CITY OF LETHBRIDGE

TRAFFIC IMPACT STUDY GUIDELINES

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- Mr. Darwin Juell, P.Eng., Transportation Manager;
- Stephen J. Burnell, P.Eng., Traffic Operations Manager;
- Mr. Muhammad Imran, P.Eng., Transportation Engineer.

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1.0 INTRODUCTION

1.1 Traffic Impact Study

The primary goals of a traffic impact study are to assess the potential effects of traffic caused by a proposed urban development project on the roadway system and to identify the total roadway improvements (within the planning cell and for the adjacent roads) needed to ensure that the roadway system will operate at an acceptable level upon completion of the proposed development. A secondary goal is to identify improvements needed to integrate the proposed development within the pedestrian and cyclist pathway system. It should be recognized that the scope of these studies may vary depending on the magnitude of the development project.

Traffic impact studies are an important part of the development review and approval process to assist developers and public agencies with land use decisions related to urbanization plans, area structure plans, outline plans, re-zonings, subdivisions, site plans, and other development reviews. Traffic impact studies are required wherever a development proposal has a significant impact on traffic operations and on other components of the transportation system. This document differentiates the requirements of a traffic impact study into three general categories:

- Urbanization and area structure plans;
- Outline plans;
- Rezoning and development permit applications.

In terms of their benefits to a municipality, traffic impact studies:

- Provide decision makers with a basis on which to assess the implications of the proposed development on the transportation system;
- Provide a rational basis to evaluate whether the scale of development is appropriate for a particular site and what improvements may be necessary, on and off the site, to provide safe and efficient access and traffic flow;
- Provide a basis to assess existing or future localized transportation system deficiencies that require improvement;
- Address transportation-related issues associated with development proposals that may be of concern to neighbouring residents, businesses and property owners;
- Establish a basis for negotiations for improvements and funding participation in conjunction with a development or zoning application.

A traffic impact study may vary in scope and complexity depending on the type and size of the proposed development.

1.2 Need and Justification

The City of Lethbridge has prepared these guidelines in order to streamline the approval process. The guidelines provide a standardized framework for consultants to follow when submitting traffic impact studies for review and should be complemented with good transportation engineering judgement. These guidelines also provide developers with information for defining terms of reference for engineering consultants to prepare traffic impact studies for their proposed development.

1.3 Purpose of Guidelines

The purpose of these guidelines is to ensure that traffic impact studies prepared for review by the City of Lethbridge meet the following criteria:

- Objective assessment — the study will evaluate the impacts of proposed new development in a rational manner;
- Consistency — the study will be based on assumptions consistent with the City's accepted methodologies and parameters and thus be comparable to similar traffic studies submitted to the City;
- Recognized by developers and consultants — the guideline will provide a standard approach to be followed and will reduce confusion and delay in processing development proposals;
- Promote understanding of the process — the steps outlined in this guideline will enable proponents, reviewers and elected officials to have a better understanding of the process;
- Ease of review by City transportation staff— a standardized set of procedures will minimize the time required by staff reviewing these studies.

2.0 GENERAL TRAFFIC IMPACT STUDY REQUIREMENTS

2.1 Need for Traffic Impact Study

There are a number of criteria under which a traffic impact study may be required. For large area developments such as area structure plans or outline plans, the study normally defines the classification of the internal road system as well as the impact on the external road system. Integration of the development plan with the regional pathway system would be addressed as well as noise mitigation measures. Traffic impact studies for smaller development projects may only focus on site access and road system impact analysis.

In general, a traffic impact study should be conducted whenever a proposed development will generate more than 100 additional (new) peak hour trips to or from the site during the adjacent roadway's peak hour or the development's peak hour. Depending on the type of land use, the threshold value may be 1,000 additional (new) daily trips. This site traffic generation value was selected because it represents a threshold at which additional turning lanes may be needed to accommodate the site generated traffic. **Table 2.1** provides some examples of the level of development that would generate approximately 100 peak hour trips. **Appendix 'A'** contains some local trip generation rates to be used in traffic impact studies.

A traffic impact study may also be required even if there are less than 100 peak hour trips when one or more of the following conditions are met:

- The development/redevelopment is located in an area of high roadway congestion and/or a high expected rate of population or employment growth;
- The development is located within or adjacent to a residential community that has existing parking issues and/or may have a residential parking permit program in place.
- The development, its access or type of operation is not envisaged by local land-use or transportation plans;
- The development or redevelopment proposal requires amendment of the applicable official plan(s);
- As part of the proposed development, a new traffic signal is proposed to be installed on the arterial road network;
- If the development/redevelopment has the potential to create unacceptable adverse operational and safety impacts on the road network. Examples include the following:
    - Inadequate horizontal or vertical sight distances at access points;
    - Substandard access spacing as it relates to intersections and/or driveways;

- Lack of existing left or right turn lane(s) on the adjacent roadway at the proposed access point(s);

- The vehicular traffic generated by the development/redevelopment would result in volume/capacity ratios at a signalized intersection becoming critical (i.e. greater than 0.80 overall or Level of Service D).

Table 2.1 Land Use Thresholds Generating 100 Peak Hour Trips

Land Use Type	Units
Residential • Low Density - single family homes up to quadraplexes • Medium Density - any multi-family above quadraplexes	 100 110
Shopping Centre (GFA)	560 m^2
High Turnover (Sit Down) Food Restaurant (GFA)	500 m^2
Gas Station with Convenience Store (fueling positions)	7
Bank with Drive-in (GFA)	190 m^2
Medical/Dental Office (GFA)	2,700 m^2
General Office (GFA)	6,230 m^2
Light Industrial/Warehousing (GFA)	200 Employees
Manufacturing Plant (GFA)	200 Employees

The onus will be on the proponent/consultant to demonstrate that a traffic impact study is not required.

2.2 Staff Consultation

It is expected that the development proponent meet with City land use and transportation planning staff to review their project in terms of land use types and intensity and development staging and timing. During the meeting, the development proponent will want to confirm the approval process, and to determine the need for a traffic impact study.

In addition, it is imperative that prior to commencing a traffic impact study, the consultant who is to prepare the traffic impact study meet with City staff in order to establish the scope of the study, to determine data requirements and their availability, and to confirm basic parameters such as trip generation and distribution.

In addition, during the study process, subsequent meetings with City transportation planning staff is required to confirm the trip distribution pattern calculated by the consultant, followed by a subsequent meeting to review the resultant traffic assignment.

Where applicable, the adjacent municipal, county and provincial highway authorities should be contacted by the proponent to determine their requirements.

