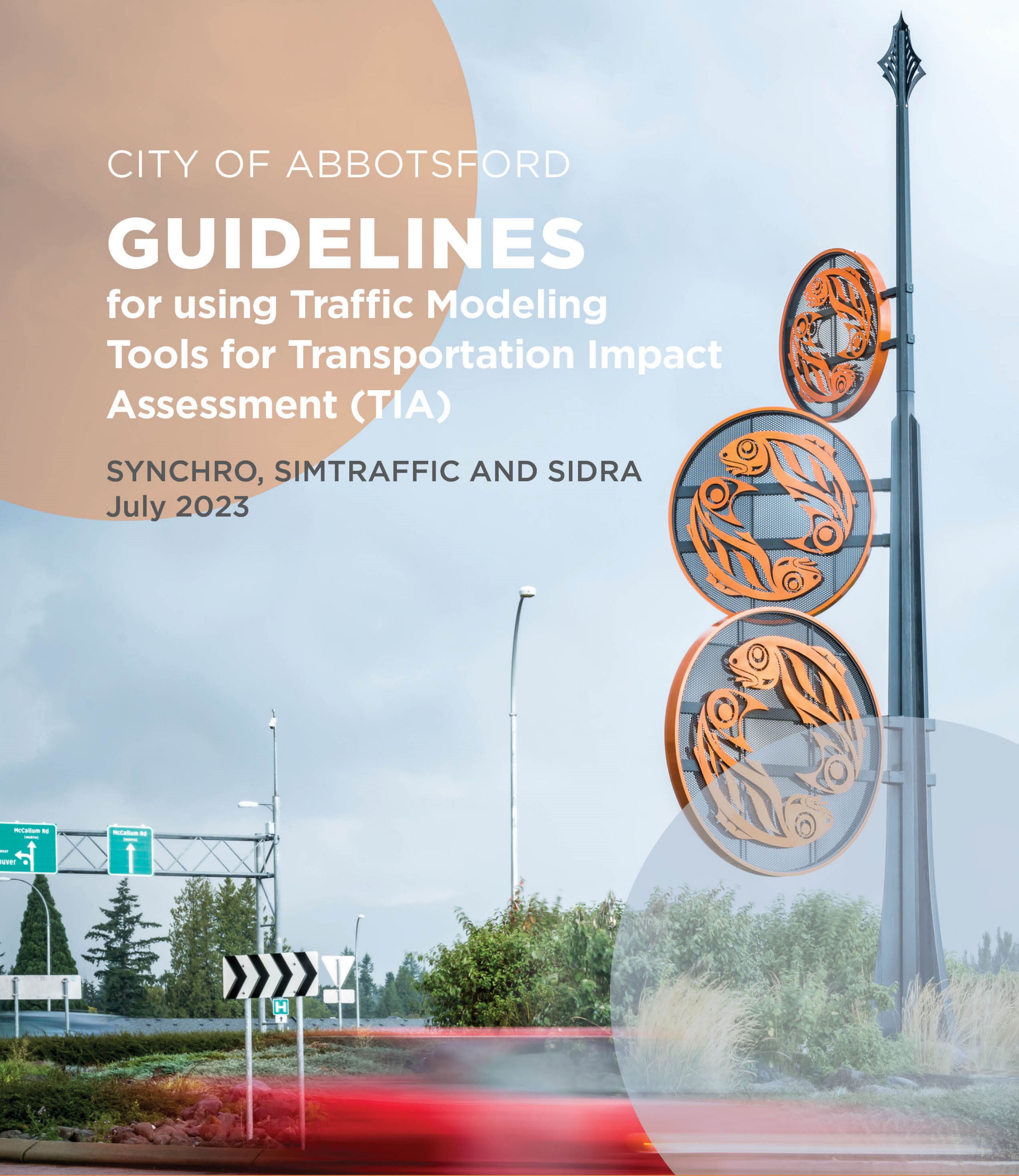
CITY OF ABBOTSFORD

GUIDELINES

for using Traffic Modeling Tools for Transportation Impact Assessment (TIA)



