

THE CITY OF CALGARY TRANSPORTATION IMPACT ASSESSMENT (TIA) GUIDELINES

April, 2011



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Transportation Impact Assessment (TIA) Guidelines

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ACKNOWLEDGEMENTS

The Transportation Development Services (TDS) division of the Transportation Planning Business Unit of The City of Calgary with support from Calgary Transit and other divisions in Transportation Planning and Roads, the Urban Development Institute of Calgary and representatives from several Transportation Consultants worked cooperatively to set the basis of this document.

Best practice examples from reports submitted by various consultants have been included in this guideline for illustration purposes. Permission has been obtained from the authors.

DISCLAIMER

These Guidelines have been prepared based on the most current practice and information available to date of publication. Planners, applicants, developers and consultants are responsible for ensuring that the latest information available is used in preparing the Transportation Impact Assessments.

The intents of these guidelines is to assist planners, applicants, developers and consultants in scoping out the basics of the Transportation Impact Assessments, but are not intended to replace consultation and/or approval with/by Transportation Development Services and/or sound engineering judgment. The scope of work for each Transportation Impact Assessment will be reviewed on a case by case basis and may vary depending on the complexity of the project.

A list of frequently used reference materials has been included in **Appendix C** of this report for information purposes. Additional publications may be available and their use is encouraged.

Transportation Impact Assessment (TIA) Guidelines

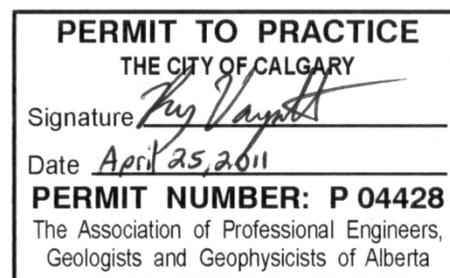
1.0 INTRODUCTION

A Transportation Impact Assessment (TIA) is typically required to support the transportation aspects of a proposed development that has the potential of generating significant amounts of new transit users, pedestrians, bicycle and vehicular traffic or that could potentially change the mobility patterns (transit, pedestrian, bicycle and/or vehicular) in the area where it is proposed.

In Calgary, as a rule of thumb, if a development has the potential for generating more than 100 person trips per hour (considering all modes) at any given peak period or for any given mode, a TIA will be required. On occasions, despite the development not reaching the threshold value abovementioned, a TIA will still be requested due to particular circumstances in the area surrounding the project or due to concerns of the surrounding/adjacent communities, or other circumstances that TDS deems appropriate to review.

The purpose of the Transportation Impact Assessment (TIA) Guidelines is to provide applicants, development and transportation consultants with the framework to prepare studies for The City of Calgary. The information below provides guidance regarding the process for preparing and submitting TIAs. These guidelines also outline the basic information that as a minimum should be contained in the study.

The contents of these guidelines will be continuously reviewed and updated as required. Transportation Development Services will advise of any major changes to the information herein provided.



Transportation Impact Assessment (TIA) Guidelines

2.0 FORMAT AND PROCESS

The need for a TIA can be identified at two stages:

- a) As part of a pre-application meeting, in which case seven copies are to be submitted to the File Manager at the time of the application submission. One copy for the file manager and six copies for TDS.

Or

- b) At the Detailed Team Review (DTR) stage, in which case, six copies are to be submitted to TDS directly. One additional copy shall be sent to the File Manager for the records.

TDS will acknowledge receipt of the TIA package via email. Four of the seven copies sent to TDS shall include electronic files, hard copies of the capacity analyses, and any other calculations in the appendices. Copies shall be labelled accordingly. Comments resulting from the review of the TIA will be sent directly to the consultant with a copy to the applicant and/or owner as applicable, and it is expected that the respective response be sent directly to TDS.

2.1 Scope Definition

For a TIA, the consultant is to send a draft or proposed scope of work to the designated Senior Transportation Engineer in TDS for review and approval. The review and approval will be completed as expeditiously as possible depending on workload, priorities and completeness of the information provided to TDS to determine the scope. Records of all discussions are to be summarized, copied to the Senior Transportation Engineer and included in the report for reference.

It is expected that the scope of work will align with the principles outlined in this document. It is also expected that the scope of work will be respected and followed. TDS will be open to discussion if interpretation issues are present.

An approved scope of work is valid for a maximum of six months, provided that the proposed project remains unchanged.

