WELLS + ASSOCIATES

MEMORANDUM

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TO: Ted Van Houten, AICP
District Department of Transportation (DDOT)

FROM: Jami Milanovich, P.E.
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RE: Art Place at Fort Totten – Phase II
3rd Street Connection Analysis

DATE: November 11, 2021

Introduction

Phase II (Lot B) of the Art Place at Fort Totten project is located on Square 3765 (Lot 10) and Square 3767 (Lot 1). As shown on Figure 1, the site is bordered by South Dakota Avenue NE to the east, Ingraham Street NE to the south, a public alley to the west and Kennedy Street NE to the north. The site is divided by 4th Street NE running north to south through the western portion of the site.

A Comprehensive Transportation Review (CTR), dated February 18, 2019 and amended March 5, 2019, was conducted in conjunction with Case #06-10D and identified a number of improvements required to mitigate the traffic impacts of the site. Based on the CTR and subsequent documents, DDOT agreed that with the proposed mitigation measures, the proposed project would have no adverse effect on the transportation network. Subsequently, as part of the current Application (06-10G), a trip generation analysis was submitted on July 16, 2021 confirming that the updated proposal will decrease the number of site trips, thereby reducing the proposal's impact on the transportation network compared to the approved CTR.[1]

As part of the update and as discussed with and approved by DDOT, the Applicant proposes to construct an approximate 200-foot segment of 3rd Street, completing the missing link between Kennedy Street and the existing Aventine at Fort Totten development. The connection will provide improved connectivity in the neighborhood for vehicles, pedestrians, and bicycles. The conceptual 3rd Street connection shown on Figure 2.

[1] A comparison between the July 16, 2021 trip generation memo and the plans included as Exhibit 2C1 was made to ensure consistency based on a comment from the Office of Planning. The comparison found that the 50,593 SF Performance Space was generated using 660 theater seats (since available trip generation rates were based on trips per seat rather than trips per square feet). The remaining culture uses were generated using 106,136 SF of space. However, the square footage for additional cultural space should have been 91,718 SF. Accordingly, the trip generation presented in the July 16, 2021 memo is slightly conservative.

This memorandum provides the results of a capacity analysis undertaken to assess the impacts of the proposed 3rd Street connection. The purpose of the assessment contained herein is to determine whether the conclusions and recommendations of the approved CTR are still valid with the connection.

3rd Street Connection Capacity Analysis

The 200-foot connection of 3rd Street between Kennedy Street and the existing Aventine at Fort Totten development was analyzed to determine any potential impacts to the neighborhood streets. The majority of traffic generated by the new development on Block B is anticipated to travel towards South Dakota Avenue. A small percentage of traffic may utilize the future 3rd Street connection to access westbound Riggs Road via 1st Place. In addition, a portion of the traffic generated by the Rocketship Infinity Charter School and Social Justice School (both located at 5450 3rd Street NE, as shown on Figure 1) would utilize the connection during peak pick-up and drop-off periods to avoid circling back onto Kennedy Street. The additional 200' grid connection on 3rd Street will provide another option for peak pick-up and drop-off periods to disperse traffic throughout the grid of streets. The opportunity to provide another grid link for pick-up and drop-off peak periods will reduce vehicle conflicts in front of the school uses and provide for an improved safety condition for students accessing the vehicles on the school frontage.

For purposes of this analysis, a capacity analysis based on these forecasts was completed at the following two intersections:

2. 1st Place/Riggs Road
6. South Dakota Avenue/Ingraham Street

Based on the updated circulation patterns, the two study intersections were determined to potentially be most impacted by the new connection. The approved CTR total future forecasts were modified to account for the updated trip generation estimates and the estimated traffic reroutes for the 3rd Street connection. The resulting total future traffic volumes were analyzed, and the results are summarized in Table 1. Synchro worksheets are provided in Attachment A.

