ASURZA ENGINEERS

Memo

To: Arash Mirhoseini, M.Sc., EIT

From: Martin Asurza, M.Eng., P. Eng.

Date: November 16, 2022

Ref: Response to Peer Review
Residential Development (Fallis Line, West of CR10)

Our company received comments provided by Arash Mirhoseini from Stantec on our updated Traffic Impact Study Report dated January 31, 2022 prepared for the proposed residential development next to Fallis Line, west of CR10 in Millbrook. Clarifications and required updates have been provided on the updated traffic report. However, the following comments still remain for which response are provide here:

A. Stantec Comment: In this TIS report, "Millbrook Development Phase 2 – Traffic Impact Study for the Tower Hill Development Ltd." prepared by JD Engineering was mentioned several times as a reference to provide information (e.g., development names, site generated trips, etc.) on some developments which are adjacent to this proposed residential site. In the previous peer review letter, it was recommended to include this full JD Engineering report as an appendix in this proposed residential TIS report or excerpts including referenced information to explain the details of trip generation based on these adjacent developments along with the trip generation volumes directly used in the volume tables in Appendix B. However, the updated TIS report still does not include this reference. Stantec recommended that the Consultant should insert this report as an appendix and additional review based on this report is needed.

Our Response: The full JD Engineering Traffic Report has been sent to the peer reviewer already; therefore, the complete source of information has been provided.

B. Stantec Comment: In Appendix E, the name of this appendix is Synchro Reports Background Horizon Year 2030. However, the contents included in this appendix are not synchro outputs. This appendix needs to be updated.

Our Response: The Appendix E; was mistakenly duplicated from previous appendix. The proper one is included at the end of this memo.

C. Stantec Comment: Under Section 4.3 Trip Distribution/Assignment in this TIS report, directional traffic patterns were estimated from the traffic data report obtained from the County and turning movement count reports included in the JD Engineering's TIS report. As mentioned in Section 2.1 of this letter, no details of trip distribution based on this information were included as an appendix in the updated TIS report. It is difficult to understand the methodology used to calculate all trip distribution percentages shown in Appendix F Trip Distribution without having access to the source information.

Our Response: The full JD Engineering Traffic Report has been sent to the peer reviewer already; therefore, the complete source of information has been provided.

D. Stantec Comment: In Section 5.4 of the updated TIS report, some auxiliary lanes at the CR10 & Larmer Line and the CR10 & Fallis Line intersections were recommended for the total traffic scenarios. The left and right turn lane warrants for these lanes need to be provided. It is recommended to add more descriptions in the updated TIS report on turning lane warrant analysis details (e.g., an individual appendix with analysis details based on TAC guidelines) in Section 5.4, instead of only listing all recommended configurations in Section 6.
It will also be beneficial to see if traffic operational performance will be acceptable (e.g., LOS D or better) with the traffic signal installation only for all background and total traffic scenarios without lane configuration improvements.

Our Response: The County of Peterborough Traffic Impact Assessment Guidelines indicates the use of the Geometric Design Standards for Ontario Highway (GDSOH) to evaluate the need for left turn lanes; however, the methodology is applicable to unsignalized intersections and not for traffic-controlled intersections. The GDSOH, which is currently part of the TAC Manual, has very limited information on traffic-controlled intersections. The same for the need of right turn lane/taper, which the county suggest the use of the Virginia Department of Transportation warrant criteria. The consulted guidelines for signal-controlled intersections is the Ontario traffic Manual

(OTM). Based on this guideline, it was identified extreme congested conditions without auxiliary lanes (v/c greater than 4.0). Due to the relative high volumes on Fallis line turning left, there is an imperative need of auxiliary lanes and traffic signals to properly control the intersection. It is suggested the County of Peterborough Traffic Impact Assessment Guidelines be updated with current guidelines and standards.

E. Stantec Comment: For the whole TIS report, it is recommended to add Appendix References in the related sections for reviewer's convenience.

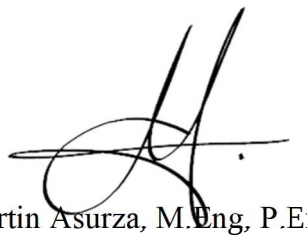
Based on the above, this updated TIS report prepared in support of the proposed residential development (West of CR10) was found to require supporting document along with the turning lane warrant analysis details, as listed in the previous sections of this letter. It is recommended for the Peterborough County to request the information to be provided in an updated TIS report or as an addendum to address the issues brought to light in this Peer Review letter.

