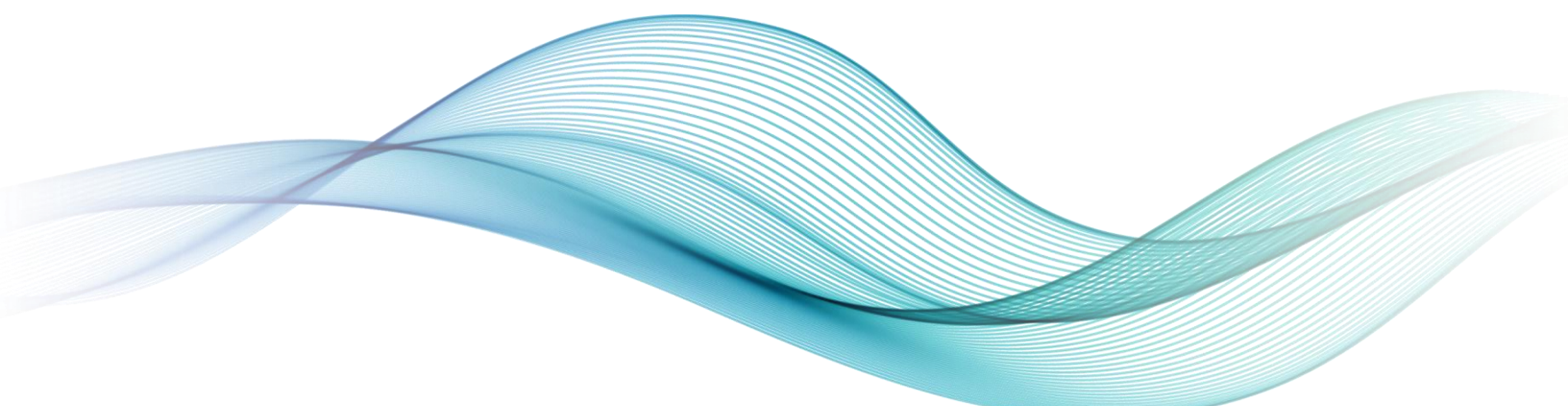




Transportation Impact Assessment Guidelines (2017)

June 2017



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Table of Contents

CHAPTER 1 INTRODUCTION TO THE TIA GUIDELINES	1
What is a Transportation Impact Assessment?	3
About the TIA Guidelines	4
Preparing a TIA Report.....	7
CHAPTER 2 TIA SCREENING AND SCOPING REPORT	13
Step 1 - Screening	15
Step 2 - Scoping	19
CHAPTER 3 TIA SUBMISSION	25
Step 3 - Forecasting	27
Step 4 - Analysis.....	35
Step 5 -Transportation Impact Assessment Submission	52
CHAPTER 4 CITY PLANNING DOCUMENTS/ REFERENCES AND STAFF CONTACTS.....	57
CHAPTER 5 APPENDICES	62
Appendix A: Certification Form for TIA Study PM.....	65
Appendix B: TIA Screening Form	69
Appendix C: Synchro Analysis Parameters.....	73
Appendix D: RMA Report Figures.....	77
Appendix E: Ideal Engineering Submission	81

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Chapter 1

Introduction to the TIA Guidelines



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What is a Transportation Impact Assessment Study?

Transportation Impact Assessment studies (TIAs) identify on-site and off-site measures to be undertaken by a developer to align the transportation system’s performance with City goals once the development is built. TIA studies support the City’s goal of creating an integrated land use and transportation system as expressed in the Official Plan and Transportation Master Plan by:

- Evaluating the consistency of a proposed development’s transportation characteristics with City goals and policies;
- Comparing transportation network performance around the site both before and after development; and
- Enabling negotiations between the City and developers about the sharing of costs for transportation system modifications.

The following definitions are provided for clarification for terms used this guideline:

TIA Study –	The overall assessment process to identify on and off-site measures to align the development with City transportation objectives.
TIA Report –	The document compiling the Screening and Scoping Report, Forecasting Report, and TIA Strategy Report.
TIA Submission –	A package of materials including the TIA Report, RMA Drawings, Functional Design Drawings, and Monitoring Report.

