County of Peterborough

Traffic Impact Assessment Guidelines

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1.0 Introduction

1.1 Background

Traffic Impact Assessments (TIA) are primarily used to identify the impacts of new developments on the County road network. They will provide the recommendations for the necessary mitigation measures to ensure that roads and intersections continue to provide acceptable operation to County road users. TIA studies can assist in identifying the financial responsibility for road network improvements and the staging/timing of these improvements. In appropriate areas of the County, the TIA study can also consider potential support/improvements to non-auto modes of transportation including future pedestrian connectivity, a possible role for public transit, as well as, cycling and active transportation facilities.

1.2 Role of Traffic Impact Assessment (TIA) Report

The County of Peterborough Traffic Impact Assessment (TIA) Guidelines define the Scope of Study and Format of the transportation analyses required to support development applications submitted to the County of Peterborough.

The Objectives of this TIA Guidelines Document are to:

- Provide development proponents and consultants with an approach to preparing traffic impact studies that will meet the County's requirements
- Ensure consistency in the preparation and reporting of traffic impact studies. This consistency will facilitate the County's review of the TIS
- Provide a process that forms a working relationship between the County, the proponent and the Consultant in developing a technical framework for information.
- Provide a consistent development review process that should aid in reducing costs and time delays in preparing the planning documents for the project approval process.

This TIA Guidelines Document defines:

- The Scope of Analyses to provide appropriate support for the development application. The range of this scope will depend on the size, scale and nature of the proposed development.
- The Types of Analyses required to determine the transportation impacts on County transportation infrastructure that will result from the proposed development.
- Definition of Acceptable Levels of Service (LoS) for those elements of the County infrastructure affected by the proposed development consistent with the current County Official Plan (OP) and Transportation Master Plan (TMP).
- The Recommended Format for TIA reports that will facilitate staff review and expedite timing for comments and approvals

1.3 The Role of the County of Peterborough

The County of Peterborough has responsibility for most non-Provincial arterial and major collector roads within the County, outside the City of Peterborough. Detailed information on the current County road network is contained in the County of Peterborough's TMP. The remaining components of the County Road network that include secondary collectors and local roads that are usually under the jurisdiction of the local municipalities that make up the County. It is the responsibility of the proponent and his consultant to contact all approving government agencies whose road(s) may be affected by the proposed development. This can include the Ministry of Transportation Ontario (MTO), the County and the local municipality within whose boundaries the proposed development will be located. The proponent and his consultant will be responsible for determining the individual study requirements to assess the transportation impacts of the developments to the satisfaction of these agencies.

Contacts for the County requirements include:

- Public Works Department - first point of contact for all traffic impact studies and key resource for available traffic data, collision data and traffic control devices as related to the County Road network
- Planning Department - primary point of contact for all County development applications. The Planning Department co-ordinates the County's response. The Planning Department is the key resource for information on population and employment growth, development patterns and OP information.
- Municipalities - for local municipal development applications including zoning by-law amendments and site plan applications, the local municipality is the primary point of contact.

Following a review of a traffic impact study, the comments prepared by staff are forwarded to the appropriate contact.

1.4 Traffic Impact Study Reports

There are three types of Traffic Impact Studies with related reporting that may be submitted to the County of Peterborough:

1.4.1 A Traffic Impact Study (TIS)

The focus of the TIS is to assess the ability of County transportation infrastructure to accommodate the proposed development. Typically this will be a larger scale development that could include a major retail facility, a franchise retail, fast food outlet or a larger residential subdivision. Where there are shortfalls in the existing infrastructure either in terms of capacity or safety, the study will develop appropriate mitigation measures that will be required to support the proposed development. If the development is to be phased, the evaluation process should be carried out for each of the planned phases.

1.4.2 A Traffic Brief (TB)

A Traffic Brief report will contain many of the technical assessment components that are associated with the TIS. However, the scale and focus will be less. The Traffic Brief will be carried out for smaller projects that could include such things as lower volume highway commercial uses, smaller rural subdivisions, individual trades or service shops and other local commercial uses. Usually the Traffic Brief will be focussed on the site entrance intersection(s) with the adjacent County Road. The Traffic Brief will normally assess future site entrance capacity, sight lines, geometric configuration and the need for auxiliary turning lanes on the County Road to serve the site entrance.

1.4.3 A Site Entrance Assessment (SEA)

Where the proposed development generates little traffic, so that site entrance capacity is not an issue, a formal Site Entrance Assessment report will be sufficient documentation. The focus of the site entrance assessment is a site visit to determine if there is sufficient sight distance/visibility at the entrance to meet the County's Entrance By-Law requirements. The site visit will also include reporting on any adjacent entrances or County Road intersections that might influence existing traffic operations in the adjacent road corridor. Depending on the proposed development, an appropriate site entrance design may be selected from the MTO Commercial Site Access Policy and Entrance Designs manual for use at the proposed site entrance.

All TIA reports should acknowledge adjacent existing development and be sensitive to the impacts of the proposed development on these existing uses.

1.5 Structure of the TIA Guidelines Document

This County of Peterborough TIA Guideline document is divided into six sections as follows:

- TIA Guidelines - the main document
- Appendix A – The TIA Check List for the pre-consultation and study processes
- Appendix B - The Traffic Impact Study, analyses methods and required documentation
- Appendix C - The Traffic Brief, analyses methods and documentation requirements
- Appendix D - The Site Entrance Assessment report, required field assessment, analyses as required and necessary documentation.
- Appendix E - Approved references, standards and traffic analyses software.

The main component of the TIA Guidelines Document provides the context and process for each of the three types of Traffic Impact Assessment reports related to the development approval process. The appropriate TIA report format will be selected and confirmed as part of the pre-consultation process. The proponent's study team will prepare a TIA report following the process and format as defined in the appropriate Appendix of this Manual.

2.0 Governing Planning Policies

2.1 Provincial Policy Framework

The Ontario Planning Act regulates and provides authority to the County of Peterborough to impose conditions when considering Planning or Development Applications. Additional authority and directions come from other regulatory documents such as the Ontario Building Code and the Municipal Act.

2.2 County of Peterborough Official Plan

The County Official Plan (OP) contains policies that define and control overall development within the County. Plans for future population and development within the County are guided by Provincial planning objectives as laid out in the Provincial Growth Plan for the Greater Golden Horseshoe. Documentation in the OP also defines the components of the County Road network. The OP provides details on a number of transportation-related planning objectives. The recommendations of the TIS report must be developed in the overall context of the OP transportation goals for the County. Specific reference should be made where required to Section 5.3 - Transportation and Section 7.26 - Transportation Policies. Additional background information is available in Section 2.6 - Development Applications.

2.3 The Transportation Master Plan

The Transportation Master Plan (TMP) provides a development plan for the County's transportation infrastructure. In the case of large scale development, the appropriate sections of the TMP can provide supplemental background information on future traffic volumes, plans for specific road and intersection improvements and guidelines for recommended County road design standards. The TMP is a useful reference in developing and preparing transportation mitigation measures that will be required to support proposed future development. In studies involving large developments, specific references to the TMP can be included in the reporting.

2.4 The Planning Process as it Relates to Transportation Studies

The planning process as it relates to assessing the traffic impacts of new developments can range from broad secondary planning issues to very site-specific issues. The key instruments in the planning process that will relate to traffic impact assessments are:

- Municipal Official Plan Amendments: - as may be required to change land use designations to accommodate a proposed land use, for example green space to residential use.
- Re-Zoning: - as may be required to increase the density or diversity of land uses on a site. Examples could include altering how land may be used, where buildings can be located on a site, the types of buildings permitted or altering parking requirements.