2.3 Study Updates

Generally, traffic impact studies are usually valid for a period of about five years. Major changes within the study area may reduce the "life" of the study if they were not considered in the impact analysis. Where the timing of subsequent development approvals exceeds five years or there have been changes in the land uses assumed in the earlier study, then a new study will likely be required.

2.4 Qualifications to Conduct Traffic Impact Study

When the scale of the development/redevelopment warrants a traffic impact study, it is the proponent's responsibility to retain a qualified transportation engineering consultant experienced in transportation planning and traffic engineering.

The consultant's representative, the engineer responsible for the traffic impact study, shall be a member of the Institute of Transportation Engineers and registered as a Professional Engineer in the Province of Alberta. The report must be dated and signed accordingly. The signing Engineer is verifying that appropriate assumptions, procedures and calculations have been undertaken during the process of completing of the traffic impact study and that they are the individual who is taking corporate/professional responsibility for the work.

2.5 Traffic Analysis Parameters

Section 4 of the guideline provides a general outline for a traffic impact study. This document also provides some specific guidance related to the analysis of signalized intersections. In this regard, the City of Lethbridge prefers the use of Synchro software and the companion suite SimTraffic. **Appendix 'B'** contains a description of the factors and methodologies that are to be used when Synchro analyses are submitted to the City of Lethbridge for the review of traffic impact assessments.

For the analysis of roundabouts, the City prefers the use of RODEL software; however, the use of SIDRA software will be accepted for analyses in transportation planning studies. Software parameters for RODEL or SIDRA must be reviewed and approved by City staff.

2.6 Copy Writes

The City of Lethbridge will not accept traffic impact study documents that are shown as being copy written. The City operates under FOIP guidelines such as these documents may be released to other parties. In addition, these traffic impact studies may be released to other consultants preparing similar traffic studies on nearby lands such that information contained in the subject study would be needed for the subsequent analysis.

2.7 Applicable Regulations, Guidelines and Resources

The key piece of legislation that relates to the design of transportation systems is the *Traffic Safety Act* of the Province of Alberta.

In addition, transportation systems designers should refer to the following guidelines:

- Geometric Design Guide for Canadian Roads, Transportation Association of Canada, 1999;
- Manual on Uniform Traffic Control Devices for Canada, Transportation Association of Canada, 1998;
- A Policy of the Design of Streets and Highways, American Association of State Transportation and Highway Officials, 2005;
- Transportation Impact Analysis for Site Development: An ITE Proposed Recommended Practice;
- Trip Generation Manual, 7th Edition, Institute of Transportation Engineers, 2004;
- Parking Generation Manual, 3rd Edition, Institute of Transportation Engineers, 2004;
- Canadian Guide to Neighbourhood Traffic Calming, Transportation Association of Canada, 1998.

Other useful web-based resources include the following:

- Transportation Association of Canada – http://tac-atc.ca/;
- Alberta Transportation – http://www.trans.gov.ab.ca/;
- Institute of Transportation Engineers – http://www.ite.org/.

2.8 Available Documentation and Data

Appendix 'C' contains a list of documents and data that may be available from the City of Lethbridge.

2.9 Traffic Impact Study Checklists

Appendix 'D' contains a checklist to assist developers and consulting engineers to assess the completeness of the Traffic Impact Study final report. This should be considered as a guide and a reminder to review the completeness of the final report with respect to the requirements of this policy document.

Appendix 'E' contains sign-off forms that may be used during the consultation process with City staff. It should be recognized that the signoff by the designated City transportation staff person may not occur at the project review meeting as there may be information presented by the consultant that requires some analysis time.

3.0 TRAFFIC IMPACT STUDY TYPES

There are three general categories of traffic impact studies needed for urban development projects in Lethbridge. The three types are associated with area structure or urbanization plans, outline plans, and specific development proposals included in rezoning or development permit applications.

3.1 Type 1 – Large Scale Development Traffic Impact Studies

The first type of traffic impact study is oriented to larger areas planned for new communities in the city. This study is one of the supporting documents related to urbanization plans and, more typically, for area structure plans. Traffic forecasts will primarily be focused on daily design volumes which can be used to determine the classification of the skeletal road network within the planning cell. However, subject to the outcome of discussions with City transportation staff at the outset of the project, there may be a need to develop design hourly flows in order to determine the geometric requirements of key intersections on the boundary of the planning cell, or to define road improvement needs for critical downstream intersections. The planning horizon will be longer due to the extended build-out of the planning cell. This study will not have the specificity as that required for the other types of traffic impact studies. This study will need to identify future transit routes to ensure the road network classifications are suitable for bus movements. In addition, pathways will need to be identified to ensure integration with the regional pathway system.

3.2 Type 2 – Outline Plan Traffic Impact Studies

The second type of traffic impact study relates to near term development projects associated with an outline plan. The subject development project is typically for a much smaller area as compared to the first study that is regional in nature. The initial documentation required relates to land use and whether the extent and type of development included in the outline plan is the same as that assumed for the first traffic impact study. If the traffic generation for the outline plan area is within 100 vehicle trips of that assumed for the initial traffic impact study (ASP related), then the original traffic forecasts can be brought forward into the second traffic impact study. However, it should be recognized that there is greater specificity in the road network for an outline plan as compared to the skeletal network shown in an ASP. For this reason, the assigned traffic to the network may change resulting in the need to confirm road classifications in the outline plan area.

In addition, there will be a need to develop design hourly flows in order to determine the geometric requirements of key intersections within (generally collector-collector and collector-local) and on the boundary of the planning cell (generally arterial-collector and arterial-arterial). If new traffic forecasts are prepared, it will likely be necessary to update the analysis of road improvement needs for critical downstream intersections. Traffic forecasts are focused on weekday peak period traffic periods and, in some instances, on weekend traffic conditions. Intersection operational analyses are very critical components of this second type of traffic impact study. Depending on the detail

of the development projects included in the outline plan, supporting traffic analyses may be required related to traffic calming and sight distance checks. Noise studies are potentially needed should residential development situated adjacent to high volume roadways be included in the project.

3.3 Type 3 – Specific Project Traffic Impact Studies

The third type of traffic impact study relates to near term urban development projects which may be associated with a rezoning or development permit applications. It should be recognized that this third type of traffic impact study may not be required if the development project was included in a traffic study related to an outline plan, and does not add 100 additional peak hour trips to the adjacent roadway. This issue should be resolved at the initial meeting with City transportation staff. The third study tends to be focused on traffic conditions within an existing roadway and traffic control infrastructure. Traffic forecasts are focused on weekday peak period traffic periods and, in some instances, on weekend traffic conditions. Intersection operational analyses are very critical components of this third type of traffic impact study. Because the project is within an area of existing urban development, supporting traffic analyses related to traffic calming, safety performance, sight distance checks, and similar detailed studies are required. Issues such as internal parking and circulation, and the widths of internal roadways may need to be considered in this type of study. Public roadway and intersection improvements (even beyond the development area) must be considered in the analysis. Continuity of pathway systems needs to be identified. Noise studies are potentially needed for any residential development included in the project that is situated adjacent to high volume roadways.

