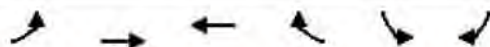


APPENDIX C – BACKGROUND TRAFFIC ANALYSIS

Lanes, Volumes, Timings

2: Quaker Road

07-26-2024



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (vph)	20	263	112	30	40	10
Future Volume (vph)	20	263	112	30	40	10
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%	0%		0%	
Storage Length (m)	0.0			0.0	0.0	0.0
Storage Lanes	0			0	0	0
Taper Length (m)	7.5				7.5	
Satd. Flow (prot)	0	1692	1654	0	1618	0
Flt Permitted		0.996			0.962	
Satd. Flow (perm)	0	1692	1654	0	1618	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		351.0	190.3		63.5	
Travel Time (s)		25.3	13.7		4.6	
Confl. Peds. (#/hr)	20					
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	2%	2%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	22	286	122	33	43	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	308	155	0	54	0
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	37.9%
Analysis Period (min)	15
	ICU Level of Service A

HCM 7th TWSC

2: Quaker Road

07-26-2024

Intersection						
Int Delay, s/veh	1.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	263	112	30	40	10
Future Vol, veh/h	20	263	112	30	40	10
Conflicting Peds, #/hr	20	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	2	2	0	0	0
Mvmt Flow	22	286	122	33	43	11
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	174	0	-	0	487	158
Stage 1	-	-	-	-	158	-
Stage 2	-	-	-	-	329	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1414	-	-	-	543	893
Stage 1	-	-	-	-	875	-
Stage 2	-	-	-	-	733	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1390	-	-	-	515	877
Mov Cap-2 Maneuver	-	-	-	-	515	-
Stage 1	-	-	-	-	845	-
Stage 2	-	-	-	-	721	-
Approach	EB	WB		SB		
HCM Control Delay, s/v	0.54	0		12.1		
HCM LOS				B		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	127	-	-	-	561	
HCM Lane V/C Ratio	0.016	-	-	-	0.097	
HCM Control Delay (s/veh)	7.6	0	-	-	12.1	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0	-	-	-	0.3	

Lanes, Volumes, Timings

4: Rice Road

07-26-2024

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	20	20	0	348	368	20
Future Volume (vph)	20	20	0	348	368	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		7.5			
Satd. Flow (prot)	1543	0	0	1697	1685	0
Flt Permitted	0.976					
Satd. Flow (perm)	1543	0	0	1697	1685	0
Link Speed (k/h)	50			40	50	
Link Distance (m)	46.3			46.9	105.7	
Travel Time (s)	3.3			4.2	7.6	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	22	22	0	378	400	22
Shared Lane Traffic (%)						
Lane Group Flow (vph)	44	0	0	378	422	0
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	32.3%			ICU Level of Service A		
Analysis Period (min)	15					

Intersection						
Int Delay, s/veh	0.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	20	20	0	348	368	20
Future Vol, veh/h	20	20	0	348	368	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	22	22	0	378	400	22
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	789	411	422	0	-	0
Stage 1	411	-	-	-	-	-
Stage 2	378	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	359	641	1137	-	-	-
Stage 1	669	-	-	-	-	-
Stage 2	693	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	359	641	1137	-	-	-
Mov Cap-2 Maneuver	359	-	-	-	-	-
Stage 1	669	-	-	-	-	-
Stage 2	693	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s/v13.63		0		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1137	-	461	-	-	
HCM Lane V/C Ratio	-	-	0.094	-	-	
HCM Control Delay (s/veh)	0	-	13.6	-	-	
HCM Lane LOS	A	-	B	-	-	
HCM 95th %tile Q(veh)	0	-	0.3	-	-	

Lanes, Volumes, Timings

6: Rice Road

07-26-2024

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	20	20	0	328	368	20
Future Volume (vph)	20	20	0	328	368	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.5	3.5	3.5	3.3	3.3	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	0.0			0.0
Storage Lanes	0	0	0			0
Taper Length (m)	7.5		7.5			
Satd. Flow (prot)	1543	0	0	1692	1678	0
Flt Permitted	0.976					
Satd. Flow (perm)	1543	0	0	1692	1678	0
Link Speed (k/h)	50			40	50	
Link Distance (m)	35.0			148.6	212.0	
Travel Time (s)	0.0			13.4	15.3	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	0%	0%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	22	22	0	357	400	22
Shared Lane Traffic (%)						
Lane Group Flow (vph)	44	0	0	357	422	0
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	32.3%			ICU Level of Service A		
Analysis Period (min)	15					

Intersection						
Int Delay, s/veh	0.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	20	20	0	328	368	20
Future Vol, veh/h	20	20	0	328	368	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	0	0	2
Mvmt Flow	22	22	0	357	400	22
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	767	411	422	0	-	0
Stage 1	411	-	-	-	-	-
Stage 2	357	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	370	641	1137	-	-	-
Stage 1	669	-	-	-	-	-
Stage 2	709	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	370	641	1137	-	-	-
Mov Cap-2 Maneuver	370	-	-	-	-	-
Stage 1	669	-	-	-	-	-
Stage 2	709	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s/v13.45		0		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1137	-	469	-	-	
HCM Lane V/C Ratio	-	-	0.093	-	-	
HCM Control Delay (s/veh)	0	-	13.5	-	-	
HCM Lane LOS	A	-	B	-	-	
HCM 95th %tile Q(veh)	0	-	0.3	-	-	

Lanes, Volumes, Timings

11: First Avenue

07-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	0	20	20	0	20	0	232	0	20	275	20
Future Volume (vph)	20	0	20	20	0	20	0	232	0	20	275	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Satd. Flow (prot)	0	1559	0	0	1574	0	0	1731	0	0	1710	0
Flt Permitted		0.976			0.976						0.997	
Satd. Flow (perm)	0	1559	0	0	1574	0	0	1731	0	0	1710	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		91.1			108.9			108.6			221.2	
Travel Time (s)		6.6			7.8			7.8			15.9	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	22	0	22	22	0	22	0	252	0	22	299	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	44	0	0	44	0	0	252	0	0	343	0
Sign Control	Stop				Stop		Free				Free	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	44.8%				ICU Level of Service A							
Analysis Period (min)	15											

Intersection												
Int Delay, s/veh	1.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	20	0	20	20	0	20	0	232	0	20	275	20
Future Vol, veh/h	20	0	20	20	0	20	0	232	0	20	275	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	2	0	0	0	0	0	0	0	0	0
Mvmt Flow	22	0	22	22	0	22	0	252	0	22	299	22

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	605	605	310	595	616	252	321	0	0	252	0	0
Stage 1	353	353	-	252	252	-	-	-	-	-	-	-
Stage 2	252	252	-	342	364	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.22	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.318	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	412	414	730	419	409	791	1251	-	-	1325	-	-
Stage 1	668	634	-	757	702	-	-	-	-	-	-	-
Stage 2	757	702	-	677	627	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	393	406	730	399	400	791	1251	-	-	1325	-	-
Mov Cap-2 Maneuver	393	406	-	399	400	-	-	-	-	-	-	-
Stage 1	655	622	-	757	702	-	-	-	-	-	-	-
Stage 2	736	702	-	644	615	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s/v	12.7		12.4		0		0.49	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1251	-	-	511	530	113	-	-
HCM Lane V/C Ratio	-	-	-	0.085	0.082	0.016	-	-
HCM Control Delay (s/veh)	0	-	-	12.7	12.4	7.8	0	-
HCM Lane LOS	A	-	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.3	0.1	-	-

Lanes, Volumes, Timings
16: Quaker Road

07-26-2024

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↱	↗	↘
Traffic Volume (vph)	285	40	20	291	20	20
Future Volume (vph)	285	40	20	291	20	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)		0.0	0.0		0.0	0.0
Storage Lanes		0	0		0	0
Taper Length (m)			7.5		7.5	
Satd. Flow (prot)	1669	0	0	1692	1543	0
Flt Permitted				0.997	0.976	
Satd. Flow (perm)	1669	0	0	1692	1543	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	262.7			188.6	59.5	
Travel Time (s)	18.9			13.6	0.0	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	310	43	22	316	22	22
Shared Lane Traffic (%)						
Lane Group Flow (vph)	353	0	0	338	44	0
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	44.5%			ICU Level of Service A		
Analysis Period (min)	15					

