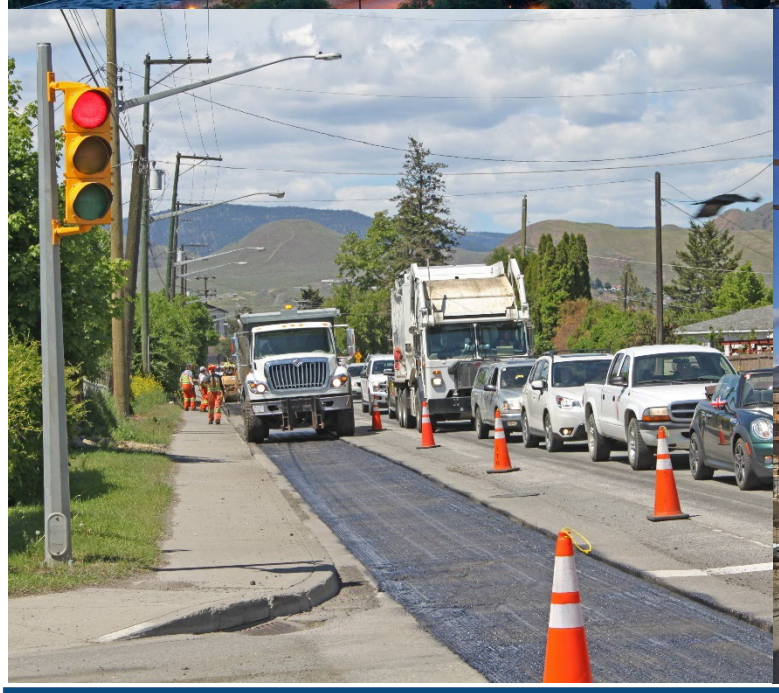


City of Kamloops

Transportation Impact Assessment Guidelines

Kamloops

Canada's Tournament Capital

TABLE OF CONTENTS

INTRODUCTION

1.1 TRANSPORTATION IMPACT ASSESSMENT (TIA)

A Transportation Impact Assessment (TIA) is a study intended to assess the impact of a proposed development on the existing transportation network infrastructure. It identifies the on-site and off-site measures to be undertaken in order to maintain or enhance the transportation system's performance when the development is built and is operational.

1.2 PURPOSE OF THE TIA GUIDELINES

The City of Kamloops has prepared these guidelines in order to streamline the approval process and provide a standardised framework for consultants to follow when submitting studies for review. This document provides guidelines for transportation consultants who will undertake a Transportation Impact Assessment (TIA) for the City of Kamloops. These guidelines establish the scope, format, and analysis required to properly assess the impacts of a proposed development on the existing transportation infrastructure, identify mitigation measures, and document the results.

In summary these guidelines provide:

1. Objective Assessment – the study will evaluate the impacts of proposed new development in a rational manner;
2. Consistency – the study will utilise assumptions consistent with the City's accepted methodologies and parameters and thus be comparable to other traffic studies in the area;
3. Recognised by developers and consultants – the guidelines will prove a standard approach to be followed and will reduce confusion and delay in processing the development proposal;
4. Staff Review – a standardised set of guidelines assists staff in the timely review of transportation studies.

1.3 WHO CAN UNDERTAKE A TIA

When a TIA is required for the proposed development, the study must be undertaken by a Qualified Engineer, with sufficient experience in transportation engineering, licensed to practice in British Columbia. The final report must be signed and sealed by the Qualified Engineer. Any memos, drawings or letters submitted independent of the TIA must also be signed and sealed by the Qualified Engineer.

REQUIREMENTS

2.1 WHEN IS A TIA NEEDED?

a) A TIA is required when:

- The proposed development is anticipated to generate 100 vehicle trips or more, in any one hour in a 24 hour period

OR

- Required by the City Engineer regardless of the quantity of vehicle traffic generated in specific circumstances where there are existing traffic problems.

OR

- The proposed development requires an amendment to the Official Community Plan.

The quantity of vehicle trips generated is determined using the most current version of the Institute of Transportation Engineers Trip Generation Manual. If the proposed land use is not contained in the manual then the transportation engineer must submit a technical memo signed and sealed by a qualified engineer, detailing the proposed trip generation rate and how it was determined, for approval by the City Engineer prior to initiating the analyses.

b) For development applications where land uses are not clearly identified or which require further analysis to determine whether a TIA is warranted, the City Engineer may require a brief technical memo signed and sealed by a qualified transportation engineer documenting the trip generation and a qualitative assessment of the impact on critical movements at adjacent intersections.

The City of Kamloops will review all submissions against the requirements as set out in the checklist in **APPENDIX D**, prior to reviewing the report. The TIA must include all of the tables and figures with all of the necessary information as shown in **Appendices B and C.**

Those submissions that do not fulfill these basic requirements will be returned to the applicant with the missing elements listed, with no further review undertaken.

2.2 SHELF LIFE OF A TIA

Given the dynamic nature of development in the City, a TIA has a "shelf life" of not more than five (5) years. If major changes have occurred to either the area development or the transportation network within the study area that were not contemplated within the original TIA, then the City Engineer may require an update to the TIA regardless of when the original TIA was prepared.