It should be noted that where a TIA is required for a development that generates less than 100 vehicle trips, the focus of this study may be limited to geometric concerns related to the access points and safety issues rather than the impact to the trips generated. The scope of such a study needs to be resolved at the initial meeting with City transportation staff.

4.0 TRAFFIC IMPACT STUDY OUTLINE

4.1 Scope of the Traffic Impact Study

The following section outlines the format and requirements of the traffic impact study. The contents and extent of the study generally depends on the location and size of the proposed development/redevelopment project and the prevailing traffic conditions in the surrounding area. The outline of the traffic impact study described below indicates the subjects that may be required in the three traffic impact studies; however, this needs to be clarified with City staff at the outset of the study. The outline indicates by the use of numbers, i.e. (1) (2) or (3), the required subjects that would likely be included in that type of traffic impact study **Table 4.1** provides a quick reference of the typical requirements for the three types of traffic impact studies.

Table 4.1 Typical Content of Traffic Impact Studies

Report Content Item	**TIS Type**		
	1 - ASP	**2 - OP**	**3 - SP**
Define proposal and study area	⊗	⊗	⊗
Planning horizon and analysis period	⊗	⊗	⊗
Existing traffic conditions	⊗	⊗	⊗
Background traffic growth	⊗	⊗	⊗
Estimation of traffic demand	⊗	⊗	⊗
Safety analysis		⊗	⊗
Boundary area site access analysis	⊗	⊗	
Site access analysis		⊗	⊗
Traffic collision analysis		⊗	⊗
Sight distance evaluation		⊗	⊗
Mitigation measures	⊗	⊗	⊗
Recommendations	⊗	⊗	⊗

⊗ Denotes a subject that would typically be included in that type of traffic impact study.

4.2 Description of the Proposal and the Study Area. (1)(2)(3)

A description of the development proposal, its location and the proposed traffic impact study area is required to permit City transportation staff to identify the site location, its anticipated operation and area of potential impact. In addition, this information facilitates timely review of key study assumptions ranging from the study area limits and horizon years to the trip generation assumptions and trip distribution and assignment estimates.

4.2.1 Description of the Development or Redevelopment Proposal

The traffic impact study should provide a full description of the proposed development. This may include the following elements, as applicable:

- Municipal address or a portion of the urban area defined by roadways or physical, natural or topographical features;
- Existing land uses or permitted use provisions in an official plan, area structure plan, outline plan and/or the Zoning By-law, as well as the relevant planning regulations to be used in the study;
- Total development area, and tabulation of the proposed land uses;
- Total area of each building and their location, and parking lot layout and capacity;
- Floor space including a summary of each type of land use including number of residential/sleeping units;
- Anticipated date of the proposed construction and occupancy, and planned phasing of the development;
- Hours of operations, if applicable;
- Nearby intersections and accesses to adjacent developments including type of traffic control;
- Proposed access points and type of access (full turns, right-in-right-out, turning movement restrictions, etc.) and throat lengths;
- Nearby transit facilities/stops;
- Regional pedestrian/cyclist pathways.

A site plan, of a suitable scale, is to be submitted for review as part of the traffic impact study document. The site plan should illustrate the circulation pattern, fire lanes, traffic control devices and tracking patterns of the design vehicles for the access, circulation, loading docks and garbage receptacles. If the proposed development/redevelopment is to be constructed in phases, describe each phase and the proposed implementation timing.

4.2.2 Study Area

The study area should extend far enough, within reason, to contain all municipal and provincial roadways that will be noticeably affected by the travel generated by the proposed development. In general, the analysis area should include:

- All roads, ramps and intersections through which peak hour site traffic composes at least 5% of the existing capacity on an intersection approach;
- All roads in the area of the development that have a traffic growth in excess of 5%;
- All intersections where volume to capacity ratios for overall intersections or through or shared through/turning movements increased to over 0.80, or where the volume to capacity ratios for the critical traffic movements increased to 0.90 or above.

The City reserves the right to establish the study area as may be deemed necessary.

A description of the existing transportation system in the study area, using a combination of maps and other documentation should identify relevant information, such as the following

- All adjacent and nearby roads, indicating the number of lanes, and posted speed;
- All adjacent and affected intersections, indicating type of traffic control, lane configurations and widths, and any turning or similar restrictions;
- If appropriate, on-street parking spaces/standing/stopping restrictions in the vicinity of the development site and those that would affect the operation of key intersections being analyzed;
- Transit routes;
- Regional pathway routes;
- Heavy vehicle prohibitions and restrictions;
- Other transportation facilities as appropriate.

Potential future transportation improvements that are currently being considered and may facilitate the traffic demand generated by the development/redevelopment should be identified. These improvements should be described to a level of detail sufficient to assess their implications for travel to/from the development site. In each case, identify the status and anticipated date of implementation.

4.3 Horizon Year and Time Periods for Analysis (1)(2)(3)

4.3.1 Horizon Year

In general, the horizon year for impact analysis should be ten (10) years from the date of the traffic impact study unless an earlier date for full occupancy of the project can be identified and justified in consultation with City staff. For Type 1 traffic studies, road hierarchy decisions require full build-out of the study area and, for regional impacts; the typical horizon is 30 years. Type 2 traffic studies need to address traffic conditions related to the opening day and 10 year planning horizons and for a build-out period if the development phasing extends beyond 10 years. Typical horizon periods for Type 3 traffic studies are opening day and 10 years.

Horizon years should also be identified for any interim phases of development and additional horizon years, ranging from a minimum of five (5) years after the study date to a maximum of full build-out of the defined study area. Typically, this type of longer-range evaluation is for larger scale projects, such as those generating 500 or more peak-hour directional trips. The specific planning horizons to be used in the study should be discussed with City transportation staff at the outset of the study.

4.3.2 Design Traffic Periods

The critical time periods for traffic is directly associated to the scope of the traffic impact study and with the peaking characteristics of the background traffic and the proposed development traffic. For Type 1 traffic impact studies, projected daily traffic flows may be sufficient to identify the classification of the hierarchical road network.