Intersection

Int Delay, s/veh 1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	285	40	20	291	20	20
Future Vol, veh/h	285	40	20	291	20	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	310	43	22	316	22	22

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	353
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.12
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.218
Pot Cap-1 Maneuver	-	-	1205
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1205
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0.52	12.67
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	513	-	-	116	-
HCM Lane V/C Ratio	0.085	-	-	0.018	-
HCM Control Delay (s/veh)	12.7	-	-	8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

Lanes, Volumes, Timings
18: Pelham St & Quaker Road

07-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↗	↘		↗	↘	
Traffic Volume (vph)	44	125	100	11	44	34	40	199	32	36	215	12
Future Volume (vph)	44	125	100	11	44	34	40	199	32	36	215	12
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	60.0		0.0	60.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	0.0			0.0			7.5			7.5		
Satd. Flow (prot)	0	1599	0	0	1585	0	1612	1656	0	1612	1683	0
Flt Permitted		0.938			0.942		0.606			0.603		
Satd. Flow (perm)	0	1511	0	0	1502	0	1028	1656	0	1022	1683	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		58			37			16			6	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		252.0			404.5			1006.2			780.9	
Travel Time (s)		18.1			29.1			72.4			56.2	
Confl. Peds. (#/hr)	4					4			1	1		
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	48	136	109	12	48	37	43	216	35	39	234	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	293	0	0	97	0	43	251	0	39	247	0
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	32.3	32.3		32.3	32.3		32.3	32.3		32.3	32.3	
Total Split (s)	32.3	32.3		32.3	32.3		32.7	32.7		32.7	32.7	
Total Split (%)	49.7%	49.7%		49.7%	49.7%		50.3%	50.3%		50.3%	50.3%	
Maximum Green (s)	26.0	26.0		26.0	26.0		26.4	26.4		26.4	26.4	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		-2.5			-2.5		-2.3	-2.3		-2.3	-2.3	
Total Lost Time (s)		3.8			3.8		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	2.5		2.5	2.5	

Lanes, Volumes, Timings
18: Pelham St & Quaker Road

07-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	19.0	19.0		19.0	19.0		19.0	19.0		19.0	19.0	
Pedestrian Calls (#/hr)	0	0		4	4		1	1		0	0	
Act Effct Green (s)		15.0			15.0		15.9	15.9		15.9	15.9	
Actuated g/C Ratio		0.38			0.38		0.40	0.40		0.40	0.40	
v/c Ratio		0.48			0.16		0.10	0.37		0.09	0.36	
Control Delay (s/veh)		10.6			6.7		9.5	10.5		9.5	10.7	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)		10.6			6.7		9.5	10.5		9.5	10.7	
LOS		B			A		A	B		A	B	
Approach Delay (s/veh)		10.6			6.7			10.3			10.5	
Approach LOS		B			A			B			B	
Queue Length 50th (m)		8.3			1.9		1.4	8.4		1.3	8.6	
Queue Length 95th (m)		34.9			11.3		8.1	32.3		7.4	32.6	
Internal Link Dist (m)		228.0			380.5			982.2			756.9	
Turn Bay Length (m)							60.0			60.0		
Base Capacity (vph)		1191			1179		832	1344		828	1364	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.25			0.08		0.05	0.19		0.05	0.18	

Intersection Summary

Area Type: Other

Cycle Length: 65

Actuated Cycle Length: 39.4

Natural Cycle: 65

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.48

Intersection Signal Delay (s/veh): 10.1

Intersection LOS: B

Intersection Capacity Utilization 55.2%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 18: Pelham St & Quaker Road



Lanes, Volumes, Timings
19: Rice Road & Quaker Road

07-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	153	72	60	80	20	37	255	76	27	256	49
Future Volume (vph)	75	153	72	60	80	20	37	255	76	27	256	49
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.3	3.3	3.3	3.3	3.3	3.3
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	0.0			0.0			0.0			0.0		
Satd. Flow (prot)	0	1638	0	0	1654	0	0	1636	0	0	1651	0
Flt Permitted		0.988			0.982			0.995			0.996	
Satd. Flow (perm)	0	1638	0	0	1654	0	0	1636	0	0	1651	0
Link Speed (k/h)		50			50			40			50	
Link Distance (m)		295.7			326.4			105.7			232.4	
Travel Time (s)		60.3			23.5			26.6			37.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	82	166	78	65	87	22	40	277	83	29	278	53
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	326	0	0	174	0	0	400	0	0	360	0
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	57.9%						ICU Level of Service B					
Analysis Period (min)	15											

Intersection

Intersection Delay, s/veh	21.3
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	75	153	72	60	80	20	37	255	76	27	256	49
Future Vol, veh/h	75	153	72	60	80	20	37	255	76	27	256	49
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	2	0	0	2	0	0	0	0	0	0	0
Mvmt Flow	82	166	78	65	87	22	40	277	83	29	278	53
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, s/veh	20.3	14.5	24.6	21.7
HCM LOS	C	B	C	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	10%	25%	38%	8%
Vol Thru, %	69%	51%	50%	77%
Vol Right, %	21%	24%	13%	15%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	368	300	160	332
LT Vol	37	75	60	27
Through Vol	255	153	80	256
RT Vol	76	72	20	49
Lane Flow Rate	400	326	174	361
Geometry Grp	1	1	1	1
Degree of Util (X)	0.721	0.617	0.357	0.662
Departure Headway (Hd)	6.487	6.817	7.383	6.604
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	556	528	485	549
Service Time	4.523	4.86	5.449	4.642
HCM Lane V/C Ratio	0.719	0.617	0.359	0.658
HCM Control Delay, s/veh	24.6	20.3	14.5	21.7
HCM Lane LOS	C	C	B	C
HCM 95th-tile Q	5.9	4.1	1.6	4.8

Lanes, Volumes, Timings

20: First Avenue/Cataract Road & Quaker Road

07-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	206	37	140	164	7	54	111	112	7	138	16
Future Volume (vph)	25	206	37	140	164	7	54	111	112	7	138	16
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	0.0			0.0			0.0			0.0		
Satd. Flow (prot)	0	1664	0	0	1670	0	0	1619	0	0	1705	0
Flt Permitted		0.995			0.978			0.990			0.998	
Satd. Flow (perm)	0	1664	0	0	1670	0	0	1619	0	0	1705	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		128.3			262.7			221.2			119.8	
Travel Time (s)		35.5			59.5			16.0			26.6	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	27	224	40	152	178	8	59	121	122	8	150	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	291	0	0	338	0	0	302	0	0	175	0
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	73.7%						ICU Level of Service D					
Analysis Period (min)	15											

HCM 7th AWSC
20: First Avenue/Cataract Road & Quaker Road

07-26-2024

Intersection	
Intersection Delay, s/veh	15.2
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	25	206	37	140	164	7	54	111	112	7	138	16
Future Vol, veh/h	25	206	37	140	164	7	54	111	112	7	138	16
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	2	0	0	2	0	0	0	0	0	0	0
Mvmt Flow	27	224	40	152	178	8	59	121	122	8	150	17
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, s/veh	14.8	17	15.1	12.5
HCM LOS	B	C	C	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	19%	9%	45%	4%
Vol Thru, %	40%	77%	53%	86%
Vol Right, %	40%	14%	2%	10%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	277	268	311	161
LT Vol	54	25	140	7
Through Vol	111	206	164	138
RT Vol	112	37	7	16
Lane Flow Rate	301	291	338	175
Geometry Grp	1	1	1	1
Degree of Util (X)	0.504	0.489	0.571	0.314
Departure Headway (Hd)	6.022	6.047	6.083	6.466
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	599	594	592	555
Service Time	4.067	4.094	4.128	4.52
HCM Lane V/C Ratio	0.503	0.49	0.571	0.315
HCM Control Delay, s/veh	15.1	14.8	17	12.5
HCM Lane LOS	C	B	C	B
HCM 95th-tile Q	2.8	2.7	3.6	1.3

