

# TRANSPORTATION IMPACT STUDY GUIDELINES

Dated: January 2015



## TABLE OF CONTENTS

<b>1.0</b>	<b>Introduction.....</b>	<b>2</b>
1.1	Transportation Impact Study.....	2
1.2	Need and Justification.....	2
1.3	Purpose of Guidelines.....	2
1.4	Transportation Demand Management.....	3
<b>2.0</b>	<b>General Transportation Impact Study Requirements .....</b>	<b>3</b>
2.1	Need for Transportation Impact Study.....	3
2.2	Staff Consultation.....	4
2.3	Study Updates .....	4
<b>3.0</b>	<b>Transportation Impact Study Outline.....</b>	<b>4</b>
3.1	Description of the Development Proposal and the Study Area.....	4
3.1.1	Description of the Development or Redevelopment Proposal.....	4
3.1.2	Study Area.....	5
3.2	Horizon Year and Time Periods for Analysis .....	6
3.2.1	Horizon Year.....	6
3.2.2	Peak Periods .....	6
3.3	Existing Traffic Conditions.....	6
3.4	Background Traffic Growth .....	6
3.4.1	Background Traffic.....	6
3.4.2	Other Area Developments .....	7
3.4.3	Transportation Network Improvements.....	7
3.4.4	Transit Considerations .....	7
3.5	Estimation of Travel Demand.....	7
3.5.1	Trip Generation. ....	7
3.5.2	Trip Distribution.....	8
3.5.3	Trip Assignments.....	8
3.5.4	Summary of Traffic Demand Estimates.....	8
3.6	Evaluation of Impacts of Site Generated Traffic .....	9
3.6.1	Capacity Analysis at Intersections. ....	9
3.6.2	Safety Analysis.....	10
3.6.3	Traffic Collision Analysis.....	10
3.7	Sight Access and Circulation.....	11
3.8	Sight Distance Evaluation .....	11
3.9	Transportation System Mitigation Measures.....	12
3.9.1	Required Roadway Improvements.....	12
3.9.2	Required Traffic Signal Improvements... ..	12
3.9.3	Preliminary Cost Estimate.....	12
3.10	Recommendations.....	12
<b>4.0</b>	<b>Documentation and Reporting.....</b>	<b>13</b>

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## **1.0 INTRODUCTION**

### **1.1 Transportation Impact Study**

The goal of a Transportation Impact Study (TIS) is to assess the potential effects of traffic caused by a proposed development on Regional and local roadways and to identify the required roadway and access improvements needed to ensure that the roadway system will operate at an acceptable level upon completion of the proposed development.

Transportation Impact Studies are an important part of the development review and approval process to assist developers and public agencies in making land use decisions, such as Official Plan amendments, re-zonings, subdivisions, site plans, planning approvals and other development reviews, where the proposal may have a significant impact on traffic and transportation operations.

Transportation Impact Studies benefit the municipality by:

- Providing decision makers with a basis on which to assess transportation implications of proposed development applications;
- Providing a rational basis on which to evaluate if the scale of development is appropriate for a particular site and what improvements may be necessary, on and off the site, to provide safe and efficient access and traffic flow;
- Providing a basis for assessing existing or future localized transportation system deficiencies that should be improved;
- Addressing transportation-related issues associated with development proposals that may be of concern to neighbouring residents, businesses and property owners; and

A Transportation Impact Study may vary in scope and complexity depending on the type and size of the proposed development.

### **1.2 Need and Justification**

Halton Region has prepared these guidelines in order to streamline the approval process and provide a standardized framework for consultants to follow when submitting traffic/transportation studies for review and should be complemented with appropriate transportation engineering judgement.

### **1.3 Purpose of Guidelines**

The purpose of these guidelines is to ensure that Transportation Impact Studies prepared for the Region's review meet the following criteria:

- Objective assessment – the study will evaluate the impacts of proposed new development in a rational manner;
- Consistency – the study will utilize assumptions consistent with the Region's accepted methodologies and parameters and thus be comparable to other transportation studies in the Region;

- Recognized by developers and consultants – the guidelines will provide a standard approach to be followed and will reduce confusion and delay in processing development proposals;
- Promote understanding of process – the steps outlined in these guidelines will enable proponents, reviewers and elected officials to understand the process more effectively; and
- Ease of review by staff – a standardized set of guidelines will aid the efficiency of staff in reviewing Transportation Impact Studies.