As shown in Table 1, the 3rd Street connection is expected to have de minimis impacts on the levels of service and vehicle delays at the study intersections compared to the results of the approved CTR. Slight increases or decreases in the delays are estimated based on the redistribution of traffic throughout the available street network. The previously accepted recommendations agreed to by the applicant and approved by DDOT would continue to mitigate site traffic with or without the proposed 3rd Street connection. While the 3rd Street connection is inconveniently located for cut-through traffic, it would serve to improve local traffic circulation and disperse traffic throughout the grid during peak periods.

Pedestrian and Bicycle Facilities

The proposed 200-foot section of 3rd Street was reviewed in detail to provide as many safety features as possible to support pedestrian and bicycle traffic in the study area. As shown on Figure 2, additional signage, striping, and bicycle sharrows are proposed to reduce traffic speeds and improve safety on the roadway for all users. In addition, the previously proposed sidewalks, landscape amenity buffer, and curb and gutter would all serve as pedestrian safety enhancements on the short section of roadway.

A reduced school zone speed limit and share the road signage is proposed on the new section of 3rd Street. The reduced speed limit of 15 miles per hour (mph) would slow traffic on the section and reduce conflicts by improving the stopping sight distances for drivers on the shared roadway. In addition, the share the road signage and sharrow pavement markings would warn drivers of the shared roadway conditions. The combination of the reduced speeds and warning signage and striping would result in improved safety for all roadway users for the proposed section.

Bike lanes are typically recommended on roadways with daily traffic volumes of at least 3,000 vehicles/day with speeds greater than 25 mph or on streets with high transit volumes. The proposed 200-foot section of 3rd Street would not meet any of these minimum requirements. Bicycle sharrows were proposed to highlight shared bicycle traffic on the roadway to drivers utilizing the new grid link.

Conclusions

Based updated forecasts including rerouted traffic due to the 3rd Street connection, with previously proposed mitigation measures, the project will have no adverse effect on the surrounding transportation network. The mitigation measures included in the prior Zoning Order would continue to mitigate the impacts of the proposed development. Further, the connection of 3rd Street would provide improved connectivity for all road users.

Table 1
Art Place Phase II
Intersection Level of Service Summary [1,2]

Intersection	Control	Lane Group Approach	Future Conditions with Improvements with Development (2023)						Future Conditions with Improvements with Development (2023) With 3rd Street Connection					
			AM Peak Hour		PM Peak Hour		SAT Peak Hour		AM Peak Hour		PM Peak Hour		SAT Peak Hour	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
2. **Riggs Road**/First Place	Signalized	EB	D	35.1	C	26.7	C	23.4	D	35.5	C	26.6	C	22.6
Proposed Mitigation Measures		WB	D	45.9	A	9.6	A	6.7	D	46.1	A	9.9	A	5.6
1. Signal timing split improvements		NB	D	49.6	E	62.3	D	45.9	D	53.1	E	65.9	D	46.6
		Overall	**D**	**42.0**	**C**	**24.1**	**B**	**18.1**	**D**	**42.7**	**C**	**24.8**	**B**	**17.5**
		EB	D	41.3	D	46.1	C	33.1	D	41.5	D	42.5	C	33.5
6. South Dakota Avenue/**Ingraham Street**	Signalized	WB	D	38.6	C	34.8	C	26.9	D	38.4	D	36.7	C	29.8
Proposed Mitigation Measures		NB	A	6.5	A	4.9	A	7.6	A	6.5	A	3.8	A	5.3
1. Add signal		SB	A	3.2	A	9.6	A	5.3	A	3.3	A	8.3	A	4.0
		Overall	**A**	**6.8**	**B**	**10.0**	**A**	**8.7**	**A**	**7.1**	**A**	**8.2**	**A**	**6.3**

Notes:
1. Capacity analysis based on Highway Capacity Manual methodology, using Synchro 10.
2. Roadway names in **bold** are considered east/west for purposes of this analysis.

