

# WELLS + ASSOCIATES

## MEMORANDUM



**To:** Jonathan D. Rogers, District Department of Transportation

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**Date:** December 21, 2016

**Subject:** Addendum to Transportation Assessment  
Washington Gateway Phases Two and Three PUD Modification  
Zoning Commission Case No. 06-14D

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This memorandum is an addendum to the Transportation Assessment dated December 2, 2016 for the Washington Gateway Phases Two and Three PUD Modification. The purpose of this memorandum is to include an operations analysis of Phase Two (interim condition) of the project (without Phase Three), which pertains to the construction of the north tower.

The north tower is proposed for 372 residential dwelling units. As shown on Attachment I, the proposed 372 residential units would generate a total of 91 AM peak hour trips (18 inbound, 73 outbound) and 109 PM peak hour trips (71 inbound, 38 outbound).

Peak hour trips generated by the proposed north tower were distributed based on the directions of approach for residential uses as outlined in the Transportation Assessment. Trips generated by the north tower were assigned to the roadway network as shown on Attachment II. Total future forecasts with Phase Two were calculated by adding the background traffic forecasts that were presented on Figure 9 of the Traffic Assessment with the site trip volumes shown on Attachment II.

Capacity/levels of service (LOS) and queue analyses for total future conditions with Phase Two were performed based on the total future forecasts shown on Attachment II and using the Highway Capacity Manual 2000 (HCM) methodology via Synchro software (Version 9.1, Build 909, Revision 20). The tabulated results and Synchro worksheets are shown as Attachment III.



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### MEMORANDUM

As shown in Attachment III, under total future conditions with the proposed Phase Two (the interim condition) of the development, the Florida Avenue/2<sup>nd</sup> Street intersection would operate at overall LOS “F” during the AM and PM peak hours. The westbound shared through-right lane group would operate at LOS “F” during both the AM and PM peak hours, while the northbound approach of 2<sup>nd</sup> Street NE would continue to operate at LOS “E” during the PM peak hour. Compared with background conditions without the approved PUD, the levels of service are consistent, though with generally longer delays.

Attachment III also shows that, with the development of Phase Two (the interim condition), each of the lane groups at the Florida Avenue/2<sup>nd</sup> Street intersection would have 95th percentile queue lengths that are within the available storage, except for the westbound shared through-right lane group, whose 95th percentile queues would exceed the available storage during the AM and PM peak hours. In addition, the northbound approach of 2<sup>nd</sup> Street would have a 95th percentile queue that continues to exceed its available storage during the PM peak hour, but with a longer queue length.