About the TIA Guidelines

Purpose

The TIA Guidelines outline to developers what the City requires of them in terms of transportation review for their development application.

The TIA Guidelines support existing legal, technical and procedural frameworks for the approval of proposed developments by identifying:

- The triggers for conducting TIA studies, the scope of TIA studies in different circumstances, and the appropriate structure, content and format of TIA studies submitted to the City;
- Policies, guidelines and practices for the planning and design of a development's transportation features;
- Policies, guidelines and practices for the planning and design of transportation networks; and
- Parameters, assumptions, methods and performance targets for transportation analyses.

Organization

These guidelines include the following sections:

- **Chapter 1** identifies the role and planning context of TIA studies in City-building and the development review process, and administrative details concerning the TIA Guidelines, and the process to be followed to complete a TIA study.
- **Chapters 2 and 3** provide instructions for completing the modules and elements of Steps 1 to 5 of the TIA study process.
- **Chapter 4** identifies City staff contacts and reference materials for completing TIA studies. These Guidelines and Technical Methods are available through the City of Ottawa website.
- **Chapter 5** provides technical materials that support the completion of a TIA study.

City Authority – Development Planning

The Province of Ontario's Planning Act authorizes the City of Ottawa to impose conditions when considering planning or 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 of Ottawa's Official Plan reflects this authority to impose development conditions, and requires a TIA study when it believes that a proposed development may impact on the performance of the transportation network (i.e. transit, cycling, pedestrian or roadway systems).

The City's authority varies by type of development application, with greater latitude for conditions available to staff when considering Official Plan Amendment, Zoning By-law Amendment and Draft Plan of Subdivision or Condominium Applications. Representative conditions that are frequently imposed on developers include:

- Dedication of property for abutting road, pathway and public transit rights-of-way that are described in the municipal Official Plan at no cost to the City;
- Acceptable design conditions for access to/ from the subject development, such as intersection controls, lane arrangements, ramps, curbing, and traffic direction signs;
- Acceptable design conditions for off-street loading and parking facilities; and,
- Acceptable design conditions for walkways, walkway ramps and all means for pedestrian access.

Policy Context for the TIA Guidelines

The City's TIA Guidelines must reflect the intentions and policies of Ottawa's Official Plan (OP) and Transportation Master Plan (TMP) to ensure that new developments contribute to a consistent vision for Ottawa's urban fabric and transportation system. Since approval of the City's previous TIA Guidelines, important updates to the City's OP and TMP have emphasized the need to increase travel by sustainable modes (i.e. walking, cycling, transit and carpooling). To that end, the City has developed several guidelines that better integrate land use and transportation systems planning, and supporting tools for making transportation infrastructure choices (e.g., complete streets and multimodal levels of service).

Based on the City's recent policy directions, these TIA Guidelines seek to realize the following objectives:

- The use of multimodal level of service objectives and indicators to determine transportation network performance and inform the development of network modification plans.
- Consideration of the impact of design on transportation by examining the effects of development design and adjacent street corridor design on mode share choice and multimodal levels of service.
- The use of a complete streets philosophy to develop transportation network modifications.
- The requirement for trip generation, parking supply and transportation demand management (TDM) programs at new 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 identification of needs, opportunities and solutions within the scope of each development for traffic calming and better road network design within developments, neighbourhood traffic management in adjacent communities, and the use of roundabouts for intersection control.

Future Updates

Authority to update these Guidelines to address minor or administrative matters as required is granted to staff under By-law No. 2016 – 369:

By-law No. 2016-369

The Council of the City of Ottawa enacts as follows:

TRANSPORTATION GUIDELINES

The General Manager, Transportation Services, the Director, Traffic Services, and the Manager, Transportation Planning, individually are delegated the authority to make minor and administrative amendments to the 2006 Transportation Impact Assessment Guidelines, standards, and specifications for the design and construction of municipal infrastructure.

