Technical Memorandum

To:	Kenneth Jennings – Jennings Developments	Date:	2023-01-24
Cc:	Nathan Petryshyn – Fotenn		
From:	John Kingsley, Andrew Harte – CGH	Project Number:	2020-103

Re: 3750 North Bowesville Road TIA Addendum

Context

This addendum serves to investigate the traffic volumes presented in the Transportation Impact Assessment (TIA) for the proposed development at 3750 North Bowesville Road, prepared by CGH in October of 2022.

Typically, traffic counts conducted within the past five years are considered to remain valid. In the case of the subject TIA, given the counts were conducted just before the pandemic disrupted traffic patterns, it was assumed that the volumes represented in the TIA were the most conservative case possible. Based on community interest in ensuring the analysis presented in the TIA is sufficiently conservative, CGH initiated a new count of the intersection of Riverside Drive at Uplands Drive/Kimberwick Crescent to verify that the volumes represented in the TIA have not since been exceeded and that conditions are not, resultantly, worse than modeled.

Traffic Volumes

Table 1 summarizes the location, dates, and sources of data for both the count used in the TIA and the new count.

Table 1: Intersection Count Dates

Intersection	Count Date	Data Source
Riverside Drive at Uplands Drive/Kimberwick Crescent	Wednesday, January 22, 2020	City of Ottawa
Riverside Drive at Uplands Drive/Kimberwick Crescent	Tuesday, January 17, 2023	The Traffic Specialist

Figure 1 illustrates the existing traffic volumes from the TIA based upon the January 2020 count, and the new volumes collected in 2023. Figure 2 illustrates the difference in volumes between the two count horizons, where negative values indicate reductions since the 2020 count.