For Type 2 and 3 traffic studies, the AM and PM peak traffic periods will typically constitute the “worst case” combination of site related and background traffic; however, in the case of retail, entertainment, religious, institutional, sports facility uses, the Saturday, Sunday or site peak may require analysis. In Lethbridge, the lunch period may contain the highest daily volume and both the outbound and inbound trips may occur during the one-hour Mid-day peak, potentially resulting in the highest traffic flows in the study area. During the initial consultation process, the consultant should determine, in conjunction with City staff, the selected peak periods for analysis.

4.4 Existing Traffic Conditions (1)(2)(3)

To provide a representative picture of the existing traffic conditions, exhibits showing the existing traffic volumes and turning movements for roadways and intersections in the study area are required, including heavy truck movements.

Traffic volumes may be acquired from the City of Lethbridge or previous transportation planning, traffic operations or traffic impact studies undertaken in the study area. Any count data this obtained from external sources should be confirmed with City transportation staff prior to their use. Traffic counts more than two years (2) old or those counts that appear not to be reflecting existing conditions should be updated to ensure that they reflect current traffic patterns.

A field observation survey may need to be undertaken to verify that traffic volumes through an intersection reflect actual demand and prevalent saturation flow values to determine the necessary adjustments to level-of-service calculations so that actual conditions are fairly represented.

4.5 Background Traffic Growth (1)(2)(3)

4.5.1 Background Traffic

The growth in background traffic should be established in consultation with City staff through one of the following methods:

- Estimation of roadway growth factors from a calibrated traffic forecast model;
- Regression analysis of historical traffic growth;
- A growth rate based on area transportation studies.

In some situations, alternative assumptions or methods, such as the application of development absorption rates may be appropriate. In the absence of these methods, rates provided by the City should be used.

An exhibit showing the background traffic volumes and turning movements for roadways and intersections in the study area must be included for each analysis horizon.

4.5.2 Other Area Developments

All significant developments under construction, approved, or in the approval process within the study area which are likely to occur by the specific horizon years must be identified and included as base assumptions in the study. The land-use type and magnitude of the probable future developments in the horizon years should be identified through consultation with City transportation and planning staff.

4.5.3 Transportation Network Improvements

Changes to the present or planned transportation network should be determined from the approved Provincial and City local capital improvement programs. A realistic assessment of timing and certainty should be made. The impacts of the transportation system changes should be identified; in particular, diversion of volumes from other facilities to new or improved facilities should be estimated.

4.6 Estimation of Travel Demand (1)(2)(3)

All trip generation, trip distribution, assignment and modal split assumptions should be in accordance with standard/accepted techniques and based on local parameters. Sources should be well-documented and any assumptions which may be considered less-than conservative should be rigorously justified. Any "soft" parameters where there is a significant uncertainty or a range of possible values should be subjected to sensitivity analysis unless a demonstrated "worst case" situation is assumed.

4.6.1 Trip Generation.

Consultation with City transportation staff is required to ensure that appropriate and agreed upon trip generation rates are being employed in the traffic impact study. Available trip generation methods include:

- City of Lethbridge defined trip rates – see Appendix A;
- Trip generation surveys from similar developments in the city that have similar operating characteristics as the proposed development. Modifications should be made to the trip generation rates to account for differences in the surveyed and proposed development sites;
- "First principles" calculations of anticipated trips to/from the site;
- ITE Trip Generation rates – assess their applicability to traffic conditions in Lethbridge. When equations are available, a sensitivity analysis must be completed to determine the appropriate use of either the average rate or the equation.

The highest of these values or an average rate is to be used.

Typical trip generation rates or equations are usually derived from counts taken at driveways of various land uses. However, for many commercial land uses, not all of the trips generated at the driveway(s) represent new trips added to the adjacent street system. The number of trips generated may include pass-by trips and internal "synergy" trips.

All trip generation assumptions and adjustments assumed in the calculation of "new" vehicle trips should be documented and justified in terms of previous research or surveys. Sensitivity analysis should be undertaken where trip generation parameters have the potential to vary considerably and the most probable values cannot be readily identified.

Required trip generation rates and analysis periods will include the AM peak hour, PM peak hour and Daily trip generation. The need for a Mid-day analysis period is to be confirmed at the initial meeting with City staff. Daily rates are used to determine roadway classification. Use of a daily factor in lieu of daily trip rates must be confirmed with the City transportation staff. It should be recognized that the preference is to use daily trip rates and directional distributions.

A table must be provided in the study report identifying the categories and quantities of land uses, with the corresponding trip generation rates or equations and the resulting number of trips. The table also needs to identify the pass-by trip percentage and the associated number of vehicle movements. For large developments that will be constructed in phases, the table should identify each significant phase separately.

4.6.2 Trip Distribution

The directions from which traffic will approach and depart the site can vary depending on several location-specific factors, including:

- Size of the proposed development;
- Type of proposed development;
- Surrounding and in some cases competing, land uses, population, and employment distributions;
- Prevailing conditions on the existing street system.

The trip distribution assumptions should be supported by one or more of the following:

- Origin-destination data based on interview surveys;
- Output from the City's transportation planning model;
- Existing/anticipated travel patterns;
- Capacity conditions on the existing road network;
- Market studies.

Engineering judgment should be utilized to determine the most applicable of the above methodologies for each particular application. As indicated earlier, during this phase of the preparation of the traffic impact study, the assumed trip distribution pattern should be reviewed by the City's transportation staff. The trip distribution pattern is to be displayed on an exhibit indicating the percentage values on the adjacent arterial and collector road network.

4.6.3 Trip Assignments

Traffic assignments should consider logical routings, available and projected roadway capacities, and travel times. Traffic assignments may be estimated using a transportation demand model or "hand assignment" based on knowledge of the proposed/future road network in the study area.

Where appropriate, the trip assignment of the proposed development may need to be adjusted to account for:

- Trips generated by land use activities to be replaced by the proposed development. Unless otherwise accounted for, these trips will normally be subtracted from the trip generation estimates.

- Pass-by trips – Pass-by trips are made by traffic already on the abutting roadway(s) that enter the site as an intermediate stop on the way from a trip origin to a primary destination. For example, a driver may stop at a convenience market on the way home from work. If this market is located along the roadway the driver normally uses to travel to home, then the trip "generated by the market" is not a new trip added to the roadway system. It should be recognized that pass-by reduction is only applicable to the evaluation of traffic operations at intersections removed from the site. These pass-by trips must all be accounted for in the turning movements into and out of the site.

- Diverted link trips – these are similar to pass-by trips but they are attracted from the traffic on roadways within the vicinity of the generator but require a diversion from that roadway to another roadway to gain access to the site.