Preparing a TIA Report

Relevance of Historical Reports

No report older than five years will represent a valid TIA report for a development proposal. Where developments are phased, or reference is made to previous work, only reports completed within the five-year period prior to the completion of the subject analysis will be accepted as relevant.

Qualifications of the TIA Study Project Manager

TIA studies are complex combinations of planning and engineering that must reflect the goals and methods in use in the City of Ottawa; TIA studies must be completed by a qualified project manager who understands:

- City of Ottawa policies and design guidelines;
- City of Ottawa complete streets and MMLOS methods; and
- City of Ottawa preferred approaches to transportation design

The PM must complete the Credentials form in **Appendix A**, sign and seal it and include with each TIA report.

Structure of a TIA Study

Basic Structure

A TIA study consists of five **steps**, completed in sequence. By exception, TIA studies for developments that generate little transportation activity may terminate at Step 1. Each **step** consists of **modules** that represent a major area of work. For example, Module 3.1 - Development-generated Travel Demand is part of Step 3- Forecasting. Each **module** consists of **elements** that represent a specific task. For example, Element 3.1.1 - Trip Generation and Mode Shares is part of Module 3.1 - Development-generated Travel Demand.

Analysis Components

Analysis in TIA studies in Ottawa will consist of two components with distinct areas of focus:

Design Review

- Evaluate the alignment of the development proposal with the City's policy objectives;
- Confirm that the site includes appropriate network elements for all modes of travel on site and on the boundary streets to connect the development into the City-wide networks;
- Confirm that the layout of the development and the proposed network facilities encourage use of sustainable modes;

- Confirm that basic access and circulation for motorized vehicles can be achieved;
- Identify any network modifications required to accommodate new accesses; and
- Provide RMA and functional design drawings to support required approvals

Network Impact

- Assess the impact of the addition of development trips and infrastructure on the performance of the transportation network;
- Identify any network modifications required to mitigate impact on network performance; and
- Provide RMA and functional design drawings to support required approvals

Overview of the TIA Study Process

A TIA study is required in support of all development proposals requiring a development agreement.

Figure 1 illustrates the TIA study process. ***NOTE: The City of Ottawa reserves the right to determine the scope of any TIA study based on its professional judgement despite these guidelines.***

Step 1 - Screening

Step 1 determines the need to complete a TIA study.

An initial Screening will determine if: (i) the number of trips generated by the development makes it desirable to assess the development design and transportation system performance of one or more modes; (ii) the development's location makes it desirable to assess development design; or (iii) development and/or boundary street conditions yield a high potential for safety concerns.

If any element indicates that the development proposal requires further assessment, proceed to Step 2; if not, the TIA study is complete and the Screening Form (Appendix B) must be submitted with the Development Application.

