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MEMORANDUM



To: Paul Nabti – City of Fairfax, Senior Planner
Curt McCullough – City of Fairfax, Traffic Engineer

From: John Andrus
Chris Turnbull

Copy: Enrico Ecchi - The IDI Group Companies
Patrick Rhodes - The IDI Group Companies
David Houston – BlankRome, LLC.

Re: Paul VI – Transportation Addendum #1

Date: March 9, 2018

1420 Spring Hill Road
Suite 610
Tysons, Virginia 22102
703-917-6620
703-917-0739 FAX
www.mjwells.com

This memorandum updates the September 29, 2017, Traffic Impact Analysis (TIA) for the proposed Paul VI Redevelopment last revised November 15, 2017.

A comment on the TIA pointed out that the TIA did not account for pedestrian crossings at the Fairfax Boulevard/Fairfax Shops - Site Entrance intersection. Appropriate revisions to the future traffic signal timing have been made and this addendum presents the results of traffic analyses incorporating added pedestrian crossing time at the study intersection.

Pedestrian crossings will be permitted on all four approaches of the Fairfax Boulevard/Fairfax Shops - Site Entrance intersection. The crossing of the east and west approaches of Fairfax Boulevard will occur during the green phase of the traffic signal cycle for the minor (north/south) approaches. The crossing of the west leg of the intersection will be approximately 60 feet in length and will require 17 seconds for a pedestrian walking at 3.5 feet per second.

The crossing of the east approach will require the crossing of a proposed 20-foot wide slow lane, a proposed 10-foot median, and the 60 feet required to cross Fairfax Boulevard. To minimize the required crossing time, it is recommended that the pedestrian push button in the southeast quadrant of the intersection be located in the proposed median separating the proposed slow lane and Fairfax Boulevard. This median would serve as pedestrian refuge and the distance that a pedestrian would cross during one signal cycle

would be limited to 60 feet and would require 17 seconds for a pedestrian walking at 3.5 feet per second.

Future levels of service with the proposed development were determined for the Fairfax Boulevard/Fairfax Shops - Site Entrance intersection based on the future traffic volumes and future lane use shown in the Traffic Impact Analysis (TIA) for the proposed Paul VI Redevelopment last revised November 15, 2017, and the 2000 Highway Capacity Manual (HCM) methodologies for signalized intersections.

It is noted that the traffic signal phasing was modified to permit the north and south intersection approaches to operate concurrently and pedestrians would cross Fairfax Boulevard during this concurrent traffic signal phase. The results of these analyses are attached to this Addendum and are summarized in Table 1. Table 1 also shows the HCM results before traffic signal timing modifications were made to provide a comparison of the previously reported and current level of service results.

Table 1
Paul VI Redevelopment
Total Future Intersection Capacity Analysis Summary¹

Intersection	Intersection Control	Approach	Without Timing Modifications			With Timing Modifications		
			AM Peak	PM School Peak	PM Peak	AM Peak	PM School Peak	PM Peak
5. Fairfax Boulevard & Shops at Fairfax Entrance/Site Entrance	Signal	EB Appr	A (7.9)	B (17.6)	C (26.5)	A (9.5)	A (7.3)	A (7.8)
		WB Appr	A (5.4)	D (42.5)	D (40.6)	A (6.2)	C (21.8)	C (26.2)
		NB Appr	F (105.2)	F (96.0)	F (95.5)	F (89.0)	F (97.8)	F (98.1)
		SB Appr	F (88.2)	F (93.9)	F (96.2)	F (87.8)	F (90.9)	F (93.6)
		Overall	B (11.5)	D (37.7)	D (39.1)	B (12.3)	C (22.8)	C (24.0)

Notes: 1. Capacity analysis based on Highway Capacity Manual methodology, using Synchro 9.1.

The reported levels of service and delays with traffic signal phasing modifications consider:

- Providing a 17 second “walk” indication for pedestrians crossing Fairfax Boulevard.
- Providing a 10 second “walk” indication for pedestrians crossing the Shops at Fairfax and Site Entrances.
- Providing a seven (7) second flashing “don’t walk” indication for all pedestrian crossings.