SYNCHRO, SIMTRAFFIC AND SIDRA
July 2023

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ABBOTSFORD

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TABLES

APPENDIX

ABBREVIATIONS

ABBREVIATION	MEANING
FHWA	Federal Highway Administration
HCM 2000	Highway Capacity Manual 2000
HV%	Heavy vehicle percentage
ICU	Intersection capacity utilization
LPI	Leading pedestrian interval
OD	Origin-destination
pc/hg/l	Passenger car per hour of green per lane
Peds/h	Pedestrians per hour
TMC	Turning movement count
v/c	Volume-to-capacity

1.0 PURPOSE OF THIS DOCUMENT

The purpose of this document aims to provide the City of Abbotsford (City) specific parameters and establish clear expectations, for using Synchro, SimTraffic, and SIDRA, for the practitioner to follow at a *minimum* when preparing traffic analyses for a traffic impact assessment (TIA). The parameters, provided in this document, are intended for modeling purpose only. The practitioner is expected to have sufficient knowledge of Synchro, SimTraffic, and SIDRA before preparing a TIA.

2.0 BACKGROUND

This document outlines specific guidelines and recommended input parameters that are tailored specifically to Abbotsford. Practitioners responsible for analyzing the City's networks using Synchro or other traffic modeling tools must adhere to the guidelines provided in this document. Upon the completion of traffic analysis, the user is accountable for submitting the model files to the City. This allows City staff to review the modeling assumptions, input parameters, analysis, and the corresponding transportation network. If, at any point, the practitioner deems it necessary to deviate from the modeling approach or modify modeling parameters as described in this document, it is their responsibility to seek confirmation from City staff prior to conducting analysis and preparing a TIA. Failure to notify and confirm such changes may result in the rejection of any assumptions made by the practitioner that do not align with the guidelines and recommended model parameters of this document. Subsequently, revisions to the work will be required for resubmission.

Synchro is a widely utilized software tool at a macroscopic level, employed for the purpose of modeling, optimizing, managing, and simulating transportation networks. In the City of Abbotsford, Synchro is the default tool for conducting operational analysis for intersections. In addition to Synchro, SimTraffic and Sidra and advanced micro-simulation tool such as PTV Vissim may be required depending on the context of the work. Guidelines for SimTraffic and Sidra are also provided in this document. See **Section 4** for situations when certain tools should be considered.

3.0 DOCUMENT STRUCTURE

This document is composed of six main sections as follows.

1. Purpose of This Document
2. Background
3. Document Structure
4. Basics for Traffic Modeling for TIA
5. Data Input Guidelines
6. References

4.0 BASICS FOR TRAFFIC MODELING FOR TIA

ANALYSIS SCENARIOS

Analyses, using the appropriate traffic modeling tool, should be completed for each scenario, including background and post-development with and without proposed improvements, as applicable.

MODELING TOOLS SELECTION

By default, Synchro should be used for analyzing signalized and unsignalized intersections (i.e., two-way stop control and all-way stop controlled intersections). Sidra should be used for analyzing roundabouts / traffic circles. Additional modeling tools may also be required on a case-by-case basis. **Table 4-1** provides a brief summary of scenarios on when certain modeling tools can be considered. The practitioner should confirm the scope of modeling and modeling tool with the City prior to preparing a TIA.

Table 4-1: Modeling Tools Selection

MODELING TOOL	WHEN TO USE
Synchro	Default tool (unless notified otherwise) for analyzing signalized and unsignalized intersections (i.e., two-way stop and all-way stop intersections)
SimTraffic	• When analyzing a series of signals along a corridor, especially if these signals are coordinated signals. • When the queue length of left turning traffic exceeds the available storage. • When significant queue lengths are present that may impact adjacent intersections.
Sidra	Roundabout / Traffic Circle
Vissim	While details and specific requirements of Vissim modeling are <u>not</u> part of this document, Vissim modeling should be considered and may be requested by the City when deemed appropriate. For example, locations which may include interchanges, considerable weaving between closely spaced intersections, high pedestrian and cyclist demands, dedicated bus lanes and unique intersection configurations.
EMME / Visum	The practitioner should consult with the City to confirm the growth assumptions for future background conditions. Depending on the scale of the study, the background growth is typically a blanket growth factor applied throughout the network. However, large proposed developments may require more refined growth and trip assignment assumptions, which may necessitate macroscopic modeling using EMME or Visum. While the details and specific requirements of such modeling are <u>not</u> included in this document, the practitioner should confirm these details with the City before conducting any analysis.