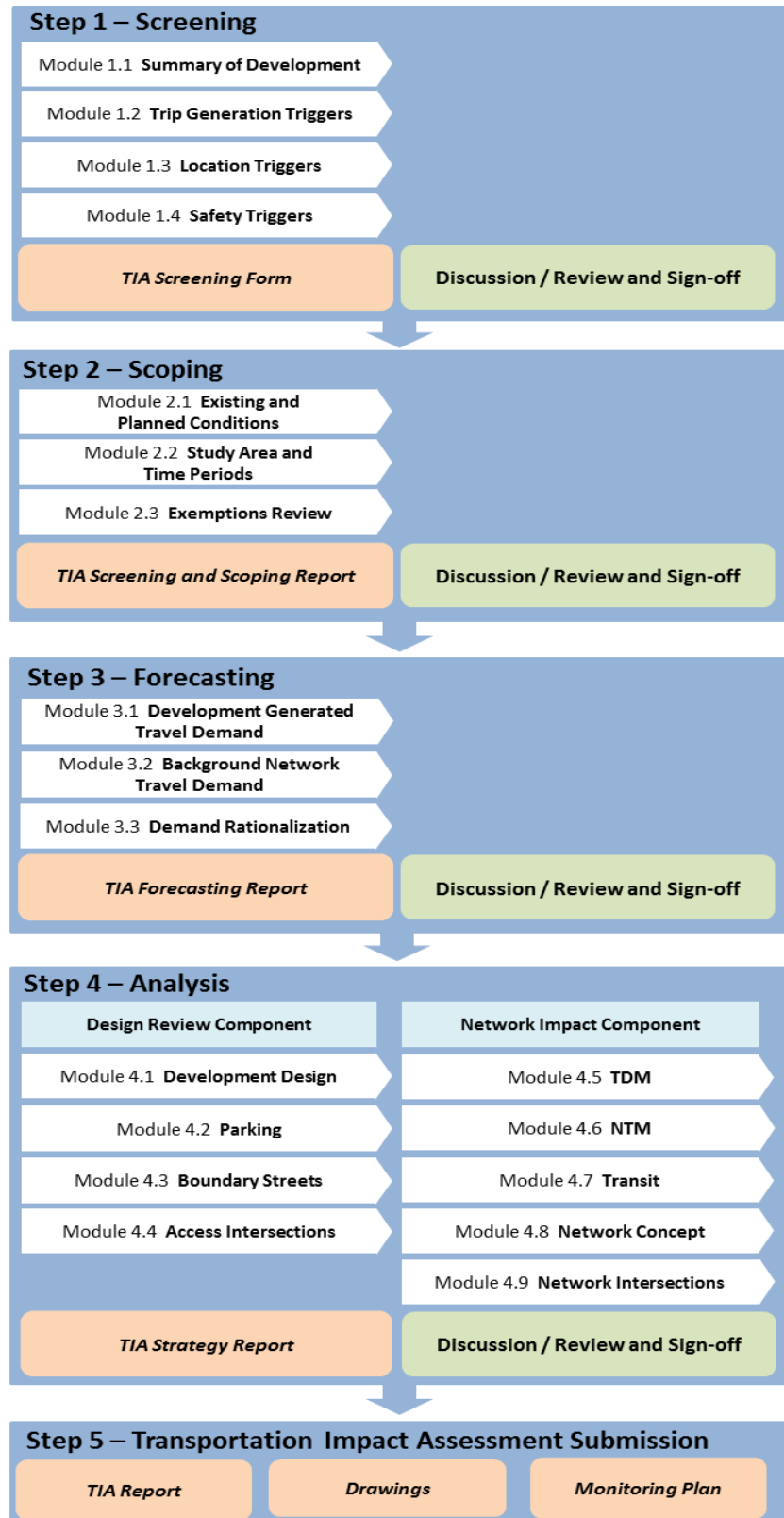
Step 2 - Scoping

Step 2 determines the scope of the TIA study.

The proponent reviews the following to determine scope:

- Existing and planned conditions;
- Key parameters including the study area, time periods for analysis and time horizons; and
- Any scope exemptions that would eliminate elements of work not relevant to the development proposal, based on consultation with City staff.

Figure 1. The Transportation Impact Assessment Study Process



Step 3 - Forecasting

Step 3 prepares forecasts of travel demand in the study area for the horizon year(s) of the development proposal.

Forecasts include trips generated by the development and those represented by background network demand. If limits on transportation network capacity would constrain growth in peak hour motor vehicle traffic, the proponent must rationalize future travel demand by adjusting development-generated and background network trips. Proponents must consult with staff prior to finalizing the forecasts to ensure that assumptions are acceptable prior to undertaking Step 4, Analysis.

Step 4 - Analysis

Step 4 assesses the alignment between the transportation features of the proposed development and the City of Ottawa’s city-building objectives.

Modifications to on and off-site features are identified where alignment with objectives needs to be improved. Step 4 also evaluates the post-development performance of the planned transportation network. Based on the City’s established performance measures / targets, the analysis identifies potential mitigation measures to off-set development impact. Step 4 considers alternative network modification designs (where modifications are required) and recommends a preferred design, based on the City’s Complete Streets philosophy and methods.