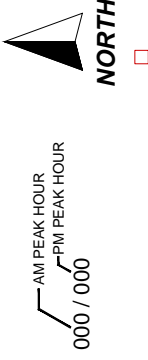
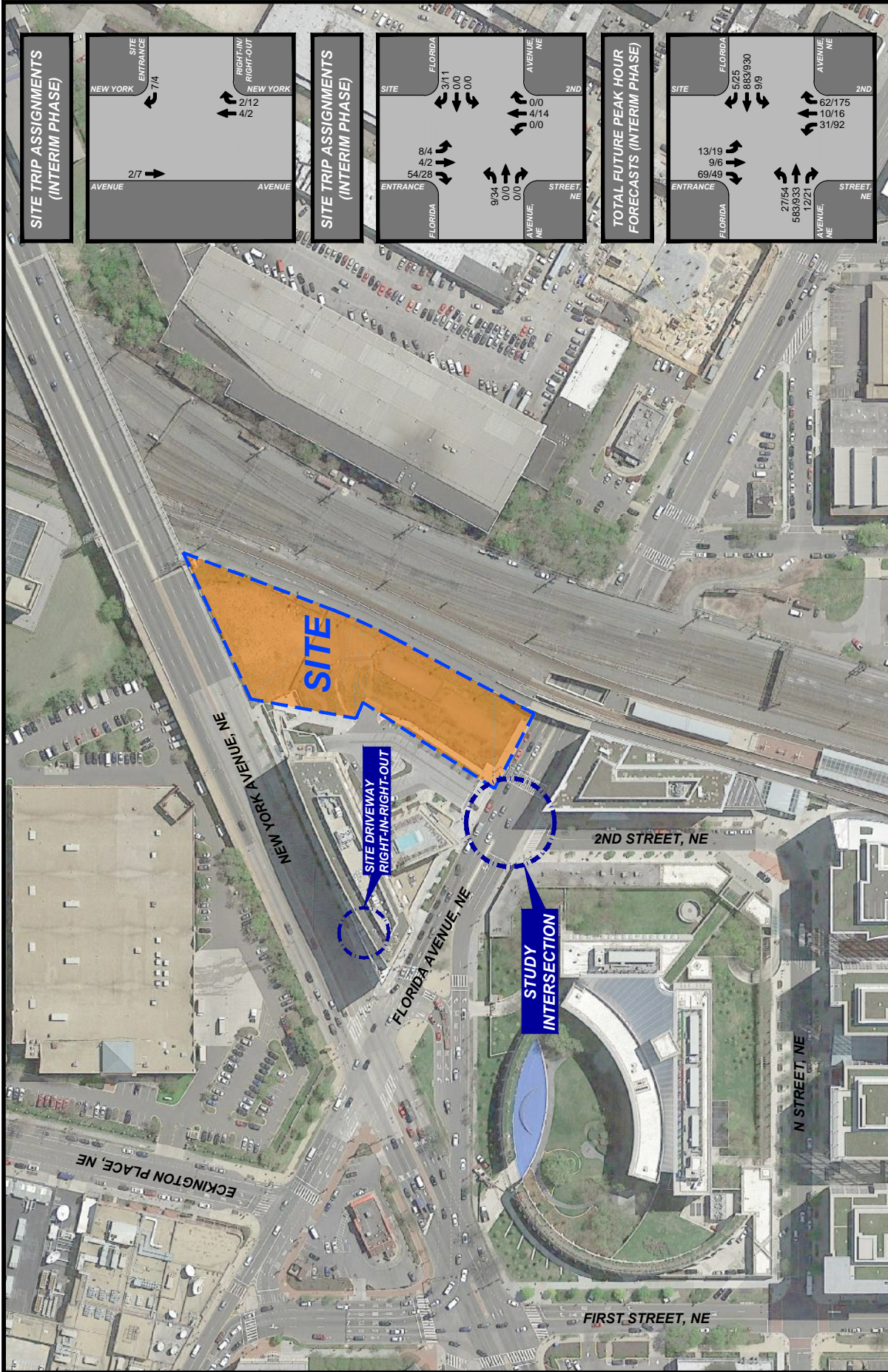
Questions or comments regarding this document should be directed to Wells + Associates.

Attachment I  
 Washington Gateway Two PUD  
 Site Trip Generation (Phase Two - Interim Condition)

Development/Land Use	ITE Code	Size	Unit	AM Peak Hour		PM Peak Hour		Total
				In	Out	In	Out	
<b>Proposed Use</b>								
North Tower Residential (Apartments)	220	372 51%	DU's	37	149	144	78	222
Transit Mode Share Reduction Residential Vehicle Trips				(19) 18	(76) 73	(73) 71	(40) 38	(113) 109
Total Proposed Vehicle Trips				<b>18</b>	<b>73</b>	<b>71</b>	<b>38</b>	<b>109</b>

Notes:

1. Number of trips generated estimated using Institute of Transportation Engineers (ITE), Trip Generation, Ninth Edition.
2. Transit mode share reductions were estimated based on regression equations used in the 2005 Development-Related Ridership Survey Final Report by the Washington Metropolitan Area Transit Authority, March 2006; and the proximity to the NoMA-Gallaudet U Metro Station.



Attachment II  
 Site Trip Assignments and Total Future Forecasts (Interim Phase)  
 Washington Gateway  
 Washington, DC

Attachment III-A  
Washington Gateway Two PUD  
Intersection Levels of Service Summary

Intersection	Intersection Control	Critical Movement	Existing Conditions		Background Conditions (without Approved PUD)		Background Conditions (with Approved PUD)		Total Future Conditions (Interim Phase)		Total Future Conditions (Option 1)		Total Future Conditions (Option 2)			
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM		
1. Florida Avenue NE/2nd Street NE/ Site Entrance	Signal	EBLT WBTR NBL/TR SBLT SBR <b>OVERALL</b>	A (6.2)	B (11.1)	A (7.2)	B (13.1)	A (9.9)	B (14.2)	A (7.3)	B (14.2)	A (8.6)	B (14.8)	A (7.3)	B (15.2)		
			E (79.7)	D (44.1)	F (169.8)	F (211.7)	F (286.6)	F (227.9)	F (172.5)	F (220.6)	F (216.3)	F (227.9)	F (174.9)	F (227.3)		
			D (41.4)	E (64.1)	D (39.9)	E (72.1)	D (44.7)	E (76.2)	D (40.0)	E (74.8)	D (41.3)	E (78.4)	D (40.2)	F (80.1)		
			D (38.9)	C (32.1)	D (37.6)	C (30.7)	D (36.1)	D (39.0)	D (38.1)	C (30.6)	D (37.4)	C (32.4)	D (38.7)	C (30.3)		
			A (7.7)	A (8.1)	A (8.1)	A (8.1)	A (8.3)	B (10.0)	A (8.5)	A (8.3)	A (8.6)	A (9.1)	A (8.7)	A (8.5)		
			<b>D (49.0)</b>	<b>C (31.1)</b>	<b>F (98.5)</b>	<b>F (105.0)</b>	<b>F (140.3)</b>	<b>F (101.2)</b>	<b>F (96.2)</b>	<b>F (107.0)</b>	<b>F (115.0)</b>	<b>F (105.5)</b>	<b>F (95.1)</b>	<b>F (109.2)</b>		