At the time of developing this document, Version 11 is the latest version of Synchro. All traffic analyses performed by the practitioner shall use the latest version of traffic analysis tool – Synchro 11 or later – and the analysis shall conform to the guidelines outlined in this document.

MODEL VALIDATION

Regardless of the modeling tools selected, the practitioner must validate the model results by ensuring that the results of the existing conditions modeling are comparable to observed field conditions, including delays and queue lengths. Additionally, the volume-to-capacity (v/c) ratio under existing conditions should generally be less than 1.1. In situations where the v/c ratios under existing conditions exceed 1.1, the practitioner should review traffic counts and signal timing information to ensure they accurately reflect the field conditions. They should also adjust lost time as needed (see Section 5 for detailed guidelines on adjusting lost time).

The process of model validation, including the review of the existing base's model results against field conditions and any adjustments made to the model with rationale must be presented in the study.

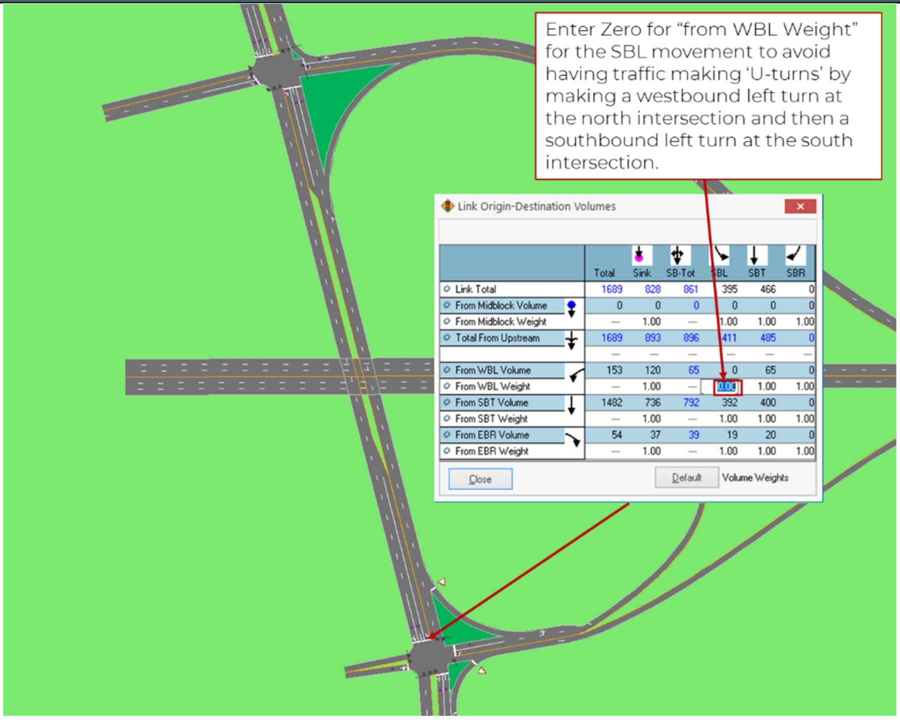
5.0 DATA INPUT GUIDELINES

This section provides the guidelines for data input for Synchro, SimTraffic and Sidra. Detailed modeling values and approaches are provided in **Table 5-1**, **Table 5-2**, and **Table 5-3** for Synchro, SimTraffic and Sidra, respectively.

