
Traffic Impact Study

Broad & Washington Redevelopment

City of Falls Church, VA

December 9, 2015

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Prepared for:

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INTRODUCTION AND SUMMARY

Purpose and Study Objective

This report presents the findings of a traffic impact analysis for the proposed redevelopment of the property located on the northeast corner of the Broad Street and Washington Street intersection in the City of Falls Church. The site is bound by Park Place on the north, E. Broad Street (Route 7) on the south, Lawton Street on the east, and N. Washington Street on the west. The development, which is planned to consist of up to 24,700 square feet of retail (restaurant and specialty retail), 336 apartments, and 62,500 square feet of office, is anticipated to be complete in 2020.

The following tasks were completed as part of this study:

- A scoping meeting was held on June 22, 2015 with City of Falls Church staff, which included discussions about the parameters of the study and relevant background information. A scoping letter stating the parameters and assumptions used in the analysis herein is included in Appendix A. Updates to the study have been incorporated to address staff comments of September 28, 2015. This study includes the new development plan and is part of the application previously submitted on December 9, 2015.
- Field reconnaissance in the vicinity of the site was performed to collect information related to existing traffic controls, roadway geometry, and traffic flow characteristics.
- Saturday peak period traffic counts were conducted on Saturday, January 31, 2015. Weekday AM and PM peak period traffic counts were conducted at the study intersections on Tuesday, February 3, 2015.
- Future without development traffic conditions were projected based on existing traffic and trip generated by approved but incomplete development in the vicinity.
- Proposed site traffic volumes were generated based on the methodology outlined in the Institute of Transportation Engineers' (ITE) Trip Generation, 9th Edition publication.
- Future with development traffic conditions were projected based on existing regional and site traffic patterns and the proposed development plan.
- Intersection capacity analyses were performed for the existing conditions (2015) and future conditions with development (2020) during the weekday and Saturday peak hours at the intersections located within the study area.

Sources of data for this study include the City of Falls Church, VDOT, Insight Property Group, MV+A Architects and the office files and field reconnaissance efforts by Gorove/Slade Associates, Inc.

Executive Summary

Site Location and Study Area

The subject development is located in the City of Falls Church, on the north side of E. Broad Street between N. Washington Street and Lawton Street. It is in the vicinity to four major commuter corridors: I-66, Route 7, Route 29, and Route 50. The site is currently occupied by an Applebee's restaurant, a physical therapy clinic, and a combined office/retail building. The study area consists of nine intersections, both local and regional in nature, two of which are the driveways for the existing uses. The proposed development will continue to be served by these two site driveways.

Description of Proposed Development

The 3.22-acre Broad & Washington development site is currently zoned Central Business (B-2) and Transitional 1 (T-1). The project is a special exception application to construct a multi-use building featuring up to 7,000 square feet of sit-down restaurant (ground floor), 17,700 square feet of specialty retail (ground floor), 336 apartments, and 62,500 square feet of office use. A multi-level garage will be constructed with access off of E. Broad Street to the south of the property. A right-in/right-out driveway will be located along the west side of the property off of N. Washington Street. The site will be served by retail parking spaces at the Broad Street level, and below-grade office and residential parking. The development is anticipated to be complete in 2020.

Principal Findings, Conclusions and Recommendations

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

Existing Conditions (2015)

Weekday traffic counts were conducted at the study intersections during the AM and PM peak periods on Tuesday, February 3, 2015 and Saturday peak period traffic counts were conducted on January 31, 2015. The existing volumes were balanced across proximate intersections to reflect a consistent baseline for the volume projections within this report.

Intersection capacity analyses were performed for the existing conditions at the study area intersections during the weekday morning and afternoon peak hours, as well as the Saturday peak hour. *Synchro, version 9.0* was used to analyze the study intersections with results based on the Highway Capacity Manual (HCM 2010) methodology. For the purpose of this analysis, it is desirable to achieve a LOS D or better for each approach of an intersection. Most of the study intersections' approaches currently operate at acceptable levels of service and most queue lengths can be accommodated during the weekday morning, afternoon, and Saturday peak hours, with the following exceptions:

- N. Washington Street/Great Falls Street (LOS)
- Broad Street and Washington Street (queues)
- N. Washington Street and Park Avenue (queues)

Future Conditions without Development (2020)

Traffic volumes were projected for the year 2020 without the proposed Broad & Washington redevelopment. The traffic associated with the 301 W. Broad Street project was added to the existing traffic volumes to obtain the future conditions without development.

Most of the study intersections' approaches will continue to operate at acceptable levels of service with manageable queues during the weekday morning, afternoon, and Saturday peak hours, with the following exceptions:

- N. Washington Street/Great Falls Street (LOS)
- Broad Street and Washington Street (LOS and queues)
- E. Broad Street and Site Driveway (LOS)

Future Conditions with Development (2020)

The proposed mixed-use redevelopment will generate approximately 169 new external trips during the weekday morning peak hour, 186 new external trips during the weekday afternoon peak hour, 101 new external trips during the Saturday peak

hour, and 1,940 new external weekday daily trips, accounting for existing or potential trips associated with the existing buildings. Access to the proposed development will be provided via a full-movement driveway on E. Broad Street and a right-in/right-out access on N. Washington Street. Future conditions with the development were derived from the future without development scenario and the site generated trips.

As under the existing and future without development conditions, most of the study intersections' approaches will continue to operate at acceptable levels of service with manageable queues during the weekday morning, afternoon, and Saturday peak hours, with the following exceptions:

- N. Washington Street/Great Falls Street (LOS)
- Broad Street and Washington Street (LOS and queues)
- E. Broad Street and Site Driveway (LOS and queues)

The northbound through/right turn movement at the intersection of Broad Street and Washington Street experiences a change in the levels of service under the future with development conditions. However, the increase in delay as compared to the future without development conditions is minimal (1.8 seconds/vehicle). Signalization of the Site Entrance on E. Broad Street is proposed as part of mitigations. With the addition of a traffic signal at the intersection of E. Broad Street and site driveway, the side street movements operate at acceptable levels of service.

In summary, traffic operations within the study area will be similar with or without the proposed Broad & Washington redevelopment.

BACKGROUND INFORMATION: PROPOSED DEVELOPMENT (SITE AND NEARBY)

Description of On-Site Development

This study is being performed to examine the potential traffic impact of the proposed Broad & Washington redevelopment on the area's future roadway network. The project site is bounded by E. Broad Street to the south and Park Place to the north, N. Washington Street to the west and Lawton Street to the east. A site location map is shown in Figure 1. Portions of the site's development plan showing access points and a typical upper level are shown in Figure 2. The subject parcel is currently zoned Central Business (B-2). The development is anticipated to be complete in 2020.

The project is a special exception application to construct up to approximately 7,000 square feet high of turnover sit-down restaurant space, 17,700 square feet of specialty retail space, 336 apartments, and 62,500 square feet of office space to be located in a multi-use building. The restaurant and specialty retail will be located on the ground floor.

Access to the proposed development will be provided by one full-entrance into a multi-level garage with full-access off of E. Broad Street. An additional right-in/right-out driveway will be located along N. Washington Street. The garage will be constructed to provide parking for the retail, restaurant, office and residential uses.

Planned Transportation Improvements

Neither the City of Falls Church's Comprehensive Plan, Five-Year Capital Improvements Program, or VDOT's Six-Year Improvement Program (SYIP) propose any major long-term transportation improvements within the study area.

Scope of Study

The study area consists of nine intersections, two of which will allow traffic to enter and exit the site. The study area was determined based on the scoping meeting held with City of Falls Church staff on June 22, 2015. A copy of the agreed-upon scoping document is included in Appendix A. The following intersections were identified for inclusion in this study:

1. Broad Street and Washington Street;
2. E. Broad Street and Applebee's entrance/proposed site entrance;
3. E. Broad Street and Lawton Street;
4. Lawton Street and E. Columbia Street;
5. N. Washington Street and Columbia Street;
6. N. Washington Street and Great Falls Street;
7. N. Washington Street and Park Avenue;
8. N. Washington Street and Park Place;
9. N. Washington Street and existing driveway/proposed driveway;

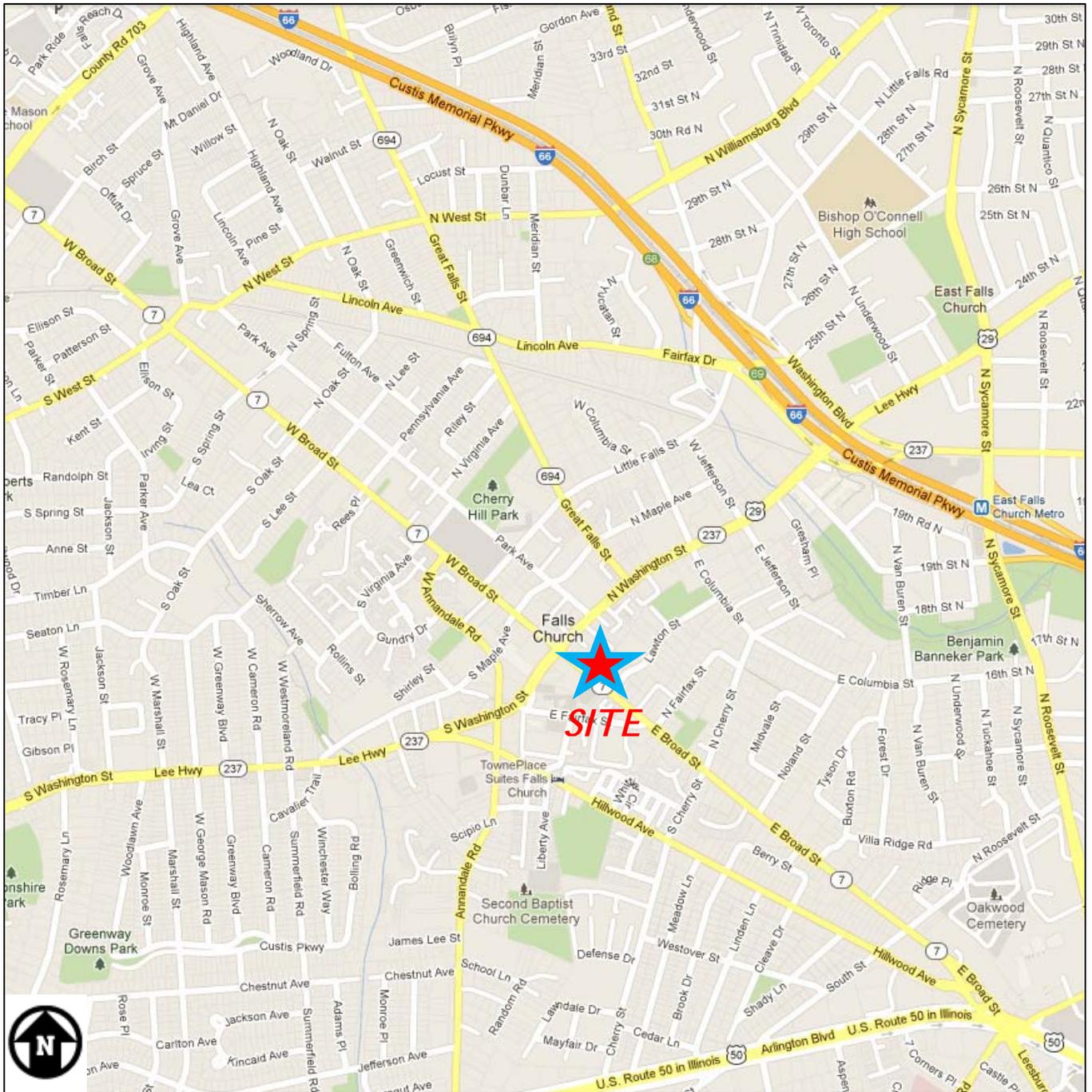


Figure 1: Site Location

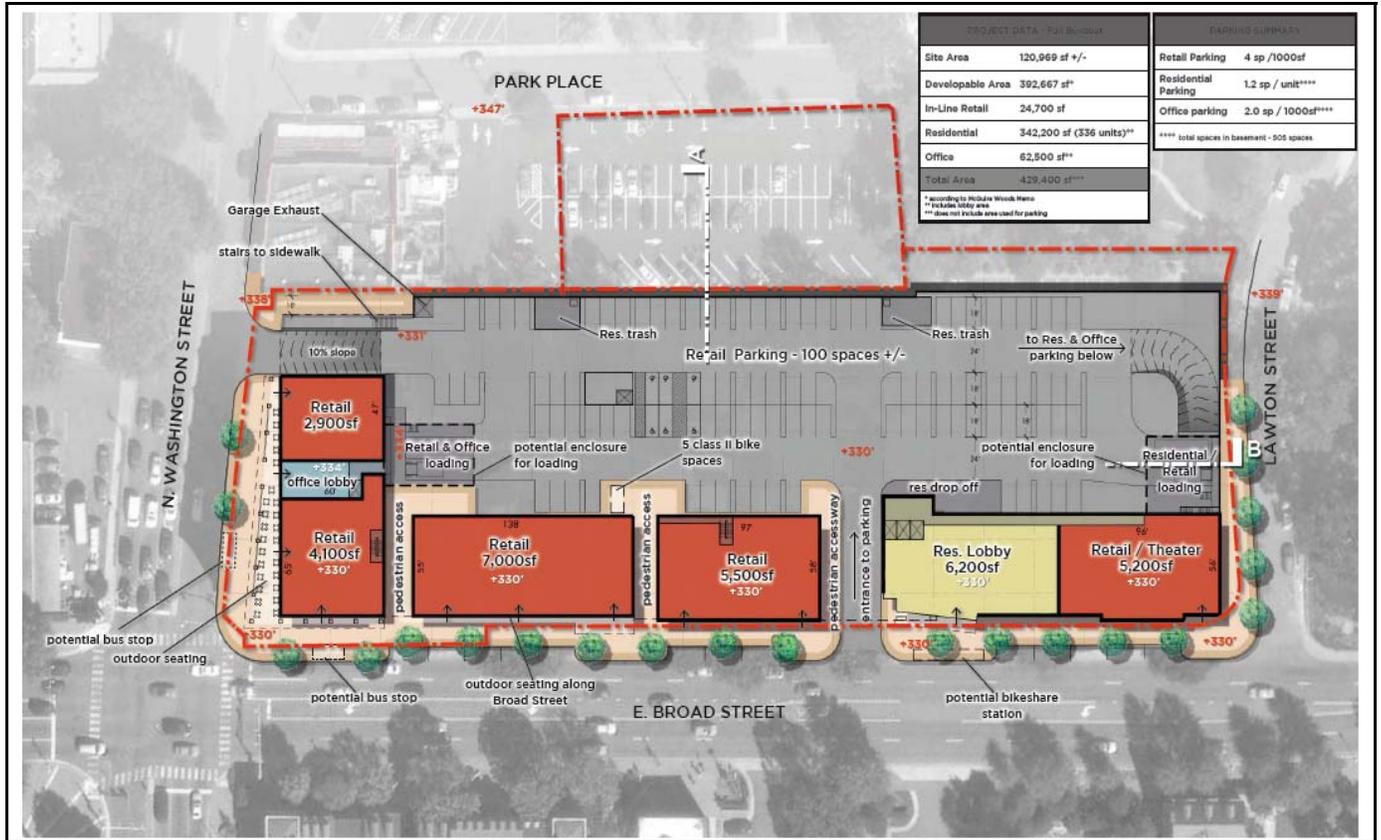


Figure 2: Proposed Development Plan

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

- **Existing Conditions (2015):** Considers existing traffic volumes and existing roadway configurations.
- **Future Conditions without Development (2020):** Considers future traffic conditions for the year 2020 with the other development traffic, but without the proposed development.
- **Future Conditions with Development (2020):** Considers future traffic conditions for the year 2020 (build-out year) with the other development traffic and the proposed Broad & Washington development.

