WELLS + ASSOCIATES

MEMORANDUM

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Tysons, VA 22102
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TO: Jonathan Rogers, DDOT

FROM: Jami Milanovich, P.E.

COPY: Jeffrey Houser, Georgetown Day School
Allison Prince, Goulston & Storrs
Matt Thrush, JFW, Inc.

RE: Georgetown Day School Public Space Application
Evaluation of 42nd Street NW with One-Way Southbound Operations
between Wisconsin Avenue and Davenport Street

DATE: July 18, 2018

INTRODUCTION

On November 29, 2017, the Board of Zoning Adjustment (BZA) voted to approve Georgetown Day School's (the "School" or "GDS") Special Exception Application[1], which would allow the school to construct a new Lower/Middle School adjacent to the existing High School on the site currently occupied by the former Tenleytown Safeway. As a condition of approval, the School agreed to close a portion of 42nd Street just south of Ellicott Street (the "slip lane") to vehicular traffic, subject to approval by the Public Space Committee. Condition 16 of the BZA Order states:

"The School shall use all reasonable and diligent efforts to cause DDOT and the Public Space Committee ("PSC") to permit the closure to vehicular traffic of the 42nd Street, NW "slip lane" and to allow such slip lane to be returned to a sodded state or to such other finished material as is mutually agreeable to the School and the ANC, in the reasonable determination of each. In the event that the ANC does not support an alternative surface treatment, grass shall be required, subject to DDOT and PSC approval. The final surface treatment of such slip lane post-closure shall be subject to DDOT and PSC approval and DDOT's or the PSC's failure to consent to a landscaped or sodded condition shall not constitute a default of the School hereunder. The Parties agree that subject to the foregoing, the closure of the slip lane must occur prior to issuance of the certificate of occupancy for the Lower/Middle School. Determination of the final surface material, and the installation of the final surface material in the closed slip lane must be completed within one year of the issuance of the certificate of occupancy for the Lower/Middle School."

[1] The BZA Order became final on December 8, 2017.

Following the BZA approval, GDS met with DDOT and the ANC to discuss the design of the area where 42nd Street would be closed to vehicular traffic. At DDOT's request, a 10-foot trail, oriented north-south, between Ellicott Street and the remaining 42nd Street roadway was incorporated into the design. Subsequently, the ANC expressed opposition to the trail unless it could transition to an on-street bicycle lane extending further south along 42nd Street. GDS strongly believes that the creation of such an on-street bicycle lane on 42nd Street is beyond the scope of the BZA approval. As such, it has looked for compromises to satisfy both DDOT and the ANC. One solution could be the conversion of 42nd Street to a one-way southbound operation between Wisconsin Avenue and Davenport Street (the 42nd Street "fishhook"). With the closure of the 42nd Street slip lane, the fishhook was envisioned to be a two-way operation (today, the fishhook operates as one-way northbound). The conversion of this portion of 42nd Street to one-way southbound would allow the DDOT requested trail to transition to an on-street bike lane, which would extend slightly further south to Davenport Street, as shown on Figure 1.

Since 42nd Street between Wisconsin Avenue and Davenport Street was analyzed under two-way operation in the Comprehensive Transportation Review conducted by Wells + Associates in conjunction with GDS's BZA application, an updated analysis has been conducted to determine whether conversion to a one-way southbound operation would have a negative impact on the adjacent roadway network. To quantify the impact, total future conditions (with the relocation of the GDS Lower/Middle School to the Safeway site) were analyzed under two-way 42nd Street operation and one-way 42nd Street operation.

TRAFFIC FORECASTS

Traffic forecasts for total future conditions with two-way operation were taken from the *Georgetown Day School Comprehensive Transportation Review* (dated September 2017), the *Comprehensive Transportation Review Addendum* (dated November 14, 2017), and the *Traffic Signal Warrant Study for Wisconsin Avenue/Chesapeake Street* (revised April 5, 2018). Traffic volumes under two-way operation are shown on Figure 2.

To account for conversion of 42nd Street to one-way southbound operation, the volumes shown on Figure 2 were rerouted. The rerouted volumes are shown on Figure 3.

OPERATIONAL ANALYSIS

To evaluate the impact of the conversion of a portion of 42nd Street to one-way southbound operation, the following intersections were analyzed:

- Fessenden Street/Wisconsin Avenue,
- Ellicott Street/Wisconsin Avenue,
- Wisconsin Avenue/42nd Street,
- Chesapeake Street/Wisconsin Avenue,
- 42nd Street/Davenport Street, and
- 42nd Street/Chesapeake Street.

Levels of service and 95th percentile queues for total future conditions with two-way 42nd Street operation (shown in Tables 1 and 2, respectively) were taken from the *Georgetown Day School Comprehensive Transportation Review* (dated September 2017), the *Comprehensive Transportation Review Addendum* (dated November 14, 2017), and the *Traffic Signal Warrant Study for Wisconsin Avenue/Chesapeake Street* (revised April 5, 2018)

Capacity analyses were performed at the study intersections using the total future peak hour traffic forecasts with the one-way 42nd Street operation shown on Figure 3. The existing traffic signal timings were used for the analysis where applicable. Traffic signal timings at the Chesapeake Street/Wisconsin Avenue intersection were consistent with timings developed in the *Traffic Signal Warrant Study for Wisconsin Avenue/Chesapeake Street.* The level of service results are presented in Table 1 and the 95th percentile queues are presented in Table 2. Synchro reports are included in Attachment A.

As shown on Table 1, the conversion of 42nd Street from two-way to one-way operation between Wisconsin Avenue and Davenport Street is expected to have minimal impact on levels of service in the study area. One notable exception is the intersection of Wisconsin Avenue and Chesapeake Street where the eastbound approach is expected to drop from a level of service (LOS) D to a LOS E during the AM peak hour. The impact can be mitigated by shifting five seconds of green time from the mainline, Wisconsin Avenue, phase to the side street, Chesapeake Street, phase. Note that since the signal design for the intersection still is in progress, the modified signal timings can be incorporated into the final design of the signal.

Table 1
Level of Service Summary

Lane Group	Total Future Conditions With Two-way 42nd Street			Total Future Conditions With One-way 42nd Street		
	AM	PM School	PM Commuter	AM	PM School	PM Commuter
Fessenden Street/Wisconsin Avenue*						
EBL	D	C	-	D	C	-
EBTR	D	D	-	D	D	-
WBL	E	D	-	E	D	-
WBTR	D	D	-	D	D	-
NBLTR	B	B	-	B	B	-
SBLTR	B	B	-	B	B	-
Overall	**B**	**B**	**-**	**B**	**B**	**-**
Ellicott Street/Wisconsin Avenue						
EBLT	D	D	D	D	D	D
EBR	D	D	C	D	D	C
WBLTR	D	D	D	D	D	D
NBLTR	A	B	B	A	A	B
SBLTR	A	B	B	A	B	B
Overall	**B**	**B**	**B**	**B**	**B**	**B**
Wisconsin Avenue/42nd Street						
EBLR	F [252.5]	E [49.9]	D	NA	NA	NA
NBT	A	A	A	A	A	A
SBT	A	A	A	A	A	A
Chesapeake Street/Wisconsin Avenue						
EBLR	D	C	C	E	D	D
NBLT	B	C	B	C	C	B
SBTR	A	A	A	A	A	B
Overall	**A**	**B**	**B**	**B**	**C**	**B**
42nd Street/Davenport Street						
EBL	C	B	B	NA	NA	NA
EBR				B	B	A
NBL	A	A	A	A	A	A
NBT				NA	NA	NA
SBTR	A	A	A	A	A	A

* Since the proposed project is anticipated to generate fewer trips during the PM commuter peak hour than when the Safeway was in operation, the study area for the PM commuter peak hour was reduced. Therefore, queues are not provided for the PM commuter peak hour for these intersections.