Lanes, Volumes, Timings
21: Niagara St & Quaker Road

07-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	198	22	83	29	24	25	49	358	24	14	266	119
Future Volume (vph)	198	22	83	29	24	25	49	358	24	14	266	119
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		65.0	0.0		22.5	75.0		0.0	22.5		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	0.0			0.0			7.5			7.5		
Satd. Flow (prot)	1612	1480	0	1612	1557	0	1612	3195	0	1612	3053	0
Flt Permitted	0.654			0.681			0.494			0.436		
Satd. Flow (perm)	1109	1480	0	1154	1557	0	837	3195	0	740	3053	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		93			30			9			93	
Link Speed (k/h)		50			50			50			60	
Link Distance (m)		297.6			214.3			467.2			109.3	
Travel Time (s)		21.4			15.4			33.6			6.6	
Confl. Peds. (#/hr)	1		2	2		1	2					2
Confl. Bikes (#/hr)												
Peak Hour Factor	0.89	0.89	0.89	0.82	0.82	0.82	0.78	0.78	0.78	0.93	0.93	0.93
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	222	25	93	35	29	30	63	459	31	15	286	128
Shared Lane Traffic (%)												
Lane Group Flow (vph)	222	118	0	35	59	0	63	490	0	15	414	0
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		10.0	10.0		20.0	20.0		20.0	20.0	
Minimum Split (s)	11.1	37.7		37.7	37.7		31.7	31.7		31.7	31.7	
Total Split (s)	13.0	51.0		38.0	38.0		39.0	39.0		39.0	39.0	
Total Split (%)	14.4%	56.7%		42.2%	42.2%		43.3%	43.3%		43.3%	43.3%	
Maximum Green (s)	9.0	44.3		31.3	31.3		32.3	32.3		32.3	32.3	
Yellow Time (s)	3.0	3.7		3.7	3.7		3.7	3.7		3.7	3.7	
All-Red Time (s)	1.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	-2.9	-2.9		-2.9	-2.9		1.0	-2.6		1.0	-2.6	
Total Lost Time (s)	1.1	3.8		3.8	3.8		7.7	4.1		7.7	4.1	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	2.5		2.5	2.5		2.5	2.5		2.5	2.5	

Lanes, Volumes, Timings
21: Niagara St & Quaker Road

07-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)		7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		24.0		24.0	24.0		18.0	18.0		18.0	18.0	
Pedestrian Calls (#/hr)		5		5	5		5	5		5	5	
Act Effect Green (s)	26.3	23.5		16.5	16.5		20.8	24.6		20.8	24.6	
Actuated g/C Ratio	0.47	0.42		0.29	0.29		0.37	0.44		0.37	0.44	
v/c Ratio	0.34	0.18		0.10	0.12		0.21	0.35		0.06	0.30	
Control Delay (s/veh)	9.9	3.8		16.9	10.6		19.2	14.0		17.9	11.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	9.9	3.8		16.9	10.6		19.2	14.0		17.9	11.0	
LOS	A	A		B	B		B	B		B	B	
Approach Delay (s/veh)		7.8			13.0			14.6			11.2	
Approach LOS		A			B			B			B	
Queue Length 50th (m)	11.9	1.3		2.9	2.4		4.5	17.5		1.0	11.1	
Queue Length 95th (m)	24.6	7.9		7.8	8.3		14.9	37.0		6.1	31.1	
Internal Link Dist (m)		273.6			190.3			443.2			85.3	
Turn Bay Length (m)							75.0			22.5		
Base Capacity (vph)	647	1271		739	1008		490	2092		433	2028	
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	0.34	0.09		0.05	0.06		0.13	0.23		0.03	0.20	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 56.4

Natural Cycle: 85

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.35

Intersection Signal Delay (s/veh): 11.8

Intersection LOS: B

Intersection Capacity Utilization 62.8%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 21: Niagara St & Quaker Road



Lanes, Volumes, Timings
22: Niagara St & Merritt Rd

07-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↔	↔			↔	↔		↔	
Traffic Volume (vph)	9	29	3	279	38	52	4	288	372	27	173	3
Future Volume (vph)	9	29	3	279	38	52	4	288	372	27	173	3
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		60.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		1	0		0
Taper Length (m)	0.0			0.0			0.0			0.0		
Satd. Flow (prot)	0	1615	0	1566	1505	0	0	1647	1401	0	3103	0
Flt Permitted		0.898		0.587				0.996			0.886	
Satd. Flow (perm)	0	1465	0	967	1505	0	0	1642	1401	0	2769	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			60				388			3
Link Speed (k/h)		50			60			60			60	
Link Distance (m)		834.8			202.8			911.9			164.9	
Travel Time (s)		60.1			12.2			54.7			9.9	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.79	0.79	0.79	0.86	0.86	0.86	0.96	0.96	0.96	0.77	0.77	0.77
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	11	37	4	324	44	60	4	300	388	35	225	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	52	0	324	104	0	0	304	388	0	264	0
Number of Detectors	1	1		1	1		1	1	1	1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (m)	12.0	12.0		12.0	12.0		12.0	12.0	6.1	12.0	12.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		
Detector Phase	4	4		3	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		7.0	10.0		20.0	20.0	20.0	20.0	20.0	
Minimum Split (s)	16.7	16.7		16.7	16.7		26.7	26.7	26.7	26.7	26.7	
Total Split (s)	16.7	16.7		20.0	36.7		28.3	28.3	28.3	28.3	28.3	
Total Split (%)	25.7%	25.7%		30.8%	56.5%		43.5%	43.5%	43.5%	43.5%	43.5%	
Maximum Green (s)	10.0	10.0		16.0	30.0		21.6	21.6	21.6	21.6	21.6	
Yellow Time (s)	3.7	3.7		3.0	3.7		3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	3.0	3.0		1.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)		-2.1		1.0	-2.1			-2.4	-2.4		-2.4	
Total Lost Time (s)		4.6		5.0	4.6			4.3	4.3		4.3	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		5.0	5.0	5.0	5.0	5.0	

Lanes, Volumes, Timings
22: Niagara St & Merritt Rd

07-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Recall Mode	None	None		None	None		Min	Min	Min	Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effect Green (s)		12.5		22.2	22.6			23.8	23.8		23.8	
Actuated g/C Ratio		0.22		0.40	0.41			0.43	0.43		0.43	
v/c Ratio		0.16		0.61	0.16			0.43	0.47		0.22	
Control Delay (s/veh)		21.7		17.1	5.3			16.3	4.1		13.0	
Queue Delay		0.0		0.0	0.0			0.0	0.0		0.0	
Total Delay (s/veh)		21.7		17.1	5.3			16.3	4.1		13.0	
LOS		C		B	A			B	A		B	
Approach Delay (s/veh)		21.7			14.2			9.5			13.0	
Approach LOS		C			B			A			B	
Queue Length 50th (m)		4.5		22.2	2.4			25.8	0.0		10.4	
Queue Length 95th (m)		11.4		38.5	8.6			48.0	15.1		15.7	
Internal Link Dist (m)		810.8			178.8			887.9			140.9	
Turn Bay Length (m)												
Base Capacity (vph)		333		582	924			734	841		1240	
Starvation Cap Reductn		0		0	0			0	0		0	
Spillback Cap Reductn		0		0	0			0	0		0	
Storage Cap Reductn		0		0	0			0	0		0	
Reduced v/c Ratio		0.16		0.56	0.11			0.41	0.46		0.21	

Intersection Summary

Area Type: Other

Cycle Length: 65

Actuated Cycle Length: 55.6

Natural Cycle: 65

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.61

Intersection Signal Delay (s/veh): 12.0

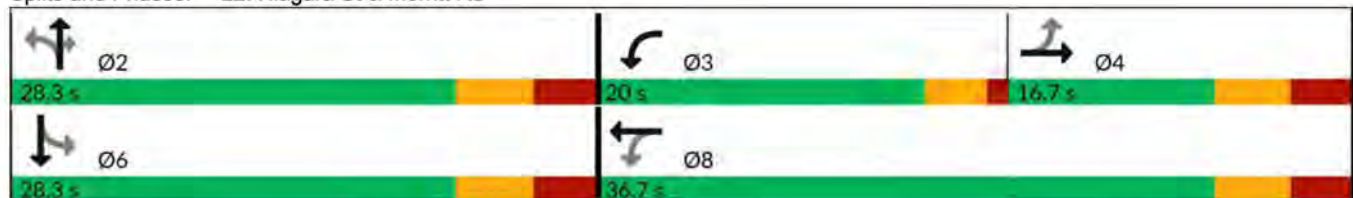
Intersection LOS: B

Intersection Capacity Utilization 61.0%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 22: Niagara St & Merritt Rd