The results of the analysis and the traffic impacts associated with the proposed development plan are presented in the Conclusion section of this report.

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 3.

Broad Street (Route 7) is a four-lane undivided major arterial with left turn bays at its signalized intersections with Washington Street. The posted speed limit is 25 mph within the study area. Published historical traffic count data from VDOT shows that in 2014, W. Broad Street carried approximately 25,000 vehicles per day while E. Broad Street carried approximately 21,000 vehicles per day.

Washington Street (Route 29) is a four-lane divided major arterial with left turn bays at its signalized intersection with Broad Street. The posted speed limit is 30 mph within the study area. VDOT traffic count data from 2014 shows that N. Washington Street carried approximately 22,000 vehicles per day while S. Washington Street carried approximately 13,000 vehicles per day.

Great Falls Street is a two-lane minor arterial extending west from N. Washington Street. The posted speed limit is 25 mph within the study area. 2014 traffic count data from VDOT shows that Great Falls Street carried approximately 3,400 vehicles per day.

Columbia Street is a two-lane undivided collector street. The posted speed limit is 25 mph within the study area. Published historical traffic count data from VDOT shows that west of N. Washington Street, Columbia Street carried 2,900 vehicles and east of Washington Street carried 3,300 vehicles in 2014.

Park Avenue is a two-lane undivided collector street. On-street parking exists along both sides west of Little Falls Street and on the south side of the street along the section of Park Avenue between N. Washington Street and N. Maple Avenue. The posted speed limit is 25 mph within the study area. There is no published historical traffic count data from VDOT available on this roadway.

Park Place is a two-lane undivided local street. Park Avenue is only about 350 feet in length and extends east from N. Washington Street to its terminus at a cluster of single family homes. On-street parking exists along both sides and the statutory speed limit is 25 mph. There is no published historical traffic count data from VDOT available on this roadway.

Lawton Street is a two-lane undivided local street with a statutory speed limit of 25 mph that spans from E. Broad Street to the south and E. Columbia Street to the north. No published historical traffic count data for this roadway is available from VDOT.

Bicycle/Pedestrian Facilities

Dedicated on-street bike lanes are absent within the study area and the entire City of Falls Church. The site is located approximately one mile from the Washington & Old Dominion (W&OD) Trail, which extends 45 miles from Shirlington to Purcellville. To improve future bicycling conditions within the study area, the City's Draft Bicycle Master Plan recommends the implementation of on-street bicycle facilities in the study area along Columbia Street and Great Falls Street to complement the shared use pavement markings (sharrows) recently installed along Park Avenue. Washington Street, W. Broad Street, and Park Avenue are designated as future bike-share corridors within the study area. There is one Capital Bikeshare station proposed in the study area, located in the northeast property corner of the Broad & Washington site.

The roadways in the vicinity of the proposed development provide pedestrian facilities and connectivity throughout the area. Continuous 4 to 8 foot wide sidewalks line all of the study area's roadways on both sides of each street. Continental crosswalk markings link sidewalk segments at all of the study area's signalized intersections with the exception of the southern east/west crossing movement at the N. Washington Street/Park Avenue intersection.

Pedestrian countdown signals are present for all crossing movements at the Broad Street and Washington Street intersection. Countdown pedestrian indications are only installed for the crossing of N. Washington Street at Columbia Street; the remaining crossings do not have pedestrian signals. At the N. Washington Street/Park Avenue intersection, there are pedestrian signals serving both marked crossing movements; however, the pedestrian signals are an older model without the countdown display. Currently, these are in compliance with the Manual on Uniform Traffic Control Devices (MUTCD) until they reach the end of their serviceable life, when they will need to be replaced with pedestrian countdown signals since the pedestrian change interval for these crossings is longer than 7 seconds. The City's guidelines recommend the installation of pedestrian countdown signals for the crossing movements that either lack the countdown displays or lack pedestrian signals altogether.

To aid the movement of pedestrians and cyclists across E. Broad Street, the City is planning a new enhanced crossing at E. Fairfax Street between the widely-spaced existing crossings at Washington Street and Cherry Street. This crossing would improve connectivity in the area, enhancing mobility and encouraging non-motorized travel. The benefits of the new crossing would be supportive of, and complimentary to, the proposed mixed-use Broad & Washington redevelopment.

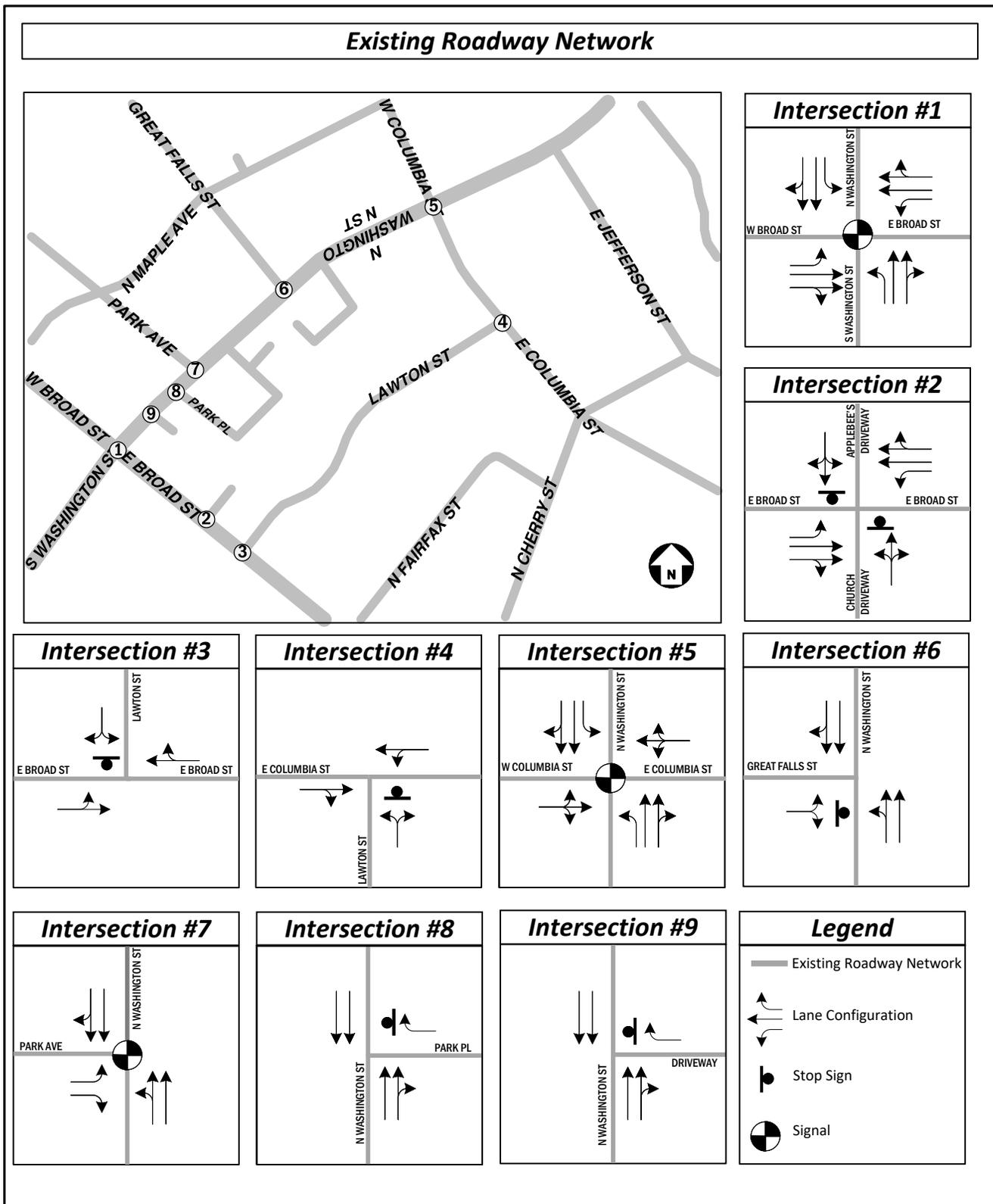


Figure 3: Existing (2015) Roadway Network

Transit

Transit service to the study area is provided by Metrorail. The East Falls Church Metrorail station is located at the I-66/Sycamore Street interchange, approximately $\frac{3}{4}$ mile to the east, and operates on Metrorail's Orange and Silver Lines. Metro trains run on each line every six minutes during the morning and afternoon peak periods and every 12 to 20 minutes during the weekday off-peak periods and on weekends. Riders traveling to or from the east as far as the Stadium-Armory station may opt for either Orange or Silver Line trains, increasing the practical frequency of the service. From the station, it is approximately a 0.9-mile walk to the site's northern property line, or an 18-23 minute walk depending on walking speed.

The Washington Transit Metropolitan Authority (WMATA) Metrobus provides bus services to the study area. Table 1 shows a summary of the bus route information for the existing bus route lines that serve the site during weekdays with stops in the study area and Figure 4 illustrates the existing bus service. A bus stop serving westbound trips on the 28A,X Metrobus lines is located on the property along E. Broad Street. Stops for the 2A and 3A are located along S. Washington Boulevard within 250 feet of the site, and the nearest stop for eastbound 28 A,X trips is approximately 400 feet west of the site. The 3T line can be access via stops located north of Park Avenue, approximately 375 feet north of the site.

Table 1: Weekday Bus Route Information

Route Number	Route Name	Destination	Service Hours	Peak Period Headway
WMATA 2A	Washington Boulevard Line	Ballston, Dunn Loring	Weekdays 4:45 am-12:55 am	15-30 min
WMATA 3A,T	Lee Highway Line	Annandale, McLean, Rosslyn	Weekdays 5:00 am-12:57 am	15-30 min
WMATA 28A	Leesburg Pike Line	Tysons Corner, King Street Metro	Weekdays 4:18 am-1:42 am	20 min
WMATA 28X	Leesburg Pike Limited Stop	Tysons Corner, Mark Center	Weekdays 5:45am-9:05am & 3:35pm-7:26pm	15-20 min

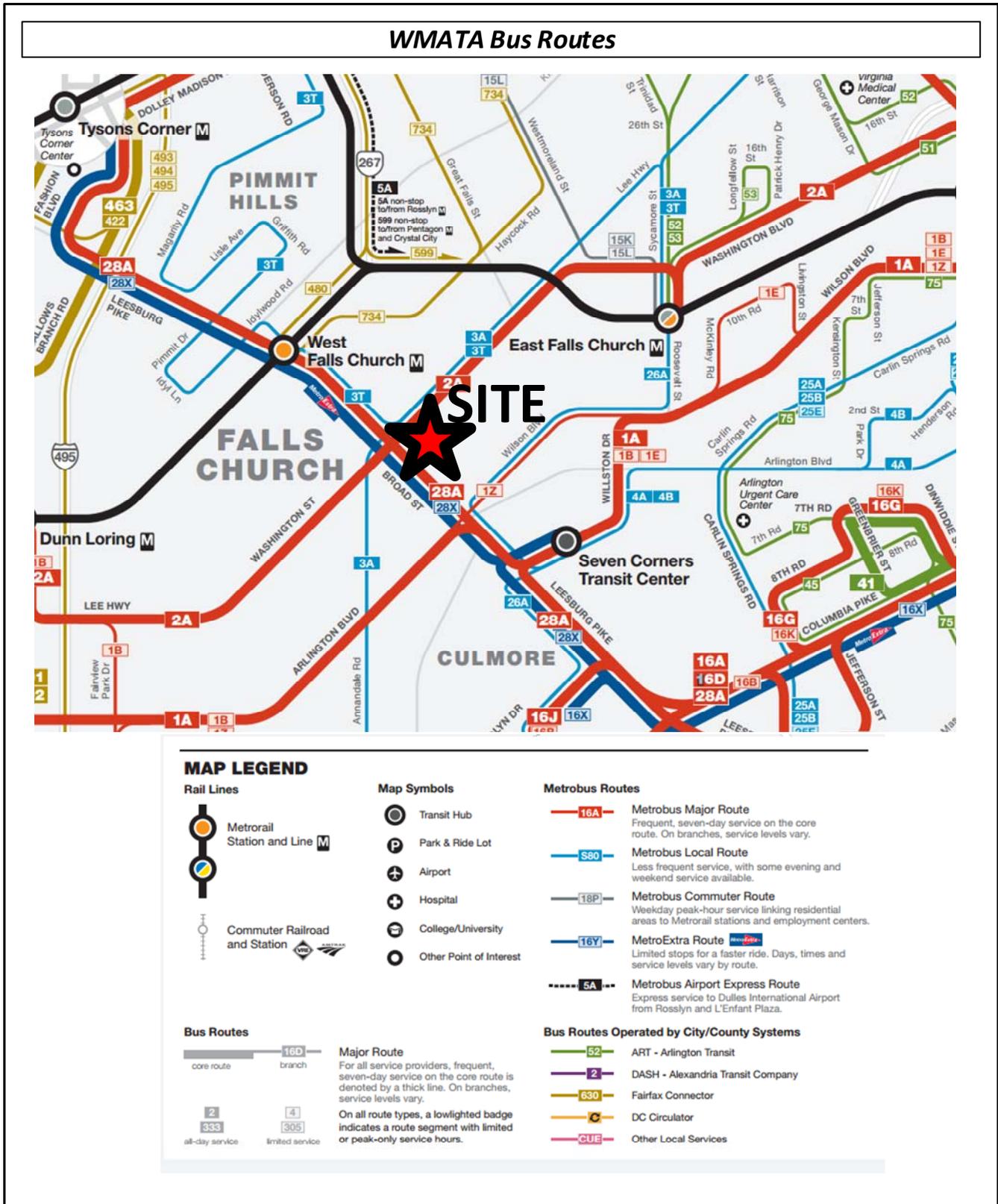


Figure 4: Existing Transit Service

EXISTING CONDITIONS (2015)

Existing Traffic Volumes

In order to determine the weekday and Saturday peak hour turning movement traffic volumes, traffic counts were conducted at the study intersections on Saturday, January 31, 2015 during the midday peak period and on Tuesday, February 3, 2015 during the morning and afternoon peak periods. Analysis of the traffic data found the following peak hours:

- AM Peak Hour: 8:30 AM to 9:30 AM
- PM Peak Hour: 4:45 PM to 5:45 PM
- Saturday Peak Hour: 12:30 PM to 1:30 PM

The counts were balanced at two locations in the study area. The first area is along E. Broad Street between the E. Broad Street/Site Driveway and the E. Broad Street/Lawton Street intersections. The second area that is balanced is along N. Washington Street between the N. Washington Street/Park Avenue and the N. Washington Street/E. Broad Street intersections. The existing balanced peak hour traffic volumes for the intersections contained within the study area are shown in Figure 5. The existing traffic counts are contained in Appendix B.