The scope of work is typically based on the application type. Two cases are identified as follows:

- At the Outline Plan stage or Land Use Amendments, in which cases analyses will be typically considered based on a full built out scenario, unless TDS indicates otherwise during the scoping process. A TIA may identify off-site improvements as a result of the analyses. An Outline Plan boundary does not constitute the study area boundary.
- At Subdivision stage or Development Permit, TDS may require that the TIA provide greater level of detail (e.g., phasing of improvements).

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2.2 Report Formatting and Contents

The report shall include the following information:

- a) City of Calgary application number (DP/LOC/SB) associated with the study. It must be included in the report (introduction or cover page).
- b) Professional and Permit to Practice Stamps: It is mandatory that every study be stamped by a Professional Engineer licensed to practice in Alberta. The company's permit to practice number shall also be indicated. These documents outline a professional opinion/recommendation. TDS does not review draft reports.
- c) Typical Structure of a TIA:
 - Introduction and Background
 - Background Operating Conditions (short-term and/or long-term horizons)
 - Road Network Description
 - Traffic Volumes
 - Operating Conditions (e.g., intersection and/or roundabout capacity analyses)
 - Proposed Development
 - Site Description
 - Trip Generation
 - Trip Distribution and Assignment
 - Access Review
 - Parking Review (supply versus Land Use Bylaw requirement) and a Parking Study if required.
 - Post-Development Operating Conditions (short-term and/or long-term horizons)
 - Traffic Volumes
 - Operating Conditions (must include intersection and round-about capacity analyses with the background infrastructure as well as with any recommended improvements)
 - Recommendations
 - Active Modes (walking/cycling) Assessment
 - Transit Service Analysis and Assessment
 - TDM (Transportation Demand Management) program. A TDM program will be requested on a case by case basis. Transportation Solutions and Transportation Development Services determine the need for this program as well as its scope and/or contents.
 - Conclusions (location of this item within the report varies upon the author's style). Ideally, conclusions should be at the beginning of the report for easy reading.

It is noted that a description of each one of these sections will be included later in this document.

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d) Appendices shall include the following information:

- Correspondence exchange between consultant and TDS regarding scope of work, changes to scope as required by the project, as well as any subjects agreed upon (e.g., trip generation rates)
- Traffic Counts/Trip Generation/Parking Generation survey data and electronic files (these data may be submitted to The City of Calgary, Transportation Data Division)
- Signal timing plans provided by Calgary Roads for existing conditions or for non-installed signals (when available).
- Spreadsheet files and figures of trip generation/assignment/volumes of complex projects that require multi-layered analyses including interim stages.
- Synchro/SimTraffic, SIDRA outputs (hardcopies and electronic files). In this item, consultants are encouraged to minimize the size (combining pages) of this part of the appendix. Outputs are expected to be legible.
- Hardcopies and electronic files of signal and pedestrian warrant calculations.
- CDs with electronic files are to be bound to the back cover of the report.
- Forecast reports used in preparing the study. Supporting information/rationale justifying modifications to reports issued by the Forecasting Division of the City of Calgary.
- Site plans as required.
- Excerpts of supporting documents (e.g., ASP, ARP and other).

2.3 Validity of Count Data and Data Collection

Traffic/pedestrian volumes are the foundation for most of the analyses and proper assessment. When obtaining/using traffic/pedestrian volumes, the following is to be considered:

- All sources of information are to be provided (i.e., who completed the count, date of completion, peak periods)
- Electronic files and hardcopies containing the raw and summarized data are to be included in the report (i.e., CD appended to the back cover)
- Data's validity varies depending of the area that is being studied.
 - For established areas, TDS accepts data up to two-years old.
 - For new/changing areas, TDS accepts data up to one-year old.
- Whenever data is adjusted or modified from what was observed in the field (e.g., balanced traffic volumes, deletion of illegal movements and so on), rationale is to be provided. Modified traffic volumes shall be clearly identified in the exhibits (e.g., color coded).
- In cases where additional data is collected, the appropriate methodology (e.g., queue or gap surveys) and reference (e.g., Canadian Capacity guide for Signalized Intersections) is to be noted.

There may be cases where more recent data (i.e., no older than one year) will be required as directed by Transportation Data and/or Forecasting. TDS will confirm.

