

Memo



To: Don Kudo, County of Wellington
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cc: Dennis Kar, Dillon Consulting Limited
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Subject: Guidelines for Traffic Impact Studies
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1.0 Introduction

1.1 Purpose of a Traffic Impact Study

A Traffic Impact Study (TIS) is a vital part of the development review and approval process. It is required to identify the impacts that a new development will have on the surrounding transportation network. The TIS considers how these transportation impacts can be mitigated and addressed. It identifies mitigation measures required to alleviate any potential concerns such as congestion and safety. These measures can include infrastructure improvements, upgrade of traffic control devices, and implementation of active transportation facilities. Additionally, a TIS can assist in identifying financial responsibility and timing for the transportation system improvements.

A key consideration of a TIS is to ensure connectivity between the proposed development and the existing transportation network. Any suggested improvements should accommodate all modes of travel (cars, trucks, transit, cyclists and pedestrians).

These guidelines have been developed for the County of Wellington to meet the following objectives:

- To provide land owners, development companies, and consultants with a standard approach to preparing a traffic impact study that meets the requirements of the County;
- To ensure consistency in the studies that are prepared for the County. This facilitates faster review times and reduces potential costs and delays to proponents;
- To afford decision makers the basis to assess the implications of the development on the transportation system; and
- To provide a basis for assessing existing and future transportation system deficiencies which will require mitigation.

Traffic impact studies vary in scope based on the type and scale of the proposed development. The level of analysis, assessment and reporting will depend on site-specific matters and should take into account previous traffic studies. Updates to previous traffic impact studies may be acceptable depending on the changes to previous development proposals, current traffic data, and other factors affecting the County road network.

1.2

Need for a TIS

A traffic impact study is required for all developments that will have an impact on the transportation network, including roads, transit, cycling and pedestrian facilities. In general, a traffic impact study is required if one of the following cases apply:

- Peak hour auto trips generated by the development exceeds 100 trips;
- Safety and/or capacity issues currently exist;
- Safety and/or capacity issues are expected to occur as a result of the proposed development; and
- Characteristics of the development warrant a detailed transportation analysis.

The County of Wellington reserves the right to require a traffic impact study notwithstanding the criteria as listed above if a County road will be impacted.

The County of Wellington also reserves the right to scale back the requirement of a traffic impact study (i.e., a short traffic impact brief or statement may be acceptable) notwithstanding the criteria as listed above.

2.0

General TIS Requirements

2.1

Qualifications

As part of the pre-consultation process it is the proponent's responsibility to retain a qualified transportation consultant who is experienced in transportation planning and traffic engineering. This experience must be demonstrated through past projects similar in scope and scale. The transportation consultant must be registered as a Professional Engineer licensed and in good standing in the province of Ontario. The consultant will be required to date, sign, and stamp the final report prior to submission. In doing so, the signing engineer is verifying that appropriate methodologies and assumptions have been used in the completion of the traffic impact study.

2.2

References

The following references should be used in the completion of a traffic impact study:

- County of Wellington standards and plans:
 - County's Official Plan;
 - Active Transportation Plan;
 - Road Master Action Plan;
- Ontario Traffic Manual (OTM) Books;
- ITE Trip Generation Manual and Handbook;
- MTO "Geometric Design Standards for Ontario Highways";

- TAC “Geometric Design Guide for Canadian Roads”;
- Roadside Safety Manual; and
- Highway Capacity Manual.

The most recent edition of each of the manuals as noted above should be used in the analysis.

3.0 Traffic Impact Study Contents

The following section presents the typical format and content required for a traffic impact study.

3.1 Description of Development Proposal / Plan

The traffic impact study should begin with a description of the development proposal. This should include the land use type (i.e. residential, industrial, commercial, lodging, etc.) as well as the number and size of the buildings on the site. The current status of the development proposal within the overall planning process should also be identified.

A site plan should be included which illustrates location of buildings, access to the existing road network, and internal traffic circulation (where applicable). The timeline for the development should be clearly laid out, including expected dates for construction start, full build-out, and any interim phases.

Time periods for which the proposed development will have the greatest impact on the transportation system should also be identified; corresponding with the peak hours of site generated traffic. This is influenced by factors such as shift changes, special events, and other unique aspects of the development. Other characteristics such as heavy truck traffic, various vehicle types (such as horse-drawn buggies/carriages) using County roads or large number of vulnerable road users should also be identified.