Figure 1
The School's Location

NORTH

Art Place PUD Modification
Washington, DC

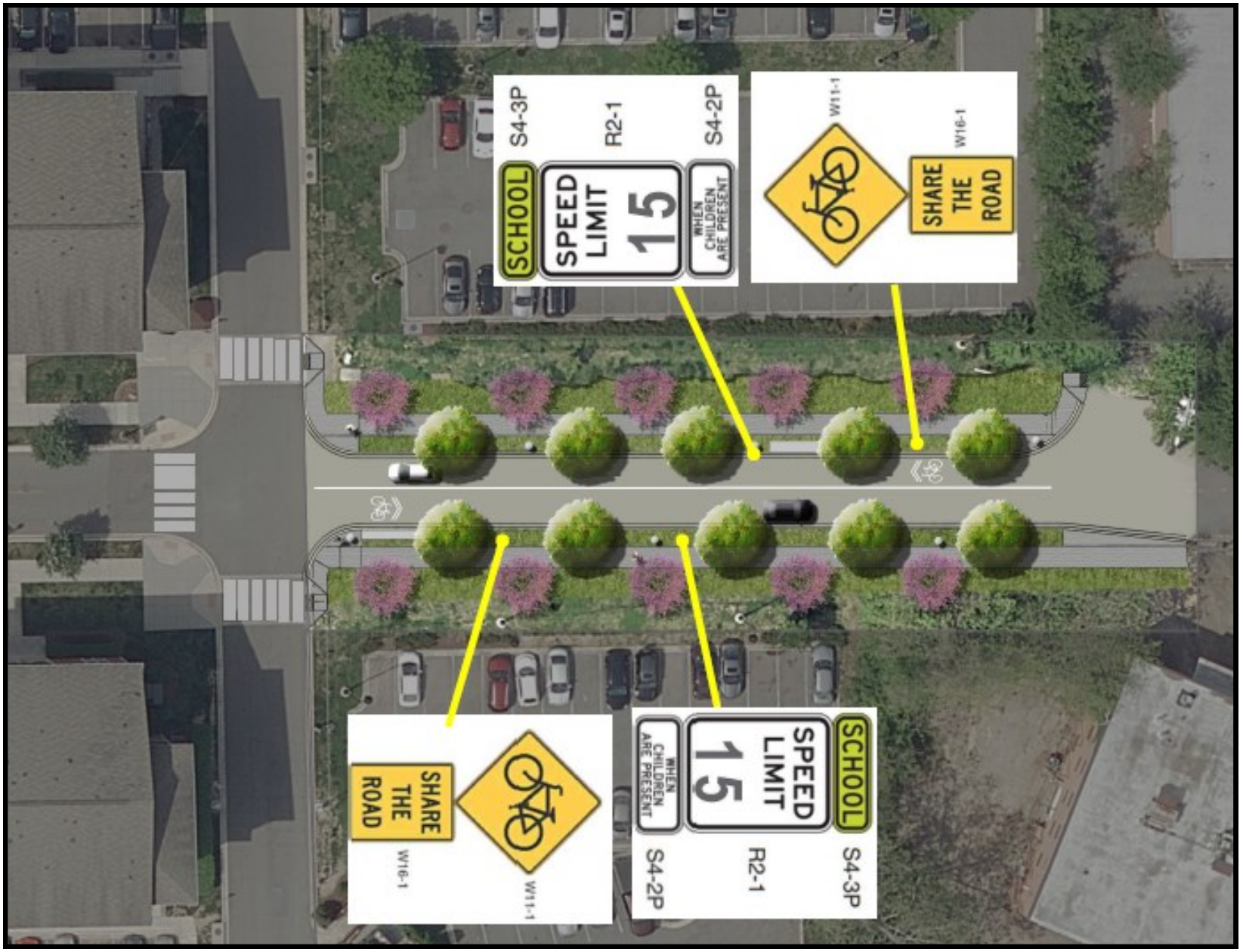


Figure 2
3rd St Road Connection

NORTH

Art Place PUD Modification
Washington, DC

ATTACHMENT A
SYNCHRO WORKSHEETS

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1094	225	61	1311	437	37
v/c Ratio	0.78	0.43	0.38	0.87	0.83	0.08
Control Delay	37.5	28.7	28.1	47.4	56.6	22.9
Queue Delay	0.0	0.0	0.0	6.3	0.0	0.0
Total Delay	37.5	28.7	28.1	53.7	56.6	22.9
Queue Length 50th (ft)	461	142	36	708	385	20
Queue Length 95th (ft)	557	217	m49	790	#572	43
Internal Link Dist (ft)	328			720	278	
Turn Bay Length (ft)		150	375			
Base Capacity (vph)	1394	527	161	1508	526	476
Starvation Cap Reductn	0	0	0	162	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.43	0.38	0.97	0.83	0.08