Existing Conditions Capacity Analysis

Intersection capacity analyses were performed for the existing conditions at the study area intersections during the weekday morning and afternoon peak hours and the Saturday peak hour. Synchro 9.0 was used to analyze the study intersections with the results based on the Highway Capacity Manual (HCM 2010) methodology. The existing peak hour factors acquired from the traffic counts and restricted to within the range of 0.85 to 1.00, were used in the analysis along with the default heavy vehicle percentage of 2%. Synchro files were created based on current lane configurations and traffic signal timing information obtained from the City of Falls Church. The results of the intersection capacity analyses are presented in Table 2, and are expressed in level of service (LOS) and delay (seconds per vehicle) per lane group. The intersections, approaches, and lane groups that operate at LOS E or F are shown in red. Lane groups where the queue length exceeds storage are also shown in red. The 95th and 50th percentile queue lengths are expressed in feet. The detailed analysis worksheets are contained in Appendix D.

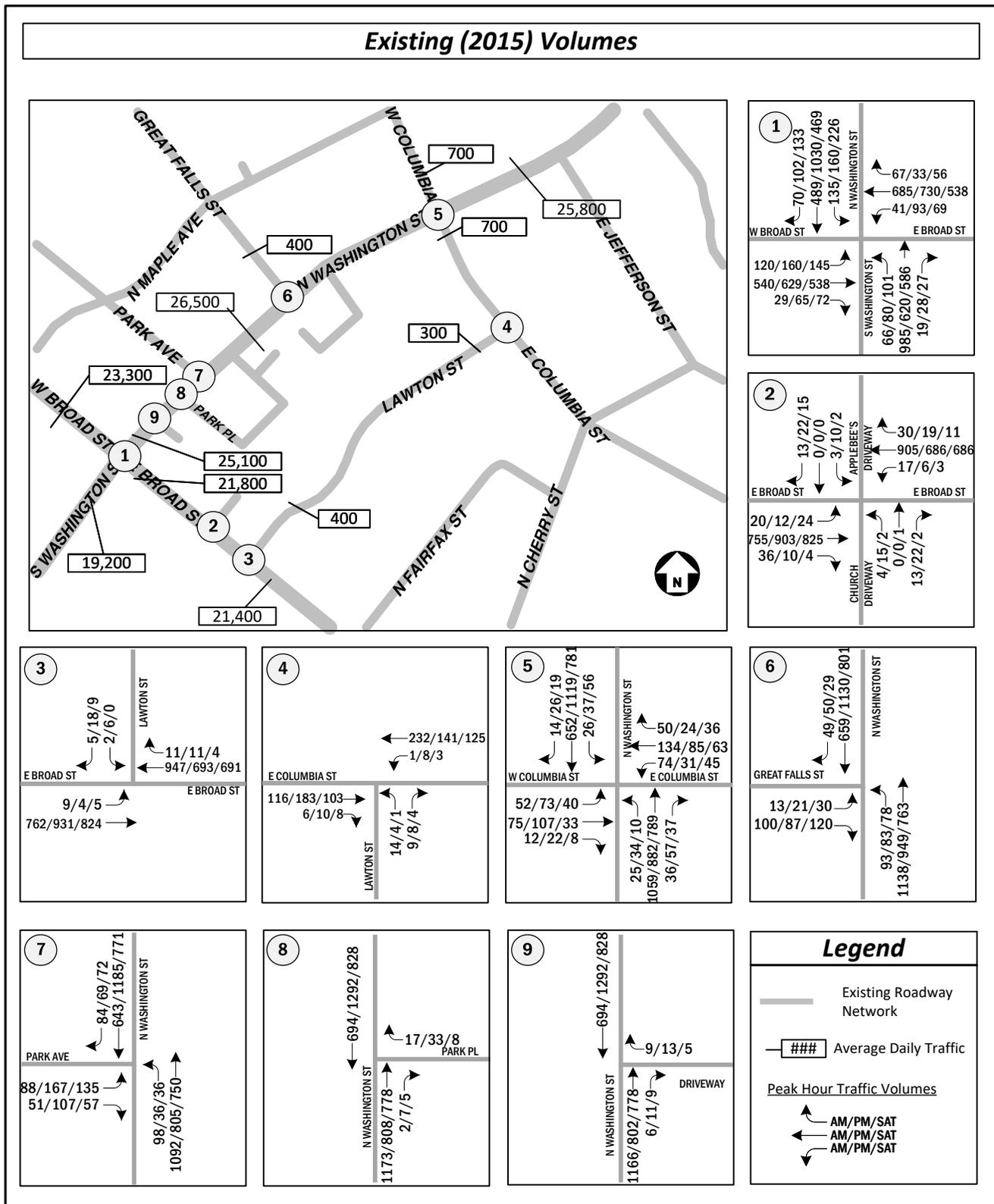


Figure 5: Existing (2015) Traffic Volumes

Table 2: Existing (2015) Intersection Capacity Analysis

No.	Intersection (Movement)	Bay/ Link Length (feet)	AM Peak				PM Peak				SAT Peak			
			50 th Queue	95 th Queue	LOS	Delay	50 th Queue	95 th Queue	LOS	Delay	50 th Queue	95 th Queue	LOS	Delay
1	E./W. Broad St & N./S. Washington St													
	Overall Intersection (Signalized)													
	<i>Eastbound Approach</i>													
					C	31.4			D	36.5			C	24.9
					<i>B</i>	<i>13.6</i>			<i>B</i>	<i>17.3</i>			<i>C</i>	<i>23.8</i>
		275	58	m#110	<i>C</i>	<i>20.8</i>	31	m#126	<i>C</i>	<i>22.2</i>	56	125	<i>C</i>	<i>20.3</i>
		450	181	167	<i>B</i>	<i>12.1</i>	176	178	<i>B</i>	<i>16.1</i>	177	304	<i>C</i>	<i>24.6</i>
	<i>Westbound Approach</i>													
					<i>C</i>	<i>33.5</i>			<i>D</i>	<i>37.8</i>			<i>C</i>	<i>26.7</i>
		255	8	m18	<i>C</i>	<i>20.7</i>	27	50	<i>C</i>	<i>22.3</i>	26	66	<i>C</i>	<i>20.5</i>
		400	210	260	<i>C</i>	<i>34.1</i>	255	#322	<i>D</i>	<i>39.6</i>	185	323	<i>C</i>	<i>27.4</i>
	<i>Northbound Approach</i>													
					<i>D</i>	<i>52.2</i>			<i>C</i>	<i>32.3</i>			<i>C</i>	<i>27.4</i>
		345	18	m47	<i>C</i>	<i>21.5</i>	37	m56	<i>C</i>	<i>27.2</i>	38	88	<i>C</i>	<i>20.4</i>
	580	193	#428	<i>D</i>	<i>54.2</i>	226	291	<i>C</i>	<i>32.9</i>	192	333	<i>C</i>	<i>28.6</i>	
<i>Southbound Approach</i>														
				<i>B</i>	<i>14.7</i>			<i>D</i>	<i>50.8</i>			<i>C</i>	<i>22.4</i>	
	190	40	100	<i>C</i>	<i>24.5</i>	27	97	<i>C</i>	<i>22.4</i>	91	185	<i>B</i>	<i>19.9</i>	
	370	147	184	<i>B</i>	<i>12.4</i>	141	#506	<i>D</i>	<i>54.8</i>	178	302	<i>C</i>	<i>23.3</i>	
2	E. Broad Street/Driveway													
	Overall Intersection (Unsignalized)													
	<i>Eastbound Approach</i>													
					n/a	n/a			n/a	n/a			n/a	n/a
					<i>A</i>	<i>0.3</i>			<i>A</i>	<i>0.1</i>			<i>A</i>	<i>0.3</i>
		75	n/a	3	<i>B</i>	<i>10.4</i>	n/a	0	<i>A</i>	<i>9.4</i>	n/a	3	<i>A</i>	<i>9.4</i>
		400	n/a	0	<i>A</i>	<i>0.0</i>	n/a	0	<i>A</i>	<i>0.0</i>	n/a	0	<i>A</i>	<i>0.0</i>
	<i>Westbound Approach</i>													
					<i>A</i>	<i>0.2</i>			<i>A</i>	<i>0.1</i>			<i>A</i>	<i>0.0</i>
		165	n/a	3	<i>A</i>	<i>9.7</i>	n/a	0	<i>B</i>	<i>10.3</i>	n/a	0	<i>A</i>	<i>9.9</i>
		165	n/a	0	<i>A</i>	<i>0.0</i>	n/a	0	<i>A</i>	<i>0.0</i>	n/a	0	<i>A</i>	<i>0.0</i>
	<i>Northbound Approach</i>													
					<i>C</i>	<i>19.7</i>			<i>D</i>	<i>30.5</i>			<i>D</i>	<i>31.8</i>
		25	n/a	5	<i>C</i>	<i>19.7</i>	n/a	20	<i>D</i>	<i>30.5</i>	n/a	3	<i>D</i>	<i>31.8</i>
<i>Southbound Approach</i>														
				<i>C</i>	<i>19.7</i>			<i>C</i>	<i>21.5</i>			<i>B</i>	<i>14.2</i>	
	25	n/a	5	<i>C</i>	<i>19.7</i>	n/a	13	<i>C</i>	<i>21.5</i>	n/a	3	<i>B</i>	<i>14.2</i>	
3	Broad Street and Lawton Street													
	Overall Intersection (Unsignalized)													
	<i>Eastbound Approach</i>													
					n/a	n/a			n/a	n/a			n/a	n/a
					<i>A</i>	<i>0.3</i>			<i>A</i>	<i>0.0</i>			<i>A</i>	<i>0.2</i>
		165	n/a	0	<i>B</i>	<i>10.7</i>	n/a	0	<i>A</i>	<i>9.2</i>	n/a	0	<i>A</i>	<i>9.2</i>
	<i>Westbound Approach</i>													
					<i>A</i>	<i>0.0</i>			<i>A</i>	<i>0.0</i>			<i>A</i>	<i>0.0</i>
	1130	n/a	0	<i>A</i>	<i>0.0</i>	n/a	0	<i>A</i>	<i>0.0</i>	n/a	0	<i>A</i>	<i>0.0</i>	
<i>Southbound Approach</i>														
				<i>C</i>	<i>20.4</i>			<i>C</i>	<i>15.7</i>			<i>B</i>	<i>10.9</i>	
	1400	n/a	3	<i>C</i>	<i>20.4</i>	n/a	5	<i>C</i>	<i>15.7</i>	n/a	0	<i>B</i>	<i>10.9</i>	
4	Lawton Street & Columbia Street													
	Overall Intersection (Unsignalized)													
	<i>Eastbound Approach</i>													
		485	n/a	0	<i>A</i>	<i>0.0</i>	n/a	0	<i>A</i>	<i>0.0</i>	n/a	0	<i>A</i>	<i>0.0</i>
	<i>Westbound Approach</i>													
					<i>A</i>	<i>0.0</i>			<i>A</i>	<i>0.4</i>			<i>A</i>	<i>0.2</i>
		440	n/a	0	<i>A</i>	<i>7.5</i>	n/a	0	<i>A</i>	<i>7.7</i>	n/a	0	<i>A</i>	<i>7.5</i>
<i>Northbound Approach</i>														
				<i>B</i>	<i>10.9</i>			<i>B</i>	<i>10.4</i>			<i>A</i>	<i>9.1</i>	
	1400	n/a	3	<i>B</i>	<i>10.9</i>	n/a	3	<i>B</i>	<i>10.4</i>	n/a	0	<i>A</i>	<i>9.1</i>	
5	N Washington Street/W Columbia Street/E Columbia Street													
	Overall Intersection (Signalized)													
	<i>Eastbound Approach</i>													
					C	22.1			C	23.1			C	22.3
					<i>C</i>	<i>28.0</i>			<i>C</i>	<i>30.8</i>			<i>B</i>	<i>14.6</i>
		370	69	123	<i>C</i>	<i>28.0</i>	111	184	<i>C</i>	<i>30.8</i>	27	68	<i>B</i>	<i>14.6</i>
	<i>Westbound Approach</i>													
					<i>C</i>	<i>32.1</i>			<i>C</i>	<i>28.9</i>			<i>B</i>	<i>15.6</i>
		485	137	221	<i>C</i>	<i>32.1</i>	70	126	<i>C</i>	<i>28.9</i>	46	107	<i>B</i>	<i>15.6</i>
	<i>Northbound Approach</i>													
					<i>C</i>	<i>22.2</i>			<i>C</i>	<i>20.3</i>			<i>C</i>	<i>24.6</i>
		70	3	m8	<i>B</i>	<i>12.5</i>	7	m11	<i>B</i>	<i>15.5</i>	3	11	<i>B</i>	<i>18.3</i>
		640	147	286	<i>C</i>	<i>22.5</i>	288	306	<i>C</i>	<i>20.5</i>	213	290	<i>C</i>	<i>24.7</i>
	<i>Southbound Approach</i>													
				<i>B</i>	<i>17.1</i>			<i>C</i>	<i>23.5</i>			<i>C</i>	<i>21.9</i>	
	125	7	18	<i>B</i>	<i>14.9</i>	10	24	<i>B</i>	<i>13.7</i>	16	35	<i>B</i>	<i>18.3</i>	
	475	148	196	<i>B</i>	<i>17.2</i>	335	424	<i>C</i>	<i>23.8</i>	153	265	<i>C</i>	<i>22.2</i>	
6	N Washington Street/Great Falls Street													
	Overall Intersection (Unsignalized)													
	<i>Eastbound Approach</i>													
					n/a	n/a			n/a	n/a			n/a	n/a
					<i>C</i>	<i>21.5</i>			<i>F</i>	<i>77.7</i>			<i>D</i>	<i>29.1</i>
	440	n/a	38	<i>C</i>	<i>21.5</i>	n/a	113	<i>F</i>	<i>77.7</i>	n/a	70	<i>D</i>	<i>29.1</i>	
<i>Northbound Approach</i>														
				<i>A</i>	<i>2.0</i>			<i>A</i>	<i>2.7</i>			<i>A</i>	<i>1.7</i>	
	425	n/a	10	<i>A</i>	<i>9.7</i>	n/a	13	<i>B</i>	<i>12.6</i>	n/a	8	<i>B</i>	<i>10.2</i>	
7	N Washington Street/Park Avenue													
	Overall Intersection (Signalized)													
	<i>Eastbound Approach</i>													
					A	4.4			A	8.6			A	4.3
					<i>D</i>	<i>50.0</i>			<i>D</i>	<i>47.8</i>			<i>B</i>	<i>15.0</i>
		360	65	104	<i>D</i>	<i>51.9</i>	104	168	<i>D</i>	<i>50.1</i>	37	87	<i>B</i>	<i>15.5</i>
	<i>Eastbound Right</i>													
					<i>D</i>	<i>46.6</i>	0	45	<i>D</i>	<i>44.2</i>	0	24	<i>B</i>	<i>14.0</i>
	<i>Northbound Approach</i>													
					<i>A</i>	<i>0.5</i>			<i>A</i>	<i>0.5</i>			<i>A</i>	<i>1.9</i>
	370	201	463	<i>A</i>	<i>0.9</i>	52	92	<i>A</i>	<i>0.9</i>	51	97	<i>A</i>	<i>4.1</i>	
<i>Southbound Approach</i>														
				<i>A</i>	<i>2.2</i>			<i>A</i>	<i>5.4</i>			<i>A</i>	<i>4.1</i>	
	425	48	83	<i>A</i>	<i>2.2</i>	33	41	<i>A</i>	<i>5.4</i>	98	167	<i>A</i>	<i>4.1</i>	
8	N Washington Street & Park Place													
	Overall Intersection (Unsignalized)													
	<i>Westbound Approach</i>													
				n/a	n/a			n/a	n/a			n/a	n/a	
				<i>B</i>	<i>14.7</i>			<i>B</i>	<i>11.9</i>			<i>B</i>	<i>11.2</i>	
	315	n/a	5	<i>B</i>	<i>14.7</i>	n/a	5	<i>B</i>	<i>11.9</i>	n/a	0	<i>B</i>	<i>11.2</i>	
9	N Washington Street & Driveway													
	Overall Intersection (Unsignalized)													
	<i>Westbound Approach</i>													
				n/a	n/a			n/a	n/a			n/a	n/a	
				<i>B</i>	<i>13.5</i>			<i>B</i>	<i>11.4</i>			<i>B</i>	<i>11.6</i>	
	105	n/a	3	<i>B</i>	<i>13.5</i>	n/a	3	<i>B</i>	<i>11.4</i>	n/a	0	<i>B</i>	<i>11.6</i>	