#### 1.4 Transportation Demand Management

Transportation Demand Management (TDM) is a term used to describe a wide variety of initiatives aimed at reducing the amount of travel by single occupant vehicles and achieving a more balanced mode split in the transportation system, particularly during the commuter peak hours.

The Region launched the Smart Commute Initiative in 2006 which is a program of Metrolinx and the municipalities in the GTHA. Smart Commute Halton encourages active and sustainable transportation by offering services and tools designed to make commuting easier for the employees of local organizations. Smart Commute is continuing to expand across the Region in partnership with Metrolinx, the local municipalities and local employers.

Traffic Impact Studies should consider TDM initiatives such as:

- Promotion and support for reduced single occupant vehicle use through carpool programs,
- Promotion of transit and employer subsidized transit programs,
- Implementation of bicycle/pedestrian infrastructure and bikeshare programs,
- Multi-modal marketing programs (web site, access guides, individualized marketing programs, information kiosks, way-finding signage, emergency ride home),
- Parking Programs (transportation allowance, preferential parking, unbundled parking),
- Alternative Work Programs (compressed work weeks, flexible work schedules, telework programs)

## 2.0 GENERAL TRANSPORTATION IMPACT STUDY REQUIREMENTS

### 2.1 Staff Consultation

It is imperative that prior to commencing a Transportation Impact Study, the consultant meet with Regional and area municipal staff, as appropriate, in order to review the level of detail and confirm the Scope of Work for the TIS, arrange contacts with the various affected road jurisdictions and to determine data requirements and its availability.

In addition to Halton Region requirements, the area municipal and provincial roadway authorities may require additional information or analysis to satisfy their requirements for a development/redevelopment proposal. The proponent should contact these roadway authorities, where applicable, to determine these requirements.

## **2.2 Study Updates**

Generally, a Transportation Impact Study will have a “shelf life” of five years. Major changes within the study area may reduce the “life” of the document if they were not considered in the impact assessment. Where the timing of subsequent development approvals exceeds five years, a new study will generally be required.

## **2.3 Data Collection**

The applicant must provide both electronic and hard copies of all raw data collected for the TIS. This includes but is not limited to the following:

- Turning Movement Counts;
- Traffic signal timings;
- ATR & AADT counts;
- Collision records;
- Gap Study observations;
- Queue Studies;
- Proxy site surveys;
- Cordon counts;
- Transit information
- Pedestrian and Cyclist circulation plan;
- Other data as requested

## **3.0 Transportation Impact Study Outline**

The following sections outline the format and requirements of the Transportation Impact Study. Area municipal or provincial roadway authorities may require additional information or analyses beyond the Regional requirements outlined in these guidelines. The contents and extent of the TIS generally depend on the location and size of the proposed development/redevelopment and the conditions prevailing in the surrounding area.

### **3.1 Description of the Proposal and the Study Area.**

A description of the development proposal, its location and the proposed Transportation Impact Study area is required to permit Regional Staff to identify the site location, its anticipated operation and area of potential impact. In addition, this information allows timely review of key study assumptions ranging from the study area limits and horizon years to the trip assignment assumptions.

#### **3.1.1 Description of the Development or Redevelopment Proposal**

The Transportation Impact Study should provide a full description of the proposed development. This may include the following elements, as applicable:

- Municipal address;
- Existing land uses or permitted use provisions in an Official Plan, Official Plan Amendments, Zoning By-law etc.
- Proposed land uses and relevant planning regulations to be used in the study;

- Total building size and building locations;
- Floor space including a summary of each type of use/number of residential units;
- Anticipated date of occupancy;
- Approximate hours of operations;
- Planned phasing of the development;
- **Near-by intersections and accesses to adjacent developments and those on the opposite side of the road including type of control;**
- Proposed access points and type of access (full movement, right-in-right-out, turning movement restrictions, etc.);
- Nearby transit facilities/stops;
- Near-by Active Transportation Facilities – sidewalks, multi-use trails, bike lanes, etc.,

It is a requirement to provide a site plan, of a suitable scale, for consideration in the review of the Transportation Impact Study. If the proposed development/redevelopment is to be constructed in phases, describe each phase and the proposed timing of implementation.