Lanes, Volumes, Timings

23: Clare Avenue/Line Avenue & Quaker Road

07-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	153	20	40	72	10	10	40	100	50	50	10
Future Volume (vph)	20	153	20	40	72	10	10	40	100	50	50	10
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	0.0			0.0			0.0			0.0		
Satd. Flow (prot)	0	1665	0	0	1651	0	0	1570	0	0	1672	0
Flt Permitted		0.995			0.984			0.997			0.978	
Satd. Flow (perm)	0	1665	0	0	1651	0	0	1570	0	0	1672	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		404.5			351.0			378.6			1022.4	
Travel Time (s)		29.1			60.3			27.3			73.6	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	22	166	22	43	78	11	11	43	109	54	54	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	210	0	0	132	0	0	163	0	0	119	0
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	42.5%											
Analysis Period (min)	15											
	ICU Level of Service A											

HCM 7th AWSC
23: Clare Avenue/Line Avenue & Quaker Road

07-26-2024

Intersection	
Intersection Delay, s/veh	9.1
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	20	153	20	40	72	10	10	40	100	50	50	10
Future Vol, veh/h	20	153	20	40	72	10	10	40	100	50	50	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	0	0	0	0	0	0
Mvmt Flow	22	166	22	43	78	11	11	43	109	54	54	11
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, s/veh	9.6	9	8.7	9
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	7%	10%	33%	45%
Vol Thru, %	27%	79%	59%	45%
Vol Right, %	67%	10%	8%	9%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	150	193	122	110
LT Vol	10	20	40	50
Through Vol	40	153	72	50
RT Vol	100	20	10	10
Lane Flow Rate	163	210	133	120
Geometry Grp	1	1	1	1
Degree of Util (X)	0.203	0.275	0.179	0.165
Departure Headway (Hd)	4.489	4.72	4.871	4.953
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	796	757	732	720
Service Time	2.543	2.774	2.931	3.011
HCM Lane V/C Ratio	0.205	0.277	0.182	0.167
HCM Control Delay, s/veh	8.7	9.6	9	9
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.8	1.1	0.6	0.6

Lanes, Volumes, Timings

99: Quaker Road

07-26-2024

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↶			↷	↶↷	
Traffic Volume (vph)	256	0	40	194	10	20
Future Volume (vph)	256	0	40	194	10	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)		0.0	0.0		0.0	0.0
Storage Lanes		0	0		0	0
Taper Length (m)			7.5		7.5	
Satd. Flow (prot)	1697	0	0	1683	1519	0
Flt Permitted				0.992	0.984	
Satd. Flow (perm)	1697	0	0	1683	1519	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	144.9			128.3	84.4	
Travel Time (s)	10.4			9.2	6.1	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	278	0	43	211	11	22
Shared Lane Traffic (%)						
Lane Group Flow (vph)	278	0	0	254	33	0
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	41.4%			ICU Level of Service A		
Analysis Period (min)	15					

Intersection

Int Delay, s/veh 1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	256	0	40	194	10	20
Future Vol, veh/h	256	0	40	194	10	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	278	0	43	211	11	22

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	278
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.12
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.218
Pot Cap-1 Maneuver	-	-	1284
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1284
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

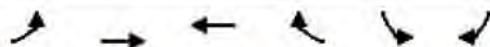
Approach	EB	WB	NB
HCM Control Delay, s/v	0	1.35	11.08
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	625	-	-	308	-
HCM Lane V/C Ratio	0.052	-	-	0.034	-
HCM Control Delay (s/veh)	11.1	-	-	7.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

Lanes, Volumes, Timings

2: Quaker Road

07-26-2024



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↰		↰	
Traffic Volume (vph)	20	308	326	20	40	10
Future Volume (vph)	20	308	326	20	40	10
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%	0%		0%	
Storage Length (m)	0.0			0.0	0.0	0.0
Storage Lanes	0			0	0	0
Taper Length (m)	7.5				7.5	
Satd. Flow (prot)	0	1694	1685	0	1618	0
Flt Permitted		0.997			0.962	
Satd. Flow (perm)	0	1694	1685	0	1618	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		351.0	190.3		63.5	
Travel Time (s)		25.3	13.7		4.6	
Confl. Peds. (#/hr)	20					
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	2%	2%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	22	335	354	22	43	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	357	376	0	54	0
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 45.4%

ICU Level of Service A

Analysis Period (min) 15

HCM 7th TWSC
2: Quaker Road

07-26-2024

Intersection						
Int Delay, s/veh	1.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	308	326	20	40	10
Future Vol, veh/h	20	308	326	20	40	10
Conflicting Peds, #/hr	20	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	2	2	0	0	0
Mvmt Flow	22	335	354	22	43	11
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	396	0	-	0	763	385
Stage 1	-	-	-	-	385	-
Stage 2	-	-	-	-	378	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1173	-	-	-	375	667
Stage 1	-	-	-	-	692	-
Stage 2	-	-	-	-	697	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1154	-	-	-	354	656
Mov Cap-2 Maneuver	-	-	-	-	354	-
Stage 1	-	-	-	-	664	-
Stage 2	-	-	-	-	685	-
Approach	EB	WB		SB		
HCM Control Delay, s/v	0.5	0		15.72		
HCM LOS				C		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	110	-	-	-	390	
HCM Lane V/C Ratio	0.019	-	-	-	0.139	
HCM Control Delay (s/veh)	8.2	0	-	-	15.7	
HCM Lane LOS	A	A	-	-	C	
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5	

Lanes, Volumes, Timings

4: Rice Road

07-26-2024

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	20	20	0	373	393	20
Future Volume (vph)	20	20	0	373	393	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		7.5			
Satd. Flow (prot)	1543	0	0	1697	1685	0
Flt Permitted	0.976					
Satd. Flow (perm)	1543	0	0	1697	1685	0
Link Speed (k/h)	50			40	50	
Link Distance (m)	36.9			46.9	105.7	
Travel Time (s)	2.7			4.2	7.6	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	22	22	0	405	427	22
Shared Lane Traffic (%)						
Lane Group Flow (vph)	44	0	0	405	449	0
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	33.8%			ICU Level of Service A		
Analysis Period (min)	15					

Intersection						
Int Delay, s/veh	0.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	20	20	0	373	393	20
Future Vol, veh/h	20	20	0	373	393	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	22	22	0	405	427	22
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	843	438	449	0	-	0
Stage 1	438	-	-	-	-	-
Stage 2	405	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	334	619	1111	-	-	-
Stage 1	650	-	-	-	-	-
Stage 2	673	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	334	619	1111	-	-	-
Mov Cap-2 Maneuver	334	-	-	-	-	-
Stage 1	650	-	-	-	-	-
Stage 2	673	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s/v14.22		0		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1111	-	434	-	-	
HCM Lane V/C Ratio	-	-	0.1	-	-	
HCM Control Delay (s/veh)	0	-	14.2	-	-	
HCM Lane LOS	A	-	B	-	-	
HCM 95th %tile Q(veh)	0	-	0.3	-	-	

Lanes, Volumes, Timings

6: Rice Road

07-26-2024

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	20	20	0	353	393	20
Future Volume (vph)	20	20	0	353	393	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		7.5			
Satd. Flow (prot)	1543	0	0	1697	1685	0
Flt Permitted	0.976					
Satd. Flow (perm)	1543	0	0	1697	1685	0
Link Speed (k/h)	50			40	50	
Link Distance (m)	44.6			148.6	212.0	
Travel Time (s)	3.2			13.4	15.3	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	22	22	0	384	427	22
Shared Lane Traffic (%)						
Lane Group Flow (vph)	44	0	0	384	449	0
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	33.8%			ICU Level of Service A		
Analysis Period (min)	15					

Intersection						
Int Delay, s/veh	0.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	20	20	0	353	393	20
Future Vol, veh/h	20	20	0	353	393	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	22	22	0	384	427	22
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	822	438	449	0	-	0
Stage 1	438	-	-	-	-	-
Stage 2	384	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	344	619	1111	-	-	-
Stage 1	650	-	-	-	-	-
Stage 2	689	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	344	619	1111	-	-	-
Mov Cap-2 Maneuver	344	-	-	-	-	-
Stage 1	650	-	-	-	-	-
Stage 2	689	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s/v14.03		0		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1111	-	442	-	-	
HCM Lane V/C Ratio	-	-	0.098	-	-	
HCM Control Delay (s/veh)	0	-	14	-	-	
HCM Lane LOS	A	-	B	-	-	
HCM 95th %tile Q(veh)	0	-	0.3	-	-	

