Mississauga

Transportation Impact Study Guidelines

December 2022 (Version 5.1)

MISSISSAUGA

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1 Introduction

1.1 Overview

Transportation Impact Studies (TIS) assess the potential effects of travel demand generated by a proposed development on the transportation network and identify the on and off-site measures required to align the performance of the system with City goals and objectives once the development is built and occupied. These studies support the City's goal of creating an integrated land use and transportation system as expressed in the City of Mississauga Official Plan and Transportation Master Plan (May 2019).

A TIS serves an important role in the development review and approval process. These technical studies help the City in assessing the merits and potential effects of a proposed development and in determining the justification for its approval. Through a TIS, the proponent must demonstrate that the application conforms with A Place to Grow: Growth Plan for the Greater Golden Horseshoe, the Provincial Policy Statement, the Official Plan, the Transportation Master Plan, and other policy documents related to transportation. Specifically, the TIS must show that:

- The proposed development can be well-integrated with the auto, transit, and active transportation networks;
- The transportation system can function safely and efficiently with the proposed development, considering network improvements and Transportation Demand Management (TDM) initiatives to be secured/identified in conjunction with the development proposal;
- The proposed development can be phased, if necessary, to coincide with the implementation of transportation system improvements and TDM initiatives, thereby ensuring supply and demand are balanced over time; and
- The proposed development includes a suitable TDM plan, incorporating all reasonable and achievable measures to facilitate and promote transit, cycling, walking, and ridesharing for trips to and from the subject lands.

All references to the terms "proposed development", "development proposal" and "development application" in this document apply equally to redevelopment initiatives.

In cases where the Transportation Consultant does not follow the guidelines in this document and/or the confirmed scope of work identified through the Pre-Study Consultation, the City of Mississauga reserves the right to return the report for revisions to be made.

1.2 Policy Objectives

As noted above, a TIS helps the City assess if a proposed development aligns with the transportation policy objectives articulated in the Official Plan and Transportation Master Plan, which include:

- The use of multimodal level of service indicators to determine transportation network performance and inform the development of network modification plans;

- Consideration of the effects of development design and adjacent street corridor design on mode choice and multimodal levels of service;
- The requirement for trip generation and TDM programs at developments to be consistent and mutually supportive;
- The requirement for a more comprehensive assessment of network safety for all modes, with a focus on vulnerable road users including pedestrians and cyclists;
- The requirement to integrate TDM measures into development approaches to reduce dependency on cars for local trips and promote transit as a priority for moving people; and
- Consideration of pedestrian circulation to provide all people with the choice to walk, cycle, and use transit in all seasons because it is convenient, connected, desirable, and healthy.

1.3 Regulatory Authority

The Official Plan contains policies enabling the City to require a study when it believes a proposed development may impact the performance of the transportation network (i.e., transit, cycling, pedestrian, or roadway systems). The requirements for pre-consultation and a complete application submission set out in Section 19 Implementation of the Official Plan include the following provisions related to transportation studies:

19.4.3 To provide consistent application of planning and urban design principles, all development applications will address, among other matters:

c. the sustainability of the development to support public transit and to be oriented to pedestrians;

g. the adequacy of the multi-modal transportation systems;

19.4.4 Prior to the submission of a development application, the City may require a meeting with the development proponent and/or their agent.

19.4.5 Some or all of the following studies, reports and/or documents may be required as part of a complete application submission for an official plan amendment, rezoning, draft plan of subdivision or condominium or consent application, dependent on the type of application, the property location and adequacy of services. Submitted material must be satisfactory to the City and relevant agency, if applicable, such as conservation authorities in the case of an Environmental Impact Study. Further, the required material must be deemed satisfactory in the early stages of application review. This list is not inclusive, and other material may be requested when the application is reviewed. The scope of the studies and the terms of reference will be determined at the pre-application meeting prior to application submission, and/or appropriate staff contacts will be provided for scoping purposes. If the requested material is not provided, the application will be deemed incomplete by the City.

- *Transportation Impact Study (including scoped studies such as gapping, signal operations, and/or other relevant traffic issues)*

- *Traffic Safety Impact Study (including access review, sight lines, queuing, gapping, and collisions)*
- *Transportation Demand Management (TDM)*

In implementing the study recommendations, the *Planning Act* authorizes the City of Mississauga to impose conditions when considering land development applications. Additional authority and direction on development conditions comes from the Provincial Policy Statement and other regulatory documents such as the Ontario Building Code, the *Municipal Act*, and the *Accessibility for Ontarians with Disabilities Act*. The City's authority varies by type of development application, with greater latitude for conditions available to staff when considering an Official Plan Amendment, Zoning By-law Amendment and Draft Plan of Subdivision or Condominium Application. Representative conditions related to transportation frequently imposed on developments include, but are not limited to:

- Dedication of property for abutting road, pathway and other transportation rights-of-way that are described in the Official Plan at no cost to the City;
- Design conditions for access to/from the subject development, such as intersection controls, lane arrangements, ramps, curbing, and traffic direction signs; and
- Design conditions for walkways, walkway ramps and all means for pedestrian access.

1.4 Purpose of this Document

The City has prepared these **Transportation Impact Study Guidelines** to outline the process for the preparation of three types of development transportation studies:

- **Transportation Impact Assessment** (TIA), which evaluates the impact of the trips generated by a proposed development on the transportation system. **Chapter 2** specifies the requirements and outline for a TIA;
- **Transportation Demand Management Plan** (TDMP), which provides further information on how to implement TDM through new development. **Chapter 3** presents the requirements and outline for a TDMP; and
- **Pedestrian Circulation Plan** (PCP), which depicts and describes how people will access and move through a proposed development. **Chapter 4** explains the requirements and outline for a PCP.

The guidelines are intended to:

- Provide direction to proponents and their Transportation Consultants on the preparation of a TIS;
- Guide City and other review agency staff and elected officials in their review and assessment of the submitted studies;
- Provide a standard framework and approach for the consistent preparation and objective assessment of a TIS for a development application, ensuring the results will be comparable to other studies carried out in the City;

- Promote a better understanding of the development review process related to transportation for proponents, review agencies and elected officials; and
- Standardize the guidelines, parameters, and requirements to aid Transportation Consultants in the preparation and City staff in the review and assessment of a TIS.

Text highlighted in blue signifies important or summary guidance to the user.

By following these guidelines, the TIS will evaluate the effects of a proposed development on the transportation system in a rational manner and will utilize assumptions consistent with the City's accepted methodologies. This can benefit both the proponent and the City.

1.5 Qualifications

The proponent is responsible for retaining a qualified practitioner to prepare the TIS. The Transportation Consultant must complete, sign, and seal (if appropriate) the **Certification Form** in **Appendix A** and submit the document with the application to ensure compliance with this requirement.

1.6 Pre-Study Consultation

1.6.1 City of Mississauga

Prior to commencing a TIS, the Transportation Consultant is required to contact the City by e-mail (Trans.Projects@mississauga.ca) to confirm the need for a study consistent with the guidance offered in this document. If a more detailed assessment is required, the Transportation Consultant must confirm the proposed scope of work, including:

- The type and scope of TIS to be completed;
- Existing and planned conditions for all modes of transportation;
- Key parameters including the study area, analysis periods, horizon years, and background considerations (e.g., other development applications in the area, growth rates);
- The method of establishing future background travel demand and site generated trips;
- Types of analyses required and methodologies to be used, including software programs;
- Any scope exemptions that would eliminate typical elements of work not relevant to the development proposal;
- Data needed to complete the TIS and how that data should be collected; and
- Any other identified issues.

To expedite the process, the Transportation Consultant must complete and submit the **Pre-Study Consultation Checklist** provided in **Appendix B**. The City will review and comment on the assumptions and provide available transportation data based on information included in the form. A fee may apply to data requests in accordance with the City's policies and practices.

The City may recommend/request the preparation of a Terms of Reference and/or a formal transportation-specific pre-consultation meeting (in person or by phone/virtual meeting) with the

proponent and Transportation Consultant prior to commencing work, depending on the scale of the proposed development, the location of the subject lands, and the type and scope of TIS required.

1.6.2 Peel Region and Ministry of Transportation of Ontario

Proponents may also be required to complete a transportation assessment to the satisfaction of Peel Region and/or the Ministry of Transportation of Ontario (MTO) if the proposed development is located proximate to roads under their respective jurisdictions. In such cases, it is conceivable that the proponent may be required to submit expanded or separate transportation studies to satisfy the analysis and/or submission requirements imposed by these agencies. Proponents (or their Transportation Consultants) are strongly encouraged to contact Peel Region and/or MTO early in the process and prior to commencing a TIS to confirm expectations, including Transportation Consultant qualifications.

1.7 Data Collection

The Transportation Consultant must provide copies of all raw data collected for the TIS as an appendix to the report submission. This includes, but is not limited to, the following:

- Turning movement counts (for all modes);
- Traffic signal timings;
- ATR and AADT counts;
- Collision records;
- Gap study observations;
- Queue studies;
- Proxy site surveys;
- On-street parking inventories and utilization studies;
- Cordon counts;
- Transit ridership and schedule information; and
- Pedestrian and bicycle circulation plans.

The data required for the TIS may be available from the City, Peel Region and/or MTO. The Transportation Consultant should contact the applicable agency at study commencement to request available information.

The City prefers the use of data supplied by agencies to other independent sources, if possible. However, in many instances, original data collection will be required to update information (e.g., traffic counts older than two years) or address data gaps. The proponent will need to obtain this information at their own cost. The Transportation Consultant should confirm the scope and schedule for the data collection program prior to commencing field studies (and preferably during pre-consultation), particularly proposed survey locations, time periods, and dates.

1.8 Interpretation and Applicability

This document outlines general guidelines for the preparation of a TIS for submission to the City of Mississauga. There may be instances where the guidelines and general study assumptions may not be applicable to certain locations or specific types of developments. It should be recognized that the purpose of this document, as noted above, is to provide a framework for the preparation of a TIS and shall not be substituted for good transportation engineering judgement.

Following the guidelines does not relieve the proponent from the obligation to prepare other required studies. This document and process does not supersede the guidelines and standards in effect for roads and highways governed by Peel Region or MTO within Mississauga.

1.9 Study Updates and Lifespan

Users of the guidelines are cautioned that the policies and standards included in this document are relevant at the time of publication. The City may revise the guidelines as necessary and at any time to reflect changes to City policy, industry practice and/or accepted standards. The proponent and/or Transportation Consultant should contact the City and/or check the City of Mississauga website to inquire whether any modifications to this document have occurred since its compilation date to ensure the most current version is being referenced.

Generally, a TIS 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 Transportation Impact Assessment

2.1 Introduction

A Transportation Impact Assessment (TIA) evaluates the impact of trips generated by a proposed development on the transportation system. A well-prepared TIA helps the proponent and/or the City to:

- Quantitatively forecast the transportation impacts created by the proposed development based on accepted practices, not perceptions;
- Determine improvements and mitigation measures needed to accommodate the proposed development;
- Allocate funds more efficiently;
- Relate land use decisions with transportation conditions; and
- Provide a basis for determining the development proponent's responsibility for specific off-site improvements.

The following terminology has been adopted for the guidelines:

- **Transportation Impact Study** – This is a comprehensive TIA, usually required for medium and large-scale developments where greater impacts to the adjacent transportation network are anticipated; and
- **Access Review** – This is a reduced scope TIA, usually required for small scale developments where little or no impact to the adjacent transportation network is anticipated.

The following section details the thresholds and content requirements for a Transportation Impact Study and Access Review.

2.2 Preparing a Transportation Impact Assessment

The typical process for completing a TIA consists of five steps:

- *Step 1 – Screening* determines if a TIA is required, and if needed, the type of TIA.
- *Step 2 – Scoping* establishes the specific requirements for the TIA, defining the study area, horizon years, analysis periods, methodologies, and information requirements to complete the assessment.
- *Step 3 – Forecasting* projects travel demand on the transportation network in the study area for the horizon year(s) of the development proposal, having regard for future TDM opportunities.
- *Step 4 – Analysis* assesses the impacts of the proposed development on the transportation system and identifies measures to address anticipated implications.
- *Step 5 – Reporting* compiles the information from the previous steps into a TIA Study report for submission to the City. The report will also include implementation and monitoring plans.

The contents and extent of the TIA generally depend on the location and size of the proposed development and the conditions prevailing in the surrounding area.

As detailed in Section 1.6, the Transportation Consultant should complete and submit the **Pre-Study Consultation Checklist** provided in **Appendix B**. Steps 1 to 3 of the TIA process are completed together as part of the Checklist, which should be submitted to the City for review and comment before proceeding with Steps 4 and 5.

2.2.1 Step 1 – Screening

A TIA must be completed for all development proposals requiring approval pursuant to the *Planning Act*, including:

- Official Plan Amendments;
- Secondary and Block Plans;
- Zoning By-law Amendments;
- Draft Plans of Subdivision and Condominium; and
- Site Plans.