- Plan of Subdivision/Condominium: - as may be required to address the impacts of a subdivision/condominium typically represented by a new residential or commercial/industrial development.
- Site Plan: - as may be required to address the details of a specific development for example, driveway configuration and location, internal site circulation roads, parking requirements and secondary emergency services (EMS) access routes.
- Severance: - as required to assess the division of an existing parcel of land into two or more new lots for the development of additional existing or new uses. The extent of the TIS assessment will depend on the number of new lots created by the Severance and the uses proposed for those lots.

As part of the traffic impact study, the introduction should include a description of where the development is in the planning process and what is being applied for with respect to any changes in the existing planning regulations.

3.0 Other Considerations in the TIA Process

3.1 The Pre-Consultation Process

The County of Peterborough Public Works Department encourages a pre-consultation process between the proponent and County staff. This will generally take the form of a meeting where the staff will receive input on the nature and scale of the proposed development. The proponent will receive input on staff expectation of study process and reporting. The intent of the pre-consultation meeting is to discuss the development proposal and relevant issues pertaining to the development and its location. Through this discussion a scope of study and study parameters will be established. A detailed pre-consultation check list is included in Appendix A to assist the proponent and his Consultant in preparation for this meeting.

The pre-consultation meeting will be arranged through the County or local municipalities Planning Department with input from the County Public Works Department as required. The format for the pre-consultation meeting will depend on the scale of the proposed development and its location in the County. The meeting format can also include an exchange of e-mails, a conference call, and a meeting(s) with municipal staff as well as MTO staff.

It is recognized, that on occasion it might be difficult to arrange a pre-consultation meeting. In these cases the County Public Works Department may accept study findings where no pre-consultation meeting has taken place. However, there may then be a need for study revisions and re-submissions that will extend the review process and potentially, increase study costs. The proponent should give full consideration to these two facts if he chooses to forgo the opportunity for a pre-consultation meeting as any required revisions/re-submissions will be at their expense.

3.2 Traffic Assessment Updates

It is recognized that during the overall planning approval process, delays and re-evaluations can take place. Should the planning process remain dormant or delays extend the time of the completed traffic study beyond three years, the traffic study must be updated as required for any changes to the original development plan and/or changes in background traffic conditions.

Where developments are phased, only reports within this three year “service life” will be accepted as relevant to the current approval process. However, older TIA documents can be used as reference to identify growth trends or travel pattern changes in adjacent transportation infrastructure.

3.3 Qualifications of the Consultant

The proponent's traffic consultant should be prepared to demonstrate the experience and expertise that both the firm and the individual acting as project manager have in the field of transportation and traffic engineering and in the preparation of traffic impact studies. In the event that the consultant lacks the experience, the County may require the applicant to retain a new qualified consultant, or a qualified sub-consultant to assist the original consultant.

The submitted traffic impact assessment report should include a signature page with the signature and stamp of a qualified professional engineer.

3.4 Responsibilities of the County

If the County's review process confirms that all traffic impacts have been properly addressed with appropriate mitigation measures that will allow the proposed development to have an acceptable impact on the County road network, then the County will provide favourable comments for inclusion in the formal review process.

Should the County's review process determine that the study is incomplete or recommended improvements are inadequate, then favourable comments on the traffic report will be withheld until such times as any necessary corrections to the traffic study report are complete.

4.0 Scope of the Traffic Impact Assessment

4.1 Traffic Impact Assessment Report Approach

This section describes the benchmarks that determine the type of TIA report that will be required to support a development application. The County of Peterborough does reserve the right to dictate the scope of work required for assessment of transportation impacts associated with any development regardless of the warrants identified following.

4.2 Traffic Study Warrants

As described in Section 1.4 there are three types of TIA reports that could be prepared for a given Development Application. Selection of the appropriate TIA report depends on various factors. The Pre-Consultation process described in Section 3.1 will assist in identifying the type of TIA report that will be required

4.3 Operational, Safety and Capacity Warrants

4.3.1 Safety/Operational Concerns

The County of Peterborough will require TIS reports for developments if there are safety and/or traffic operational issues present on roads/intersections in the immediate vicinity of the study site. Typical conditions that would generate access-related safety or operational concerns included in the representative list following:

- Operating speeds on the adjacent road exceed the posted speed by 20 kph or more. This situation will typically be found in rural road conditions.
- Horizontal and/or vertical alignment of the adjacent road limit sight lines at the proposed site entrance(s).
- Traffic volumes on the adjacent road(s) are significant enough to cause queuing spill back, storage or delay concerns at adjacent intersections or commercial entrances.
- The frequency of collisions meets or exceeds six (6) in any particular pattern over a three year period on development-affected roadways in the immediate vicinity of the site
- Proposed site access is within an area of influence of an adjacent traffic signal, defined or STOP controlled County intersection consistent with County Entrance By-Law requirements.

Regardless of the size of or location of the development, a TIA report will be required for all proposals that include drive-thru facilities, to demonstrate that sufficient storage is being provided and that no impacts will occur on public streets. A TIA report will be required for all proposals that include roadway modifications to adjacent roads.

4.3.2 Site Trip Generation Warrants

For non-residential developments where Development Applications are forecast to generate fewer than 60 peak hour trips (two-way) per hour using a single entrance, a TIS will not be usually be required. Where the future site is forecast to generate 30 to 59 two-way trips during peak hour periods a TB will usually be required. Where the proposed development is forecast to generate less than 30 peak hour trips (2-way) per hour using a single entrance, only a SEA will be required. Development Applications of less than 30 trips per hour will not usually create capacity issues for the County road network. However, the proposed site entrance must meet County design and sight line standards as described in the County Entrance By-Law for such an entrance. The warrant criteria are summarized in the Table 1 following.

Table 1 - Trip Generation Warrants

Warrant Criteria	TIA Reporting
Greater Than 60 2-way trips	Full Traffic Impact Study
30 – 59 2-way trips, single entrance	Traffic Brief
Less Than 30 2-way trips single entrance	Site Entrance Assessment

The final decision on the TIA report format that will be required by the County will be confirmed as part of the pre-consultation process. The TIS, TB and SEA reports should be prepared according to the documentation requirements as described in:

- Appendix B - Traffic Impact Study Reports, Analyses and Reporting.
- Appendix C - Traffic Briefs, Analyses and Reporting
- Appendix D – Site Impact Assessment Reports

4.4 Considerations in TIA Studies for Development Applications

TIA studies are often required in support of planning for future developments (see Table 1). These TIA studies will normally be submitted to the County and the municipality where the development is located. As an example, a re-zoning will normally allow for a range of uses that the proponent will wish to include for potential development on the study site. The level of development on these sites is usually based on a percentage of lot coverage. This can be as high as 50% of the total lot area. However most developments in the County coverage is often less than 25% of the lot area. The exact percentage of lot area considered for future traffic analyses is normally in the range of 15% to 20% of the lot area. While the percentage will vary depending on the land use, the percentage of lot coverage to be used for site trip generation analyses should be confirmed as part of the pre-consultation process. The selected trip generation forecasts for such a development study should be based on some combination of the three land uses with the highest levels of trip generation.

4.5 Other Study Considerations

Traffic Impact Studies and Traffic Briefs must consider the ability of the site to accommodate traffic entering/exiting the study site as well as on-site traffic circulation and traffic accessing parking areas. Site entrance parameters to be considered include, number of lanes, throat lengths and corner clearance to adjacent streets or entrances. A secondary EMS access routing will usually have to be considered for most multi-unit developments with a single entrance to the study site. Usually secondary EMS access options can be developed as part of the site planning process. Consultation with the County and the municipality on planning these secondary EMS access routes is mandatory.

Other study considerations in carrying out the TIA can include assessment of future potential Community Impacts. Larger scale developments can create traffic infiltration issues in adjacent communities, related parking issues, and increased truck traffic. In the case of resource development projects, an increase in truck traffic, improved road geometrics and related safety issues will often have to be included in the TIA report.