Intersection Summary

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

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1017	209	57	1219	406	34
Future Volume (vph)	1017	209	57	1219	406	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	11	11	10	10
Grade (%)	-7%			1%	-1%	
Total Lost time (s)	4.0	4.0	3.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00	0.90	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	2906	1098	1211	2694	1361	1020
Flt Permitted	1.00	1.00	0.14	1.00	0.95	1.00
Satd. Flow (perm)	2906	1098	174	2694	1361	1020
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	1094	225	61	1311	437	37
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1094	225	61	1311	437	37
Confl. Peds. (#/hr)		17	17		11	13
Confl. Bikes (#/hr)		4				
Heavy Vehicles (%)	8%	15%	29%	16%	12%	24%
Bus Blockages (#/hr)	0	0	0	0	0	18
Turn Type	NA	Perm	pm+pt	NA	Prot	pt+ov
Protected Phases	6		5	2	4	4 5
Permitted Phases		6	2			
Actuated Green, G (s)	70.0	70.0	82.0	82.0	56.0	69.0
Effective Green, g (s)	72.0	72.0	84.0	84.0	58.0	71.0
Actuated g/C Ratio	0.48	0.48	0.56	0.56	0.39	0.47
Clearance Time (s)	6.0	6.0	5.0	6.0	6.0	
Lane Grp Cap (vph)	1394	527	159	1508	526	482
v/s Ratio Prot	0.38		0.02	c0.49	c0.32	0.04
v/s Ratio Perm		0.20	0.19			
v/c Ratio	0.78	0.43	0.38	0.87	0.83	0.08
Uniform Delay, d1	32.5	25.5	20.5	28.3	41.6	21.6
Progression Factor	1.00	1.00	1.55	1.46	1.00	1.00
Incremental Delay, d2	4.5	2.5	4.9	5.1	14.2	0.3
Delay (s)	37.0	28.0	36.6	46.5	55.7	21.9
Level of Service	D	C	D	D	E	C
Approach Delay (s)	35.5			46.1	53.1	
Approach LOS	D			D	D	

Intersection Summary			
HCM 2000 Control Delay	42.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	124	7	895	1049
v/c Ratio	0.57	0.05	0.49	0.47
Control Delay	26.2	33.3	7.5	3.6
Queue Delay	0.1	0.0	0.8	0.4
Total Delay	26.4	33.3	8.3	4.0
Queue Length 50th (ft)	26	4	48	59
Queue Length 95th (ft)	78	15	258	114
Internal Link Dist (ft)	78	201	187	190
Turn Bay Length (ft)				
Base Capacity (vph)	329	273	1836	2224
Starvation Cap Reductn	0	0	588	237
Spillback Cap Reductn	15	0	0	577
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.39	0.03	0.72	0.64