Lanes, Volumes, Timings

11: First Avenue

07-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	0	20	20	0	20	0	283	0	20	271	20
Future Volume (vph)	20	0	20	20	0	20	0	283	0	20	271	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Satd. Flow (prot)	0	1559	0	0	1574	0	0	1731	0	0	1710	0
Flt Permitted		0.976			0.976						0.997	
Satd. Flow (perm)	0	1559	0	0	1574	0	0	1731	0	0	1710	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		91.1			108.9			108.6			221.2	
Travel Time (s)		6.6			7.8			7.8			15.9	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	22	0	22	22	0	22	0	308	0	22	295	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	44	0	0	44	0	0	308	0	0	339	0
Sign Control	Stop				Stop		Free				Free	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	44.8%				ICU Level of Service A							
Analysis Period (min)	15											

Intersection												
Int Delay, s/veh	1.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	20	0	20	20	0	20	0	283	0	20	271	20
Future Vol, veh/h	20	0	20	20	0	20	0	283	0	20	271	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	2	0	0	0	0	0	0	0	0	0
Mvmt Flow	22	0	22	22	0	22	0	308	0	22	295	22

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	657	657	305	646	667	308	316	0	0	308	0	0
Stage 1	349	349	-	308	308	-	-	-	-	-	-	-
Stage 2	308	308	-	338	360	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.22	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.318	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	381	387	734	388	382	737	1255	-	-	1264	-	-
Stage 1	672	637	-	707	664	-	-	-	-	-	-	-
Stage 2	707	664	-	681	630	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	362	379	734	368	374	737	1255	-	-	1264	-	-
Mov Cap-2 Maneuver	362	379	-	368	374	-	-	-	-	-	-	-
Stage 1	657	624	-	707	664	-	-	-	-	-	-	-
Stage 2	686	664	-	647	617	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v13.15		13.04	0	0.51
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1255	-	-	485	491	114	-
HCM Lane V/C Ratio	-	-	-	0.09	0.089	0.017	-
HCM Control Delay (s/veh)	0	-	-	13.1	13	7.9	0
HCM Lane LOS	A	-	-	B	B	A	A
HCM 95th %tile Q(veh)	0	-	-	0.3	0.3	0.1	-

Lanes, Volumes, Timings
16: Quaker Road

07-26-2024

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	400	20	20	405	20	20
Future Volume (vph)	400	20	20	405	20	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)		0.0	0.0		0.0	0.0
Storage Lanes		0	0		0	0
Taper Length (m)			7.5		7.5	
Satd. Flow (prot)	1686	0	0	1693	1543	0
Flt Permitted				0.998	0.976	
Satd. Flow (perm)	1686	0	0	1693	1543	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	262.7			188.6	131.1	
Travel Time (s)	18.9			13.6	9.4	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	435	22	22	440	22	22
Shared Lane Traffic (%)						
Lane Group Flow (vph)	457	0	0	462	44	0
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	50.8%			ICU Level of Service A		
Analysis Period (min)	15					

Intersection

Int Delay, s/veh 0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	400	20	20	405	20	20
Future Vol, veh/h	400	20	20	405	20	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	435	22	22	440	22	22

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	457
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.12
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.218
Pot Cap-1 Maneuver	-	-	1104
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1104
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0.39	15.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	393	-	-	85	-
HCM Lane V/C Ratio	0.111	-	-	0.02	-
HCM Control Delay (s/veh)	15.3	-	-	8.3	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-

Lanes, Volumes, Timings
18: Pelham St & Quaker Road

07-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	125	108	41	144	75	107	271	37	65	324	62
Future Volume (vph)	21	125	108	41	144	75	107	271	37	65	324	62
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	60.0		0.0	60.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	0.0			0.0			7.5			7.5		
Satd. Flow (prot)	0	1594	0	0	1606	0	1612	1662	0	1612	1656	0
Flt Permitted		0.956			0.911		0.425			0.515		
Satd. Flow (perm)	0	1529	0	0	1475	0	721	1662	0	873	1656	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		73			40			13			19	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		252.0			404.5			1006.2			780.9	
Travel Time (s)		18.1			29.1			72.4			56.2	
Confl. Peds. (#/hr)	4					4			1	1		
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	23	136	117	45	157	82	116	295	40	71	352	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	276	0	0	284	0	116	335	0	71	419	0
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	32.3	32.3		32.3	32.3		32.3	32.3		32.3	32.3	
Total Split (s)	32.3	32.3		32.3	32.3		32.7	32.7		32.7	32.7	
Total Split (%)	49.7%	49.7%		49.7%	49.7%		50.3%	50.3%		50.3%	50.3%	
Maximum Green (s)	26.0	26.0		26.0	26.0		26.4	26.4		26.4	26.4	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		-2.5			-2.5		-2.3	-2.3		-2.3	-2.3	
Total Lost Time (s)		3.8			3.8		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	2.5		2.5	2.5	

Lanes, Volumes, Timings
18: Pelham St & Quaker Road

07-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	19.0	19.0		19.0	19.0		19.0	19.0		19.0	19.0	
Pedestrian Calls (#/hr)	0	0		4	4		1	1		0	0	
Act Effct Green (s)		16.1			16.1		18.1	18.1		18.1	18.1	
Actuated g/C Ratio		0.38			0.38		0.42	0.42		0.42	0.42	
v/c Ratio		0.44			0.49		0.38	0.47		0.19	0.59	
Control Delay (s/veh)		10.3			12.5		14.1	11.9		10.5	13.7	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)		10.3			12.5		14.1	11.9		10.5	13.7	
LOS		B			B		B	B		B	B	
Approach Delay (s/veh)		10.3			12.5			12.4			13.3	
Approach LOS		B			B			B			B	
Queue Length 50th (m)		9.1			11.3		4.7	13.5		2.6	17.9	
Queue Length 95th (m)		30.9			36.2		20.7	44.7		12.3	58.5	
Internal Link Dist (m)		228.0			380.5			982.2			756.9	
Turn Bay Length (m)							60.0			60.0		
Base Capacity (vph)		1120			1072		522	1207		632	1205	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.25			0.26		0.22	0.28		0.11	0.35	

Intersection Summary

Area Type: Other

Cycle Length: 65

Actuated Cycle Length: 42.6

Natural Cycle: 65

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.59

Intersection Signal Delay (s/veh): 12.3

Intersection LOS: B

Intersection Capacity Utilization 66.8%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 18: Pelham St & Quaker Road



Lanes, Volumes, Timings
19: Rice Road & Quaker Road

07-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	93	202	53	71	228	33	86	243	64	22	289	56
Future Volume (vph)	93	202	53	71	228	33	86	243	64	22	289	56
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.3	3.3	3.3	3.3	3.3	3.3
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	0.0			0.0			0.0			0.0		
Satd. Flow (prot)	0	1653	0	0	1666	0	0	1636	0	0	1651	0
Flt Permitted		0.987			0.989			0.989			0.997	
Satd. Flow (perm)	0	1653	0	0	1666	0	0	1636	0	0	1651	0
Link Speed (k/h)		50			50			40			50	
Link Distance (m)		295.7			326.4			105.7			232.4	
Travel Time (s)		60.3			23.5			26.6			37.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	101	220	58	77	248	36	93	264	70	24	314	61
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	379	0	0	361	0	0	427	0	0	399	0
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	84.8%					ICU Level of Service E						
Analysis Period (min)	15											