Table 5-1: City of Abbotsford – Synchro Data Input Guidelines

PARAMETER	VALUE / METHODOLOGY
Laning / Volumes	
Ideal saturated flow (pc/hg/l)	1850 pc/hg/l for all movements
Lost time adjustment (seconds)	• 0.0 by default • Up to -1 second for model validation as needed
Leading detector (m)	Only needs to be entered for actuated signals. Code 2 detectors; detector one is placed at the stop bar (0.0 m); and detector two should be measured off aerial image, otherwise, a typical value of (15.0 m) should be entered; and use Synchro's default for detector size
Trailing detector (m)	Default value
Conflicting pedestrians (#/hr)	Based on TMC
Conflicting bicycles (#/hr)	Based on TMC
Peak hour factor	• 0.93 for the morning peak period • 0.94 for the afternoon peak period
Heavy vehicles (%)	• Residential or commercial developments that are expected to generate minimal truck volumes during the analysis periods: use HV% based on TMC for all scenarios • Industrial development or any kind of development (i.e., a temporary construction site) that will generate a significant number of trucks: Convert all truck volumes to equivalent passenger volumes outside of the model and enter zero for HV% in the model. • Medium-duty (FHWA vehicle Class 4 – Class 6): apply a factor of 2 (1 truck = 2 passenger vehicles) • Heavy-duty (FHWA vehicle Class 7+): apply a factor of 3 (1 truck = 3 passenger vehicles)
Traffic from Mid-Block	• Input data if available • If a notable volume 'gap' appears between two modelled intersections on the same corridor, indicating a portion of traffic is from upstream mid-block sources, this field should be adjusted to reflect the field condition
Link OD volumes	Use Synchro default but modify as needed especially at interchange ramps to avoid 'U-turns'. See example below.

PARAMETER	VALUE / METHODOLOGY



Lane width (m)	Non-bus/truck route travel lanes: • 3.2 m for non-curb general lane • 3.4 m for curb lane Bus/truck route travel lanes: • 3.3 m for non-curb general lane • 3.6 m for curb lane Any lane width at intersections that is greater than 4.8 m is to be entered as two lane (i.e., a through and a short right turn lane)
Link speed (km/h)	50 km/h, unless otherwise is posted
Grade (%)	• 0% is used if the grade is relatively flat. • 5% or higher (actual grades) for steep approach
Storage length (m)	Actual storage lengths must be entered. The storage length excludes the taper.
Signal	
Signal control type	Currently, Abbotsford's traffic signals operate using one of the following control types: • Actuated-Uncoordinated • Semi-Actuated Uncoordinated • Actuated-Coordinated The City does not have pre-timed signals at this moment. Consult the City to determine the type of signal control type for study intersections Pedestrian actuated signals: • If the pedestrian actuated signal is coordinated with an adjacent intersection, use "actuated-coordinated” • If the pedestrian actuated signal operates freely on its own, use "semi-uncoordinated"

PARAMETER	VALUE / METHODOLOGY
Minimal initial (sec)	• Main street through: 10 seconds • Minor street through: 6 seconds • Left turn (main and minor street): 7 seconds
Cycle Length	• Existing base: refer to City's signal timing records • Future scenario: use optimized cycle length using Synchro's built-in function and set the value between 60 seconds and 120 seconds
Recall setting	Consult the City for signal timing information. If this information is not available from signal timing records, For actuated-coordinated signal: • "Coord-MIN" is default for the coordinated phase • "None" for the side streets and remaining phases For free operation signal: • "MIN" for the main street through phase • "None" for the side streets and remaining main street phases Pedestrian Actuated Signal • If the pedestrian actuated signal is coordinated with an adjacent intersection, use "C-MIN" for vehicle phase and "Ped" for the pedestrian phase • If the pedestrian actuated signal operates freely on its own, use "MIN" for vehicle phase and "Ped" for the pedestrian phase • If the pedestrian actuated intersection experiences minimal pedestrian crossing activities and using the above coding may result in much longer delays and queue lengths results compared to field observations sometimes. In this case, the practitioner can consider developing an additional scenario assuming the intersection operates as a stop-controlled intersection as a supplement scenario. This means a range of operational performances will be provided in the TIA that the stop-controlled scenario represents minimal delays to the main street traffic and the signal scenario represents longer delays to the main street traffic.
Pedestrian calls	Estimated pedestrian calls can be entered based on the pedestrian activities at study intersections: • 0 calls for <10 peds/h • 5 calls for >= 10 and <15 peds/h • Enter a rounded value based on pedestrian volume estimates when between 15 and 100 peds/h • 100 calls for >100 peds/h This value needs to be checked again under future conditions to reflect the proposed development. For example, a site that may have minimal pedestrian activities today will be redeveloped in the future and the pedestrian calls need to be adjusted accordingly under the future scenarios.
Minimal pedestrian walk time (sec)	7 seconds
Minimal pedestrian clearance time (sec)	• Reference traffic signal record • For the proposed configuration where crossing distance changes, use 1.2m/s walk speed across the entire pedestrian crossing. Use 1.0m/s if the intersection is near a school, hospital, medical facility, or senior housing.

