Traffic Impact and Parking Study terms of Reference

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CITY of BRAMPTON
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Purpose of Document

The purpose of this document is to outline the Terms of Reference for the various traffic studies required as part of New Development and Infill Developments located within the City of Brampton. The type of study required for the type of development proposed shall be determined by City of Brampton Traffic Planning staff.
All Traffic Impact studies shall be prepared by a qualified Transportation Consultant with experience in the preparation of the type of study required. The report must be stamped, dated and signed by a qualified Transportation Professional.

This document is broken down into several sections that outline the requirements for the following types of traffic studies:

- Full Traffic Impact Study (scoped Traffic Impact Study requirements shall be verified with the Traffic Planning Section prior to starting the study)
- Traffic Impact Analysis for School Sites
- Parking and Traffic Study for Places of Worship

These terms of reference below are to serve as general guidelines for the various types of studies outlined above, in this regard the applicant shall contact the Traffic Planning section at the City of Brampton and the Region of Peel (if required) to verify that no additional items are required to be included in the scope of work for the required study.

Full Traffic Impact Study

Description of the Proposed Site

The traffic impact study shall provide a full description of the existing/proposed development which shall include, but is not limited to:

1. Municipal address.
2. Existing land uses that are permitted and use provisions in an Official Plan Amendment, Zoning By-law, etc.
3. Proposed land uses.
4. Floor space, including a summary of each type of use and/or number of residential units (where applicable).
5. Anticipated date of occupancy.

6. Approximate hours of operation.
7. Planned phasing of the development.
8. Nearby Regional and Municipal intersections and access to adjacent developments, including type of control (signalized or unsignalized).
9. The existing number of lanes, width and configuration of the adjacent roadway/ intersections. The requirements for auxiliary turn lanes shall be reviewed City of Brampton Traffic Planning Staff. Adequate spacing must be provided between access points in accordance with current best practices and City of Brampton Guidelines. All design standards must be in accordance with those outlined in the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads and the Ministry of Transportation, Ontario (MTO) Geometric Design Standards for Ontario Highways.
10. Proposed access points and type of access: When determining the location of an access, consideration should be given to the impact the proposed access will have on the surrounding road network, area residents and area businesses. All proposed site access points on shall be evaluated for capacity, safety and adequacy of queue storage capacity. Approval of the proposed access will be evaluated using current Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads and the Ministry of Transportation, Ontario (MTO) Geometric Design Standards for Ontario Highways and sound engineering judgement.
11. Nearby transit facilities/stops.
12. Bike paths (existing and proposed).
13. A combination of maps and other documentation, which will identify all relevant information.

Traffic Volume Analysis

The traffic volume analysis for all development/rezoning/secondary plan amendments and site plans shall include the following:

1. Analysis of the 5,10 and 20 horizon years, depending on full build-out, or as advised by City of Brampton Traffic Planning staff.
2. AM, PM and off-peak periods at a minimum. Commercial developments may require Saturday analysis - note that the analysis of turning movement counts (TMCs) for a

Saturday of a holiday weekend will not be accepted except when directed by City of Brampton Traffic Planning staff.

3. Background, site-generated and total traffic volumes.
4. "Worst case" combination of site-related and background traffic.
5. Please contact City of Brampton Transportation Planning staff to confirm growth rates along the required City of Brampton roadways.
6. Please contact City of Brampton Traffic Operations staff to obtain the most recent turning movement counts and/or average annual daily traffic (AADT). There is a standard fee for all AADT and traffic movement count information obtained from the City of Brampton. If no traffic movement counts are available or if count information is older than 2yrs, then the consultant will be required to obtain their own counts.
7. Please contact City of Brampton Traffic Signals staff to obtain traffic signal timing parameters and ensure that the information includes the appropriate walk/don't walk splits, recall modes and offsets.
8. Please contact the City of Brampton Planning staff to obtain details on surrounding developments in the area that would affect traffic capacity in the planning horizon year(s)

Trip Generation and Distribution

The trip distribution and trip generation analysis shall include:

