per approach LOS D at each intersection. The results presented in Table 3 shows that all intersections operate at acceptable conditions except for the following:

- Ashburn Village Boulevard and Farmwell Drive (AM and PM)



The intersection of Ashburn Village Boulevard and Waxpool Road is planned for improvements by the year 2012. These improvements include the installation of a traffic signal as well as changes to lane geometry and configurations for each approach; the planned improvements have been reflected in the analysis for 2012 conditions.

Figures 9 and 10 illustrate graphically the intersection capacity analysis results and recommended improvements.

Table 4 below shows the queuing results for the left turning movements at the specified intersections.

Table 4: Future Conditions without Development (2012) Queuing Analysis

Intersection/Approach/Movement	Turn Bay Length (F)	AM Peak Hour		PM Peak Hour		Sunday Peak Hour	
		Average Queue	95% Queue	Average Queue	95% Queue	Average Queue	95% Queue
<i>Ashburn Village Blvd and Farmwell Rd</i>							
Eastbound Left	355	89	141	200	#375	Intersection not analyzed, per scoping meeting notes	
Westbound Left	390	60	102	132	188		
Northbound Left	375	172	#310	~375	#566		
Southbound Left	445	381	432	165	220		
<i>Ashburn Village Blvd and Michener Dr</i>							
Eastbound Left	305	33	87	65	137	Intersection not analyzed, per scoping meeting notes	
Westbound Left	70	21	61	55	120		
Northbound Left	410	22	53	31	70		
Southbound Left	390	32	72	125	#274		
<i>Ashburn Village Blvd and Red Rum Dr</i>							
Westbound Left		N/A	2	N/A	21	N/A	0
Southbound Left	250	N/A	5	N/A	7	N/A	0
<i>Ashburn Village Blvd and Waxpool Rd</i>							
Eastbound Left	215	18	46	45	87	12	47
Westbound Left	350	14	40	82	145	6	29
Northbound Left	350	2	11	29	65	3	11
Southbound Left/Though	..	135	208	171	283	55	131

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

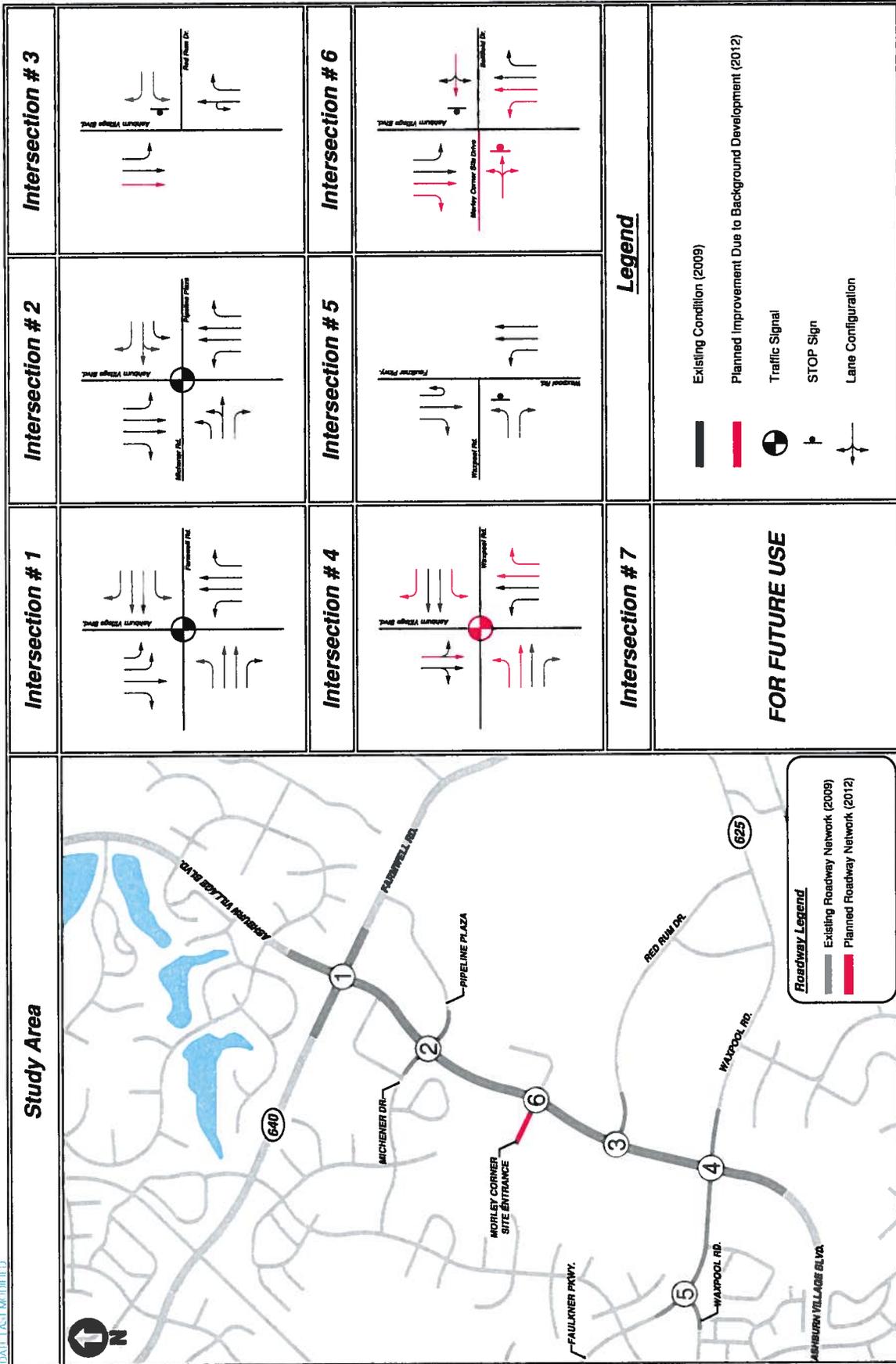


Figure 10
 Future Conditions without Development (2012)
 Recommended Improvements

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FUTURE CONDITIONS WITH DEVELOPMENT (2012)

Site Description and Site Access

This report presents the findings of a traffic impact analysis for the proposed Temple Baptist Church development in Loudoun County, Virginia. The site is located west of Route 2020 (Ashburn Village Boulevard), north of Route 625 (Waxpool Road) and south of Route 640 (Farmwell Road). The project site consists of approximately 21 acres of developable land currently zoned for “commercial center district” use (PD-CC (CC)). Two access points will serve the site; one primary access will be on Ashburn Village Boulevard and the secondary access will be a right in right out access along Waxpool Road.