Notes:

- (1) Numbers in parentheses indicate average delay in seconds per vehicle for signal controlled intersections.
- (2) Numbers in brackets indicate average delay in seconds per vehicle for unsignalized intersections.

Attachment III-B  
Washington Gateway Two PUD  
Queues Summary - Synchro

Intersection	Intersection Control	Critical Movement	Available Storage	Existing Conditions				Background Conditions (without Approved PUD)				Background Conditions (with Approved PUD)				Total Future Conditions (Interim Phase)				Total Future Conditions (Option 1)				Total Future Conditions (Option 2)					
				AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour			
				50th	95th	50th	95th	50th	95th	50th	95th	50th	95th	50th	95th	50th	95th	50th	95th	50th	95th	50th	95th	50th	95th				
1. Florida Avenue NE/2nd Street NE/ Site Entrance	Signal	EBLT WBTR NBLTR SBLT SBR	175 340 240 75 75	18	52	74	94	26	71	101	126	54	98	106	132	27	72	106	132	39	84	108	135	28	72	109	136		
				187	#268	150	#213	~287	#375	~322	#413	~353	#444	~333	#425	~320	#411	~334	#425	~328	#420	~320	#411	~334	#425	~292	#382	~333	#424
				25	64	116	#246	25	69	139	#297	77	134	143	#309	28	72	148	#314	54	105	155	#325	29	74	161	#337	161	#337
				7	18	11	30	6	19	10	30	13	33	55	113	14	34	14	38	17	39	32	70	21	44	16	42	21	44
				3	8	4	11	3	9	4	11	9	21	57	91	13	27	9	21	16	32	30	53	21	39	13	27		

Notes:

- (1) Synchro 9 (build 909, rev 20) was used to calculate 50th and 95th percentile queues, unless otherwise specified.
- (2) Queues are reported in units of feet. In general, one vehicle length approximates to 25 feet.
- (3) Queues with a # footnote indicate that the 95th percentile volume exceeds the capacity.
- (4) Queues with a m footnote indicate that volume for the 95th percentile is metered by an upstream signal.
- (5) Queues with a ~ footnote indicate that the volume exceeds capacity, and the queue may be longer.

## Queues

## 1: 2nd Street NE/Driveway &amp; Florida Avenue NE



Lane Group	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	676	975	112	24	75
v/c Ratio	0.27	1.27	0.51	0.13	0.10
Control Delay	4.9	167.0	24.4	35.3	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	4.9	167.0	24.4	35.3	5.4
Queue Length 50th (ft)	27	~290	28	14	13
Queue Length 95th (ft)	72	#380	72	34	27
Internal Link Dist (ft)	43	411	141	46	
Turn Bay Length (ft)					
Base Capacity (vph)	2495	767	334	311	781
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.27	1.27	0.34	0.08	0.10

## Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis  
 1: 2nd Street NE/Driveway & Florida Avenue NE