1. Trip generation surveys from similar developments in the City of Brampton which have similar operating characteristics as the proposed development. (A minimum of 3 proxy sites shall be used, and proxy sites must be approved by City of Brampton Traffic Planning staff). And/or the latest trip generation rates as outlined in the latest edition of the Institute of Transportation Engineers (ITE) Trip Generation Rate Manual are acceptable (use the greater of the average rate method or the fitted line equation).
2. A table summarizing the findings of the rates.
3. Trip distribution assumptions must be supported by one or more of the following:
    i. Transportation Tomorrow Survey
    ii. Origin-destination surveys
    iii. Comprehensive travel surveys
    iv. Existing/anticipated travel patterns

v. Output from the City of Brampton Travel Demand Forecasting Model
vi. Market studies

Capacity Analysis

1. The report must include capacity analysis for all intersections (within the study area) and proposed site accesses completed in Synchro (version 8.0 or newer is preferred). Unsignalized analysis can be completed in either Synchro or CCG Intercalc (2008 version at a minimum).
2. A queuing assessment shall be included, including the levels of service and queuing distances and are to be based on micro-simulations using Sim-Traffic, or similar software analysis to those produced through the Sim-Traffic simulation reports. Reports to be based on a minimum of five simulations comprising of a minimum one-hour simulation runs plus a minimum seeding time of for vehicles to travel through the entire network, or a minimum of 30-minute seeding time, whichever is the greater. The City does not deem the Synchro queuing analysis to be an accurate reflection of actual traffic performance, therefore, micro-simulations are required to aid in the elimination of errors due to issues missed within the Synchro analysis, such as intersection or lane spillback, forced lane changes, unbalanced lane use and possible other traffic idiosyncrasies which are not addressed within the macro reports.
3. The following parameters must be used in either software:
    i. Saturation flow rate of 1,900 vehicles per hour
    ii. 3.7 metre lane width on Regional roads; and
    iii. 3.5 metre lane width on City of Brampton roadways and/or access(es)
4. The analysis must also include the identification of signalized intersections, unsignalized intersections and unsignalized accesses where:
    i. Volume/capacity (V/C) ratios for overall intersection operations, through movements or shared through/turning movements increased to 0.90 or above.
    ii. V/C ratios for exclusive movements that will exceed 1.00.
    iii. 95th percentile queue lengths for individual movements.
5. All intersections that are modelled as signalized intersections (other than existing signalized intersections) must be supported by an Ontario Traffic Manual (OTM) Book 12 traffic control signals warrant, the warrant analysis output sheets shall be included in the appendix of the TIS.

6. If traffic control signals are found to be warranted at a particular intersection in an earlier horizon year (e.g. 5-year horizon), a warrant is not required for the subsequent horizon year (e.g. 10-year horizon). The horizon year in which a particular intersection is warranted for traffic control signals must be documented in the text of the TIS. A roundabout feasibility analysis may also be required at the direction of City of Brampton staff.
7. In Synchro unsignalized intersection analysis, if on the minor approach in existing conditions analysis an unacceptable LOS ("E" or higher) and v/c ratio results, the consultant shall conduct a gap study to establish an average value for gaps accepted (in seconds) and override the resultant value for the HCM-calculated critical gap in the Signing window.
8. For horizon year analysis with an existing two- lane road, if the road is forecasted to be widened to four lanes by the respective horizon year, the consultant shall override the resultant value for the HCM-calculated critical gap in the Signing window by inputting recommended values for critical gap of left-turning and right-turning movements onto a four-lane road as identified in the Ministry of Transportation, Ontario (MTO) Geometric Design Standards for Ontario Highways.

Sight Distance Evaluation

1. A review and analysis of the sight distance availability for all proposed accesses or roads is required. The sight distance requirements must be determined based on the most current standards and guidelines used by the City of Brampton. Available sight distance should be taken from actual field measurements to ensure accurate conditions.
2. Assess the sightlines based on the City of Brampton standards, eye height and object height of 1.05 metres and 0.38 metres above road surface, respectively. The City of Brampton requires the access to meet the following sightline requirements:
    i. Stopping sight distance; and
    ii. Turning sight distance.
3. Sight distances must be in accordance with the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads methodology. Folded full size and to scale drawings of the sightline analysis are required for our review and comment.