Table 1 (continued)
Level of Service Summary

Lane Group	Total Future Conditions With Two-way 42nd Street			Total Future Conditions With One-way 42nd Street		
	AM	PM School	PM Commuter	AM	PM School	PM Commuter
42nd Street/Chesapeake Street						
EBLTR	B	A	A	A	A	A
WBLTR	B	A	A	A	A	A
NBLTR	B	A	A	A	A	A
SBLTR	B	A	A	A	B	A
Overall	**B**	**A**	**A**	**A**	**A**	**A**

As shown on Table 2, the conversion of 42nd Street from one-way to two-way operation is not expected to have a significant impact on queues in the study area.

Table 2
95th Percentile Queue Summary (in feet)

Lane Group	Available Storage†	Total Future Conditions With Two-way Fishhook			Total Future Conditions With One-way Fishhook		
		AM	PM School	PM Commuter	AM	PM School	PM Commuter
Fessenden Street/Wisconsin Avenue							
EBL	90’	34	48	-	34	48	-
EBTR	85'/250'	103	113	-	108	113	-
WBL	90'	288	121	-	288	121	-
WBTR	40'/90'	240	180	-	240	180	-
NBLTR	270'	246	278	-	266	311	-
SBLTR	185'/410'	213	238	-	214	242	-
Ellicott Street/Wisconsin Avenue							
EBLT	140'/420'	110	126	94	110	126	94
EBR	140’	91	29	24	91	29	24
WBLTR	40'/365'	123	81	59	123	81	59
NBLTR	100'	83	458	385	145	104	346
SBLTR	140'	195	206	196	195	206	196

† All distances measured to nearest intersection or end of turn lane, as appropriate. Where two storage lengths are given, the first is the distance to the driveway; the second is the distance to the nearest intersection.

* Since the proposed project is anticipated to generate fewer trips during the PM commuter peak hour than when the Safeway was in operation, the study area for the PM commuter peak hour was reduced. Therefore, queues are not provided for the PM commuter peak hour for these intersections.

Table 2 (continued)
95th Percentile Queue Summary (in feet)

Lane Group	Available Storage†	Total Future Conditions With Two-way Fishhook			Total Future Conditions With One-way Fishhook		
		AM	PM School	PM Commuter	AM	PM School	PM Commuter
Wisconsin Avenue/42nd Street							
EBLR	250'	192	86	45	NA	NA	NA
NBT	280'	0	0	0	0	0	0
SBT	110'	0	0	0	0	0	0
Chesapeake Street/Wisconsin Avenue							
EBLR	275'	62	89	66	235	226	189
NBLT	460’	458	428	327	450	464	129
SBTR	340’	46	169	142	357	162	323
42nd Street/Davenport Street							
EBL	165’	74	21	9	NA	NA	NA
EBR					15	17	8
NBL	220’/340’	33	8	4	1	8	4
NBT					NA	NA	NA
SBTR	250’/375’	0	0	0	0	0	0
42nd Street/Chesapeake Street							
EBLTR	330’	15	13	5	10	7.5	2.5
WBLTR	120’/275’	35	15	13	17.5	15	12.5
NBLTR	300’	68	20	18	17.5	12.5	7.5
SBLTR	120’/765’	78	40	35	37.5	45	37.5

† All distances measured to nearest intersection or end of turn lane, as appropriate. Where two storage lengths are given, the first is the distance to the driveway; the second is the distance to the nearest intersection.

CONCLUSIONS

The conclusions of this evaluation are as follows:

1. With the conversion of 42nd Street from two-way to one-way southbound operation between Wisconsin Avenue and Davenport Street, the eastbound approach of the Wisconsin Avenue/Chesapeake Street intersection will see an increase in traffic volumes. However, the proposed signal, which is being installed by GDS as a condition of their BZA approval, can accommodate the additional traffic.

2. Based on current traffic volumes, 42nd Street is used by some as an alternate northbound route in lieu of Wisconsin Avenue. Conversion of a portion of 42nd Street to one-way southbound will add a relatively moderate amount of traffic to northbound Wisconsin

Avenue. The additional traffic is not expected to have an adverse impact to operations along Wisconsin Avenue.

3. Conversion of 42nd Street to one-way southbound will allow for an on-street bicycle lane to be installed on 42nd Street between the fishhook and Davenport Street, effectively extending the bicycle path from Ellicott Street to Davenport Street.

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FIGURES

Figure 1
Proposed Conversion of 42nd Street to One-Way and Proposed Extension of On-Street Bike Lane

NORTH
Georgetown Day School
Washington, DC

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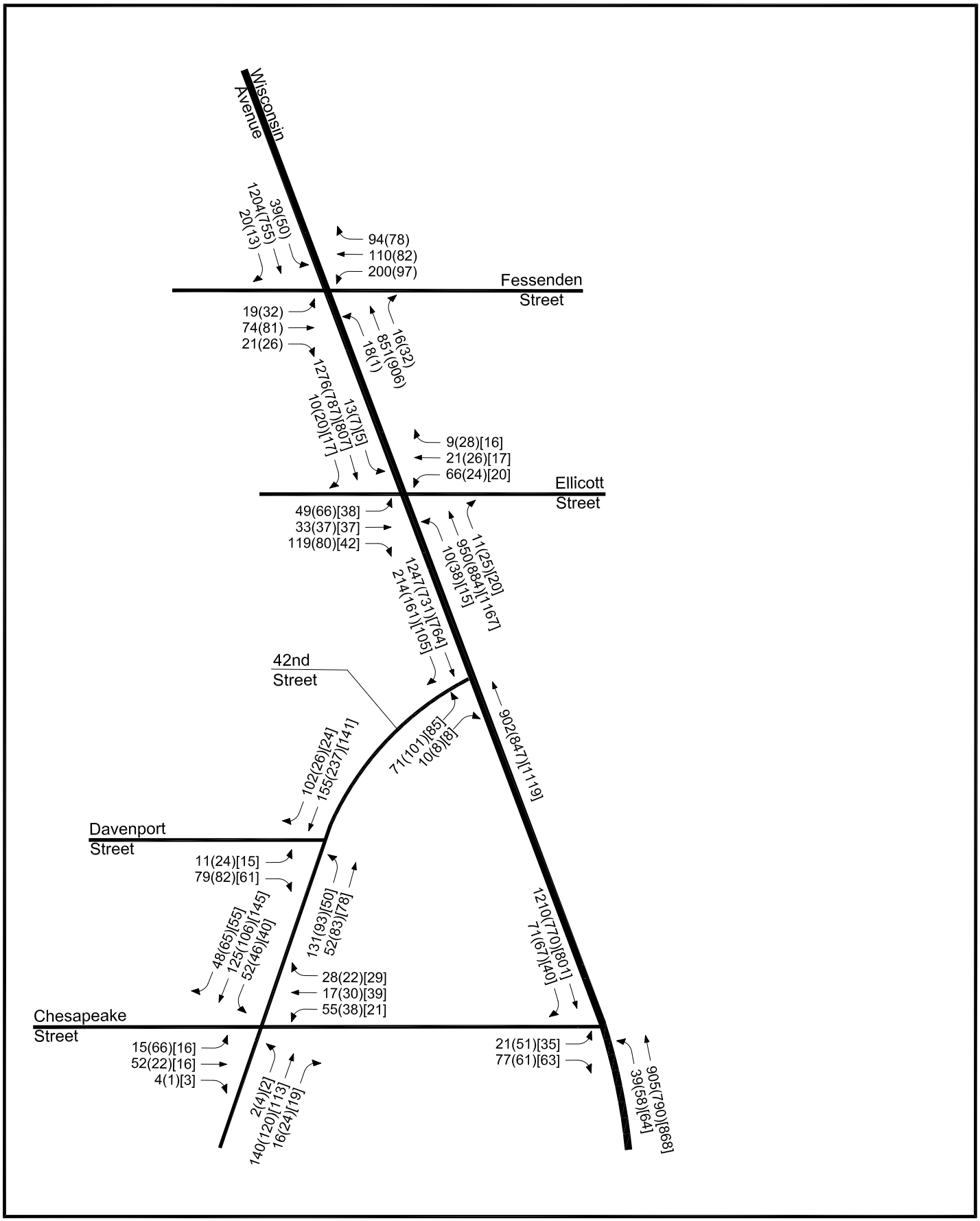