PARAMETER	VALUE / METHODOLOGY
Leading Pedestrian Interval (LPI)	• LPI should be applied for improving pedestrian safety for future improvements when possible. • LPI should not be used when there is a protected left turn phase that conflicts with the pedestrian phase of the crossing. For example, if the northbound left operates under fully protected operation, LPI should not be used for the pedestrian phase of the crosswalk crossing the west leg. • Use 5 seconds as default and increase its duration to up to 7 seconds for large intersections. • Use 'HOLD' for the LPI phase and subtract the LPI duration from the minimal pedestrian walk time. For example, when adding a LPI phase with 5 seconds of duration, use 2 seconds for minimal pedestrian walk time (7 seconds minus 5 seconds)

Reporting	Use Synchro's default method and select the following attributes at the minimum:
	• Intersection Capacity Utilization (ICU) for signalized intersection
	  ○ Lane Inputs
	  ○ Volumes Inputs
	  ○ Level of Service Info
	  ○ Timing Inputs
	  ○ V/C Ratios, Delays
	  ○ Queues
	• HCM 2000 for unsignalized intersection (stop for minor and free flow for major road)
	• HCM 2010 for all-way stop intersection. Note that the HCM 95th percentile queue result presented in the model report represent the vehicles and queue length will need to estimated by multiplying the number of vehicles in queue by average vehicle length including gaps between vehicles (7m).
	
	Include peak period and scenario information in the header and / or footer. Refer to **Appendix A** for example model outputs.

Table 5-2: City of Abbotsford – SimTraffic Data Input Guidelines

PARAMETER	VALUE / METHODOLOGY
Link OD volumes	OD patterns should be reviewed to reduce or eliminate certain turn combinations and better reflect any anticipated significant lane change behaviour. Special attentions should be paid at interchange ramp intersections to avoid 'U-turn' traffic.
Enter blocked intersection	In "Simulation Setting", adjust the Yes/No setting to reflect observed field conditions
Seeding & recording time	• Seeding: 10 minutes as the minimal value and should increase depending on the size of the network. For example, if it takes 15 minutes for a vehicle to finish from one end of the network to the other end when the network is unloaded, the seeding period should be set at 15 minutes at the minimum. • Recording: 60 minutes
Minimal number of runs	• For <=3 intersections: 3 - 5 runs • For >3 intersections: 5 - 10 runs • Using a "random Number Seed" of "0" for each file
Reporting	• Include the 'Simulation Summary' information as part of the model outputs. • If SimTraffic is only for providing queueing results, check ‘queuing information’ when configuring model reports. If other information such as delays and corridor travel time are used in the TIA analysis, check ‘Performance Report’ to include Delays by intersection and movement and ‘Arterial Report’ to include such results in the model reports. • Refer to **Appendix A** for example model reports.

Table 5-3: City of Abbotsford – Sidra Data Input Guidelines

PARAMETER	VALUE / METHODOLOGY
Evaluation period (min)	60 min with a 15-min peak flow period
Peak hour factor	Based on TMC
Ideal saturated flow (pc/hg/l)	1,850 pc/hg/l for all movements
Heavy vehicles (%)	Based on TMC
Minimal lane width (m)	• 4.3 m for single-lane roundabouts • 4.5m for both lanes for dual-lane roundabouts
Capacity manual selection	Either HCM - Metric or Sidra Standard. However, the user must verify the capacity manual selection by confirming the model results are comparable to field conditions.
Reporting	Include Lane Level of Service and Movement Summary. See **Appendix A** for example model reports.