### **3.1.2 Study Area**

The study area should extend far enough, within reason, to contain all municipal, regional and provincial roadways that will be noticeably affected by the trips generated by the proposed development. The study area should be determined through the Scope of Work and the Region reserves the right to establish the study area as may be deemed necessary.

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

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

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

## **3.2 Horizon Year and Time Periods for Analysis**

### **3.2.1 Horizon Year**

In general, the horizon year for impact analysis must be **five (5)**, and, depending on the development size and phasing periods, ten (10) years (to be determined by Halton Region) from the date of the transportation impact study unless an earlier date for full occupancy of the project can be identified and justified in consultation with Regional staff.

### **3.2.2 Peak Periods**

The critical time period for traffic generated by a given project is directly associated with the peaking characteristics of both the development related traffic and the transportation system traffic. Typically, the AM and PM peak traffic period will constitute the "worst case" combination of site related and background traffic; however, in the case of retail, entertainment, religious, institutional, sports facility uses, golf courses or as determined by Halton Region, the Saturday, Sunday and/or site peak may require analysis. As part of the consultation process prior to commencing the study, the consultant should determine in conjunction with Regional staff the selected time periods for analysis.

## **3.3 Existing Traffic Conditions**

To provide a representative picture of the existing transportation conditions with exhibits showing the existing traffic volumes and turning movements for all modes of transportation for roadways and intersections in the study area including pedestrian/cyclist volumes and heavy truck movements, should be included.

Traffic volumes may be acquired from the Region, local municipalities or previous transportation planning, traffic operation or traffic impact studies undertaken in the study area. Traffic counts more than two years (2) old or counts that appear not to be reflecting existing conditions should be updated to ensure that they reflect current traffic levels. All data requests are at the cost of the Developer/Owner.

A field observation (peak one hour count at minimum) should be undertaken to verify that traffic volumes through an intersection reflect actual demand and to determine the necessary adjustments to level-of-service calculation so that actual conditions are fairly represented.

## **3.4 Background Traffic Growth**

### **3.4.1 Background Traffic**

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

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

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

An Applicant will also be required to work in conjunction with the Local Municipality and Transit Authorities, as well as the Province.

### **3.4.2 Other Area Developments**

All significant developments under construction, approved, or in the approval process within the study area and are likely to occur by the specific horizon years should be identified and recognized in the study. The land-use type and magnitude of the probable future developments in the horizon years should be identified through consultation with Regional and area municipal staff. In some cases, the traffic impact of other area developments will need to be explicitly considered in the analysis of the traffic impact of the proposed development.

### **3.4.3 Transportation Network Improvements**

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

### **3.4.4 Transit/HOV Considerations**

A TIS should evaluate the impacts of site generated transit demand for the relevant time periods and scenarios on all transit services and transit stops/stations/terminals where ridership will be increased by 5% or more by site generated transit demand.

For HOV analysis, the lane analyses must use a lane utilization factor of 0.80 for the assumption that 20% is assumed as the HOV lane usage.

## **3.5 Estimation of Travel Demand**

### **3.5.1 Trip Generation**

Traffic volumes expected to be generated by the proposed development shall be forecast using the latest edition of the ITE Trip Generation Manual, unless local & more reliable trip generation data is available.

Trip generation parameters shall be selected using the principles as described in Chapter 3 of the ITE Trip Generation Handbook.

The estimation of traffic volumes shall be based on the full build-out condition and/or maximum land use intensity allowed under existing or proposed zoning regulations.

Adjustments to trip generation rates and generated traffic volumes to account for internal traffic, pass-by traffic and increased modal splits is permitted provided that assumptions are clearly documented and justified, and illustrated in separate diagrams.

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

A table should be provided in the study report identifying the categories and quantities of land uses, with the corresponding trip generation rates or equations and the resulting number of trips. For large developments that will be phased in over time, the table should identify each significant phase separately.

### **3.5.2 Trip Distribution**

All trip distribution assumptions must be documented and justified. Due consideration should also be given to potential differences in trip distribution patterns associated with different time periods, days of the week and development land-use types.

Engineering judgement should be utilized to determine the most applicable of the above methodologies for each particular application. Halton Region staff may have data available that assists in determining appropriate trip distribution.