Our Response: With the complete source of information and further concepts provided here, I trust the additional information provides better overview of our findings.

General comments

The site plan has been updated with minor changes in the number of units. The Traffic Impact Study Report dated January 31, 2022 was evaluated with a number of units and generated trips as shown in ***Table 1*** below; currently with the updated site plan, the number of units and the estimated new trips are shown in ***Table 2***. Since the difference in the number of resulting trips are not substantial (no more than 30 trips or no less than 14 trips); the conclusions and recommended actions remain.

Respectfully;



Martin Asurza, M.Eng, P.Eng.
Senior Transportation/Traffic Engineer

ESTIMATED NUMBER OF TRIPS BY LAND USE - RESIDENTIAL (YEAR 2025)											
ITE	ITE	Total	AM Peak Hr. of Adj. Street			PM Peak Hr. of Adj. Street			SAT Peak Hr. of Adj. Street		
Code	Land Use	Units	Trips	In	Out	Trips	In	Out	Trips	In	Out
210	Single-Family Detached Housing	186	137	34	103	184	116	68	173	93	79
220	Multifamily Housing (Low Rise)	74	34	8	26	41	26	15	52	26	26
221	Multifamily Housing (Mid Rise)	75	27	7	20	33	20	13	33	16	17
TOTAL TRIPS RESIDENTIAL			198	49	149	258	162	96	257	135	122

ESTIMATED NUMBER OF TRIPS BY LAND USE - RESIDENTIAL (YEAR 2030)											
ITE	ITE	Total	AM Peak Hr. of Adj. Street			PM Peak Hr. of Adj. Street			SAT Peak Hr. of Adj. Street		
Code	Land Use	Units	Trips	In	Out	Trips	In	Out	Trips	In	Out
210	Single-Family Detached Housing	371	275	69	206	367	231	136	345	186	159
220	Multifamily Housing (Low Rise)	148	68	16	52	83	52	31	104	52	52
221	Multifamily Housing (Mid Rise)	150	54	14	40	66	40	26	66	32	34
TOTAL TRIPS RESIDENTIAL			397	98	298	516	324	192	515	270	244

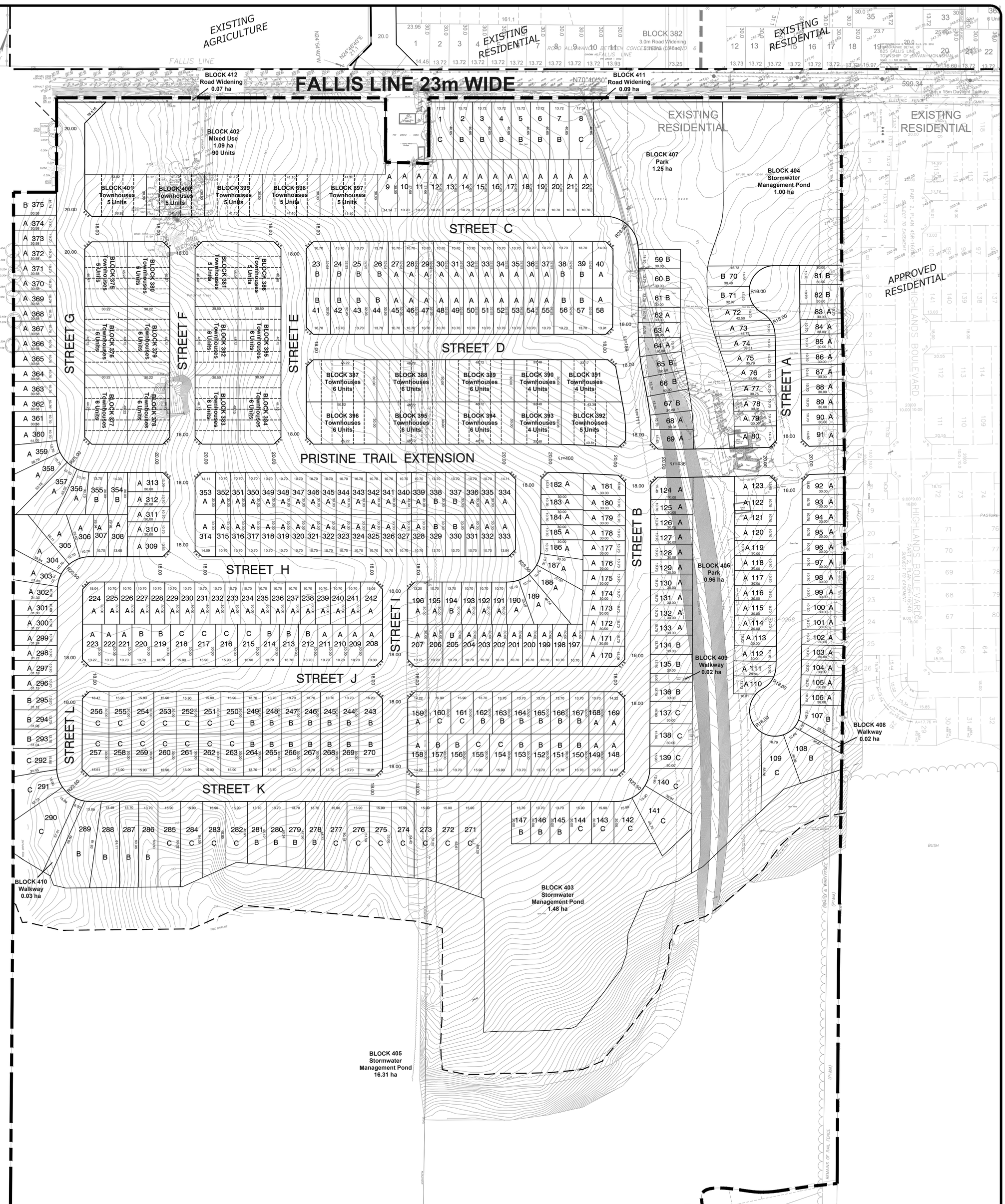
Table 1: *Generation of Trips (From Traffic Study Report, January 31, 2022).*