FIGURE 2
Total Future Forecasts with
42nd Street Two-Way

AM Peak Hour
PM School Peak Hour
PM Peak Hour
000 (000) [000]

NORTH

Georgetown Day School
Washington, DC

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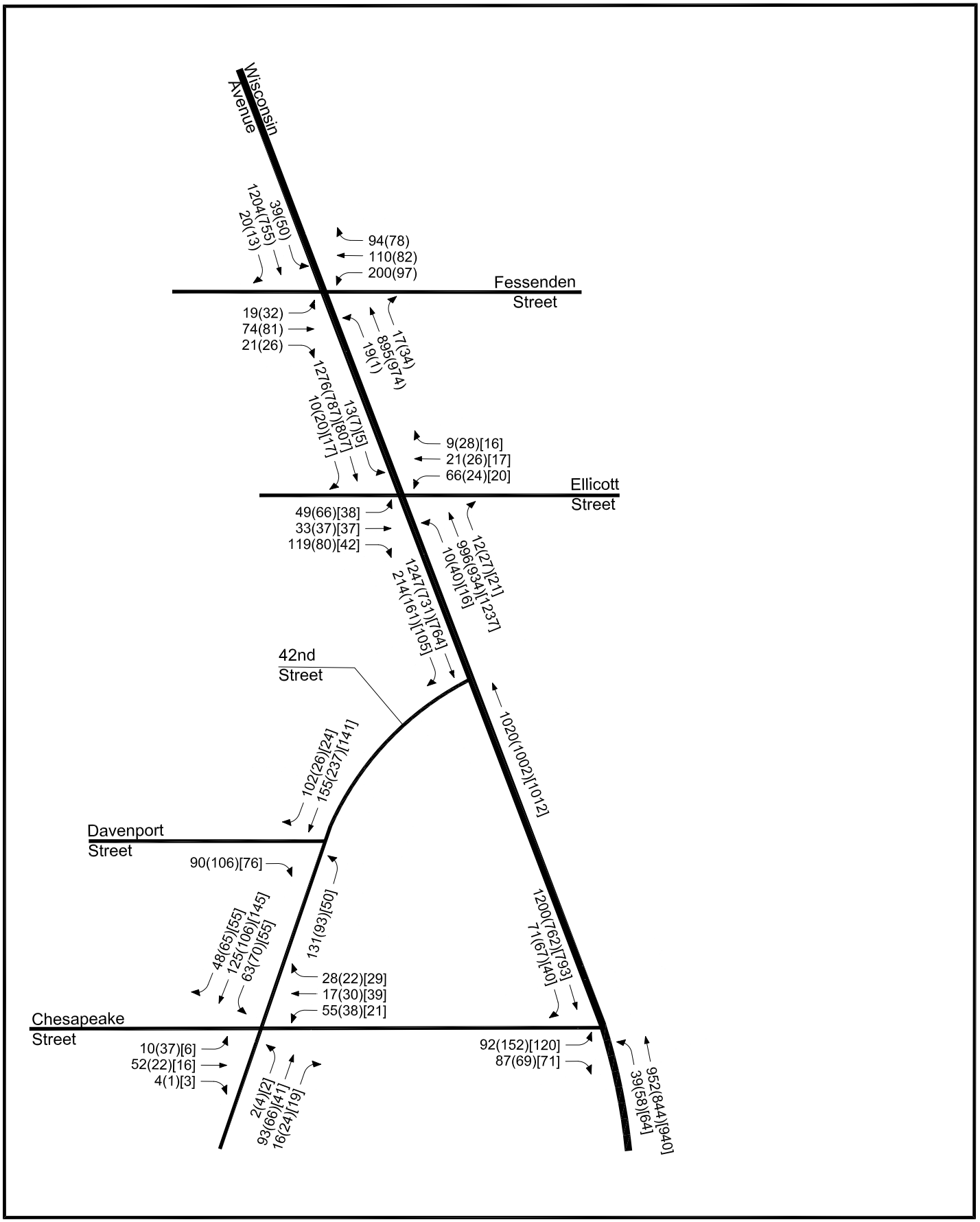


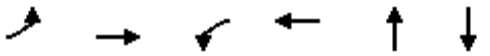
FIGURE 3
Total Future Forecasts with
42nd Street Two-Way

AM Peak Hour
PM School Peak Hour
PM Peak Hour
000 (000) [000]

NORTH

Georgetown Day School
Washington, DC

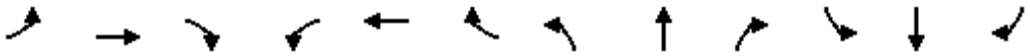
ATTACHMENT A
SYNCHRO WORKSHEETS



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	24	119	220	224	1000	1302
v/c Ratio	0.14	0.34	0.79	0.60	0.59	0.53
Control Delay	37.6	36.7	62.8	47.4	13.1	11.7
Queue Delay	0.0	0.0	0.0	0.0	4.2	0.0
Total Delay	37.6	36.7	62.8	47.4	17.4	11.7
Queue Length 50th (ft)	15	69	160	154	207	178
Queue Length 95th (ft)	34	108	#288	240	266	214
Internal Link Dist (ft)		307		88	278	364
Turn Bay Length (ft)						
Base Capacity (vph)	173	348	280	374	1709	2441
Starvation Cap Reductn	0	0	0	0	615	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.34	0.79	0.60	0.91	0.53