Figure 1: Existing Traffic Counts

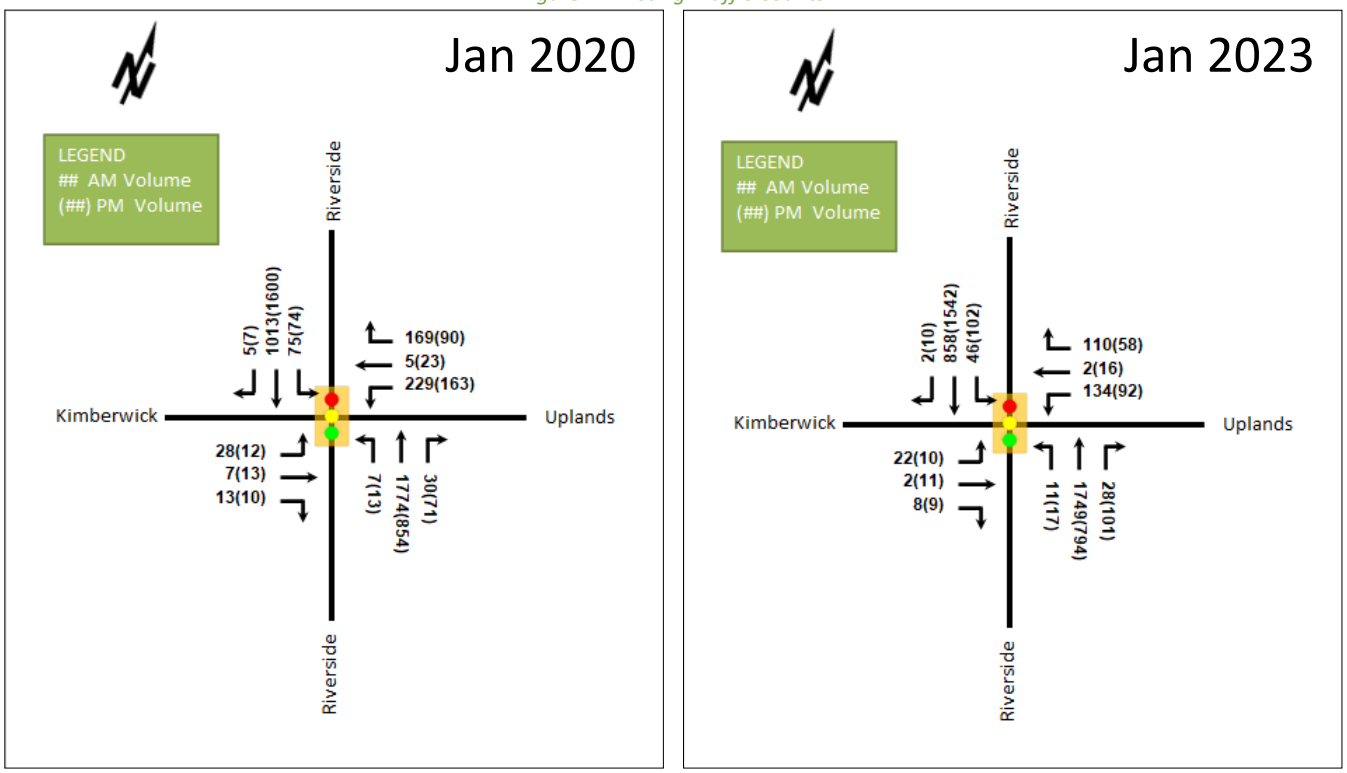
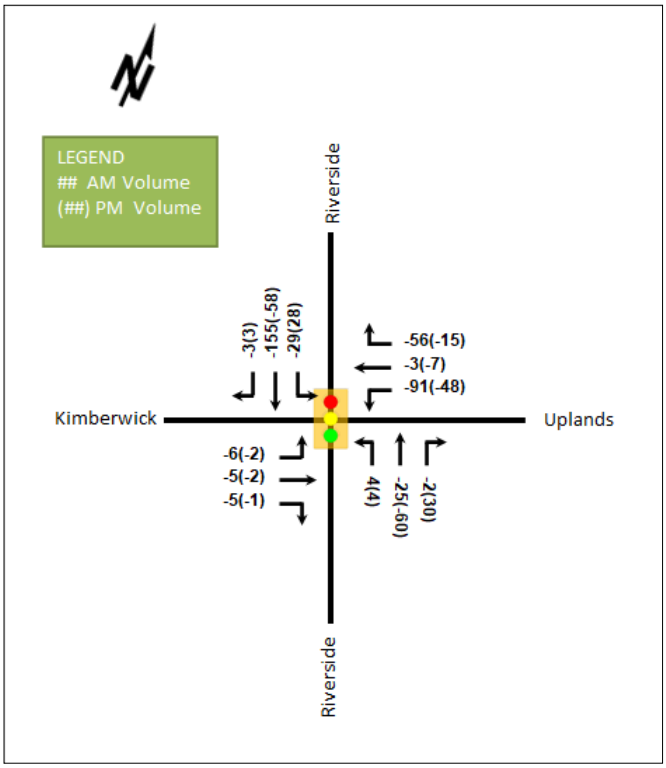


Figure 2: Volume Difference



Overall, the intersection has experienced a reduction in traffic with the exception of the northbound left during the AM and PM peaks, and the northbound right and southbound left movement during the PM peak hour. The minor increase in volumes on these movements are assumed to be a result of area traffic rerouting to access the community from the west due to the opportunity generated by reduced delays along the Riverside Drive corridor.

Traffic Operations

Table 2 summarizes the existing intersection operations presented in the TIA based upon the 2020 count.

Table 2: Existing Intersection Operations from the TIA

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Riverside Drive at Uplands Drive/ Kimberwick Crescent *Signalized*	EBL	A	0.20	40.7	14.8	A	0.09	42.8	8.5
	EBT/R	A	0.06	20.9	8.2	A	0.08	27.9	10.4
	WBL/T	E	0.92	**82.7**	**#106.4**	D	0.85	**80.2**	**#84.6**
	WBR	A	0.40	7.9	18.0	A	0.28	9.8	14.4
	NBL	A	0.03	14.6	3.6	A	0.14	17.3	5.8
	NBT/R	**F**	**1.06**	**66.6**	**#341.8**	A	0.52	16.3	102.1
	SBL	A	0.50	25.1	20.8	A	0.25	8.2	11.7
	SBT/R	A	0.51	11.3	82.5	C	0.76	15.0	182.1
	Overall	**F**	**1.02**	**46.5**	-	**D**	**0.82**	**19.5**	-

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 0.90
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity
v/c = volume to capacity ratio

As shown above, high delays and extended queues are note on the westbound left/through movement during both peak hours, and the northbound through/right movement and the overall intersection are operation over theoretical capacity during the AM peak hour.