3.2 Study Area

The study area for the traffic impact study is dependent on the scale of the development as noted in **Table 1**. It should include the road network (road sections and intersections), transit network, and cycling and pedestrians facilities that will be impacted by the proposed development. Pre-study consultation with County staff is required to establish study area limits; including specific intersections and transportation facilities to be included in the assessment.

A description of the existing transportation system should be developed using a combination of maps and figures, and should include the following information:

- The road network under study, including number of lanes and posted speed limit;
- Study intersections, including lane configurations, type of control, and turn restrictions (if applicable);
- On-street parking restrictions (specifically in the vicinity of the proposed development);

- Heavy vehicle routes and restrictions;
- Transit routes; and
- Active transportation facilities.

3.3 Existing Conditions

An assessment of the existing conditions in the study area should be completed. A summary of the traffic data that may be required to complete the assessment (dependant on scope), includes the following:

- Existing and historical traffic volumes;
- Active transportation volumes (cyclists and pedestrians);
- Collision records (most recent 5 years of data);
- Signal timing plans;
- Transit routes and schedules; and
- Committed road improvements (refer to capital plan).

The most recent available traffic counts and/or signal timing plans (if applicable) for the study intersections should be requested from the County or local municipality. If these counts are not available or indicative of existing conditions, new counts should be undertaken at the cost of the proponent.

Existing traffic operations within the study area should be assessed for AM and PM peak hour conditions. This analysis should include truck volumes as well as cyclist and pedestrian volumes. Exhibits presenting existing traffic volumes and turning movements should be developed for all study area intersections.

A field investigation should be undertaken to confirm that traffic conditions are similar to that assessed. As such, the investigation should take place during peak hours. The site visit is also meant to confirm the following elements:

- Traffic control device type (and signal timings as appropriate);
- Transit, cycling, and pedestrian facilities;
- Traffic regulations (turn prohibitions, speed limits, parking restrictions); and
- Adjacent land uses.

3.4 Study Horizons

Horizon years to be assessed in the study should be determined on a case-by-case basis, dependant on the scale of the development. Refer to **Table 1** for the development characteristics that define the study horizons. Typical horizon years that are considered include the following:

- Opening Day – represents full build out of the proposed development;
- 5 Year Horizon – horizon year by which to assess the mature state of the development, typically for small to moderate sized developments; and

- 10 Year Horizon – horizon year by which to assess the mature state of the development, typically for large to regional sized developments.

Horizon years should also be identified for any interim phases of the development if applicable. Study horizon years will be confirmed upon consultation with the County.

Table 1: Analysis Category

Analysis Category	Development Attributes	Study Horizons	Recommended Study Area
A	Small 100 - 500 peak hour trips	1. Opening Day 2. 5 year after opening	1. Site Access Driveways 2. Adjacent signalized intersections within 500 metres, major unsignalized intersections within 200 metres
B	Moderate 500 - 1,000 peak hour trips	1. Opening Day 2. 5 years after opening	1. Site Access Driveways 2. Signalized intersections within 1 km, major unsignalized intersections within 1 km
C	Large 1,000 - 1,500 peak hour trips	1. Opening Day 2. 10 years after opening	1. Site Access Driveways 2. Signalized intersections within 2 km, major unsignalized intersections within 2 km
D	Regional > 1,500 peak hour trips	1. Opening Day 2. 10 years after opening	1. Site Access Driveways 2. Signalized intersections within 5 km, major unsignalized intersections within 5 km

3.5 Background Traffic Growth

The background traffic growth will be confirmed upon consultation with County staff. Background traffic growth should be established through one of the following methods:

- Application of growth factor based on regression analysis of historical traffic volumes;
- Estimation of growth from available travel demand forecasting models; and
- Growth rate based on previously completed area transportation studies.

In the absence of data related to any of the above mentioned items, growth rates (often 2.0% per annum) will be provided by the County to be used in the study.

3.6 Development Related Traffic

The estimation of development related traffic should be completed in accordance with industry standards and accepted practices. All trip generation, mode split, trip distribution, and trip assignment assumptions should be clearly identified and any sources used as part of the study should be well documented.

3.6.1

Trip Generation / Mode Split

The number of site trips entering and exiting the development during peak periods should be estimated using one of the following methods:

- “First principles” approach wherein estimates of site generated traffic are based on expected site activity (e.g. number of employees) and converted to vehicle trips through the application of factors such as modal split and percentage of traffic entering and exiting during peak hours; and
- Trip rates from the current edition of the Institute of Transportation Engineers (ITE) *Trip Generation Manual*.