SCOPE OF WORK

The scope of work for a TIA is to include, but is not limited to:

1. Identify the project site and its location relative to the existing transportation network.
2. Identify a suitable study area to be submitted to the City for approval prior to initiating the study.
3. Reference of relevant documents that potentially affect the study area including, but not limited to:
    a. Official Community Plan
    b. Zoning Bylaw
    c. City of Kamloops Design Criteria Manual
    d. Transportation Master Plan
    e. Neighbourhood Plans/Area Plans, if available
    f. Neighbourhood Improvement projects
    g. BC Transit Service Plans
    h. MOTI infrastructure plans
4. Identify anticipated future developments within the study area that may affect the generation of vehicular trips
5. Specify the design peak hour(s) of analysis.
6. Analyze the capacity of signalized and unsignalized intersection(s) within the study area for future horizon years with and without the proposed development traffic.
7. Propose a traffic projection methodology, trip distribution and traffic assignment parameters, and traffic volume growth rate to the City Engineer for approval prior to initiating the analysis.
8. Develop improvements to the road layout, traffic control and facilities to accommodate future growth of pedestrian, bicycle, transit and vehicular traffic
9. Estimate potential costs to upgrade the existing transportation network (roads, pedestrian facilities and cycling facilities) that would accommodate additional trips generated by the proposed development.
10. Conduct a swept path analysis.
11. Conduct a sightline analysis (when possible).

METHODOLOGY

Any meetings, correspondence, or edits regarding the Terms of Reference (ToR) must include the Qualified Engineer sealing the TIA report. An example ToR is included in **APPENDIX A**.

Examples of the various figures and tables listed below are included in **APPENDIX B** and **APPENDIX C**, respectively.

1. Identify the development proposal details including:
    a. Type and size of each land use within the proposed development
    b. Timing and size of each phase (if more than one phase)
    c. Layout and access to each phase
    d. Figure illustrating the limits of each phase (aerial base)
    e. Bylaw requirements for bicycle and vehicle parking
    f. Bylaw requirements for loading zone (including solid waste handling).
2. Using a figure, identify the project site and its location relative to the existing transportation network. Using a figure, identify a suitable study area which shall at a minimum extend beyond the boundaries of the development to at least the next major intersection anticipated to be impacted by the development. The study area may be expanded as directed by the City to respond to the scale and nature of development.
3. Identify if the proposed development falls within the jurisdiction of the Ministry of Transportation and Infrastructure (typically within 800 metres of an access to a roadway under the Ministry's jurisdiction).
4. Reference relevant documents that potentially affect the study area including, but not limited to:
    a. Official Community Plan
    b. Zoning Bylaw
    c. City of Kamloops Design Criteria Manual
    d. Transportation Master Plan (TMP)
    e. Area Plans, if available
    f. Neighbourhood Improvement projects
    g. BC Transit Service Plans
    h. MOTI infrastructure plans
    i. Development Permit Areas

5. Using a figure, identify anticipated future developments within the study area that may affect the generation of vehicular trips.
6. Specify design peak hour(s) of analysis – typically the AM and PM peak hours but within Kamloops commercial districts, commercial/retail developments may require analysis for weekend mid-day.
7. Use a traffic volume growth rate of 1.5% per annum, straight line, unless otherwise directed by the City Engineer.
8. Trip Generation is to be undertaken using the most current version of the Institute of Transportation Engineers Trip Generation Manual for each land use and for each phase within the development. The trip generation table must present the peak hour of the adjacent street traffic, as available. The study must identify the setting/location as set out in the ITE Trip Generation Manual. The capacity analyses must be based on the peak hour of the adjacent street traffic. If an appropriate land use cannot be determined within the ITE Trip Generation Manual then the proponent must propose an alternative with supporting technical justification to the City Engineer for approval prior to initiating the analysis.
9. Illustrate the trip distribution and assignment in the report for both existing and proposed transportation networks. Computer modelling may be used or required. If a computer model is used, all assumptions and zonal inputs must be documented.
10. Data collection must be undertaken for all existing intersections included in the study. Traffic data must not be more than two (2) years old. Data collection must occur on days when Kamloops schools (School District #73) is in session. The days for data collection for weekday analysis are Tuesday, Wednesday or Thursdays. Data collection may not occur on the two (2) days prior to, or two (2) days after a Statutory Holiday.
11. Based on the collected data, the engineer is to determine the Peak Hour Factor (not to exceed 0.95), and the appropriate truck percentage (minimum 2%) to be used in subsequent analyses.
12. Analyze the following scenarios with and without development traffic:
    a. Existing conditions
    b. Opening Day (for each phase)
    c. Opening Day + 10 years (from final phase)

13. Intersection capacity analysis must be undertaken using the Highway Capacity Manual procedures using a current version of Synchro and SIDRA for roundabout analysis. The report must clearly document, for each movement:
    a. Traffic Volume
    b. Level of Service (LoS)
    c. Volume/Capacity Ratio
    d. Delay (in seconds)
    e. 95th Percentile Queue length (from Synchro)
14. The intersection analyses must clearly highlight all movements with a V/C ratio in excess of 0.85 and all movements where the 95th percentile queue exceeds the existing queue storage.
15. Where the 95th percentile queue length exceeds the storage length, the applicant must provide a mitigation measure(s) to ensure that the queue does not spill out of the storage area.
16. The maximum permitted cycle length is 120 seconds. Minor street minimum green is 7 seconds and Major Street minimum green is 15 seconds.
17. Typical pedestrian walking speed 1.0 m/s.
18. The minimum acceptable LOS for an Intersection is LoS D, with individual movements not worse than LoS E. For all movements or intersections that do not achieve these Levels of Service, the applicant must propose appropriate mitigation measures.
19. Evaluate demand for transit with recommendations for on and off-site improvements to accommodate the anticipated demand generated by the development.
20. Evaluate the pedestrian network and desire lines with recommendations for on and off-site improvements to meet the desire lines. Include a review of existing and future connections to the network as outlined in the Transportation Master Plan.
21. Evaluate the cycling network and connections from the proposed development to the network. Include a review of existing and future connections to the network as outlined in the Transportation Master Plan. Provide recommendations for on and off-site improvements to meet the anticipated demand.
22. Develop improvements to the road layout, traffic control and facilities to accommodate future growth of vehicular traffic.
23. Estimate potential costs to upgrade the existing transportation network (roads, pedestrian facilities and cycling facilities) that would accommodate additional trips generated by the proposed development. These cost estimates are to be Class "D" or better.

