



# SABRA, WANG & ASSOCIATES, INC.

## MEMORANDUM

**From:** Erin Brinton, P.E.  
Sabra, Wang & Associates, Inc.

**To:** Ms. Kirsten Munz, P.E., AICP  
Civil Engineer  
City of Falls Church

**Subject:** **Review of Broad & West Traffic Impact Study  
Published January 22, 2014**

**Date:** **March 18, 2014**

The purpose of this memorandum is to provide comments on the subject report including existing conditions, future conditions, and proposed mitigation. The comments herein focus on the technical content and accuracy of the report, including adherence to ITE methodology and recommended guidelines, validity of assumptions, and quality and consistency of data.

The site is proposed as a mix of uses including 24,487 square feet of retail uses, a 14,882 square-foot pharmacy with drive-through, a 150-room hotel, 298 multifamily residential dwelling units, and 2 single-family detached homes. Overall, the study did follow the required analysis set forth by the City for Traffic Impact Analysis.

### **1. Does the study area include all likely affected intersections?**

The study evaluated 11 intersections as follows:

- West Broad Street/West Street (signalized)
- North West Street/Grove Avenue (minor-street stop control)
- North West Street/Park Avenue (minor-street stop control)
- West Broad Street/Spring Street (signalized)
- Park Avenue/North Spring Street (four-way stop control)
- North West Street/Lincoln Avenue (signalized)
- Grove Avenue/W&OD Trail (stop control on trail)
- North West Street/W&OD Trail (stop control on trail)
- West Broad Street/Birch Street (signalized)
- West Broad Street/Oak Street (minor streets stop control)
- Park Avenue/North Oak Street (four-way stop control)
- All proposed site entrances

Proposed access to the site will be as follows:

- Maintain an existing right-in/right-out/left-in access point at the western access to the site on West Broad Street; (Proposed as right-in/right-out only)
- Provide a full-movement, signalized access point at the eastern access to the site on West Broad Street;
- Reconfigure the intersection of North West Street and Park Avenue to accommodate a fourth leg accessing the site at a four-way stop; and

- Provide a right-in/right-out/left-in access point along North West Street between West Broad Street and Park Avenue. (Proposed as right-in/right-out only)

Based on the proposed site access points, and existing traffic patterns, all critical intersections are included.

**2. *Is the existing roadway network accurately documented?***

All of the intersections are accurately documented, including traffic control and lane configuration, except for the following:

- Intersection #4: South Spring Street is open to two-way traffic south of West Broad Street. (Figure 2-1)
- Intersection #5: Southbound North Spring Street should not have a through lane at Park Avenue. (Figure 2-1)
- West Street consists of three lanes in the vicinity of the site, not two. (TIS page 7)

These errors do not affect the traffic analysis.

**3. *Is the traffic count data valid?***

Peak hour traffic data contained in the report was primarily obtained during September 2013 during the AM and PM peak hours. Two intersections (Oak Street at West Broad Street and at Park Avenue) used the baseline counts in the *706 West Broad Street Traffic Impact Study*, as agreed upon in the scoping document.

Examining the existing traffic counts used in the Synchro analysis shows that there is a volume imbalance on West Broad Street. It is recommended to balance the AM eastbound and westbound volumes by increasing the through volumes at Spring Street and at West Street. Additional balancing is also recommended on West Broad Street in the PM peak period.

**4. *Is growth in existing traffic volumes accounted for, and if so is the growth rate reasonable?***

A 1% annual growth rate was applied to the existing (2013) traffic volumes through the build-out year, 2019. This growth rate is based on conversations with City staff and historical data that indicate a growth rate of approximately 1.16% on West Broad Street near West Street. The growth rate is reasonable.

However, the applied growth rate was 0.5% over 6 years for volumes found in Figure 5-1: Regional Traffic Growth. It is recommended that these volumes be corrected, as well as the background future traffic volumes and the total future traffic volumes, which are also affected by this miscalculation.