The impact of increased transit usage is generally only associated with urban areas. While transit does not play a major role in County travel, its use is encouraged. The current TMP describes supporting plans to improve this service. Future site access with respect to potential transit service and active transportation facilities particularly in suburban, village/hamlet communities in the County should be considered where appropriate in the TIA reporting.

5.0 The Components of the Traffic Impact Assessment

5.1 Overview

Upon selection of the type of traffic impact assessment to be conducted (i.e. TIS, TB or SEA), the traffic analyses can be undertaken. The traffic analyses will follow the framework laid out in the following sections of the manual. This framework for the analyses will include but will not necessarily be limited to the following components:

5.2 Description of the Development Proposal

The report title page shall include the name of the proposed development, the developer's name, and the consultant's name, as well as the road and municipality where the development is to be located.

The current status of the development proposal within the planning process shall be noted, as well as, the expected dates for construction start, full build-out and completion of any interim phases.

The type and size of the proposed development shall be clearly described, including as much detail as possible on the proposed uses and number and size of the buildings. The location of buildings on the site, the proposed access to the study road network, and internal road and where applicable pedestrian circulation routes shall be illustrated on the site plan. This site plan shall be included for reference as part of the traffic study report.

The selected peak hour periods used in the study analyses should be included in this description. These peak hours will be based on when the development will have the greatest impact on the road network. This can include the weekday AM or PM peak hour of the road network and/or the peak hour of site activity that could involve worker shift changes or special events. For recreational routes within the County, the critical hours can occur during summer weekend periods.

5.3 Definition of the Study Area

The study area will be defined considering:

- The location and type of development
- The existing traffic volumes on the adjacent road network
- The collision history of the adjacent road network
- The geometrics and sight lines of the adjacent road network

Definition of the study area should be part of the pre-consultation process with the County. The boundaries of the immediate study area, the road corridors and the specific intersections to be included in the study analyses should be confirmed during the pre-consultation process. The traffic impact study report shall include a key map to illustrate the study area and the study road network within the municipality where the development is located.

5.4 Background to the Study

As part of the pre-consultation process, anticipated background conditions should be confirmed with County staff. The main parameters comprising background conditions are discussed in more detail in the following sections:

5.4.1 Changes to the County Road Network

Planned transportation network changes are identified in the County's Official Plan (OP) and the current Transportation Master Plan. Timing of such improvements will be based on the County's Capital Budget Plan as the only accepted source of planned infrastructure construction. The Consultant must project and demonstrate the impact of any such planned network changes on study site traffic and travel patterns.

5.4.2 Other Study Area Developments

All committed developments where all planning approvals are in place and all developments that are under construction in the vicinity of the study site must be considered in the TIA analyses. These other projects can impact traffic volumes and the assignment of site traffic. The assumptions regarding these other developments must be referenced in the traffic study reporting.

The Consultant should review and reference available traffic study reports prepared for any of these other developments considered in the study analyses.

5.5 Description of Existing Conditions

The existing physical conditions in the study area shall be clearly documented through a site visit(s) and shall include detailed descriptions of the roadways, intersections, traffic control devices, relevant signage including posted speed, turn restrictions, and parking control. Non-auto facilities including bicycle paths and sidewalks should be included with notes on their potential connectivity to the proposed development. It is recommended that photos be included in the traffic report that aid in the description of these facilities. Photos of the proposed site entrance location are particularly useful.

The most recent available traffic volume data and collision data for the study road corridor(s) may be obtained from County sources. This data should be supported with current peak period traffic count data collected by the Consultant. This count data should include the road corridor volumes adjacent to the study site as well as peak period turning movement volumes at adjacent study intersections. Traffic count data collected by the consultant may require the application of seasonal adjustment factors to bring observed volumes up to levels that are more appropriate for the summer seasonal volumes that can occur on recreational travel corridors in the County. The need and application of seasonal adjustment factors should be confirmed as part of the pre-consultation process.

Existing traffic operations should be observed and documented during peak periods of background traffic volumes. It is expected that these observations would be carried out

during a site visit(s). This will assist in identifying unusual/difficult traffic operations. These observations will also assist in confirming the validity of the study traffic analyses, conclusions and any recommended mitigation measures.

A summary list of traffic data and other related study data that may be required is as follows:

- Existing and historical traffic volumes as available from County and MTO sources
- Pedestrian crossing volumes at suburban/urban envelop intersections
- Collison records/data (3 years of recent history is most preferred)
- Intersection control and signal timing for signalized intersections
- List of committed road improvements in vicinity of study site

The traffic data collection procedures and periods of observation should be described in the report text supplemented with appropriate intersection volume diagrams. For larger scale traffic impact studies, the raw traffic data should be included in the technical appendix of the report.

5.6 Planning Horizon Years

Background traffic is that traffic which travels or will be travelling on the adjacent road network regardless of the proposed development. Background traffic provides the benchmark in assessing the impact of future site traffic. Prior to preparing the background traffic forecasts, the planning horizons for the proposed development must be established. The number and timelines for these planning horizons depends on the scale and nature of the development. The County requires that all transportation impact assessments consider at least one and where required, two planning horizons for the study analyses. An initial planning horizon will be timing of the build-out/full occupancy + 5 years. This will normally be 7 to 8 years beyond the initial planning studies date.

Larger scale developments are often constructed in phases. An analyses should be carried out for the planning horizon associated with each phase beyond the initial phase of development. The number of and timing of the planning horizons will be determined through the pre-consultation process.

5.7 Background Traffic Forecasts

Background traffic forecasts will be prepared for each study planning horizon for each peak hour period. Typical methods for preparing background traffic forecasts can include the following steps:

- Application of growth factors based on historical traffic growth in the study road corridor(s). Where data is insufficient to use some form of regression analyses to prepare the background traffic forecasts for these road corridor(s), then a growth rate of 2% per year (compounded) should be used in the forecasting process.
- Where available Transportation Tomorrow Survey (TTS) data may be considered for use. However, given the low sample rate for the County, these data should be used with caution.
- Traffic from committed/approved adjacent development(s) must be included in future

background traffic volumes.

- On occasion committed reconstruction in adjacent road corridors may impact future traffic volumes in the study road corridor. Appropriate adjustments to future background traffic volumes should be made to account for any such changes in the adjacent roads and intersections. Data on such changes can be taken from approved capital works programs, development charges by-laws, and traffic study reports for any adjacent developments.

The background traffic forecast methodology and its assumptions for each planning horizon should be clearly explained in the study report. Summaries of the forecasting process including any regression analyses should be included in the report's technical appendix. Appropriate exhibits illustrating the road corridor and intersection turning volumes should be included in the study report.

An approved methodology for preparing background traffic forecasts can be developed as part of the pre-consultation process. When the available traffic data and data that has been collected as part of the study process is assembled, the forecasting methodology future traffic should be confirmed with the Public Works Department.

5.8 Site Trip Generation Forecasts

Forecasts of the number of vehicle trips that will be generated by the proposed development must be prepared for each planning horizon for each peak hour period. These forecasts can be prepared by applying one of or some combination of the following methodologies:

- First Principals - estimates of traffic based on anticipated site activity calculated on such independent variables as number of employees, number of customers/users, number of units in the development or gross floor area of the development.
- Trip Generation Surveys - proxy developments for uses not found in the ITE Trip Generation Manual may be found at other locations in the County or adjacent municipalities. Observations at these proxy developments can provide a good base of data for preparing trip generation forecasts. Caution is advised in using data taken from developments in the larger urban areas of the GTA.
- ITE Trip Generation Rates - a wide range of trip generation rates are available in the current ITE Trip Generation Manual. This reference and its guidelines for trip generation analysis is a widely accepted standard in Canada and the United States.

5.9 Adjusting Site Trip Generation Forecasts

The basic trip generation forecasts developed through one of the above methodologies may require adjustment(s) to properly represent future traffic travelling to/from the study site. These potential adjustments may include following.