24. Conduct a swept path analysis using an appropriate software package for loading zones solid waste handling and parkades. An appropriate design vehicle must be selected. Typically:

    - P-TAC for parkades
    - HSU-TAC for solid waste handling
    - WB-20 for larger commercial enterprises
    - BC Building Code requirements for Fire Department Access
    - Other design vehicles will be considered on a case-by-case basis at the discretion of the City Engineer.

25. Sightline analysis to be undertaken for all site access points to ensure safe operations on opening day. The minimum required sightline is based on Stopping Sight Distance as set out in the Transportation Association of Canada Geometric Design Guide. The design speed shall be the posted speed limit. The Qualified Engineer is to identify all deficiencies and recommend an appropriate mitigation strategy(s).

26. Evaluate parking layout to ensure sufficient magazine storage between the access at the property line and the first parking stall. The minimum distance is 6 metres. For parking lots in excess of 200 stalls, the minimum distance is 20 metres.

27. Evaluate the parking requirements using the City of Kamloops zoning bylaw, off-street parking requirements. Where applicable, the engineer may utilise the principles of "shared parking" as set out in the most current edition of "Shared Parking", published by the Urban Land Institute. If there is a variance of 10% or less, the TIA is to provide a technical rationale to support the variance. If the variance is greater than 10%, the City Engineer may require a proxy survey (consisting of at least three comparable sites, each over two or three days) within Kamloops

28. Evaluate the queuing for drive through service:

    Drive-thru businesses, such as restaurants, pharmacies, and financial institutions, shall provide a vehicle access lane that meets the following requirements:

    a) For drive-thru restaurants:

    i) the minimum vehicle stacking length from the order point to the street line or to any internal access road or circulation aisle that provides direct access from the street shall be:

    - 60 m (10 vehicles) for typical drive-thru restaurants; and,
    - 120 m (20 vehicles) for high volume drive-thru restaurants, 60 m of which may also provide access to parking stalls;

    ii) the minimum vehicle stacking length from the order point to the pick-up window shall be 24 m (four vehicles).

b) for non-restaurant drive-thru businesses, the minimum vehicle stacking length from the point of contact to the street line or to any internal access road or circulation aisle that provides direct access from the street shall be 30 m (5 vehicles); and

c) for all drive-thru businesses:

i) the minimum access lane width shall be 3.65 m; and,

ii) the minimum access lane setback shall be 1 m from any street line and 3 m from any property line abutting a residential zoned property, and this setback area shall include landscape screening.

"Restaurant, High Volume Drive-Thru" means a restaurant or café that generates 200 or more vehicle trips during the busiest hour of operation.

29. Use the Transportation Association of Canada methodology for Traffic Signal Warrants; use the MOTI left turn warrant; use the MUTCDC all-way STOP warrant.

REPORT

The Qualified Engineer shall submit a draft report in PDF format and three (3) hard copies to the City and other Key Stakeholders for review and comment. The draft report must document all of the above and clearly identify all the study conclusions and recommendations. The site plan, collected data and analysis output shall be included in appendices to the report. Any report in excess of 20 pages (excluding appendices) shall have an executive summary of not more than two (2) pages. All reports submitted to the City must include all appendices

The City shall provide the Qualified Engineer with written comments on the draft report. The Qualified Engineer shall review the comments and amend the draft report. For all comments that the engineer elects not to amend the report, the engineer shall provide a detailed written explanation as to why the report was not amended.

The Qualified Engineer shall provide the City with a signed and sealed final report in PDF format and three (3) paper copies.

The Qualified Engineer shall provide all traffic data collected to the City in Excel format.

The Qualified Engineer shall provide all data files (e.g., Synchro, SIDRA, etc) used in the analysis to the City in printed format. Synchro output shall be in the HCM format. It is understood that the Qualified Engineer relies solely on the printed copies of the model(s) output provided with the final, signed and sealed report.

APPENDIX A
EXAMPLE TERMS OF REFERENCE

DRAFT TERMS OF REFERENCE (15 August 2020)

Residential Development, Kamloops, B.C.