Site Generated Volumes

In order to calculate the trips generated by the proposed development, ITE’s Trip Generation, 8th Edition was used to determine the trips into and out of the study site for the weekday morning, afternoon and Sunday peak hours. **Table 5** shows the trip generation calculations for the build-out year, 2012.

Table 5A: Site Trip Generation

Land Use	ITE Code	Size	Weekday						Sunday				
			AM Peak Hour			PM Peak Hour			Daily Total	Midday Peak Hour			Daily Total
			In	Out	Total	In	Out	Total		In	Out	Total	
Church	560	160.0 kSF	56	34	90	43	45	88	1,458				
Church (Sunday)		1,600 Seats								498	478	976	2,960
Private School (K-12)	536	500 Students	248	157	405	37	48	85	1,240				
Retail	814	22.5 kSF	28	29	57	34	42	76	1,001	34	42	76	460
	Pass-by	15%	-4	-4	-9	-5	-6	-11	-150	-5	-6	-11	-69
Total			328	216	543	109	129	238	3,549	527	513	1,040	3,351

*AM is 25% of PM PHG

*Sunday peak hour info not available; used PM peak hour data

Table 5A provides trip generation information for the Church based on square footage and seats. Trip generation rates based on number of seats is not available for the AM and PM peak hour; therefore trip generation calculations based on square feet were used for the AM and PM peak hour. Trip generation for the Sunday peak hour is based on the number of seats provided by the Church. As shown in Table 3, the proposed Temple Baptist Church will generate approximately 543 new trips in the weekday morning peak hour, 238 new trips in the weekday afternoon peak hour and approximately 1,040 new trips in the Sunday peak hour by 2012. Daily total traffic volumes for weekday and Sunday are 3,549 and 3,351 respectively. The trip generation comparison between permitted and proposed uses is shown in table 3B on the next page.



Table 5B: Trip Generation Comparison (Permitted Vs Proposed)

Land Use	ITE Code	Size	Units	----- Weekday -----										
				AM Peak Hour			PM Peak Hour			Daily Total	Midday Peak Hour			Sunday Total
				In	Out	Total	In	Out	Total		In	Out	Total	
Permitted Uses														
General Office Building	710	145,000 SF		223	30	253	42	200	242	1,776	10	7	17	99
High Turnover (Sit-Down) Restaurant*	932	16,000 SF		97	88	185	107	68	175	2,035	163	133	296	2,110
Drugstore with Drive-Through*	881	15,000 SF		23	17	40	64	66	130	1,323	59	59	118	1180
Drive-in Bank	912	4,000 SF		28	21	49	92	91	183	987	10	9	19	128
Retail	820	80,000 SF		84	53	137	260	281	541	5,875	134	128	262	3,556
Total Permitted Uses				455	209	664	565	706	1,271	11,996	376	336	712	7,073
Proposed Uses														
Church	560	160.0 kSF		56	34	90	43	45	88	1,458				
Church (Sunday)		1,600 Seats									498	478	976	2,960
Private School (K-12)	536	500 Students		248	157	405	37	48	85	1,240				
Retail	814	22.5 kSF		28	29	57	34	42	76	1,001	34	41	75	460
		Pass-by 15%		-4	-4	-9	-5	-6	-11	-150	-5	-6	-11	-69
Total Proposed Uses				328	216	543	109	129	238	3,549	527	513	1,040	3,351
Proposed-Permitted Uses				-127	6	-121	-456	-577	-1,033	-8,447	151	177	328	-3,722

*Sunday data not available, therefore Saturday data used

Table 5B shows the permitted uses for the property under PD-CC. The trip generation comparison was conducted between the permitted and proposed uses for the site. Except for Sunday peak hour, the proposed uses will generate far less trips than the permitted uses for the property, approx. 121 less trips during the AM peak hour, 1,033 less trips during the PM peak hour, 8,447 less daily trips and 3,722 less trips on Sunday.

Direction of Approach and Future Conditions with Development (2012) Volumes

The trip distributions for vehicles accessing the proposed development were routed in the roadway network to the project site based on existing traffic trends and location of the proposed development. The direction of approaches for the proposed development is shown in Table 6.

Table 6: Site Trip Distribution

Roadway Link	Trip Distribution for Church and Private School	Trip Distribution for Retail Use
To/From North on Ashburn Village Boulevard	25%	10%
To/From West on Michener Drive	10%	25%
To/From West on Farmwell Road	5%	5%
To/From East on Farmwell Road	5%	5%
To/From South on Ashburn Village Boulevard	15%	5%
To/From West on Waxpool Road	10%	10%
To/From East on Waxpool Road	10%	10%
To/From North on Faulkner Parkway	20%	10%
To/From East on Pipeline Plaza	0%	10%
To/From East on Red Rum Drive	0%	10%
Total	100%	100%

The site traffic assignment for weekday and Sunday peak hours is illustrated in Figures 11A, 11B and 11C. The proposed site trips were added to the future background 2012 volumes in order to establish the total future 2012 traffic volumes as shown in Figure 12.