- Internal "synergy" trips — these are trips that are shared between two or more uses on the same site, i.e., a motorist visiting a retail store and a grocery store on the same site without having to access the public road network when moving between the sites.

- Transportation demand management (TDM) strategies.

Depending on the scope of the traffic impact study, the typical types of exhibits that should be included in the final report are as following:

- Existing background traffic;

- Future horizon(s) background traffic;

- Site generated traffic for the planning horizons included in the study;

- Site related pass-by and diverted link traffic for the various planning horizons, if appropriate;

- Total combined traffic for the various planning horizons.

4.6.4 Summary of Traffic Demand Estimates.

A summary of the future traffic demands (each combination of horizon year and peak period for both site generated and total future traffic conditions) must be provided in the form of exhibits. Pass-by traffic assumptions must be clearly identified and illustrated on an exhibit, which summarizes the reassignment of pass-by traffic.

4.7 Evaluation of Impacts of Site Generated Traffic (1)(2)(3)

For Type 1 traffic studies associated with new urban communities, it can be expected that the projected traffic flows within the planning cell will be portrayed on maps indicating the design daily flows on the various links within the road network. In tabular form, the site generated traffic shown on the maps will be compared with the design volume thresholds for the relevant street classifications. The maximum daily volume and the primary traffic use of the link will be the determinant for the classification of the street, unless there is a design objective to develop a transition between street classifications for that specific link. The proposed transit service in the development area is another determinant of street classification. In addition, the City's design standards should be reviewed as to roadway classification criteria.

For the more detailed traffic impact studies (Types 2 and 3), an evaluation of signalized and unsignalized intersections affected by site generated traffic volumes for all relevant peak periods for the existing and future planning horizons is required and summaries are to be provided in a tabular format. The objective is to identify traffic patterns created by the development and that the "problem" movements that exist with the background traffic are not worsened by this additional development related traffic.

Place in an appendix to the traffic impact study the documentation of all assumptions used in the analysis concerning lane configuration/use, pedestrian activity, saturation flows, traffic signal cycle length, phasing and timing, utilization of the inter-green phase and other relevant parameters. Existing signal timings should be used for existing intersections and signal timing modifications may be considered as a measure to address capacity or level of service deficiencies. It should be noted that the analysis of new or existing signalized intersections, the proposed timings must reflect pedestrian crossing requirements and the appropriate clearance intervals for the road geometrics.

Supplementary surveys or analyses may be needed to assess saturation flows, gap availability, projected queue lengths and possible blocking queues.

4.7.1 Capacity Analysis at Intersections

The summary must include the level-of-service including average vehicle delay and volume to capacity (v/c) ratios for overall intersection operations and individual critical movements for all analysis periods and time horizons. Full documentation of the results of all level of service analyses must be provided in an appendix. All traffic impact study submissions must include an electronic copy of the intersection operational analysis (i.e. Synchro).

When considering intersection improvements, it should be recognized that there is a hierarchy related to the control at intersections and types of improvements. The intersection improvement hierarchy includes:

- Two-way Stop control;
- Reversing the direction of the two-way Stop control;

- Multi-way (four-way) Stop control when used as an interim step subject to further improvements;

- Roundabout;

- Traffic signals.

Where the installation of traffic signals is being considered, the consultant is referred to the MUTCD to review the section on the "General Considerations for the Installation of Traffic Signals", review alternative traffic control or geometric changes that might reduce the need for installing traffic signals, and then complete the traffic signal warrant procedure. Copies of the signal warrant worksheet are to be included in the traffic study appendix.

In terms on analyzing signalized intersections, the City accepts traffic analyses undertaken with the latest version of Synchro software package. The parameters that should be used when undertaking the traffic analyses are defined in Appendix B. The analysis must incorporate adequate crossing time for pedestrians, clearance intervals and use conventional signal timing plans.

For the analysis of roundabouts, the City accepts the analysis undertaken by the RODEL software and may accept SIDRA software. Should a consultant wish to utilize another software package, prior approval must be obtained from the City's transportation planning staff.

The analysis should include improvements where:

- Volume/capacity (V/C) ratios for overall intersection operations, through movements, or shared through/turning movements are increased to 0.80 or above:

- V/C ratios for the critical traffic movements are increased to 0.90 or above; or

- Queues for an individual movement are projected to exceed available turning lane storage based on the 95^{th} percentile queue criteria.

Conventional signal timing plans should be used and all proposed adjustments to traffic signal timing, phasing and cycle lengths should be evaluated in terms of pedestrian crossing time requirements, clearance intervals, effect on queue lengths, adequacy of existing storage and effects on the existing signal co-ordination.

Identification of unsignalized intersections where:

- Level of service (LOS), based on average delay per vehicle, on individual movements exceeds LOS "F"; or

- The estimated 95^{th} percentile queue length for an individual movement exceeds the available queue storage.

4.7.2 Safety Analysis (2)(3)

Identification of potential safety or operational issues associated with (but not limited to) the following, as applicable:

- Weaving;
- Merging;
- Corner clearance;
- Sight distance;
- Shortcut traffic;
- Vehicle-pedestrian conflicts;
- Access point conflicts;
- Heavy truck movement conflicts;
- Cyclist/vehicle/pedestrian conflicts.

4.8 Boundary Area Site Access Analysis (1)(2)

For large-area urban development projects that abut existing City roads, the traffic impact studies must identify the geometrics of those interface intersections situated on the boundary. While the typical focus of Type 1 traffic studies is on daily traffic flows, peak period traffic flows must be developed for the study horizons so that the road improvement needs can be identified for these boundary intersections.

The development areas for Type 2 traffic studies are typically smaller; however, these boundary intersection conditions still exist. Type 2 traffic studies develop peak period traffic movements facilitating the intersection traffic analysis. Refer to previous sections as to the procedures that are to be used in this traffic analysis.

4.9 Site Access Analysis Requirements (2)(3)

4.9.1 Access Geometrics

The number and location of access points should be reviewed to ensure only the minimum number necessary are provided to serve the project without negatively impacting the flow of traffic along the abutting streets. The site plan must indicate the throat lengths for each access point. Access points should be located on minor roads where feasible and justification for more than one access must be based on capacity of site traffic and not design preference. Traffic infiltration into an adjacent residential area should also be considered in the locating of site access points.

The locations should be adequately spaced from adjacent street and driveway intersections. The number of exit lanes, radii and vehicle storage should be appropriate to accommodate the estimated traffic demands. The throat length at the road should be sufficiently long to minimize conflicts with street traffic and within the site. Throat lengths must be in conformance with those outlined in the '*Geometric Design Guide for Canadian Roads*, 1999 Edition, published by the Transportation Association of Canada.