Notes: N/A – Not Applicable
 # – 95th percentile volume exceeds capacity, queue may be longer. Queue shown is the maximum after two cycles.
 m – Volume for 95th percentile queue is metered by upstream signal.
 ~ – Volume exceeds capacity, queue can be longer. Queue shown is maximum after two cycles.

Consistent with the scoping agreement, it is desirable to achieve a LOS D or better for each approach of an intersection. If an acceptable level of service cannot be achieved, then it is desirable for the future with development conditions to be no worse than the network without the new development. A description of the various levels of service is included in Appendix C.

All of the study intersections' approaches currently operate at acceptable levels of service during the weekday morning, afternoon, and Saturday peak hours with the exception of the eastbound Great Falls Street approach at N. Washington Street during the weekday PM peak hours.

Based on the queuing analysis, peak hour queue lengths currently exceed the storage lengths in one or more of the lane groups at the following intersections during one or more of the peak periods:

- Broad Street and Washington Street (PM only)
- N. Washington Street and Park Avenue (AM only)

The results of the intersection capacity analyses for the existing conditions are shown in Figure 6.

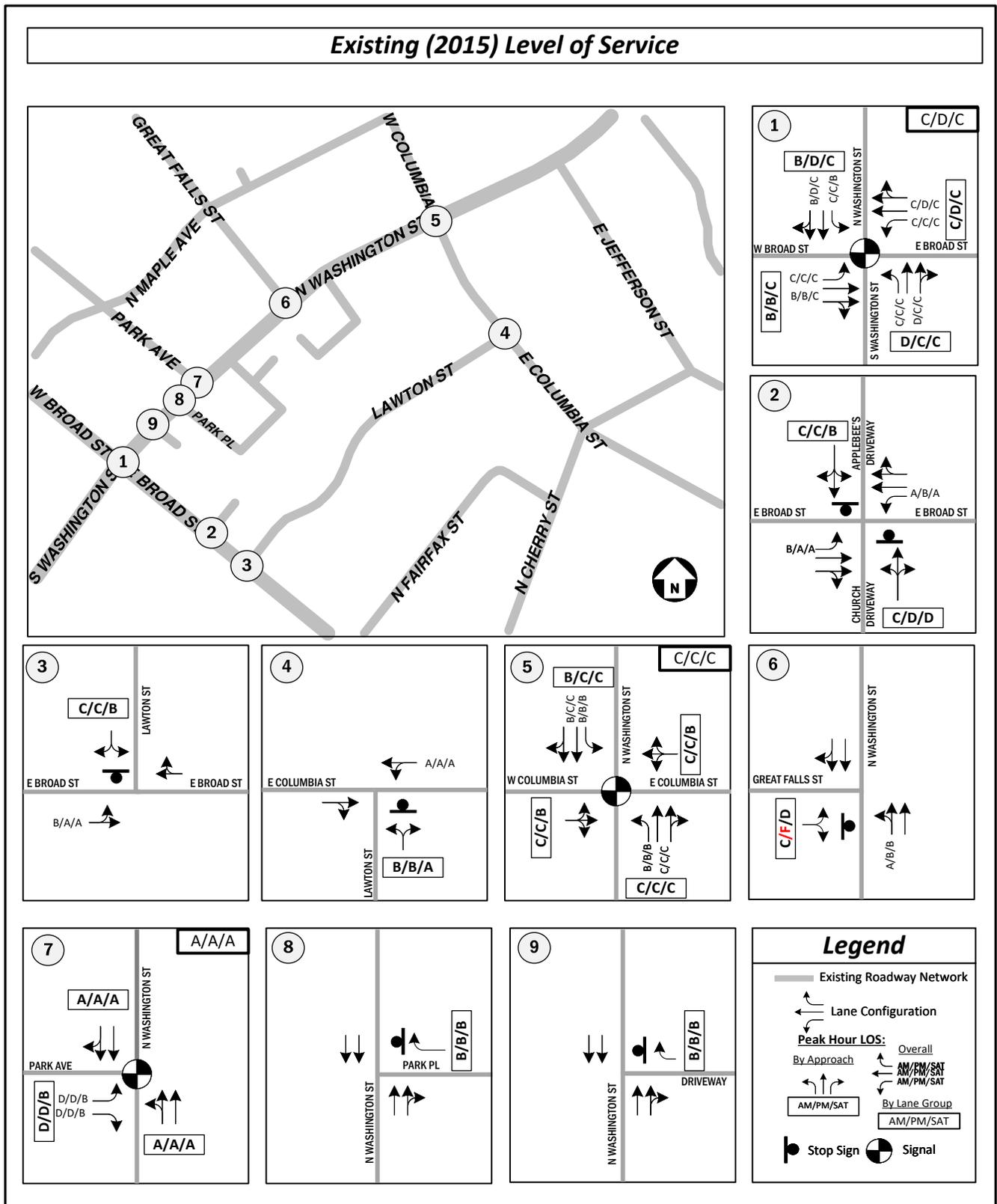


Figure 6: Existing (2015) Level of Service

FUTURE CONDITIONS WITHOUT DEVELOPMENT (2020)

Future without Development Traffic Volumes

The proposed Washington Street and Broad Street redevelopment is anticipated to be complete in 2020. Based on historic traffic counts published by VDOT, area traffic volumes have decreased steadily in recent years. Thus, no regional traffic growth was applied for future conditions.

Background developments include the 301 W. Broad Street redevelopment which is already under construction and is scheduled to be complete in 2016. This redevelopment is planned to consist of one multi-use building featuring a 60,000 square foot supermarket, 282 apartments, and 3,470 square feet of ground floor retail. The associated Traffic Impact Study, prepared by Gorove/Slade and dated January 23, 2013, the analysis was conducted assuming a 60,883 square foot supermarket, 297 apartments, and 4,011 square feet of ground floor retail. The traffic assignments from the 301. W. Broad Street study are included in all future conditions as a background development. As there are currently no road improvements being constructed at the study intersections, no changes to the lane configurations were assumed in the analysis of future scenarios. Additionally, there are no planned funded road improvements within the study area.

The volumes for Future without Development conditions are illustrated in Figure 7.

Future without Development Capacity Analysis

Intersection capacity analyses were performed for the future conditions without the proposed development at the intersections contained within the study area during the weekday morning and afternoon peak hours, as well as the Saturday peak hour. *Synchro 9.0* was used to analyze the study intersections with the results based on the [Highway Capacity Manual](#) (HCM 2010) methodology. The default peak hour factor of 0.92 has been used in the analysis. Heavy vehicle percentages, lane widths, road grades, and number of bus blockages per hour were kept the same as the existing conditions. The capacity and queuing analysis results are shown in Table 3. The detailed analysis worksheets are contained in Appendix E.