**5. *Are other future developments accounted for and documented? Are the trip generation and distributions for background developments documented?***

Two background developments were included in the analysis:

- a) 706 West Broad Street/707 Park Avenue development with 5,439 square feet of medical office and a 110-room hotel located in the block between West Broad Street, North Oak Street, Park Avenue, and North Lee Street.
- b) 301 West Broad Street development with 294 residential units, a 60,883-square foot supermarket, and 4,011 square feet of specialty retail space located on the south side of West Broad Street at Little Falls Street.

The land use shown on page 21 for the 301 West Broad Street development is not correct and differs from that shown in Table 5-1.

The trip distribution and assignment were based on the above two approved traffic impact studies. For 706 West Broad Street approximately 35% of the traffic is to/from the west along West Broad Street, 8% is from south on West Street, 4% is to/from the north on North West Street, 2% is to/from the south on Oak Street, and approximately 51% is to/from the east.

For 301 West Broad Street, 25-20% is to/from west on Broad Street, 20% is to/from east on Broad Street, 15-20% is to/from the south on Maple Avenue, 15-20% is to/from the south on Annandale Road, 10-15% is to/from the north on Washington Street, 5% is to/from the north on Maple Avenue, and 5% is to/from the north on Little Falls Street.

706 West Broad Street projected 74 AM and 84 PM net new peak hour vehicle trips. 301 West Broad Street projected 238 AM and 493 PM net new peak hour vehicle trips. The total net new trips added are 312 AM and 577 PM trips.

The calculations for background trip distribution and total traffic volumes were checked and found to be accurate along West Broad Street

**6. Is the horizon study year reasonable?**

A 6-year build-out (2019) was assumed in the report, which is appropriate considering the site excavation work necessary for a development of this size.

**7. Are the proposed trip generation rates explained and documented? Are the ITE land use categories appropriate? Are any trip discounts applicable (i.e. transit, pedestrian, internal capture and by-pass)?**

ITE trip generation rates for land use codes Single-Family Detached (210), Apartments (220), Pharmacy with Drive-Through (881), Specialty Retail Center (826), and Hotel (310) were selected and calculated based on the 9<sup>th</sup> Edition ITE *Trip Generation Handbook*. The values that are calculated in Table 6-1 of the TIS vary from those reported in the scope, the development statement in Appendix A, and the first page of the TIS, as shown in the following table. While some of these changes may seem minor, they can greatly influence the trip generation volume estimates.

**Table 1 – Summary of Land Use Program for the Broad and West Development**

Land Use	Scope (2A)	Scope (2B)	Development Statement 11/7/13	TIS Page 1	TIS Table 6-1
SF Specialty Retail	11,516+12,468=23,984	11,516+14,904=26,420	39,369-pharmacy = 24,487	24,487	14,863+9,624=24,487
SF Pharmacy with Drive Thru	14,800	14,800	Incl. 14,882	14,882	14,882
Hotel Rooms	149 (occupied rooms)	--	150	150	149 (occupied rooms)
Apartments	274	274	297	298	298
Single-Family Detached	2	2	2	2	2
Drive-in Bank	3,000	3,000	--	--	--
General Office	--	40,044	--	--	--

Pass-by trips were set at 25% for retail uses as per the scoping meeting and due to the limited availability per the ITE. A trip discount for non-auto site access of 5% was applied to the residential generated trips per the scoping meeting. An additional discount of 5% for the AM and 10% for the PM was applied for internally captured trips between retail and residential land uses. In Table 6-1, these discounts were incorrectly calculated, which causes a slight increase in the actual number of generated trips, as shown in the following table.

**Table 1 – Summary of Trip Generation for the Broad and West Development**

Total Proposed Trips in TIS:	131	200	331	229	182	411
Recalculated Total Trips:	138	208	346	233	196	429
Difference	7	8	15	4	14	18

To determine an average rate for Specialty Retail, a ratio was taken comparing the AM and PM adjacent street rates with the PM peak hour of generator rate. If the AM peak hour of generator were used instead, the AM peak hour trips would increase. Using “occupied rooms” instead of “rooms” for the trip generation of the hotel yields slightly higher volumes.

Credits for the existing site uses were also applied based on existing driveway counts. It is recommended for improved clarity that the study provide a Figure with the existing peak hour driveway counts (separate from Figure 6-1 site trips removed) and a list of land uses being eliminated. Overall, the site is projected to generate 115 AM and 291 PM net new peak hour vehicular trips.