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2.4 Trip Generation Rates

In assessing the trip generation potential of a site:

- Standard City of Calgary trip generation rates are to be used as the basis for analyses. Transportation Data has a Data Bank with Observed City trip rates that the consultant can also use for reference.
- When using non-standard trip generation rates, the consultant/applicant must submit the appropriate documentation that supports the proposed trip rates (e.g., data obtained from trip generation surveys of similar sites, reference or inserts of the technical sources of information, rationale of first principles, comparison of trip rates, etc). **Table 1** illustrates an example where different sources of data were considered.
- If a trip generation study is to be pursued to supplement existing data, a range of sites similar in nature (i.e., use, size, surroundings, location) to the proposed site is to be proposed to TDS for discussion and agreement. The trip generation study must be completed during the times of day and days of the week in which the analyses will be completed.
- ITE trip generation rates¹ are not always applicable in Calgary. They can be used for reference purposes, and must be approved by TDS prior to use in the study.
- All trip generation rates shall be approved by TDS prior to use in the studies.

TABLE 1: TRIP GENERATION COMPARISON

Count Date		Existing Units	AM Peak Hour						PM Peak Hour						Weekday
			In trips	Out trips	Total trips	Trip rate/unit	In%	Out%	In trips	Out trips	Total trips	Trip rate/unit	In%	Out%	Trip rate/unit
Jan 11, 2010	Mon.	162	6	28	34	0.21	18%	82%	22	17	39	0.24	56%	44%	
Jun 2, 2010	Wed.	162	8	35	43	0.27	19%	81%	18	22	40	0.25	45%	55%	3.96 ¹
ITE	Land Use														
Apartment	220					0.51	20%	80%				0.52	65%	35%	6.65
High Rise Apartment	222					0.3	25%	75%				0.35	61%	39%	4.2
High Rise Res. Condo	232					0.34	19%	81%				0.38	62%	38%	4.18
Res. Condo	230					0.44	17%	83%				0.52	67%	33%	5.81
Average of ITE Rates						0.40	20%	80%				0.47	64%	36%	5.21
City of Calgary	Multi-family					0.6	20%	80%				0.7	65%	35%	7.0

¹ Institute of Transportation Engineers. Trip Generation. An ITE Informational Report. 8th Edition. Washington DC: 2008

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2.5 Submission and Response to Comments Process

The current TIA submission and review process is outlined below:

- The consultant completes a TIA in support of a development application (Land Use, Outline Plan, Subdivision, and Development Permit).
- The consultant includes his/her P.Eng. stamp and Permit to Practice number within the document, either on front cover, or in an early page.
- The TDS Senior Engineers review the TIA, and provide comments via email.
- The consultant responds, usually by letter/email or as indicated by TDS, and often includes stamp and permit to practice at end of letter.
- The above two points repeat until an acceptable conclusion is reached.

2.6 Final approval of TIA by The City of Calgary

If the TIA is accepted for use, TDS will provide an acceptance page to the consultant (standard sheet format included in **Appendix A**) that will include the P.Eng. Stamp and signature of the reviewing Senior Engineer, along with the City Permit to Practice stamp. This sheet includes a standard paragraph about acceptance of the TIA, and unique to each TIA, the list of conditions of approval as a result of the review. These will often include the same conditions that would be added to the CPAG Detailed Team Review Documents, either as Prior to Decision, or Prior to Release conditions. Some may also be Permanent Conditions. The consultant will be required to include the acceptance page into the finalized documents to be submitted to the City, and any other final copies for their (or their clients') use.

If the TIA is not accepted, no acceptance page would be provided. This would be noted on any future reports going to Calgary Planning Commission or to Council.

2.7 Current Timelines for Scoping and Review of TIAs

In an effort to better align resources with the Principles and Priorities of the Municipal Development Plan (MDP) and the Calgary Transportation Plan (CTP), Transportation Planning has established review timelines for Transportation Impact Assessments and Parking Studies. TDS will endeavour to provide initial comments on studies that are submitted as part of a formal CPAG application within the timelines outlined in **Table 2** below:

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TABLE 2: REVIEW TIMELINES

Site Location/Urban Structure (as per MDP)	Timeline for initial comments
Activity Centres (Centre City, Major Activity Centre, Community Activity Centre); Corridors (Urban Corridor, Neighbourhood Corridor); Industrial – Employee Intensive	14 days
Developed Areas (Inner City, Established Communities)	21 days
Developing Areas (Planned Greenfield with Area Structure Plan (ASP))	28 days
Developing Areas (Future Greenfield)	N/A – will require approved ASP prior to TIA scoping

All TIAs and Parking Studied must have an approved scope prior to submission to The City as part of an application. Request for scopes are typically reviewed within two weeks of receipt.