Safety Audit

The Traffic impact study shall include a traffic safety section, which shall include the identification of potential safety or operational issues must be reviewed that are associated with:

a. weaving
b. merging
c. corner clearances
d. sight distances
e. vehicle/pedestrian conflicts
f. traffic infiltration
g. access conflicts
h. cyclist movements
i. heavy truck movement conflicts

In addition, should the development be determined by City of Brampton staff to be adjacent to a road segment with significant collision history, most recent five-year collision data for the intersection(s) and/or road segment (s) must be reviewed and an assessment of the impact of the proposed development provided. Such information may be helpful to minimize any additional problems through the design or location of access points along the subject Municipal road(s).
Please contact City of Brampton Traffic Operations staff for collision information.

Functional Design

A functional design detailing a recommended access configuration and/or proposed intersection geometrics may be required at the discretion of City of Brampton Traffic Planning staff.

Final Report

The following study structure for the final report is suggested:

1. Site/development description
2. Study area, including map
3. Existing conditions - exhibit required

4. Analysis periods
5. Background, existing, future background and future total traffic demand - exhibit required
6. Site generated traffic - exhibit required
7. Improvement alternatives
8. Traffic impacts for future background and total traffic with and without mitigation (tabular summaries)
9. Access considerations
10. Recommendations
11. The TIS should consist of a main document, supplemented by technical appendices containing detailed analyses as required. The appendices shall also include a copy of the terms of reference and supporting letters from the Region of Peel and City of Brampton acknowledging the acceptance of the terms of reference.

The City of Brampton will require 1 copy of the final report to be in electronic format and 2 hard copies of the final report complete with the appropriate supporting documentation. This shall be submitted to the Traffic Planning section of Public Works for review, comment and approval.

All information submitted to City of Brampton staff in connection with any Traffic Impact Study will be considered to be in the public domain.

Appendix

The appendix for the final report shall include:

1. Turning movement counts (include date counted) with breakdown of heavy vehicle counts;
2. Signal timing plan(s) for signalized intersections; and
3. For submissions using Synchro, generated Synchro reports showing HCM 2000 results and queuing, as well as electronic Synchro files (CD copy or sent concurrently with the TIS via email); or
4. For submissions using CCG Intercalc, a CCG Intercalc summary report.

Traffic Impact Analysis for School Sites

Terms of Reference

In an effort to ensure that school openings within the City of Brampton are managed effectively it is essential that the school board(s) share information with the City of Brampton in order to determine the operational requirements/impacts of the proposed school prior to it's opening. In order to formalize the existing process, the school board(s) shall share this information in the format of a School Traffic Impact Assessment. The Assessment will be required in order to determine what infrastructure/improvements related to the proposed school are required to be in place at the time of opening of the school site.

The following items pertaining to the School Traffic Impact Assessment shall be addressed in the required study prior to Site Plan Approval:

1. **Date to be Opened**, for all schools (new and/or retrofit) this shall include the projected completion date and School start date.
2. **Type of School,** i.e. Junior Elementary, Secondary etc.
3. **School Hours,** this shall include start and end times for the subject school site.
4. **Detail/Identify Surrounding Land Uses,** this shall include all surrounding land uses within the vicinity of the subject school site i.e. residential, commercial and/or existing school sites adjacent to or in the area of the proposed school block.
5. **Enrollment**, i.e. number of students including potential portable population and opening school enrollment projections.
6. **Catchment Area**, this shall include identifying all boundary roads on a detailed context plan within the study.
7. **Number of Buses**, this shall include number of students to be bused verses number of students that will not be bused.
8. **Projected Bus Routes**, detail on a separate plan within the study all bus routes related to the subject school site.
9. **Surrounding Roadway Network**, this shall include a roadway description (type i.e. collector, local and overall pavement width) for all roadways within the immediate vicinity of the subject school block. In this regard, the study shall include details pertaining to the surrounding intersections and include whether they are stop controlled, signalized and/or unsignalized.
10. **Pedestrian Routes**, this shall include a context plan illustrating all planed and projected pedestrian routes to and from the proposed school site. The context plan shall identify potential crosswalk locations to be approved by the City of Brampton.
11. **Conclusion/Recommendations,** this shall include any potential conflicts that may occur due to the completion of the school site and its impacts on the surrounding local roadway network. Should the study identify "areas of concerns" and/or infrastructure

improvements required to support the opening of the school i.e. sidewalks/signals etc. then the study shall provide recommendations for our review and comment.

Parking and Traffic Study for Places of Worship

Introduction

The City of Brampton requires that a parking/traffic impact study be submitted for all Places of Worship being developed or redeveloped in the city.