The proponent must complete the **Pre-Study Consultation Checklist** contained in **Appendix B** to determine the type of TIA required in support of the proposed development. This initial screening identifies the TIA type based on three criteria, or *triggers*:

- *Trip Generation* of the proposed development;
- *Location* of the subject lands, and/or
- *Operational or Safety* concerns on any development and/or boundary street.

The resulting TIA will take one of the three following forms, depending on the anticipated *Trip Generation* of the proposed development and complexity of issues to be addressed. The City reserves the right to determine the need for a TIS, specify the type and scope of a study, define the study area, set analysis parameters, and establish the scope of investigations with each TIS based on its professional judgement despite content in these guidelines that infers to the contrary:

Transportation Impact Study

A **Transportation Impact Study** is required for proposed developments located outside the Downtown designation in the Official Plan which are projected to generate more than 100 peak hour person trips (worst peak hour), thereby satisfying the Trip Generation trigger.

Table 2.1 provides information to assist with the estimation of development-generated trips. For other land use types, estimates of person-trip generation may be made based on average trip generation characteristics presented in the current edition of the ITE *Trip Generation Manual*.

TABLE 2.1: TRIP GENERATION TRIGGERS

Land Use Type	Minimum Development Size
Single-Family Home	50 units
Townhouses or Apartments	100 units
Office	4,000 m^2
Industrial	5,000 m^2
Fast-Food Restaurant or Coffee Shop	100 m^2
Destination Retail	1,000 m^2
Gas Station or Convenience Market	75 m^2

Access Review

An **Access Review** is required for proposed developments that satisfy the Location and/or Operational/Safety triggers detailed below but may not exceed the Trip Generation threshold (i.e., generates 100 peak hour person trips or less). If either trigger is met, the TIA will assess site access provisions and any localized operational and/or safety issues for all modes of transportation. A TDMP and/or PCP may also be requested.

- *Location* – Review the subject site location to determine if the proposed development:
  - Is located within the Downtown designation in the Official Plan;
  - Is in another area designated for more intense development within the City;
  - Is not envisaged by overarching planning documents (ie.g., Official Plan, local secondary plan, Transportation Master Plan) and/or requires an amendment to a secondary plan or the Official Plan to proceed;
  - Requires a new traffic signal to be installed on a City or Peel Region roadway; or
  - Will have a noticeable impact on transit operations.
- *Operational/Safety* – Review development and boundary street conditions to determine if there is an elevated potential for operational and/or safety concerns:
  - Posted speed limits on a boundary street are 60 km/h or greater;
  - Horizontal/vertical curvature on a boundary street limits sight lines at a proposed intersection or driveway;
  - The proposed access point(s) is near other existing driveways or intersections;
  - The boundary street lacks turn lane(s) at the proposed access point(s);
  - A proposed intersection or driveway is within the area of influence of an adjacent traffic signal or roundabout (i.e., within 300 m of intersection in rural conditions, or within 150 m of intersection in urban/suburban conditions) or within auxiliary lanes of an intersection;
  - A proposed intersection or driveway makes use of an existing median break that serves an existing site;

- There is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the proposed development;
- The proposed development includes a drive-thru facility; or
- The vehicular traffic generated by the proposed development results in volume to capacity ratios at a signalized intersection exceeding 0.85 for the overall intersection and/or 1.0 for an individual through or turning movement.

No Additional Study Required

The City may not require a formal study if the proposed development does not satisfy any of the three triggers. In this case, the proponent will submit the **Pre-Study Consultation Checklist** in **Appendix B** to the City with the development application to satisfy the TIA requirement.

The onus is on the proponent to demonstrate that a more detailed TIA is not needed through the screening step. The City must explicitly state a study is not needed in its response to forego this requirement.

2.2.2 Step 2 – Scoping

Table 2.2 outlines the typical requirements for a Transportation Impact Study and an Access Review. Section 2.3 below explains the information contained in the table in greater detail.

The Transportation Consultant must submit the completed **Pre-Study Consultation Checklist** in **Appendix B** to the City for approval prior to commencing the TIA. City staff will be relying on the checklist when reviewing the study report for completeness. If required elements are not included without a detailed explanation in the document, the submitted TIA may be considered incomplete and returned to the Transportation Consultant for revision.

2.2.3 Step 3 – Forecasting

This step generates the future transportation demand estimates required to analyze pre- and post-development network performance to determine if modifications are required to offset anticipated impacts. Future travel demands are forecasted by accounting for development-generated traffic and background travel demands in the horizon year(s) of the proposed development.

If requested through pre-study consultation, the Transportation Consultant shall prepare and submit a Forecasting Memo to the City for approval prior to finalizing the forecasts to ensure that assumptions are acceptable before undertaking analysis in Step 4.

TABLE 2.2: TRANSPORTATION IMPACT ASSESSMENT REQUIREMENTS

Report Element	Chapter 2 Reference	Type of TIA	
		Transportation Impact Study[1]	Access Review
Trip Generation Threshold (Peak Hour Person Trips)		*> 100*	*≤ 100*
Title Page	2.3.1	●	
Cover Letter or Signature Page	2.3.2	●	●
Executive Summary	2.3.3	●	
Table of Contents	2.3.4	●	
Introduction	2.3.5	●	●
Development Description	2.3.6	●	●
Summary of Transportation Planning Policies	2.3.7	○	
Study Area	2.3.8	●	●
Horizon Year	2.3.9	●	
Analysis Periods	2.3.10	●	●
Existing Transportation Networks: • Automobile • Pedestrian, Bicycle and Transit	2.3.11	 ● ●	 ● ○
Observations	2.3.12	●	
Input Parameters and Assumptions	2.3.13	●	
Existing Transportation Conditions: • Automobile • Pedestrian, Bicycle and Transit	2.3.14	 ● ●	 ● ○
General Background Travel Growth	2.3.15	●	
Planned Network Improvements	2.3.16	●	
Background Developments in the Study Area	2.3.17	●	
Future Background Transportation Conditions	2.3.18	●	
Site Trip Generation and Mode Share	2.3.19	●	●
Site Trip Distribution	2.3.20	●	○
Site Trip Assignment	2.3.21	●	○
Future Total Transportation Conditions	2.3.22	●	○
Identification of Mitigation Improvement Measures	2.3.23	●	●
Implementation and Funding of Improvement Measures	2.3.24	●	●
Safety Analysis	2.3.25	●	●
Site Access and Circulation	2.3.26	▲	●
Impacts During Construction	2.3.27	○	○
Community Impacts	2.3.28	○	○
Conclusions and Recommendations	2.3.29	●	●

Legend and Notes: ● Required; ○ May be required (determined on a case-by-case basis); ▲ May not be required for Official Plan Amendments and Secondary or Block Plans

1 A Transportation Impact Study may still be required for a proposed development that does not exceed the *Trip Generation* threshold (i.e., generates 100 peak hour person trips or less) but satisfies the *Location* and/or *Operation or Safety* criteria.

2.2.4 Step 4 – Analysis

Travel Mode Performance and Indicators

The City has historically focused on the performance of vehicular traffic in evaluating level of service (LOS)/capacity on streets. Since no comparable LOS measures existed for other modes of travel, the trade-offs between vehicle delay and its impacts on the quality of travel for other modes have not typically been assessed or explicitly considered in evaluating transportation performance. As a result, the typical outcome of improving level of service has been wider roads with more travel lanes, higher vehicle volumes, and faster vehicle speeds - conditions less conducive to the use of modes other than the automobile.

With the policies of the Official Plan and Transportation Master Plan emphasizing the need for a more integrated, multimodal transportation system, these guidelines take a broader perspective to evaluating LOS and establish performance measures for all modes, including cycling, walking, transit and vehicular. This concept, referred to as Multimodal Level of Service (MMLOS), allows comparison using similar performance metrics for each mode.

Table 2.3 summarizes typical quantitative and qualitative indicators for each travel mode to be evaluated and included in the TIA Study. Using this approach, the quantitative and qualitative evaluation methodologies are applied to assess the LOS for each travel mode separately.

TABLE 2.3: TYPICAL PERFORMANCE INDICATORS BY TRAVEL MODE

Travel Mode	Typical Performance Indicators
Automobile	• Volume-to-capacity ratio (V/C) • Intersection level of service (delay seconds per vehicle) • Queuing • Storage capacity/auxiliary turning lanes • Potential conflicts/weaving/safety issues
Transit	• Access to transit stops, stations, or transfer points • Transit service frequency and boarding volumes • Transit vehicle performance at the intersection approach
Pedestrian	• Facility and connectivity • Designs, gaps, and missing links • Average crossing delay at signalized intersections • Average crosswalk length/crossing distance • Qualitative measure of pedestrian experience • Traffic volume • Traffic speeds • Buffer between sidewalk and traffic lanes
Bicycle	• Bike lane facility and connectivity • Designs, gaps, and missing links • Access to bikeways (distance and time) • Potential barriers

Although the MMLOS methodology enables trade-offs to be made between modes, the individual LOSs should not be combined into one overall measure since the trip purpose, length, and expectations for each mode differ within a corridor. Performance indicators also vary by mode as they measure different factors. That said, the assessment should still examine the combined performance and interaction between modes within a corridor to ensure the recommended mitigation measures and improvements complement each other. For example, as vehicular volumes or speeds increase, LOS for other modes may decrease due to potential conflict and other safety issues. Conversely, if bicycle, pedestrian, or transit flows increase, the LOS for the vehicular traffic stream may decrease. As such, when preparing analyses and recommendations, the Transportation Consultant should keep in mind that not all factors can be improved as the LOS for one mode may affect the others.

Recognizing that MMLOS analysis techniques are somewhat new, the City only requires auto LOS analysis at present. Future updates of the Guidelines will consider the inclusion of MMLOS analysis and outline the required methodologies.

Appendix C summarizes the **Performance Evaluation Requirements** for the auto mode to be assessed through a TIA. Target LOSs have been provided. Where existing or future target LOSs have not been met, it is expected that the Transportation Consultant will recommend reasonable mitigation measures and improvements to achieve the target level of service.

Existing signal timings should be used for existing intersections. Signal timing modifications may be considered as a measure to address capacity or LOS deficiencies.

Analysis Software and Input Parameters

The City will accept the following tools and methods for intersection operational analysis:

- Highway Capacity Software based on the procedures of the *Highway Capacity Manual* (HCM);
- Synchro software using HCM outputs;
- Vistro software based on the procedures of the *Canadian Capacity Guide for Signalized Intersections* (CCG);
- Microsimulation software (e.g., Vissim, Paramics, SimTraffic); and
- Specialized roundabout analysis software (e.g., Rodel, Sidra, Arcady).

The latest version of the analytics software should be used, where applicable.

Prior approval from the City is required to use a software package other than those listed above. Under this circumstance, it should be recognized that the City reserves the right to request that specific intersection analysis is undertaken with one of the above noted software packages, should the verification of results be required.

All input parameters and assumptions should be clearly documented and confirmed to comply with the City's standards and current practices. **Appendix D** lists typical input parameters for conducting intersection capacity analysis using Synchro. The Transportation Consultant must justify and document any proposed deviations from typical values to calibrate traffic models to match existing conditions. See Subsection 2.3.14 for further guidance.

2.2.5 Step 5 – Reporting

The TIA Study report should consist of a main document, supplemented by technical appendices containing detailed analyses as required. The appendices should include 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 parameters.

The TIA Study report should generally adhere to the structure outlined in Section 2.3. Following this format will facilitate more efficient review, discussion, and communication with the City. Relevant figures, graphs and tables should be placed adjacent to the relevant text.

The proponent must submit the final TIA Study report complete with supporting documentation to the City for review with the development application. The City reserves the right to request digital copies of the analysis files.

All information submitted to the City with any TIA Study is within the public domain.

2.3 Transportation Impact Assessment Outline

2.3.1 Title Page

Provide a cover page outlining:

- Company name;
- Project name/title;
- Municipal address/concession block;
- Landowner/applicant name; and
- Date.

2.3.2 Cover Letter or Signature Page

Provide a cover letter or signature page outlining:

- Company name;
- Date;
- Project name/title;
- Municipal address/Concession block;
- Report revision number (if applicable) and titles/dates of related reports;
- Contact information of the qualified Transportation Consultant; and
- Signature of the Transportation Consultant conducting and recommending the study results.

2.3.3 Executive Summary

Provide an executive summary outlining:

- Proposed development, including location, statistics, phasing, type of land use(s) and other background information to help the reviewer understand the context of the development;
- Study/analysis process;
- Key findings and recommendations of the study; and
- Implementation plan for the study recommendations.

2.3.4 Table of Contents

Provide table of contents for:

- Report sections;
- Figures;
- Tables; and
- Appendices.

2.3.5 Introduction

Include an introduction identifying/describing:

- Applicant;
- Site location, with a map or plan illustrating the extent of the proposed development;
- Type of application (Official Plan Amendment, Secondary or Block Plan, Zoning By-law Amendment, Draft Plan of Subdivision or Condominium, Site Plan or other);
- Study scope of work; and
- Acknowledgement of pre-consultation, with a summary of any comments provided by the City. Copies of the **Pre-Study Consultation Checklist** in **Appendix B**, Forecasting Memo and any correspondence, e-mails and/or meeting minutes should be included in an appendix.