5.9.1 Pass-by and Linked Trips

Pass-by trips are those trips attracted from the existing traffic stream and as such are not new traffic added to the County road network. Common example land uses with high levels of pass-by traffic include gas stations, convenience stores and fast food restaurants. The current ITE Trip Generation Handbook contain detailed information on calculating and assigning pass-by trips as part of future site traffic.

Linked trips are those trips that have been attracted to another use in the vicinity of the study site and will be also attracted to the study site. These trips are already in the study road network. If site trip generation is being adjusted for pass-by and/or linked trips then the ITE procedures and forecasting rates as described in the current Trip Generation Handbook should be applied to such analyses. If non-ITE rates are assumed in the study analysis then appropriate local traffic data must be included to justify the application of these rates.

5.9.2 Linked Trips within Mixed Use Developments

Mixed use developments that often include a mix of residential, commercial, office and retail uses will likely have some level of trip interaction where trips generated by the site uses remain on-site. The current ITE Trip Generation Handbook contains detailed procedures for calculating internal capture of these trips. Any reduction of forecast trip reduction based on internal capture should follow the procedures laid out in this ITE Handbook.

In the County of Peterborough such mixed use developments are usually at a lower scale than normally found in larger urban areas. These mixed use sites in the County often consist of a gas station/convenience store and a fast food outlet. Field observations at these sites in the County usually have shown that the maximum level of such linked trips is in the order of 10% of total site trip generation. Assumed rates higher than 10% must be justified with appropriate field trip generation survey data collected in the County or in areas with similar socio-economic characteristics.

5.9.3 Redevelopment of the Study Site

Where the study site is being redeveloped from an existing use that is not a dormant brownfield site, it may be acceptable to deduct existing site traffic volumes to determine the level of new site traffic. However, the operational and capacity analysis must consider the total future site (driveway) volumes.

5.9.4 Adjustments for non-Auto Travel

The percentage of non-auto traffic demand within the County is estimated to be about 2% to 4% of total demand. Outside the City of Peterborough most County roads serve a combination of rural and suburban traffic. In the summer there will also be a significant recreational traffic component. Any reduction in site traffic forecasts for non-auto traffic should be reviewed for approval as part of the pre-consultation process. Reduction in vehicular traffic should be supported with data from the current TMP on transit travel in the County.

5.9.5 Travel Demand Management

Travel Demand Management (TDM) is not usually a consideration for future developments in the County. It will generally only apply to larger scale developments particularly large commercial sites often with a considerable office space component. The opportunity for the application of TDM measures will likely be limited within the County. Regardless, if opportunities are available to implement TDM policies as part of a particular development, they should be noted in the traffic study analyses. A detailed description of the TDM plan and its implementation should be included as part of the technical appendix. Any reduction in forecast vehicle trip generation based on planned implementation of TDM measures should be reviewed with County staff before application to the study analyses.

5.10 Site Trip Distribution

Gateways to the study road network for traffic travelling to/from the study site will be defined as the first step in the trip distribution analysis. The distribution of future site traffic to/from these gateways via the study road network through adjacent intersections can be carried out utilizing the following methodologies:

- Existing travelling patterns on the adjacent road network
- General distribution of population and employment that may utilize future site activities
- Origin destination survey data that may be available from the MTO for adjacent provincial highway corridors or from the City of Peterborough
- Data taken from the current TTS survey. Caution should be exercised in using TTS data given the low sample rate taken in the County
- Census data on Journey to Work travel patterns. While this data can be useful for area-wide travel studies it must be used with caution for local TIA studies.

Given the rural nature of much of the County, application of existing travel patterns combined with the distribution of adjacent population and employment usually provides sufficient guidance in forecasting future site trip distribution. The selected rational for site trip distribution forecasts should be confirmed through discussions with the County.

Trip Distribution patterns can vary depending on trip purpose and which peak hour period is being assigned to the study road network. Where multiple trip purposes travel to/from the study site, separate trip distribution patterns may have to be established for each trip purpose for each peak hour period. The rational for these trip distribution assumptions must be included in the study reporting. The use of summary tables and/or exhibits illustrating the site trip distribution assumptions can be used to assist explanation of these assumptions.

5.11 Total Traffic Assignment

Traffic assigned to the study road network shall include site traffic plus future background traffic for each peak hour for each planning horizon. Site traffic shall be assigned to the study road network via the shortest travel time route from the study site to each gateway based on the trip distribution assumptions developed through the study analyses.

For large scale developments that may be located in suburban or urban envelops within the County, there may be alternative routes from the study site to each gateway that will be similar in travel time. Traffic may be assigned to these alternative routes, but the validity of the assignment assumptions must be confirmed. This can be done by checking the level of service of the intersections carrying site traffic. These intersections for total traffic conditions must be operating at about the same level of service/intersection delay as defined in the current Highway Capacity Manual.

Assignment of site traffic can be carried out manually or by utilizing appropriate computer-based software. The method of assigning site traffic must be clearly described in the study report. This description will include the following:

- The rational for the routing choice(s) to each gateway
- Where multiple route assignment is used, a description of assignment process must be included in the reporting. These details can be included in the technical appendix as an aid to providing the necessary documentation to support the assignment assumptions.
- Appropriate exhibits should be included in the study report that illustrate total traffic, site traffic and where required, pass-by traffic and internal capture traffic. There should be an exhibit for each peak hour period for each planning horizon.

5.12 Traffic Analyses

The analyses of existing and future traffic conditions shall be conducted using methodologies that are accepted by the County. This is necessary as part of ensuring that the analyses are consistent with County expectations, that they are consistent with other traffic studies and the resulting study recommendations and mitigation measures will be consistent with current County requirements. A list of these references for standards and guidelines is included in Appendix E - Traffic Study References.

5.12.1 Intersection Capacity Analyses

The capacity of all study intersections including the site entrance intersections must be

evaluated for the following conditions:

- Existing conditions for study peak hour periods
- Future background traffic conditions for all planning horizons for all peak hour periods
- Future total traffic conditions for all planning horizons for all peak hour periods.

The capacity analyses must apply the current Highway Capacity Manual capacity analyses methodologies and standards for the appropriate intersection control. The analyses should be done using Trafficware's, Synchro software. The proponent's consultant should confirm the application of acceptable versions of Synchro with County staff. Summary tables of these analyses should be included in the study reports. Detailed summary printouts of the capacity analyses as provided by the Synchro software should be included in the technical appendix of the traffic report. Electronic copies of the Synchro files may be required depending on the scale of the project analyses.

All unsignalized public road study intersections and the critical movements in those intersections, periods must operate an acceptable LoS as defined in the summary table following during the study planning horizon peak hour:

LOS	Roadside Environment	Speed	V/C
D	Urban / Rural	> 60km/hr	≤ 0.85
E	Urban/Suburban	≤ 60km/hr	≤ 0.85

All signalized public road study intersections and critical movements in those intersections, during the study planning horizon peak hour periods must operate at a Level of Service "E" or better, and must not exceed an average delay of 80 seconds of delay per vehicle (s/veh). The overall intersection must operate with a v/c ratio of less than or equal to 0.85. The individual intersection movements during these planning horizon peak hour periods should have a volume/capacity (v/c) ratios of no more than 0.85. If the v/c is greater than 0.85, additional capacity will have to be provided for that movement and/or the intersection. This will usually require a revised signal timing plan, geometric improvements and/or revised intersection control.

Queue analyses is provided as part of the Synchro analyses. The 95% maximum probable queue should be used as the standard to assess queue storage requirements for all public road intersection auxiliary lane storage as well as the design of future site entrance geometrics. Forecast 95th percentile maximum queues must be accommodated in existing intersection auxiliary lanes where such lanes exist. Where they do not accommodate future queues, these auxiliary lanes must be extended to accommodate the forecast planning horizon year 95th percentile queues.