ESTIMATED NUMBER OF TRIPS BY LAND USE - RESIDENTIAL (YEAR 2025)											
ITE	ITE	Total	AM Peak Hr. of Adj. Street			PM Peak Hr. of Adj. Street			SAT Peak Hr. of Adj. Street		
Code	Land Use	Units	Trips	In	Out	Trips	In	Out	Trips	In	Out
210	Single-Family Detached Housing	188	139	35	104	186	117	69	174	94	80
220	Multifamily Housing (Low Rise)	73	34	8	26	41	26	15	51	26	26
231	Mid-Rise Residential with 1st-Floor Commercial	45	14	4	10	16	11	5	39	19	19
TOTAL TRIPS RESIDENTIAL			186	46	140	243	154	89	264	139	125

ESTIMATED NUMBER OF TRIPS BY LAND USE - RESIDENTIAL (YEAR 2030)											
ITE	ITE	Total	AM Peak Hr. of Adj. Street			PM Peak Hr. of Adj. Street			SAT Peak Hr. of Adj. Street		
Code	Land Use	Units	Trips	In	Out	Trips	In	Out	Trips	In	Out
210	Single-Family Detached Housing	375	278	69	208	371	234	137	349	188	160
220	Multifamily Housing (Low Rise)	146	67	15	52	82	52	30	102	51	51
231	Mid-Rise Residential with 1st-Floor Commercial	90	27	8	19	32	23	10	77	39	39
TOTAL TRIPS RESIDENTIAL			372	92	279	485	308	177	528	278	250

Table 2: *Generation of Trips with Current Site Plan.*

Appendix A – Draft Site Plan (Updated)