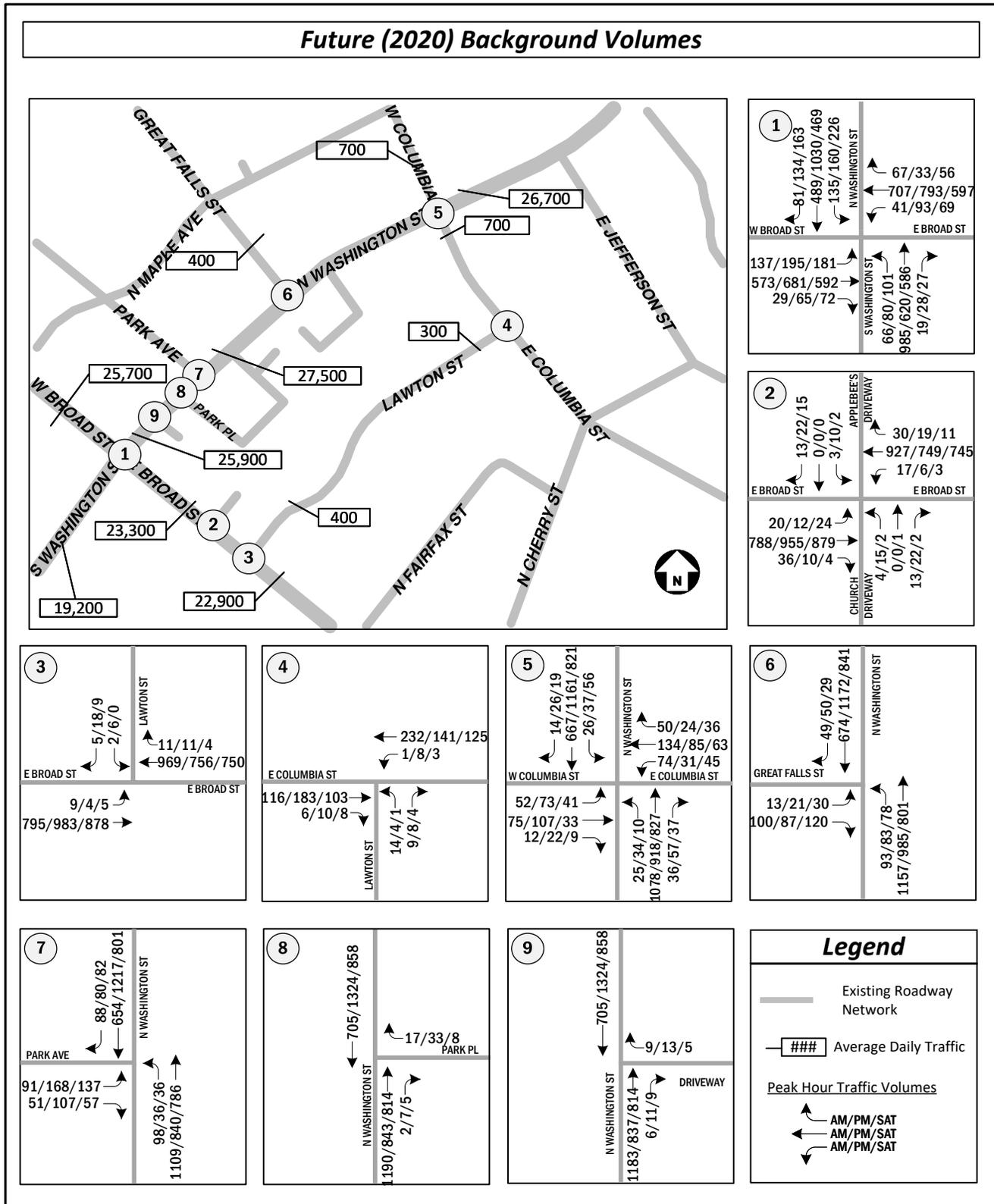


Figure 7: Future without Development (2020) Traffic Volumes

Table 3: Future without Development (2020) Intersection Capacity Analysis

No.	Intersection (Movement)	Bay/ Link Length (feet)	AM Peak				PM Peak				SAT Peak			
			50 th Queue	95 th Queue	LOS	Delay	50 th Queue	95 th Queue	LOS	Delay	50 th Queue	95 th Queue	LOS	Delay
1	E./W. Broad St & N./S. Washington St													
	Overall Intersection (Signalized)													
	<i>Eastbound Approach</i>													
					C	31.3			D	39.4			C	26.5
					B	14.1			C	20.3			C	24.1
	Eastbound Left	275	68	m#151	C	21.6	65	#213	C	29.2	76	156	C	21.2
	Eastbound Thru/Right	450	192	175	B	12.4	196	205	B	18.0	206	340	C	24.8
	<i>Westbound Approach</i>				C	34.1			D	44.4			C	28.6
	Westbound Left	255	8	m18	C	20.7	27	49	C	23.3	27	67	C	21.5
	Westbound Thru/Right	400	225	275	C	34.8	282	#395	D	46.8	225	369	C	29.4
	<i>Northbound Approach</i>				D	52.1			C	31.6			C	29.5
	Northbound Left	345	18	m47	C	21.5	37	m56	C	27.1	42	95	C	22.2
	Northbound Thru/Right	580	193	#428	D	54.2	226	291	C	32.1	212	349	C	30.7
<i>Southbound Approach</i>				B	14.8			D	53.6			C	24.5	
Southbound Left	190	37	98	C	24.5	30	96	C	22.0	103	198	C	21.5	
Southbound Thru/Right	370	151	186	B	12.4	169	#534	E	57.8	209	338	C	25.6	
2	E. Broad Street/Driveway													
	Overall Intersection (Unsignalized)													
	<i>Eastbound Approach</i>													
					n/a	n/a			n/a	n/a			n/a	n/a
					A	0.2			A	0.1			A	0.3
	Eastbound Left	75	n/a	3	B	10.5	n/a	3	A	9.7	n/a	3	A	9.7
	Eastbound Thru/Right	400	n/a	0	A	0.0	n/a	0	A	0.0	n/a	0	A	0.0
	<i>Westbound Approach</i>				A	0.2			A	0.1			A	0.0
	Westbound Left	165	n/a	3	A	9.8	n/a	0	B	10.5	n/a	0	B	10.1
	Westbound Thru/Right	165	n/a	0	A	0.0	n/a	0	A	0.0	n/a	0	A	0.0
	<i>Northbound Approach</i>				C	20.7			E	35.4			E	35.4
	Northbound Left/Thru/Right	25	n/a	5	C	20.7	n/a	25	E	35.4	n/a	3	E	35.4
	<i>Southbound Approach</i>				C	20.5			C	24.5			C	15.0
Southbound Left/Thru/Right	25	n/a	5	C	20.5	n/a	15	C	24.5	n/a	5	C	15.0	
3	Broad Street and Lawton Street													
	Overall Intersection (Unsignalized)													
	<i>Eastbound Approach</i>													
					n/a	n/a			n/a	n/a			n/a	n/a
					A	0.3			A	0.1			A	0.2
	Eastbound Left/Thru	165	n/a	0	B	10.6	n/a	0	A	9.5	n/a	0	A	9.5
	<i>Westbound Approach</i>				A	0.0			A	0.0			A	0.0
	Westbound Thru/Right	1130	n/a	0	A	0.0	n/a	0	A	0.0	n/a	0	A	0.0
<i>Southbound Approach</i>				C	20.4			C	16.9			B	11.2	
Southbound Left/Right	1400	n/a	3	C	20.4	n/a	5	C	16.9	n/a	3	B	11.2	
4	Lawton Street & Columbia Street													
	Overall Intersection (Unsignalized)													
	<i>Eastbound Approach</i>													
					n/a	n/a			n/a	n/a			n/a	n/a
					A	0.0			A	0.0			A	0.0
	Eastbound Approach	485	n/a	0	A	0.0	n/a	0	A	0.4	n/a	0	A	0.2
	Westbound Left/Thru	440	n/a	0	A	7.5	n/a	0	A	7.7	n/a	0	A	7.5
<i>Northbound Approach</i>				B	10.3			B	10.1			A	9.2	
Northbound Left/Right	1400	n/a	3	B	10.3	n/a	3	B	10.1	n/a	0	A	9.2	
5	N Washington Street/W Columbia Street/E Columbia Street													
	Overall Intersection (Signalized)													
	<i>Eastbound Approach</i>													
					C	22.3			C	23.8			C	22.4
					C	28.0			C	30.8			B	15.3
	Eastbound Left/Thru/Right	370	69	123	C	28.0	111	184	C	30.8	29	71	B	15.3
	<i>Westbound Approach</i>				C	32.1			C	28.9			B	16.3
	Westbound Left/Thru/Right	485	137	221	C	32.1	70	126	C	28.9	49	110	B	16.3
	<i>Northbound Approach</i>				C	22.6			C	20.9			C	24.6
	Northbound Left	70	3	m7	B	12.6	7	m12	B	16.0	3	11	B	18.2
	Northbound Thru/Right	640	136	240	C	22.8	292	331	C	21.1	226	305	C	24.7
	<i>Southbound Approach</i>				B	17.2			C	24.4			C	21.9
	Southbound Left	125	7	18	B	15.0	10	24	B	14.0	16	35	B	18.3
Southbound Thru/Right	475	153	202	B	17.3	356	448	C	24.8	163	281	C	22.2	
6	N Washington Street/Great Falls Street													
	Overall Intersection (Unsignalized)													
	<i>Eastbound Approach</i>													
					n/a	n/a			n/a	n/a			n/a	n/a
					D	25.5			F	99.2			D	33.0
Eastbound Left/Right	440	n/a	48	D	25.5	n/a	130	F	99.2	n/a	78	D	33.0	
<i>Northbound Approach</i>				A	2.1			A	2.9			A	1.7	
Northbound Thru/Left	425	n/a	10	A	9.8	n/a	15	B	13.0	n/a	10	B	10.4	
7	N Washington Street/Park Avenue													
	Overall Intersection (Signalized)													
	<i>Eastbound Approach</i>													
					A	4.3			A	8.5			A	4.3
					D	50.3			D	47.7			B	15.1
	Eastbound Left	360	61	108	D	52.3	105	169	D	50.0	38	90	B	15.5
	Eastbound Right	360	0	34	D	46.7	0	45	D	44.1	0	25	B	13.9
	<i>Northbound Approach</i>				A	0.2			A	0.5			A	1.9
	Northbound Thru/Left	370	175	m111	A	0.4	70	m104	A	1.0	55	104	A	4.2
<i>Southbound Approach</i>				A	2.0			A	5.6			A	4.2	
Southbound Thru/Right	425	42	87	A	2.0	33	41	A	5.6	105	178	A	4.2	
8	N Washington Street & Park Place													
	Overall Intersection (Unsignalized)													
	<i>Westbound Approach</i>													
				n/a	n/a			n/a	n/a			n/a	n/a	
				B	14.4			B	12.1			B	11.4	
Westbound Right	315	n/a	3	B	14.4	n/a	5	B	12.1	n/a	0	B	11.4	
9	N Washington Street & Driveway													
	Overall Intersection (Unsignalized)													
	<i>Westbound Approach</i>													
				n/a	n/a			n/a	n/a			n/a	n/a	
				B	13.7			B	11.6			B	11.6	
Westbound Right	105	n/a	3	B	13.7	n/a	3	B	11.6	n/a	0	B	11.6	

Notes: N/A – Not Applicable
 # – 95th percentile volume exceeds capacity, queue may be longer. Queue shown is the maximum after two cycles.
 m – Volume for 95th percentile queue is metered by upstream signal.
 ~ – Volume exceeds capacity, queue can be longer. Queue shown is maximum after two cycles.

Most of the study intersections' approaches will continue to operate at acceptable levels of service during the weekday morning, weekday afternoon, and Saturday peak hours. Similar to existing conditions, the eastbound approach of Great Falls Street with N. Washington Street will continue to operate at LOS F conditions during the PM peak hours. The southbound thru-right movement at the Broad Street/Washington Street intersection would operate at LOS E conditions during the PM peak hours. The northbound approach at the Broad Street/Site Driveway intersection also operates at LOS E during the PM and Saturday peak hours.

Based on the queuing analysis, peak hour queue lengths will continue to exceed the storage length in one or more of the lane groups at the following intersection during one or more of the peak periods:

- Broad Street and Washington Street (PM and Saturday)

The minimal improvements that occurred in the delay results at some of the study intersections' approaches and lane groups, when compared to the delay results of the existing conditions, are attributed to the use of existing peak hour factors (by approach) in the existing conditions; whereas the default peak hour factor of 0.92 was used in both future scenarios. The use of the peak hour factor in this way was agreed upon in the scoping document and is standard industry practice.

The results of the intersection capacity analyses for the future without development conditions are shown in Figure 8.

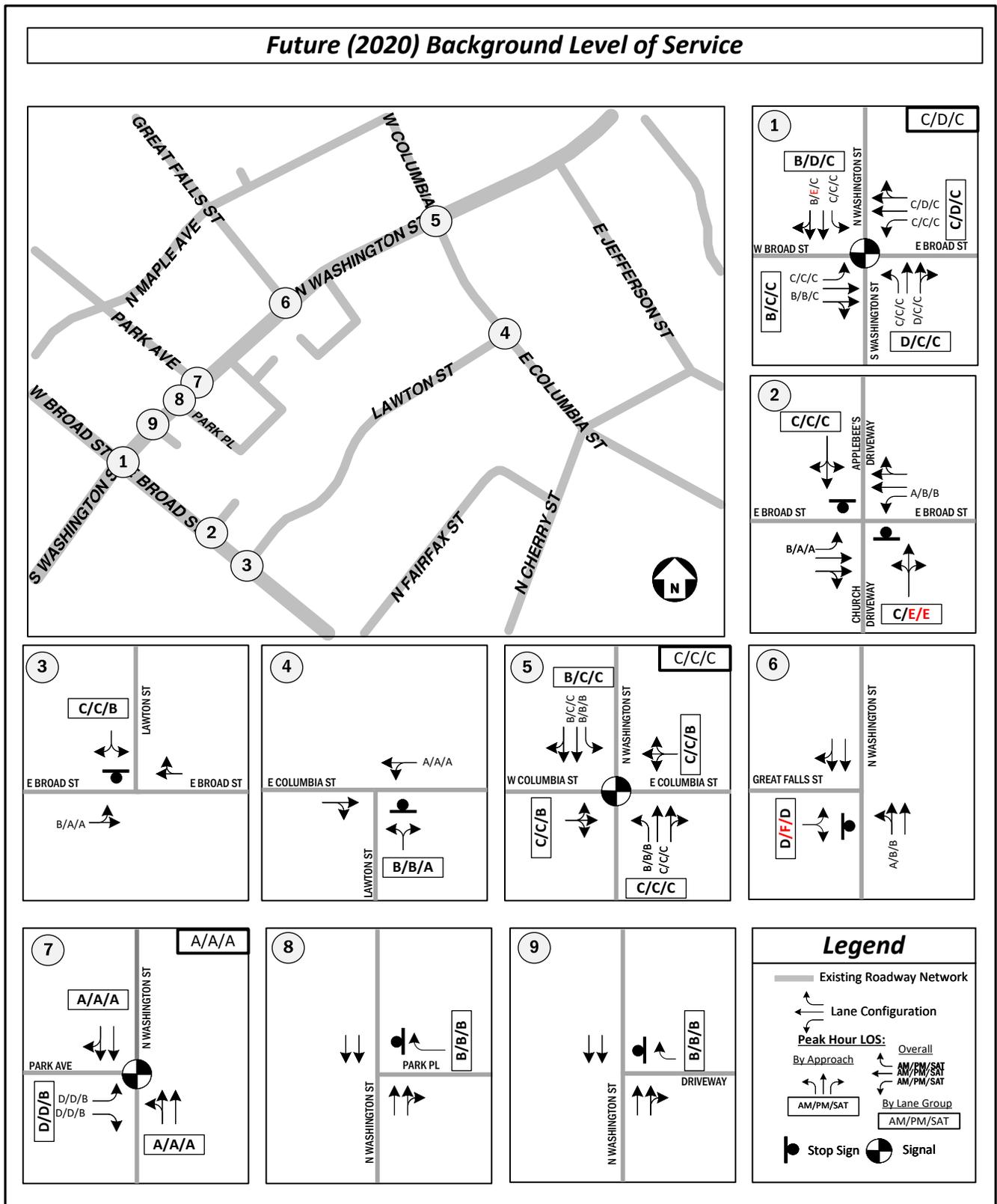


Figure 8: Future without Development (2020) Level of Service

TRIP GENERATION

In order to calculate the trip generation for the proposed redevelopment, the Institute of Transportation Engineers’ (ITE) Trip Generation Manual, 9th Edition was used to determine the trips into and out of the Broad & Washington site for the weekday morning, afternoon, and Saturday peak hours, as well as the typical weekday daily and Saturday (24-hour) trips to the site. To account for the synergy between the residential and retail land uses, a 5%, 10%, 15%, 10% internal capture reduction was applied to the weekday AM, PM, Daily, and Saturday site generated trips, respectively, as allowed per VDOT Chapter 870 guidelines. This reduction was calculated based on the site’s residential trips, rather than the retail, because it is lesser trip generator of the two land uses. As agreed upon at the scoping meeting with City of Falls Church staff and as allowed per VDOT Chapter 870 guidelines, 36% of the new retail trips generated were assumed to be pass-by trips in order to recognize drivers already on the adjacent streets that will enter from the existing stream of traffic, and then continue in their original path after exiting the site. This rate represents the average pass-by trip percentage for the supermarket land use according to the ITE Trip Generation Manual, 9th Edition. The proposed Broad & Washington redevelopment’s trip generation is shown in Table 4.

Table 4: Site Trip Generation

Land Use	ITE Code	Size	----- Weekday -----						----- Saturday -----				
			AM Peak Hour			PM Peak Hour			Daily	SAT Peak Hour			Daily
			In	Out	Total	In	Out	Total	Total	In	Out	Total	Total
Proposed Retail													
High Turnover Sit Down Restaurant	932	7.0 kSF	42	34	76	41	28	69	890	52	46	98	1,109
Specialty retail	826	17.7 kSF	97	105	202	28	36	64	795	148	136	284	744
<i>Subtotal (Retail without reductions)</i>			139	139	278	69	64	133	1,685	200	182	382	1,853
<i>Internal Trips Reduction (Retail)</i>			-7	-2	-8	-7	-13	-20	-324	-8	-8	-16	-357
<i>Subtotal (Retail with internal reduction)</i>			132	137	270	62	51	113	1,361	192	174	366	1,496
<i>Transit/Walk Reduction - 2% (Retail Only)</i>			-3	-3	-5	-1	-1	-2	-27	-4	-3	-7	-30
<i>Subtotal (w/Transit/Walk Reduction)</i>			130	135	264	61	50	111	1,334	188	171	359	1,466
<i>Pass by Trips Reduction - 36% (Retail Only)</i>			-47	-48	-95	-22	-18	-40	-480	-68	-61	-129	-528
Existing Restaurant to be removed	932	4.3 kSF	-25	-21	-46	-25	-17	-42	-541	-32	-28	-60	-674
Existing Retail to be removed	826	11.4 kSF	-83	-89	-172	-22	-27	-49	-526	-111	-102	-213	-480
Total Proposed New External Retail Trips			-25	-24	-49	-8	-12	-20	-213	-22	-21	-43	-216
Proposed Residential													
Apartment	220	336 DU	34	134	168	131	71	202	2,160	79	78	157	2,381
<i>Internal Trips Reduction (Residential)</i>			-2	-7	-8	-13	-7	-20	-324	-8	-8	-16	-357
<i>5% (AM), 10% (PM & SAT), 15% (Weekday/Weekend Daily)</i>			32	127	160	118	64	182	1,836	71	70	141	2,024
<i>Transit Reduction - 10% (Residential Only)</i>			-3	-13	-16	-12	-6	-18	-184	-7	-7	-14	-202
<i>Subtotal (w/Transit Reduction)</i>			29	115	144	106	58	164	1,652	64	63	127	1,821
Total Residential Trips			29	115	144	106	58	164	1,652	64	63	127	1,821
Proposed Office													
Office	710	62.5 kSF	116	16	132	25	123	148	919	15	12	27	159
<i>Transit/Walk Reduction - 2% (Office Only)</i>			-2	0	-3	-1	-2	-3	-18	0	0	-1	-3
<i>Subtotal (w/Transit/Walk Reduction)</i>			114	16	129	25	121	145	901	15	12	26	156
Office to be removed	710	20.9 kSF	-48	-7	-55	-17	-85	-102	-400	-5	-4	-9	-74
Total Office Trips			66	9	74	8	36	43	501	10	8	17	82
Proposed Site Trips without Reductions			289	289	578	225	258	483	4,764	294	272	566	4,393
Proposed Site Trips with Reductions			70	99	169	105	81	186	1,940	51	50	101	1,687

In the context of the trip generation table and discussion, “reductions” refer to deductions from the numbers of vehicle trips generated by a use due to the use of another mode or sharing of trip purpose. The reduction is relative to the raw numbers of trips published by ITE, rather than reflecting the removal of trips currently on the road network. The ITE trip rates represent

the number of vehicles expected to enter and exit a site in a location with high auto availability and few travel mode choices and are appropriately modified in environments like the City of Falls Church.