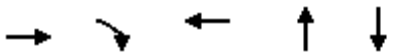
Intersection Summary

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



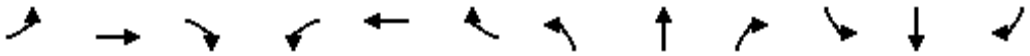
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	74	21	200	110	94	19	895	17	39	1204	20
Future Volume (vph)	19	74	21	200	110	94	19	895	17	39	1204	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	9	8	8	9	8	8	10	9	10	10	9	10
Total Lost time (s)	6.0	6.0		6.0	6.0			5.0			5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.91	
Frpb, ped/bikes	1.00	0.99		1.00	0.98			1.00			1.00	
Flpb, ped/bikes	0.98	1.00		0.98	1.00			1.00			1.00	
Frt	1.00	0.97		1.00	0.93			1.00			1.00	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1380	1362		1584	1498			2880			4271	
Flt Permitted	0.48	1.00		0.67	1.00			0.90			0.87	
Satd. Flow (perm)	695	1362		1121	1498			2598			3705	
Peak-hour factor, PHF	0.80	0.80	0.80	0.91	0.91	0.91	0.93	0.93	0.93	0.97	0.97	0.97
Adj. Flow (vph)	24	92	26	220	121	103	20	962	18	40	1241	21
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	24	111	0	220	224	0	0	1000	0	0	1301	0
Confl. Peds. (#/hr)	23		18	18		23	23		26	26		23
Confl. Bikes (#/hr)			1			1			1			1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	5%	0%	0%	4%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	23	0	0	49
Parking (#/hr)	6	6	6				6	6	6	6	6	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	30.0	30.0		30.0	30.0			79.0			79.0	
Effective Green, g (s)	30.0	30.0		30.0	30.0			79.0			79.0	
Actuated g/C Ratio	0.25	0.25		0.25	0.25			0.66			0.66	
Clearance Time (s)	6.0	6.0		6.0	6.0			5.0			5.0	
Lane Grp Cap (vph)	173	340		280	374			1710			2439	
v/s Ratio Prot		0.08			0.15							
v/s Ratio Perm	0.03			c0.20				c0.38			0.35	
v/c Ratio	0.14	0.33		0.79	0.60			0.58			0.53	
Uniform Delay, d1	35.0	36.7		42.0	39.7			11.4			10.8	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	1.7	2.5		19.6	6.9			1.5			0.8	
Delay (s)	36.6	39.3		61.6	46.6			12.9			11.6	
Level of Service	D	D		E	D			B			B	
Approach Delay (s)		38.8			54.0			12.9			11.6	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	19.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	79.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	EBR	WBT	NBT	SBT
Lane Group Flow (vph)	107	155	100	1095	1397
v/c Ratio	0.43	0.49	0.44	0.54	0.49
Control Delay	48.2	26.8	47.0	5.2	9.1
Queue Delay	0.0	0.0	0.0	0.2	49.1
Total Delay	48.2	26.8	47.0	5.4	58.2
Queue Length 50th (ft)	73	50	65	76	164
Queue Length 95th (ft)	110	91	123	145	195
Internal Link Dist (ft)	160		391	77	106
Turn Bay Length (ft)					
Base Capacity (vph)	246	315	228	2035	2847
Starvation Cap Reductn	0	0	0	282	1584
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.43	0.49	0.44	0.62	1.11

Intersection Summary
Description: Wisconsin and Ellicott/42nd



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	33	119	66	21	9	10	996	12	13	1276	10
Future Volume (vph)	49	33	119	66	21	9	10	996	12	13	1276	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	10	10	10	9	9	14	9	9	8
Total Lost time (s)		6.5	6.5		6.5			5.5			5.5	
Lane Util. Factor		1.00	1.00		1.00			0.95			0.91	
Frpb, ped/bikes		1.00	1.00		1.00			1.00			1.00	
Flpb, ped/bikes		0.99	1.00		1.00			1.00			1.00	
Frt		1.00	0.85		0.99			1.00			1.00	
Flt Protected		0.97	1.00		0.97			1.00			1.00	
Satd. Flow (prot)		1511	1235		1468			3137			4435	
Flt Permitted		0.78	1.00		0.73			0.93			0.92	
Satd. Flow (perm)		1206	1235		1106			2924			4092	
Peak-hour factor, PHF	0.77	0.77	0.77	0.95	0.95	0.95	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	64	43	155	69	22	9	11	1071	13	14	1372	11
RTOR Reduction (vph)	0	0	63	0	3	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	107	92	0	97	0	0	1094	0	0	1396	0
Confl. Peds. (#/hr)	20					20	20		47	47		
Heavy Vehicles (%)	2%	0%	10%	0%	0%	0%	3%	3%	7%	14%	5%	0%
Parking (#/hr)	6	6	6	6	6	6						
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8		8	4			2			6		
Actuated Green, G (s)		24.5	24.5		24.5			83.5			83.5	
Effective Green, g (s)		24.5	24.5		24.5			83.5			83.5	
Actuated g/C Ratio		0.20	0.20		0.20			0.70			0.70	
Clearance Time (s)		6.5	6.5		6.5			5.5			5.5	
Lane Grp Cap (vph)		246	252		225			2034			2847	
v/s Ratio Prot												
v/s Ratio Perm		c0.09	0.07		0.09			c0.37			0.34	
v/c Ratio		0.43	0.37		0.43			0.54			0.49	
Uniform Delay, d1		41.7	41.1		41.7			8.9			8.4	
Progression Factor		1.00	1.00		1.00			0.47			1.00	
Incremental Delay, d2		5.5	4.1		5.9			1.0			0.6	
Delay (s)		47.2	45.1		47.6			5.1			9.0	
Level of Service		D	D		D			A			A	
Approach Delay (s)		46.0			47.6			5.1			9.0	
Approach LOS		D			D			A			A	

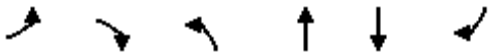
Intersection Summary			
HCM 2000 Control Delay	12.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	67.9%	ICU Level of Service	C
Analysis Period (min)	15		
Description: Wisconsin and Ellicott/42nd			

c Critical Lane Group

Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	0	1020	1247	214	0	0
Future Volume (Veh/h)	0	1020	1247	214	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	0	1360	1663	285	0	0
Pedestrians					1	
Lane Width (ft)					0.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		312	157			
pX, platoon unblocked	0.87				0.91	0.87
vC, conflicting volume	1949				2486	698
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1556				1765	112
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	373				69	802

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	680	680	665	665	618
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	285
cSH	1700	1700	1700	1700	1700
Volume to Capacity	0.40	0.40	0.39	0.39	0.36
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS					
Approach Delay (s)	0.0		0.0		
Approach LOS					

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	32.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	90	13	0	155	102
Future Volume (Veh/h)	0	90	13	0	155	102
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.83	0.83
Hourly flow rate (vph)	0	120	17	0	187	123
Pedestrians	26			22	2	
Lane Width (ft)	11.0			16.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	2			2	0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	310	296	336			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	310	296	336			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	83	99			
cM capacity (veh/h)	658	710	1199			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	120	17	310
Volume Left	0	17	0
Volume Right	120	0	123
cSH	710	1199	1700
Volume to Capacity	0.17	0.01	0.18
Queue Length 95th (ft)	15	1	0
Control Delay (s)	11.1	8.0	0.0
Lane LOS	B	A	
Approach Delay (s)	11.1	8.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	32.6%	ICU Level of Service	A
Analysis Period (min)	15		
Description: 42nd St NW/Davenport St			