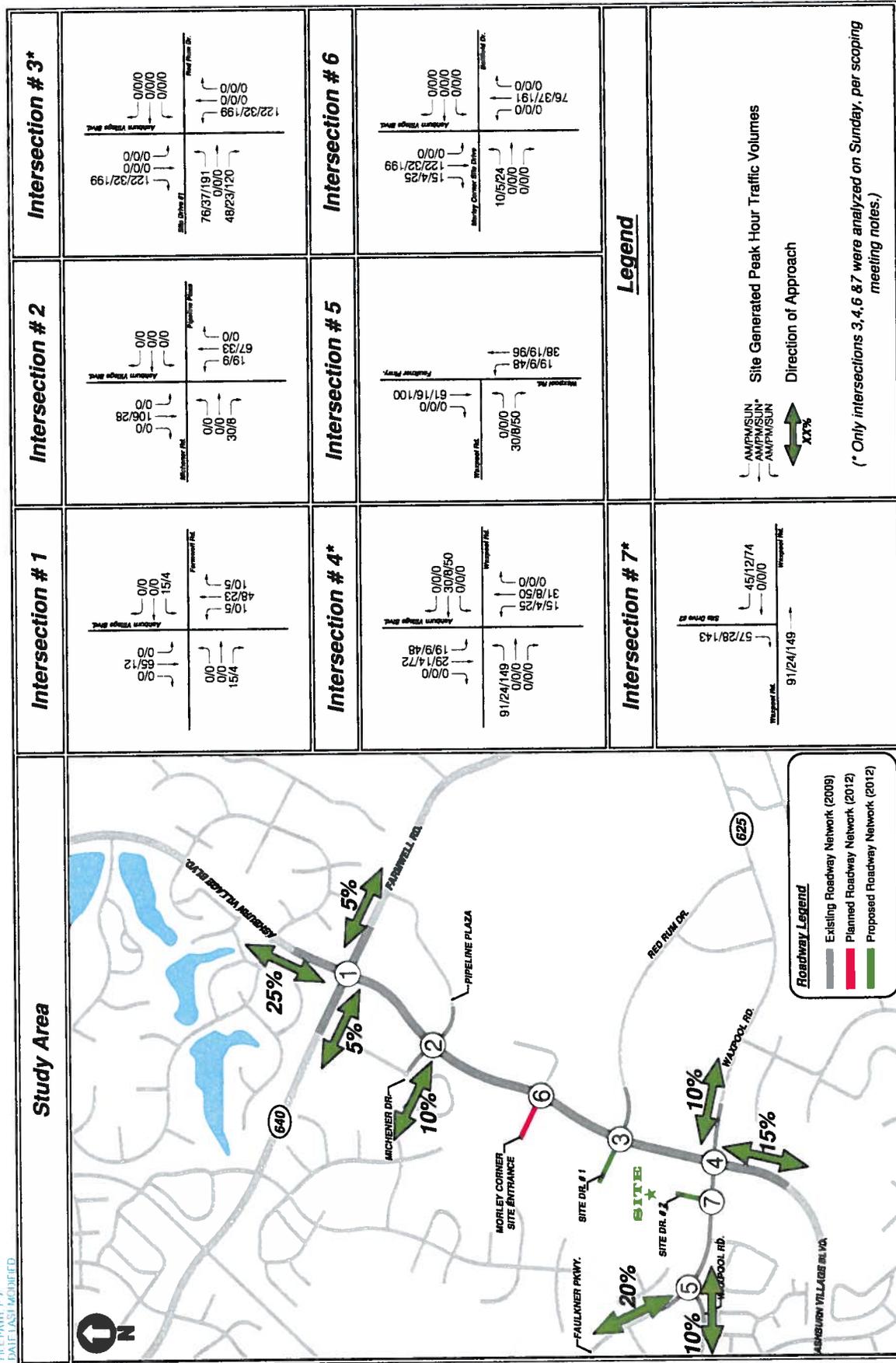


Figure 11A
 Future Conditions with Development (2012)
 Site Generated Peak Hour Traffic Volumes- Church and Private School Use