The trips currently associated with the partially-occupied site uses were then removed from the trip generation to account for the demolition of the existing buildings. Given the suburban nature of the buildings with surface parking lots, no reductions for transit use or internal capture, beyond those inherent in the ITE data, were applied. Thus, the proposed redevelopment will generate approximately 169 new external trips during the weekday morning peak hour, 186 new external trips during the weekday afternoon peak hour, 101 new external trips during the Saturday peak hour, and 1,940 new external weekday daily trips.

VDOT Mixed-Use Trip Generation Model

The results of the ITE trip generation analysis were compared with the VDOT Mixed-Use Trip Generation Model to evaluate the similarities and differences in the resulting trip generation. The model was developed for the San Diego Association of Governments (SANDAG) based on data collected at existing “smart growth” sites. Parameters included in the computation of internal and non-auto trip reductions include population, network connectivity, employment, and land area. While the model computes a larger share of non-auto trips than utilized in the ITE calculations above, no breakdown by lane use or trip direction (inbound vs. outbound) is provided. Additionally, the number of land use categories is limited in the Mixed-Use Trip Generation Model and leads to an overestimation of the retail trips in this case. It is unclear whether simply modifying the “raw” trip estimates would lead to an accurate representation of the interaction of the land uses, as the underlying computations are not available to the user of the model.

The resulting trip reduction estimates from the model are shown in Table 5, without the adjustments for existing uses to be removed. Accounting for the existing trips, the model would yield 29 AM peak hour trips, 227 PM peak hour trips, and 2,555 daily trips; no estimates for Saturday are computed. These figures represent 83% fewer AM peak hour trips, 22% more PM peak hour trips, and 32% more daily trips than the net trips in Table 4. Thus, the ITE trip estimates with reductions consistent with VDOT guidelines are within the range of trips estimated by the Mixed-Use Trip Generation Model. Due to the more complete information provided by the ITE calculations, that methodology was used to derive the site traffic assignments and future with development traffic forecasts.

Table 5: Mixed-Use Trip Generation Model Results

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Number of "Raw" ITE Trips Subject to Model	1678	3043	1461	6182	245	166	22	433	224	251	154	629
Predicted Probabilities:												
Internal Capture	4.50%	3.66%	6.36%	4.52%	4.50%	3.66%	6.36%	4.27%	4.50%	3.66%	6.36%	4.62%
Walking External	3.03%	38.56%	30.03%	26.93%	3.03%	38.56%	30.03%	18.06%	3.03%	38.56%	30.03%	23.85%
Transit External	15.44%	0.84%	1.37%	4.93%	15.44%	0.84%	1.37%	9.11%	15.44%	0.84%	1.37%	6.17%
Number of Trips:												
Internal Capture	75	111	93	280	11	6	1	19	10	9	10	29
Walking External	49	1130	411	1590	7	61	6	75	6	93	43	143
Transit External	247	25	19	291	36	1	0	38	33	2	2	37
Net Number of IXXI Vehicle Trips	1307	1776	939	4022	191	97	14	302	174	146	99	420
Results	External Vehicle Trips			VMT								
	Raw	Net	Reduction %	Raw	Net	Reduction %						
Daily	6,182	4,022	35%	25,785	17,525	32%						
AM Peak Hour	433	302	30%	2,205	1,605	27%						
PM Peak Hour	629	420	33%	2,791	1,948	30%						

SITE TRAFFIC DISTRIBUTION AND ASSIGNMENT

Site Access

Vehicular access to the subject property is currently provided via:

- Three driveways along E. Broad Street
- Two driveways along Park Place
- One driveway on N. Washington Street (about 140 feet south of Park Place)

Access to the proposed development will be consolidated to the following:

- One full movement driveway along E. Broad Street (current Applebee's driveway location)
- One limited access driveway on N. Washington Street (current location-about 140 feet south of Park Place)

Distribution and Assignment

The distribution of site trips was based on previous studies performed in the area, existing traffic patterns, the City's TDM plan and the nature of the proposed development. Trips generated from the site were assigned based on the abovementioned factors. The inbound and outbound trips calculated for the weekday morning, afternoon, and Saturday peak hours were routed through the roadway network to the site. The site direction of approach and trip distribution for the weekday and Saturday peak hours is illustrated in Figure 9. The site traffic assignment for the weekday and Saturday peak hours is illustrated in Figure 10. The trip assignments for each of the site land uses, as well as the pass-by trips, are included in Appendix F.

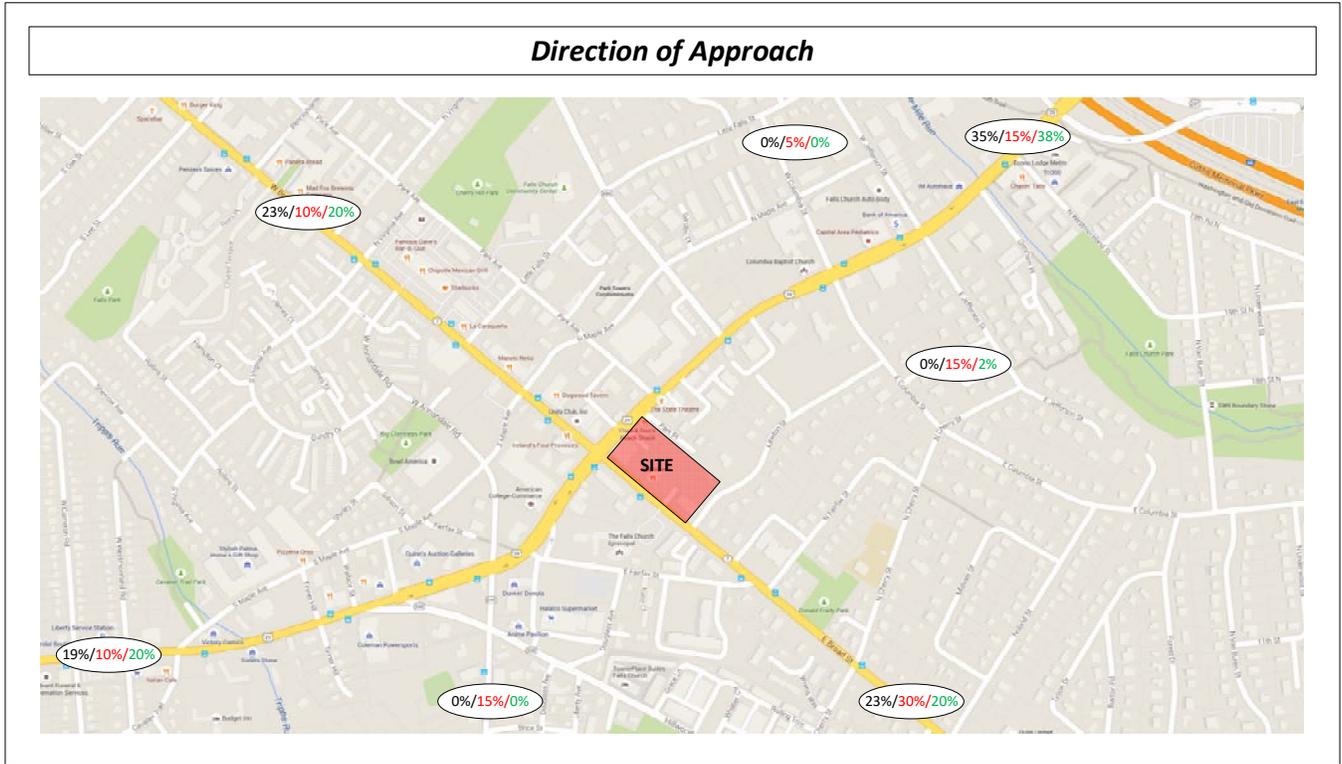


Figure 9: Directions of Approach

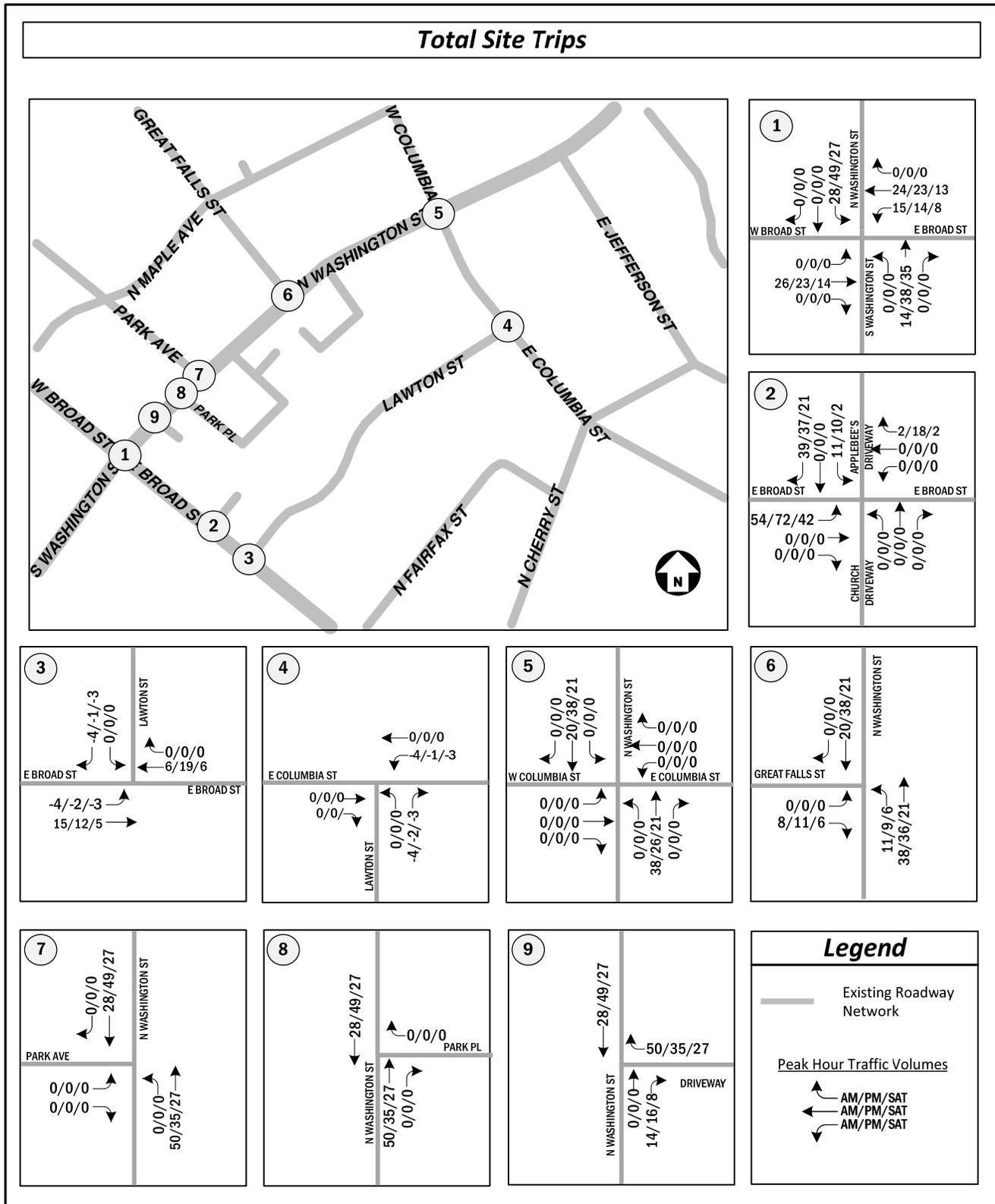


Figure 10: Site Generated Trips

FUTURE CONDITIONS WITH DEVELOPMENT (2020)

Future with Development Traffic Volumes

The proposed site generated development traffic volumes were added to the future without development traffic volumes to forecast the 2020 future with development conditions. The traffic volumes for the future with development traffic conditions are shown in Figure 11.

Future with Development Capacity Analysis

Intersection capacity analyses were performed for the future conditions with the proposed development at the intersections contained within the study area during the weekday morning and afternoon peak hours, as well as the Saturday peak hour. *Synchro 9.0* was used to analyze the study intersections with results based on the Highway Capacity Manual (HCM 2010) methodology. The default peak hour factor of 0.92 has been used in the analysis. Heavy vehicle percentages, lane widths, road grades, and number of bus blockages per hour were kept the same as the existing conditions. The capacity and queuing analysis results are presented in Table 6 and shown in Figure 12. The detailed analysis worksheets are contained in Appendix G.