Intersection	
Intersection Delay, s/veh	9.4
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	52	4	55	17	28	2	93	16	63	125	48
Future Vol, veh/h	10	52	4	55	17	28	2	93	16	63	125	48
Peak Hour Factor	0.76	0.76	0.76	0.75	0.75	0.75	0.78	0.78	0.78	0.87	0.87	0.87
Heavy Vehicles, %	1	2	0	0	6	0	0	0	0	0	2	0
Mvmt Flow	13	68	5	73	23	37	3	119	21	72	144	55
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.8	9.1	8.8	10
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	2%	15%	55%	27%
Vol Thru, %	84%	79%	17%	53%
Vol Right, %	14%	6%	28%	20%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	111	66	100	236
LT Vol	2	10	55	63
Through Vol	93	52	17	125
RT Vol	16	4	28	48
Lane Flow Rate	142	87	133	271
Geometry Grp	1	1	1	1
Degree of Util (X)	0.185	0.122	0.182	0.343
Departure Headway (Hd)	4.68	5.043	4.91	4.547
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	763	706	727	787
Service Time	2.735	3.107	2.97	2.594
HCM Lane V/C Ratio	0.186	0.123	0.183	0.344
HCM Control Delay	8.8	8.8	9.1	10
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.7	0.4	0.7	1.5

Lane Group	EBL	SET	NWT
Lane Group Flow (vph)	214	1366	1043
v/c Ratio	0.82	0.42	0.57
Control Delay	65.0	3.4	24.7
Queue Delay	0.4	0.1	3.0
Total Delay	65.4	3.5	27.7
Queue Length 50th (ft)	137	111	368
Queue Length 95th (ft)	#235	134	450
Internal Link Dist (ft)	285	357	184
Turn Bay Length (ft)	280		
Base Capacity (vph)	262	3290	1833
Starvation Cap Reductn	0	707	658
Spillback Cap Reductn	2	279	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.82	0.53	0.89

Intersection Summary

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

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (vph)	92	87	1200	71	39	952
Future Volume (vph)	92	87	1200	71	39	952
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10
Total Lost time (s)	5.0		5.0			5.0
Lane Util. Factor	1.00		0.91			0.95
Frpb, ped/bikes	1.00		0.99			1.00
Flpb, ped/bikes	1.00		1.00			1.00
Frt	0.93		0.99			1.00
Flt Protected	0.97		1.00			1.00
Satd. Flow (prot)	1405		4379			2998
Flt Permitted	0.97		1.00			0.81
Satd. Flow (perm)	1405		4379			2445
Peak-hour factor, PHF	0.84	0.84	0.93	0.93	0.95	0.95
Adj. Flow (vph)	110	104	1290	76	41	1002
RTOR Reduction (vph)	28	0	6	0	0	0
Lane Group Flow (vph)	186	0	1361	0	0	1043
Confl. Peds. (#/hr)	22			43	43	
Confl. Bikes (#/hr)				4		
Heavy Vehicles (%)	0%	0%	3%	0%	0%	5%
Bus Blockages (#/hr)	0	0	8	8	0	0
Parking (#/hr)	6	6	6	6	6	6
Turn Type	Prot		NA		Perm	NA
Protected Phases	4		6			2
Permitted Phases					2	
Actuated Green, G (s)	20.0		90.0			90.0
Effective Green, g (s)	20.0		90.0			90.0
Actuated g/C Ratio	0.17		0.75			0.75
Clearance Time (s)	5.0		5.0			5.0
Lane Grp Cap (vph)	234		3284			1833
v/s Ratio Prot	c0.13		0.31			
v/s Ratio Perm						c0.43
v/c Ratio	0.79		0.41			0.57
Uniform Delay, d1	48.0		5.4			6.5
Progression Factor	1.00		0.57			3.54
Incremental Delay, d2	23.6		0.3			0.9
Delay (s)	71.6		3.4			24.1
Level of Service	E		A			C
Approach Delay (s)	71.6		3.4			24.1
Approach LOS	E		A			C

Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	73.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	SET	NWT
Lane Group Flow (vph)	214	1366	1043
v/c Ratio	0.67	0.44	0.60
Control Delay	47.4	5.6	29.2
Queue Delay	0.1	0.1	3.8
Total Delay	47.5	5.7	33.0
Queue Length 50th (ft)	128	116	383
Queue Length 95th (ft)	197	162	462
Internal Link Dist (ft)	285	357	184
Turn Bay Length (ft)	280		
Base Capacity (vph)	321	3107	1729
Starvation Cap Reductn	0	669	581
Spillback Cap Reductn	2	283	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.67	0.56	0.91

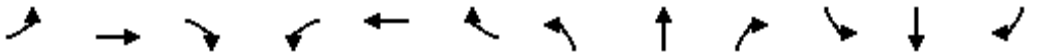
Intersection Summary

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (vph)	92	87	1200	71	39	952
Future Volume (vph)	92	87	1200	71	39	952
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10
Total Lost time (s)	5.0		5.0			5.0
Lane Util. Factor	1.00		0.91			0.95
Frpb, ped/bikes	1.00		0.99			1.00
Flpb, ped/bikes	1.00		1.00			1.00
Frt	0.93		0.99			1.00
Flt Protected	0.97		1.00			1.00
Satd. Flow (prot)	1405		4379			2998
Flt Permitted	0.97		1.00			0.81
Satd. Flow (perm)	1405		4379			2443
Peak-hour factor, PHF	0.84	0.84	0.93	0.93	0.95	0.95
Adj. Flow (vph)	110	104	1290	76	41	1002
RTOR Reduction (vph)	29	0	5	0	0	0
Lane Group Flow (vph)	186	0	1361	0	0	1043
Confl. Peds. (#/hr)	22			43	43	
Confl. Bikes (#/hr)				4		
Heavy Vehicles (%)	0%	0%	3%	0%	0%	5%
Bus Blockages (#/hr)	0	0	8	8	0	0
Parking (#/hr)	6	6	6	6	6	6
Turn Type	Prot		NA		Perm	NA
Protected Phases	4		6			2
Permitted Phases					2	
Actuated Green, G (s)	25.0		85.0			85.0
Effective Green, g (s)	25.0		85.0			85.0
Actuated g/C Ratio	0.21		0.71			0.71
Clearance Time (s)	5.0		5.0			5.0
Lane Grp Cap (vph)	292		3101			1730
v/s Ratio Prot	c0.13		0.31			
v/s Ratio Perm						c0.43
v/c Ratio	0.64		0.44			0.60
Uniform Delay, d1	43.3		7.4			8.9
Progression Factor	1.00		0.70			3.07
Incremental Delay, d2	10.1		0.4			1.1
Delay (s)	53.5		5.6			28.4
Level of Service	D		A			C
Approach Delay (s)	53.5		5.6			28.4
Approach LOS	D		A			C

Intersection Summary			
HCM 2000 Control Delay	18.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	73.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