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MEMORANDUM

- Pedestrian calls occurring during a majority of the traffic signal cycles even though the level of pedestrian activity will likely decrease when Paul VI High School is relocated.

As shown in Table 1, similar levels of delay to those reported in the TIA are anticipated for motorists on the north and south intersection approaches with the traffic signal phasing modifications to accommodate pedestrian crossings.

Please feel free to contact us at 703/917-6620 if there are any questions or comments regarding this analysis.

Attachments:

- Capacity Analysis Printouts - Future Conditions with Pedestrian Timing Modifications
- CD Containing Synchro Capacity Analysis Files

HCM Signalized Intersection Capacity Analysis
 5: Site Entrance/Fairfax Shoppes Entrance & Fairfax Boulevard

TF AM wPed.syn
 02/13/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗			↖	↗		↖	↗
Traffic Volume (vph)	26	1593	29	7	612	9	36	0	44	11	0	18
Future Volume (vph)	26	1593	29	7	612	9	36	0	44	11	0	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.2		5.0	5.2			6.2	6.2		6.2	6.2
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.95	1.00		0.95	1.00
Satd. Flow (prot)	1805	3496		1770	3433			1770	1583		1805	1615
Flt Permitted	0.38	1.00		0.10	1.00			0.75	1.00		0.73	1.00
Satd. Flow (perm)	713	3496		192	3433			1397	1583		1390	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	28	1732	32	8	665	10	39	0	48	12	0	20
RTOR Reduction (vph)	0	1	0	0	0	0	0	0	43	0	0	18
Lane Group Flow (vph)	28	1763	0	8	675	0	0	39	5	0	12	2
Heavy Vehicles (%)	0%	3%	2%	2%	5%	0%	2%	2%	2%	0%	2%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4		4	8		8
Actuated Green, G (s)	181.4	175.8		175.8	173.0			24.0	24.0		24.0	24.0
Effective Green, g (s)	183.4	176.8		175.8	174.0			24.0	24.0		24.0	24.0
Actuated g/C Ratio	0.83	0.80		0.80	0.79			0.11	0.11		0.11	0.11
Clearance Time (s)	5.0	6.2		5.0	6.2			6.2	6.2		6.2	6.2
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	627	2809		173	2715			152	172		151	176
v/s Ratio Prot	c0.00	c0.50		0.00	0.20							
v/s Ratio Perm	0.04			0.04				c0.03	0.00		0.01	0.00
v/c Ratio	0.04	0.63		0.05	0.25			0.26	0.03		0.08	0.01
Uniform Delay, d1	3.3	8.6		7.9	6.0			89.8	87.6		88.1	87.4
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	0.0	1.1		0.1	0.2			0.9	0.1		0.2	0.0
Delay (s)	3.3	9.6		8.0	6.2			90.7	87.7		88.3	87.5
Level of Service	A	A		A	A			F	F		F	F
Approach Delay (s)		9.5			6.2			89.0			87.8	
Approach LOS		A			A			F			F	

Intersection Summary			
HCM 2000 Control Delay	12.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	220.0	Sum of lost time (s)	16.4
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 5: Site Entrance/Fairfax Shoppes Entrance & Fairfax Boulevard