In the case of site entrance driveways accessing high volume arterial roads, if the critical movement(s) at the site entrance are forecast to operate beyond LoS "E" but are forecast to have a v/c of less than 0.50 and average delays of 65 seconds or less as defined by the HCM analyses, they may be considered acceptable provided that no other operational or safety issues have been identified in the immediate vicinity of the entrance.

When the capacity analyses identifies future intersection operations that do not meet the

above County standards such as a shortfall in the capacity of a Two-Way Stop Control (TWSC) public road intersection, alternative intersection control must be considered. A hierarchy of control options are available that will provide additional intersection capacity. These options include auxiliary lanes, All-Ways-Stop Control (AWSC), roundabouts and the installation of traffic signals.

Any recommendations for the signalization of an intersection must be supported with an appropriate signal warrant analyses. The warrant analyses procedures should be based on current TAC 12 hour warrant criteria. Reference can also be made to the current OTM Book 12 warrant criteria. Warrant procedures are available where 12 hours of intersection data are not available. Application of these other warrant procedures should be reviewed with the County Public Works Department.

When traffic signals are recommended, the key parameters of the signal timing should be included in the technical appendix. These parameters will include the proposed cycle lengths, the need for actuation, actuation parameters, minimum timing and phasing. The Synchro analyses for intersection capacity should be based on the proposed signal timing as described in the technical appendix.

5.12.2 Auxiliary Lane Warrant Analyses

There is also a requirement to assess the need for auxiliary left and right turn lanes. For unsignalized intersections, left turn lane warrants will be determined using the current MTO methodologies and criteria as laid in the current Geometric Design Standards for Ontario Highways (GDSOH). The analyses will be based on a design speed as defined in the County's TMP under roadway classification.

For rural signalized intersections, a left turn lane will normally be required for safety as well as capacity reasons. For suburban/urban envelop signalized intersections, the need for a left turn lane will be based on the requirements of the individual intersection determined from left turning volumes, collision history and physical location of the intersection.

The warrant for a right turn lane, taper or rounding will be evaluated using current Virginia Department of Transportation (VDOT) warrant criteria. A copy of this warrant procedure is included in Appendix E.

5.12.3 Collision Analyses

Collision analyses will be carried out where collision data is available from County, Police Services or municipal sources. The data should be for 3 recent years for adjacent study intersections and/or road corridors adjacent to the study site. The analyses will be done to identify any specific locations and their geometric controls or characteristics that may be a contributing source of any potential collision issue(s). Should this analyses identify such collision issues, then recommendations should be prepared for mitigation measures that address these issues. Where appropriate information is available in the Highway Safety Manual (HSM), the potential effectiveness of the proposed mitigation measures

should be assessed utilizing relevant safety performance functions (spf) where they are available in the HSM.

5.13 Site Entrance Design and Parking Requirements

All site entrances to County roads must have acceptable sight distance. The County requirements are based on the County's Entrance By-Law requirements for commercial entrances. Detailed information on the design of acceptable commercial entrances is contained in the MTO publication Commercial Site Access Policy and Standard Designs. All commercial site entrances should be based on these MTO commercial entrance designs.

The actual design of the new site entrance(s) will depend on the function of the site and the vehicle mix. Standard entrance designs for a range of different land uses are available in the MTO commercial entrance designs. These designs may be used directly for a future commercial entrance.

All new site entrances and internal circulation roads must be designed to meet County and local municipal standards for the land use that is being developed. The internal roads must have a cross-section that will provide for good internal site traffic circulation as well as, access by municipal service vehicles and EMS vehicles. Where the forecast daily traffic is more than 250 trips per day and/or the access road is more than 250 m in length, for a single point access subdivision, then a secondary EMS access must be provided to the subdivision. Assuming a typical residential unit generates 10 trips per day, this would define the maximum level of single family residential units to 25 homes on a single point access subdivision. These standards for a single access subdivision were taken from current ITE references[1] and substantiated with standards extracted from an Internet library search. The nature, form and location of such an EMS access must be acceptable to the County and the municipality.

Site parking requirements are normally defined by municipal zoning by-laws. Where no such parking requirements are available, the current ITE publication Parking Generation can be used as a reference document.

The proponent must demonstrate that there will be sufficient parking for the land use being developed on-site to assure that there will be no spillage onto adjacent land uses, County roads or municipal roads.

5.14 The Impact of Non-Auto Modes

If a development, particularly one including residential units is planned for a community within an urban envelop, then pedestrian connectivity must be considered in assessing access to the new development. This assessment should review pedestrian routings to shopping, schools and other community facilities to assure appropriate connectivity to sidewalks and active transportation facilities.

[1] Transportation and Land Development, Chapter 13, Table 13-6, ITE pub.

Where the pedestrian route crosses an arterial or major collector road, the need for pedestrian crossing facilities should be considered in the study analyses. The current TAC manual, Pedestrian Crossing Control Guide can be used to assist in this analysis. Where the pedestrian routing utilizes a signalized intersection, appropriate pedestrian signals should be provided as part of the signal infrastructure.

The County's TMP defines the potential for transit usage in the County at 2% to 4% of travel demand. Given the rural nature of much of the County, transit service and this estimate of future mode split will not normally impact traffic impact analyses within the County. Some limited private sector transit service does exist and if a particular development may be in a position to take advantage of such a service then it may be considered in the analyses.

There are a number of recreational trails for non-auto modes located in selected corridors through the County. If a potential development should have use(s) oriented to recreational travel, access to the trails and the role of these trails should be considered in the traffic analyses.

5.15 Community Impact Analyses

Larger scale commercial, residential developments or new resource-based developments can have a broader based community impact. Commercial and retail developments can encourage traffic infiltration onto existing roads during commuter peak hour periods. While this not a common problem with sites developed in the rural areas of the County, there is potential for it to occur within existing villages and suburban areas adjacent to the City of Peterborough. When this infiltration occurs in residential neighbourhoods, it can have a negative effect on these areas. Where the potential for such infiltration exists, future volumes on these streets should be assessed against current TAC standards for the capacity of neighbourhood streets and local roads. If future volumes are forecast to exceed neighbourhood street capacity, appropriate mitigation measures must be developed to maintain acceptable levels of traffic on such neighbourhood streets.

Larger developments that include public institutional facilities, schools, office buildings, medical buildings and recreational facilities can generate steady volumes of traffic throughout the day. These uses can generate significant amounts of parking demand with the potential for parking spill-over onto adjacent streets. Within the urban/suburban envelops in the County, traffic studies for such facilities should include a parking capacity component to assure that parking required by the site zoning will be sufficient. In some cases there may be opportunities for shared parking with other adjacent uses/sites. Use of shared parking may be considered but such assumptions in planning for the new site development will be assessed on a site-by-site basis.

Opportunities for a range of resource development projects can occur particularly in the northern part of the County. These resource developments often involve mineral and aggregate extraction with associated volumes of new truck traffic. While these truck volumes can often be accommodated within the capacity of the adjacent road network, they can represent a significant percentage increase in daily traffic on local roads. In addition, these local roads can have substandard geometrics that combined with new truck traffic, increase the potential for future collision risk. The traffic study for such developments should include a review the geometrics of the road corridor(s) that will access the resource development. This review should focus on any improvements that will be required to provide safe travel in the corridor(s) for site-generated truck traffic as well as existing and future background traffic. Appropriate design standards for these low volume rural roads carrying truck traffic are available from TAC and the American Association of State Highway and Transportation Officials (AASHTO). Details on these references are included in Appendix E. Other community impact issues such as noise, dust control and physical impacts on the road pavement structure should be addressed with their own technical studies.

6.0 Study Reporting

The specific structure of the study report will depend on which of the three types of TIA reporting will be required for the particular traffic impact analyses. The three study report formats are as follows:

- Traffic Impact Study report for all larger scale developments or where there are existing operational or safety issues
- Traffic Brief for modest scale projects with single access entrances
- Site Entrance Assessment for small developments that will generate few trips.