Table 3 summarizes the intersection operations based on the updated 2023 count. The Synchro intersection worksheets are provided in Attachment 1.

Table 3: Existing Intersection Operations Using the 2023 Volumes

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Riverside Drive at Uplands Drive/ Kimberwick Crescent *Signalized*	EBL	A	0.14	40.5	11.8	A	0.07	43.5	7.5
	EBT/R	A	0.04	21.3	5.2	A	0.09	29.2	9.8
	WBL/T	B	0.69	62.2	52.0	B	0.63	64.6	46.4
	WBR	A	0.36	9.6	15.0	A	0.23	8.4	9.0
	NBL	A	0.04	12.5	4.4	A	0.14	16.0	7.4
	NBT/R	E	0.94	32.4	**#321.5**	A	0.48	14.1	99.3
	SBL	A	0.36	17.3	12.0	A	0.32	7.8	15.3
	SBT/R	A	0.40	7.9	64.5	B	0.69	11.5	166.3
	Overall	**D**	**0.89**	**25.5**	-	**C**	**0.72**	**14.5**	-

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 0.90
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity
v/c = volume to capacity ratio

As shown above, delays and queues on the westbound left/through movement have been reduced during both peak hours, and capacity issues on the northbound through/right and overall intersection have been resolved during the AM peak hour. The intersection presently operates well and better than modeled within the TIA.

Conclusions

Vehicle volumes at the intersection of Riverside Drive at Uplands Drive/Kimberwick Crescent were confirmed to be lower in 2023 than in 2020, which are modelled within the TIA.

As a result of the reduction in volumes since 2020, the operations at this intersection are improved from those modelled within the TIA. Of specific note to the area residents, the delays and queues on the westbound approach of this study area intersection are reduced.

Therefore, the analyses contained within the TIA are considered to be conservative, and thus the conclusions remain valid.

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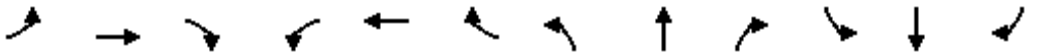
Attachment 1

Synchro Intersection Worksheets – Existing 2023 Conditions

CGH TRANSPORTATION



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	2	8	132	2	110	11	1749	28	46	858	2
Future Volume (vph)	22	2	8	132	2	110	11	1749	28	46	858	2
Satd. Flow (prot)	1658	1510	0	0	1659	1455	1658	3305	0	1551	3283	0
Flt Permitted	0.583				0.721		0.300			0.049		
Satd. Flow (perm)	1002	1510	0	0	1252	1410	522	3305	0	80	3283	0
Satd. Flow (RTOR)		9				122		2				
Lane Group Flow (vph)	24	11	0	0	149	122	12	1974	0	51	955	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	8	2	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	10.0	10.0		5.0	10.0	
Minimum Split (s)	34.5	34.5		34.5	34.5	34.5	31.1	31.1		11.1	31.1	
Total Split (s)	35.0	35.0		35.0	35.0	35.0	65.0	65.0		20.0	85.0	
Total Split (%)	29.2%	29.2%		29.2%	29.2%	29.2%	54.2%	54.2%		16.7%	70.8%	
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.7	3.7		3.7	3.7	
All-Red Time (s)	3.2	3.2		3.2	3.2	3.2	2.4	2.4		2.4	2.4	
Lost Time Adjust (s)	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.5	6.5			6.5	6.5	6.1	6.1		6.1	6.1	
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Max	C-Max		None	C-Max	
Act Effct Green (s)	20.6	20.6			20.6	20.6	76.2	76.2		86.8	86.8	
Actuated g/C Ratio	0.17	0.17			0.17	0.17	0.64	0.64		0.72	0.72	
v/c Ratio	0.14	0.04			0.69	0.36	0.04	0.94		0.36	0.40	
Control Delay	40.5	21.3			62.2	9.6	12.5	32.4		17.3	7.9	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	40.5	21.3			62.2	9.6	12.5	32.4		17.3	7.9	
LOS	D	C			E	A	B	C		B	A	
Approach Delay		34.5			38.5			32.3			8.4	
Approach LOS		C			D			C			A	
Queue Length 50th (m)	4.9	0.4			33.7	0.0	1.0	211.2		2.9	39.3	
Queue Length 95th (m)	11.8	5.2			52.0	15.0	4.4	#321.5		12.0	64.5	
Internal Link Dist (m)		147.2			77.5			257.5			196.3	
Turn Bay Length (m)	28.0						47.5			185.0		
Base Capacity (vph)	237	365			297	427	331	2100		228	2373	
Starvation Cap Reductn	0	0			0	0	0	0		0	0	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.10	0.03			0.50	0.29	0.04	0.94		0.22	0.40	