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	3	78	4	2	1	49	805	5	4	935	68
Future Volume (vph)	38	3	78	4	2	1	49	805	5	4	935	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	10	10	10	10	11	11	10	11	11
Grade (%)		-4%			-6%			2%			-2%	
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		0.98			1.00			1.00			1.00	
Flpb, ped/bikes		0.99			0.99			1.00			1.00	
Frt		0.91			0.98			1.00			0.99	
Flt Protected		0.98			0.97			1.00			1.00	
Satd. Flow (prot)		1284			1349			2880			3019	
Flt Permitted		0.89			0.86			0.82			0.95	
Satd. Flow (perm)		1160			1188			2377			2876	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	40	3	81	4	2	1	51	839	5	4	974	71
RTOR Reduction (vph)	0	71	0	0	1	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	53	0	0	6	0	0	895	0	0	1045	0
Confl. Peds. (#/hr)	14		9	9		14	7		9	9		7
Confl. Bikes (#/hr)									2			1
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	8%	0%	0%	4%	0%
Parking (#/hr)	6	6	6	6	6	6						
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		10.7			10.7			75.3			75.3	
Effective Green, g (s)		12.7			12.7			77.3			77.3	
Actuated g/C Ratio		0.13			0.13			0.77			0.77	
Clearance Time (s)		7.0			7.0			7.0			7.0	
Vehicle Extension (s)		3.0			3.0			1.0			1.0	
Lane Grp Cap (vph)		147			150			1837			2223	
v/s Ratio Prot												
v/s Ratio Perm		c0.05			0.01			c0.38			0.36	
v/c Ratio		0.36			0.04			0.49			0.47	
Uniform Delay, d1		39.9			38.3			4.1			4.0	
Progression Factor		1.00			1.00			1.38			0.65	
Incremental Delay, d2		1.5			0.1			0.8			0.6	
Delay (s)		41.5			38.4			6.5			3.3	
Level of Service		D			D			A			A	
Approach Delay (s)		41.5			38.4			6.5			3.3	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	80.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1648	233	91	1171	252	123
v/c Ratio	0.89	0.30	0.61	0.54	0.83	0.35
Control Delay	29.2	12.9	23.7	8.3	77.5	44.7
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	29.2	12.9	23.7	8.5	77.5	44.7
Queue Length 50th (ft)	662	95	14	325	237	95
Queue Length 95th (ft)	798	143	m38	m362	#384	157
Internal Link Dist (ft)	363			720	268	
Turn Bay Length (ft)		150	375			
Base Capacity (vph)	1861	770	149	2184	305	348
Starvation Cap Reductn	0	0	0	218	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.89	0.30	0.61	0.60	0.83	0.35

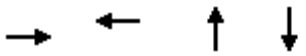
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1599	226	88	1136	244	119
Future Volume (vph)	1599	226	88	1136	244	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	11	11	10	10
Grade (%)	-7%			1%	-1%	
Total Lost time (s)	4.0	4.0	3.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00	0.95	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	2879	1192	1383	3034	1348	1161
Flt Permitted	1.00	1.00	0.08	1.00	0.95	1.00
Satd. Flow (perm)	2879	1192	112	3034	1348	1161
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	1648	233	91	1171	252	123
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1648	233	91	1171	252	123
Confl. Peds. (#/hr)		6	6		14	49
Confl. Bikes (#/hr)		3				
Heavy Vehicles (%)	9%	12%	13%	3%	13%	9%
Bus Blockages (#/hr)	0	0	0	0	0	18
Turn Type	NA	Perm	pm+pt	NA	Prot	pt+ov
Protected Phases	6		5	2	4	4 5
Permitted Phases		6	2			
Actuated Green, G (s)	95.0	95.0	106.0	106.0	32.0	44.0
Effective Green, g (s)	97.0	97.0	108.0	108.0	34.0	46.0
Actuated g/C Ratio	0.65	0.65	0.72	0.72	0.23	0.31
Clearance Time (s)	6.0	6.0	5.0	6.0	6.0	
Lane Grp Cap (vph)	1861	770	148	2184	305	356
v/s Ratio Prot	c0.57		c0.03	0.39	c0.19	0.11
v/s Ratio Perm		0.20	0.41			
v/c Ratio	0.89	0.30	0.61	0.54	0.83	0.35
Uniform Delay, d1	21.9	11.6	19.7	9.6	55.2	40.3
Progression Factor	1.00	1.00	0.99	0.79	1.00	1.00
Incremental Delay, d2	6.6	1.0	11.8	0.6	21.9	2.6
Delay (s)	28.5	12.7	31.4	8.2	77.1	43.0
Level of Service	C	B	C	A	E	D
Approach Delay (s)	26.6			9.9	65.9	
Approach LOS	C			A	E	