**8. Does the trip distribution seem reasonable?**

Assumed trip distribution is summarized below in **Table 1**.

**Table 2 – Summary of Trip Distribution for the Broad and West Development**

Land Use	Distribution
Mixed Use	<ul style="list-style-type: none"> <li>● 35% to and from west on West Broad Street</li> <li>● 35% to and from east on West Broad Street</li> <li>● 10% to and from the north on North West Street</li> <li>● 8% to and from the south on South West Street</li> <li>● 10% to and from the east on Park Avenue</li> <li>● 2% to and from the west on Grove Avenue</li> </ul>

The overall trip distributions reflect the assumptions at the scoping meeting and appear to be appropriate.

**9. Are there any other proposed capacity-enhancing transportation improvements in the study area by others?**

The report does not note any background improvements to the study area roadways, nor are there any improvements that should have been included.

**10. Is the capacity analysis methodology correct? Are the calculations correct?**

Existing, background, and total future levels of service were calculated in the report at each intersection in the study area, using Highway Capacity Manual methodology in Synchro 7.0 software. The report found under existing conditions that movements at the following five intersections fail based on HCM analysis:

1. Signalized intersection of West Broad Street at West Street various movement during AM and PM peak and overall intersection during PM peak
2. North West Street at Grove Street eastbound approach during PM peak
3. West Broad Street at North Spring Street northbound approach during PM peak
4. West Broad Street at Birch Street southbound approach during the PM peak
5. West Broad Street at North Oak Street northbound and southbound approaches during the AM and PM peaks

The existing year 2013 capacity analysis was independently checked using Synchro, version 8 and the results shown are acceptable.

**Table 3. W Broad St and West St Development Existing Conditions HCM Capacity Analysis**

Intersection	Level of Service		Volume-to-Capacity		Delay	
	AM	PM	AM	PM	AM	PM
West Broad Street at West Street <sup>1</sup>	D	E	0.96	1.08	49.6	67.4
North West Street at Grove Street <sup>*2</sup>	C	E	0.28	0.57	19.1	43.9
North West Street at Park Avenue <sup>**</sup>	C	D	0.45	0.58	23.9	28.0
West Broad Street at North Spring Street	A	A	0.53	0.53	4.6	4.5
Park Avenue at North Spring Street <sup>**</sup>	A	A	N/A	N/A	8.7	8.3
North West Street at Lincoln Avenue	A	B	0.24	0.41	7.5	13.0
West Broad Street at Birch Street	A	A	0.60	0.62	7.8	9.4
West Broad Street at North Oak Street <sup>*3</sup>	F	F	0.79	0.41	134.1	53.1
Park Avenue at North Oak Street <sup>**</sup>	B	A	N/A	N/A	10.1	9.9

\* - Stop controlled intersection, level of service, v/c ratio and delay are for stop controlled movements only

\*\* - All-way stop

<sup>1</sup> – EB left and NB thru/right movements fail in AM; NB approaches are LOS E in AM; EB left, SB thru, and SB approach fail in the PM; EB thru, EB approach, and NB thru are LOS E in the PM

<sup>2</sup> – EB approach is LOS E in the PM

<sup>3</sup> – NB approach fails in the AM & PM; SB approach is LOS E in PM

A future year 2019 capacity analysis was re-run including:

- 1) Growth in existing traffic volumes
- 2) Site traffic volumes for the 706 West Broad Street & 301 West Broad Street development
- 3) Site traffic volumes for the West Broad Street and West Street development
- 4) Fourth leg and all-way stop control at intersection of West Street and Park Avenue
- 5) Proposed traffic signal at West Broad Street and Eastern Site Entrance

Background and Total Future analyses should use a peak hour factor of 0.92. Each analysis file had PHFs lower than 0.92 at one or more intersections. All background and future files should be corrected.

The future year 2019 capacity analysis was independently checked using Synchro, version 8 and the results shown are acceptable. The results indicate that the levels of service in the TIS report are in line with those of the independent analysis. This analysis was performed with the West Street and western West Broad Street site access points configured as right-in/right-out only. The volumes were also balanced along West Broad Street.