2.3.6 Development Description

Provide a suitable scale plan of the proposed development. Include a description specifying (as applicable):

- Municipal address;
- Existing land uses or permitted use provisions in the Official Plan, applicable Official Plan Amendments, the Zoning By-law, etc. for the subject site;
- Type of planning application;
- Relevant Secondary Plan studies, approved and pending subdivisions, as well as the site plans within the study area;

- Proposed land uses and relevant planning regulation;
- Total building size and the size of individual land use components expressed in units related to transportation analysis (e.g., floor area, number of residential units, population, employment, number of parking spaces). Special attention should be paid to gross versus net floor area definitions;
- Building location(s);
- Approximate hours of operations;
- Planned phasing and timing of the proposed development, if applicable;
- Anticipated dates of full and interim (if applicable) occupancy;
- Proposed access points and type of access (full movement, right-in/right-out, turning movement restrictions);
- Proposed parking supply for autos and bicycles; and
- Proposed and loading spaces.

2.3.7 Summary of Transportation Planning Policies

Provide a summary of the relevant transportation related policies in the *Growth Plan for the Greater Golden Horseshoe* (A Place to Grow), the Provincial Policy Statement, the Official Plan, Transportation Master Plan, Cycling Master Plan, and Pedestrian Master Plan specific to the development site or area, and how these policies apply to the proposed development.

2.3.8 Study Area

Define the study area using a combination of maps, figures, and other documentation. The study area will vary based on the size and nature of the development proposal, and the specific considerations for each mode.

Define the study area for auto-based infrastructure to 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. In general, the analysis area should include:

- All roads, ramps, and intersections through which peak hour site traffic comprises at least five percent of the existing capacity on an intersection approach; and/or
- Roads around the development that have an annual traffic growth more than five percent.

Confirm the study area with the City as part of the **Pre-Study Consultation Checklist** in **Appendix B** during pre-consultation and before commencing data collection and analyses. The City reserves the right to establish the study area as may be deemed necessary.

2.3.9 Horizon Years

Analyze future transportation conditions for a horizon year five years from the date of the study unless an earlier date for full occupancy of the project can be identified and approved in advance by City staff.

Horizon years must also be identified for any interim phases of the development. The City may require additional horizon years depending on the magnitude of the development, ranging from a minimum of 5 years after the study date to a maximum of full build-out of the defined study area. This type of longer-range evaluation is generally only required for larger scale projects, with multiple phases.

2.3.10 Analysis Periods

Analyze transportation conditions for the "worst case" combination of site-generated trips plus background volumes across the study area. The critical period is directly associated with the peaking characteristics of both the development-related traffic and volumes already using the transportation system.

Determine the required analysis periods from **Table 2.4**, which summarizes typical peak periods for analysis based on land use designation categories. Typically, the Weekday AM and PM peak hours will be analyzed for residential and employment land uses. In the case of retail, entertainment, religious, institutional and sports facility uses, the Saturday, Sunday or site peak may (also) require analysis. For restaurants, the midday peak hour may have to be analyzed.

TABLE 2.4: TYPICAL PEAK PERIODS FOR ANALYSIS

Land Use Category	Weekday AM Peak	Weekday PM Peak	Weekend/ Saturday	Site Specific
Residential (e.g., single family, townhouse, condominium, apartments, senior homes)	Yes	Yes	No	No
Mixed Use (e.g., ground floor retail and apartments above)	Yes	Yes	Yes	No
Commercial (Retail) (e.g., shopping centre, restaurant, specialty store, supermarket)	No	Yes	Yes	No
Employment (e.g., business park, industrial park, office, warehouse)	Yes	Yes	No	No
Institutional (e.g., school, hospital, church, banquet hall, entertainment centre, community centre)	-	-	-	Yes

Additional analysis periods may be required at the City's discretion to appropriately capture traffic conditions within the study area.

2.3.11 Existing Transportation Networks

Describe the existing transportation system in the study area by mode using a combination of figures and other documentation.

Automobile

Describe the existing automobile transportation system, including:

- Existing roads and ramps, including jurisdiction, classification, number of lanes, and posted speed limit;
- Existing intersections, indicating type of control, lane configurations, turning restrictions, alignment, and any other relevant data (e.g., extraordinary lane widths, grades);
- Existing driveways to adjacent developments (both sides of all roads bordering the site) within 200 m of the proposed site driveway, indicating the land use associated with the driveway;
- Current on-street parking spaces and regulations;
- Locations of critical horizontal and vertical curves and significant grades;
- Current heavy vehicle prohibitions and restrictions;
- Railway crossings;
- Existing area traffic management measures;
- Other transportation facilities, as appropriate; and
- Other large-scale traffic generators such as schools, parks, stadiums, shopping centres and parking facilities.

Transit

Describe the existing transit transportation system, including:

- Existing transit routes, stations and stops;
- Existing transit service levels and frequencies by day of week; and
- Higher order transit including Light-Rail Transit (LRT), Transit Priority Lanes, High Occupancy Vehicle (HOV) Lanes and Bus Rapid Transit (BRT) Lanes.

Pedestrian and Bicycle

Describe the existing pedestrian and bicycle transportation systems, including:

- Existing on-and off-road bicycle facilities and pedestrian sidewalks and multi-use trail networks;
- Location of bicycle parking facilities; and
- Available/existing TDM programs and services serving the subject site.

2.3.12 Observations

Conduct a site visit during peak periods to observe and document existing conditions pertaining to site operation, local road network, access arrangements, local area travel patterns, general traffic operations, transit routes and active transportation facilities. The observation should be carried out concurrently with traffic data collection if applicable. Note lane configurations, speed limits and

other traffic control measures on study area roads. The Transportation Consultant is strongly encouraged to conduct an independent site visit at the time of completing the study.

2.3.13 Input Parameters and Assumptions

Document all assumptions concerning saturation flows, peak hour factors, lost times, lane utilization, traffic signal cycle lengths, signal phasing and signal timings should be documented. The City may request additional clarification or supporting documentation regarding input parameter assumptions or adjustments for both existing and future year analyses. The report should confirm that assumptions are in conformance with City standards and current best practices. Subsection 2.2.4 provides further detail on the City's general input parameters, assumptions, and analysis methods, with **Appendix C** outlining **Performance Evaluation Requirements** and **Appendix D** providing **Typical Synchro Analysis Parameters**.

Confirm the input parameters, assumptions, and analysis methods with the City through the **Pre-Study Consultation Checklist** in **Appendix B** during pre-consultation and before commencing data collection and analyses.

2.3.14 Existing Transportation Conditions

Prepare figures showing existing volumes for each analysis period and mode (if available).

Analyze and describe existing transportation system performance in the study area for each analysis period and mode using a combination of figures and other documentation, as described below. The assessment should examine the combined performance and interaction between modes within a corridor to ensure the recommended mitigation measures and improvements complement each other. The LOS methodologies and software applications described in Subsection 2.2.4 should be applied. Provide a table to summarize the performance results for the four travel modes.

Summarize existing traffic volumes and turning movements, including transit, pedestrian and cyclist volumes and heavy truck movements, for roadways and intersections within the study area. Volumes should be based on the most recent traffic counts available from the City, Peel Region, and MTO.

Collect new counts where existing data is more than two years old or appears to be anomalous or insufficient. If new data needs to be collected, the counts should be conducted on a typical weekday (Tuesday through Thursday) over the following time periods:

- 7 AM to 10 AM;
- 11 AM to 2 PM (as applicable); and
- 4 PM to 7 PM.

New counts should not be conducted during the summer months or during holidays. The City reserves the right to require updated counts and data collection as may be deemed necessary.

As noted in Subsection 2.3.10 counts may be required for other peak periods, such as Friday evenings or Saturday/Sunday afternoons, for certain types of development.

Verify that traffic volumes through study area intersections reflect actual demand observed during the site visit. If required, determine necessary adjustments to LOS calculation to better represent actual conditions. For V/C ratios exceeding 1.00 under existing conditions either:

- Adjust lost time, saturation flow rate, and/or left-turn factor to calibrate base year conditions;
- Acknowledge certain locations are already at capacity and fully built-out (i.e., no further mitigation measures to address deficiencies).

The Transportation Consultant must justify and document any proposed deviations from typical values to calibrate traffic models to match existing conditions. If the minor street approach reports a LOS E or worse, adjustments to the critical gap time specified in the **Typical Synchro Analysis Parameters** in **Appendix D** are required based upon a gap study.

Analyze and describe existing intersection operations using current signal timing parameters obtained from the City and Peel Region (if appropriate). A table should be provided to summarize the performance results. The summary should include V/C ratios, Levels of Service (LOS), average vehicle delays, and queue lengths for overall intersection operations and individual critical movements (as appropriate).

Identify and analyze potential mitigation measures for existing conditions. Any recommendations to improve existing traffic operations should be documented and approved by the City and Peel Region, if necessary, before being used in the analysis to reference the "Existing" scenario. Provide a table to summarize the performance results with mitigation measures.

2.3.15 Growth Rate

Estimate general background traffic growth rates at a corridor level in consultation with the City and Peel Region (if appropriate) through one of the following methods:

- Estimation of roadway growth factors from a calibrated travel demand forecasting model;
- Regression analysis of historical traffic growth; and
- A growth rate based on other area land-use or transportation planning studies.

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

2.3.16 Planned Network Improvements

Identify any potential future transportation improvements that are currently being considered in the study area. Changes to the present or planned transportation network should be determined from the approved City, Peel Region, and MTO capital improvement programs. A realistic assessment of timing and certainty should be made. The impacts of the transportation system changes should be identified, particularly diversion of volumes from other facilities to new or improved facilities should be estimated.

In areas where major improvements to the transportation system are planned, develop and evaluate alternative scenarios to examine the impact of the proposed development with and

without these improvements. The "without" scenario will cover situations where risk factors such as funding and necessary permits may not be available by the horizon year. The Transportation Consultant should consult with the City and Peel Region (if applicable) as part of the **Pre-Study Consultation Checklist** in **Appendix B** to determine if an analysis is required.

2.3.17 Other Planned Developments

Check the City's website for other developments under construction, approved, or in the approval process within the study area occurring by the TIA Study horizon year(s). The developments to include should be confirmed with the City during pre-consultation. A map and table summarizing the development applications should be included. All sources should be clearly documented.

If available, obtain the transportation studies completed for the other developments to determine site generated trip assignments. If not, use the methodologies outlined in Subsection 2.3.20 to estimate trip generation and mode shares, Subsection 2.3.21 to determine trip distribution, and Subsection 2.3.22 to derive trip assignments.

2.3.18 Future Background Transportation Conditions

Estimate future background volumes by adding:

- Existing volumes;
- Travel demand generated by background developments; and
- General background travel growth.

Prepare separate sets of figures for the background growth and other area development components showing future volumes for each horizon year and analysis period and for each mode.

Analyze and describe future background transportation system performance in the study area for each horizon year and analysis period and for each mode using a combination of figures and other documentation. The assessment should examine the combined performance and interaction between modes within a corridor to ensure the recommended mitigation measures and improvements complement each other. The LOS methodologies and software applications described in Subsection 2.2.4 should be applied. A table should be provided to summarize the performance results for the travel modes.

Identify potential mitigation measures for each mode for future background conditions. Provide a table to summarize the performance results with mitigation measures (if appropriate).

2.3.19 Site Trip Generation

Detail appropriate methods to forecast development trip generation for all modes and methods to adjust trip generation including pass-by trips, internal capture, and modal share. Subsections of the report will detail the specific automobile, transit, bicycle, and pedestrian trip generation requirements.

Calculate person trips generated by the proposed development by mode using the seven-step methodology detailed below.

Document and justify all trip generation assumptions and adjustments assumed in the calculation of "new" vehicle trips in terms of previous research or surveys. All assumptions should be in accordance with standard, accepted techniques and based on local conditions. Sources should be documented, and any assumptions considered less than conservative should be justified. Sensitivity analysis should be undertaken where trip generation parameters have the potential to vary considerably and most probable values cannot be readily identified, unless a demonstrated "worst case" situation is assumed.

Provide a table 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 stated. For large developments that will be phased over time, the table should identify each phase separately.

Step 1 – Select Trip Generation Data Source

Select a supported source for the base trip generation rate in the following order:

- Trip generation surveys of similar developments in the City or elsewhere in Peel Region. Surveyed developments should have similar operating and market characteristics as the proposed development;
- "First principles" calculations of anticipated trips to/from the proposed development;
- Trip generation rates (or equations) contained in the latest edition of the ITE *Trip Generation Manual* or in other technical sources from ITE, provided differences in the site nature, size, transit use and land use are accounted for; and
- Other transportation studies in the area or from similar communities

The Transportation Consultant must state the rates selected for all land uses in the TIA Study. Any deviations from recommended values must be justified and documented.