Project Description: **265 unit residential development**

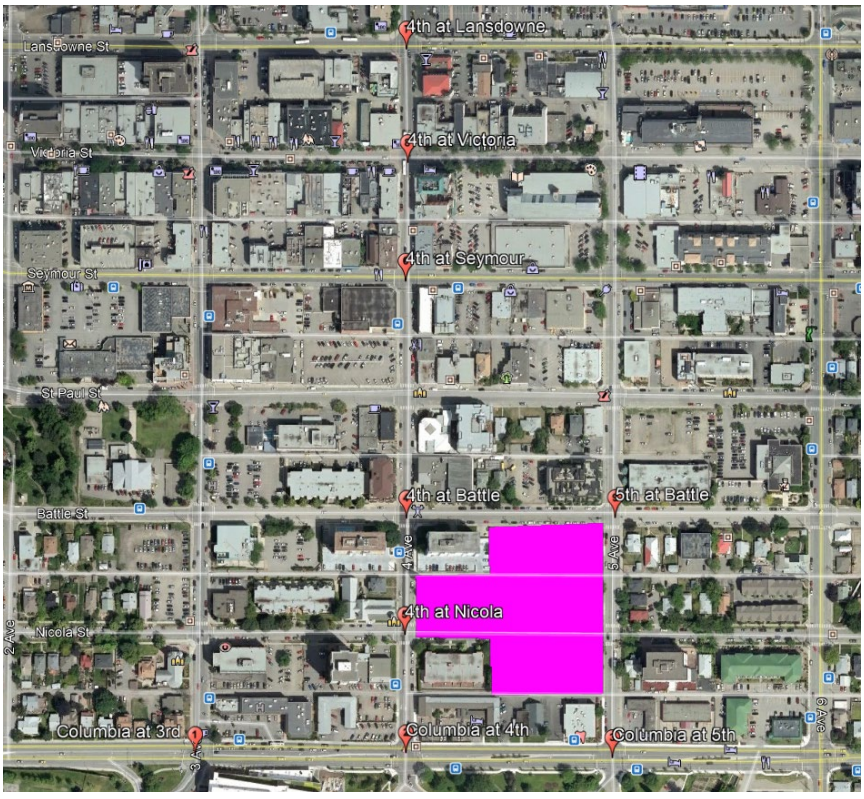
units of multi-family

single family dwellings

A. Study area limits and list of intersections to analyse

Study area to include the following intersections:

1. Columbia Street at 3rd Avenue
2. Columbia Street at 4th Avenue
3. Columbia Street at 5th Avenue
4. 4th Avenue at Battle Street
5. 4th Avenue at Nicola street at Site Access (Major)
6. 4th Avenue at Seymour Street
7. 4th Avenue at Lansdowne Street
8. 4th Avenue at Victoria Street
9. 5th Avenue at Battle Street



B. Existing and future base road network in study area

City of Kamloops to advise if any proposed changes to road network.

C. Relevant background material

Consultant to use the information provided by City of Kamloops.

D. Anticipated future developments within study horizon that are above and beyond what can be assumed to be built into an annual traffic volume growth rate.

To be provided by the City of Kamloops.

E. Design Peak Hour of Analysis

Examine the weekday morning and afternoon peak periods and analyse two peak hours for analysis.

F. Horizon Years of Analysis

Examine the following years:

- 2020 (i.e. existing base)
- 2022 (future base)
- 2022 (future base + site generated traffic from full build-out)
- 2032 (future base)
- 2032 (future base + site generated traffic from full build-out)

G. Traffic Volume Growth Rate

Propose to use 1.5% per year (simple straight line) to factor up existing base volumes to future horizon years.

H. Traffic Projection Methodology

Use current accepted traffic engineering practices for traffic projections and to document any assumptions in the report.

I. Trip Generation Methodology

Use the latest Institute of Transportation Engineers (ITE) vehicle trip generation to estimate site traffic volumes which represent the “worst case scenario” for the impact assessment.

J. Trip Distribution and Traffic Assignment Parameters

Use existing travel patterns in the study area to develop trip distribution and traffic assignment parameters.

K. Traffic Engineering Methodology for Analysis

Use 2016 Highway Capacity Manual methodologies for all intersection capacity analysis. (Synchro Ver. 10). Signal warrant analysis – TAC; Left turn warrant analysis – MoTI; All-way stop warrant analysis - MUTCDC

L. Engineering Standards

Use City of Kamloops standards for the adjacent roadways.