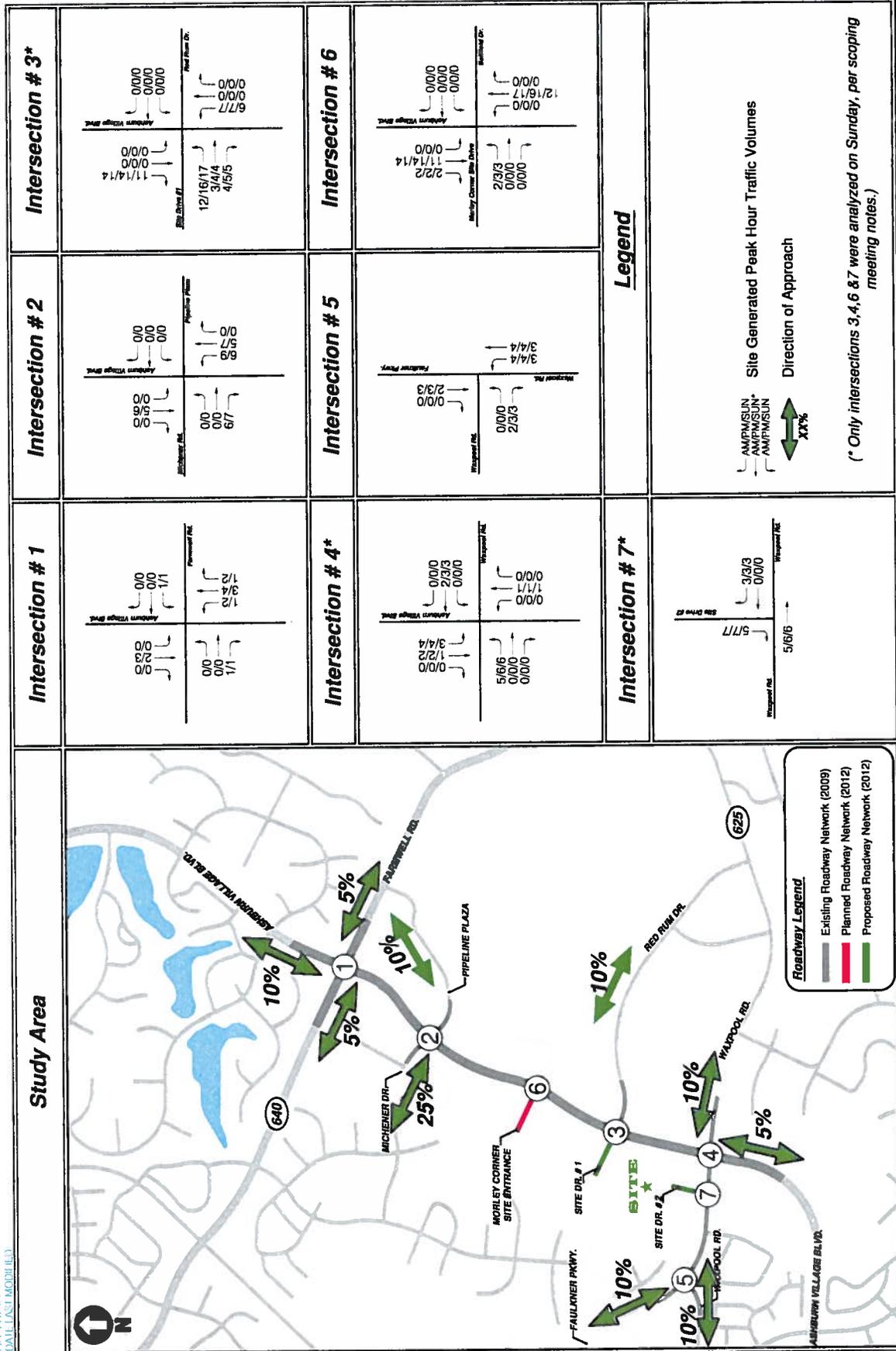


Figure 11B
 Future Conditions with Development (2012)
 Site Generated Peak Hour Traffic Volumes - Retail Use

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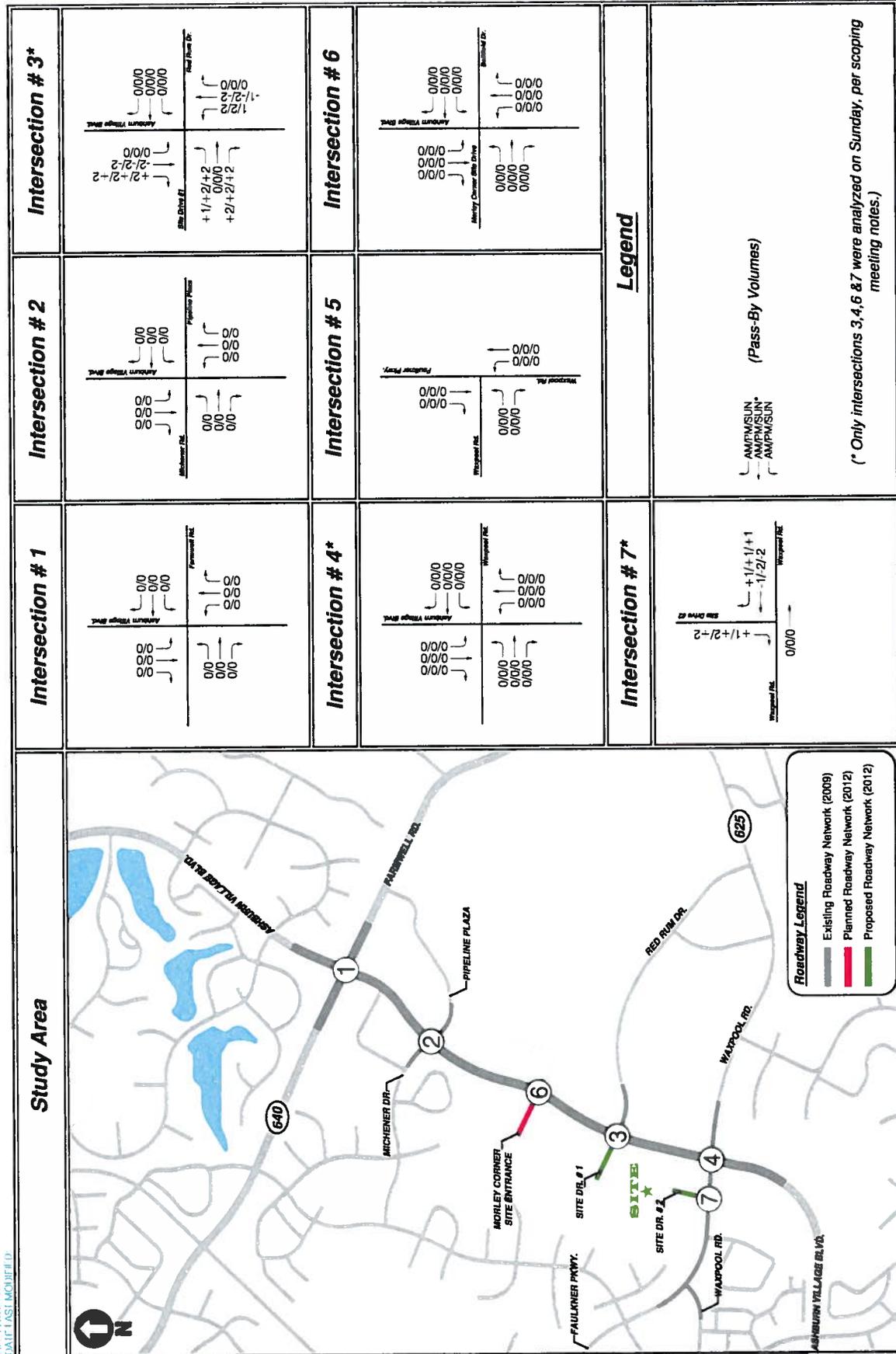
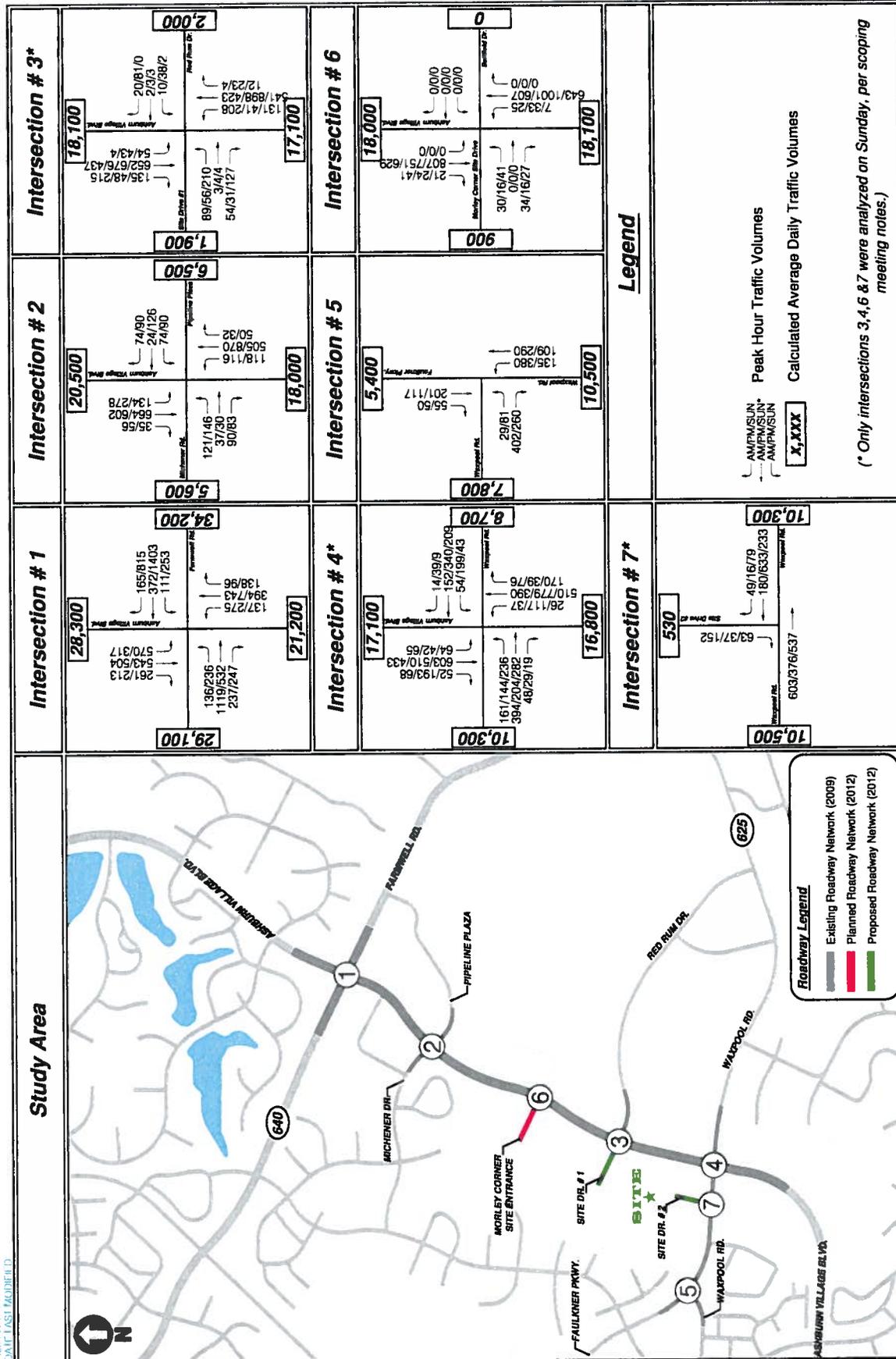