6.0 REFERENCE

1. CUBIC | Trafficware, Synchro Studio 11 Synchro Plus SimTraffic and 3D Viewer User Guide, 2019
2. City of Vancouver, British Columbia, Guidelines for Using Synchro Version 10 (Revision 1.4), June 2022
3. City of Calgary, Transportation Impact Assessment (TIA) Guidelines, April 2011
4. City of Toronto, Guidelines for Using Synchro 11 (including SimTraffic 11), January 2021
5. Ministry of Transportation and Infrastructure, BC Supplement to TAC Geometric Design Guide, 3rd Edition, 2019

APPENDIX

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Appendix A

Example Synchro Reports – Signalized Intersection

Lanes, Volumes, Timings
2: Road B & Road A 07/13/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	200	800	250	150	700	200	100	150	150	100	300	150
Future Volume (vph)	200	800	250	150	700	200	100	150	150	100	300	150
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Lane Width (m)	3.3	3.3	3.3	3.3	3.3	3.3	3.2	3.2	3.2	3.2	3.2	3.2
Storage Length (m)	50.0		80.0	50.0		80.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Satd. Flow (prot)	1666	3109	0	1666	3116	0	0	2995	0	0	3043	0
Flt Permitted	0.160			0.140				0.645			0.755	
Satd. Flow (perm)	275	3109	0	245	3116	0	0	1938	0	0	2306	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		58			52			160			76	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		210.7			214.9			318.2			164.8	
Travel Time (s)		15.2			15.5			22.9			11.9	
Confl. Peds. (#/hr)	92		83	83		92	106		64	64		106
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)												
Lane Group Flow (vph)	213	1117	0	160	958	0	0	426	0	0	585	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	10.0		7.0	10.0		6.0	6.0		6.0	6.0	
Minimum Split (s)	11.5	25.5		11.5	25.5		32.5	32.5		32.5	32.5	
Total Split (s)	12.4	33.0		13.6	34.2		33.4	33.4		33.4	33.4	
Total Split (%)	15.5%	41.3%		17.0%	42.8%		41.8%	41.8%		41.8%	41.8%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	Min		None	Min		None	None		None	None	
Act Effct Green (s)	36.1	28.1		37.1	28.6			24.8			24.8	
Actuated g/C Ratio	0.48	0.37		0.49	0.38			0.33			0.33	
v/c Ratio	0.76	0.93		0.57	0.79			0.57			0.72	
Control Delay	33.6	38.3		19.8	25.9			15.6			24.6	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	33.6	38.3		19.8	25.9			15.6			24.6	
LOS	C	D		B	C			B			C	
Approach Delay		37.5			25.0			15.6			24.6	
Approach LOS		D			C			B			C	
Queue Length 50th (m)	16.8	85.7		12.2	65.9			16.5			35.3	
Queue Length 95th (m)	#52.8	#133.4		27.2	92.1			30.8			53.8	
Internal Link Dist (m)		186.7			190.9			294.2			140.8	
Turn Bay Length (m)	50.0			50.0								

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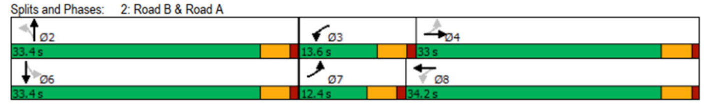
Lanes, Volumes, Timings
2: Road B & Road A 07/13/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	280	1231		297	1280			853			945	
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	0.76	0.91		0.54	0.75			0.50			0.62	

Intersection Summary
Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 75.1
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 28.6 Intersection LOS: C
Intersection Capacity Utilization 101.1% ICU Level of Service G
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Road B & Road A



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Page 2

Example Synchro Report – Unsignalized Intersection (Stop Controlled for Minor Road and Free Flow for Major Road)

HCM Unsignalized Intersection Capacity Analysis
2: Road B & Road A 07/13/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	200	400	50	150	400	50	5	10	5	5	10	5
Future Volume (Veh/h)	200	400	50	150	400	50	5	10	5	5	10	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	213	426	53	160	426	53	5	11	5	5	11	5
Pedestrians		106			64			83			92	
Lane Width (m)		3.3			3.3			3.2			3.2	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		8			5			6			7	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	571			562			1824	1852	600	1791	1852	650
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	571			562			1824	1852	600	1791	1852	650
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	77			83			81	74	99	83	74	99
cM capacity (veh/h)	933			947			27	42	447	29	42	402