The purpose of this study is to determine the major improvements that may be required on the adjacent road network for the most critical operational and development scenarios of the proposed Place of Worship. Also, this study will determine the amount of parking spaces required to adequately facilitate parking on-site.

This detailed study should investigate and document the on-site and off-site traffic operations during normal and major events at the proposed facility.

Analysis Area for Traffic Study

The analysis area should be defined by the consultant and be approved by the City of Brampton and in general should include:

1. All roadways immediately adjacent to the site;
2. The access point to the proposed development in the concept plan, and;
3. All roadways, which are judged to become noticeably affected by the proposed development.

Objectives

The specific objectives of this study are to:

1. Accurately determine the transportation infrastructure level of service based on the ultimate phase of development of the site, and;
2. Determine the detailed road service for the site based on the existing transportation facilities and programmed facilities such that appropriate road levels of service are maintained;
3. Accurately determine the amount of parking spaces required to adequately facilitate the parking on-site.

Approach for Traffic Impact Study

The analysis approach for the traffic impact portion of the study consists of three components:

1. Demand analysis;

2. Impact analysis, and;
3. Mitigation measures.

Demand Analysis

Assumptions on trip generation, trip distribution, parking demand and analysis years should be selected in consultation with the City of Brampton. They include:

1. Horizon years for analysis: the horizon years should be the current year for the base year, and the year of full development of the site;
2. Time periods for analysis: both morning, afternoon and weekend peak hours relating to the site traffic should be evaluated, Weekday and Weekend operation under normal and special events;
3. Trip generation rates: the applicant shall provide relevant traffic surveys. In this regard 3 appropriate proxy sites, as approved by City of Brampton Traffic Planning Staff, shall be considered for these surveys;
4. Background traffic and adjacent developments: background traffic growth and traffic from adjacent anticipated developments within the study area should be estimated, the background traffic peak hours shall be analyzed;
5. Site traffic: trip generation, trip distribution, and mode split assumptions should be well documented and any assumptions which may be considered less than conservative should be rigorously justified. Specific assumptions such as reduction for pass-by trips should be used and should be documented and justified in terms of previous research or surveys, and;
6. Total traffic: maps to summarize existing traffic/transit volumes, existing plus background growth, and existing plus background growth plus site generated volumes.

Impact Analysis

Volume to Capacity Ratios and the overall level of service should be evaluated for all road links, specific screen lines and problem intersections and traffic movements and should be documented in clearly understandable tables. The analysis should specifically address the following issues:

1. The location of the existing and proposed accesses.
2. The limitations of access (i.e. right-in/right-out)
3. The anticipated timing of all improvements for adjacent roadways.

Mitigation Measures

In general, the objective of this component is to ensure that appropriate measures are taken so that problem movements or road links are not created by the development concept and that the current levels of service are not worsened by the proposed development concept. More specifically, the analysis is required to:

1. Identify all transportation system improvements necessary to serve the proposed development concept including:
    a. Turn lanes required;
    b. Signal installation;
    c. Additional lanes with dimensions and pavement widening;
    d. Parking requirements (see 5.0 Parking Survey) and other site circulation and safety requirements, and;
2. Any problem transportation components that cannot be mitigated with improvements;

Parking Survey

Parking demand shall be determined by performing a parking survey of three proxy sites. All proxy sites to be surveyed shall be approved by the City of Brampton.

Survey Parameters

Parking surveys shall be conducted during AM, PM and Weekend peaks, along with the peak hours of operations including any special events and services which occur on a regular basis. The following details shall be discussed within the report:

1. # of spaces required per square foot or square meter
2. # of spaces required per patron

Parking Demand

Based on data gathered from the survey, a recommendation as to the number of spaces required at the Place of Worship will be detailed within the report.

Report Requirements

The consultant shall submit a comprehensive traffic impact report consisting of:

1. An executive summary;
2. A description of the report methodology;
3. Relevant maps/illustrations in accordance with the study requirements outlined in Sections 4.0 and 5.0 of this document;
4. Appendices containing summaries of data collection, assumptions relating to traffic operations, computer outputs of level of service calculations, and other technical data, and;
5. Recommendations necessary to fulfill the study requirements.

The consultant shall provide copies of this report in both hardcopy and PDF format for the use of the City of Brampton.