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3.0 TECHNICAL INFORMATION

3.1 Software Input Parameters

Consultants are advised that The City of Calgary currently uses Synchro/SimTraffic 7 and SIDRA 5 which are based on the HCM 2000 methodology. TDS will inform consultants of any major changes in the use of software. However, it is the consultant's responsibility to be up to date on the latest software methodology.

The latest list of parameters for each software package is included in **Appendix B** of these guidelines. If the use of different parameter is proposed, TDS must review and validate prior to use.

3.2 Active Modes

Depending on the context, location of the project and at the discretion of TDS, qualitative and quantitative analyses will be requested as follows:

- Detailed pedestrian/bicycle generation and assignment (that may or may not be incorporated into full capacity analyses depending on the intensity of the pedestrian assignment identified and at the discretion of TDS) for projects located in the Centre City, Major Activity Centers, Community Activity Centres, Urban Corridors, Neighbourhood Corridors, Industrial Employee Intensive areas, Greenfield Areas where major community activities are identified (e.g., school sites, recreation centres, parks), and areas within 600 metres of the Primary Transit Network . In these cases, pedestrian and bicycle trip generation is to be calculated using modal split information outlined in the Mobility Monitor, or estimates based on the expected operation of the site (i.e., first principles and/or operation protocols).
- For other areas or long-term scenarios, the following default pedestrian and bicycle volumes are to be assigned to each approach of the intersections identified for analyses:
 - Very low impact locations (e.g., Crestridge Wy/Crestridge Gate): 10 pedestrians/hour, 5 bikes/hour.
 - Low impact locations (e.g., Cranston Wy/Cranston Rd): 25 pedestrians/hour , 10 bikes/hour.
 - Moderate impact locations (e.g., High Street/Mackenzie Towne Gate): 50 pedestrians/hour , 20 bikes/hour.
- Qualitative analyses with focus on connectivity to the primary transit and cycling network, regional pathway system shall be included in the Active Modes review.

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3.3 Transit Service Analysis

The goal of the Transit Service analysis is to identify the level of service and the growing need for this service in the area surrounding the proposed site. Components of this section should include as a minimum:

Existing Transit Services and Conditions:

- Current transit services
 - LRT stations serving the area – within 600 metres walking distance
 - Bus routes serving the area – note for each route include information on service frequency, hours of service (start finish, weekdays, weekends, etc), ridership by route type of bus used (community shuttle, 12 metre or 18 metre) where applicable.
 - Location of existing bus zones and listing of amenities located at these zones (shelters, benches, bus bays, etc). Dimension of bus pads may be required at particular locations.
- Current pedestrian facilities serving the site – i.e. sidewalks (with dimensions), pedestrian crossings.
- Current pedestrian volumes on adjacent facilities
- Future transit service plans for the immediate area

Impact of Proposed Development or Land Use on Existing Services & Facilities

- Forecast of transit trips generated to / from the proposed land use / development by route;
- Forecast number of pedestrian trips on adjacent pedestrian facilities;
- Need for transit facilities – shelters, bus zone aprons, bus bays, benches, etc;
- Explanation of what steps have been made to orient the front doors to the sidewalk / bus zones and provide a measure of walking distance to transit from the development access points.
- Ability for Calgary Transit to serve this location – highlight service changes required – e.g. revised routing / extension, new routes needed, enhanced level of service by route, transit service costs.

The consultant is encouraged to contact Calgary Transit to obtain data to complete the transit service analysis.

3.4 Internal Intersection Analyses

- It is at the discretion of TDS to require analysis of internal intersections. Examples of cases where these analyses could be used are commercial areas where uses/tenants are uncertain, and Outline plan applications. Intersections to be analysed will be confirmed by TDS through the TIA scope.
- Analyses for internal intersections will be generally limited to the first intersection off of an arterial. However, there will be cases where analyses beyond the first intersection off of an arterial will be required at the discretion of TDS.
- Internal intersection analysis can be required for hierarchies of collector to collector and above. These analyses are required to identify the appropriate type of traffic control (e.g., stop, multi-way stop, roundabout, signal) and ensure that sufficient right-of-way is protected.