### **3.5.3 Trip Assignments**

Traffic assignments should consider logical routings, available and projected roadway capacities, and travel times. Traffic assignments may be estimated using a transportation planning model or "hand assignment" based on knowledge of the proposed/future road network in the study area. Halton Region can provide assistance with confirming growth rates. All data requests are at the cost of the Developer/Owner.

### **3.5.4 Summary of Traffic Demand Estimates**

Figure(s) should be presented indicating the assignment of all site-generated traffic volumes and pass-by volumes (if applicable) separately to the local road network, as well as to the individual site access locations by direction and by turning movement where required.

For each time period, include figures that summarize:

- Existing traffic/transit volumes;
- Existing plus background growth for each horizon year; and,
- Existing plus background growth plus site generated volumes for each horizon year

A summary of the future traffic demands (each combination of horizon year and peak period for both site generated and total future traffic conditions) should be provided in the form of

exhibits. Pass-by traffic assumptions should be clearly identified and illustrated on an exhibit, which summarizes the reassignment of pass-by traffic.

### **3.6 Evaluation of Impacts of Site Generated Traffic**

The evaluation of impacts shall be conducted for all of the time periods of each horizon year. The existing volumes, existing plus background growth and existing plus background growth plus site-generated traffic by direction and by turning movement should be included, as well as the scenarios with and without any relevant major transportation system improvements.

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

#### **3.6.1 Capacity Analysis at Intersections**

Capacity analysis at intersections will assess the operations of individual intersections and movements anticipated to be impacted by the proposed development. The adequacy of operations before and after the proposed development will be determined based on the analysis methodology and Regional thresholds as described below.

The evaluation of signalized and unsignalized intersections affected by site generated traffic volumes is required for all relevant time periods and scenarios and summaries are to be provided in a tabular format. The objective should be to maintain existing levels of service.

Documentation in the TIS appendix is required to detail all assumptions used in the analysis concerning lane configuration/use, pedestrian/cyclist activity, saturation flows, traffic signal cycle length, phasing and timing, utilization of the inter-green phase and other relevant parameters. Existing signal timings must be used for existing intersections and signal timing modifications may be considered as a measure to address capacity or level of service deficiencies.

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

The summary should include the level-of-service including average vehicle delay and volume to capacity (v/c) ratios for overall intersection operations and individual critical movements, for all analysis periods and time horizons. Full documentation of the results of all level of service analyses should be provided in an appendix.

The Region accepts both the Highway Capacity Manual (HCM) and Canadian Capacity Guide (CCG) methodologies of intersection analysis. Specific software packages include CCG/CALC2, InterCalc HCS Version 3.0 or higher, Synchro 7.0 or higher. Analysis parameters should be confirmed with Halton Region staff through the pre-consultation and the submission of a scope of work. Should a consultant wish to utilise a software package other than these listed above, prior approval from the Region must be obtained.

The analysis should include the mitigation of impacts to signalized intersection operations where:

- Volume/capacity (V/C) ratios for overall intersection operations, through movements, or shared through/turning movements increased to 0.85 or above;
- V/C ratios for exclusive movements increased to 0.95 or above; or
- Queues for an individual movement are projected to exceed available turning lane storage.

The analysis should also include unsignalized intersections where:

- Level of service (LOS), based on average delay per vehicle, on individual movements exceeds LOS “D”, or
- The estimated 95<sup>th</sup> percentile queue length for an individual movement exceeds the available queue storage.

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

### **3.6.2 Safety Analysis**

Potential safety or operational issues associated with the following, as applicable, should be identified:

- Weaving;
- Merging;
- Transit operational conflicts
- Corner clearances;
- Sight distances;
- Vehicle-pedestrian conflicts;
- Traffic infiltration;
- Access conflicts;
- Cyclist movements;
- Heavy truck movement conflicts;
- Queuing

### **3.6.3 Traffic Collision Analysis**

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

## **3.7 Site Access and Circulation**

Site access location and design shall be determined with respect to the operational analysis in conjunction with Halton Region's "Access Management Guidelines."

All site access points on Regional roads shall be evaluated in terms of capacity, safety and sight distance & adequacy of queue storage capacity. This evaluation shall be similar in scope to that for the signalized and unsignalized intersections described previously.