Section 1.4 of this Manual describes in more detail the nature of the three types of reports. The selected report format will be confirmed as part of the pre-consultation process.

Requirements for the study reporting are as follows:

- Five hard copies of the report including the technical appendix delivered to the County and additional hard copies to the municipality as may be required
- One electronic copy of the report including the technical appendix in pdf file format to be submitted to the County.
- A signature page as part of a covering letter to identify the person(s) responsible for preparing the report. As the report is to be signed by a P.Eng., the signature must be accompanied with the appropriate professional stamp.
- The report should include a Table of Contents identifying the main sections of the report, the exhibits and the tables.
- Key maps and exhibits can be placed within the report or in a section for exhibits immediately following the report text.
- An electronic copy of the Synchro intersection capacity analyses files should be made available upon a request from the County.
- The technical appendix will include background data such as raw traffic and collision data, details of the trip generation computations as required, intersection capacity analyses printouts and any auxiliary lane warrant analyses nomographs and calculations. On occasion, recommended site entrance standards may be provided as a guide for design of the site entrance(s).

The traffic impact study will have a “service-life” of three years. If other components of the development application are delayed or dormant for more than three years, the traffic study may have to be updated. Traffic planning horizons will have to be adjusted as required and “existing” traffic data may have to be revised to properly reflect current volumes.

The County may, at its discretion, engage the services of a qualified traffic professional to peer review a traffic impact study at the applicant’s expense. The proponent and his consultant will be notified if such a peer review is to be undertaken.

Appendix A – The Traffic Impact Assessment Check List

Section A-1 The Pre-Consultation Check List

It is expected that the proponent and his consultant will have reviewed the plans for the proposed development and the adjacent road network in sufficient detail so as to bring forward a specific check list of study items to be discussed at the pre-consultation meeting. The size of this check list will be determined by the scale and nature of the proposed development as well as level of traffic on the adjacent road network. The following list is provided as a comprehensive guide. However, it will be the proponent's responsibility to assure that all the appropriate items are brought forward at the pre-consultation meeting.

The suggested pre-consultation list includes consideration of the following items:

- Extent of the study area including adjacent roads and intersections.
- Road jurisdictions and responsibilities of all road agencies that may be impacted by the proposed development.
- Selection of appropriate study planning horizons. This will be driven by the number of phases in the proposed development.
- Selection of the appropriate peak hour periods relevant to the proposed development. As well as the usual AM and PM weekday peak hours, the analyses could include Saturday peak hours, particular summer peak hour periods or peak periods during work shift changes.
- Selection of suitable rates for the growth of background traffic.
- Definition of any related new development or road infrastructure improvements that should be considered in the study analyses.
- Selection of appropriate trip generation forecasting rates for the proposed development.
- Identification of appropriate warrant procedures for signals, All-Ways-Stop Control (AWSC), left turn lanes and right turn lanes.
- Confirmation of acceptable software for intersection capacity analyses.
- Confirmation of the appropriate methodology for computing storage lane and corner clearance requirements.
- Potential application of appropriate access management policies to the proposed site development.

Section A-2 The Traffic Study / Parameter Check List

A-2.1 Defining the study area

A-2.2 Data Requirements

- Establish peak periods for study
- Available County traffic data
- Available County signal timing information where required
- Available County collision data
- Necessary traffic data collection required
- Traffic operations and speed study data as required
- Field site visits to observe existing traffic operations, adjacent land uses and current road geometrics

A-2.3 Preparation of Background Traffic Forecasts

- Select planning horizon years
- Define future road network/intersections to include in the analyses
- Methodology and parameters for forecasting future background traffic volumes

A-2.4 Site Trip Generation Forecasts

- Select trip generation forecast methodology from proxy site data, first principals, ITE Trip Generation Manual or some combination of the three approaches
- Adjustments for pass-by/linked trips and/or internal site capture
- Prepare forecasts for each phase of any phased development

A-2.5 Site Trip Distribution

- Define study area “gateways” based on the study road network
- Select methodology for defining the percentage distribution to each “gateway”
- Potential application of TTS data for travel patterns. In the more rural areas of the County, TTS data should be used with caution given the limited size of the TTS sample
- Market study data should be used with caution since it is usually collected for a different purpose

A-2.6 Total Traffic Forecasts

- Select an appropriate methodology for site traffic assignment to the study road network. This will usually be a minimum path assignment from the study site to the closest road network “gateway”.
- Total traffic will be background traffic combined with assigned traffic

A-2.7 Traffic Analyses

- Capacity analyses for site entrance intersections and intersections in the study road network will be carried out using the current versions of Trafficware's Synchro software for the current version of the Highway Capacity Manual (HCM)
- Signal Warrant analyses will be based on OTM Book 12 and/or TAC warrant criteria
- Left turn lane warrant analyses will be done using MTO procedures taken from the GDSOH
- Right turn lane warrant analyses will be done using Virginia DOT warrants
- Storage lane requirements will be based on MTO criteria and/or the 95th percentile queue length as taken from the Synchro analyses

A-2.8 Site Entrance Requirements

- Acceptable sight triangle criteria as per the County's Entrance By-Law minimum visibility requirements should be met at each site entrance These criteria will be based on MTO requirements for the selected design speed
- The number of site entrances and the spacing of those entrances will be based on the current County Entrance By-Law requirements
- The proposed site entrance(s) must be based on a design taken from the current MTO Commercial Site Entrance Policy and Standard Designs manual or a design acceptable to the County for the planned site uses

A-2.9 Study Reporting

- Depending on which of the three types of TIA reports is being prepared the appropriate report format will be selected from Appendices B through D
- Five hard copies of the report will be submitted to the County along with an electronic copy in pdf file format
- An appropriate number of copies will be submitted to the other approving agencies as required by those agencies
- An electronic copy of the Synchro analyses files will be submitted on an "as required" basis

Appendix B – Traffic Impact Study Submissions

The Traffic Impact Study (TIS) report will be prepared for larger scale projects. The TIS report will provide a full description of the proposed development, its forecast impacts on the adjacent road network, the mitigations required to support the new site traffic and the geometric details of the new site entrance(s) and any auxiliary lanes required to support these entrances. The depth of the study process to support the TIS reporting will be determined through the pre-consultation process. Additional background information on *the study process can be taken from Appendix A – The Traffic Impact Assessment Checklist.*

The TIS report will contain the following sections:

1. A summary of the background to the study and its principal findings and recommendations
   - This will include where the study fits in terms of the planning process that will accompany the development.
   - A brief description of the location of the study site and the proposed development. This should include a key map showing the general location of the study site within the municipality/County.
   - A summary of the potential site traffic impacts and the recommended mitigation measures to assure future acceptable traffic operations on adjacent County roads.

2. Existing Conditions
   - A description of the study site, its location and present uses. This should include a local area map illustrating the study site and the adjacent road network.
   - A description of adjacent land uses.
   - A description of the adjacent road corridors, intersections and their jurisdictional agencies.
   - A summary of the site visit(s) and observations of existing traffic operations.
   - A summary of available traffic and collision data assembled from the County and the municipality where available.
   - A summary/description of traffic data timing etc., collected for the study.
   - A summary of the capacity analyses results for existing peak hour conditions for the study intersections. Summary printouts of the analyses should be included in the technical appendix.
   - A description of any geometric/operational shortfalls identified from the field observations and/or the capacity analyses.

3. Proposed Site Development
   - Brief summary of the site location and present uses. If those uses are presently generating peak hour traffic. These volumes should be referenced and accounted for in the forecasts of future site trip generation.
   - A description of proposed development including building footprints, site access points, internal circulation roads and parking areas.
   - An exhibit illustrating the proposed development, building footprints etc.
   - Description of the selected site trip generation forecasting process.
   - A summary table of site trip forecast for each use, for each peak hour period.
   - Where there are site trip generation modifications based on pass-by or linked trips these should be accounted for in the summary table with “new” site trips identified along with the “pass-by” trips.