Step 2 – Estimate Total Person Trips Generated by the Proposed Development

Forecast total person trips generated by the proposed development using the base trip generation rate derived through Step 1. If the data is stated in terms of vehicle trips, estimate the automobile mode share associated with the base automobile trip generation rate. Use this automobile mode share and the projected automobie trips forecasted for the development to calculate the total person trips generated by the proposed land uses.

If using ITE *Trip Generation Manual* rates, the data typically represent suburban or low-density development conditions. Consequently, the inherent transit mode shares are typically low. Assume a default 10% non-automobile mode share and average vehicle occupancy of 1.15 for the purposes of translating automobile trips to person trips (i.e., multiply ITE vehicle trip rates by 1.28 to convert to person trip rates).

Step 3 – Determine Existing Mode Shares

Using the most recent Transportation Tomorrow Survey (TTS) data, identify existing mode shares for transit, walking, cycling, automobile passengers and automobile drivers for equivalent trip purposes (i.e., work, school, home-based, etc.) for the Traffic Analysis Zone (TAZ) that contains the proposed development. Data from one or more additional TAZs may be used instead of, or in

addition to, the TAZ containing the proposed development if those other TAZs are more representative and justified as such to the satisfaction of the City.

Step 4 – Set Future Mode Share Targets

Set future mode share targets for the proposed development considering:

- The analysis horizon year and projected build-out year of the proposed development;
- Current and future maturity of the transportation network and different travel options;
- Policy directions and objectives of the City as articulated in the Official Plan, Transportation Master Plan, and other policy documents;
- Proposed development land uses, type, and location; and
- Proposed development design and parking supply.

The future transit mode share target should be based on key determinants of potential transit use, including:

- Land use, built form and development density in proximity to transit corridors;
- Existing and anticipated transit service type and frequency of service in those corridors;
- Number and convenience of transfers; and
- Prevailing and anticipated travel patterns.
- Sources of data and approaches to develop the future transit mode share include:
- Existing published surveys such as the TTS for proxy TAZ household travel information with similar transit service characteristics;
- Surveys of surrogate land uses with similar transit service characteristics and site context; and/or
- Previous transportation planning studies prepared for the study area.

The transit potential estimates should be based on methodologies and parameters that are justified based on previous research or surveys and are to be documented. Sensitivity analyses will be required where estimates may vary due to uncertainties related to any of the key determinants identified above. The analyses should lead to conclusions about the support for and adequacy of existing and future anticipated transit services in the study area.

A similar rationale can be applied in deriving future mode splits for the other non-automoblie driver modes (walking, cycling, and automobile passenger).

Future mode share targets should be consistent with expected infrastructure and service levels for all modes. The Transportation Consultant must identify and confirm changes to transit service required to meet the future transit mode share target with MiWay.

Complete **Table 2.5** and include in the TIA Study to summarize and justify the assumptions.

TABLE 2.5: MODE SHARE ASSUMPTIONS SUMMARY TABLE

Travel Mode	Mode Share		Rationale
	Existing	Target	
Transit			
Walking			
Cycling			
Auto Passenger			
Auto Driver			

Step 5 – Determine Person Trips Generated by the Proposed Development by Mode and Phase

Estimate the person trips generated by the proposed development for all modes for each phase of development based on the future mode share targets.

Where appropriate, reduce the person trip estimates for redevelopment or expansion, where an existing use is being replaced by the proposed development (deduct trips generated by the existing development from the projected development trips) or expanded (add only additional trips generated by the expanded development). Operational analysis of development accesses needs to still consider the total volume of development traffic following redevelopment (i.e., existing + new trips).

Step 6 – Convert Person Trips to Vehicle Trips

Derive average vehicle occupancy from the ratio of auto to auto passenger trips and convert person trips to vehicle trips for the auto and auto passenger modes.

Step 7 – Apply Vehicle Trip Reduction Factors (as appropriate)

Where appropriate, reduce the vehicle trip estimates for:

- *Synergy (or internal capture)* between two or more uses within a mixed-use development accounting for trips internal to the site (deduct trips made within the proposed development from the project development trips). It is important to note that these reductions are applied externally to the site (i.e., at entrances, adjacent intersections, and adjacent roadways), not within the proposed development. The ITE *Trip Generation Handbook* provides guidance to calculate the internal capture rate for different land uses and analysis periods; and
- *Pass-by vehicle trips* making an intermediate stop at the proposed development on the way from an origin to a primary trip destination without a route diversion (deduct trips attracted to the proposed development from the projected development trips). Since pass-by trips are not new traffic added to the road network, the trip adjustments should only be accounted for at intersections immediately adjacent the subject lands and in turning movements into and out of the site. The ITE *Trip Generation Handbook* suggests pass-by trip percentages for different land uses. Any deviations from these recommended values must be justified and documented to the satisfaction of the City.

The adjustments may be applied to trip rates or generated trips as appropriate. If used, the adjustments should be documented within the TIA Study and justified to the satisfaction of the City.

2.3.20 Site Trip Distribution

Distribute the site-generated trips by cardinal direction (i.e., north, south, east, and west). The directions from which trips will approach and depart the proposed development can vary depending on several location-specific factors, including:

- Size and type of the proposed development;
- Surrounding land uses, particularly location of competing developments;
- Distribution of population and employment; and
- Characteristics of the surrounding transportation network.

The trip distribution may be based on one or more of the following data sources:

- Transportation Tomorrow Survey (TTS) data, if applicable;
- Origin-destination surveys;
- Comprehensive travel surveys;
- Output from transportation planning models;
- Existing or anticipated travel patterns;
- Census data;
- Population and employment forecasts provided by the City; and
- Market studies.

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

2.3.21 Site Trip Assignment

Assign the site-generated trips to the transportation network, considering logical routings, current and projected roadway and transit capacities, and travel times. Trip assignments may be estimated using a transportation planning model or manual technique based on knowledge of the study area. Traffic cannot be assigned to private roadways or routed through private lands.

The proponent should not assume existing access rights can be retained with the redevelopment of an existing property. A review of the proposed land use and conditions on the adjacent road network should identify an acceptable access pattern. The Transportation Consultant must document this review in the TIA Study.

Prepare figures showing the assignment of site-generated volumes to the transportation network. Prepare figures illustrating the pass-by traffic volumes (if applicable) to the adjacent road network, as well as to the individual site access locations by direction and by turning movement where required, for each analysis period.

2.3.22 Future Total Transportation Conditions

Derive future total volumes for each horizon year and analysis period by adding the following "layers":

- Total background volumes (Subsection 2.3.18); and
- Site trip assignment (Subsection 2.3.21).

Develop separate estimates for the scenarios with and without planned major improvements to the transportation system, if appropriate (see Subsection 2.3.16).

The "without" scenarios will cover situations where risk factors such as funding and necessary permits may not be available within the horizon year. The Transportation Consultant should confirm with the City and/or Peel Region to determine the appropriateness and requirements of these scenarios.

Prepare figures showing future total volumes for each horizon year and analysis period and for each scenario. Include pedestrians crossing each intersection leg if appropriate.

If appropriate, adjust projected background and/or site-generated automobile trips to create a more realistic representation of future conditions. The bottom-up forecasting methodology employed in a TIA Study occasionally results in the estimation of future peak hour auto demands that cannot physically be carried on the planned road network. Future peak hour serviced demand on the transportation network, by definition, cannot exceed future capacity. In such cases, the actual outcome is that the resulting congestion would lead to changes in travel behaviour – namely, a reduction in some peak hour demand, a spreading of peak hour demand to off-peak hours, a rerouting of demand to alternative routes, and/or an increase in non-auto mode shares. This applies to background and/or site-generated trips. Apply the following process to rationalize demands:

- Identify any locations and approaches where future total auto demand is projected to exceed capacity, and what reductions in peak hour approach auto volumes would be required for demand to meet capacity;
- Identify how the required reductions would be expected to be attributed to background and site-generated travel demands;
- For background travel demands, review potential to shift auto demand to alternative routes, modes, or times; and
- Prepare a detailed justification for the shifts in auto demands and discuss with the City.

Analyze and describe future total transportation system performance in the study area for each horizon year and analysis period and for each scenario using a combination of figures and other documentation, as described below. The assessment should examine the combined performance

and interaction between modes within a corridor to ensure the recommended mitigation measures and improvements complement each other. The LOS methodologies and software applications described in Subsection 2.2.4 should be applied.

Evaluate the operation of all signalized and un-signalized intersections within the study area affected by site generated traffic volumes for all horizon years and analysis periods and for each mode and scenario. The adequacy of operations before and after the proposed development will be determined based on the analysis methodology and the thresholds stated below.

Provide a comprehensive summary table to summarize the performance results, comparing the existing, future background and future total conditions. The summary should include V/C ratios, LOS, average vehicle delays and queue lengths for overall intersection operations and individual critical movements (as appropriate).

Other considerations in completing the analyses include:

- Existing signal timings should be used for existing conditions at intersections. Signal-timing modifications may be considered as a measure to address capacity or level of service deficiencies for the future background and/or future total conditions.
- Conventional signal timing plans should be used, with all proposed adjustments to traffic signal timing, phasing and cycle lengths evaluated in terms of pedestrian crossing time, effect on queue lengths, adequacy of existing storage, and effects on the existing signal coordination. The analysis should incorporate adequate crossing time for pedestrians at an acceptable walking speed.
- Supplementary surveys or analyses may be needed to assess saturation flows, gap availability, projected queue lengths and possible blocking queues.
- All assumptions used in the analysis concerning lane configurations and use, pedestrian and cyclist activity, saturation flows, cycle lengths, phasing and timing, utilization of the inter-green phase and other relevant parameters should be documented in an appendix to the report. The results of all operational analyses (typically in the form of software output reports) should also be provided in the appendix.

Assess potential for community impacts, such as traffic infiltration, overflow parking and light intrusion.

2.3.23 Identification of Mitigation Improvement Measures

Provide a summary table of all impacts for all horizon years, analysis periods and scenarios.

Identify impact mitigation measures for all horizon years, analysis periods and scenarios. List the proposed measures in the table summarizing the impacts.

Roadway Capacity

Any physical and operational road network deficiencies and/or traffic control inadequacies identified in the TIA need to 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.

Identify required modifications and improvements of signalized and un-signalized intersections where future background or future total auto and/or transit volumes exceed the **Performance Evaluation Requirements** in **Appendix C**. The City may consider modifications to these threshold values for development proposals located within designated intensification areas.

Identify any changes in traffic control, changes to existing signal timings, evaluation of roundabouts required to support the proposed development. Consider pedestrians, cyclists, and transit for any intersection improvements (e.g., signal timings). It should be noted that signalized intersections with high left- and right-turn traffic volumes, long exclusive right-turn lanes, channelized right turns, and wide intersections can negatively impact pedestrians and cyclists.

For all intersections identified as "critical", determine the contribution of the development proposal to the situation, possible remedial measures, a recommended solution, and the effectiveness of the solution towards resolving the situation. In general, the objective is to ensure that no new "critical" movements are created by the proposed development and that "critical" movements that exist without the addition of site-generated traffic are not worsened by the development proposal.

Examine all exclusive turning lanes used by site-generated traffic to ensure adequate storage exists. Differentiate turn lanes for site access from general roadway improvements (development versus general benefit).

Evaluate all proposed new traffic signals in terms of signal warrants, distance from other signals, effects on existing signal coordination, likely timing of implementation, sightlines, etc.

Evaluate all proposed adjustments to traffic signal timing, phasing, and cycle lengths in terms of pedestrian crossing time, effect on queue lengths, adequacy of storage and effects on the existing signal coordination, if applicable.

Neighbourhood Traffic Infiltration

If the proposed development relies on local roads or minor collectors for access to/from the subject lands, assess whether the addition of development-related traffic would change the existing road classification (i.e., role and function), and if future volumes are projected to increase by greater than five percent, determine if:

- Changes to the development access scheme and routes could reduce or eliminate use of local roads and/or minor collectors for access; or
- Neighbourhood Traffic Management (NTM) measures should be introduced to mitigate impact of development traffic.

If development impacts cannot be avoided, prepare a **Neighbourhood Traffic Management Plan** for impacted roads.

Transportation Demand Management Plan

Prepare a **Transportation Demand Management Plan** detailing the policies, programs, infrastructure improvements and/or services to reduce reliance on and aid in mitigating the potential impacts of motor vehicle traffic. Refer to Chapter 3 for the requirements.

2.3.24 Implementation and Funding of Mitigation Improvement Measures

Prepare implementation and monitoring plan detailing the recommended mitigation measures, timing for implementation, funding allocations, criteria for monitoring and assessing whether the measures address impacts, and potential remedial actions if the mitigation measures do not achieve the intended effect.

2.3.25 Safety Analysis

Address potential safety issues associated with the following, as applicable:

- Weaving;
- Merging;
- Corner clearances;
- Sight distance;
- Vehicle-pedestrian/cyclist conflicts;
- Traffic infiltration;
- Access conflicts;
- Pedestrian and cyclist movements;
- Heavy vehicle movement conflicts;
- School crossings;
- Transit operational conflicts; and
- Any other issue identified by the City or Transportation Consultant.