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3.5 Pedestrian and Traffic Signal Warrant Analyses

- Pedestrian and Traffic Signal Warrant Analyses shall follow the methodology outlined in the 2005 TAC (Transportation Association of Canada) documents.
- Existing TAC methodology is applicable to existing conditions and short-term scenarios that do not exceed 10 years. Actual six-hour traffic volumes must be used in completing the assessment.
- For long-term scenarios (i.e., horizons beyond ten years), the type of intersection control will be determined based on the results of traffic analyses. Failure results do not automatically default in the need for a signal. However, there will be locations at which a signal or other type of intersection control will be the obvious next step up.

3.6 Weekend Analyses

Weekend analyses may be requested for specific uses and locations (e.g., shopping centres, places of worship, recreational facilities).

TDS acknowledges that the Regional Transportation Model (RTM) does not have traffic volumes for Saturday peak hour conditions. However, consultants will need to establish their own traffic volumes when required.

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4.0 DETAILED DESCRIPTION OF TYPICAL SECTIONS OF A TIA

4.1 Introduction and Background

This section should contain a brief overview of the purpose of the study, location of the site, land use, the type of project supported by the study. Relating to other studies/applications associated with development of the site is useful information.

4.2 Background/Post-Development (Short and Long-term scenarios) Operating Conditions

The purpose of this section is to provide a detailed overview of the available infrastructure in the area surrounding the proposed site, as well as to identify any issues of concern that precede/follow development.

This section must include the following components when applicable:

- Detailed description of the transportation network with figures outlining traffic controls, intersection configuration and dimensions, bicycles routes, speed limits, parking restrictions, bus stops, directional signs, pedestrian signage, surrounding land uses, driveways, distance of driveways to adjacent intersections, railway crossings and any other information that may affect the intersection performance during the selected analyses periods (typically morning and afternoon. Some cases may include midday analyses). All these data are typically collected through site visits. It is advisable to include photos outlining particular situations (.e.g., closely spaced driveways, non-standard signs, and so on). Existing and Future Roadway classification is to be provided in this section.
- Short-term changes in the area are to be documented in this section (e.g., change of a one-way road to a two-way road, scheduled installation of signals, permanent road closures). These changes shall be reflected in the analyses. The consultant is expected to do the due diligence in their review of network changes. If the scheduled date of the change falls within the timeframe of the study or submission of the application, changes must be reflected in the study.
- For future operating conditions, changes to the intersection configurations shall be provided in both descriptive and graphic forms.
- Traffic Volumes are to be presented in both graphic and electronic form as per section 2.3 in these guidelines.
- Daily Traffic Volumes are to be presented in this section when relevant. Daily traffic volumes can be obtained from actual counts, estimated using expansion factors provided by the Transportation Data division or by applying a standard factor of 10 to the p.m. peak hour if appropriate.
- Traffix is not a permissible software at the City at this time. The City is exploring the potential of using this software in the TIA/MAP Guidelines. Comparison of the existing and expected daily traffic volumes and the latest approved Environmental Design Guidelines² (EDG) may be requested for certain sites for both background and post-development scenarios.

² Design Guidelines for Subdivision Servicing, The City of Calgary, August 2004.

Transportation Impact Assessment (TIA) Guidelines

- Traffic Volumes for future background horizons will be obtained from various sources:
 - Application of a growth rate to the area. The growth rate can be obtained from comparing counts from previous years. This will be acceptable if no significant changes in the road network have occurred in the observed period. A proposed growth rate shall be approved by TDS prior to use in the study.
 - Data obtained from the Forecasting Division of the City of Calgary.
 - In some instances, background traffic volumes will have to be composed by adding traffic volumes (including active modes) associated with development of other approved but not build sites. TDS will confirm through the scope of work.
- The Capacity Analyses for each intersection/site access and period as outlined in the scope of work should be included in this section, along with the following:
 - A description of the methodology/software used to complete the assessment.
 - Signal Timing Plans obtained from Roads, Traffic Division and used for the analyses. In the event of a scheduled signal that does not have a signal timing plan at the time of the study, a reasonable signal timing plan must be provided.
 - An outline of the parameters used in assessing the level-of-service of each individual movement
 - A table outlining the results obtained from the analyses. Results shall include level-of-service, volume-to-capacity ratio, queues and average delays for each individual movement.
 - When results obtained from analyses completed in Synchro show poor performance (i.e., excessive queue lengths with the potential of blocking intersections, conflicts with rail crossings), the consultant shall validate the results with observations in the field or with micro-simulation.
 - If improvements are recommended, they will have to be supported with analysis as per above and site plans or aerial photos (e.g., a roundabout is recommended, then capacity analyses demonstrating effectiveness and photos/plans showing availability of right-of-way are to be provided).