Intersection Summary			
HCM 2000 Control Delay	24.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	83.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	135	13	1174	995
v/c Ratio	0.63	0.07	0.65	0.46
Control Delay	35.8	26.3	4.4	9.5
Queue Delay	0.0	0.0	0.2	0.0
Total Delay	35.8	26.3	4.5	9.5
Queue Length 50th (ft)	46	5	160	181
Queue Length 95th (ft)	101	20	7	304
Internal Link Dist (ft)	85	192	187	201
Turn Bay Length (ft)				
Base Capacity (vph)	301	302	1809	2157
Starvation Cap Reductn	0	0	107	0
Spillback Cap Reductn	0	0	0	2
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.45	0.04	0.69	0.46

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	2	70	1	7	5	76	1038	1	11	860	74
Future Volume (vph)	56	2	70	1	7	5	76	1038	1	11	860	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	10	10	10	10	11	11	10	11	11
Grade (%)		-4%			-6%			2%			-2%	
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		0.99			0.98			1.00			0.99	
Flpb, ped/bikes		0.98			1.00			1.00			1.00	
Frt		0.93			0.95			1.00			0.99	
Flt Protected		0.98			1.00			1.00			1.00	
Satd. Flow (prot)		1288			1326			3067			3057	
Flt Permitted		0.85			0.98			0.78			0.94	
Satd. Flow (perm)		1122			1300			2404			2861	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	59	2	74	1	7	5	80	1093	1	12	905	78
RTOR Reduction (vph)	0	49	0	0	4	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	86	0	0	9	0	0	1174	0	0	990	0
Confl. Peds. (#/hr)	21		3	3		21	23		21	21		23
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	50%	0%	0%	0%	0%	0%	1%	0%	0%	2%	0%
Parking (#/hr)	6	6	6	6	6	6						
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		12.7			12.7			73.3			73.3	
Effective Green, g (s)		14.7			14.7			75.3			75.3	
Actuated g/C Ratio		0.15			0.15			0.75			0.75	
Clearance Time (s)		7.0			7.0			7.0			7.0	
Vehicle Extension (s)		3.0			3.0			1.0			1.0	
Lane Grp Cap (vph)		164			191			1810			2154	
v/s Ratio Prot												
v/s Ratio Perm		c0.08			0.01			c0.49			0.35	
v/c Ratio		0.53			0.05			0.65			0.46	
Uniform Delay, d1		39.4			36.6			6.0			4.7	
Progression Factor		1.00			1.00			0.38			1.66	
Incremental Delay, d2		3.0			0.1			1.6			0.5	
Delay (s)		42.5			36.7			3.8			8.3	
Level of Service		D			D			A			A	
Approach Delay (s)		42.5			36.7			3.8			8.3	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	91.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

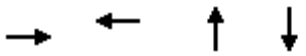
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1631	131	38	1157	151	26
v/c Ratio	0.88	0.18	0.28	0.59	0.53	0.09
Control Delay	24.4	9.5	7.9	5.3	50.2	32.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.4	9.5	7.9	5.3	50.2	32.1
Queue Length 50th (ft)	503	38	2	27	105	15
Queue Length 95th (ft)	636	67	m4	m337	177	38
Internal Link Dist (ft)	328			720	278	
Turn Bay Length (ft)		150	375			
Base Capacity (vph)	1864	717	138	1953	283	297
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	3	0	0	0	0	4
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.88	0.18	0.28	0.59	0.53	0.09