Figure 11C
Future Conditions with Development (2012)
Pass-By Trips



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Figure 12
Future Conditions with Development (2012)
Peak Hour Traffic Volumes



Future with Development Capacity Analysis (2012)

Intersection capacity analyses were performed for the future with development (2012) traffic conditions at the intersections contained within the study area during the morning, afternoon and Sunday peak hours. *Synchro, version 7.0* was used to analyze the study intersections based on the Highway Capacity Manual methodology. The results of the intersection capacity analyses for the future with development conditions are presented in **Table 7**. The detailed analysis worksheets are contained in the Technical Appendix F.

Table 7: Future Conditions with Development (2012) Intersection Capacity Analysis

Intersection/Approach/Movement	Future Conditions with Development (2012)								
	AM Peak Hour			PM Peak Hour			Sunday Peak Hour		
	LOS	Delay	Overall LOS/Delay	LOS	Delay	Overall LOS/Delay	LOS	Delay	Overall LOS/Delay
<i>Ashburn Village Blvd and Farmwell Rd</i>									
Overall Intersection	E	59.5		F	87.8				
Eastbound Left	C	24.2		F	81.1				
Eastbound Through	D	50.4	D/45.6	C	32.0	D/43.0			
Eastbound Right	D	35.6		C	30.4				
Westbound Left	D	39.2		C	20.4				
Westbound Through	D	35.7	D/35.7	E	79.4	F/81.9	Intersection not analyzed, per scoping meeting notes		
Westbound Right	C	33.2		F	105.3				
Northbound Left	F	140.1		F	276.3				
Northbound Through	E	71.3	F/83.7	F	88.9	F/131.4			
Northbound Right	E	62.8		D	45.3				
Southbound Left	E	74.4		E	63.4				
Southbound Through	F	86.4	E/74.0	F	143.7	F/98.7			
Southbound Right	D	47.6		D	44.7				
Proposed site generated traffic constitutes only 5% and 2% of the total traffic volumes in the AM and PM peak hour period, respectively; therefore, due to the minimal impact from the proposed development at this intersection, no mitigations are recommended.									
<i>Ashburn Village Blvd and Michener Dr</i>									
Overall Intersection	B	19.9		C	29.2				
Eastbound Left	C	27.6		D	44.1				
Eastbound Left/Through	C	27.6	C/23.6	D	44.1	D/39.7	Intersection not analyzed, per scoping meeting notes		
Eastbound Right	B	16.7		C	30.5				
Westbound Left	C	30.2		D	40.5				
Westbound Left/Through	C	30.2	C/26.4	D	42.5	D/35.5			
Westbound Right	B	17.8		C	21.3				
Northbound Left	B	11.5	B/18.4	B	16.6	C/31.2			



Intersection/Approach/Movement	Future Conditions with Development (2012)								
	AM Peak Hour			PM Peak Hour			Sunday Peak Hour		
	LOS	Delay	Overall LOS/Delay	LOS	Delay	Overall LOS/Delay	LOS	Delay	Overall LOS/Delay
Northbound Through	C	20.8		C	33.8				
Northbound Right	B	11.0		B	12.3				
Southbound Left	A	9.9		C	27.6				
Southbound Through	C	21.2	B/18.8	C	20.7	C/22.1			
Southbound Right	A	8.4		A	9.3				