Proposed access points shall be evaluated with respect to existing access points and intersections, on-street weaving problems, need for acceleration or deceleration lanes and pedestrian and cycling safety. As development occurs within the Nodes and Corridors (reference Regional Right-of-Way Guidelines), especially those adjacent to future HOV/transit corridors networks; Halton Region will work with the local Municipality to ensure that there is proper integration between pedestrian walkways, cycling paths and transit routes and vehicular access to development. Halton Region will also support any Municipal initiatives to encourage and increase safety for pedestrians and cyclists. Additional studies to review active transportation strategies for development proposals within Node and Corridor areas may be required and will be done in consultation with the local Municipality.

On-site parking and circulation systems shall be evaluated to demonstrate appropriate clear throat distances and avoid any possible queuing onto the Regional roads.

Sight lines should be evaluated to ensure safe conditions in accordance with Halton Region's "Access Management Guidelines" and based on Decision Sight Distance as identified in Transportation Association of Canada – 1999 Geometric Design Guide for Canadian Roads (TAC Manual).

Proposed truck/courier loading facilities and access to these facilities shall be evaluated to ensure that they are adequately sized, designed and provided with suitable access so that they will not adversely affect traffic and transit operations on Regional roads.

Any required turning or other restrictions should be identified.

Generally, it is preferable to minimize the number of private site accesses to regional roads, in order to maintain the integrity of the arterial road network. Site access should be provided only to the local road network wherever possible. Benefits to the Regional road network should be demonstrated when an access is proposed. Any additional accesses above minimum shall be justified as described in Halton Region Access Management Guideline for Regional Roads.

### **3.8 Sight Distance Evaluation**

At each proposed access and/or at each intersection where a new road is proposed, the sight distance requirements should be determined based on Decision Sight Distance and Turning Sight Distance as identified in Transportation Association of Canada – 1999 Geometric Design Guide for Canadian Roads (TAC Manual). The availability of sight distance shall be determined from actual field measurements. Additional information available can be found in Halton Region's "Access Management Guidelines."

### **3.9 Transportation System Mitigation Measures**

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

#### **3.9.1 Required Roadway Improvements**

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

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

#### **3.9.2 Required Traffic Signal Improvement**

Any traffic signal operational deficiencies that have been identified in the Transportation Impact Study must be addressed and solutions provided that are feasible to implement. The design requirements for traffic signals are outlined in the “Design Information for Proposed Road and Traffic Signal Works on Region of Halton Roads.”

#### **3.9.3 Preliminary Cost Estimate**

A preliminary cost estimate must be provided for all identified infrastructure improvements.

### **3.10 Recommendations**

A summary of the key findings with respect to the transportation impact of the proposed development shall be presented along with a summary of the recommended improvements if necessary.

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

- Timing of short-range and long-range network improvements that are already planned and scheduled;
- Anticipated time schedule of adjacent developments;
- Size and timing of individual phases of the proposed development;
- Logical sequencing of various improvements or segments;
- Right-of-way needs and availability of additional right-of-way within the appropriate time frames;

### **4.0 Documentation and Reporting**

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

- Executive Summary
- Site/Development Description (Site plan if applicable);
- Study Area (Map identifying the study area and site);
- Existing Conditions (Exhibit required);
- Analysis Periods;
- Background Traffic Demand – Existing and Future Background (Exhibits required);
- Site Generated Traffic (Exhibits required);
- Level of Service Analysis;
- Total Traffic Demand – Future Background plus Site Generated Traffic (Exhibits required);
- Improvement Alternatives Required to Mitigate Traffic Impacts
- Traffic Impacts for Future Background and Total Traffic with and without mitigation measures (Tabular Summaries);
- Access Considerations; and
- Recommendations.

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

The Transportation Impact Study should consist of a main document, supplemented by technical appendices containing detailed analyses as required. The Region reserves the right to request digital copies of the analysis.

Documentation in an appendix to the traffic impact study of all assumptions used in the analysis concerning lane configuration/use, pedestrian activity, saturation flows, traffic signal cycle length, phasing and timing, utilization of the inter-green phase and other relevant parameters. Existing signal timings should be used for existing intersections and signal timing modifications may be considered as a measure to address capacity or level of service deficiencies.

All information submitted to Regional staff in connection with any Transportation Impact Study will be considered to be in the public domain.

Two (2) copies of the “draft” and two (2) copies of the final Transportation Impact Study complete with supporting documentation should be submitted to Regional staff for review.