Intersection

Intersection Delay, s/veh	88.1
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	93	202	53	71	228	33	86	243	64	22	289	56
Future Vol, veh/h	93	202	53	71	228	33	86	243	64	22	289	56
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	2	0	0	2	0	0	0	0	0	0	0
Mvmt Flow	101	220	58	77	248	36	93	264	70	24	314	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, s/veh	76.6	68.9	112.8	90
HCM LOS	F	F	F	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	22%	27%	21%	6%
Vol Thru, %	62%	58%	69%	79%
Vol Right, %	16%	15%	10%	15%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	393	348	332	367
LT Vol	86	93	71	22
Through Vol	243	202	228	289
RT Vol	64	53	33	56
Lane Flow Rate	427	378	361	399
Geometry Grp	1	1	1	1
Degree of Util (X)	1.115	0.986	0.951	1.039
Departure Headway (Hd)	9.668	10.021	10.144	9.837
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	380	363	361	371
Service Time	7.668	8.021	8.144	7.837
HCM Lane V/C Ratio	1.124	1.041	1	1.075
HCM Control Delay, s/veh	112.8	76.6	68.9	90
HCM Lane LOS	F	F	F	F
HCM 95th-tile Q	15.4	11.2	10.2	12.9

Lanes, Volumes, Timings

20: First Avenue/Cataract Road & Quaker Road

07-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	245	35	128	282	15	29	131	163	12	148	16
Future Volume (vph)	26	245	35	128	282	15	29	131	163	12	148	16
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	0.0			0.0			0.0			0.0		
Satd. Flow (prot)	0	1671	0	0	1674	0	0	1605	0	0	1705	0
Flt Permitted		0.996			0.985			0.995			0.997	
Satd. Flow (perm)	0	1671	0	0	1674	0	0	1605	0	0	1705	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		130.3			262.7			221.2			119.8	
Travel Time (s)		35.5			59.5			16.0			26.6	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	28	266	38	139	307	16	32	142	177	13	161	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	332	0	0	462	0	0	351	0	0	191	0
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	80.7%					ICU Level of Service D						
Analysis Period (min)	15											

HCM 7th AWSC
20: First Avenue/Cataract Road & Quaker Road

07-26-2024

Intersection	
Intersection Delay, s/veh	28.8
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	26	245	35	128	282	15	29	131	163	12	148	16
Future Vol, veh/h	26	245	35	128	282	15	29	131	163	12	148	16
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	2	0	0	2	0	0	0	0	0	0	0
Mvmt Flow	28	266	38	139	307	16	32	142	177	13	161	17
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, s/veh	22.9	41.9	23.9	16.3
HCM LOS	C	E	C	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	9%	8%	30%	7%
Vol Thru, %	41%	80%	66%	84%
Vol Right, %	50%	11%	4%	9%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	323	306	425	176
LT Vol	29	26	128	12
Through Vol	131	245	282	148
RT Vol	163	35	15	16
Lane Flow Rate	351	333	462	191
Geometry Grp	1	1	1	1
Degree of Util (X)	0.682	0.657	0.88	0.413
Departure Headway (Hd)	6.992	7.107	6.857	7.776
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	516	506	527	459
Service Time	5.069	5.189	4.93	5.874
HCM Lane V/C Ratio	0.68	0.658	0.877	0.416
HCM Control Delay, s/veh	23.9	22.9	41.9	16.3
HCM Lane LOS	C	C	E	C
HCM 95th-tile Q	5.1	4.7	9.8	2

Lanes, Volumes, Timings
21: Niagara St & Quaker Road

07-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	180	45	118	41	28	18	153	468	57	36	658	190
Future Volume (vph)	180	45	118	41	28	18	153	468	57	36	658	190
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		65.0	0.0		22.5	75.0		0.0	22.5		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	0.0			0.0			7.5			7.5		
Satd. Flow (prot)	1612	1496	0	1612	1588	0	1612	3172	0	1612	3097	0
Flt Permitted	0.580			0.641			0.129			0.448		
Satd. Flow (perm)	983	1496	0	1086	1588	0	219	3172	0	760	3097	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		134			26			17			40	
Link Speed (k/h)		50			50			50			60	
Link Distance (m)		297.6			214.3			467.2			109.3	
Travel Time (s)		21.4			15.4			33.6			6.6	
Confl. Peds. (#/hr)	1		2	2		1	2					2
Confl. Bikes (#/hr)												
Peak Hour Factor	0.88	0.88	0.88	0.70	0.70	0.70	0.96	0.96	0.96	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	205	51	134	59	40	26	159	488	59	39	715	207
Shared Lane Traffic (%)												
Lane Group Flow (vph)	205	185	0	59	66	0	159	547	0	39	922	0
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases	7	4			8		5	2			6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		10.0	10.0		7.0	20.0		20.0	20.0	
Minimum Split (s)	11.1	37.7		37.7	37.7		12.7	31.7		31.7	31.7	
Total Split (s)	11.4	49.1		37.7	37.7		14.0	50.9		36.9	36.9	
Total Split (%)	11.4%	49.1%		37.7%	37.7%		14.0%	50.9%		36.9%	36.9%	
Maximum Green (s)	5.3	42.4		31.0	31.0		10.0	44.2		30.2	30.2	
Yellow Time (s)	4.1	3.7		3.7	3.7		3.0	3.7		3.7	3.7	
All-Red Time (s)	2.0	3.0		3.0	3.0		1.0	3.0		3.0	3.0	
Lost Time Adjust (s)	-2.9	-2.9		-2.9	-2.9		1.0	-2.6		1.0	-2.6	
Total Lost Time (s)	3.2	3.8		3.8	3.8		5.0	4.1		7.7	4.1	
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	3.0	2.5		2.5	2.5		2.5	2.5		2.5	2.5	

Lanes, Volumes, Timings

21: Niagara St & Quaker Road

07-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		None	Min		Min	Min	
Walk Time (s)		7.0		7.0	7.0			7.0		7.0	7.0	
Flash Dont Walk (s)		24.0		24.0	24.0			18.0		18.0	18.0	
Pedestrian Calls (#/hr)		5		5	5			5		5	5	
Act Effect Green (s)	26.0	25.4		16.8	16.8		42.4	43.4		25.9	29.7	
Actuated g/C Ratio	0.34	0.33		0.22	0.22		0.55	0.56		0.34	0.39	
v/c Ratio	0.50	0.32		0.25	0.18		0.58	0.30		0.15	0.76	
Control Delay (s/veh)	23.7	7.7		29.4	18.6		21.6	10.7		23.3	26.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	23.7	7.7		29.4	18.6		21.6	10.7		23.3	26.4	
LOS	C	A		C	B		C	B		C	C	
Approach Delay (s/veh)		16.1			23.7			13.1			26.3	
Approach LOS		B			C			B			C	
Queue Length 50th (m)	22.8	5.2		7.7	5.0		10.1	18.5		3.8	55.7	
Queue Length 95th (m)	38.0	16.8		13.2	10.1		#40.8	45.7		14.2	#120.7	
Internal Link Dist (m)		273.6			190.3			443.2			85.3	
Turn Bay Length (m)							75.0			22.5		
Base Capacity (vph)	414	966		496	739		289	2007		299	1391	
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	0.50	0.19		0.12	0.09		0.55	0.27		0.13	0.66	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 77

Natural Cycle: 95

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.76

Intersection Signal Delay (s/veh): 20.1

Intersection LOS: C

Intersection Capacity Utilization 69.8%

ICU Level of Service C

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 21: Niagara St & Quaker Road



Lanes, Volumes, Timings
22: Niagara St & Merritt Rd

07-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↔	↔			↔	↔		↔	
Traffic Volume (vph)	2	25	3	483	64	32	2	268	397	44	413	19
Future Volume (vph)	2	25	3	483	64	32	2	268	397	44	413	19
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		60.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		1	0		0
Taper Length (m)	0.0			0.0			0.0			0.0		
Satd. Flow (prot)	0	1623	0	1566	1566	0	0	1648	1401	0	3097	0
Flt Permitted		0.968		0.548				0.996			0.895	
Satd. Flow (perm)	0	1576	0	903	1566	0	0	1642	1401	0	2786	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			34				436			6
Link Speed (k/h)		50			60			60			60	
Link Distance (m)		835.0			202.8			911.9			164.9	
Travel Time (s)		60.1			12.2			54.7			9.9	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.68	0.68	0.68	0.94	0.94	0.94	0.91	0.91	0.91	0.87	0.87	0.87
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	3	37	4	514	68	34	2	295	436	51	475	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	44	0	514	102	0	0	297	436	0	548	0
Number of Detectors	1	1		1	1		1	1	1	1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (m)	12.0	12.0		12.0	12.0		12.0	12.0	6.1	12.0	12.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		
Detector Phase	4	4		3	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		7.0	10.0		20.0	20.0	20.0	20.0	20.0	
Minimum Split (s)	16.7	16.7		16.7	16.7		26.7	26.7	26.7	26.7	26.7	
Total Split (s)	16.7	16.7		26.3	43.0		27.0	27.0	27.0	27.0	27.0	
Total Split (%)	23.9%	23.9%		37.6%	61.4%		38.6%	38.6%	38.6%	38.6%	38.6%	
Maximum Green (s)	10.7	10.7		22.3	36.3		20.3	20.3	20.3	20.3	20.3	
Yellow Time (s)	3.0	3.0		3.0	3.7		3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	3.0	3.0		1.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)		-2.1		1.0	-2.1			-2.4	-2.4		-2.4	
Total Lost Time (s)		3.9		5.0	4.6			4.3	4.3		4.3	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		5.0	5.0	5.0	5.0	5.0	