Where the proposed development is in the vicinity of an intersection or roadway with identified safety problems, existing collision data (available from the City) must be reviewed and an assessment of the impact of the proposed development provided.

2.3.26 Site Access and Circulation

Site Access

Generally, it is preferable to minimize the number of private site accesses to municipal roads to reduce delays, decrease turning conflicts, and maintain the integrity of the road network. Site access should be located on minor roads, wherever possible. The preference of the City is one site access per development. Additional site accesses would be subject to traffic analyses justifying the need for the access(es) to improve safety, flow, and/or circulation, and not on design preference.

The locations of access points must align with existing intersections and/or opposing access points wherever possible. Where this is not possible, access points must be adequately spaced from both adjacent roads and access points to adjacent properties. The number of exit lanes, radii and vehicle storage should be appropriate to accommodate site generated traffic demands. The clear throat length at the access must be sufficiently long to minimize conflicts between site traffic and roadway users within the municipal right-of-way.

Evaluate all site access points on City and Peel Region roads in terms of capacity, safety (for all road users), vehicular & pedestrian sight distance, location, corner clearance, alignment, clear throat distance, and adequacy of queue storage capacity, based on the Transportation Association of Canada (TAC) *Geometric Design Guide for Canadian Roads* or other City-approved document. The evaluation should follow the same approach and methodology as for the signalized and un-signalized intersections described above.

Evaluate proposed access points with respect to existing access points and intersections, on-street weaving problems, need for acceleration or deceleration lanes and pedestrian and cycling safety. Assess queue lengths to ensure adequate storage.

Site Circulation Review

Review the on-site circulation plan for each travel mode. Ensure proper integration between pedestrian walkways, cycling paths and transit routes and vehicular access to development. Review the layout of the parking area and pedestrian desire lines for the development to assess whether conflicts exist.

Prepare a **Pedestrian Circulation Plan** outlining the path that pedestrians will take to access the adjoining pedestrian network and nearby transit stops. Refer to Chapter 4 for the requirements.

Analyze vehicular site circulation to demonstrate satisfactory maneuverability, sight distances, and clear throat distances to avoid any possible queuing onto public right-of-way, especially as related to drive-through operations. **Table 2.6** lists the design vehicles from the TAC *Geometric Design Guide for Canadian Roads* to apply in the assessment of different conditions. Analyze on-site intersections like external driveways. Identify any required turning or other restrictions.

TABLE 2.6: DESIGN VEHICLES FOR SITE CIRCULATION REVIEW

Condition	Recommended TAC Design Vehicle
General on-site parking and circulation systems	Passenger Car (P)
Waste collection vehicle access and circulation	Heavy Single Unit Truck (HSU)
Emergency vehicle access and circulation, including fire routes	Pumper Fire Truck
Courier and delivery truck loading facilities and access	Light, Medium or Heavy Single Unit Truck (LSU, MSU or HSU) depending on conditions
Transport truck swept path analysis (for developments that receive deliveries (e.g., gas stations) or expect trucks as customers (e.g., fuel or eating establishments))	WB-20 Tractor Semi-Trailer Truck

It must be ensured that all service and delivery design vehicles can enter the site in a forward motion, turn around on private property, and exit the site in a forward motion. Reversing of vehicles to/from the municipal road allowance is not permitted.

Identify locations for snow storage on site and assess potential implications for parking and access.

Auxiliary Turn Lanes

Assess the need for exclusive left- and/or right-turn lanes at proposed access locations based on the following criteria.

- *Left-Turn Lanes* – Refer to the MTO *Design Supplement for the TAC Geometric Design Guide for Canadian Roads* for left-turn lane volume warrants. A left-turn storage lane may be considered at locations where four or more collisions related to left turns occur per year or where six or more occur within a period of two years, provided the collisions are of a type that could reasonably be expected to be eliminated by provision of a left-turn lane. The minimum storage length for the collision warrant is 15 metres.
- *Right-Turn Lanes* – In general, an exclusive right-turn lane should be considered when the volume of right-turning vehicles is between 10 to 20 percent of the through volume, subject to a minimum of 60 vehicles per hour in the design hour. Design speed should be considered when determining right-turn requirements. The TAC *Geometric Design Guide for Canadian Roads* recommends the use of an exclusive right-turn lane when the volume of decelerating or accelerating vehicles compared with the through traffic volume causes undue hazard. Level of Service, operating conditions, and the safety of vulnerable road users must also be considered.

Adequate spacing should be provided between access points to avoid potential turn lane overlaps. All design standards must be in conformance with those outlined in latest version of the TAC *Geometric Design Guide for Canadian Roads*.

Provide a pavement marking and signage plan for the roadway(s) along the frontage of the proposed development showing both existing and proposed lane markings and traffic control devices if auxiliary turn lanes are required.

Traffic Control Devices

Evaluate the need for traffic control signals, all-way stop control and/or other traffic control devices at proposed access locations based on the warrant criteria specified in Ontario Traffic Manual (OTM) Book 12 – Traffic Control Devices for traffic control signals and Book 5 – Regulatory Devices for all-way stop control. Where appropriate and in consultation with City staff, roundabout feasibility studies should be conducted.

Sight Distance

Evaluate sight lines at each access point and at each intersection where a new road is proposed to ensure safe conditions in accordance with Decision Sight Distance as identified in the TAC *Geometric Design Guide for Canadian Roads*.

2.3.27 Impacts During Construction

Consider the potential for transportation impacts during the construction phase, such as, but not limited to: lane closures, sidewalk closures, multi-use trail closures, bicycle lane closures, lane/shoulder widths changes, and the need to move or temporarily relocate transit stops.

Examine the operational and safety implications of construction-generated traffic, including truck movements to and from the site and worker traffic and parking.

Develop a strategy to address the impacts.

2.3.28 Community Impacts

Include a section in the report to address Community Impacts. This section shall include summary statements outlining the resulting traffic increases to the critical streets, movements and intersections. Comments or concerns from the community through future public meetings and engagements that are related to traffic shall also be addressed in this section.

2.3.29 Conclusions and Recommendations

Present a summary of the key findings with respect to the transportation impact of the proposed development and the recommended improvements if necessary. Provide detailed recommendations regarding on-site/off-site roadway improvements, site access, site circulation, and TDM measures.Structure recommendations for improvements within appropriate time perspectives, with sensitivity to the following issues:

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

3 Transportation Demand Management Plan

3.1 Introduction

3.1.1 Overview

The chapter provides a framework for assessing, identifying, and implementing Transportation Demand Management (TDM) opportunities through new development. The framework is intended to supplement existing guidelines by highlighting opportunities for development proponents to support TDM in a way that is relevant to their project. **It is not intended to be prescriptive, replace legislative or zoning requirements, nor serve as a formal design guideline.**

TDM measures are typically integrated into new development in a phased approach during pre- and post-occupancy through urban design, site development, parking management, and program development. Proponent requirements are one mechanism used to achieve implementation and are most often reflected in development agreements and/or specific site and building guidelines and resulting zoning requirements. They set standards for program-oriented travel demand policy and provide for TDM-friendly site design standards, identified either through a **Transportation Demand Management Plan** (TDMP) or through parking reductions and elevated parking management practices.

The following terminology has been adopted for the guidelines:

- **TDM Scheme** – This is a comprehensive TDMP, usually required for medium and large-scale developments where greater impacts to the adjacent transportation network are anticipated; and
- **TDM Statement** – This is a reduced scope TDMP, usually required for small scale developments where little or no impact to the adjacent transportation network is anticipated.

Subsection 3.2.2 details the thresholds and content requirements for a TDM Scheme and TDM Statement.

3.1.2 What is Transportation Demand Management?

TDM is a set of strategies that results in more efficient use of the transportation system. Effective TDM results in more efficient use of the transportation system by influencing travel behaviour by mode, time of day, frequency, trip length, regulation, route, or cost.

TDM manages the demands placed on transportation infrastructure using policies, programs, infrastructure improvements, and/or services to influence travel behaviour. TDM encourages sustainable travel choices by supporting alternatives to driving alone.

Successful TDM measures lead to a reduction in the number of single occupant vehicle (SOV) trips on City roads. There are several benefits to the City and residents when TDM measures are effective, including:

- *Transportation* – Fewer cars on the roadways leads to less congestion and a more inviting environment for walking and cycling. A reduction in automobile trips also benefits the life cycle of transportation infrastructure.
- *Environmental* – Reducing SOV trips and encouraging the use of non-automotive modes of transportation will reduce the amount of greenhouse gas emissions (GHG) leading to cleaner air and better community health. Encouraging the use of active transportation or public transit can significantly reduce environmental impacts such as urban heat island effect, excess stormwater runoff, idling in congested traffic, and levels of particulate matter.
- *Economic* – Current and future generation of workers do not necessarily want to drive their cars to work every day. By ensuring that there is a connected network of bus routes, active transportation facilities and teleworking program support, businesses can attract the best and brightest of the workforce while maintaining their location in the City. TDM can also help families reduce or eliminate their car usage and related costs.
- *Social* – Walking, cycling, and taking public transit increases social connections and allows residents to feel a sense ownership for their community. TDM also helps to improve overall community health and physical activity levels by decreasing the volume of cars on roadways. Additionally, TDM increases equitable access to transportation particularly for those who do not work or cannot afford to own a private vehicle but still have mobility needs.

TDM measures are aimed at influencing land use patterns, development design, parking availability and cost, and/or the relative cost, convenience, and availability of other travel modes to reduce reliance on motor vehicles. These strategies can be divided into two categories:

- *Pre-occupancy* – Measures implemented in the design and construction of the development; and
- *Post-occupancy* – Measures implemented once the development is operating.

Actions taken pre-occupancy can influence how attractive, convenient, and safe travel by modes other than the single-occupant vehicle will be once the site is developed and occupied. At this stage, the site can be designed to better facilitate travel by walking, cycling and transit, while ensuring sufficient vehicle parking is provided to meet but not exceed demand. The City also has greater influence on their implementation than post-occupancy measures. Offering incentives after the development is completed can influence travel behaviour but will not be as effective if the site and its surroundings are oriented to travel by automobile.

TDM is one of the tools that municipalities are using to create a vibrant and sustainable community. Using policies and programs to make active and sustainable transportation more convenient, a TDM approach to transportation can deliver long-term environmental sustainability, improve public health, create stronger communities, and build more prosperous and livable cities.

3.1.3 Benefits of TDM for Development Proponents

There are many potential benefits to pursuing TDM within development projects. These benefits will vary by type of development, location, and context, but in simple terms may include:

- Opportunities to build at higher densities, as sustainable modes maximize the use of existing infrastructure;
- Lower development costs by reducing parking requirements and the number of driveway entrances to be built;
- Using space that would be directed to additional parking to supply additional units and building amenities;
- Access to changing markets and customers who desire transportation alternatives; and
- Support for LEED accreditation (building or neighbourhood level).

3.1.4 Strategies to Encourage Implementation

The City can provide incentives to reduce or offset the cost of implementing TDM programs and TDM-supportive infrastructure to foster proponent support. For the incentive to be successful, it should:

- Be measurable over time;
- Offer legal recourse, where possible;
- Increase the desirability of the site;
- Be easy to implement and monitor; and
- Be sustainable to implement over time.

The following incentives can be used to encourage proponent participation in TDM programs in Mississauga:

- *Reduced Parking Requirements* – Reduced on-site parking requirements can lower development costs and yield significant cost savings that can be used to implement TDM programs and install TDM supportive infrastructure. Parking reductions can also encourage compliance with TDM requirements, as failure to implement promised TDM programs could result in a parking shortage. However, there is potential for unmet parking demand to spillover from the site, resulting in visitors and employees parking on adjacent streets or at nearby developments. The onus is on the Proponent to demonstrate that sufficient on-site vehicular parking spaces will be provided to meet demand.
- *Reduced Traffic Impact Mitigation* – Vehicle trip generation estimates for new development can be adjusted based on the anticipated reduction impacts of planned TDM programs. In some instances, this may allow proponents to avoid or defer roadway improvements. The financial benefits could be significant depending on the project. However, should anticipated vehicle trip reductions not be achieved, levels of service on adjacent roadways and intersections could be adversely affected.
- *Increased Density* – Allowing density intensification for proponents who implement TDM measures will increase leasable and saleable space. The revenue generated by the increase in leasable or saleable space can be used to implement TDM programs and install TDM supportive infrastructure. Should anticipated vehicle trip reductions not be achieved in this scenario, resulting vehicle trip generation could negatively impact LOS on adjacent roadways and intersections.

- *Improved Local Transit Service* – The City can encourage development and the implementation of TDM through the provision of transit service to new developments. Transit service can increase the effectiveness of TDM programs and enhance the attractiveness of new developments to lessees and purchasers.
- *Membership in a Transportation Management Association* – The City can encourage or mandate participation in a TMA. By continuing to fund membership in a TMA, proponents will only have to implement the minimum requirements for TDM. Additionally, programs offered by TMAs may make the site more appealing to employers, which would make leasing and sales easier.