Schedule of Land Use

Description		Lot / Block No.	Residential Units	Area (ha)
Minimum Lot Width 10.70m (35')	A	9-22, 27-37, 40, 45-55, 58, 62-64, 68, 69, 72-80, 83-106, 110-133, 148, 149, 158, 159, 168-193, 195-204, 206-211, 221-242, 296-328, 331-336, 339-353, 356-374	241	8.68
Minimum Lot Width 13.70m (45')	B	2-7, 23-26, 38, 39, 41-44, 56, 57, 59-61, 65-67, 70, 71, 81, 82, 107, 108, 134-136, 145-147, 150-153, 156, 157, 162-167, 194, 205, 212-214, 219, 220, 243-249, 264-270, 278-281, 286-289, 293-295, 329, 330, 337, 338, 354, 355, 375	87	4.17
Minimum Lot Width 15.90m (52')	C	1, 8, 109, 137-144, 154, 155, 160, 161, 215-218, 250-263, 271-277, 282-285, 290-292	47	3.02
Total Single Detached			375	15.87
Street Townhouse Minimum Lot Width 7.62m (25')		375-401	146	3.71
Mixed Use		402	90	1.09
Net Developable Total			611	20.67
Stormwater Management Pond		403, 404		2.48
Natural Heritage Systems		405		16.31
Park		406, 407		2.21
Walkway		408-410		0.07
Road Widening		411, 412		0.16
Right of Way				7.29
Total Site Area				**49.19**

TITLE:

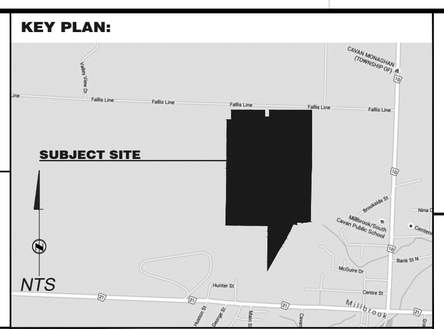
DRAFT PLAN OF SUBDIVISION

LEGAL DESCRIPTION:

DRAFT PLAN OF PROPOSED SUBDIVISION
PART OF LOT 11, CONCESSION 5
(Geographic Village of Millbrook, Township of Cavan)
PART OF LOT 11, CONCESSION 5 (Geographic Township of Cavan)
TOWNSHIP OF CAVAN-MONAGHAN
NORTH MONAGAN
(COUNTY OF PETERBOROUGH)

787 - 825 Fallis Line West
Township of Cavan Monaghan

KEY PLAN:



NOTE:
DISTANCES AND/OR COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED AS SHOWN ON THIS PLAN AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATE AND CORRECTLY SHOWN IN ACCORDANCE WITH A PLAN OF SURVEY PREPARED BY:SURVEYOR_COMPANY

2022/01/17
DAVID COMERY — DATE
IBW SURVEYORS

OWNER'S CERTIFICATE

I HEREBY AUTHORIZE THE BIGLIERI GROUP LTD. TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION TO THE MUNICIPALITY

2022/01/17
SAVERIO MONTEMARANO — DATE
CS4 DEVELOPMENT

REQUIRED INFORMATION

AS REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT R.S.O. 1990.

(a) SEE PLAN
(b) SEE PLAN
(c) SEE KEY MAP
(d) SEE SCHEDULE OF LAND USE
(e) SEE PLAN
(f) SEE PLAN
(g) SEE PLAN
(h) MUNICIPAL WATER AND SEWAGE AVAILABLE
(i) SANDY SILT / SILTY SAND TO CLAYEY SILT / SILTY CLAY
(j) SEE PLAN
(k) MUNICIPAL WATER AND SEWAGE AVAILABLE
(l) SEE PLAN

NOTE: CONTOURS RELATE TO CANADIAN GEODETIC DATUM

REVISIONS

No.	Description	Date	Int.
3			
2	Prepared for Second Submission	22/10/03	EC
1	Stormwater Management Pond Revision	21/12/15	JS

PROJECT No.: 20697
DATE: November 3, 2022
SCALE: 1:1500
DRAFTED BY: EC CHECKED BY: MT
DRAWING No.: **DP-01**

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126 Catharine Street North, Hamilton
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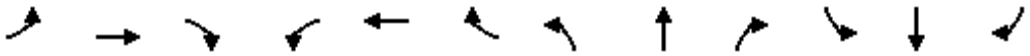
Appendix E

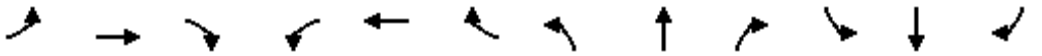
Synchro Reports – Background Horizon Year 2030