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔↔			↔↔↔			↔			↔	↔
Traffic Volume (vph)	27	583	12	9	883	5	31	10	62	13	9	69
Future Volume (vph)	27	583	12	9	883	5	31	10	62	13	9	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	12	12	12	12	12	12
Total Lost time (s)		5.0			5.0			5.0			5.0	5.0
Lane Util. Factor		0.91			0.91			1.00			1.00	1.00
Frbp, ped/bikes		0.99			1.00			0.89			1.00	0.94
Flpb, ped/bikes		1.00			1.00			0.98			0.92	1.00
Frt		1.00			1.00			0.92			1.00	0.85
Flt Protected		1.00			1.00			0.99			0.97	1.00
Satd. Flow (prot)		4063			4126			1297			1463	1302
Flt Permitted		0.89			0.93			0.90			0.86	1.00
Satd. Flow (perm)		3640			3834			1182			1301	1302
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)	29	634	13	10	960	5	34	11	67	14	10	75
RTOR Reduction (vph)	0	2	0	0	1	0	0	58	0	0	0	0
Lane Group Flow (vph)	0	674	0	0	974	0	0	54	0	0	24	75
Confl. Peds. (#/hr)	91		359	359		91	41		130	130		41
Confl. Bikes (#/hr)			14			26						14
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	pm+ov
Protected Phases	1 3	2			2			4			4	1 3
Permitted Phases	2	1 2 3		2			4			4		4
Actuated Green, G (s)		66.1			20.0			13.9			13.9	60.0
Effective Green, g (s)		66.1			20.0			13.9			13.9	60.0
Actuated g/C Ratio		0.66			0.20			0.14			0.14	0.60
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		1.0			1.0			3.0			3.0	
Lane Grp Cap (vph)		2490			766			164			180	911
v/s Ratio Prot		0.05										0.04
v/s Ratio Perm		c0.12			c0.25			c0.05			0.02	0.02
v/c Ratio		0.27			1.27			0.33			0.13	0.08
Uniform Delay, d1		7.0			40.0			38.9			37.8	8.4
Progression Factor		1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2		0.3			132.5			1.2			0.3	0.0
Delay (s)		7.3			172.5			40.0			38.1	8.5
Level of Service		A			F			D			D	A
Approach Delay (s)		7.3			172.5			40.0			15.6	
Approach LOS		A			F			D			B	

**Intersection Summary**

HCM 2000 Control Delay	96.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	63.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Queues

1: 2nd Street NE/Driveway & Florida Avenue NE



Lane Group	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	1096	1048	307	28	53
v/c Ratio	0.53	1.38	0.94	0.11	0.07
Control Delay	10.2	213.2	67.4	31.2	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	10.2	213.2	67.4	31.2	5.2
Queue Length 50th (ft)	106	~328	148	14	9
Queue Length 95th (ft)	132	#420	#314	38	21
Internal Link Dist (ft)	43	411	141	46	
Turn Bay Length (ft)					
Base Capacity (vph)	2085	758	336	260	759
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.53	1.38	0.91	0.11	0.07

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis  
1: 2nd Street NE/Driveway & Florida Avenue NE



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔↔			↔↔↔			↔			↔	↔
Traffic Volume (vph)	54	933	21	9	930	25	92	16	175	19	6	49
Future Volume (vph)	54	933	21	9	930	25	92	16	175	19	6	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	12	12	12	12	12	12
Total Lost time (s)		5.0			5.0			5.0			5.0	5.0
Lane Util. Factor		0.91			0.91			1.00			1.00	1.00
Frbp, ped/bikes		0.99			0.99			0.90			1.00	0.91
Flpb, ped/bikes		1.00			1.00			0.99			0.95	1.00
Frt		1.00			1.00			0.92			1.00	0.85
Flt Protected		1.00			1.00			0.98			0.96	1.00
Satd. Flow (prot)		4076			4104			1297			1489	1265
Flt Permitted		0.84			0.92			0.88			0.70	1.00
Satd. Flow (perm)		3422			3780			1160			1089	1265
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)	59	1014	23	10	1011	27	100	17	190	21	7	53
RTOR Reduction (vph)	0	2	0	0	2	0	0	59	0	0	0	0
Lane Group Flow (vph)	0	1094	0	0	1046	0	0	248	0	0	28	53
Confl. Peds. (#/hr)	53		131	131		53	36		116	116		36
Confl. Bikes (#/hr)			9			19			10			2
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	pm+ov
Protected Phases	1 3	2			2			4			4	1 3
Permitted Phases	2	1 2 3		2			4			4		4
Actuated Green, G (s)		57.0			20.0			23.0			23.0	60.0
Effective Green, g (s)		57.0			20.0			23.0			23.0	60.0
Actuated g/C Ratio		0.57			0.20			0.23			0.23	0.60
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		1.0			1.0			3.0			3.0	
Lane Grp Cap (vph)		2081			756			266			250	885
v/s Ratio Prot		0.11										0.02
v/s Ratio Perm		c0.19			c0.28			c0.21			0.03	0.02
v/c Ratio		0.53			1.38			0.93			0.11	0.06
Uniform Delay, d1		13.2			40.0			37.7			30.4	8.3
Progression Factor		1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2		1.0			180.6			37.0			0.2	0.0
Delay (s)		14.2			220.6			74.8			30.6	8.3
Level of Service		B			F			E			C	A
Approach Delay (s)		14.2			220.6			74.8			16.0	
Approach LOS		B			F			E			B	

Intersection Summary			
HCM 2000 Control Delay	107.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	84.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			