Ashburn Village Blvd and Red Rum Dr/Primary Site Drive

Overall Intersection	N/A	N/A		N/A	N/A		N/A	N/A	
Eastbound Approach	F	209.1		F	101.1		F	349.9	
Westbound Approach	C	18.6		C	17.5		E	43.0	
Northbound Left	B	10.6		A	9.6		B	10.4	
Southbound Left	A	8.9		B	10.1		A	8.3	

Mitigation - Add Traffic Signal

Overall Intersection	B	18.4		C	20.4		C	27.7	
Eastbound Left/Through	E	56.4	D/54.0	D	49.9	D/48.7	D	46.9	D/43.1
Eastbound Right	D	49.8		D	46.5		D	36.8	
Westbound Left/Through	D	49.7	D/49.5	D	47.9	D/47.2	D	35.6	D/35.6
Westbound Right	D	49.4		D	46.8		A	0.0	
Northbound Left- Add left turn bay	A	9.7		B	11.3		B	17.3	
Northbound Through	B	13.7	B/12.9	B	18.3	B/17.8	C	20.1	B/19.1
Northbound Right	B	11.3		B	12.9		B	17.2	
Southbound Left	B	10.9		B	12.2		C	23.8	
Southbound Through	B	16.3	B/15.6	B	16.4	B/16.0	C	28.6	C/27.9
Southbound Right- Add right turn bay	B	13.7		B	13.0		C	26.5	

Ashburn Village Blvd and Waxpool Rd

Overall Intersection (Signalized)	B	18.3		C	21.2		B	19.5	
Eastbound Left	B	14.3		C	23.1		B	13.3	
Eastbound Through	C	25.1	C/21.6	C	32.7	C/28.1	B	19.9	B/16.8
Eastbound Right	B	16.8		C	21.3		B	13.2	
Westbound Left	B	17.6		C	20.3		B	19.4	
Westbound Through	C	26.2	C/24.0	C	32.2	C/27.8	C	27.2	C/25.8
Westbound Right	C	25.1		C	28.6		C	25.4	
Northbound Left	B	10.8	A/9.6	B	11.6	B/11.1	B	13.1	B/12.5
Northbound Through	B	11.1		B	11.5		B	13.4	



Intersection/Approach/Movement	Future Conditions with Development (2012)								
	AM Peak Hour			PM Peak Hour			Sunday Peak Hour		
	LOS	Delay	Overall LOS/Delay	LOS	Delay	Overall LOS/Delay	LOS	Delay	Overall LOS/Delay
Northbound Right	A	5.0		A	3.1		A	7.5	
Southbound Left-Through/Through-Right	C	22.2	C/22.2	C	25.3	C/25.2	C	25.3	C/25.3
<i>Waxpool Rd and Faulkner Pkwy*</i>									
Overall Intersection	N/A	N/A	.	N/A	N/A	.	Intersection not analyzed, per scoping meeting notes		
Eastbound Approach	C	15.1	.	C	23.5	.			
Northbound Left	A	8.2	.	A	8.7	.			
<i>Ashburn Village Blvd and Morley Corner Site Driveway</i>									
Overall Intersection (Unsignalized)	N/A	N/A	.	N/A	N/A	.	N/A	N/A	.
Eastbound Approach	B	13.8	.	C	15.9	.	C	16.8	.
Westbound Approach	A	0.0	.	A	0.0	.	A	0.0	.
Northbound Left	A	9.2	.	A	9.3	.	A	9.2	.
Southbound Left	A	0.0	.	A	0.0	.	A	0.0	.
<i>Waxpool Rd and RIRO Site Driveway</i>									
Overall Intersection (Unsignalized)	N/A	N/A	.	N/A	N/A	.	N/A	N/A	.
Southbound Approach	A	9.1	.	A	9.5	.	A	9.9	.

*Northbound approach is along Waxpool Road, Eastbound approach is along Waxpool Road, Southbound approach is along Faulkner Parkway

**The levels of service at intersections along the study area resulted in negligible changes due to the mitigation on Ashburn Village Blvd and Red Rum Dr.

It is desirable to achieve a minimum overall and per approach LOS D at each intersection. The results presented in **Table 7** shows that all intersections operate at acceptable conditions except for the following intersections:

- Ashburn Village Boulevard and Farmwell Drive (AM and PM)
- Ashburn Village Boulevard and Red Rum Drive (AM, PM and Sunday)

The following mitigations are proposed under the future with development scenario (2012):

- *Ashburn Village Road and Red Rum Road/Site Entrance*
 - *Installation of a traffic signal*

The intersection of Ashburn Village Boulevard and Farmwell Road continues to operate at unacceptable levels of service. The site traffic generated by the proposed development constitutes only 5% percent of the total traffic in the AM peak hour and only 2% of the traffic in PM peak hour at the intersection; therefore, there is minimal impact from the site generated traffic on this intersection. Hence, no mitigations are recommended for the intersection of Ashburn Village Boulevard and Farmwell Road. The results of the intersection capacity analyses and recommended improvements for 2012 are shown graphically in **Figures 13 and 14** respectively.



Table 8 below shows the queuing results for the left turning movements at the specified intersections.