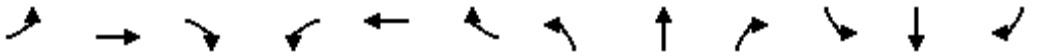
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 59 (49%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 25.5	Intersection LOS: C
Intersection Capacity Utilization 91.7%	ICU Level of Service F
Analysis Period (min) 15	

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

Splits and Phases: 1: Kimberwick Crescent/Uplands Drive & Riverside Drive



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	11	9	92	16	58	17	794	101	102	1542	10
Future Volume (vph)	10	11	9	92	16	58	17	794	101	102	1542	10
Satd. Flow (prot)	1658	1512	0	0	1641	1414	1658	3248	0	1551	3312	0
Flt Permitted	0.632				0.743		0.118			0.227		
Satd. Flow (perm)	1089	1512	0	0	1267	1376	206	3248	0	371	3312	0
Satd. Flow (RTOR)		10				77		15			1	
Lane Group Flow (vph)	11	22	0	0	120	64	19	994	0	113	1724	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	8	2	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	10.0	10.0		5.0	10.0	
Minimum Split (s)	34.5	34.5		34.5	34.5	34.5	31.1	31.1		11.1	31.1	
Total Split (s)	35.0	35.0		35.0	35.0	35.0	70.0	70.0		25.0	95.0	
Total Split (%)	26.9%	26.9%		26.9%	26.9%	26.9%	53.8%	53.8%		19.2%	73.1%	
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.7	3.7		3.7	3.7	
All-Red Time (s)	3.2	3.2		3.2	3.2	3.2	2.4	2.4		2.4	2.4	
Lost Time Adjust (s)	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.5	6.5			6.5	6.5	6.1	6.1		6.1	6.1	
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Max	C-Max		None	C-Max	
Act Effct Green (s)	19.7	19.7			19.7	19.7	83.4	83.4		97.7	97.7	
Actuated g/C Ratio	0.15	0.15			0.15	0.15	0.64	0.64		0.75	0.75	
v/c Ratio	0.07	0.09			0.63	0.23	0.14	0.48		0.32	0.69	
Control Delay	43.5	29.2			64.6	8.4	16.0	14.1		7.8	11.5	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	43.5	29.2			64.6	8.4	16.0	14.1		7.8	11.5	
LOS	D	C			E	A	B	B		A	B	
Approach Delay		34.0			45.1			14.2			11.2	
Approach LOS		C			D			B			B	
Queue Length 50th (m)	2.5	2.7			29.8	0.0	1.7	59.6		6.2	96.6	
Queue Length 95th (m)	7.5	9.8			46.4	9.0	7.4	99.3		15.3	166.3	
Internal Link Dist (m)		147.2			77.5			257.5			196.3	
Turn Bay Length (m)	28.0						47.5			185.0		
Base Capacity (vph)	238	339			277	361	132	2088		450	2490	
Starvation Cap Reductn	0	0			0	0	0	0		0	0	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.05	0.06			0.43	0.18	0.14	0.48		0.25	0.69	

Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 43 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.69

Intersection Signal Delay: 14.5	Intersection LOS: B
Intersection Capacity Utilization 85.4%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Kimberwick Crescent/Uplands Drive & Riverside Drive