M. Number of Final Report Copies

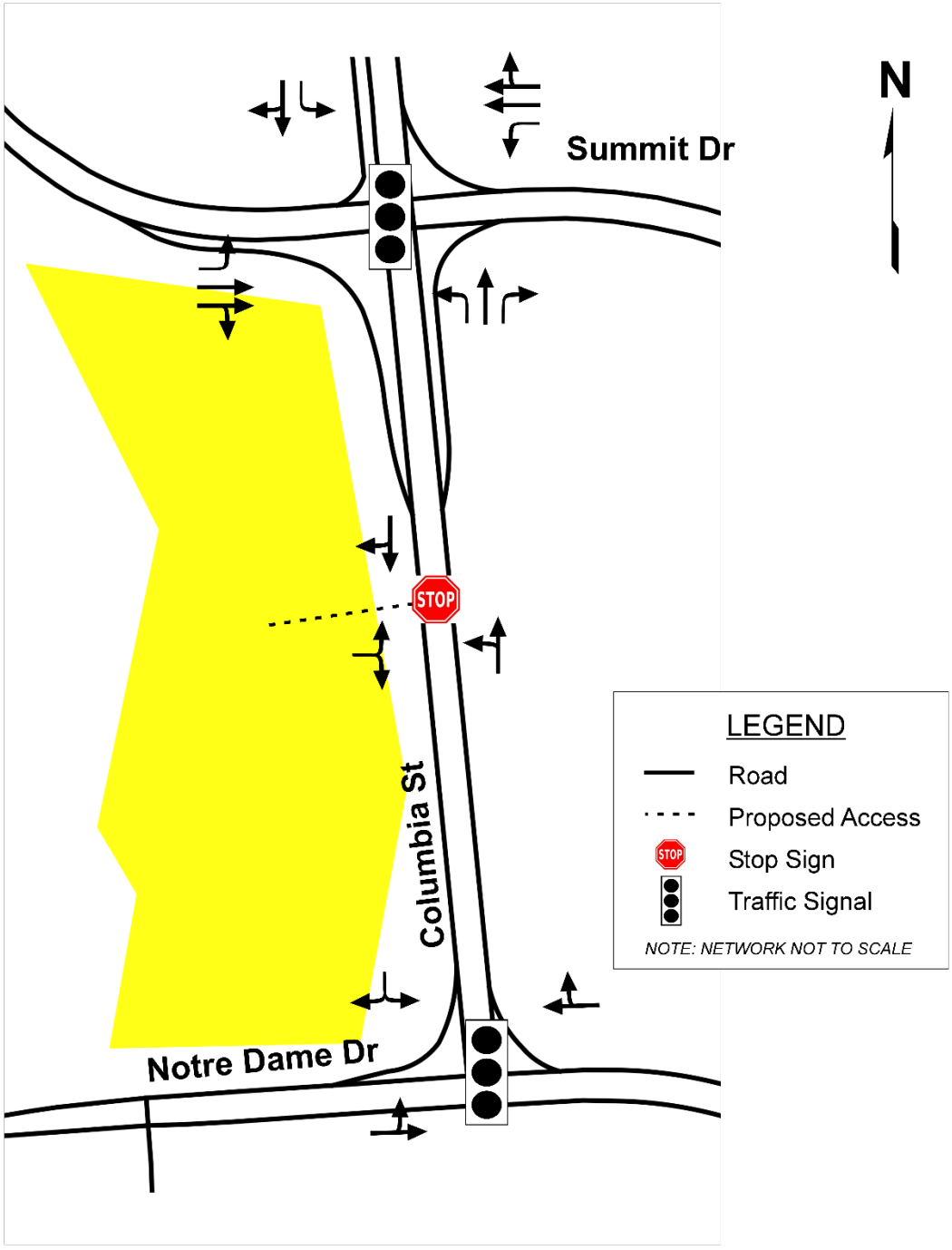
- City of Kamloops — 3 bound copy + 1 digital copy
- Client — 1 bound copy + 1 digital copy