4.3 Proposed Development

This section is to provide a detailed description of the proposed development including land use, intensities, access points, parking supply, and any other details that may have an impact on the transportation network. A site plan is to be included in this section. If the application is not tied to plans, at least a concept plan is to be provided with indication of the access points.

- Trip Generation potential of the site is to be estimated based on approved trip generation rates as outlined in section 2.4 of these guidelines, along with any considerations related to proximity to a Transit Oriented Development (TOD) area, mix of uses (internal capture), or pass-by trips. Trip generation includes pedestrian/bicycles and vehicular traffic.
- Trip Distribution patterns will be established following one the following:
 - Existing traffic patterns in the area, availability of connecting roads, proximity to other attracting land uses.

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- Select Links reports obtained from the RTM.
- Other sources as appropriate.
- Trip Assignment will be based on location of the access points with respect to the road network.
- Post-development Traffic Volumes are obtained from superimposing the site-generated traffic onto the background traffic volumes.

4.4 Access Review

The appropriateness of the proposed access locations is to be assessed in this section. Minimum spacing requirements are to be considered.

The Design Guidelines for Subdivision Servicing³ is a useful tool for assessing any requirements regarding access.

4.5 Parking Review

Proposed parking supply is to be compared to the minimum requirements set in the Calgary Land Use Bylaw (LUB) 1P2007. Rationale and analyses for providing parking supply over or under what is specified in the LUB shall be included in this section.

When appropriate, the relationship between parking supply and trip generation is to be outlined in this section or in the Trip Generation section (e.g., a centre city office development with restricted parking supply. Vehicular trip generation may be limited by the parking supply).

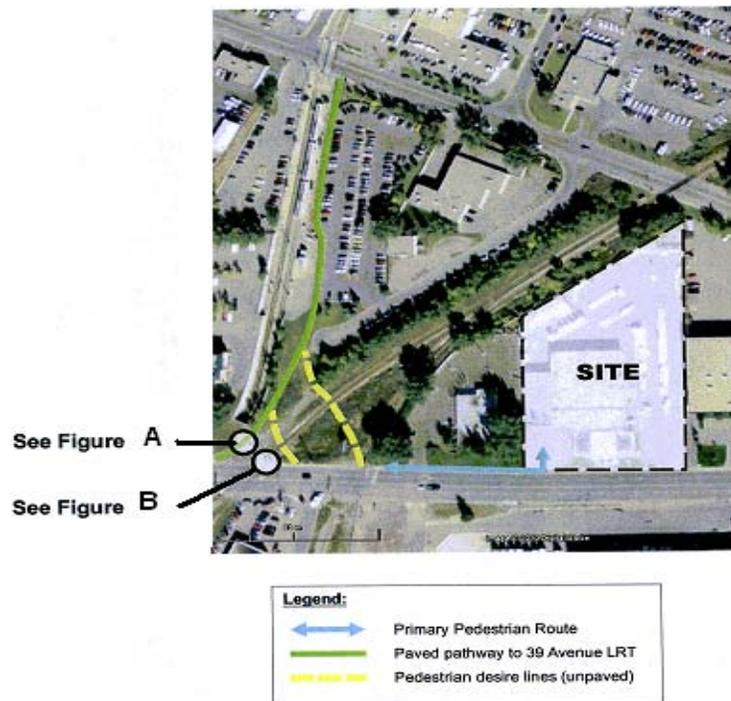
4.6 Active Modes (walking/cycling) Assessment

As per section 3.2 in this report, this section shall include:

- A detailed description of the available infrastructure in the area surrounding the site for pedestrians and cyclists, including condition. This information shall be complemented with photographs.
- A figure illustrating the available/future pedestrian and bicycle network within one and three kilometres from the centroid for small scale projects and from the edges for large scale projects. Additionally, it is assumed that internal pedestrian and bicycle connections will be included in the evaluation. This figure should include the places that pedestrians/cyclists would potentially travel to/from (recreation centres, LRT stations, retail areas, and so on).
- Barriers to walking and cycling must be documented and improvements are to be recommended. Photos are useful in this section. Barriers can be illustrated in the figure noted above. **Figures 1 and 2** illustrate good examples of the above noted bullet points. Figure 1 also illustrates a Transit Map.
- Impact/Benefit of Active Modes for the proposed site. For instance, Active Modes can become a viable solution for a site with restricted accessibility due to congestion in the surrounding roads.