It is best to provide incentives based on project phasing. For example, if a development achieves certain vehicle trip reductions after constructing its first phase, parking reductions would be allowed in subsequent phases. The same process could apply for vehicle trip reductions associated with TIAs.

3.2 Developing a Transportation Demand Management Plan

3.2.1 Need for a Transportation Demand Management Plan

As part of the City's approach to integrating TDM into the development approvals process, proponents must prepare a TDMP as part of a complete application for all development proposals. The need and scope for the TDMP should be confirmed with the City as part of the **Pre-Study Consultation Checklist** provided in **Appendix B.**

3.2.2 Types of Transportation Demand Management Plans

When a TDMP is required, the document will typically take one of two forms (or levels), depending on anticipated trip generation by the proposed development. Sites expected to generate fewer trips will likely offer less opportunities for TDM, so reporting requirements can be reduced. The Transportation Consultant should confirm the TDMP level and scope of work with the City through pre-study consultation.

TDM Statement

For developments forecasted to generated less than 100 new peak hour person trips or equivalent (worst peak hour), the Transportation Consultant must prepare a **TDM Statement** outlining TDM measures that will be incorporated into the proposed development. The document will take the form of a letter report or a component/chapter of a TIA Study report, where appropriate.

TDM Scheme

For developments forecast to generate 100 or more new peak hour person trips or equivalent (worst peak hour), the Transportation Consultant must prepare a more detailed plan outlining TDM initiatives (including supporting documentation), that will be incorporated into: the proposed development; projected reductions in trips; and proposed actions for future monitoring and evaluation. The **TDM Scheme** will typically form a chapter of a TIA Study report, although on occasion a standalone report may be required.

A TDM Scheme may still be required for proposed developments anticipated to generate 50 or fewer peak hour person trips, depending on:

- Geographic/growth area;
- Amount of proposed parking;
- Number of employees; and
- Number of residents.

3.2.3 Reporting

The TDMP report should consist of a main document supplemented by technical appendices containing detailed analyses as required. If the TDMP is included as part of a TIA Study report, the TDMP should form a separate chapter.

The TDMP report should generally adhere to the following structure (described in further detail in Section 3.3):

- Cover letter or signature page;
- Introduction;
- Site development and description;
- Assessment of TDM environment;
- Identification of potential TDM measures;
- Implementation strategy; and
- Monitoring and adaptive management strategies (TDM Scheme only).

The completed **Transportation Demand Management and Pedestrian Circulation Checklist** provided in **Appendix E** must also be included. The checklist is used to assess how well TDM initiatives are addressed in the development application.

Following this format will facilitate more efficient review, discussion, and communication with the City. Relevant figures, graphs, and tables should be placed adjacent to the relevant text.

If standalone, the final TDMP report complete with supporting documentation should be submitted to the City for review with the development application.

All information submitted to the City with any TDMP is within the public domain.

3.3 Transportation Demand Management Plan Outline

3.3.1 Cover Letter or Signature Page

For standalone TDMPs (i.e., not a component/chapter of a broader TIA report), include a cover letter or signature pages outlining:

- Company name;

- Date;
- Project name/title;
- Municipal address/Concession block;
- Report revision number (if applicable) and titles/dates of related reports;
- Contact information of the qualified transportation specialist; and
- Signature of the Transportation Consultant conducting and recommending the study results.

3.3.2 Introduction

For standalone TDMPs (i.e., not a component/chapter of a broader TIA report), include an introduction identifying/describing:

- Applicant;
- Site location, with a map or plan illustrating the extent of the proposed development;
- Type of application (Official Plan Amendment, Secondary or Block Plan, Zoning By-law Amendment, Draft Plan of Subdivision or Condominium, Site Plan or other); and
- Acknowledgement of pre-consultation, with a summary of any comments provided by the City.

3.3.3 Site Development and Description

For standalone TDMPs (i.e., not a component/chapter of a broader TIA report), describe the existing and proposed land uses and site characteristics, including:

- Current zoning of the site, proposed zoning (if applicable), and any previously approved applications that altered the legally required number of on-site parking spaces;
- Description of the existing land use and proposed change in land use (redevelopment sites only), or proposed new land use, and the adjacent land uses that may be impacted such as public parking facilities;
- Land use details such as the existing tenants, proposed tenants, and gross floor area including the identification of any vacant space that may be utilized in the future;
- Existing parking supply as shown in an approved site plan and confirmation the existing site conditions reflect this plan (redevelopment sites only);
- Proximity of the site to public transit service and active transportation facilities (i.e., cycling lanes, sidewalks, trails, etc.); and
- Any existing TDM programs or initiatives in place.

3.3.4 Assessment of TDM Environment

Assess the TDM environment at the time of build-out (e.g., proximity to transit, sidewalks, cycling infrastructure, proposed parking (auto and bicycle), and access to a local Transportation Management Association (TMA)).

Evaluate TDM needs and opportunities specific to the project site.

3.3.5 Identification of Potential TDM Measures

Provide a table and short discussion on the use and applicability of potential TDM measures, including both supportive infrastructure (hard) and programming (soft) measures.

Develop a table and short discussion illustrating the expected effectiveness of specific TDM measures (high/medium/low) based on available research, required resources (significant/ moderate/none), and party responsible for implementation (developer/building owner/occupant/ TMA/combination). The **Transportation Demand Management and Pedestrian Circulation Checklist** in **Appendix E** provides information on potential measures.

Match the most appropriate TDM measures (infrastructure and programs) to the context that will provide the most significant impact (justification required if lower impact measures are chosen). Consideration of complementary measures and monitoring should be included.

Develop a list of candidate TDM measures (for plan stage and for built project).

3.3.6 Implementation Strategy

Provide instructions for implementation, identifying:

- Proposed TDM measures with estimated implementation and ongoing costs;
- Location and/or applicability of proposed measures;
- Benefitting parties;
- Implementation responsibility:
  - Proponent responsible for on-site physical measures
  - Off-site (hard and soft) measures may be funded by proponents but implemented by the City
  - On-site (soft) measures responsibility of building operations/management possibly in coordination with TMA;
- Target audience for TDM measures; and
- Indication of how the measures will support the overall strategy.

3.3.7 Monitoring and Adaptive Management Strategies

For TDM Schemes, provide guidance on what monitoring and adaptive management strategies should be included in the TDMP including:

- A monitoring period, monitoring/reporting structure and responsibility;
- Projected trip reductions for TDM measures, with reference material (e.g., reports, studies);
- Recommended performance measures (e.g., number of TDM programs implemented, membership with TMA, results of surveys showing travel mode share among occupants, parking utilization); and

- Guidance on adaptive management plans that outline additional TDM measures and expected outcomes of those additional measures if performance targets are not being met.

3.3.8 TDM Checklist

Complete and attach the **Transportation Demand Management and Pedestrian Circulation Checklist** provided in **Appendix E**.

4 Pedestrian Circulation Plan

4.1 Introduction

A **Pedestrian Circulation Plan** (PCP) depicts and describes how people will access and move through a proposed development. Since all trips begin and end with an individual walking, providing a well-designed pedestrian network within a proposed development is crucial. Major considerations in developing walkable, connected neighbourhoods, and creating a pedestrian-oriented environment include:

- Creating safe pedestrian facilities at all pathways and while crossing intersections;
- Providing adequate separation between pedestrian and vehicular facilities;
- Remaining sensitive to the needs of persons with physical challenges; and
- Completing missing pedestrian linkages within and immediately adjacent to the development to create connectivity.

The purpose of a PCP is to demonstrate a proposed development complies with relevant walkability and accessibility policies expressed in the Official Plan, Transportation Master Plan, and other City documents. A PCP generally includes a description of the scope and intensity of the proposed project, a summary of the projected impacts, and any required mitigation measures to ensure that the surrounding pedestrian network can safely accommodate the proposed development. A well-prepared PCP helps the proponent and City assess the pedestrian realm of a proposed development more efficiently and ensure it is consistent with municipal goals and objectives.

4.2 Developing a Pedestrian Circulation Plan

4.2.1 Need for Pedestrian Circulation Plan

Pedestrian-friendly development encourages people to walk more. When people walk more, they are more physically fit and have fewer health problems. Walking more and driving less also reduces greenhouse gas emissions and results in other environmental benefits. In addition, good pedestrian design brings economic benefits as walkable places attract consumers.

Consistent with this direction, proponents are required to prepare a PCP as part of a complete application for all development proposals. The PCP may be prepared in conjunction with a TIA or TDMP, where appropriate. The preferred approach should be determined with City staff as part of the **Pre-Study Consultation Checklist** provided in **Appendix B.**

4.2.2 Pedestrian-Friendly Site Design Requirements

A well-designed site provides circulation systems for all modes of transportation, considering pedestrians first. The pedestrian circulation system should be designed to serve natural desire lines and minimize potential conflicts between vehicles, pedestrians, and cyclists. Generous sidewalks, pedestrian corridors, plazas, curb extensions, accessibility features, pedestrian signals, marked

crosswalks, special paving, street trees and landscaping, furnishings, public art, pedestrian scale lighting, and wayfinding are frequent elements of pedestrian friendly developments. Specific features to incorporate include:

- Delineated walkways through parking lots;
- Connections to neighbourhoods and surrounding areas;
- Easy to identify building entrances;
- Convenient and safe access to transit and adjacent sidewalks;
- Alignment of walkways for convenience and reduced travel distances;
- Accessible routes of travel to and from the site, as well as throughout the site;
- Safe and direct crossings of roads and other vehicle circulation routes;
- Absence of barriers to pedestrian travel (e.g., walls, ditches, landscaping, roads without safe crossings); and
- Pedestrian-friendly architectural design (e.g., awnings, active frontages along streets, visible and well-lit building entrances, etc.).

The **Pedestrian-Oriented Site Design Prompt List** in **Appendix F** provides a convenient reminder for site designers and reviewers of the important considerations in designing pedestrian-oriented development.

4.2.3 Reporting

The PCP report should consist of a main document and a drawing illustrating circulation patterns and pedestrian-oriented features, supplemented by technical appendices containing detailed analyses as required. If the PCP is included as part of a TIA Study report, the PCP should form a separate chapter.

The PCP report should generally adhere to the following structure (described in further detail in Section 4.3):

- Cover Letter or Signature Page;
- Introduction;
- Pedestrian Circulation Summary; and
- Plan Drawing.

Following this format will facilitate more efficient review, discussion, and communication with the City. Relevant figures, graphs, and tables should be placed adjacent to the relevant text.

If standalone, the final PCP report complete with supporting documentation should be submitted to the City for review with the development application.

All information submitted to the City with any PCP is within the public domain.

4.3 Pedestrian Circulation Plan Outline

4.3.1 Cover Letter or Signature Page

For standalone PCPs (i.e., not a component/chapter of a broader TIA report), include a cover letter or signature pages outlining:

- Company name;
- Date;
- Project name/title;
- Municipal address/Concession block;
- Report revision number (if applicable) and titles/dates of related reports;
- Contact information of the qualified Transportation Consultant; and
- Signature of the Transportation Consultant conducting and recommending the study results.

4.3.2 Introduction

For standalone PCPs (i.e., not a component/chapter of a broader TIA report), include an introduction identifying/describing:

- Applicant;
- Site location, with a map or plan illustrating the extent of the proposed development;
- Type of application (Official Plan Amendment, Secondary or Block Plan, Zoning By-law Amendment, Draft Plan of Subdivision or Condominium, Site Plan or other); and
- Acknowledgement of pre-consultation, with a summary of any comments provided by the City.

4.3.3 Pedestrian Circulation Summary

Identify all pedestrian linkages through, within, and around the perimeter of the site including connections made to adjacent sites, through parking areas and to local transit amenities.

Identify how and where the needs of a pedestrian are accommodated throughout the site, including persons walking and cycling, and those with disabilities.

Identify the location and materials to be used for all pedestrian linkages.

Complete and attach Category A (Pedestrian Circulation) of the **Transportation Demand Management and Pedestrian Circulation Checklist** provided in **Appendix E** if required (i.e., checklist is not required for TDMP per Chapter 3).

4.3.4 Plan Drawing

Provide figure(s) illustrating the pedestrian circulation on site, highlighting pedestrian crossing facilities, walkways, sidewalks, multi-use trails, and critical points for potential vehicle-pedestrian conflicts. Note other pedestrian-oriented features.

Appendix A

Certification Form

Individuals submitting reports will be responsible for all aspects of development-related transportation assessment and reporting, and undertaking such work, in accordance and compliance with the City of Mississauga's Official Plan, Transportation Master Plan, and Transportation Impact Study Guidelines.