Rates should be confirmed with County staff to ensure that they are appropriate for use in the study. Trip generation rates as developed above should be adjusted where appropriate to account for the following factors:

- *Pass-by trips* – trips made by traffic already on the roadway that enter the site as an intermediate stop on the way from their primary origin to their primary destination;
- *On-site “synergy” trips* – trips that are shared by two or more uses on the same site (e.g. person visiting a hardware store and grocery store in the same plaza); and
- *TDM adjustments* – adjustments made to site traffic based on traffic demand management strategies.

The methodology and assumptions used to estimate site generated traffic should be confirmed through consultation with the County and should be completed in accordance with the current edition of the ITE *Trip Generation Handbook*.

3.6.2

Trip Distribution

The distribution of trips to the study area network should be completed using the following methods:

- Existing traffic patterns;
- Origin-destination surveys;
- Planning models;
- Market studies;
- Transportation Tomorrow Survey (TTS) data; and
- Census data.

The methodology and any assumptions should be confirmed through consultation with the County.

3.6.3

Trip Assignment

The assignment of site trips to the road network should be built upon the trip generation and trip distribution completed in the previous steps. Logical alternative routes to and from the site should be established based on existing and expected future travel patterns. Travel patterns are dependent on roadway capacities (current and projected) and travel times. Route assignment can be completed by hand or by using a transportation planning model.

3.7

Summary of Traffic Demand Estimates

A summary of traffic demands should be provided. This should be done for each horizon year and peak hour. Background growth shall be combined with site traffic (as defined in **Section 3.6**) to establish total future traffic. All existing and projected traffic demands should be illustrated via exhibits in the report.

Traffic demands should be developed for the following conditions:

- Existing conditions;
- Future horizon year background conditions (existing conditions + background growth); and
- Future horizon year total conditions (background conditions + site traffic).

3.8

Evaluation of Impacts

A transportation analysis should typically be completed for existing conditions, future background conditions, and future total conditions (for the appropriate horizon years). This analysis should focus on assessing signalized and major unsignalized intersections within the study area that will be affected by the site generated traffic.

The following factors should be included in the evaluation: existing signal timings, peak hour factors, heavy vehicle proportions, and pedestrian activity.

The typical software package used to complete this assessment is Synchro 10. Software outputs should be in the HCM 2000 format. Should the consultant wish to use a different software package, prior approval must be received from the County. The following metrics should be reported as part of the operational analysis:

- Volume to Capacity (v/c) ratios;
- Delay;
- Level of Service (LOS); and
- 95th Percentile Queues.

The analysis should identify signalized intersections where the following conditions exist:

- Volume to Capacity (v/c) ratio for the overall intersection operation, through movements, or shared through/turn movements is greater than 0.85;
- Volume to Capacity (v/c) ratio for a dedicated left or right turn movement is greater than 0.90; and/or
- 95th percentile queues exceed available storage.

The conditions as noted above are deemed to be “critical” in terms of operations. Additionally, the assessment should identify unsignalized intersections where the following conditions exist:

- Overall intersection Level of Service is LOS E or F; and/or
- 95th percentile queues exceed available storage.

The objective of the analysis is to ensure that existing problem movements are not worsened and new problem movements are not created as a result of the site traffic. Existing timing plans should be used for existing signalized intersections. However, there is opportunity for optimization and modifications to existing timings to address capacity and LOS deficiencies. The results of the operational analysis will identify deficiencies in the road network and determine appropriate mitigation measures.

All assumptions should be documented in appendix.

3.9 Access Analysis

3.9.1 General

Access management is a key consideration of the County in the review of development proposals. From a safety and operational perspective the number and locations of the accesses should not negatively impact the existing road network. Typical considerations for access management include:

- If possible, access points should be located on minor roads to limit the impact on the road network;
- Access points should be evaluated based on need for capacity, safety, and adequate queue storage;
- Exit lanes and vehicle storage on site should be appropriate to accommodate site generated traffic;
- The number of access points to the site should be based on site traffic, not design preference and should follow existing County Policies and Official Plan guidelines; and
- Where feasible, access points should line up with existing intersections in the road network.

The traffic impact study should include a pavement marking and signage plan. Plans should also identify existing and proposed devices.

3.9.2 Turn Lane Requirements

Right and left turn lane requirements should be assessed based on the traffic operational analysis and applicable design guidelines (TAC “Geometric Design Guide for Canadian Roads”). A key consideration is to ensure adequate spacing is provided between access points to avoid any overlaps in turn lanes.