**Table 4. W Broad St and West St Development Year 2019 Future Conditions Capacity Analysis**

Intersection	Level of Service		Volume-to-Capacity		Delay	
	AM	PM	AM	PM	AM	PM
West Broad Street at West Street <sup>1</sup>	D	F	1.02	1.12	54.1	83.6
North West Street at Grove Street <sup>2</sup>	C	E	0.24	0.61	17.6	48.7
North West Street at Park Avenue <sup>**3</sup>	C	D	N/A	N/A	18.8	30.0
West Broad Street at North Spring Street	A	A	0.57	0.59	4.5	3.3
Park Avenue at North Spring Street <sup>**</sup>	A	A	N/A	N/A	8.6	8.3
North West Street at Lincoln Avenue	A	C	0.24	0.47	6.9	25.7
West Broad Street at Birch Street	A	B	0.59	0.66	7.3	10.7
West Broad Street at North Oak Street <sup>4</sup>	F	F	1.03	0.90	228.3	205.0
Park Avenue at North Oak Street <sup>**</sup>	A	A	N/A	N/A	9.9	9.8
West Street at Site Entrance <sup>*</sup>	B	B	0.01	0.01	11.2	10.5
West Broad Street at Western Site Entrance <sup>*</sup>	B	B	0.04	0.07	11.6	11.3
West Broad Street at Eastern Site Entrance <sup>5</sup>	A	A	0.51	0.64	4.6	7.0

\* - Stop controlled intersection, level of service, v/c ratio and delay are for stop controlled movements only & highest value is reported

\*\* - All-way stop, v/c ratio not available

<sup>1</sup> - EB left and NB thru/right movements fail in AM; EB & NB approaches are LOS E in AM; EB left, EB thru, EB approach, SB thru, and SB approach fail in the PM; NB thru and NB approach are LOS E in the PM

<sup>2</sup> - EB approach is LOS E in the PM

<sup>3</sup> - SB approach is LOS E in PM

<sup>4</sup> - NB approach is LOS F in AM; NB & SB approaches are LOS F in AM & PM

<sup>5</sup> - SB approach is LOS E in AM & PM

**11. Do the recommended improvements mitigate the impact and achieve desirable level of service?**

The report encourages the following recommendations to accommodate the subject development:

PROPOSED MITIGATION	ISSUE ADDRESSED	INDEPENDENT ANALYSIS VERIFICATION?	COMMENTS
<p>Provide and enhance the pedestrian facilities within the site's block and ensure connections between the site's internal network and the surrounding ped/bike system, including the W&amp;OD Trail, as envisioned in the Comprehensive Plan.</p> <p>Provide wider sidewalks and an enhanced streetscape along the entire site's roadway frontages. Provide an open park space on the north side of the site adjacent to the intersection of North West Street and Park Avenue. Install crosswalk on Park Avenue at North West Street.</p>	Pedestrian connectivity	n/a	none

Provide bike racks and storage lockers	Encourage bicycling	n/a	none
Install new traffic signal at eastern site access point on West Broad Street	Accommodate site access; reduce side street vehicle delays; improve pedestrian safety for crossing West Broad Street	Future intersection is shown to meet the Peak Hour Warrant	<p>Provide full signal warrant analysis prior to installation of a new traffic signal.</p> <p>The nearest signalized intersections to the east and to the west are approximately 475 feet away, at the intersections of West Broad Street and North Spring Street and West Street, respectively. The spacing of signals at such a distance could be acceptable per the City's Public Facilities Manual, but the applicant must perform a signal timing/ time-space progression analysis.</p>
Provide right-in/right-out/left-in movements at western site access point on West Broad Street. Extend eastbound left turn storage bay to 50 feet by reducing the westbound left turn bay on West Broad Street at West Street.	Accommodate site access	LOS and queues are similar without the left-in movement.	<p>We recommend the site access be right-in/right-out only.</p> <p>If the EB left turn movement remains, extending the turn bay would decrease the WB left turn bay on West Broad Street at West Street. Also, the future available storage in Table 4-2 and Table 7-2 should not match. The applicant should provide a geometric examination of relocating the proposed EB left-turn from West Broad Street to the proposed signalized access point.</p>
Provide right-in/right-out/left-in movements at site access point on West Street north of West Broad Street	Accommodate site access	Site access should be right-in/right-out only unless North West Street is restriped to 1 NB thru lane, 1 SB thru, 1 SB right turn lane, and 1 center, two-way left-turn lane (between Broad St & Grove Ave).	In the scoping document, the access point was proposed as right-in/right-out only. It was analyzed two ways: right-in/right-out and right-in/right-out/left-in.