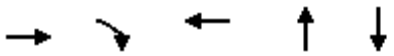
Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	40	134	107	176	1085	843
v/c Ratio	0.17	0.34	0.36	0.41	0.60	0.56
Control Delay	34.7	33.3	38.6	38.5	15.2	14.8
Queue Delay	0.0	0.0	0.0	0.0	8.5	0.0
Total Delay	34.7	33.3	38.6	38.5	23.8	14.8
Queue Length 50th (ft)	23	73	66	111	247	185
Queue Length 95th (ft)	48	113	121	180	311	242
Internal Link Dist (ft)		307		88	278	364
Turn Bay Length (ft)						
Base Capacity (vph)	242	395	297	425	1810	1500
Starvation Cap Reductn	0	0	0	0	689	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.34	0.36	0.41	0.97	0.56

Intersection Summary



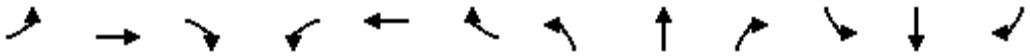
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	81	26	97	82	78	1	974	34	50	755	13
Future Volume (vph)	32	81	26	97	82	78	1	974	34	50	755	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	9	8	8	9	8	8	10	10	10	10	10	10
Total Lost time (s)	6.0	6.0		6.0	6.0			5.0			5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.98			1.00			1.00	
Flpb, ped/bikes	0.99	1.00		0.97	1.00			1.00			1.00	
Frt	1.00	0.96		1.00	0.93			0.99			1.00	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1393	1363		1527	1503			3032			3008	
Flt Permitted	0.58	1.00		0.65	1.00			0.95			0.79	
Satd. Flow (perm)	855	1363		1050	1503			2895			2398	
Peak-hour factor, PHF	0.80	0.80	0.80	0.91	0.91	0.91	0.93	0.93	0.93	0.97	0.97	0.97
Adj. Flow (vph)	40	101	32	107	90	86	1	1047	37	52	778	13
RTOR Reduction (vph)	0	10	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	40	124	0	107	176	0	0	1085	0	0	842	0
Confl. Peds. (#/hr)	12		24	24		12	46		25	25		46
Confl. Bikes (#/hr)									4			1
Heavy Vehicles (%)	0%	0%	0%	3%	0%	0%	0%	3%	0%	0%	4%	8%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	44	0	0	27
Parking (#/hr)	6	6	6				6	6	6	6	6	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	34.0	34.0		34.0	34.0			75.0			75.0	
Effective Green, g (s)	34.0	34.0		34.0	34.0			75.0			75.0	
Actuated g/C Ratio	0.28	0.28		0.28	0.28			0.62			0.62	
Clearance Time (s)	6.0	6.0		6.0	6.0			5.0			5.0	
Lane Grp Cap (vph)	242	386		297	425			1809			1498	
v/s Ratio Prot		0.09			c0.12							
v/s Ratio Perm	0.05			0.10				c0.37			0.35	
v/c Ratio	0.17	0.32		0.36	0.41			0.60			0.56	
Uniform Delay, d1	32.3	33.9		34.3	34.9			13.5			13.0	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	1.5	2.2		3.4	3.0			1.5			1.5	
Delay (s)	33.8	36.1		37.7	37.9			15.0			14.5	
Level of Service	C	D		D	D			B			B	
Approach Delay (s)		35.6			37.8			15.0			14.5	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	19.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	90.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	EBR	WBT	NBT	SBT
Lane Group Flow (vph)	134	104	81	1076	876
v/c Ratio	0.45	0.28	0.25	0.60	0.46
Control Delay	44.2	8.9	28.9	4.8	11.2
Queue Delay	0.0	0.0	0.0	0.1	51.4
Total Delay	44.2	8.9	28.9	4.9	62.6
Queue Length 50th (ft)	88	0	36	87	162
Queue Length 95th (ft)	126	29	81	104	206
Internal Link Dist (ft)	77		391	77	106
Turn Bay Length (ft)					
Base Capacity (vph)	297	372	330	1782	1903
Starvation Cap Reductn	0	0	0	94	1121
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.45	0.28	0.25	0.64	1.12

Intersection Summary
Description: Wisconsin and Ellicott/42nd



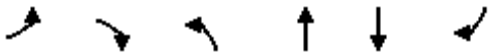
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	66	37	80	24	26	28	40	934	27	7	787	20
Future Volume (vph)	66	37	80	24	26	28	40	934	27	7	787	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	10	10	10	9	9	14	9	9	8
Total Lost time (s)		6.5	6.5		6.5			5.5			5.5	
Lane Util. Factor		1.00	1.00		1.00			0.95			0.95	
Frpb, ped/bikes		1.00	0.97		0.99			1.00			1.00	
Flpb, ped/bikes		0.99	1.00		1.00			1.00			1.00	
Frt		1.00	0.85		0.95			1.00			1.00	
Flt Protected		0.97	1.00		0.98			1.00			1.00	
Satd. Flow (prot)		1507	1198		1421			3119			3079	
Flt Permitted		0.78	1.00		0.88			0.87			0.94	
Satd. Flow (perm)		1211	1198		1276			2722			2907	
Peak-hour factor, PHF	0.77	0.77	0.77	0.95	0.95	0.95	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	86	48	104	25	27	29	43	1004	29	8	846	22
RTOR Reduction (vph)	0	0	78	0	17	0	0	2	0	0	1	0
Lane Group Flow (vph)	0	134	26	0	64	0	0	1074	0	0	875	0
Confl. Peds. (#/hr)	17		9	9		17	25		23	23		25
Confl. Bikes (#/hr)			3						2			3
Heavy Vehicles (%)	2%	0%	10%	0%	0%	0%	3%	3%	7%	14%	5%	0%
Parking (#/hr)	6	6	6	6	6	6						
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8		8	4			2			6		
Actuated Green, G (s)		29.5	29.5		29.5			78.5			78.5	
Effective Green, g (s)		29.5	29.5		29.5			78.5			78.5	
Actuated g/C Ratio		0.25	0.25		0.25			0.65			0.65	
Clearance Time (s)		6.5	6.5		6.5			5.5			5.5	
Lane Grp Cap (vph)		297	294		313			1780			1901	
v/s Ratio Prot												
v/s Ratio Perm		c0.11	0.02		0.05			c0.39			0.30	
v/c Ratio		0.45	0.09		0.21			0.60			0.46	
Uniform Delay, d1		38.4	34.9		35.9			11.9			10.3	
Progression Factor		1.00	1.00		1.00			0.28			1.00	
Incremental Delay, d2		4.9	0.6		1.5			1.4			0.8	
Delay (s)		43.3	35.5		37.4			4.8			11.1	
Level of Service		D	D		D			A			B	
Approach Delay (s)		39.9			37.4			4.8			11.1	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	85.1%	ICU Level of Service	E
Analysis Period (min)	15		
Description: Wisconsin and Ellicott/42nd			
c Critical Lane Group			

Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	0	1002	731	161	0	0
Future Volume (Veh/h)	0	1002	731	161	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.94	0.94
Hourly flow rate (vph)	0	1077	786	173	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		312	157			
pX, platoon unblocked					0.88	
vC, conflicting volume	959				1411	348
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	959				1192	348
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	725				158	653