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	213	479	160	479	21	21
Volume Left	213	0	160	0	5	5
Volume Right	0	53	0	53	5	5
cSH	933	1700	947	1700	46	47
Volume to Capacity	0.23	0.28	0.17	0.28	0.46	0.45
Queue Length 95th (m)	7.0	0.0	4.8	0.0	13.3	13.0
Control Delay (s)	10.0	0.0	9.6	0.0	139.3	133.4
Lane LOS	A		A		F	F
Approach Delay (s)	3.1		2.4		139.3	133.4
Approach LOS					F	F

Intersection Summary			
Average Delay	6.8		
Intersection Capacity Utilization	59.8%	ICU Level of Service	B
Analysis Period (min)	15		

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Example Synchro Report – All-way Stop Intersection

HCM 2010 AWSC
2: Road B & Road A 07/13/2023

Intersection	
Intersection Delay, s/veh	33
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	200	400	50	150	400	50	5	10	5	5	10	5
Future Vol, veh/h	200	400	50	150	400	50	5	10	5	5	10	5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	213	426	53	160	426	53	5	11	5	5	11	5
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	37.8	29.4	10.2	10.2
HCM LOS	E	D	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	25%	31%	25%	25%
Vol Thru, %	50%	62%	67%	50%
Vol Right, %	25%	8%	8%	25%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	20	650	600	20
LT Vol	5	200	150	5
Through Vol	10	400	400	10
RT Vol	5	50	50	5
Lane Flow Rate	21	691	638	21
Geometry Grp	1	1	1	1
Degree of Util (X)	0.041	0.918	0.854	0.041
Departure Headway (Hd)	6.859	4.78	4.818	6.859
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	525	754	747	525
Service Time	4.861	2.852	2.892	4.861
HCM Lane V/C Ratio	0.04	0.916	0.854	0.04
HCM Control Delay	10.2	37.8	29.4	10.2
HCM Lane LOS	B	E	D	B
HCM 95th-tile Q	0.1	12.6	10	0.1

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Example SimTraffic Report

SimTraffic Simulation Summary

07/13/2023

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:45	4:45	4:45	4:45	4:45	4:45
End Time	6:00	6:00	6:00	6:00	6:00	6:00
Total Time (min)	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1
Vehs Entered	3109	3225	3218	3181	3246	3195
Vehs Exited	3100	3238	3194	3168	3250	3190
Starting Vehs	50	59	50	48	55	53
Ending Vehs	59	46	74	61	51	58
Travel Distance (km)	1374	1425	1409	1409	1437	1411
Travel Time (hr)	52.7	55.2	54.2	55.1	64.7	56.4
Total Delay (hr)	23.1	24.5	24.0	24.8	33.7	26.0
Total Stops	2457	2550	2486	2520	2924	2588
Fuel Used (l)	143.5	149.4	146.7	147.2	157.6	148.9

Interval #0 Information Seeding

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	5:00
End Time	6:00
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	3109	3225	3218	3181	3246	3195
Vehs Exited	3100	3238	3194	3168	3250	3190
Starting Vehs	50	59	50	48	55	53
Ending Vehs	59	46	74	61	51	58
Travel Distance (km)	1374	1425	1409	1409	1437	1411
Travel Time (hr)	52.7	55.2	54.2	55.1	64.7	56.4
Total Delay (hr)	23.1	24.5	24.0	24.8	33.7	26.0
Total Stops	2457	2550	2486	2520	2924	2588
Fuel Used (l)	143.5	149.4	146.7	147.2	157.6	148.9

PM Exisitng

SimTraffic Report
Page 1

SimTraffic Performance Report

07/13/2023

2: Road B & Road A Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	2.8	0.5	0.8	2.6	0.3	0.4	0.3	0.1	0.2	0.3	0.1	0.3
Total Del/Veh (s)	32.4	32.1	31.8	24.5	22.9	20.6	37.5	27.5	11.0	29.7	25.6	13.2

2: Road B & Road A Performance by movement

Movement	All
Denied Del/Veh (s)	0.6
Total Del/Veh (s)	26.5

Total Network Performance

Denied Del/Veh (s)	0.6
Total Del/Veh (s)	28.2

PM Exisitng

SimTraffic Report
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Queuing and Blocking Report