Add a fourth leg to the North West Street/Park Avenue intersection to accommodate site access and realign intersection. Control by four-way stop.	Accommodate site access; realign intersection; improve safety	The intersection is expected to work at LOS D or better in 2019.	VA MUTCD multi-way stop analysis should be performed prior to installing four-way stop.
Implement Transportation Demand Management (TDM) strategies	Encourage alternative modes of transportation	This section only describes strategies that the applicant should consider and provides few concrete details of the TDM measures guaranteed to be undertaken by the applicant.	<p><i>Provide details for number of carpool/flextime/Zip parking spaces.</i></p> <p><i>Analyze the number of bicycle spaces required.</i></p> <p><i>It is undesirable to provide a private (publicly unavailable) shuttle, but rather that they contribute annual funding (\$5,000 per year) toward operating local transit service and/ or enhancing existing bus stops.</i></p>

The following inadequacies in the report should be addressed by the applicant in addition to the above recommendations.

**A. Report Edits**

- 1. Update Figure 2-1 to depict correct lane geometry**
- 2. Balance existing traffic volumes along Broad Street in the AM and PM peak hour and update existing capacity analysis**
- 3. Correct growth rate calculation**
- 4. Clarify proposed site land uses, finalize site trip forecasts and correct calculations in site trip adjustments**
- 5. Provide a graphic illustrating existing site access peak hour counts and existing site land uses**
- 6. update future year capacity analysis with corrected growth rates, correct peak hour factors, and revised site traffic forecasts**
- 7. Perform multi-way stop analysis for Park/ West/ Site Entrance intersection**
- 8. Provide signal timing/ progression evaluation of proposed new signal on West Broad**
- 9. Evaluate feasibility of eastbound left-turn lane relocation to proposed eastern (signalized) entrance**
- 10. Provide specific targets for TDM (e.g. bicycle parking, car share spaces, operating contributions toward public local bus transit)**

**B. Trail:** No analysis was performed for the Washington and Old Dominion (W&OD) Trail. Improving the safety of the at-grade crossings was not emphasized, except in recommending a four-way stop at the intersection of North west Street and Park Avenue. Is there any data that shows that travel speeds will be lower? Is speeding currently an issue at the trail crossing?

**C. Queues:** The queue lengths at two of the intersections were found using SimTraffic 7 instead of Synchro 7 like the other intersections. Explanation should be provided for this discrepancy.

No mitigations were proposed for locations where the turn lane storage length is exceeded. Under background future conditions, the queue for the northbound left turn and eastbound left turn movements will exceed the available storage at the intersection of West Broad Street and West Street. The length of the southbound left queue on West Street at Park Avenue was not adequately addressed. It is expected to exceed the storage length during the AM and PM peak periods.

**It is recommended the applicant evaluate the following improvement to mitigate projected queuing: restriping southbound West Street approaching West Broad Street to provide a right turn lane, a through lane, a center left-turn lane, and a northbound travel lane, and revising the side-street signal phasing to concurrent with a northbound exclusive/permissive left-turn and a southbound permissive left-turn phase.**

**D. Typos/Miscellaneous Corrections:**

- Page 9: Grove Avenue. On-street parking is permitted along *Park Avenue*.
- Page 9: Public Transit Service. WMATA does not have a “3B” bus service, and the “Lee Highway” line runs along Washington Street, not Broad Street. However, there is the 3T: Pimmit Hills-Falls Church Line that should be included in the report.
- Page 21: In last paragraph, put correct figure numbers.
- Page 25: labels Existing as 2012 instead of 2013
- AM Existing Synchro file: Broad/Spring should have 120 second cycle length