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	30	5	42	29	3	12	38	676	48	6	438	4
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	33	5	46	32	3	13	41	735	52	7	476	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1349	1361	478	1383	1337	761	480			787		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1349	1361	478	1383	1337	761	480			787		
tC, single (s)	7.1	6.5	6.4	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.5	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	72	96	92	70	98	97	96			99		
cM capacity (veh/h)	117	141	552	104	146	405	1082			832		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	84	48	828	487
Volume Left	33	32	41	7
Volume Right	46	13	52	4
cSH	210	134	1082	832
Volume to Capacity	0.40	0.36	0.04	0.01
Queue Length 95th (m)	13.6	11.2	0.9	0.2
Control Delay (s)	33.1	46.2	1.0	0.2
Lane LOS	D	E	A	A
Approach Delay (s)	33.1	46.2	1.0	0.2
Approach LOS	D	E		

Intersection Summary				
Average Delay	4.1			
Intersection Capacity Utilization	72.4%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	230	5	221	87	14	68	167	316	11	130	199	134
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	250	5	240	95	15	74	182	343	12	141	216	146
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)			4									
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1287	1217	216	1334	1357	349	362			355		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1287	1217	216	1334	1357	349	362			355		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	96	71	0	86	89	85			88		
cM capacity (veh/h)	91	135	824	73	112	694	1197			1203		

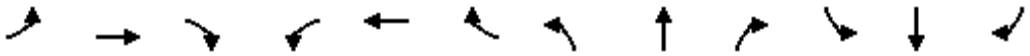
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	496	184	182	355	358	146
Volume Left	250	95	182	0	141	0
Volume Right	240	74	0	12	0	146
cSH	163	119	1197	1700	1203	1700
Volume to Capacity	3.05	1.55	0.15	0.21	0.12	0.09
Queue Length 95th (m)	Err	101.1	4.1	0.0	3.0	0.0
Control Delay (s)	Err	348.8	8.5	0.0	4.0	0.0
Lane LOS	F	F	A		A	
Approach Delay (s)	Err	348.8	2.9		2.8	
Approach LOS	F	F				

Intersection Summary				
Average Delay	2921.1			
Intersection Capacity Utilization	64.6%	ICU Level of Service		C
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	3	108	44	5	41	23
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	117	48	5	45	25
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	165	51			53	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	165	51			53	
tC, single (s)	6.4	6.3			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.4			2.3	
p0 queue free %	100	88			97	
cM capacity (veh/h)	801	1004			1479	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	121	53	70
Volume Left	3	0	45
Volume Right	117	5	0
cSH	997	1700	1479
Volume to Capacity	0.12	0.03	0.03
Queue Length 95th (m)	3.1	0.0	0.7
Control Delay (s)	9.1	0.0	4.9
Lane LOS	A		A
Approach Delay (s)	9.1	0.0	4.9
Approach LOS	A		

Intersection Summary			
Average Delay	5.9		
Intersection Capacity Utilization	23.7%	ICU Level of Service	A
Analysis Period (min)	15		



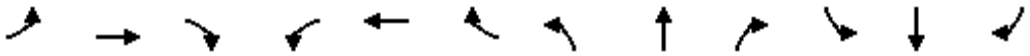
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	107	36	1	8	42	243	3	29	8	219	35	186
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	116	39	1	9	46	264	3	32	9	238	38	202

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	157	318	43	238	240
Volume Left (vph)	116	9	3	238	0
Volume Right (vph)	1	264	9	0	202
Hadj (s)	0.22	-0.43	-0.07	0.55	-0.54
Departure Headway (s)	5.9	5.1	6.0	6.4	5.3
Degree Utilization, x	0.26	0.45	0.07	0.42	0.35
Capacity (veh/h)	563	673	518	537	648
Control Delay (s)	11.0	12.1	9.5	12.9	10.0
Approach Delay (s)	11.0	12.1	9.5	11.4	
Approach LOS	B	B	A	B	

Intersection Summary				
Delay	11.5			
HCM Level of Service	B			
Intersection Capacity Utilization	54.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Intersection: 12: King St (CR21) & CR10

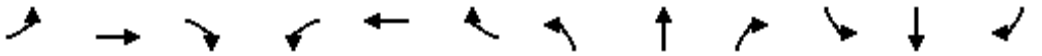
Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	LTR	L	TR
Maximum Queue (m)	18.9	25.4	13.0	19.7	19.0
Average Queue (m)	12.6	17.6	6.1	14.6	14.4
95th Queue (m)	19.9	29.3	15.5	22.0	21.2
Link Distance (m)	518.3	494.8	260.2		495.3
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)				12.0	
Storage Blk Time (%)				11	9
Queuing Penalty (veh)				25	21