Lanes, Volumes, Timings
22: Niagara St & Merritt Rd

07-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Recall Mode	None	None		None	None		Min	Min	Min	Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effect Green (s)		12.6		26.6	27.0			23.5	23.5		23.5	
Actuated g/C Ratio		0.21		0.44	0.45			0.39	0.39		0.39	
v/c Ratio		0.13		0.85	0.14			0.46	0.53		0.50	
Control Delay (s/veh)		23.3		27.4	6.2			19.8	4.9		18.3	
Queue Delay		0.0		0.0	0.0			0.0	0.0		0.0	
Total Delay (s/veh)		23.3		27.4	6.2			19.8	4.9		18.3	
LOS		C		C	A			B	A		B	
Approach Delay (s/veh)		23.3			23.9			11.0			18.3	
Approach LOS		C			C			B			B	
Queue Length 50th (m)		4.3		42.1	3.8			30.2	0.0		29.5	
Queue Length 95th (m)		9.1		#73.8	10.1			53.4	17.8		43.2	
Internal Link Dist (m)		811.0			178.8			887.9			140.9	
Turn Bay Length (m)												
Base Capacity (vph)		354		703	1058			649	817		1104	
Starvation Cap Reductn		0		0	0			0	0		0	
Spillback Cap Reductn		0		0	0			0	0		0	
Storage Cap Reductn		0		0	0			0	0		0	
Reduced v/c Ratio		0.12		0.73	0.10			0.46	0.53		0.50	

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 59.8

Natural Cycle: 65

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay (s/veh): 17.4

Intersection LOS: B

Intersection Capacity Utilization 80.1%

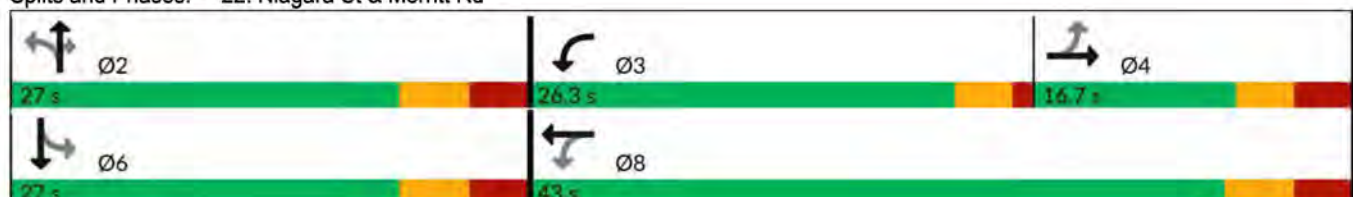
ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 22: Niagara St & Merritt Rd



Lanes, Volumes, Timings

23: Clare Avenue/Line Avenue & Quaker Road

07-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	178	20	75	212	50	10	40	100	50	50	10
Future Volume (vph)	20	178	20	75	212	50	10	40	100	50	50	10
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	0.0			0.0			0.0			0.0		
Satd. Flow (prot)	0	1666	0	0	1644	0	0	1570	0	0	1672	0
Flt Permitted		0.995			0.989			0.997			0.978	
Satd. Flow (perm)	0	1666	0	0	1644	0	0	1570	0	0	1672	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		404.5			351.0			378.6			1022.4	
Travel Time (s)		29.1			60.3			27.3			73.6	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	22	193	22	82	230	54	11	43	109	54	54	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	237	0	0	366	0	0	163	0	0	119	0
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	62.0%					ICU Level of Service B						
Analysis Period (min)	15											

HCM 7th AWSC
23: Clare Avenue/Line Avenue & Quaker Road

07-26-2024

Intersection

Intersection Delay, s/veh	11.7
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	20	178	20	75	212	50	10	40	100	50	50	10
Future Vol, veh/h	20	178	20	75	212	50	10	40	100	50	50	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	0	0	0	0	0	0
Mvmt Flow	22	193	22	82	230	54	11	43	109	54	54	11
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, s/veh	11	13.3	10	10.2
HCM LOS	B	B	A	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	7%	9%	22%	45%
Vol Thru, %	27%	82%	63%	45%
Vol Right, %	67%	9%	15%	9%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	150	218	337	110
LT Vol	10	20	75	50
Through Vol	40	178	212	50
RT Vol	100	20	50	10
Lane Flow Rate	163	237	366	120
Geometry Grp	1	1	1	1
Degree of Util (X)	0.239	0.344	0.513	0.192
Departure Headway (Hd)	5.287	5.221	5.038	5.78
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	678	687	714	619
Service Time	3.329	3.257	3.069	3.824
HCM Lane V/C Ratio	0.24	0.345	0.513	0.194
HCM Control Delay, s/veh	10	11	13.3	10.2
HCM Lane LOS	A	B	B	B
HCM 95th-tile Q	0.9	1.5	3	0.7

Lanes, Volumes, Timings

99: Quaker Road

07-26-2024

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↱	↗	↘
Traffic Volume (vph)	288	0	20	307	20	20
Future Volume (vph)	288	0	20	307	20	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)		0.0	0.0		0.0	0.0
Storage Lanes		0	0		1	0
Taper Length (m)			7.5		7.5	
Satd. Flow (prot)	1697	0	0	1692	1543	0
Flt Permitted				0.997	0.976	
Satd. Flow (perm)	1697	0	0	1692	1543	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	142.9			130.3	72.1	
Travel Time (s)	10.3			9.4	5.2	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	313	0	22	334	22	22
Shared Lane Traffic (%)						
Lane Group Flow (vph)	313	0	0	356	44	0
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	45.4%			ICU Level of Service A		
Analysis Period (min)	15					

Intersection

Int Delay, s/veh 1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	288	0	20	307	20	20
Future Vol, veh/h	288	0	20	307	20	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	313	0	22	334	22	22

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	313
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.12
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.218
Pot Cap-1 Maneuver	-	-	1247
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1247
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0.49	12.59
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	518	-	-	110	-
HCM Lane V/C Ratio	0.084	-	-	0.017	-
HCM Control Delay (s/veh)	12.6	-	-	7.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

Lanes, Volumes, Timings
102: Merritt Rd

07-26-2024

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	0.0		0.0	0.0	
Storage Lanes	1	0		0	0	
Taper Length (m)	7.5				7.5	
Satd. Flow (prot)	1697	0	1697	0	0	1697
Flt Permitted						
Satd. Flow (perm)	1697	0	1697	0	0	1697
Link Speed (k/h)	50		50			50
Link Distance (m)	835.0		563.2			119.8
Travel Time (s)	60.1		40.6			8.6
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	0.0%			ICU Level of Service A		
Analysis Period (min)	15					

Intersection

Int Delay, s/veh 0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1	0	0
Stage 1	0	-	-
Stage 2	1	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	1022	-	-
Stage 1	-	-	-
Stage 2	1022	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1022	-	-
Mov Cap-2 Maneuver	1022	-	-
Stage 1	-	-	-
Stage 2	1022	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s/veh)	-	0	0	-
HCM Lane LOS	-	A	A	-
HCM 95th %tile Q(veh)	-	-	-	-

APPENDIX D – TRAFFIC SIGNAL WARRANTS

Quaker Rd @ Rice Rd

Count Date: 14-Sep-2022

Intersection: Rice Rd & Quaker Rd

Municipality: Welland

Major Road: Rice Rd

Major Road Runs: N/S one lane each way

Operating Speed of Major Road: 50 km/hr

Operating under restricted flow conditions

Warrant #1: Minimum Vehicular Volumes.