3.9.3 Sight Distance

An analysis of sight distance requirements should be completed at each access and intersection directly impacted by the development. Requirements should be determined based on appropriate guidelines (i.e. TAC “Geometric Design Guide for Canadian Roads”) and corresponding County policies. Field investigation should be undertaken to confirm that the built conditions satisfy all sight distance requirements. Sight distances to be considered include; stopping distance, intersection sight triangles, departure sight distance, and signal sight distance.

3.9.4

Intersection Control

Potential changes to traffic control should be assessed if there are capacity, level-of-service and/or delay considerations at one or more movements based on existing or future conditions. Specific traffic control changes (such as the introduction of all-way STOP control, a pedestrian crossover (PXO), a roundabout or a traffic signal) may be warranted.

In the case of changing an intersection control, the need will have to explicitly consider the methodology/warrants identified within the Ontario Traffic Manual (OTM) and/or TAC “Geometric Design Guide for Canadian Roads”.

In the case of an intersection that currently features side-street (two-way STOP) control, the warrant for an all-way STOP-control and a traffic signal would need to be undertaken.

In the case of a traffic signal being warranted, roundabouts are currently the preferred traffic control by the County and should be considered from a design criteria and cost standpoint.

In the case where there may be a significant increase to the number of pedestrians crossing an existing road (at a new intersection or crossing location), the need for a pedestrian crossover (PXO) should also be considered.

3.10

Safety Review

A safety review should be completed which identifies potential safety or operations issues. The review should consider and follow the practices identified in the following documents that were developed as part of the Road Master Action Plan:

1. *Safety Strategy* – a series of road safety measures that were developed to reduce property damage, injuries, and deaths related to motor vehicle collisions.
2. *Speed Management Guidelines* – guidelines that were developed to manage speeding concerns and ultimately improve roadway safety.

3.10.1

Safety Analysis

Typical safety-related factors that should be considered in the safety analysis include:

- Sight distance;
- Conflict areas (with special attention paid to areas where vulnerable road users are at risk);
- Weaving and merging;
- Non-local traffic using residential areas as through routes; and
- Safety issues related to truck movements.

Refer to the noted safety and speed management guidelines noted above.

3.10.2

Traffic Collision Analysis

The County will identify collision prone locations and safety concerns that deserve specific consideration. Existing collision data (provided by the County) should be reviewed to recognize existing safety concerns. The collision analysis should be completed using a dataset of the 5 most recent years of collision data available. Collisions involving vulnerable road users will be given special attention and closely analyzed to identify any deficiencies and potential mitigation measures.

The analysis will be summarized using collision diagrams and tables to assist in identifying patterns and contributing factors.

3.11

Findings and Recommendations

A summary of key findings and recommendations resulting from the traffic analysis shall be presented and should include the following:

- A summary of the impacts of the proposed development on the adjacent roadway network and on any transit and active transportation systems;
- A summary of recommended improvements required to support the existing and future transportation demands. These recommendations should address the operational and capacity deficiencies identified in the analysis. This may include any improvements to roads/intersections (i.e. additional lanes, right and left turn tapers, etc.), traffic signals (i.e. warrants, optimization, etc.), access management, active transportation and transit;
- Discussion on feasibility of improvements and compliance with County policies;
- An implementation strategy which outlines the proposed timing of installation of required road improvements. The strategy should identify short term and long term network improvements; and
- A preliminary cost estimate for all identified infrastructure improvements.

3.12

Reporting

The traffic impact study, traffic impact brief or traffic impact statement should be documented in a report that is clear and easy to follow. The structure and format should align with the preceding sections of this document. Prior to submission, a comprehensive quality assurance / quality control (QA/QC) process should be completed by the consultant.

Key maps, tables, exhibits, and graphs should be placed within the body of the report, alongside the corresponding text. The TIS should consist of a main document supplemented by technical appendices containing additional technical details as required. The final report should be submitted as one electronic file to the County. Supporting technical files (i.e. spreadsheets, Synchro files, etc.) are to be made available upon request.

Once submitted, the TIS is considered to be public domain and can be shared by County staff. It should be noted that a peer review of the traffic impact study can be completed at any time by another consultant. The proponent and their consultant will be notified by the County if this is the case.

The traffic impact study shall have a shelf life of two years if the development application is dormant. If the application is reconsidered after this time period, an addendum or updated report in the form of either a short traffic impact statement or brief or a fully updated study will be required to address any changes to the existing transportation condition.