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	4	1	37	29	1	4	34	554	26	10	743	12
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	4	1	40	32	1	4	37	602	28	11	808	13
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1531	1540	814	1567	1533	616	821			630		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1531	1540	814	1567	1533	616	821			630		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	99	89	59	99	99	95			99		
cM capacity (veh/h)	90	109	378	77	110	490	808			952		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	46	37	667	832
Volume Left	4	32	37	11
Volume Right	40	4	28	13
cSH	277	86	808	952
Volume to Capacity	0.16	0.43	0.05	0.01
Queue Length 95th (m)	4.4	13.4	1.1	0.3
Control Delay (s)	20.5	75.5	1.2	0.3
Lane LOS	C	F	A	A
Approach Delay (s)	20.5	75.5	1.2	0.3
Approach LOS	C	F		

Intersection Summary				
Average Delay	3.0			
Intersection Capacity Utilization	66.4%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	202	19	150	166	8	57	211	277	31	156	260	231
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	220	21	163	180	9	62	229	301	34	170	283	251
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)			4									
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1448	1415	283	1490	1649	318	534			335		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1448	1415	283	1490	1649	318	534			335		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	78	78	0	87	91	78			86		
cM capacity (veh/h)	67	92	756	50	66	723	1034			1225		

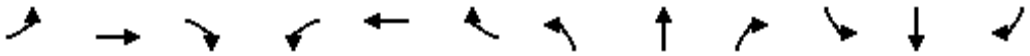
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	403	251	229	335	452	251
Volume Left	220	180	229	0	170	0
Volume Right	163	62	0	34	0	251
cSH	109	65	1034	1700	1225	1700
Volume to Capacity	3.69	3.84	0.22	0.20	0.14	0.15
Queue Length 95th (m)	Err	Err	6.4	0.0	3.7	0.0
Control Delay (s)	Err	Err	9.5	0.0	4.0	0.0
Lane LOS	F	F	A		A	
Approach Delay (s)	Err	Err	3.9		2.6	
Approach LOS	F	F				

Intersection Summary				
Average Delay	3406.7			
Intersection Capacity Utilization	68.5%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	2	55	48	3	113	67
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	60	52	3	123	73
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	372	54			55	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	372	54			55	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	94			92	
cM capacity (veh/h)	578	1005			1530	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	62	55	196
Volume Left	2	0	123
Volume Right	60	3	0
cSH	980	1700	1530
Volume to Capacity	0.06	0.03	0.08
Queue Length 95th (m)	1.5	0.0	2.0
Control Delay (s)	8.9	0.0	5.0
Lane LOS	A		A
Approach Delay (s)	8.9	0.0	5.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	26.6%	ICU Level of Service	A
Analysis Period (min)	15		



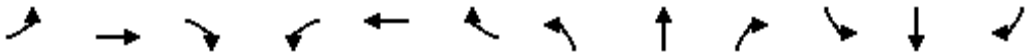
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	217	82	4	10	61	275	3	64	18	411	19	193
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	236	89	4	11	66	299	3	70	20	447	21	210

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	329	376	92	447	230
Volume Left (vph)	236	11	3	447	0
Volume Right (vph)	4	299	20	0	210
Hadj (s)	0.17	-0.44	-0.09	0.53	-0.60
Departure Headway (s)	7.2	6.6	8.1	7.7	6.5
Degree Utilization, x	0.66	0.69	0.21	0.96	0.42
Capacity (veh/h)	483	537	395	463	544
Control Delay (s)	23.4	22.9	13.1	58.0	13.0
Approach Delay (s)	23.4	22.9	13.1	42.7	
Approach LOS	C	C	B	E	

Intersection Summary				
Delay	31.5			
HCM Level of Service	D			
Intersection Capacity Utilization	76.7%	ICU Level of Service	D	
Analysis Period (min)	15			

Intersection: 12: King St (CR21) & CR10

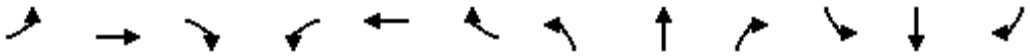
Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	LTR	L	TR
Maximum Queue (m)	25.9	26.9	14.9	26.7	17.9
Average Queue (m)	17.0	19.4	9.8	20.0	13.4
95th Queue (m)	26.6	30.1	16.3	29.9	20.9
Link Distance (m)	518.3	494.8	260.2		495.3
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)				12.0	
Storage Blk Time (%)				26	8
Queuing Penalty (veh)				54	35