07/13/2023

Intersection: 2: Road B & Road A

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LT	TR	LT	TR
Maximum Queue (m)	57.4	145.1	148.3	56.6	76.6	88.6	64.3	51.6	68.0	59.4
Average Queue (m)	38.2	71.5	74.2	25.6	49.1	50.6	31.5	21.3	40.8	27.5
95th Queue (m)	66.4	127.5	130.0	50.9	71.4	78.2	53.7	39.5	61.1	50.7
Link Distance (m)		198.8	198.8		203.1	203.1	304.3	304.3	150.8	150.8
Upstream Blk Time (%)		1	1							
Queuing Penalty (veh)		0	0							
Storage Bay Dist (m)	50.0			50.0						
Storage Blk Time (%)	1	17		0	6					
Queuing Penalty (veh)	3	35		0	9					

Network Summary

Network wide Queuing Penalty: 46

PM Exisitng

SimTraffic Report
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Example Sidra Model Report

LANE LEVEL OF SERVICE

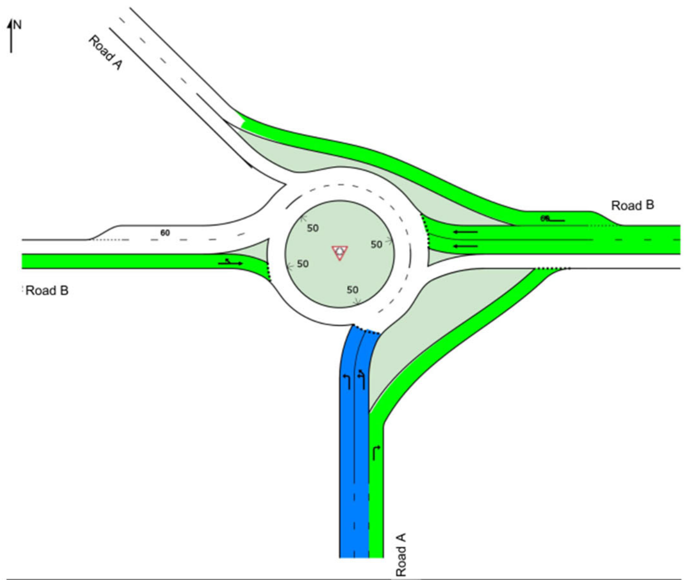
Lane Level of Service

Site: 102 [Road A 2023 - AM Peak - Dual]

Network: N101 [2023 AM Peak - Dual]

New Site
Site Category: (None)
Roundabout

	Approaches			Intersection
	South	East	West	
LOS	B	A	A	B



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Roundabout Level of Service Method: SIDRA Roundabout LOS
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

MOVEMENT SUMMARY

Site: 102 [Road A 2023 - AM Peak - Dual]

Network: N101 [2023 AM Peak - Dual]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road A														
1	L2	1188	7.0	1188	7.0	0.769	21.4	LOS C	6.3	46.8	1.00	0.59	1.00	37.9
1a	L1	42	0.0	42	0.0	0.644	20.5	LOS C	6.3	46.8	1.00	0.57	1.00	47.2
3	R2	210	9.0	210	9.0	0.125	3.6	LOS A	0.4	2.8	0.35	0.39	0.35	56.3
Approach		1440	7.1	1440	7.1	0.769	18.8	LOS B	6.3	46.8	0.91	0.56	0.91	41.2
East: Road B														
5	T1	276	10.0	276	10.0	0.370	7.0	LOS A	0.7	5.1	0.96	0.74	0.96	47.4
6a	R1	62	0.0	62	0.0	0.031	1.8	LOS A	0.0	0.0	0.00	0.22	0.00	60.7
Approach		338	8.2	338	8.2	0.370	6.0	LOS A	0.7	5.1	0.78	0.65	0.78	50.6
West: Road B														
10b	L3	506	0.0	504	0.0	0.385	10.9	LOS B	0.0	0.0	0.00	0.61	0.00	57.0
11	T1	178	36.0	178	36.0	0.385	2.2	LOS A	0.0	0.0	0.00	0.61	0.00	54.1
Approach		685	9.4	682 N1	9.4	0.385	8.6	LOS A	0.0	0.0	0.00	0.61	0.00	56.2
All Vehicles		2463	7.9	2460 N1	7.9	0.769	14.2	LOS B	6.3	46.8	0.64	0.58	0.64	46.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.