4. Site Trip Distribution Forecasts
   - A brief description of each “gateway” in the study road network.
   - A summary of the selected trip distribution methodology.
   - A summary table of site trip distribution to each “gateway”. Where required, there may be a separate distribution for each site use and each peak hour period. These should be broken out in the summary table.
   - There is some TTS data available for use in developing site traffic distribution. However, the sample size is small for the County. This data should be used with caution when applied to specific traffic impact studies.

5. Future Conditions

5.1 Future Traffic Volumes
   - Provide a description of the methodology and assumed annual growth rate used to forecast future background traffic.
   - Description of the methodology to compute future total traffic conditions.
   - Include an exhibit of future total traffic with the site traffic component for each turning movement at each of the study intersections.
   - Provide an intersection capacity analyses summary table that includes:
     - Existing background traffic
     - Future background traffic
     - Total future traffic
     - This single summary table allows for a direct comparison of changes in intersection operations
   - The summary table should include for each intersection movement:
     - Identify the critical intersection movement
     - The LoS and delay in seconds for the critical movement(s)
     - The 95^{th} percentile queue length
     - The volume/capacity ratio for the movement
     - For signalized and AWSC intersections the overall intersection LoS, delay and v/c should also be included.

- A copy of the Synchro capacity analyses printouts should be included in the technical appendix.

5.2 Auxiliary Lane Warrant Analyses

- A left turn lane warrant analyses should be carried out for all unsignalized intersections that carry site traffic as well as the study site entrances. The warrant analyses should use current MTO methods and criteria. A copy of the warrant nomographs used I n the analyses should be included in the technical appendix.
- A right turn lane warrant analyses should be carried out for all site entrances. The warrant analyses should utilize the current VDOT warrant criteria. A copy of the appropriate nomographs for two and four lane roadways are included in Appendix E. Copies of the warrant nomographs used in the study analyses should be included in the technical appendix.

5.3 Site Access Requirements

- Define the number of inbound and outbound lanes for each site entrance based on the Synchro access requirements.
- Define an appropriate site entrance “throat length” to first internal site entrance as required.
- Confirm that there is an acceptable “corner clearance” distance to any adjacent site entrances or municipal streets.
- Confirm that the proposed site entrance meets current County Entrance By-Law requirements. This assessment should also assure that there is an appropriate sight triangle and sufficient turning sight distance (TSD) based on current MTO standards for the design speed of the adjacent road.
- Provide recommendations for an appropriate site entrance design where required. The MTO Commercial Site Access Policy and Standard Designs manual can provide appropriate guidance.
- Confirm type of site entrance control for each site entrance intersection with adjacent County and municipal roads. For higher volume land uses accessing a high volume County road, this may mean signalization. Appropriate signal warrant analysis calculations must be included in the technical appendix to justify a recommendation for any such signal.

6.0 Conclusions and Recommendations

The final section of the report will contain the conclusions and recommendations. It will include but not be limited to the following:

- Summary of key findings on the impacts of the proposed development on the County Road corridor and any adjacent municipal road corridors included in the study analyses.
- Summary of the recommended improvements. This should include but not be limited to type of access, key entrance design features, County road improvements including upgraded intersection controls, the need for auxiliary left and/or right turn lanes, tapers and visibility triangles at the site entrance(s). Any new or upgraded signage recommendations should be taken from current OTM publications.
- If one TIS report is being prepared for the County and the municipality in which the development is to be located, the report should clearly differentiate between improvements to the County road(s) and improvements to the municipal road(s).

All diagrams, drawings and exhibits contained in the TIS must be of sufficient scale to be legible. All drawings, tables and exhibits/figures included in the TIS report must be labelled and listed in an index located at the front of the report, following the Table of Contents. Use of footnotes in the report is recommended to assist in cross-referencing external material discussed in the report.

Appendix C – Traffic Brief Submissions

The Traffic Brief (TB) will have a similar overall structure as the TIS reporting but will be prepared for smaller scale projects. These projects will usually have one or two land uses and a single entrance to the County road. Less descriptive detail will be required. The main focus of the Traffic Brief will be the definition of an appropriate site entrance, confirmation of sight line requirements and assessing the need for auxiliary turning lanes at the site entrance to the County road. The depth of the study process to support the Traffic Brief will be determined through the pre-consultation process. Additional background information on the study process can be taken from Appendix A – The Traffic Impact Assessment Checklist.

The TB report will contain the following sections:

1. A summary of the background to the study and its principal findings
    - This will include where the study fits in terms of the planning process that will accompany the development
    - A brief description of the location of the study site and the proposed development. This should include a key map showing the location of the study site within the municipality/County.
    - A point form summary of the principal findings and the recommended mitigation measures.

2. Existing Conditions
    - A description of the study site location.
    - A brief description of adjacent land uses
    - A brief description of the adjacent road corridors, intersections and their jurisdictional agencies
    - A summary of the site visit(s) and observations of existing traffic operations
    - A summary of available traffic and collision data assembled from the approving agencies
    - A summary/description of traffic data timing etc., collected for the study
    - A summary of the capacity analyses results for existing peak hour conditions for the study intersections. Summary printouts of the analyses should be included in the technical appendix.
    - A description of any geometric/operational shortfalls identified from the field observations and/or the capacity analyses.

3. Proposed Site Development
    - A summary of the site location and present uses. If these uses generate traffic volumes, the peak hour observed volumes should be noted.
    - A description of proposed development including building footprints, site access points, internal circulation roads and parking areas.
    - An exhibit illustrating the proposed development, building footprints etc.
    - Description of the selected site trip generation forecasting process

- A summary table of site trip forecast for each use, for each peak hour period.
- A description of any site trip generation modifications based on pass-by or linked trips. These should be accounted for in the summary table with “new” site trips identified along with the “pass-by” trips.

4. Site Trip Distribution Forecasts
   - A brief description of each “gateway” in the study road network
   - A summary of the selected trip distribution methodology
   - A summary table of site trip distribution to each “gateway”. Where required, there may be a separate distribution listing in the table for each site use and each peak hour period.

5. Future Conditions

5.1 Future Traffic Volumes
   - Provide a description of the methodology and assumed annual growth rate used to forecast future background traffic
   - Describe the methodology to compute future total traffic conditions.
   - Provide an exhibit of future total traffic with the site traffic component for each turning movement at each of the study intersections.
   - Include an intersection capacity analyses summary table that includes:
     - Existing background traffic
     - Future background traffic
     - Total future traffic
   - The summary table should include for each intersection:
     - The critical intersection movement
     - The LoS and delay in seconds for this movement
     - The 95th percentile queue length
     - The volume/capacity ratio for the movement
     - For signalized and AWSC intersections the overall intersection LoS, delay and v/c should be included.
     - A copy of the *Synchro* capacity analyses printouts should be included in the technical appendix.

5.2 Auxiliary Lane Warrant Analyses
   - A left turn lane warrant analyses should be carried out for all unsignalized intersections that carry site traffic and for the study site entrance(s). The warrant analyses should use current MTO methods and criteria. A copy of the warrant nomographs should be included in the technical appendix.

- A right turn lane warrant analyses should be carried out for site entrance(s). The warrant analyses should utilize the current VDOT warrant criteria. A copy of the appropriate nomographs for two and four lane roadways are included in Appendix E. Copies of the warrant nomographs used in the study analyses should be included in the technical appendix.