Access points should be evaluated in terms of capacity, safety and adequacy of queue storage capacity. Access points should be free of all encumbrances and provide appropriate sight triangles. Proposed loading facilities and access to these facilities should be evaluated to ensure that they are adequately sized, designed and provided with suitable access so that they will not adversely affect traffic operations on City streets. In the design of access points, the turning movements must be based on the design vehicle(s) indicated in the City's design standards.

Access standards should be in conformance with those outlined in the following documents:

- '*Geometric Design Guide For Canadian Roads'*, 1999 edition, published by the Transportation Association of Canada (TAC);

- City of Lethbridge design standards.

4.9.2 Turn Lane Requirements

The requirements for left turn and right turn lanes should be examined. Adequate spacing should be provided between access points to avoid potential turning lane overlaps. All design standards must be in conformance with City of Lethbridge standards and with those outlined in the TAC Manual. The length of turning lanes must accommodate the 95th percentile queue length.

4.10 Traffic Collision Analysis (2)(3)

Where the development is adjacent to an area with identified traffic safety problems, existing collision data (available from the City) must be reviewed and an assessment of the impact of the proposed development provided. Such information may be helpful to minimize any additional problems through the design or location of the site access points.

4.11 Sight Distance Evaluation (2)(3)

At each access point and at each intersection where a new road is proposed, the sight distance requirements should be determined based on appropriate standards (TAC Manual), and the availability of sight distance determined from actual field measurements for existing streets or based on subdivision plans for large scale developments.

4.12 Traffic Calming (2)(3)

As defined by ITE, "traffic calming is the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior and improve conditions for non-motorized street users". Where the proposed development is to be located adjacent to a residential community with existing traffic infiltration problems, the traffic impact study will need to assess the affect of the increased traffic generation on the streets in the nearby community.

Traffic calming measures tend to involve vertical or horizontal deflection, horizontal obstruction and traffic signing to address traffic issues related to the reduction of speed, volume and conflicts and the environment. This issue should also be discussed with City transportation staff at the initial consultation meeting.

4.13 Transportation System Mitigation Measures

This section outlines the process of identification of operational transportation system improvements and other measures required to ensure that acceptable operation of the transportation system is maintained. The improvements must incorporate recommendations and standards outlined in previous urban transportation or corridor studies.

4.13.1 Site Circulation (2)(3)

One aspect of the analysis of the proposed development on the transportation system is to ensure acceptable operation of the development site. Therefore, a site plan is needed to identify the access points and the associated throat lengths, the internal circulation pattern, traffic control requirements, and the tracking of design vehicle movements related to access points, circulation roads/aisles, loading docks and garbage receptacles.

4.13.2 Required Roadway Improvements (1)(2)(3)

The physical and operational road network deficiencies that have been identified in the traffic impact study must be addressed and solutions provided that are feasible and economic to implement.

Functional design plans or detailed design drawings may be required for identified physical improvements to ensure their feasibility.

4.13.3 Required Intersection Improvements (2)(3)

Any intersection operational deficiencies that have been identified in the traffic impact study must be addressed and solutions provided that are feasible to implement.

Alternate intersection designs or traffic control strategies may be proposed to mitigate the requirement for installation of a traffic signal.

Transportation Association of Canada Traffic Signal Warrant worksheets must be completed for intersections proposed for signalization or on the threshold of requiring signalization. Copies of the worksheets (in digital format) must be included in the Traffic Impact Study final report.

4.13.4 Preliminary Cost Estimate (1)(2)(3)

A preliminary cost estimate must be provided for all identified transportation infrastructure improvements. The costing exercise should identify the responsibility for the infrastructure improvements as it relates to the developer, city or other organizations or jurisdictions, in accordance with standard City development policies.

4.14 Recommendations

It is expected that the key recommendations related to general traffic impact studies for new urban development or redevelopment will identify the recommended transportation network to serve the planning cell and any downstream traffic implications and associated road/transportation system improvements that are needed.

The more detailed traffic impact studies will include a series of detailed recommendations enumerating the needed improvements such as geometric changes to nearby intersections, signal timing or other traffic control changes, traffic calming measures to be employed, bus route or stop/shelter changes, and new or revised pathway connections.

It is important to structure recommendations for improvements within appropriate time perspectives. Recommendations should be sensitive to the following issues:

- Timing of short-range and long-range network improvements that are already planned and scheduled;
- Anticipated time schedule of adjacent developments;
- Size and timing of individual phases of the proposed development;
- Logical sequencing of various improvements or segments;
- Right-of-way needs and availability of additional right-of-way within the appropriate time frames;
- Local priorities for transportation improvements and funding;
- Cost-effectiveness of implementing improvements at a given stage of development;
- Necessary lead-time for additional design and construction.

Since improvements can often be implemented in more than one order, the recommendations should address an implementation sequence that would provide maximum compatibility with the overall roadway system configuration needed for the effectiveness of the transportation network.

5.0 DOCUMENTATION AND REPORTING

The structure and format of the Traffic Impact Study should follow the guidelines outlined in this document, as applicable. The following is a suggested document structure:

- Site/Development Description (site plan if applicable);
- Study Area (map identifying the study area and site);
- Existing Traffic Conditions (exhibit required);
- Analysis Periods;
- Background Traffic Demand — existing and future background traffic (exhibits required);
- Site Generated Traffic (exhibits required);
- Total Traffic Demand — future background plus site generated traffic (exhibits required);
- Improvement Alternatives Required to Mitigate Traffic Impacts;
- Traffic Impacts for Future Background and Total Traffic with and without mitigation measures (tabular summaries);
- Access Considerations;
- Alternate modes of transportation – public transit service and pathway requirements;
- Recommendations.

This format will facilitate review, discussion and communication. Relevant maps, graphs and tables should be placed adjacent to the relevant text.

The traffic impact study should consist of a main document, supplemented by technical appendices containing detailed analyses as required. The City requires digital copies of the analysis to be submitted with the Traffic Impact Study final report.

Three (3) copies of the final traffic impact study report (including a pdf file of the report), complete with supporting documentation, should be submitted to City staff for review. All information submitted to City of Lethbridge in connection with any traffic impact study will be considered to be in the public domain.