Table 8: Future Conditions with Development (2012) Queuing Analysis

Intersection/Approach/Movement	Turn Bay Length (F)	Future Conditions with Development (2012)					
		AM Peak Hour Average Queue	AM Peak Hour 95% Queue	PM Peak Hour Average Queue	PM Peak Hour 95% Queue	Sunday Peak Hour Average Queue	Sunday Peak Hour 95% Queue
<i>Ashburn Village Blvd and Farmwell Rd</i>							
Eastbound Left	355	95	141	200	#375	Intersection not analyzed, per scoping meeting notes	
Westbound Left	390	76	149	135	192		
Northbound Left	375	189	#343	-391	#584		
Southbound Left	445	381	432	165	220		
<i>Ashburn Village Blvd and Michener Dr</i>							
Eastbound Left	305	37	94	66	137	Intersection not analyzed, per scoping meeting notes	
Westbound Left	70	23	67	58	122		
Northbound Left	410	28	66	37	81		
Southbound Left	390	33	74	135	#301		
<i>Ashburn Village Blvd and Red Rum Dr</i>							
Eastbound Left	..	90	151	55	101	196	288
Westbound Left	..	11	32	36	74	4	14
Northbound Left	300	46	142	15	29	109	157
Southbound Left	300	18	33	15	30	2	8
<i>Ashburn Village Blvd and Waxpool Rd</i>							
Eastbound Left	215	49	106	58	108	77	157
Westbound Left	350	16	43	83	146	12	36
Northbound Left	350	6	19	32	67	10	30
Southbound Left/Though	..	152	237	192	305	136	218

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

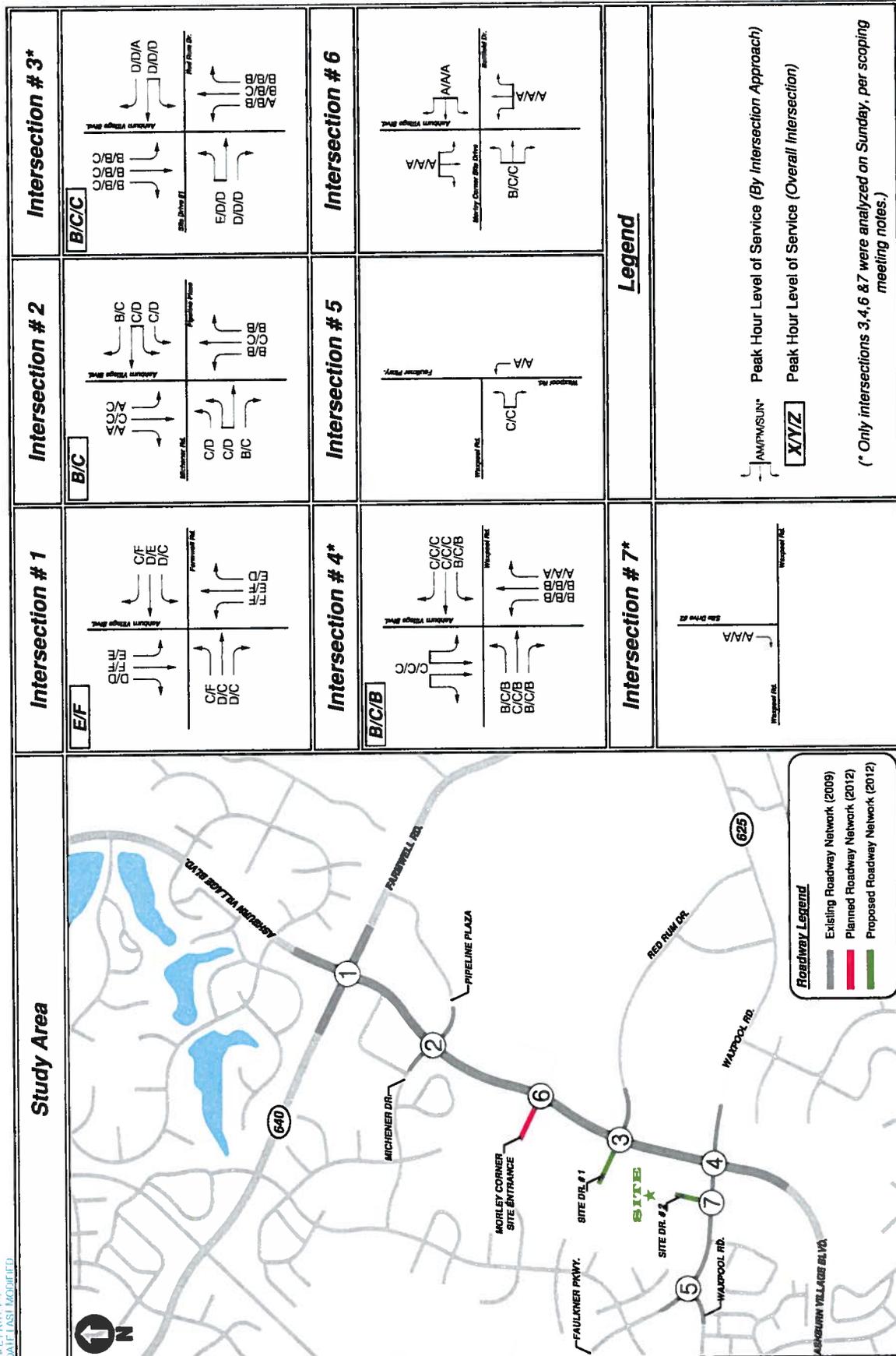


Figure 13
 Future Conditions with Development (2012)
 Peak Hour Levels of Service