By submitting the attached report (and any associated documents) and signing this document, I acknowledge that:

- I have reviewed and have a sound understanding of the objectives, needs, and requirements of the City of Mississauga's Official Plan, Transportation Master Plan, and the Transportation Impact Study Guidelines as they apply to this submission;
- I have sound knowledge of industry standard practices pertaining to the preparation of development-related transportation study reports;
- I have substantial experience (more than five years) in completing development-related transportation studies and strong background knowledge of the transportation planning and engineering principles underpinning these studies; and
- I am registered as a Professional Engineer (P.Eng.), Licensed Engineering Technologist (LET), Certified Engineering Technologist (C.E.T.), or Registered Professional Planner (RPP) in good standing in the Province of Ontario with specific training in transportation planning and engineering.

Dated at _____ this_____ day of _____, 20___.
(City)

Name: _____

Professional Title: _____

Signature: _____

Office Contact Information (Please Print)

Address: _____

City/Postal Code: _____

Telephone/Extension: _____

E-mail Address: _____

Appendix B

Pre-Study Consultation Checklist

Description	Information	Section Reference
Development Information		
Development Description (land use, size, and number of phases of development)	• Phase 1: • Phase 2: • Phase 3:	2.3.6
Transportation Impact Assessment		
Step 1 – Screening		
Type of Application (attach a drawing)	☐ Official Plan Amendment ☐ Zoning Amendment ☐ Site Plan Control Application ☐ Plan of Subdivision ☐ Other_____	2.3.5
Screening Criteria	☐ Trip Generation Trigger Satisfied ☐ Location Trigger Satisfied ☐ Operational/Safety Trigger Satisfied	2.2.1
Type of Study	☐ Transportation Impact Study ☐ Access Review ☐ No Additional Study Required	2.2.1
Step 2 – Scoping		
Study Area (intersections to be analyzed) Note: The Transportation Consultant is responsible to identify any further intersections impacted as the study progresses.	• • • • • • • • •	2.3.8

Description	Information	Section Reference
Horizon Years	☐ 5 years from date of TIS ☐ Interim years_____ ☐ Other_____	2.3.9
Analysis Periods	☐ AM weekday peak hour of adjacent roadway ☐ PM weekday peak hour of adjacent roadway ☐ Saturday peak hour of adjacent roadway ☐ AM weekday peak hour of development ☐ PM weekday peak hour of development ☐ Saturday peak hour of development ☐ Other _____	2.3.10
Input Parameters and Assumptions (potential deviations)	• • • •	2.3.13
Existing Transportation Conditions	☐ City data sources ☐ New data collection_____ ☐ Other _____	2.3.14
Planned Network Improvements (with timing)	• • •	2.3.16
Other Planned Developments (per City's Website)	• • • • • •	2.3.17
Identification of Mitigation Improvement Measures	☐ Neighbourhood Traffic Management Plan ☐ Other_____	2.3.23
Safety Analysis (any special issues)	• • • •	2.3.25
Site Access and Circulation (design vehicles)	☐ Passenger Car (P) ☐ Light Single Unit Truck (LSU) ☐ Medium Single Unit Truck (MSU) ☐ Heavy Single Unit Truck (HSU) ☐ Pumper Fire Truck ☐ WB-20 Tractor Semi-Trailer Truck ☐ Other_____	2.3.26
Impacts During Construction (any special issues)	• • • •	2.3.27

Description	Information	Section Reference
Step 3 – Forecasting		
Growth Rate	☐ Obtained from City ☐ Historical traffic counts ☐ Travel demand forecasts ☐ Proposed Growth Rate: _____	2.3.15
Site Trip Generation	☐ ITE Trip Generation Manual ☐ "First Principles" ☐ Observed rates for similar developments in area ☐ Other _____	2.3.19
Trip Reductions	☐ Internal capture reductions for mixed-use developments ☐ Pass-by reductions ☐ Other _____	2.3.19
Trip Distribution	☐ Local traffic patterns ☐ TTS ☐ Travel demand model ☐ Population and employment distribution ☐ Market analysis of catchment area ☐ Other _____	2.3.20
Trip Assignment	☐ Local traffic patterns ☐ Shortest distance ☐ Site layout, access design and logical routing ☐ Existing turning movements ☐ Other _____	2.3.21
Transportation Demand Management Plan		
Format	☐ Within a TIA Report ☐ Standalone	3.2.1
Type of Transportation Demand Management Plan	☐ TDM Statement ☐ TDM Scheme	3.2.2
Pedestrian Circulation Plan		
Format	☐ Within a TIA Report ☐ Standalone	4.2.1
Additional Comments		

Appendix C

Performance Evaluation Requirements

C.1 Introduction

This appendix details the performance measures to be assessed through a TIA. Detailed analyses and supporting information should be included in the appendices of the final TIA Study report.

C.2 Requirements

The performance of signalized and un-signalized intersections within the study area will be assessed based on the following three criteria:

- Volume-to-capacity (V/C) ratio for signalized intersections;
- Level of Service (LOS) (vehicle delay) for un-signalized intersections; and
- 95th percentile queues, as derived from SimTraffic or *Highway Capacity Manual* (HCM) outputs from Synchro. If SimTraffic, use 15 minute minimum seeding interval time and 60 minute minimum analysis period, and average the results from ten runs.

Threshold Criteria for Signalized Intersections

- V/C ratios for overall intersection operations to reach or exceed 0.85
- V/C ratios for individual through or turning movements to reach or exceed 1.0
- Estimated 95th percentile queue lengths for an individual movement to exceed available turning lane storage
- Estimated 95th percentile queue lengths for through lanes to block vehicles from entering turning lanes

Table C.1 summarizes the level of service criteria for signalized intersections for comparison.

TABLE C.1: LEVEL OF SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS

Level of Service	Delay (sec/veh)	V/C
A	≤10	0 to 0.60
B	>10-20	0.61 to 0.70
C	>20-35	0.71 to 0.80
D	>35-55	0.81 to 0.90
E	>55-80	0.91 to 1.00
F	>80	>1.00

Threshold Criteria for Unsignalized Intersections

- Level of service, based on average delay per vehicle, on individual movements to exceed LOS E
- Estimated 95th percentile queue lengths for an individual movement to exceed available storage

Table C.2 summarizes the level of service criteria for unsignalized intersections.

TABLE C.2: LEVEL OF SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS

Level of Service	Delay (sec/veh)
A	≤10
B	>10-15
C	>15-25
D	>25-35
E	>35-50
F	>50

Appendix D

Typical Synchro Analysis Parameters

Any variations from these typical values requires a documented engineering study.

General Signal Timing Standards	
Cycle Length	Optimal: 90 to 120 seconds Maximum: 160 seconds Changes to the cycle length should be avoided along corridors with coordinated traffic signals.
Minimum Green Time	Existing Signalized Intersections: Based on the City's timing card. Future Signalized Intersections: 10 seconds for side street through movements, 5 seconds for left-turn phases.
Vehicle Clearance	Must consist of amber and all-red display. Duration in accordance with Ontario Traffic Manual Book 12 (Traffic Signals).
Pedestrian Phases	
Minimum Walk Time	Existing Signalized Intersections: Based on the City's timing card for Phases 2,4,6,8. Future Signalized Intersections: 7 seconds.
Walking Speed	1.1 metres per second typically, or 0.9 metres per second at intersections where crossing guards are present, retirement homes in the vicinity or request from CNIB.
Pedestrian Clearance	Total crossing time (curb to curb) minus amber time.
Median Storage	If centre median storage for pedestrians is provided, then the minimum walk time must be of adequate duration to allow a crossing from the curb to the far side of the median plus one lane. The pedestrian clearance interval must be of adequate duration to permit the longest crossing from the median to the curb. Use of the median for pedestrian refuge shall only be considered in consultation with the City.
Auxiliary Turn Lane Phasing	
Overlap Left-Turn	In cases where left-turn phasing is required for opposing left-turn movements and one of the movements is much heavier than the opposing movement, consideration should be given to early termination of the arrow indication for the lighter left-turn movement to permit an earlier commencement of the conflicting through movement. Appropriate vehicle clearance displays must be provided for all left-turn phases. Proper account must be made for lost time resulting from these clearances.
Fully Protected Left-Turn Phasing	Protected only left-turn phasing must be used when conditions are such that an undue hazard might result if permissive phasing were used. This is normally considered to be the case with a double left turn. Protected left turn phasing must be used in corridors with bi-directional multi-use pathway (MUP) and/or Light-Rail Transit (LRT) vehicles running between travel lanes.

Shared Lane Operation	All movements permitted from a shared use lane must operate on the same signal phase.
Dual Right/Left-Turn Movements	Conflicting pedestrian movements should not be permitted simultaneously with dual right/left-turn movements. Normally, dual right turns will also require signalization.
Right/Left-Turn Arrows	A right/left-turn arrow shall not be displayed at the same time a conflicting pedestrian movement is permitted.
Intersection Spacing and Minimum Storage Lengths	
Visibility	As per the requirements of the Ontario Traffic Manual Book 12 (Traffic Signals), signalized intersection spacing must be determined based on posted speed, to ensure adequate visibility of the signal heads.
Through Vehicle Storage Between Intersections	Signalized intersections must be spaced to ensure that storage is available to accommodate 1.5 times the average number of vehicles arriving on each red indication during the heaviest hour. Assumes an average vehicle length of 7 metres.
Storage Lane Lengths	Left-turn storage lanes must be long enough to accommodate the 95th percentile queue during the heaviest traffic hour. Where double left turn lanes are in use, calculations should assume a 45%/55% distribution of traffic between the lanes. Right-turn storage lanes must be long enough to permit right-turning traffic to clear the maximum queue of through vehicles that is anticipated to accumulate during the red indication. Assumes an average vehicle length of 7 metres.
Parameters for Intersection Analysis	
Heavy Vehicle Equivalent	Heavy Vehicles or Buses: 2.0 passenger car units (PCUs) Input the heavy vehicle percentage as obtained from the TMCs and Synchro will internally adjust to PCUs. Future volume analysis must use the existing heavy vehicle percentages unless anticipated to change.
Saturation Flow Rate	Advanced Left Movement: 1900 vehicles per hour per lane (vphpl) Through Movement: 1900 vehicles per hour per lane Right Movement: 1900 vehicles per hour per lane Saturation flow rates may need to be modified to reflect downstream congestion/ constraints. Field observations and surveys should be undertaken to determine appropriate assumptions under these circumstances.
Lane Utilization Factor	Curbside High Occupancy Vehicle (HOV) and/or Bus Rapid Transit (BRT) Lanes: 0.80 (to reflect 20% lane usage by HOV and/or BRT)
Peak Hour Factor	Existing Conditions: 0.92 Future Conditions: 0.92
Critical Gap Times	Synchro defaults. Any variation requires a gap study.
Lost Time	Advanced Green: 1.0 second Back-to-Back Lefts: 1.0 second Main Phase: 5.0 seconds
Analysis Period	15 minutes
Area Type	"CBD" within the Downtown designation in the Official Plan Other outside the Downtown designation in the Official Plan

Appendix E

Transportation Demand Management and Pedestrian Circulation Checklist

This checklist is designed to evaluate the incorporation of Transportation Demand Management (TDM) measures, including pedestrian circulation techniques, into development proposals. The template is modelled on the prototype Class 2: Medium Density/Moderate Congestion (TDM Moderate) checklist contained in *TDM Supportive Guidelines for Development Approvals* (ACT Canada, 2008).

The applicant must complete and return this checklist with their **Transportation Demand Management Plan** (TDMP) and/or **Pedestrian Circulation Plan** (PCP).

Application Summary

Development Application No: _____

Date: _____

Applicant: _____

Staff: _____

SCORE AND RATING: _____

TDM SUPPORTIVE?

Yes _____ No _____

Scorecard

Use the scorecard below to determine the TDM rating and supportiveness of the development proposal based on the final score calculated on page E-5. If the proposal does not satisfy the minimum threshold, review and enhance the TDM measures.