N. Other Matters

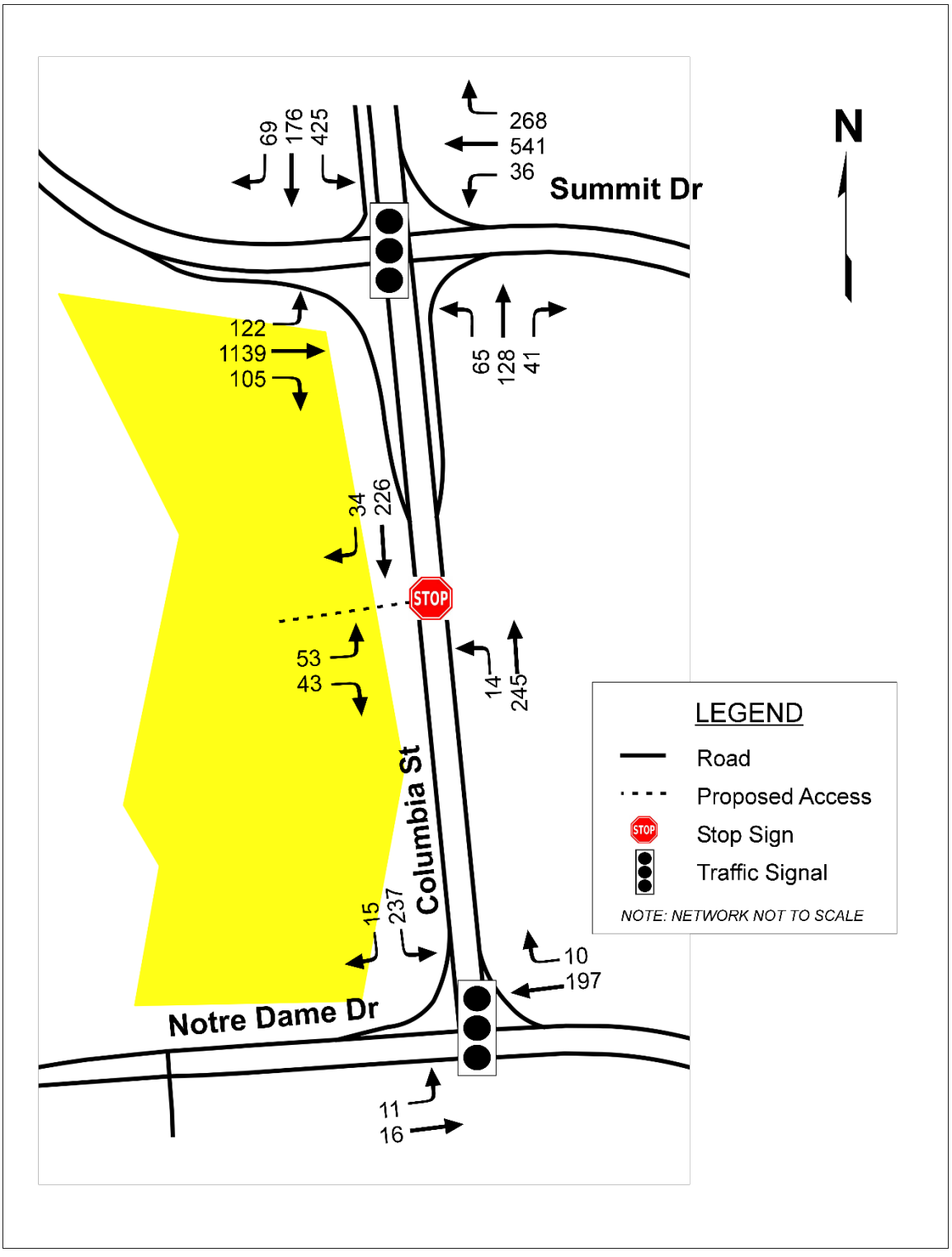
APPENDIX B

EXAMPLE FIGURES

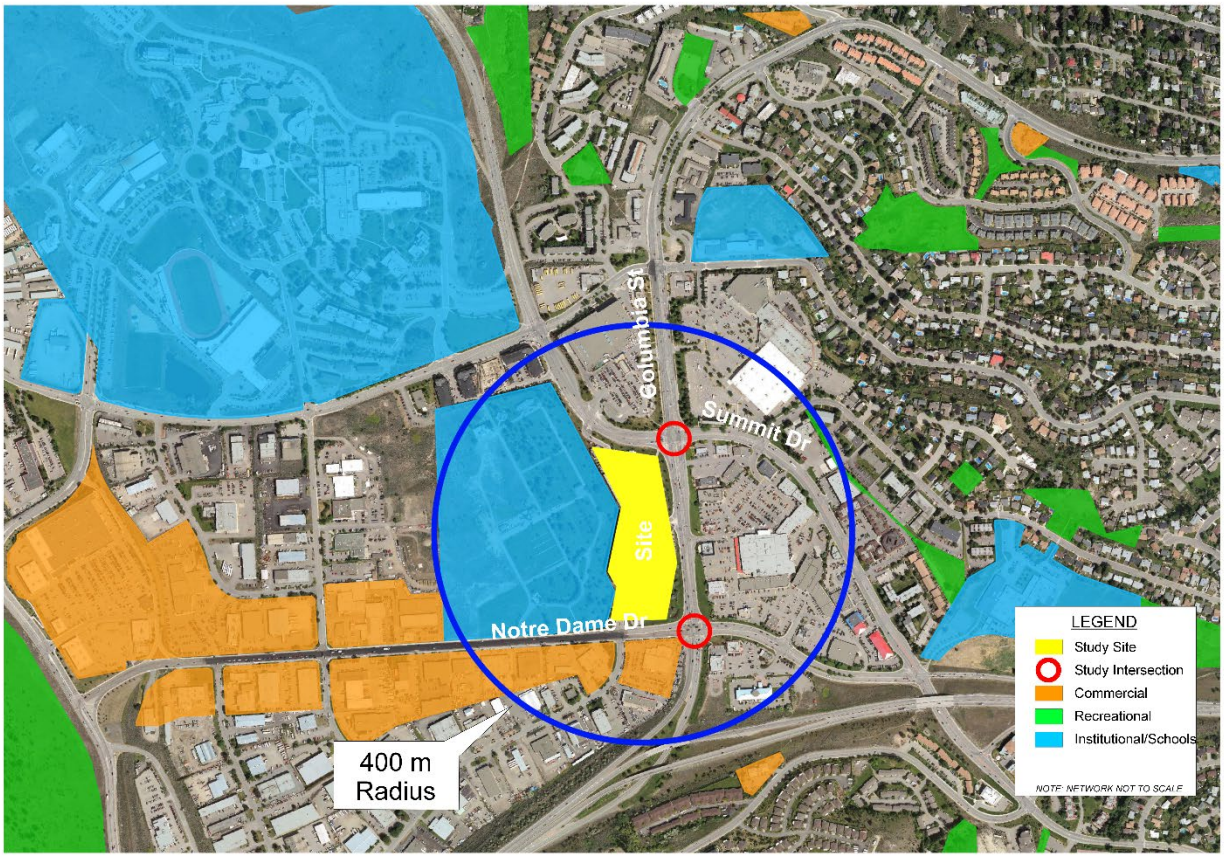
Example - Lane Configuration Figure



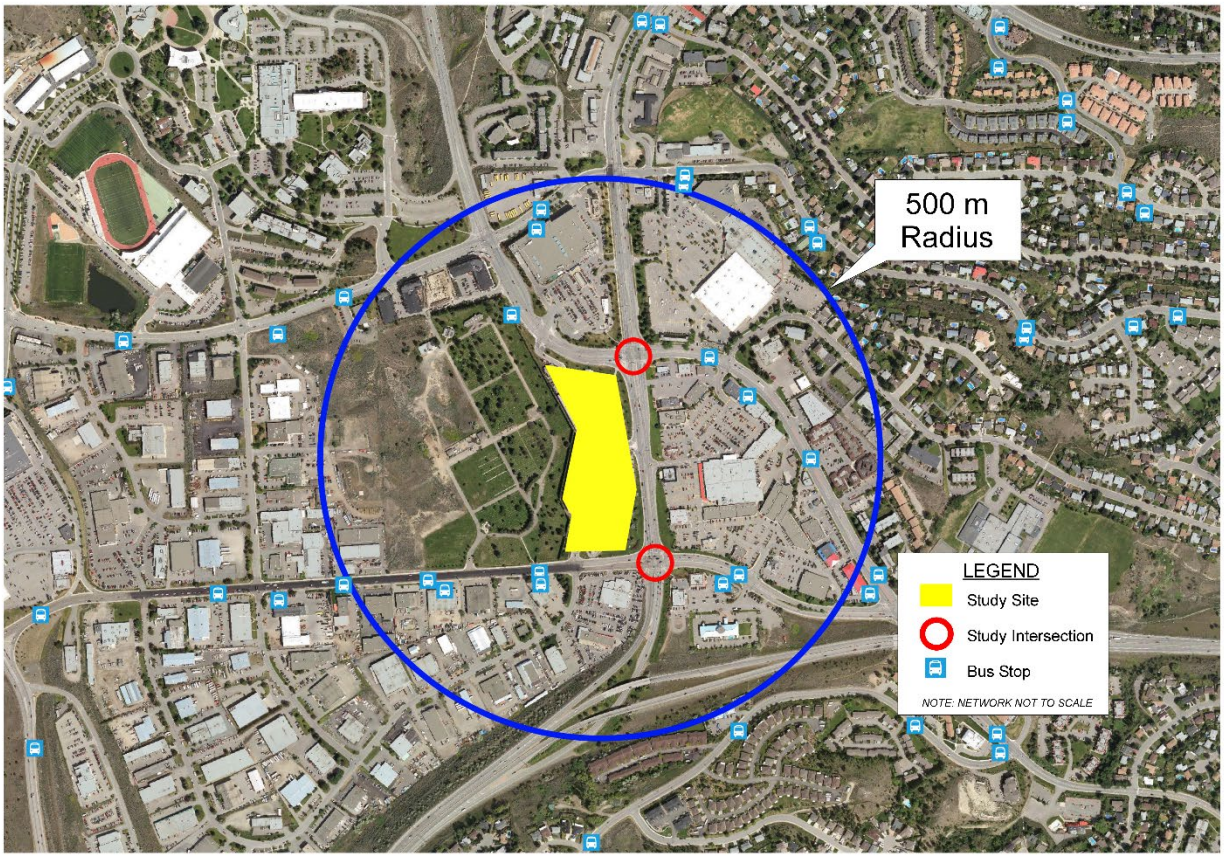
Example – Traffic Volume Figure



Example – Site Extent Figure



Example – Study Area Figure



APPENDIX C

EXAMPLE TABLES

Example Trip Generation Table

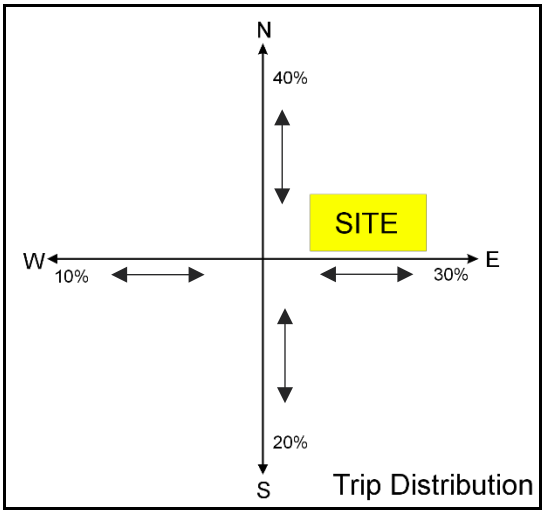
Land Use	Peak Hour	Trip Generation Variable	Scope of Development	Vehicle Trip Generation Rate	Trip Rate Source	Directional Split		Passby Credit	Peak Hour Volumes (vph)		
						% in	% out		in	out	total
Multifamily Housing (Low-Rise)	Morning Peak	Dwelling Units	83	0.46	ITE 10th Edition - Code 220	23%	77%	0%	8	31	39
	Afternoon Peak			0.56		63%	37%	0%	29	18	47

Land Use	Peak Hour	Trip Generation Variable	Scope of Development	Vehicle Trip Generation Rate	Trip Rate Source	Directional Split		Passby Credit	Peak Hour Volumes (vph)		
						% in	% out		in	out	total
TownHouses	Morning Peak	Dwelling Units	45	0.57	Local Trip Rate	28%	72%	0%	7	19	26
	Afternoon Peak			0.67		66%	34%	0%	20	11	31

Example of Trip Distribution Tables

FROM / TO	WD AM PEAK HOUR		WD PM PEAK HOUR	
	INBOUND	OUTBOUND	INBOUND	OUTBOUND
North	18.9%	13.1%	18.6%	15.4%
East	41.5%	29.1%	24.8%	51.1%
South	8.8%	13.1%	11.3%	6.2%
West	30.8%	44.7%	45.3%	27.4%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Example of Trip Distribution Figure