³ Design Guidelines for Subdivision Servicing, The City of Calgary, August 2004.

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A: 39TH AVENUE LRT AND 42 AVENUE PATHWAY CONNECTION



B: 42 AVENUE CPR PEDESTRIAN CROSSING

FIGURE 2: PEDESTRIAN ROUTES AND BARRIER IDENTIFICATION*

*Note how the barriers and poor conditions of the pedestrian connections are identified in these images.

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4.7 Transit Service Analysis/Statement

A Transit Service Analysis is to be provided in this section. It shall meet the requirements outlined in section 3.3. Figure 1 illustrates a good example for summarizing information.

4.8 Transportation Demand Management Program

Typically requested at the DP stage, this program is to be documented by the consultant in order to explain how on-site management measures can reduce the amount of single occupancy auto-trips and encourage the use of active modes or transit.

Approval of this program is granted by the Transportation Demand Management Specialist of the City of Calgary in conjunction with TDS.

APPENDIX A: TIA ACCEPTANCE PAGE

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<Date>

Our File: <Application Number>

I, <Name of Engineer>, P.Eng., authenticate the submission of this document titled <Insert TIA Title> dated <Insert Date>:



TO BE USED

by The City of Calgary for input into the planning application process. The specific contents of the document remain the responsibility of the engineer of record and their company.

Professional Engineer Authentication

Corporate Permit to Practice

<Name of P.Eng.>

The City of Calgary

Based on review of this document, I further authenticate on behalf of The City of Calgary the following conditions:

1. <Insert as Necessary>
2. Comment 2
3. Comment 3, etc.

APPENDIX B: SYNCHRO AND SIDRA PARAMETERS

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SYNCHRO PARAMETERS

This document summarizes the factors and methodologies to be used when submitting Synchro analyses to The City of Calgary for review. Variations to the following guidelines should be detailed and justified with each submittal. Factors which change over time horizons must be detailed and justified in the report.

Physical components such as lane length, storage length, lane width, grade, curb radius, add lanes, RTOR, Adjacent Parking Lane, etc. All physical components of analysis shall be based upon field measurements. When not available, contact Development Services for guidance.

Input Parameters
Ideal Sat. Flow = 1850 for all movements
Lost time adjustment = 0
Leading detector = 8 m for lefts, 4 m for through
Trailing detector = 2 m
Turning speed = defaults
Lane Utilization = default
Right turn factor = default (i.e. program calculated)
Left Turn Factor (prot) = default (i.e. program calculated)
Saturated Flow rate (prot) = default (i.e. program calculated)
Left turn Factor (perm) = default (i.e. program calculated)
Saturated Flow rate (perm) = default (i.e. program calculated)
Saturated Flow Rate (RTOR) = default (i.e. program calculated)
Headway factor = default (i.e. program calculated)
Conflicting peds# = apply where available
Conflicting bikes# = apply where available
Peak Hour Factor = 0.94 a.m. peak hour, 0.95 p.m. peak hour
Growth Factor = 1.0
Heavy Vehicles = Enter if known. Otherwise please use a default of 5% on main street and 2% on side street. In industrial areas, please use higher factors (7.5% or greater).
Bus blockages = applicable when available
Traffic from midblock = provide volumes when available

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Input Parameters
Link OD Volumes = Alterations must be documented in detail.
Lane Group Flow = default (i.e. program calculated)
Vehicle clearances and existing timings = Please contact Traffic Signals
Minimum Initial Main Street = 20 seconds or pedestrian time (sum of walk and pedestrian clearance), whichever is greater.
Minimum Initial Side Street = 10 seconds
Minimum Initial Arrows = 5 seconds
Minimum Initial Split = default (i.e. program calculated)
A recall (pedestrian or minimum) should be placed on the main street unless the intersection operates in a fixed time (pre-timed) mode. Pre-timed mode of operation is generally only used in the Downtown / Beltline areas.
A recall should NOT be placed on the minor street or turns.
Pedestrian walk times = a minimum of 8 seconds
Pedestrian clearance times = Please contact Calgary Roads, Traffic Division
Pedestrian Calls = Approximate from a count where available.
Minimum Splits for Arrows = 10 seconds plus clearance. In extreme cases 8 seconds plus clearance for pro/per arrows, 9 seconds plus clearance for pro only arrows.
Dual Entry = Yes
Inhibit Max = contact Traffic Signals
All other factors shall be left as their default / calculated values.