5.3 Site Access Requirements

- Define the number of inbound and outbound lanes for each site entrance based on the Synchro access requirements
- Define the appropriate site entrance "throat length" to first internal site entrance as required
- Confirm that there is an acceptable "corner clearance" distance to any adjacent site entrances or municipal streets
- Confirm that the new site entrance meets current County Entrance By-Law requirements. There should be an appropriate sight triangle and sufficient turning sight distance (TSD) at each site entrance based on current MTO standards for the design speed of the adjacent County road
- Provide recommendations for an appropriate site entrance design where required. The MTO Commercial Site Access Policy and Standard Designs manual can be used to provide guidance in developing the design.
- Confirm the type of site entrance control for the site entrance intersection with the adjacent County Road. This is usually STOP-control with the site entrance as the minor approach to the County Road.

6.0 Conclusions and Recommendations

The final section of the report will contain the conclusions and recommendations. It will include but not be limited to the following:

- Summary of key findings on the impacts of the proposed development on the County Road corridor and any adjacent County/municipal road corridors included in the study analyses.
- Summary of the recommended improvements. The summary should include but is not limited to type of access, key entrance design features, County road improvements including upgraded intersection controls, the need for auxiliary left and/or right turn lanes or tapers and visibility triangles at the site entrance(s). Any new or upgraded signage designs should be taken from current OTM publications.
- If the TB report is being prepared for the County and the municipality in which the development is to be located, the report should clearly differentiate between improvements to the County road(s) and improvements to the municipal road(s).

All diagrams, drawings and exhibits contained in the TB must be of sufficient scale to be legible. All drawings, tables and exhibits/figures included in the TB report must be labelled and listed in an index located at the front of the report, following the Table of Contents. Use of footnotes in the report is recommended to assist in cross-referencing external material discussed in the report.

Appendix D – Site Entrance Assessment Submissions

The Site Entrance Assessment (SEA) will be used where the volumes of future site traffic can be accommodated by the existing road infrastructure and road/intersection capacity is not an issue. The focus of the reporting will be to assure that the future site entrance to be located on the County road will meet the requirements of the County Entrance By-Law where appropriate. Additional background information on the study process can be taken from Appendix A – The TIA Checklist.

The SEA report will contain the following sections:

1. A summary of the background to the study.
    - This will include where the study fits in terms of the planning process that will accompany the development
    - A brief description of the location of the study site and the proposed development. This should include a key map showing the location of the study site within the municipality/County.

2. Existing Conditions
    - A description of the study site, its location and present uses. This should include a local area map illustrating the study site and the study road network.
    - A brief description of adjacent land uses
    - A brief description of the adjacent road corridor, where applicable the closest public road intersection and the jurisdictional road agencies impacted by the development.
    - A summary of the site visit(s) and observations of existing traffic operations
    - A summary of available traffic and collision data assembled from the approving agencies
    - A description of any geometric/operational shortfalls identified from the field observations and/or the capacity analyses.

3. Proposed Site Development
    - Brief summary of the site location, present uses and site traffic traffic that is being presently generated at the study site.
    - A description of proposed development including building footprints, site access points, internal circulation roads and parking areas.
    - An exhibit illustrating the proposed development, building footprints etc.
    - Description of the selected site trip generation forecasting process
    - A summary table of site trip forecast for each use, for each peak hour period.

4. Site Trip Distribution Forecasts
    - A brief description of each “gateway” in the study road network
    - A summary of the selected trip distribution methodology

5. Future Conditions

5.1 Future Traffic Volumes

- Provide a description of the methodology and assumed annual growth rate used to forecast future background traffic
- Description of the methodology to compute future total traffic conditions.
- Provide an exhibit of future total traffic with the site traffic component for each turning movement at each of the study intersections.

5.2 Site Access Requirements

- Define the number of inbound and outbound lanes for the site entrance. Define appropriate site entrance “throat length” to first internal site entrance as required
- Confirm that there is acceptable “corner clearance” to any adjacent site entrances or municipal streets
- Confirm that the proposed site entrance will meet County Entrance By-Law requirements and provide entrance geometrics appropriate for the design speed of the adjacent road
- Provide recommendations for an appropriate site entrance design where required. The MTO Commercial Site Access Policy and Standard Designs manual can provide appropriate guidance in developing the entrance design.
- Confirm type of site entrance control for its intersection with the adjacent County Road. This will usually be STOP-control posted on the site entrance as the minor approach to the County road.

6.0 Conclusions and Recommendations

The final section of the report will contain the conclusions and recommendations. It will include but not be limited to the following:

- Summary of site entrance(s) requirements. This should include but is not limited to type of access and key entrance design features
- The need for an auxiliary left turn lane and/or right taper or turn “rounding”
- Confirmation that the entrance meets County Entrance By-Law requirements and that visibility triangles at the site entrance(s) are appropriate for the design speed of the County road.
- Any new or upgraded signage required for the new/upgraded entrance will be taken from current OTM publications.

All diagrams, drawings and exhibits contained in the SEA report must be of sufficient scale to be legible. All drawings, tables and exhibits/figures included in the SEA report must be labelled and listed in an index located at the front of the report, following the Table of Contents. Use of footnotes in the report is recommended to assist in cross-referencing external material discussed in the report.

Appendix E – References

New material is being developed on an ongoing basis to provide additional background information in the preparation of a wide range of traffic studies. This is particularly the case in the area of Highway Safety and its related analyses. When a traffic issue that may have a particularly unique set of characteristics arises, it is suggested that a comprehensive internet search be carried out to assure that the latest reference material has been reviewed in assessing these issues.

The following references will provide additional background in the preparation of traffic impact studies for the County. While the list is not intended to be all-inclusive, it should be of assistance in the preparation of the traffic impact studies.

E-1 Traffic Impact Assessment Process

- Transportation Impact Analyses for Site Development, An ITE Proposed Recommended Practice
- Transportation Planning Handbook, ITE pub.
- Manual of Transportation Engineering Studies, ITE pub.
- General Guidelines for the Preparation of Traffic Impact Studies, MTO pub., current edition

E-2 Site Trip Generation and Parking Forecasts

- Trip Generation Manual, ITE pub.
- Trip Generation Handbook, An ITE Recommended Practice
- Enhancing Internal Trip Capture Estimation for Mixed-Use Developments, NCHRP (USA) Report 684.
- Parking Generation, an Informational report, ITE pub.

E-3 Intersection Capacity Analyses and Software

- Highway Capacity Manual, Transportation Research Board (TRB) (USA), pub.
- Ontario Traffic Manual (OTM) Book 12
- Canadian Capacity Guide for Signalized Intersections, ITE pub.
- Traffic Signal and Pedestrian Signal Head Warrant Handbook, TAC pub.
- Trafficware – Synchro and Simtraffic software for intersection capacity and operational analyses
- Traffic Signal Timing Manual, ITE pub.

E-4 Geometric Design References

- Geometric Design Standards for Ontario Highways, MTO pub.
- Commercial Site Access Policy and Standard Entrance Designs, MTO pub.
- Geometric Design Standards for Canadian Roads, TAC pub.
- Urban Supplement to the Geometric Design Standards for Canadian Roads, TAC pub.
- Geometric Design Standards for Low Volume Roads, AASHTO pub.

- York Region Safety and Traffic Circulation at School Sites Guidelines Study, Region of York pub. Virginia Department of Transportation (VDOT) Right Turn Lane Warrants
- VDOT Road Design Manual, Appendix G, Access Management Design Standards for Entrances and intersections for Minor Arterials, Collectors and Local Streets. The Virginia DOT has developed two nomographs to assess the need for a right turn lane at an unsignalized intersection; the first for a two lane road and the second for a four lane road. The nomographs were developed from an extensive research program and are contained in their current. A copy of each of the two nomographs is included following:

E-5 Traffic Operations Analyses

- Traffic Engineering Handbook, ITE pub.
- Manual of Uniform Traffic Control Devices

E-6 Road Safety Analyses

- Highway Safety Manual, AASHTO pub.