APPENDIX A

Local Trip Generation Rates

Lethbridge Trip Generation Rates

Land Use Type	Peak Period	Peak Hour Trip Rate	Directional Split (%)	
			Inbound	Outbound
Low Density Residential – single family up to quadraplexes	AM	0.77	26	74
	PM	1.02	64	36
Medium Density Residential – any dwelling unit above quadraplexes	AM	0.75	29	71
	PM	0.92	61	39

APPENDIX B

Traffic Analysis Parameters

CITY OF LETHBRIDGE
Traffic Analysis Parameters

Intersection Analyses Using Synchro Software

The following is a listing of the various assumptions, factors and methodologies to be used when Synchro analyses are submitted to the City of Lethbridge for the review of traffic impact studies:

1. Lane Window

    - Ideal saturation flow – 1,750 vehicles per hour (vph) for all movements.
    - Use the DEFAULT for the remaining categories in the Lane Window.

2. Volume Window

    - Conflicting pedestrians – apply data where available. Future planning horizons should consider potential pedestrian movements.
    - Conflicting bicycles – apply data where available.
    - Peak hour factor (PHF) – use 0.88 or actual data taken from traffic counts (0.88 is recommended by Trafficware for areas with uniform flow and a recognizable peak, i.e. small cities). Note: if the analysis is completed with 15 minute data, a PHF of 1.0 is required.
    - Growth factor – 1.0.
    - Heavy Vehicles – Use actual data if known, otherwise, in non-industrial areas use a value of 5 % on the main street and 2 % on the side street. Use a value of 10 % for all roads in industrial areas.
    - Bus blockages – factor is applicable where data is available.
    - Traffic from mid-block - apply data where available.
    - Link OD volumes – any alterations must be documented in detail.
    - Lane group flow – use the DEFAULT.
    - Vehicle clearances and existing signal timings – contact City of Lethbridge – Traffic Operations. Existing signal timing information is available at a cost of $100.00 per intersection.

3. Timing Window (Signals)

- Main Street Minimum Initial – use 20 seconds or the minimum pedestrian interval (sum of walk and the pedestrian clearance), whichever is greater.
- Sidestreet Minimum Initial – use 10 seconds or the minimum pedestrian interval (sum of walk and pedestrian clearance), whichever is greater.
- Minimum Initial for Arrows – use 5 seconds.
- A recall (pedestrian or minimum) should be applied to the main street unless the intersection operates in a fixed time (pre-timed) mode.
- A recall should not be placed on the minor street or for turning movements.

4. Phasing Window

- Pedestrian Walk Time – use a minimum of 6 seconds.
- Pedestrian Clearance Time – the minimum value is derived by using the actual crossing distance (m) divided by a walking speed of 1.2 m/s. In areas with high senior citizen crossing volumes, the assumed walking speed should be reduced to a value of 1.0 m/s.
- Pedestrian Calls – approximate a value from counts where available.
- Minimum Phase Time for Arrows – use 10 seconds plus a clearance interval. In extreme conditions, use 8 seconds plus a clearance interval for protected/prohibited phases, and 9 seconds plus a clearance interval for protected only phases.
- Dual Entry – assume Yes.
- All other factors to be set at default or calculated values.

5. General Comments

- If an arrow phase is needed for one peak period, it should be included in the signal phasing in the analysis of all peak hours.
- Summary sheets must indicate v/c ratios, LOS values and queue lengths (95%).
- Electronic copies of all Synchro analysis must be submitted with the Traffic Impact Study final report.

APPENDIX C

Available Documentation and Data

CITY OF LETHBRIDGE
List of Available Documentation and Data

The following City-related documents and data may be available upon request from the City of Lethbridge. A nominal cost may apply to acquire some or all of these documents.

Data

Intersection Turning Movement Counts ($50.00/count – 2008)

ADT Counts (Volumes, Speeds, & Classification) ($50.00/count – 2008)

Forecasted Volumes (EMME/2 Model), trip distribution and modal split assumptions - $100/ hour to prepare

Aggregated Collision Data - $100/ hour to prepare

Segment/Intersection geometry, lane configuration and physical parameters - $100/ hour to prepare

Traffic Signal Timing Plans ($100/plan – 2008)

Documents – available at www.lethbridge.ca

2003 Lethbridge Transportation Master Plan,

Urbanization Plans

Area Structure Plans

Outline Plans

City Design Standards

APPENDIX D

Traffic Impact Study Checklist

CITY OF LETHBRIDGE
Check List for Traffic Impact Study

1. Need for Traffic Impact Study

    - ☐ Site trip generation equal to or greater than 100 vph (new trips).
    - ☐ One or more of the special conditions are applicable to the project (See page 3).

2. Preliminary Meeting with City Transportation Planning – it is advisable to communicate with the City transportation staff to outline the project so that staff can make some preliminary checks of available information or data that will be needed for the study.

    - ☐ Meet with City transportation staff prior to beginning the study.
    - ☐ Review site plan for the proposed development, land use statistics, phasing and timing.
    - ☐ Traffic analysis period identified:
        - ☐ Analysis needed for AM, Mid-day and PM peak or Daily flows,
        - ☐ Analysis needed for weekend,
        - ☐ Analysis needed for school crossing or other high pedestrian crossing points,
        - ☐ Analysis needed for special event activities.
    - ☐ Traffic count data availability determined and need for new traffic counts identified.
    - ☐ Future planning periods confirmed – opening day, 10 years, 30 years, other.
    - ☐ Traffic impact study area defined.
    - ☐ Trip generation factors confirmed.
    - ☐ Traffic analysis software confirmed.
    - ☐ Bicycle route mapping secured.
    - ☐ Source of future background traffic flows determined (City model or confirmed growth factors).
    - ☐ Signal timing information identified and/or secured and payment provided - $_____.
    - ☐ Future road improvements identified.
    - ☐ Noise mitigation analysis – noise studies are not an integral part of a traffic impact study. However, it is prudent to discuss the need for a noise study at the initial meeting and to determine if needed.

3. Background Information

- ☐ Proposed land use clearly defined and development units identified, including parking supply if applicable.
- ☐ Phasing of development clearly defined including implementation schedule.
- ☐ Site map for the development included.
- ☐ Study area map indicating existing roadway, bicycle/pathway and transit networks.
- ☐ Proposed transportation system improvements identified.

4. Existing Traffic Conditions

- ☐ Geometric parameters of existing roads defined.
- ☐ Parking opportunities and/or restrictions on the adjacent roadways.
- ☐ Bus routing and stops adjacent the site identified.
- ☐ Bicycle and pedestrian pathways identified.
- ☐ Traffic counts (City and counts completed for the study) are summarized and balanced, and shown on an exhibit for use in the Final Report.

5. Background Traffic

- ☐ Horizon traffic: opening day, 10 and/or 30 years into the future and consistent with development phasing.
- ☐ Future background traffic developed consistent with policy.
- ☐ Future traffic displayed on an exhibit indicating link volumes and turning movements.