General comments:

- If an arrow is found to be needed in one peak hour, then it should be included in all peak hour analyses.
- When showing summaries, please include the v/c ratios as well as the level of service values and queues.

Transportation Impact Assessment (TIA) Guidelines

SIDRA PARAMETERS

The intent is to replicate, as near as possible, the methodologies of the Highway Capacity Manual 2000. This will provide a consistent basis for comparing different traffic control devices.

Input Parameters
Initialize program to HCM - Metric - right hand drive rules
All physical components (lane length, storage length, lane width, grade, curb radius, lane configuration, entry angle, RTOR, Adjacent Parking Lane, etc.) shall be based upon field measurements and/or a proposed design. When not available, contact Development Services for guidance.
Evaluation period = 60 minutes with a 15-minute peak flow period
Peak Hour Factor = Peak Flow Factor = 1.0
Queue lengths should be evaluated at 95th percentile at the back of queue
HCM Delay and Queue should be selected as the measures of evaluation
Area type or CBD or Entry/Circulating Flow Adjustment = left as default
Level of service will be evaluated by Delay and Degree of Saturation
Ideal Sat. Flow = 1850 for all movements, Saturation flow scale = 100%
Heavy Vehicles = Enter if known. Otherwise please use a default of 5% on the main street and 2% on the side street. In industrial areas, please use higher factors (7.5% or greater).
Lane Utilization = default
Growth Factor = Flow Scale = 100%
Practical Degree of Saturation = 85%
Lane width = minimum of 4.3 m for single-lane roundabouts
Platooning = Extra bunching = per guidelines of the program and reflective of field conditions

All other factors shall be left as their default/calculated values. Any alterations to the above specifications should be detailed and included in the main body of all reports.

The above values should provide a standard basis for the evaluation of roundabouts while providing flexibility to designers and engineers evaluating this traffic control option.

APPENDIX C: DOCUMENTS OF REFERENCE

Transportation Impact Assessment (TIA) Guidelines

DOCUMENTS OF REFERENCE

ASSOCIATION OF PROFESSIONAL ENGINEERS OF ALBERTA

- Association of Professional Engineers of Alberta, APEGGA. Practice Standard for authenticating Professional Documents V2.0 – April 2002

CITY OF CALGARY

- City of Calgary. Municipal Development Plan. Calgary:2009
- City of Calgary. Calgary Transportation Plan. Calgary: 2009
- City of Calgary. Land Use By-Law 1P2007
- City of Calgary. Design Guidelines for Subdivision Servicing. Calgary:2004
- City of Calgary. Roundabout right-of-way requirements. Calgary: 2007
- City of Calgary. Pedestrian Policy and Needs Report. Calgary:2008
- City of Calgary. Bicycle Policy and Needs Report. Calgary:2008
- City of Calgary. Bicycle Pathways and Routes Map. Calgary:2008
- City of Calgary. Mobility Monitor (#24, 33). Calgary: Various issues

INSTITUTE OF TRANSPORTATION ENGINEERS

- Institute of Transportation Engineers. Transportation Impact Analyses for Site Development. Washington DC: 2005
- Institute of Transportation Engineers. Trip Generation. An ITE Informational Report. 8th Edition. Washington DC: 2008
- Institute of Transportation Engineers. Parking Generation 4th generation. Washington DC:

TRANSPORTATION ASSOCIATION OF CANADA

- Transportation Association of Canada. Canadian Traffic Signal Warrant Matrix Procedure. 2005
- Transportation Association of Canada. Pedestrian Crossing control Manual. 1998
- Transportation Association of Canada. Geometric Design Guide for Canadian Roads. 1999
- Transportation Association of Canada. Manual of Uniform Traffic Control Devices for Canada.

TRANSPORTATION RESEARCH BOARD

- Transportation Research Board. Highway Capacity Manual. Washington DC: 2000

WEBSITES

- www.calgary.ca/transportation and www.calgarytransit.ca
- www.ite.org
- www.tac-atc.ca