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

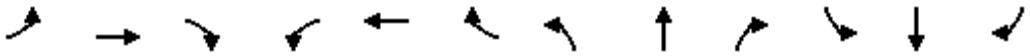
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1566	126	36	1111	145	25
Future Volume (vph)	1566	126	36	1111	145	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	11	11	10	10
Grade (%)	-7%			1%	-1%	
Total Lost time (s)	4.0	4.0	3.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00	0.92	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	2906	1118	1211	2694	1361	1020
Flt Permitted	1.00	1.00	0.08	1.00	0.95	1.00
Satd. Flow (perm)	2906	1118	101	2694	1361	1020
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1631	131	38	1157	151	26
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1631	131	38	1157	151	26
Confl. Peds. (#/hr)		17	17		11	13
Confl. Bikes (#/hr)		4				
Heavy Vehicles (%)	8%	15%	29%	16%	12%	24%
Bus Blockages (#/hr)	0	0	0	0	0	18
Turn Type	NA	Perm	pm+pt	NA	Prot	pt+ov
Protected Phases	6		5	2	4	4 5
Permitted Phases		6	2			
Actuated Green, G (s)	75.0	75.0	85.0	85.0	23.0	34.0
Effective Green, g (s)	77.0	77.0	87.0	87.0	25.0	36.0
Actuated g/C Ratio	0.64	0.64	0.72	0.72	0.21	0.30
Clearance Time (s)	6.0	6.0	5.0	6.0	6.0	
Lane Grp Cap (vph)	1864	717	137	1953	283	306
v/s Ratio Prot	c0.56		0.02	c0.43	c0.11	0.03
v/s Ratio Perm		0.12	0.18			
v/c Ratio	0.88	0.18	0.28	0.59	0.53	0.08
Uniform Delay, d1	17.6	8.7	12.3	8.0	42.3	30.2
Progression Factor	1.00	1.00	1.21	0.57	1.00	1.00
Incremental Delay, d2	6.1	0.6	2.5	0.7	7.0	0.5
Delay (s)	23.7	9.3	17.3	5.2	49.3	30.7
Level of Service	C	A	B	A	D	C
Approach Delay (s)	22.6			5.6	46.6	
Approach LOS	C			A	D	

Intersection Summary			
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	73.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	106	6	819	909
v/c Ratio	0.51	0.03	0.47	0.41
Control Delay	26.3	17.8	6.1	4.5
Queue Delay	0.0	0.0	0.8	0.0
Total Delay	26.3	17.8	7.0	4.5
Queue Length 50th (ft)	27	0	72	68
Queue Length 95th (ft)	69	10	147	107
Internal Link Dist (ft)	78	201	187	190
Turn Bay Length (ft)				
Base Capacity (vph)	315	312	1756	2204
Starvation Cap Reductn	0	0	598	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.34	0.02	0.71	0.41

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	1	45	0	1	5	68	688	14	6	783	66
Future Volume (vph)	54	1	45	0	1	5	68	688	14	6	783	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	10	10	10	10	11	11	10	11	11
Grade (%)		-4%			-6%			2%			-2%	
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		0.99			0.97			1.00			1.00	
Flpb, ped/bikes		0.99			1.00			1.00			1.00	
Frt		0.94			0.89			1.00			0.99	
Flt Protected		0.97			1.00			1.00			1.00	
Satd. Flow (prot)		1311			1235			2878			3015	
Flt Permitted		0.83			1.00			0.79			0.95	
Satd. Flow (perm)		1116			1235			2287			2866	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	57	1	48	0	1	5	72	732	15	6	833	70
RTOR Reduction (vph)	0	41	0	0	4	0	0	1	0	0	6	0
Lane Group Flow (vph)	0	65	0	0	2	0	0	818	0	0	903	0
Confl. Peds. (#/hr)	14		9	9		14	7		9	9		7
Confl. Bikes (#/hr)									2			1
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	8%	0%	0%	4%	0%
Parking (#/hr)	6	6	6	6	6	6						
Turn Type	Perm	NA			NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		9.0			9.0			57.0			57.0	
Effective Green, g (s)		11.0			11.0			59.0			59.0	
Actuated g/C Ratio		0.14			0.14			0.74			0.74	
Clearance Time (s)		7.0			7.0			7.0			7.0	
Vehicle Extension (s)		3.0			3.0			1.0			1.0	
Lane Grp Cap (vph)		153			169			1686			2113	
v/s Ratio Prot					0.00							
v/s Ratio Perm		c0.06						c0.36			0.32	
v/c Ratio		0.42			0.01			0.49			0.43	
Uniform Delay, d1		31.6			29.8			4.3			4.0	
Progression Factor		1.00			1.00			1.00			0.85	
Incremental Delay, d2		1.9			0.0			1.0			0.6	
Delay (s)		33.5			29.8			5.3			4.0	
Level of Service		C			C			A			A	
Approach Delay (s)		33.5			29.8			5.3			4.0	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	6.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	76.5%	ICU Level of Service	D
Analysis Period (min)	15		