6. Site Traffic

- ☐ Site traffic estimates are for time periods consistent with the planning horizons used for the background traffic, i.e. opening day, 10 years, and 30 years.
- ☐ Site trip generation factors are clearly defined for each type of land use, and study traffic period.
    - ☐ City of Lethbridge defined trip generation rates.
    - ☐ Trip generation rates using the latest edition of ITE Trip Generation Manual.
    - ☐ Trip generation rates for special land uses requiring independent traffic studies confirmed by City staff.
    - ☐ Pass-by and diverted link trips are clearly defined.
    - ☐ Internal “synergy” trips identified.

- TDM strategies considered.

- Site traffic distribution pattern clearly identified based on:
  - Population distribution.
  - City's traffic model trip distribution pattern.
  - Market studies.
  - Other methods – must be clearly defined.
  - Site traffic distribution pattern shown on an exhibit indicating the percentage values for the major roads adjacent the site.
- Site and total traffic shown on an exhibit including, when applicable, demonstration of pass-by and diverted-link, and internal synergy trips, if applicable.

7. Mid-Project Meeting with City Transportation Staff – Consultant should consider the potential for two iterations of meetings to secure the sign-off.
   - Trip generation, pass-by, diverted link and synergy trips reviewed.
   - Trip distribution reviewed.
   - Traffic assignment review – typically reviewed at the second Mid-Project Meeting.
8. Traffic Analysis
   - Traffic operations analysis undertaken using Synchro and the companion suite SimTraffic, or an approved alternative software indicated as follows: _____
   - Key analysis factors related to Lane Window, Volume Window, Timing Window, Phasing Window utilized.
   - Roundabout operations analysis undertaken using RODEL, or approved alternative software such as SIDRA.
   - Level-of-service, vehicle delay and v/c ratios for the intersection and individual critical movements identified – provide a summary table only in the Final Report, but digital file copies to provided also.
   - Safety analysis completed as per policy (Section 3.6.2).
   - Turning lane requirements identified and in conformance with TAC guidelines.
9. Transportation System Mitigation Measures
   - Road classifications within the development area identified.
   - Impacts of City transportation system improvements identified including traffic diversion.

- ☐ Access geometrics reviewed including the on-site throat lengths.
- ☐ Site plan indicating the design vehicle, on-site circulation pattern, fire lanes, traffic control devices, garbage receptacles and loading areas with the associated tracking pattern of the design vehicles.
- ☐ Traffic signal warrant using the new TAC procedure completed as required, and worksheets included in final report (electronic copies to be provided of the worksheets).
- ☐ Road improvements clearly defined and cost estimates prepared.
- ☐ Transit service and pathway improvements identified.

10. Recommendations

- ☐ Transportation network required to serve the development area.
- ☐ Transportation system improvements identified.
- ☐ Sequencing of transportation improvements defined.
- ☐ Right-of-way needs identified.

11. Study Documentation

- ☐ Three copies of the final report submitted along with a digital pdf copy.
- ☐ Final Report signed by a professional engineer registered in Alberta.
- ☐ Electronic copies of all operational analyses (Synchro, SIDRA, RODEL, signal warrants) provided with report – paper copies of the analysis results are not to be included in the report appendices.

12. Sign-off Forms – See Appendix E

- ☐ Initial Project Sign-off Sheet
- ☐ Mid-Project Sign-off Sheet
- ☐ Final Project Sign-off Sheet

APPENDIX E

Project Sign-off Sheets

City of Lethbridge
Initial Traffic Impact Study Sign-off Sheet

Project Name:_____ Consultant:_____

Date:_____ Project Engineer:_____

Review Subject		Review Status
1	Site plan, development statistics, phasing and timing:*	
2	Traffic impact study area:	
3	Traffic analysis period(s):	
4	Planning horizons:	
5	Trip generation factors: (review also pass-by, diverted and synergy trip rates):*	
6	Basis for Trip Distribution:	
7	Source for Future Background Traffic:	
8	Assumed Future Road Improvements:	
9	Traffic Analysis Software:	

Data Collection

Type of Data		Review Status
1	Existing Traffic Counts:	
2	Signal Timing:	
3	Bicycle Route Map:	
4	Bus Routes and Stops:	
5		
6		
7	Local Parking Issues:	
8	Local Traffic Issues:	

Comments: G = Good, C = Item is of concern, R = Revision required, OK = Satisfactorily reviewed

Initial Sign-off: Engineer:_____ City: _____

Date: _____ Page _____ of _____

Notes:* Indicates information that the consultant is to prepare in advance and provide to the City prior to the initial meeting

City of Lethbridge
Mid-Project Traffic Impact Study Sign-off Sheet

Project Name:_____ Consultant:_____

Project Engineer: _____

Mid-Project Initial Review Date:_____

Review Subject		Review Status
1	Balanced background traffic flows:*	
2	Traffic generation tabulation:*	
3	Site traffic pattern (Pass-by, diverted link and synergy trips):*	
4	Trip distribution pattern:	
5		
6	Other issues considered:	

Mid-Project Follow-up Review Date:_____

Review Subject		Review Status
1	Traffic assignment:*	
2	Transportation planning adjustments to be considered:	
3	Other traffic issues:	

Comments: G = Good, C = Item is of concern, R = Revision required, OK = Satisfactorily reviewed

Mid-Project Sign-off:

Engineer:_____ City: _____

Date: _____ Page _____ of _____

Notes:* Indicates information that the consultant is to prepare in advance and provide prior to the mid-project meeting

City of Lethbridge
Final Traffic Impact Study Sign-off Sheet

Project Name:_____Submitted By:_____

Date:_____ Project Engineer:_____Signature:_____

Item	Comment Subject	Review Status	Rev. Req.	Sat. Rev.

Comments: G = Good, C = Item is of concern, R = Revision required, OK = Satisfactorily revised

City Review Date: _____ By: _____

Resubmitted Date: _____ By: _____

City Subsequent Review Date: _____ By: _____

Final Sign-off: Engineer:_____City: _____

Date: _____ Page _____ of _____

Supplementary Comments

Item	Comment Subject	Review Status	Rev. Req.	Sat. Rev.

Note to Reviewers: The subject traffic impact study has been undertaken by or under the supervision of a professional engineer. The City Reviewer should undertake the review in the spirit of providing assistance to the consultant and their client, while protecting the safety of Lethbridge citizens. It should be recognized that there will be a degree of variance in the development of traffic forecasts, and this variance will increase when making long range traffic projections.