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	538	538	314	314	330
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	173
cSH	1700	1700	1700	1700	1700
Volume to Capacity	0.32	0.32	0.18	0.18	0.19
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS					
Approach Delay (s)	0.0		0.0		
Approach LOS					

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	31.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	106	93	0	237	26
Future Volume (Veh/h)	0	106	93	0	237	26
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	0	125	109	0	279	31
Pedestrians	36			22	5	
Lane Width (ft)	11.0			16.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	3			2	0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	554	352	346			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	554	352	346			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	81	91			
cM capacity (veh/h)	430	660	1191			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	125	109	310
Volume Left	0	109	0
Volume Right	125	0	31
cSH	660	1191	1700
Volume to Capacity	0.19	0.09	0.18
Queue Length 95th (ft)	17	8	0
Control Delay (s)	11.7	8.3	0.0
Lane LOS	B	A	
Approach Delay (s)	11.7	8.3	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	4.4		
Intersection Capacity Utilization	34.7%	ICU Level of Service	A
Analysis Period (min)	15		
Description: 42nd St NW/Davenport St			

Intersection	
Intersection Delay, s/veh	9.4
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	37	22	1	38	30	22	4	66	24	70	106	65
Future Vol, veh/h	37	22	1	38	30	22	4	66	24	70	106	65
Peak Hour Factor	0.92	0.92	0.92	0.75	0.75	0.75	0.88	0.88	0.88	0.77	0.77	0.77
Heavy Vehicles, %	0	9	0	0	4	0	0	0	0	0	0	0
Mvmt Flow	40	24	1	51	40	29	5	75	27	91	138	84
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.7	8.9	8.3	10.1
HCM LOS	A	A	A	B

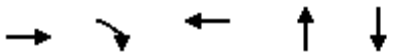
Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	4%	62%	42%	29%
Vol Thru, %	70%	37%	33%	44%
Vol Right, %	26%	2%	24%	27%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	94	60	90	241
LT Vol	4	37	38	70
Through Vol	66	22	30	106
RT Vol	24	1	22	65
Lane Flow Rate	107	65	120	313
Geometry Grp	1	1	1	1
Degree of Util (X)	0.135	0.093	0.162	0.381
Departure Headway (Hd)	4.566	5.117	4.867	4.382
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	783	697	734	820
Service Time	2.609	3.17	2.916	2.414
HCM Lane V/C Ratio	0.137	0.093	0.163	0.382
HCM Control Delay	8.3	8.7	8.9	10.1
HCM Lane LOS	A	A	A	B
HCM 95th-tile Q	0.5	0.3	0.6	1.8

Lane Group	EBL	SET	NWT
Lane Group Flow (vph)	240	891	960
v/c Ratio	0.53	0.50	0.65
Control Delay	36.4	7.1	30.5
Queue Delay	0.0	0.1	3.1
Total Delay	36.4	7.2	33.6
Queue Length 50th (ft)	141	127	385
Queue Length 95th (ft)	226	162	464
Internal Link Dist (ft)	285	357	184
Turn Bay Length (ft)	280		
Base Capacity (vph)	451	1784	1480
Starvation Cap Reductn	0	209	400
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.53	0.57	0.89

Intersection Summary

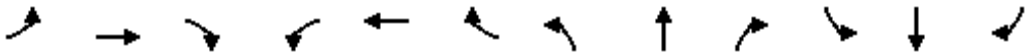
Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (vph)	152	69	762	67	58	844
Future Volume (vph)	152	69	762	67	58	844
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10
Total Lost time (s)	5.0		5.0			5.0
Lane Util. Factor	1.00		0.95			0.95
Frpb, ped/bikes	0.99		0.98			1.00
Flpb, ped/bikes	1.00		1.00			1.00
Frt	0.96		0.99			1.00
Flt Protected	0.97		1.00			1.00
Satd. Flow (prot)	1421		2925			2992
Flt Permitted	0.97		1.00			0.81
Satd. Flow (perm)	1421		2925			2434
Peak-hour factor, PHF	0.92	0.92	0.93	0.93	0.94	0.94
Adj. Flow (vph)	165	75	819	72	62	898
RTOR Reduction (vph)	14	0	5	0	0	0
Lane Group Flow (vph)	226	0	886	0	0	960
Confl. Peds. (#/hr)	27	3		64	64	
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	0%	0%	3%	0%	0%	5%
Bus Blockages (#/hr)	0	0	8	8	0	0
Parking (#/hr)	6	6	6	6	6	6
Turn Type	Prot		NA		Perm	NA
Protected Phases	4		6			2
Permitted Phases					2	
Actuated Green, G (s)	37.0		73.0			73.0
Effective Green, g (s)	37.0		73.0			73.0
Actuated g/C Ratio	0.31		0.61			0.61
Clearance Time (s)	5.0		5.0			5.0
Lane Grp Cap (vph)	438		1779			1480
v/s Ratio Prot	c0.16		0.30			
v/s Ratio Perm						c0.39
v/c Ratio	0.52		0.50			0.65
Uniform Delay, d1	34.1		13.2			15.2
Progression Factor	1.00		0.47			1.85
Incremental Delay, d2	4.3		0.9			1.7
Delay (s)	38.4		7.1			29.8
Level of Service	D		A			C
Approach Delay (s)	38.4		7.1			29.8
Approach LOS	D		A			C

Intersection Summary			
HCM 2000 Control Delay	21.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	76.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	EBR	WBT	NBT	SBT
Lane Group Flow (vph)	97	55	71	1456	855
v/c Ratio	0.31	0.15	0.22	0.60	0.44
Control Delay	40.2	10.3	30.0	13.5	10.9
Queue Delay	0.0	0.0	0.0	0.1	51.5
Total Delay	40.2	10.3	30.0	13.6	62.4
Queue Length 50th (ft)	62	0	33	299	155
Queue Length 95th (ft)	94	24	59	346	196
Internal Link Dist (ft)	77		391	77	106
Turn Bay Length (ft)					
Base Capacity (vph)	315	364	318	2442	1942
Starvation Cap Reductn	0	0	0	227	1172
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.31	0.15	0.22	0.66	1.11