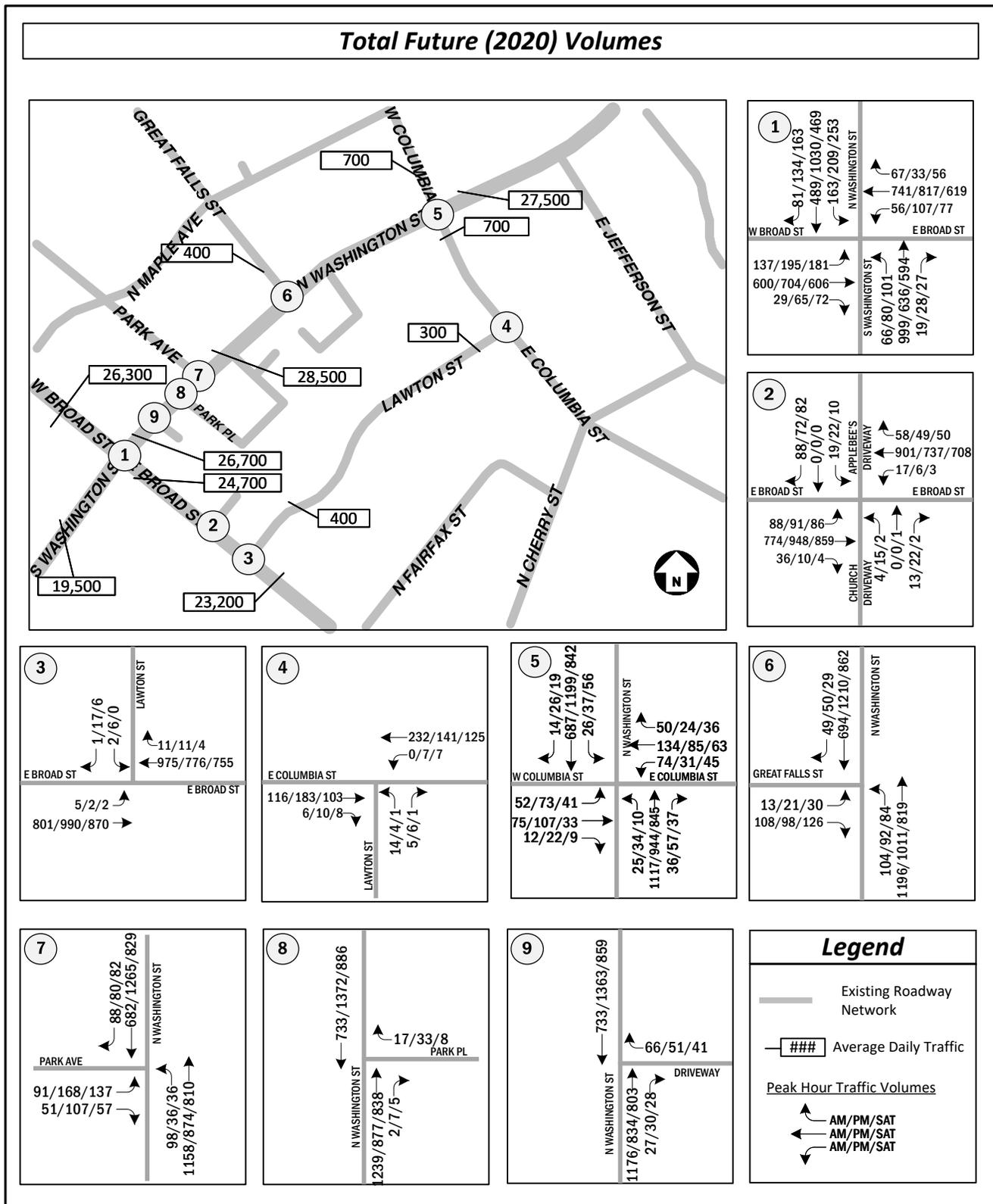


Figure 11: Future with Development (2020) Traffic Volumes

Table 6: Future with Development (2020) Intersection Capacity Analysis

No.	Intersection (Movement)	Bay/ Link Length (feet)	AM Peak				PM Peak				SAT Peak			
			50 th Queue	95 th Queue	LOS	Delay	50 th Queue	95 th Queue	LOS	Delay	50 th Queue	95 th Queue	LOS	Delay
1	E./W. Broad St & N./S. Washington St													
	Overall Intersection (Signalized)													
	<i>Eastbound Approach</i>													
		275	70	m#132	C	23.4	61	#207	C	30.7	80	160	C	22.1
		450	201	182	B	14.6	205	220	B	19.7	271	430	C	27.6
	<i>Westbound Approach</i>													
		255	12	m27	D	37.0			D	46.4			C	29.9
		400	258	304	D	38.1	293	#413	D	49.3	243	390	C	30.6
	<i>Northbound Approach</i>													
		345	18	m47	C	21.4	38	m56	C	27.8	43	96	C	23.0
		580	195	#440	E	56.0	242	299	D	35.3	223	359	C	32.2
	<i>Southbound Approach</i>													
		190	53	139	C	27.5	70	148	C	23.4	120	#243	C	22.0
	370	150	183	B	11.3	198	#534	E	57.7	212	344	C	25.9	
2	E. Broad Street/Driveway													
	Overall Intersection (Unsignalized)													
	<i>Eastbound Approach</i>													
		75	n/a	13	B	11.2	n/a	10	B	10.3	n/a	10	B	10.1
		400	n/a	0	A	0.0	n/a	0	A	0.0	n/a	0	A	0.0
	<i>Westbound Approach</i>													
		165	n/a	3	A	9.8	n/a	0	B	10.5	n/a	0	B	10.0
		165	n/a	0	A	0.0	n/a	0	A	0.0	n/a	0	A	0.0
	<i>Northbound Approach</i>													
		25	n/a	8	D	27.5	n/a		F	57.6	n/a		E	46.6
		25	n/a	8	D	27.5	n/a	38	F	57.6	n/a	4	E	46.6
	<i>Southbound Approach</i>													
		25	n/a	70	E	40.4	n/a	65	E	40.8	n/a	25	C	19.6
	25	n/a	70	E	40.4	n/a	65	E	40.8	n/a	25	C	19.6	
Overall Mitigation: Add a Traffic Signal														
Overall Intersection (Signalized)														
<i>Eastbound Approach</i>														
	75	11	m20	A	0.5	14	m36	A	1.6	8	29	A	4.8	
	400	51	m65	A	0.4	85	165	A	0.7	50	93	A	3.4	
<i>Westbound Approach</i>														
	165	0	m0	A	3.6	0	m1	A	7.0	0	2	A	3.3	
	165	2	4	A	2.2	0	m1	A	4.9	0	2	A	4.4	
<i>Northbound Approach</i>														
	25	0	12	D	41.8	19	23	A	7.1	41	77	A	3.3	
	25	0	12	D	41.8	4	32	C	33.4	1	7	B	19.7	
<i>Southbound Approach</i>														
	25	12	63	D	47.3	13	57	C	34.6	2	33	C	22.4	
	25	12	63	D	47.3	13	57	C	34.6	2	33	C	22.4	
3	Broad Street and Lawton Street													
	Overall Intersection (Unsignalized)													
	<i>Eastbound Approach</i>													
		165	n/a	0	B	10.6	n/a	0	A	9.5	n/a	0	A	9.5
	<i>Westbound Approach</i>													
		1130	n/a	0	A	0.0	n/a	0	A	0.0	n/a	0	A	0.0
		1400	n/a	3	D	30.0	n/a	8	C	19.7	n/a	0	B	11.2
	1400	n/a	3	D	30.0	n/a	8	C	19.7	n/a	0	B	11.2	
4	Lawton Street & Columbia Street													
	Overall Intersection (Unsignalized)													
	<i>Eastbound Approach</i>													
		485	n/a	0	A	0.0	n/a	0	A	0.0	n/a	0	A	0.0
	<i>Westbound Approach</i>													
		440	n/a	0	A	0.0	n/a	0	A	7.7	n/a	0	A	0.0
	1400	n/a	3	B	10.5	n/a	0	B	10.0	n/a	0	A	9.4	
	1400	n/a	3	B	10.5	n/a	0	B	10.0	n/a	0	A	9.4	
5	N Washington Street/W Columbia Street/E Columbia Street													
	Overall Intersection (Signalized)													
	<i>Eastbound Approach</i>													
		370	69	123	C	28.0	111	184	C	30.8	29	72	B	15.6
	<i>Westbound Approach</i>													
		485	137	221	C	32.1	70	126	C	28.9	50	112	B	16.6
	<i>Northbound Approach</i>													
		70	3	m7	C	23.3			C	21.3			C	24.5
		640	139	281	B	12.7	6	m13	B	16.5	3	11	B	18.1
		475	159	208	C	23.5	299	350	C	21.5	233	313	C	24.6
	475	159	208	B	17.4			C	25.3			C	21.9	
	125	7	18	B	15.4	10	24	B	14.2	16	34	B	18.3	
	475	159	208	B	17.5	374	471	C	25.7	169	290	C	22.2	
6	N Washington Street/Great Falls Street													
	Overall Intersection (Unsignalized)													
	<i>Eastbound Approach</i>													
		440	n/a	53	D	26.5	n/a	178	F	160.7	n/a	90	E	37.0
	<i>Northbound Approach</i>													
	425	n/a	10	A	2.5	n/a	18	A	2.5	n/a	10	A	1.9	
	425	n/a	10	A	10.0	n/a	18	B	13.5	n/a	10	B	10.6	
7	N Washington Street/Park Avenue													
	Overall Intersection (Signalized)													
	<i>Eastbound Approach</i>													
		360	61	108	D	50.3	105	169	D	47.7	38	91	B	15.5
		360	0	34	D	46.7	0	45	D	44.1	0	25	B	13.9
	<i>Northbound Approach</i>													
		370	137	m118	A	0.3			A	0.5			A	1.9
		370	137	m118	A	0.6	73	m117	A	1.0	57	110	A	4.2
	<i>Southbound Approach</i>													
		425	44	98	A	2.1	34	42	A	5.8	110	186	A	4.2
	425	44	98	A	2.1	34	42	A	5.8	110	186	A	4.2	

No.	Intersection (Movement)	Bay/ Link Length (feet)	AM Peak				PM Peak				SAT Peak			
			50 th Queue	95 th Queue	LOS	Delay	50 th Queue	95 th Queue	LOS	Delay	50 th Queue	95 th Queue	LOS	Delay
8	N Washington Street & Park Place													
	Overall Intersection (Unsignalized)			n/a	n/a			n/a	n/a			n/a	n/a	
	Westbound Approach			B	14.8			B	12.4			B	11.5	
	Westbound Right	315	n/a	3	B	14.8	n/a	5	B	12.4	n/a	0	B	11.5
9	N Washington Street & Driveway													
	Overall Intersection (Unsignalized)			n/a	n/a			n/a	n/a			n/a	n/a	
	Westbound Approach			C	15.2			B	12.2			B	12.2	
	Westbound Right	105	n/a	15	C	15.2	n/a	8	B	12.2	n/a	8	B	12.2

Notes: N/A – Not Applicable
 # – 95th percentile volume exceeds capacity, queue may be longer. Queue shown is the maximum after two cycles.
 m – Volume for 95th percentile queue is metered by upstream signal.
 ~ – Volume exceeds capacity, queue can be longer. Queue shown is maximum after two cycles.

As mentioned previously, it is desirable to achieve a LOS D or better per approach. Similar to the existing and future without development conditions, most of the study intersections’ approaches will continue to operate at acceptable levels of service during the weekday morning, afternoon, and Saturday peak hours. The eastbound approach of Great Falls Street with N. Washington Street will continue to operate at LOS F conditions during the PM peak hours and will operate at LOS E during the Saturday peak hours. The southbound thru/right movement at the Broad Street and Washington Street intersection would continue to operate at LOS E conditions during the PM peak hours. The northbound thru/right movement at the Broad Street and Washington Street intersection now operates at LOS E conditions during the AM peak hours. However as compared to the future without development conditions, the increase in delay at the northbound thru/right movement is minimal (1.8 seconds/vehicle). The side-street approaches at the site driveway on E. Broad Street will operate at LOS E and F conditions during the AM, PM and Saturday peak hours.

Based on the queuing analysis, peak hour queue lengths will continue to exceed the storage length in one or more of the lane groups at the following intersections during one or more of the peak periods:

- Broad Street and Washington Street (PM and Saturday)
- E. Broad Street and Site Driveway (AM, PM and Saturday)

As part of mitigations, installation of a traffic control signal is proposed at the intersection of the site driveway along E. Broad Street. With the addition of a traffic signal at the site driveway and E. Broad Street, the side streets of the intersection operate at acceptable levels of service.

In summary, some approach delays at signalized intersections, and some stop-controlled side-street delays, will occur within the study area with or without the proposed Broad & Washington redevelopment. These conditions are consistent with an urban street network, particularly one with existing development that frames the streets and constrains the right-of-way. Traffic moving through the street grid “pulses” between closely spaces traffic signals, providing mobility for non-motorized travel as well as transit and private automobile traffic.

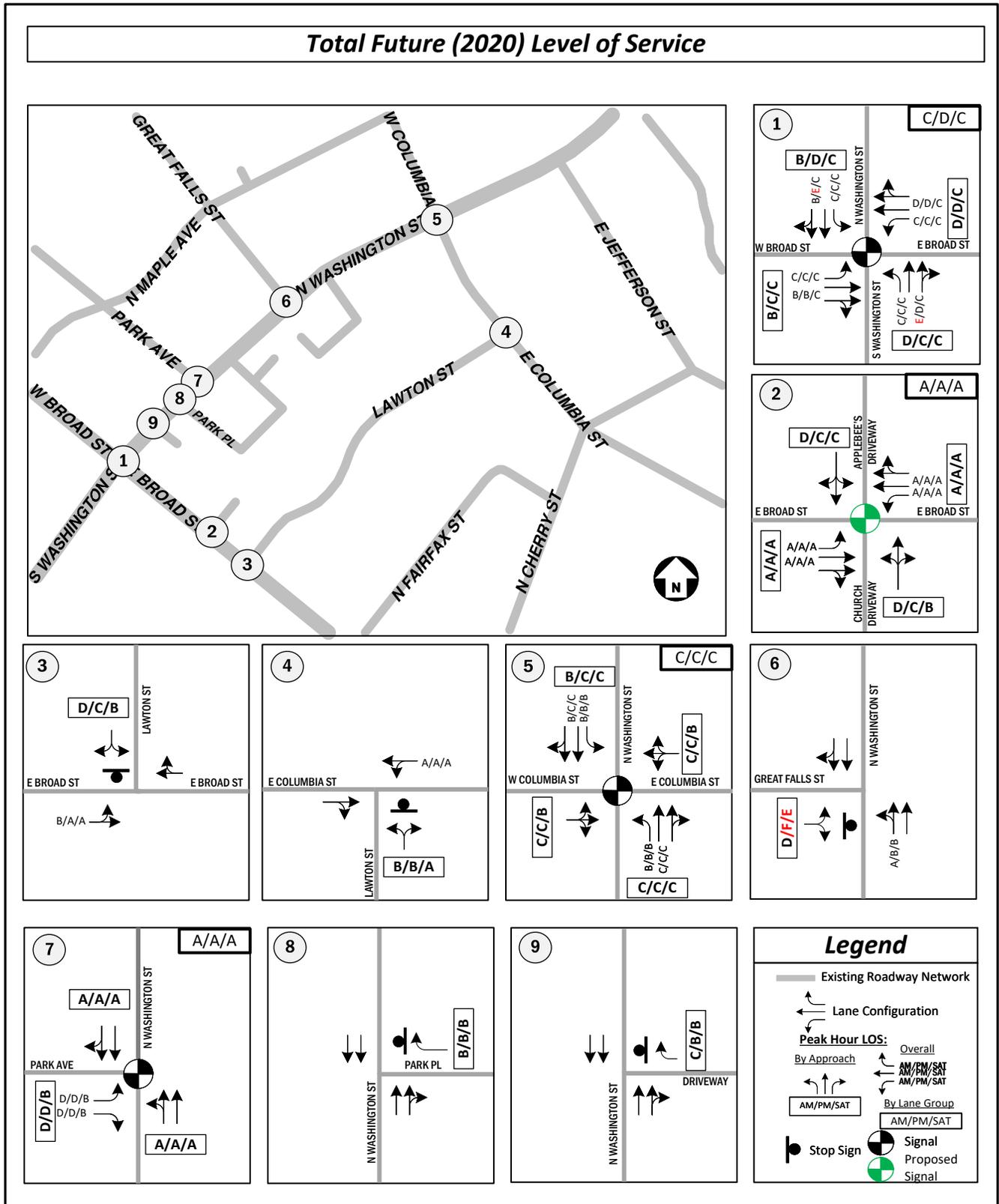


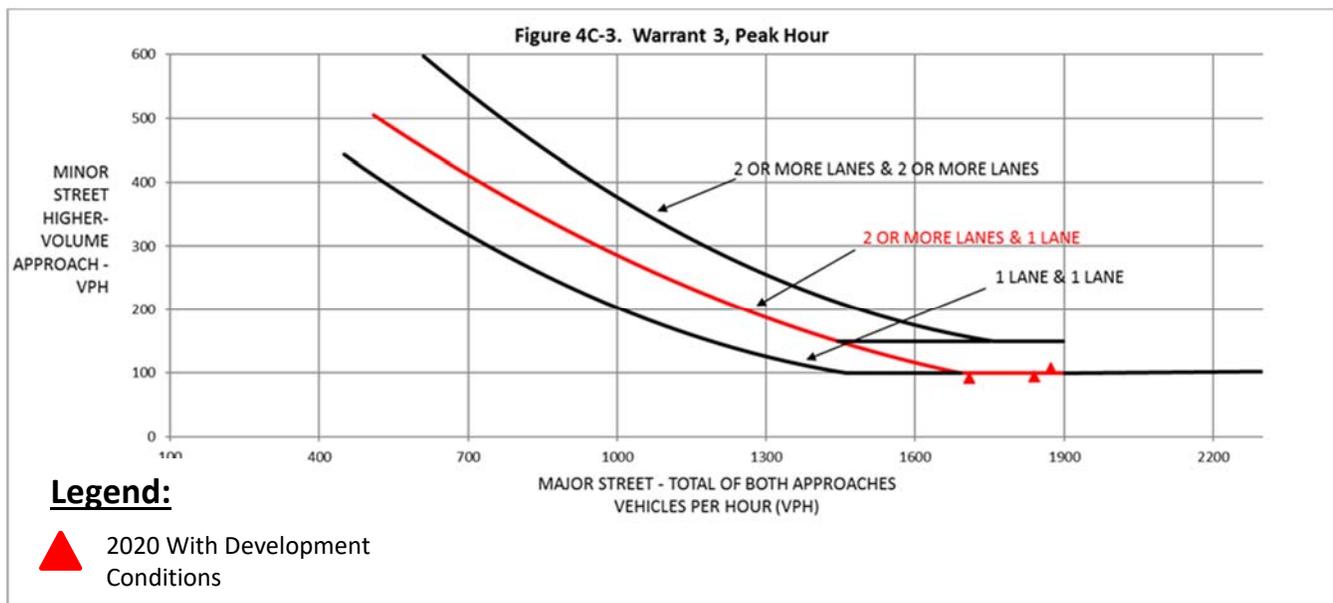
Figure 12: Future with Development (2020) Level of Service