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	18	4	44	32	8	5	43	661	35	5	729	16
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	20	4	48	35	9	5	47	718	38	5	792	17
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1653	1662	801	1693	1652	738	810			757		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1653	1662	801	1693	1652	738	810			757		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	71	95	88	41	91	99	94			99		
cM capacity (veh/h)	68	91	384	59	92	418	816			854		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	72	49	803	815
Volume Left	20	35	47	5
Volume Right	48	5	38	17
cSH	157	70	816	854
Volume to Capacity	0.46	0.70	0.06	0.01
Queue Length 95th (m)	16.1	23.9	1.4	0.1
Control Delay (s)	46.1	131.7	1.5	0.2
Lane LOS	E	F	A	A
Approach Delay (s)	46.1	131.7	1.5	0.2
Approach LOS	E	F		

Intersection Summary				
Average Delay	6.4			
Intersection Capacity Utilization	79.1%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	209	12	198	156	11	85	202	314	22	224	201	223
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	227	13	215	170	12	92	220	341	24	243	218	242
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)			4									
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1584	1510	218	1612	1740	353	461			365		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1584	1510	218	1612	1740	353	461			365		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	83	74	0	78	87	80			80		
cM capacity (veh/h)	46	77	821	39	55	690	1100			1193		

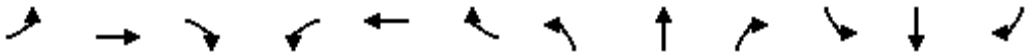
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	455	274	220	365	462	242
Volume Left	227	170	220	0	243	0
Volume Right	215	92	0	24	0	242
cSH	85	58	1100	1700	1193	1700
Volume to Capacity	5.36	4.70	0.20	0.21	0.20	0.14
Queue Length 95th (m)	Err	Err	5.6	0.0	5.8	0.0
Control Delay (s)	Err	Err	9.1	0.0	5.6	0.0
Lane LOS	F	F	A		A	
Approach Delay (s)	Err	Err	3.4		3.7	
Approach LOS	F	F				

Intersection Summary				
Average Delay	3615.3			
Intersection Capacity Utilization	71.9%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	7	54	44	4	65	45
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	59	48	4	71	49
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	240	50			52	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	240	50			52	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	94			95	
cM capacity (veh/h)	714	1018			1541	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	66	52	120
Volume Left	8	0	71
Volume Right	59	4	0
cSH	971	1700	1541
Volume to Capacity	0.07	0.03	0.05
Queue Length 95th (m)	1.7	0.0	1.1
Control Delay (s)	9.0	0.0	4.5
Lane LOS	A		A
Approach Delay (s)	9.0	0.0	4.5
Approach LOS	A		

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	23.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	123	32	1	6	37	274	2	32	6	245	45	192
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
Hourly flow rate (vph)	134	35	1	7	40	298	2	35	7	266	49	209

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	170	345	43	266	258
Volume Left (vph)	134	7	2	266	0
Volume Right (vph)	1	298	7	0	209
Hadj (s)	0.19	-0.48	-0.05	0.53	-0.53
Departure Headway (s)	6.1	5.2	6.3	6.5	5.5
Degree Utilization, x	0.29	0.49	0.08	0.48	0.39
Capacity (veh/h)	550	662	493	529	634
Control Delay (s)	11.5	13.1	9.8	14.3	10.7
Approach Delay (s)	11.5	13.1	9.8	12.5	
Approach LOS	B	B	A	B	

Intersection Summary				
Delay	12.4			
HCM Level of Service	B			
Intersection Capacity Utilization	58.0%	ICU Level of Service	B	
Analysis Period (min)	15			

Intersection: 12: King St (CR21) & CR10

Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	LTR	L	TR
Maximum Queue (m)	16.0	22.5	10.7	18.2	18.7
Average Queue (m)	11.7	15.5	6.5	13.9	12.9
95th Queue (m)	17.0	24.7	14.1	20.3	20.1
Link Distance (m)	518.3	494.8	260.2		495.3
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)				12.0	
Storage Blk Time (%)				11	9
Queuing Penalty (veh)				27	22