TF PM School wPed.syn
 02/13/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	784	81	38	1145	29	82	0	20	57	0	57
Future Volume (vph)	44	784	81	38	1145	29	82	0	20	57	0	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.2		5.0	5.2			6.2	6.2		6.2	6.2
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt	1.00	0.99		1.00	1.00			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.95	1.00		0.95	1.00
Satd. Flow (prot)	1805	3459		1770	3429			1770	1583		1805	1615
Flt Permitted	0.19	1.00		0.28	1.00			0.69	1.00		0.59	1.00
Satd. Flow (perm)	353	3459		530	3429			1294	1583		1117	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	48	852	88	41	1245	32	89	0	22	62	0	62
RTOR Reduction (vph)	0	2	0	0	1	0	0	0	20	0	0	55
Lane Group Flow (vph)	48	938	0	41	1276	0	0	89	2	0	62	7
Heavy Vehicles (%)	0%	3%	2%	2%	5%	0%	2%	2%	2%	0%	2%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4		4	8		8
Actuated Green, G (s)	179.3	172.2		176.3	170.7			24.8	24.8		24.8	24.8
Effective Green, g (s)	181.3	173.2		176.3	171.7			24.8	24.8		24.8	24.8
Actuated g/C Ratio	0.82	0.79		0.80	0.78			0.11	0.11		0.11	0.11
Clearance Time (s)	5.0	6.2		5.0	6.2			6.2	6.2		6.2	6.2
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	344	2723		456	2676			145	178		125	182
v/s Ratio Prot	c0.01	0.27		0.00	c0.37							
v/s Ratio Perm	0.11			0.07				c0.07	0.00		0.06	0.00
v/c Ratio	0.14	0.34		0.09	0.48			0.61	0.01		0.50	0.04
Uniform Delay, d1	5.1	6.8		4.7	8.4			93.0	86.7		91.7	87.0
Progression Factor	0.61	1.05		1.42	2.58			1.00	1.00		1.00	1.00
Incremental Delay, d2	0.2	0.3		0.1	0.5			7.5	0.0		3.1	0.1
Delay (s)	3.3	7.5		6.8	22.3			100.5	86.8		94.8	87.1
Level of Service	A	A		A	C			F	F		F	F
Approach Delay (s)		7.3			21.8			97.8			90.9	
Approach LOS		A			C			F			F	

Intersection Summary			
HCM 2000 Control Delay	22.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	220.0	Sum of lost time (s)	16.4
Intersection Capacity Utilization	58.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

5: Site Entrance/Fairfax Shoppes Entrance & Fairfax Boulevard

Total Future PM with Ped



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	921	89	46	1394	29	78	0	18	64	0	31
Future Volume (vph)	37	921	89	46	1394	29	78	0	18	64	0	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.2		5.0	5.2			6.2	6.2		6.2	6.2
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt	1.00	0.99		1.00	1.00			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.95	1.00		0.95	1.00
Satd. Flow (prot)	1805	3461		1770	3431			1770	1583		1805	1615
Flt Permitted	0.13	1.00		0.23	1.00			0.66	1.00		0.60	1.00
Satd. Flow (perm)	256	3461		430	3431			1234	1583		1147	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	40	1001	97	50	1515	32	85	0	20	70	0	34
RTOR Reduction (vph)	0	3	0	0	0	0	0	0	18	0	0	30
Lane Group Flow (vph)	40	1095	0	50	1547	0	0	85	2	0	70	4
Heavy Vehicles (%)	0%	3%	2%	2%	5%	0%	2%	2%	2%	0%	2%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4		4	8		8
Actuated Green, G (s)	176.3	170.7		179.3	172.2			24.8	24.8		24.8	24.8
Effective Green, g (s)	178.3	171.7		179.3	173.2			24.8	24.8		24.8	24.8
Actuated g/C Ratio	0.81	0.78		0.82	0.79			0.11	0.11		0.11	0.11
Clearance Time (s)	5.0	6.2		5.0	6.2			6.2	6.2		6.2	6.2
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	253	2701		393	2701			139	178		129	182
v/s Ratio Prot	c0.00	0.32		0.00	c0.45							
v/s Ratio Perm	0.12			0.10				c0.07	0.00		0.06	0.00
v/c Ratio	0.16	0.41		0.13	0.57			0.61	0.01		0.54	0.02
Uniform Delay, d1	6.7	7.8		4.8	9.1			93.0	86.7		92.2	86.8
Progression Factor	0.79	0.96		1.07	2.91			1.00	1.00		1.00	1.00
Incremental Delay, d2	0.3	0.4		0.1	0.4			7.7	0.0		4.6	0.0
Delay (s)	5.6	7.9		5.2	26.9			100.7	86.8		96.8	86.9
Level of Service	A	A		A	C			F	F		F	F
Approach Delay (s)		7.8			26.2			98.1			93.6	
Approach LOS		A			C			F			F	

Intersection Summary			
HCM 2000 Control Delay	24.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	220.0	Sum of lost time (s)	16.4
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			