PEAK HOUR SIGNAL WARRANT ANALYSIS

A peak hour signal warrant analysis was conducted for the site driveway along E. Broad Street. Table 7 shows the volumes used in Figure 13 which utilizes the Warrant 3 graph provided in the MUTCD. The traffic volumes assume a full-movement intersection consistent with the configuration analyzed with a signal. As indicated in Figure 13, the peak hour warrant is met during the AM peak hour.

Table 7: Volumes used for Peak Hour Warrant Analysis

Condition		Major Street - Total of Both Approaches (VPH)	Minor Street – Site Driveway (VPH)
1	2020 AM Peak	1,874	107
2	2020 PM Peak	1,841	94
3	2020 SAT Peak	1,710	92



*Note: 150 vph applies as the lower threshold volume for a minor –street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 13: Warrant 3, Peak Hour Signal Warrant Analysis Results

It should be noted that the signal warrant analysis presented in this section analyzes only the Peak Hour warrant. Additional warrant analysis computations would have to be conducted prior to the installation of the traffic signal. This additional analysis may or may not warrant the need of a traffic signal at the intersection of the site driveway along E. Broad Street.

TRANSPORTATION DEMAND MANAGEMENT

The proposed Broad & Washington development is located approximately $\frac{3}{4}$ mile away from the East Falls Church Metrorail Station as the crow flies. The walking distance from the Metro station to the subject site is approximately 1.0 miles along the Washington & Old Dominion Trail and N. Washington Street. The Broad & Washington site is also situated at the crossroads of major roadways and is served by four existing local bus routes, all of which stop within 400 feet of the site.

Transportation Demand Management (TDM) measures have many components that are specifically tailored to promote travel modes that have the least impact on the transportation network and other resources, such as the environment, and discourage those that have the greatest impact. Management measures taken by the Broad & Washington development can be monitored and adjusted as needed to continually create opportunities to reduce the amount of traffic generated by the site. The TDM measures proposed for the redevelopment of the site may consist of the following strategies:

- Parking Management Plan

The proposed plan will provide parking for residents, office workers, and retail patrons and employees. The parking management plan will consist of the following strategies:

- Provide effective directional signage to direct residents and visitors to the appropriate locations in the parking garage; and
- Residential parking spaces will not be bundled with units and leases. Unbundling parking from units and leases reduces parking demand because individuals are less likely to pay for and use parking when they know the cost and there are alternative travel options;

- Appoint Transportation Management Plan Coordinator

Designate a member(s) of building management or leasing office to serve in the unofficial position of the Transportation Management Plan Coordinator. The TMP Coordinator would have duties such as the following:

- Distribute literature and promotional materials concerning regional transit services five times per year to the tenants and residents at the site. Display information regarding transit routes, schedules, fares, etc. in common areas;
- Encourage participation in the region-wide Air Quality Action Days via providing Air Quality Code Red Day alert notifications on both the property management website or other communications systems;
- Provide links on the property management's website to sites such as <http://www.commuterconnections.org>, which will serve as the platform in which the residents can interact for the purpose of setting up carpools. The property management's website may also act as a central carpooling organizer for residents in the building, where residents can login to post destination inquiries and carpool requests. Links to websites for the local transit opportunities, such as Metro (<http://www.wmata.com>) will also be provided; and
- Conduct annual transportation surveys and adjust the TDM plan accordingly.

- Marketing/Promotion

- Install real-time transit information displays in the lobby, or provide information for mobile device users, to promote transit ridership;
- Conduct a targeted marketing program for residential leases that encourages and attracts transit-oriented residents, such as bicyclists, one- or no-car individuals/families and employees of nearby worksites to live in the residential units; provided, however, that such marketing shall be completed on a non-discriminatory basis in conformance with the Fair Housing Act and all other applicable laws and regulations;

- Bicycle Accommodations

The following considerations should be made to encourage more bicycling amongst the building’s residents and to enhance the bicycling conditions in the area surrounding the site:

- Provide ample secure bicycle parking/storage facilities on-site in the parking garage (112 secure spaces are proposed on parking level P3); and
- Install bicycle racks along the sidewalk adjacent to the site’s property frontage along E. Broad Street (18 spaces are proposed to be distributed along E. Broad Street, with another 8 spaces at bus shelters).

- Pedestrian/Transit Considerations

The following considerations for improved access to transit are to enhance safety and convenience for transit users:

- Construct a bus stop with appropriate signage, shelter, and landing pad amenities, such as bus schedule, in the location of the existing bus stop situated in the along E. Broad Street at N. Washington Street;
- Relocated the bus stop from northbound S. Washington Street to the N. Washington Street site frontage and construct appropriate signage, shelter, and landing pad amenities, such as bus schedule;
- Upgrade the pedestrian indications at the N. Washington Street/Park Avenue intersection to countdown signal heads as part of the incorporation of the Park Place approach;
- Provide *SmarTrip* cards with \$50 on each card to each resident at initial occupancy only in order to promote and make residents more accustomed to using transit. Inform the residents that the cards can be refilled online at <http://www.wmata.com>; and
- Explore a coordinated approach to transit opportunities with other projects/developments/apartment buildings located in the vicinity of the site to potentially create a bus service providing direct access between each participating building and the East Falls Church Metrorail station.

- Trip Reduction Goals

The following trip reduction goals, relative to the standard ITE trip generation estimates for each use, will be formalized as part of the final TDM Program:

Use	Residential	Office	Retail
Trip Reduction Goal	20%	10%	5%

CONCLUSIONS

This report presents the findings of a traffic impact analysis for the proposed Broad & Washington redevelopment located in the City of Falls Church. The site is bounded by E. Broad Street to the south, N. Washington Street to the west, Lawton Street to the east and Park Place to the north. The development, which is planned to consist of a multi-use building containing retail, restaurant, office, and residential space, is anticipated to be complete in 2020.

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

Existing Conditions (2015)

Weekday traffic counts were conducted at the study intersections during the AM and PM peak periods on Tuesday, February 3, 2015 and Saturday peak period traffic counts were conducted on January 31, 2015. The existing volumes were balanced across proximate intersections to reflect a consistent baseline for the volume projections within this report.

Intersection capacity analyses were performed for the existing conditions at the study area intersections during the weekday morning and afternoon peak hours, as well as the Saturday peak hour. *Synchro, version 9.0* was used to analyze the study intersections with results based on the Highway Capacity Manual (HCM 2010) methodology. For the purpose of this analysis, it is desirable to achieve a LOS D or better for each approach of an intersection. Most of the study intersections' approaches currently operate at acceptable levels of service and most queue lengths can be accommodated during the weekday morning, afternoon, and Saturday peak hours, with the following exceptions:

- N. Washington Street/Great Falls Street (LOS)
- Broad Street and Washington Street (queues)
- N. Washington Street and Park Avenue (queues)

Future Conditions without Development (2020)

Traffic volumes were projected for the year 2020 without the proposed Broad & Washington redevelopment. The traffic associated with the 301 W. Broad Street project was added to the existing traffic volumes obtain the future conditions without development.

Most of the study intersections' approaches will continue to operate at acceptable levels of service with manageable queues during the weekday morning, afternoon, and Saturday peak hours, with the following exceptions:

- N. Washington Street/Great Falls Street (LOS)
- Broad Street and Washington Street (LOS and queues)
- E. Broad Street and Site Driveway (LOS)

Future Conditions with Development (2020)

The proposed mixed-use redevelopment will generate approximately 169 new external trips during the weekday morning peak hour, 186 new external trips during the weekday afternoon peak hour, 101 new external trips during the Saturday peak hour, and 1,940 new external weekday daily trips, accounting for existing or potential trips associated with the existing buildings. Access to the proposed development will be provided via a full-movement driveway on E. Broad Street and a right-in/right-out access on N. Washington Street. Future conditions with the development were derived from the future without development scenario and the site generated trips.

As under the existing and future without development conditions, most of the study intersections' approaches will continue to operate at acceptable levels of service with manageable queues during the weekday morning, afternoon, and Saturday peak hours, with the following exceptions:

- N. Washington Street/Great Falls Street (LOS)
- Broad Street and Washington Street (LOS and queues)
- E. Broad Street and Site Driveway (LOS and queues)

The northbound through/right turn movement at the intersection of Broad Street and Washington Street experiences a change in the levels of service under the future with development conditions. However, the increase in delay as compared to the future without development conditions is minimal (1.8 seconds/vehicle). Signalization of the Site Entrance on E. Broad Street is proposed as part of mitigations. With the addition of a traffic signal at the site driveway and E. Broad Street intersection, the side streets of the intersection operate at acceptable levels of service.

In summary, traffic operations within the study area will be similar with or without the proposed Broad & Washington redevelopment.

TECHNICAL APPENDIX

TECHNICAL APPENDIX TABLE OF CONTENTS

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Appendix F: Traffic Volumes for Each Use and Pass-by Trips

Appendix G: Intersection Capacity Analysis - Future with Development Condition (2020)

APPENDIX A

SCOPING DOCUMENT

APPENDIX B

EXISTING (2015) TRAFFIC VOLUMES & COUNT SHEETS

APPENDIX C

LEVEL OF SERVICE DEFINITIONS

APPENDIX C: LEVEL OF SERVICE DEFINITIONS

All capacity analyses are based on the procedures specified by the Transportation Research Board, Special Report 209: *Highway Capacity Manual (HCM)*, 2010. Levels of service (LOS) range from A to F. A brief description of each level of service for signalized and unsignalized intersections is provided below.

Signalized Intersections: Level of service is based upon the traffic volume present in each lane on the roadway, the capacity of each lane at the intersection and the delay associated with each directional movement. The levels of service for signalized intersections are defined below:

- Level of Service A describes operations with very low average delay per vehicle, i.e., less than 10.0 seconds. This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop. Short signal cycle lengths may also contribute to low delay.
- Level of Service B describes operations with average delay in the range of 10.1 to 20.0 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.
- Level of Service C describes operations with delay in the range of 20.1 to 35.0 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level although many still pass through the intersection without stopping. This is generally considered the lower end of the range of the acceptable level of service in rural areas.
- Level of Service D describes operations with delay in the range of 35.1 to 55.0 seconds per vehicle. At LOS D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, and/or high traffic volumes as compared to the roadway capacity. Many vehicles are required to stop and the number of vehicles that do not have to stop declines. Individual signal cycle failures, where all waiting vehicles do not clear the intersection during a single green time, are noticeable. This is generally considered the lower end of the range of the acceptable level of service in urban areas.
- Level of Service E describes operations with delay in the range of 55.1 to 80.0 seconds per vehicle. These higher delay values generally indicate poor progression, long cycle lengths, and high traffic volumes. Individual cycle failures are frequent occurrences. LOS E has been set as the limit of acceptable conditions.
- Level of Service F describes operations with average delay in excess of 80.0 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with over-saturation, i.e., when traffic arrives at a flow rate that exceeds the capacity of the intersection. It may also occur at high volumes with many individual cycle failures. Poor progression and long cycle lengths may also contribute to such delays.

Unsignalized Intersections: At an unsignalized intersection, the major street through traffic and right-turns are assumed to operate unimpeded and therefore receive no level of service rating. The level of service for the minor street and the major street left-turn traffic is dependent on the volume and capacity of the available lanes, and, the number and frequency of acceptable gaps in the major street traffic to make a conflicting turn. The level of service grade is provided for each conflicting movement at an unsignalized intersection and is based on the total average delay experienced by each vehicle. The delay includes the time it takes a vehicle to move from the back of a queue through the intersection.

The unsignalized intersection level of service analysis does not account for variations in driver behavior or the effects of nearby traffic signals. Therefore, the results from this analysis usually indicate worse levels of service than may be experienced in the field. The unsignalized intersection level of service descriptions are provided below:

- Level of Service A. Describes operations where there is very little to no conflicting traffic for a minor side street movement, i.e., an average total delay of less than 10.0 seconds per vehicle.
 - Level of Service B. Describes operations with average total delay in the range of 10.1 to 15.0 seconds per vehicle.
 - Level of Service C. Describes operations with average total delay in the range of 15.1 to 25.0 second per vehicle.
 - Level of Service D. Describes operations with average total delay in the range of 25.1 to 35.0 seconds per vehicle.
 - Level of Service E. Describes operations with average total delay in the range of 35.1 to 50.0 seconds per vehicle.
 - Level of Service F. Describes operations with average total delay of 50 seconds per vehicle. LOS F exists when there are insufficient gaps of suitable size to allow a side street demand to cross safely through or enter a major street traffic stream. This level of service is generally evident from extremely long total delays experienced by side street traffic and by queuing on the minor approaches. It is important to note that LOS F may not always result in long queues but may result in adjustments to normal driver behavior.
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APPENDIX D

INTERSECTION CAPACITY ANALYSIS – EXISTING CONDITIONS (2015)

APPENDIX E

INTERSECTION CAPACITY ANALYSIS –

FUTURE WITHOUT DEVELOPMENT CONDITION (2020)

APPENDIX F

TRAFFIC VOLUMES FOR EACH USE AND PASS-BY TRIPS

APPENDIX G

INTERSECTION CAPACITY ANALYSIS –

FUTURE WITH DEVELOPMENT CONDITION (2020)