Example of Signalized Intersection Capacity Analysis Summary Table

Intersection	Time of Day	Scenario	Performance Measure	Eastbound			Westbound			Northbound			Southbound			LOS	Notes
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Columbia St (N/S) and Summit Dr (E/W)	Weekday Morning Peak Hour	2020 Base	Volumes	20	2	135	16	2	10	51	222	6	6	456	23	A	Optimized singal timing.
			V/C	0.05	0.30		0.07			0.12	0.13	0.13	0.01	0.27	0.27		
			95% Queue (m)	3.4	13.9		3.7			6.2	8.5	8.5	1.4	17.0	17.0		
		2022 Base	Volumes	21	2	140	17	2	10	53	231	6	6	474	24	A	Optimized singal timing.
			V/C	0.05	0.31		0.07			0.13	0.13	0.13	0.01	0.28	0.28		
			95% Queue (m)	3.6	14.7		3.9			6.6	9.1	9.1	1.4	18.2	18.2		
		2022 Base + Site	Volumes	21	26	164	17	29	10	81	231	6	6	474	24	A	Optimized singal timing.
			V/C	0.05	0.37		0.11			0.20	0.14	0.14	0.01	0.29	0.29		
			95% Queue (m)	3.7	19.8		6.6			10.5	10.1	10.1	1.6	20.3	20.3		
		2027 Base + Site	Volumes	27	26	187	18	29	11	89	253	7	7	520	27	A	Optimized singal timing.
			V/C	0.07	0.43		0.12			0.27	0.18	0.18	0.02	0.37	0.37		
			95% Queue (m)	5.0	25.8		7.7			12.8	12.1	12.1	2.0	24.7	24.7		
		2032 Base + Site	Volumes	29	26	200	20	29	12	94	275	7	7	565	30	A	Optimized singal timing.
			V/C	0.07	0.45		0.13			0.31	0.19	0.19	0.02	0.41	0.41		
			95% Queue (m)	5.6	29.8		8.7			14.5	13.7	13.7	2.1	28.7	28.7		
	Weekday Afternoon Peak Hour	2020 Base	Volumes	26	1	78	4	2	3	80	529	5	4	313	23	A	Optimized singal timing.
			V/C	0.07	0.19		0.02			0.12	0.24	0.24	0.01	0.15	0.15		
			95% Queue (m)	4.1	9.1		1.9			7.2	16.3	16.3	0.9	9.9	9.9		
		2022 Base	Volumes	27	1	81	4	2	3	83	550	5	4	326	24	A	Optimized singal timing.
			V/C	0.07	0.19		0.02			0.13	0.25	0.25	0.01	0.15	0.15		
			95% Queue (m)	4.3	9.6		1.9			7.6	17.2	17.2	1.0	10.4	10.4		
		2022 Base + Site	Volumes	27	18	99	4	16	3	98	550	5	4	326	24	A	Optimized singal timing.
			V/C	0.07	0.26		0.05			0.18	0.29	0.29	0.01	0.18	0.18		
			95% Queue (m)	4.7	13.7		4.0			9.8	19.2	19.2	1.1	11.7	11.7		
		2027 Base + Site	Volumes	32	18	114	5	16	3	117	603	6	5	357	29	A	Optimized singal timing.
			V/C	0.08	0.29		0.05			0.23	0.32	0.32	0.01	0.20	0.20		
			95% Queue (m)	5.6	16.2		4.4			12.5	22.5	22.5	1.3	13.7	13.7		
		2032 Base + Site	Volumes	34	18	122	5	16	4	125	656	6	5	388	32	A	Optimized singal timing.
			V/C	0.09	0.31		0.05			0.25	0.34	0.34	0.01	0.22	0.22		
			95% Queue (m)	6.3	18.5		4.8			14.0	25.6	25.6	1.3	15.4	15.4		

Intersection approaching capacity (LOS 'D' or 'E'); or approach demand near capacity (v/c 0.85 to 0.99)

Intersection equals or exceeds capacity (LOS 'F'); or high approach demand over capacity (v/c => 1.0)

95% Queue length exceeds the capacity of existing storage bay.

Example of Unsignalized Intersection Capacity Analysis Summary Table

Intersection	Time of Day	Scenario	Performance Measure	Eastbound			Westbound			Northbound			Southbound			LOS	Notes
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Columbia St (N/S) & Site Access (E/W)	Weekday Morning Peak Hour	2022 Base + Site	Volumes								38	37	111	141		A	OK
			Delay								0.0		7.8				
			95% Queue (veh)								0.0		0.4				
		2027 Base + Site	Volumes								82	37	111	267		A	OK
			Delay								0.0		8.0				
			95% Queue (veh)								0.0		0.5				
		2032 Base + Site	Volumes								85	37	111	277		A	OK
			Delay								0.0		8.0				
			95% Queue (veh)								0.0		0.5				
	Weekday Afternoon Peak Hour	2022 Base	Volumes								160	20	59	109		A	OK
			Delay								0.0		7.8				
			95% Queue (veh)								0.0		0.2				
		2027 Base + Site	Volumes								306	20	59	194		A	OK
			Delay								0.0		8.3				
			95% Queue (veh)								0.0		0.2				
		2032 Base + Site	Volumes								321	20	59	202		A	OK
			Delay								0.0		8.4				
			95% Queue (veh)								0.0		0.2				

Delay = Average Delay (seconds/vehicle)

Intersection approaching capacity (LOS 'D' or 'E'); ; or medium approach delays (25sec to <50sec)

Intersection equals or exceeds capacity (LOS 'F'); or high approach delays (=> 50sec)

95% Queue = UNSIGNALIZED QUEUE IS PER VEHICLE

APPENDIX D

CHECKLIST

Transportation Impact Assessment Checklist:

Yes / No ..... Referenced appropriate background documents

Yes / No ..... Site Statistics (square feet of development, number of residential units, quantity parking etc)

Yes / No ..... Study Area Figure

Yes / No ..... ITE Trip Generation table

Yes / No ..... Trip Distribution/Assignment Figure

Yes / No ..... Figures illustrating traffic volumes

Yes / No ..... Analysis Summary Table (with and without development)

Existing
Opening Day
Final Phase + 10 years

Yes / No ..... Swept Path Analysis

Yes / No ..... Sightline analysis

Yes / No ..... Cost Estimate for mitigation measures

Yes / No ..... Summary/Recommendations

Yes / No ..... Site Plan – Appendix

Yes / No ..... Traffic Count Data – Appendix

Yes / No ..... Analytical Model Output - Appendix