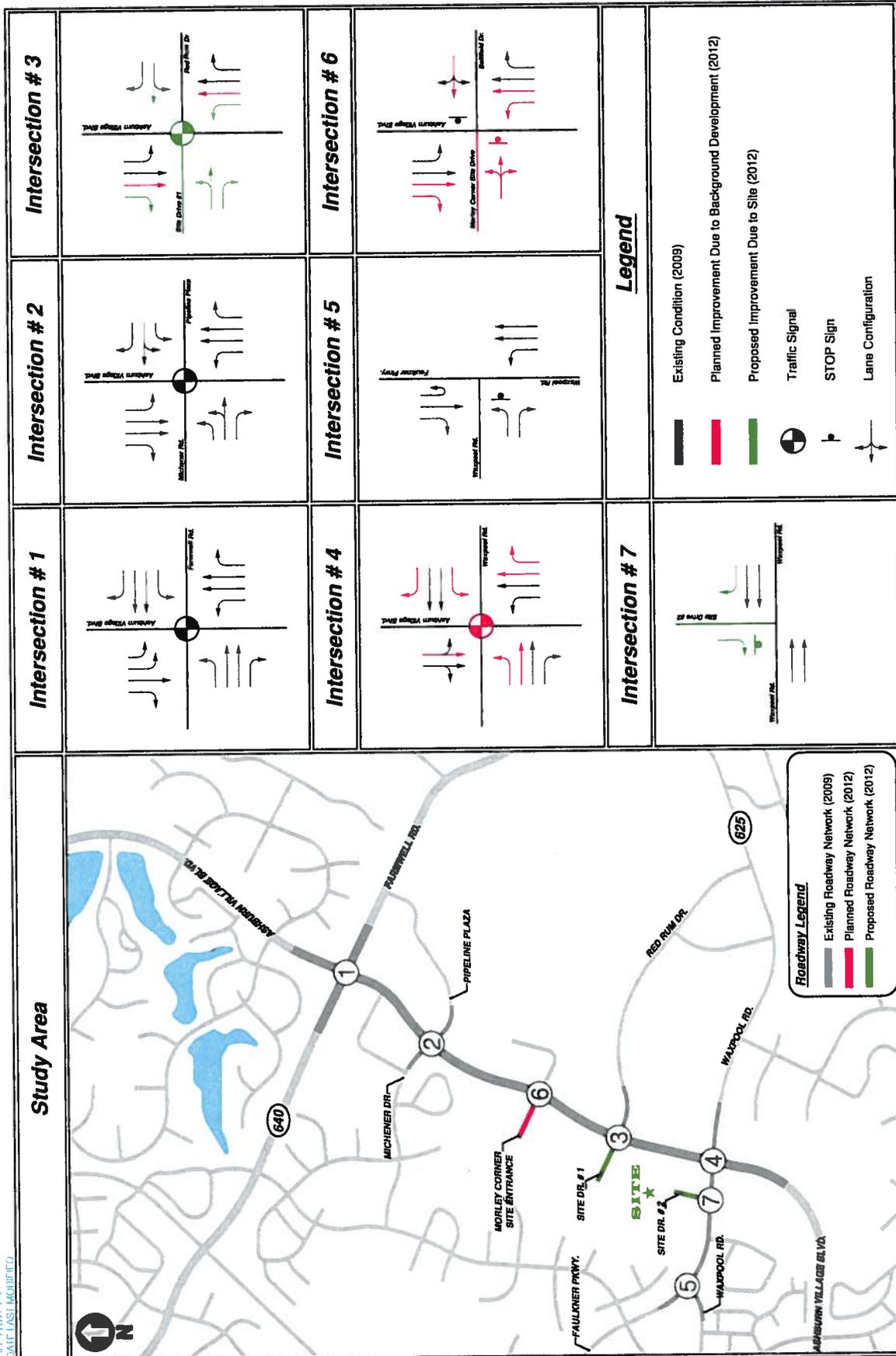


Figure 14
 Future Conditions with Development (2012)
 Recommended Improvements

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CONCLUSIONS

This report presents the findings of a traffic impact analysis for the proposed Temple Baptist Church development in Loudoun County, Virginia. The site is located west of Route 2020 (Ashburn Village Boulevard), north of Route 625 (Waxpool Road) and south of Route 640 (Farmwell Road). The project site consists of approximately 21 acres of developable land currently zoned for “commercial center district” use (PD-CC (CC)). Two access points will serve the site; one primary access will be on Ashburn Village Boulevard and the second access will be a right-in-right out access along Waxpool Road.

The analysis presented in this report supports the following major conclusions:

- The proposed development plan calls for the construction of a Church, Private School (K-12) and retail.
- The proposed development is anticipated to be open by 2012.
- The proposed development will generate approximately 543 new trips in the weekday morning peak hour, 238 new trips in the weekday afternoon peak hour and approximately 1,040 new trips on the Sunday peak hour by 2012. Daily total traffic volumes for weekday and Sunday are 3,549 and 3,351 respectively.
- Except for Sunday peak hour, the proposed uses will generate far less trips than the permitted uses for the property, approx. 121 less trips during the AM peak hour, 1,033 less trips during the PM peak hour, 8,447 less daily trips and 3,722 less trips on Sunday.
- The following is a summary of the improvements/mitigations required to accommodate existing and future regional and local traffic:
 - **Existing Conditions (2009):**
 - *The intersection of Ashburn Village Boulevard with Waxpool Road and Ashburn Village Boulevard with Farmwell Road operate under unacceptable levels of service under existing conditions. However, no mitigations were recommended under the existing conditions.*
 - **Future Conditions without Development (2012):**
 - The following planned improvements anticipated to be in place by 2012 (as discussed at the scoping meeting) were considered in the analysis:*
 1. *Ashburn Village Boulevard As part of the approved Morley Corner residential development, planned to be constructed as a four-lane road across the property frontage; turn lanes will be provided in all directions at the Morley Corner Site entrance.*
 2. *Loudoun County in conjunction with VDOT is in the process of widening the existing two-lane section from Faulkner Parkway to Unbridled Way to a four-lane median-divided road. As part of this planned widening, a traffic signal is also planned at the intersection of Waxpool Road and Ashburn Village Boulevard. The signal design is currently under review.*



- With the improvements listed above in place, all study intersections operate at acceptable levels of service except for the intersection of Ashburn Village Boulevard and Farmwell Road.

○ **Future Conditions with Development (2012):**

The following improvements have been proposed under the future with development conditions with the proposed development in place:

4. Installation of a traffic signal at the intersection of Ashburn Village Boulevard and Red Rum Drive/Site Entrance
5. Addition of a northbound left turn lane and southbound right turn lane at the primary site entrance along Ashburn Village Boulevard
6. Addition of a right turn bay into the secondary (right in right out entrance) along Waxpool Road

- With the improvements listed above in place, all study intersections operate at acceptable levels of service except for the intersection of Ashburn Village Boulevard and Farmwell Road. The site generated traffic constitutes only approximately 5% and 2% of the total traffic volume in the AM and PM peak hour periods, respectively; therefore, no mitigations were recommended for this intersection. As shown in the table below, the impacts to this intersection from the proposed development are negligible.

Table: Ashburn Village Boulevard and Farmwell Road: Site Percentages

	AM	PM
Site Volumes	214	110
Total Volumes (2012)	4,183	5,634
Site Percentage	5%	2%

- The results of the study have identified that the planned roadway improvements in the study area along with the installation of a traffic signal at Ashburn Village Road and Red Rum Road/Primary Site Entrance will accommodate the traffic generated by the proposed development.