A. All Approaches.

100% Satisfied

No. of Lanes	Minimum Requirements					Hours Ending									
	1 Lane Each Way		2 Lanes Each Way		3 Lanes										
Flow Condition	1 Lane F. Flow (Code 1)	1 Lane R. Flow (Code 2)	2 Lane F. Flow (Code 3)	2 Lane R. Flow (Code 4)	or More R. Flow (Code 5)	8:00	9:00	12:00	13:00	14:00	16:00	17:00	18:00	Percentage Warrant	
100%	480	720	600	900	1125	839	1160	1079	1100	1024	1294	1440	1318	100%	
80%	385	575	480	720	900									Yes: X No:	
All Approaches	100% Fulfilled					100	100	100	100	100	100	100	100	800	
	80% Fulfilled													0	
	Actual % if Below 80%													0	

Total: 800

Actual Average (Total/8): 100%

B. Minor Street Both Approaches.

100%	120	170	120	170	170	362	460	437	447	425	554	680	580	100%
80%	95	135	95	135	135									Yes: X No:
Minor Street Both Approaches	100% Fulfilled					100	100	100	100	100	100	100	100	800
	80% Fulfilled													0
	Actual % if Below 80%													0

Total: 800

Actual Average (Total/8): 100%

Quaker Rd @ Rice Rd

Count Date: 14-Sep-2022

Intersection: Rice Rd & Quaker Rd

Municipality: Welland

Major Road: Rice Rd

Major Road Runs: N/S one lane each way

Operating Speed of Major Road: 50 km/hr

Operating under restricted flow conditions

Warrant #2: Delay to Cross Traffic.

A. Major Street Both Approaches.

80% Satisfied

No. of Lanes	Minimum Requirements													
	1 Lane Each Way		2 Lanes Each Way		3 Lanes	Hours Ending								
Flow Condition	1 Lane F. Flow (Code 1)	1 Lane R. Flow (Code 2)	2 Lane F. Flow (Code 3)	2 Lane R. Flow (Code 4)	or More R. Flow (Code 5)	8:00	9:00	12:00	13:00	14:00	16:00	17:00	18:00	Percentage Warrant
100%	480	720	600	900	1125	477	700	642	653	599	740	760	738	100%
80%	385	575	480	720	900									Yes:
All Approaches	100% Fulfilled										100	100	100	300
	80% Fulfilled						80	80	80	80				320
	Actual % if Below 80%					66								66

Total: 686

Actual Average (Total/8): 86%

B. Traffic Crossing Major Street.

100%	50	75	50	75	75	236	288	234	238	228	333	392	332	100%
80%	40	60	40	60	60									Yes: X No:
All Approaches	100% Fulfilled					100	100	100	100	100	100	100	100	800
	80% Fulfilled													0
	Actual % if Below 80%													0

Total: 800

Actual Average (Total/8): 100%

Quaker Rd @ Rice Rd

Count Date: 14-Sep-2022

Intersection: Rice Rd & Quaker Rd

Municipality: Welland

Major Road: Rice Rd

Major Road Runs: N/S one lane each way

Operating Speed of Major Road: 50 km/hr

Operating under restricted flow conditions

Warrant #3: Accident Experience.

Not Satisfied

A. Reportable accidents within a twelve month period averaged over 36 consecutive months susceptible to correction by a traffic signal.

Minimum Requirements	Actual Number of Accidents	Average Number of Accidents	Fulfilled
5	0 in 0 years	Invalid	0%

B. Adequate trial of less restrictive remedies has failed to reduce accident frequency.

No

C. Either Warrant 1 (Minimum Vehicular Volume) or Warrant 2 (Delay to Cross Traffic) satisfied 80% or more.

Yes

Warrant #4: Combination Warrant. (Used if no warrant satisfied 100%)

Satisfied

Minimum Requirements	Warrant Satisfied 80% or More	Fulfilled
Two Warrants Satisfied 80%	Warrant 1 (Minimum Vehicular Volume) Warrant 2 (Delay to Cross Traffic) Warrant 3 (Accident Experience)	Yes Yes No

Conclusion: Traffic signal warranted.

Quaker Rd @ First Ave

Count Date: 2-Nov-2022

Intersection: Quaker Rd & First Ave

Municipality: Welland

Major Road: Quaker Rd

Major Road Runs: E/W one lane each way

Operating Speed of Major Road: 50 km/hr

Operating under restricted flow conditions

Warrant #1: Minimum Vehicular Volumes.

A. All Approaches.

100% Satisfied

No. of Lanes	Minimum Requirements														
	1 Lane Each Way		2 Lanes Each Way		3 Lanes	Hours Ending								Percentage Warrant	
Flow Condition	1 Lane F. Flow (Code 1)	1 Lane R. Flow (Code 2)	2 Lane F. Flow (Code 3)	2 Lane R. Flow (Code 4)	or More R. Flow (Code 5)	9:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00		
100%	480	720	600	900	1125	1017	789	937	889	947	1132	1241	1010	100%	
80%	385	575	480	720	900									Yes: X No:	
All Approaches	100% Fulfilled					100	100	100	100	100	100	100	100	800	
	80% Fulfilled													0	
	Actual % if Below 80%													0	

Total: 800

Actual Average (Total/8): 100%

B. Minor Street Both Approaches.

100%	120	170	120	170	170	438	308	359	369	389	452	516	424	100%
80%	95	135	95	135	135									Yes: X No:
Minor Street Both Approaches	100% Fulfilled					100	100	100	100	100	100	100	100	800
	80% Fulfilled													0
	Actual % if Below 80%													0

Total: 800

Actual Average (Total/8): 100%

Quaker Rd @ First Ave

Count Date: 2-Nov-2022

Intersection: Quaker Rd & First Ave

Municipality: Welland

Major Road: Quaker Rd

Major Road Runs: E/W one lane each way

Operating Speed of Major Road: 50 km/hr

Operating under restricted flow conditions

Warrant #2: Delay to Cross Traffic.

A. Major Street Both Approaches.

Not Satisfied

No. of Lanes	Minimum Requirements													
	1 Lane Each Way		2 Lanes Each Way		3 Lanes	Hours Ending								
Flow Condition	1 Lane F. Flow (Code 1)	1 Lane R. Flow (Code 2)	2 Lane F. Flow (Code 3)	2 Lane R. Flow (Code 4)	or More R. Flow (Code 5)	9:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	Percentage Warrant
100%	480	720	600	900	1125	579	481	578	520	558	680	725	586	100%
80%	385	575	480	720	900									Yes:
All Approaches	100% Fulfilled											100		100
	80% Fulfilled					80		80			80		80	320
	Actual % if Below 80%						67		72	78				217

Total: 637

Actual Average (Total/8): 80%

B. Traffic Crossing Major Street.

100%	50	75	50	75	75	199	112	127	150	151	169	185	166	100%
80%	40	60	40	60	60									Yes: No: X
All Approaches	100% Fulfilled					100	100	100	100	100	100	100	100	800
	80% Fulfilled													0
	Actual % if Below 80%													0

Total: 800

Actual Average (Total/8): 100%

Quaker Rd @ First Ave

Count Date: 2-Nov-2022

Intersection: Quaker Rd & First Ave

Municipality: Welland

Major Road: Quaker Rd

Major Road Runs: E/W one lane each way

Operating Speed of Major Road: 50 km/hr

Operating under restricted flow conditions

Warrant #3: Accident Experience.

Not Satisfied

A. Reportable accidents within a twelve month period averaged over 36 consecutive months susceptible to correction by a traffic signal.

Minimum Requirements	Actual Number of Accidents	Average Number of Accidents	Fulfilled
5	0 in 0 years	Invalid	0%
B. Adequate trial of less restrictive remedies has failed to reduce accident frequency.			No
C. Either Warrant 1 (Minimum Vehicular Volume) or Warrant 2 (Delay to Cross Traffic) satisfied 80% or more.			Yes

Warrant #4: Combination Warrant. (Used if no warrant satisfied 100%)

Not Satisfied

Minimum Requirements	Warrant Satisfied 80% or More	Fulfilled
Two Warrants Satisfied 80%	Warrant 1 (Minimum Vehicular Volume) Warrant 2 (Delay to Cross Traffic) Warrant 3 (Accident Experience)	Yes No No

Conclusion: Traffic signal warranted.