Final Score	Rating	TDM Supportive?
91% - 100%	***** (5 Star)	YES
81% - 90%	**** (4 Star)	
71% - 80%	*** (3 Star)	
61% - 70%	** (2 Star)	NO (Review and Enhance TDM Measures)
50% - 60%	* (1 Star)	
Less than 50%	(None)	

CATEGORY A – Pedestrian Circulation					
In creating an environment that facilitates and supports pedestrian activity, the public realm needs to be accessible, safe, and comfortable to encourage movement on the street and in the surrounding area(s).					
	Features	**Yes**	**No**	**N/A**	**Comments**
A1	Development located within 800 m walking distance of residential (if employment) or employment (if residential) uses				
A2	Development located within 400 m walking distance of retail, restaurant, or other pedestrian-oriented uses or similar services provided on-site				
A3	At least one functional building entrance oriented towards public space (i.e., street, park, square)				
A4	At least one functional building entrance located close to on-site or adjacent street transit stop				
A5	Nearest functional building entrance located within 50 m of (and connected to) public street with sidewalk				
A6	Accessible on-site pedestrian routes provided and connected to surrounding network and transit				
A7	Continuous sidewalks (1.5 m min. width) provided along all on-site roads and both sides of adjacent public streets				
A8	No conflict points between pedestrians and other users (i.e., vehicles, cyclists)				
A9	Adequate and properly designed pedestrian crossings provided on-site				
A10	Off-site road works designed to maximize pedestrian safety and minimize pedestrian crossing distances (e.g., no right turn channelization)				
A11	Amenities provided along pedestrian routes (i.e., benches, street furniture)				
A11	Shelters and benches provided at transit stops				
A12	Wayfinding provided to guide pedestrians				
A13	Lighting provided along pedestrian routes				
A14	Weather protection provided along pedestrian routes				
A15	Vehicle parking areas located away from street and pedestrian routes				
A16	Protected pedestrian routes provided through vehicle parking lots and linked to building(s)				

CATEGORY A – Pedestrian Circulation					
In creating an environment that facilitates and supports pedestrian activity, the public realm needs to be accessible, safe, and comfortable to encourage movement on the street and in the surrounding area(s).					
	Features	**Yes**	**No**	**N/A**	**Comments**
A17	Passenger pick-up and drop-off areas located to side or rear of buildings, downstream from major building entrance points, but no more than 30 m away				
A18	Loading areas located away from street and pedestrian routes				
	Sub-Total				

CATEGORY B – Cycling Orientation					
In creating an environment that facilitates and supports cycling activity, the public realm needs to be accessible, safe, and comfortable to encourage movement on the street and in the surrounding area(s).					
	Features	**Yes**	**No**	**N/A**	**Comments**
B1	On-site cycling routes provided and connected to surrounding network				
B2	Class A (long-term) and Class B (short-term) bicycle parking spaces provided per City of Mississauga Zoning By-law (reproduced at end of this checklist for reference)				
B3	Bicycle repair station provided at-grade or within underground structure close to long-term bicycle parking				
B4	Wayfinding provided to guide cyclists				
B5	Other amenities provided for cyclists (e.g., showers, change rooms)				
	Sub-Total				

CATEGORY C – Transit Service					
The availability and proximity of convenient public transit service with direct pedestrian linkages to the building expands the range of viable travel options for employees, visitors, and residents.					
	Features	**Yes**	**No**	**N/A**	**Comments**
C1	Development located within 800 m walking distance of a rapid transit station (existing or planned) or within 400 m of two or more public bus routes with minimum 15-minute headway service during peak commuter periods and every 30 minutes throughout the remainder of the day				
C2	Information about public transit routes, schedules, and fares provided in accessible and visible location on-site and in adjacent bus stops				
C3	Sufficient capacity available to accommodate transit riders generated by development				
	Sub-Total				

CATEGORY D – Motor Vehicle Parking					
The location and design of motor vehicle parking facilities can affect the character and cost of a development. Avoiding the oversupply of parking can also help reduce single occupant vehicle travel.					
	Features	**Yes**	**No**	**N/A**	**Comments**
D1	No more than the minimum number of parking spaces required by the Zoning By-law provided				
D2	Priority parking equivalent to 10% of employee spaces provided for carpooling/vanpooling				
D3	Priority parking equivalent to 3% of full-time building occupants provided for auto share and hybrid/alternative fuel vehicles				
D4	Priority parking equivalent to 1% of the parking stalls provided for mopeds, motorcycles, and minicars				
D5	Parking shared for different uses on-site and/or adjoining properties				
D6	50% of parking located underground or in structured parking				
	Sub-Total				

CATEGORY E – Incentives

Building owners and tenants can offer occupants Transportation Demand Management incentives that help reduce single occupant vehicle travel.

	Features	Yes	No	N/A	Comments
E1	TDM Plan prepared that targets a 10% reduction in peak hour trips using forecast trip generation with status quo travel characteristics				
E2	Building owner/tenant will provide a ride matching service for car/vanpooling				
E3	Building owner/tenant will provide emergency ride home options				
E4	Building owner/tenant will provide subsidized transit passes for all occupants for a period of at least two years				
E5	Building owner/tenant will charge for parking as an unbundled cost to occupants				
E6	Building owner/tenant will reduce cost for users of car/van pool, bicycle, moped/motorcycle/minicar spaces				
E7	Building owner/tenant will become a member of a local TMA and appoint a TDM Coordinator to oversee and coordinate promotional opportunities and events on site				
	Sub-Total				

SCORING SUMMARY

Count the number of applicable features for each category (items not assigned "N/A") and enter under the column "Applicable" in the table below.

Assign 1 point to each "Yes" answer, except for Category A (Pedestrian Circulation) where each "Yes" answer is worth ½ a point and Category C (Transit Service) where each "Yes" answer is worth 2 points. Award 0 points for a "No" answer. Tally the points for each category under the column "Points" in the table below.

Calculate "Final Score" as a percentage by dividing total "Points" by the total "Applicable" and enter in the table below and in the "SCORE AND RATING" field on page E-1.

Category	Possible	Applicable	Points	Comments
A – Pedestrian Circulation	9 (18/2)			
B – Cyclist Orientation	5			
C – Transit Service	6 (3x2)			
D – Motor Vehicle Parking	6			
E – Incentives	7			
TOTAL	**33**			
Score% (Points/Applicable)				

City of Mississauga Zoning By-law Table 3.1.6.5.1- Required Number of Bicycle Parking Spaces for Residential Uses) Type of Use	Bicycle Parking Requirement (Spaces)	
	Bicycle Parking Class A (Long-Term)	Bicycle Parking Class B (Short-Term)
Apartment and stacked townhouse without exclusive 0.05 spaces per unit garages	0.6 spaces per unit	The greater of 0.05 spaces per unit or 6 spaces
Apartment and stacked townhouse without exclusive garages (within CCI to CC4 and CCO zones)	0.6 spaces per unit	The greater of 0.1 spaces per unit or 6 spaces
Long-Term Care Building	0.2 spaces per IOO m2 GFA - residential	0.2 spaces per IOO m2 GFA - residential
Long-Term Care Building (within CCI to CC4 and CCO zones)	0.3 spaces per IOO m2 GFA - residential	0.3 spaces per IOO m2 GFA - residential
Retirement Building	0.3 spaces per unit	The greater of 0.03 spaces per unit or 6 spaces
Retirement Building (within CCI to CC4 and CCO zones)	0.4 spaces per unit	The greater of 0.05 spaces per unit or 6 spaces

(Excerpt from City of Mississauga City of Mississauga Zoning By-law Table 3.1.6,6 - Required Number of Bicycle Parking Spaces for Non-Residential Uses)

Type of Use	Bicycle Parking Requirement (Spaces)	
	Bicycle Parking Class A (Long-Term)	Bicycle Parking Class B (Short-Term)
Active Recreational Use, Community Centre, Hospital, Library, Place of Religious Assembly, and Recreational Establishment	0.1 spaces per 100m^2 GFA-non-residential	0.1 spaces per 100m^2 GFA-non-residential
Active Recreational Use, Community Centre, Hospital, Library, Place of Religious Assembly, and Recreational Establishment (within CCI to CC4 and CCO zones)	0.3 spaces per 100m^2 GFA-non-residential	0.3 spaces per 100m^2 GFA-non-residential
College, University	1.0 spaces per 100 m^2 GFA non-residential	1.2 spaces per 100 m^2 GFA non-residential
College, University (within CCI to CC4 and CCO zones)	1.0 spaces per 100 m^2 GFA non-residential	1.2 spaces per 100 m^2 GFA non-residential
Contractor's Yard, Essential Emergency Service, Power Generating Facility, Self Storage Facility, Utilities (Electric Transformer and Distribution Facility, Sewage Treatment Plant, Utility Building, Water Treatment Facility) and Waste Transfer Station	n/a	2.0 spaces
Education and Training Facility, Financial Institution, Manufacturing Facility, Science and Technology Facility, Warehouse/Distribution Facility, and Wholesaling Facility	0.1 spaces per 100 m^2 GFA non-residential	2.0 spaces

Education and Training Facility, Financial Institution, Manufacturing Facility, Science and Technology Facility, Warehouse/Distribution Facility, and Wholesaling Facility (within CCI to CC4 and CCO zones)	0.15 spaces per 100 m^2 GFA non-residential	0.15 spaces per 100 m^2 GFA non-residential
Entertainment Establishment, Restaurant, Convenience Restaurant, Take-out Restaurant non-residential Retail Centre, Retail Store, and Service Establishment	0.15 spaces per 100 m^2 GFA non-residential	0.2 spaces per 100 m^2 GFA non-residential
Entertainment Establishment, Restaurant, Convenience Restaurant, Take-out Restaurant non-residential Retail Centre, Retail Store, and Service Establishment (within CCI to CC4 and CCO zones)	0.15 spaces per 100 m^2 GFA non-residential	0.2 spaces per 100 m^2 GFA non-residential
Medical Office and Medical Office - Restricted	0.1 spaces per 100 m^2 GFA non-residential	0.1 spaces per 100 m^2 GFA non-residential
Medical Office and Medical Office - Restricted (within CCI to CC4 and CCO zones)	0.15 spaces per 100 m^2 GFA non-residential	0.2 spaces per 100 m^2 GFA non-residential
Office	0.1 spaces per 100 m^2 GFA non-residential	0.1 spaces per 100 m^2 GFA non-residential
Office (within CCI to CC4 and CCO zones)	0.15 spaces per 100 m^2 GFA non-residential	0.2 spaces per 100 m^2 GFA non-residential
Public School and Private School	0.1 spaces per 100 m^2 GFA non-residential	0.4 spaces per 100 m^2 GFA non-residential
Public School/Private School (within CCI to CC4 and CCO zones)	0.1 spaces per 100 m^2 GFA non-residential	0.4 spaces per 100 m^2 GFA non-residential
All other non-residential uses	0.05 spaces per 100 m^2 GFA non-residential	0.1 spaces per 100 m^2 GFA non-residential
All other non-residential uses (within CCI to CC4 and CCO zones)	0.05 spaces per 100 m^2 GFA non-residential	0.1 spaces per 100 m^2 GFA non-residential

Appendix F

Pedestrian-Oriented Site Design Prompt List

The following list is a convenient reminder for site designers and reviewers of important considerations in designing pedestrian-oriented development. The template is based on guidance contained in *Promoting Sustainable Transportation Through Site Design* (Institute of Transportation Engineers, 2010).

Site Planning	
☐	Locate highest density land uses closest to activity nodes such as transit stops and intersections
☐	Use retail, restaurant, and other pedestrian-oriented land uses to animate street frontage
Building Placement	
☐	Locate buildings close to the street but allow for pedestrian activities along street frontage
Building Entrances	
☐	Orient functional building entrances towards public spaces (i.e., street, park, square)
☐	Locate functional building entrances close to public streets with direct pedestrian access
☐	Locate functional building entrances close to on-site or adjacent street transit stops
☐	Locate short-term bicycle parking close to functional building entrances
☐	Locate preferential parking for sustainable modes (i.e., carshare, carpool) close to functional building entrances
☐	Avoid vehicle paths crossing major building entrance points
Pedestrian Routes	
☐	Provide safe, direct, continuous, and clearly defined pedestrian routes along desire lines. Routes should be accessible, wide, and unobstructed.
☐	Provide safe, direct, continuous, and clearly defined pedestrian routes to transit stops. Walking distances to stops should not exceed 800 m for rapid transit stations (existing or planned) or 400 m for public bus routes.
☐	Connect on-site pedestrian routes with surrounding networks
☐	Provide continuous sidewalks along all on-site roads and both sides of adjacent public streets
☐	Minimize conflict points between pedestrians and other users (i.e., vehicles, cyclists)
Pedestrian Crossings	
☐	Minimize block lengths where possible or provide midblock crosswalks if needed
☐	Design intersections to provide safe pedestrian crossings
☐	Provide properly signed crossings wherever a route crosses a road
☐	Warn pedestrians of upcoming crossings through physical treatment and/or accessible signals
☐	Design off-site road works to maximize pedestrian safety and minimize pedestrian crossing distances (e.g., no right-turn channelization)

Pedestrian Amenities	
☐	Provide benches, street furniture, and other amenities along pedestrian routes
☐	Provide wayfinding signs and other physical features to guide pedestrians
☐	Provide safe, well-lit, and visible shelters and benches at transit stops
☐	Provide lighting along pedestrian routes where possible
☐	Provide weather protection along pedestrian routes where possible
Vehicle Parking Layout	
☐	Locate off-street vehicle parking away from street, preferably behind buildings or underground
☐	Separate vehicle access to parking lots from pedestrian access
☐	Avoid vehicle access and egress controls to parking lots from blocking pedestrian routes
☐	Minimize vehicle parking lot area and design to prevent speeding
☐	Provide protected pedestrian routes through vehicle parking lots and link to buildings
Passenger Pick-up and Drop-off Areas	
☐	Locate passenger pick-up and drop-off areas to side or rear of buildings, downstream from major building entrance points, but no more than 30 m away
Loading Areas	
☐	Locate loading areas away from street, preferably behind buildings or underground
☐	Avoid severing pedestrian routes with loading area access
Site Grading	
☐	Maintain relatively level terrain along pedestrian routes
☐	Provide ramps wherever stairs necessary
☐	Design slopes along pedestrian routes to avoid ponding of slush and water