Intersection Summary
Description: Wisconsin and Ellicott/42nd



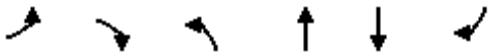
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	37	42	20	17	16	67	1237	21	5	807	17
Future Volume (vph)	38	37	42	20	17	16	67	1237	21	5	807	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	10	10	10	9	9	14	9	9	8
Total Lost time (s)		6.5	6.5		6.5			5.5			5.5	
Lane Util. Factor		1.00	1.00		1.00			0.91			0.95	
Frpb, ped/bikes		1.00	0.97		0.99			1.00			1.00	
Flpb, ped/bikes		0.99	1.00		0.99			1.00			1.00	
Frt		1.00	0.85		0.96			1.00			1.00	
Flt Protected		0.98	1.00		0.98			1.00			1.00	
Satd. Flow (prot)		1525	1315		1403			4536			3140	
Flt Permitted		0.82	1.00		0.87			0.82			0.95	
Satd. Flow (perm)		1284	1315		1246			3729			2969	
Peak-hour factor, PHF	0.77	0.77	0.77	0.75	0.75	0.75	0.91	0.91	0.91	0.97	0.97	0.97
Adj. Flow (vph)	49	48	55	27	23	21	74	1359	23	5	832	18
RTOR Reduction (vph)	0	0	41	0	13	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	97	14	0	58	0	0	1455	0	0	854	0
Confl. Peds. (#/hr)	17		12	12		17	27		50	50		27
Confl. Bikes (#/hr)									4			5
Heavy Vehicles (%)	2%	0%	0%	0%	0%	6%	0%	2%	0%	0%	3%	5%
Parking (#/hr)	6	6	6	6	6	6						
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8		8	4			2			6		
Actuated Green, G (s)		29.5	29.5		29.5			78.5			78.5	
Effective Green, g (s)		29.5	29.5		29.5			78.5			78.5	
Actuated g/C Ratio		0.25	0.25		0.25			0.65			0.65	
Clearance Time (s)		6.5	6.5		6.5			5.5			5.5	
Lane Grp Cap (vph)		315	323		306			2439			1942	
v/s Ratio Prot												
v/s Ratio Perm		c0.08	0.01		0.05			c0.39			0.29	
v/c Ratio		0.31	0.04		0.19			0.60			0.44	
Uniform Delay, d1		36.9	34.5		35.8			11.8			10.1	
Progression Factor		1.00	1.00		1.00			1.04			1.00	
Incremental Delay, d2		2.5	0.2		1.4			1.1			0.7	
Delay (s)		39.4	34.7		37.2			13.3			10.8	
Level of Service		D	C		D			B			B	
Approach Delay (s)		37.7			37.2			13.3			10.8	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	14.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.4%	ICU Level of Service	E
Analysis Period (min)	15		
Description: Wisconsin and Ellicott/42nd			
c Critical Lane Group			

Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	0	1012	764	105	0	0
Future Volume (Veh/h)	0	1012	764	105	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.91	0.91	0.97	0.97	0.89	0.89
Hourly flow rate (vph)	0	1112	788	108	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		312	157			
pX, platoon unblocked					0.92	
vC, conflicting volume	896				1213	317
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	896				908	317
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	766				255	685

Direction, Lane #	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	371	371	371	315	315	266
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	0	108
cSH	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.22	0.22	0.22	0.19	0.19	0.16
Queue Length 95th (ft)	0	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS						
Approach Delay (s)	0.0			0.0		
Approach LOS						

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	22.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	76	50	0	141	24
Future Volume (Veh/h)	0	76	50	0	141	24
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.81	0.81	0.92	0.92
Hourly flow rate (vph)	0	82	62	0	153	26
Pedestrians	18			22	6	
Lane Width (ft)	11.0			16.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			2	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	314	206	197			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	314	206	197			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	90	95			
cM capacity (veh/h)	640	808	1369			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	82	62	179
Volume Left	0	62	0
Volume Right	82	0	26
cSH	808	1369	1700
Volume to Capacity	0.10	0.05	0.11
Queue Length 95th (ft)	8	4	0
Control Delay (s)	10.0	7.8	0.0
Lane LOS	A	A	
Approach Delay (s)	10.0	7.8	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.0		
Intersection Capacity Utilization	29.2%	ICU Level of Service	A
Analysis Period (min)	15		
Description: 42nd St NW/Davenport St			

Intersection	
Intersection Delay, s/veh	8.8
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	16	3	21	39	29	2	41	19	55	145	55
Future Vol, veh/h	6	16	3	21	39	29	2	41	19	55	145	55
Peak Hour Factor	0.87	0.87	0.87	0.80	0.80	0.80	0.86	0.86	0.86	0.90	0.90	0.90
Heavy Vehicles, %	0	0	0	0	3	0	0	0	5	0	0	0
Mvmt Flow	7	18	3	26	49	36	2	48	22	61	161	61
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8	8.3	7.8	9.3
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	3%	24%	24%	22%
Vol Thru, %	66%	64%	44%	57%
Vol Right, %	31%	12%	33%	22%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	62	25	89	255
LT Vol	2	6	21	55
Through Vol	41	16	39	145
RT Vol	19	3	29	55
Lane Flow Rate	72	29	111	283
Geometry Grp	1	1	1	1
Degree of Util (X)	0.087	0.038	0.141	0.333
Departure Headway (Hd)	4.353	4.798	4.57	4.226
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	824	746	785	853
Service Time	2.374	2.826	2.593	2.24
HCM Lane V/C Ratio	0.087	0.039	0.141	0.332
HCM Control Delay	7.8	8	8.3	9.3
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.3	0.1	0.5	1.5

Lane Group	EBL	SET	NWT
Lane Group Flow (vph)	205	915	1068
v/c Ratio	0.47	0.49	0.48
Control Delay	34.0	14.9	10.8
Queue Delay	0.0	1.8	0.0
Total Delay	34.0	16.6	10.8
Queue Length 50th (ft)	113	248	87
Queue Length 95th (ft)	189	323	129
Internal Link Dist (ft)	285	357	184
Turn Bay Length (ft)	280		
Base Capacity (vph)	439	1877	2205
Starvation Cap Reductn	0	751	0
Spillback Cap Reductn	0	12	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.47	0.81	0.48

Intersection Summary

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (vph)	120	71	793	40	64	940
Future Volume (vph)	120	71	793	40	64	940
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10
Total Lost time (s)	5.0		5.0			5.0
Lane Util. Factor	1.00		0.95			0.91
Frpb, ped/bikes	0.99		0.99			1.00
Flpb, ped/bikes	1.00		1.00			1.00
Frt	0.95		0.99			1.00
Flt Protected	0.97		1.00			1.00
Satd. Flow (prot)	1409		3039			4474
Flt Permitted	0.97		1.00			0.80
Satd. Flow (perm)	1409		3039			3576
Peak-hour factor, PHF	0.93	0.93	0.91	0.91	0.94	0.94
Adj. Flow (vph)	129	76	871	44	68	1000
RTOR Reduction (vph)	18	0	3	0	0	0
Lane Group Flow (vph)	188	0	912	0	0	1068
Confl. Peds. (#/hr)	6	5		56	56	
Confl. Bikes (#/hr)				6		
Heavy Vehicles (%)	0%	0%	0%	3%	2%	3%
Bus Blockages (#/hr)	0	0	8	8	0	0
Parking (#/hr)	6	6	6	6	6	6
Turn Type	Prot		NA		Perm	NA
Protected Phases	4		6			2
Permitted Phases					2	
Actuated Green, G (s)	36.0		74.0			74.0
Effective Green, g (s)	36.0		74.0			74.0
Actuated g/C Ratio	0.30		0.62			0.62
Clearance Time (s)	5.0		5.0			5.0
Lane Grp Cap (vph)	422		1874			2205
v/s Ratio Prot	c0.13		c0.30			
v/s Ratio Perm						0.30
v/c Ratio	0.44		0.49			0.48
Uniform Delay, d1	33.9		12.6			12.6
Progression Factor	1.00		1.11			0.80
Incremental Delay, d2	3.4		0.8			0.6
Delay (s)	37.3		14.8			10.6
Level of Service	D		B			B
Approach Delay (s)	37.3		14.8			10.6
Approach LOS	D		B			B

Intersection Summary			
HCM 2000 Control Delay	14.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	68.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			