Step 5 - Transportation Impact Assessment Plan

Step 5 compiles the final TIA deliverables for the proposed development.

All project reports from Steps 1 to 4 will be assembled and the RMA and functional engineering drawings will be prepared and submitted. A Monitoring Plan will be prepared where the proponent can offer a defensible rationale (e.g. conflicting objectives) for deferring mitigation actions such as infrastructure modifications or TDM program measures or where modal shares must be shifted to achieve the City’s goals.

Required Points of Discussion with City Staff

Collaboration and communication between development proponents and City staff are required at several points in the TIA process. Minimum points of discussion are shown in **Figure 1** and **Table 1**.

Table 1: Minimum Required Points of Discussion with Staff

Point of Contact	Purpose
End of Step 1	Confirm need to complete a TIA study
End of Step 2	Confirm TIA study scope
End of Step 3	Confirm travel demand forecasts
End of Step 4	Confirm preferred Improvement Option prior to finalizing engineering drawings

Summary of Key Thoughts:

- Transportation Impact Assessment (TIA) studies identify on-site and off-site measures to be undertaken by a developer to align the transportation system's performance with City goals once the development is built.
- TIA studies are complex combinations of planning and engineering that must reflect the goals and methods in use in the City of Ottawa; TIA studies must be completed only by qualified project managers who are familiar with local conditions.
- Analysis in TIA studies in Ottawa will consist of two components: a Design Review component and a Network Impact component.

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Chapter 2

TIA Screening and Scoping Report



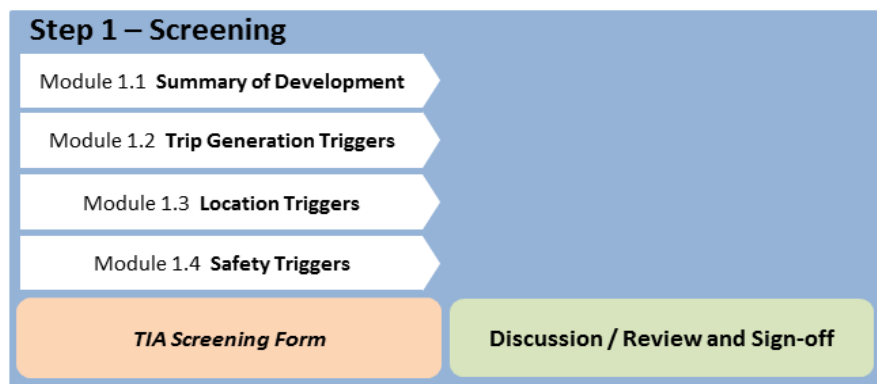
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Step 1 - Screening

Step 1 is an initial assessment of the proposed development to establish the need to continue with the TIA study. The initial Screening will determine if:

- (i) the number of trips generated by the development makes it desirable to complete a TIA study to assess the Design Review and Network Impact components; or
- (ii) the development’s location and/or boundary street conditions makes it desirable to complete a TIA study to assess the Design Review component only.

Step 1 has four modules, as shown below:



The proponent should use the TIA Screening Form in **Appendix B** to complete Step 1.

Module 1.1 - Summary of Development

Prepare a brief summary of the proposed development, including:

- Proposed land uses and development size (building size, number of units, etc.);
- Preliminary access scheme; and
- Identification of any drive-thru facility

Module 1.2 - Trip Generation Triggers

Both the Design Review and Network Impact components must be addressed for all developments generating 60 person-trips or more during weekday peak hours. **Table 2** presents 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 represented in the current edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual.

Table 2: Trip Generation Trigger

Land Use Type	Minimum Development Size
Single-family homes	40 units
Townhomes or apartments	90 units
Office	3,500 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

If the proposed development level meets or exceeds the development levels in Table 2 the proponent can prepare the TIA Screening Form and proceed to Step 2.

If the proposed development levels are below the levels identified in Table 2, the proponent must consider the Location and Safety triggers to determine if a TIA must be prepared to address the Design Review component.

Module 1.3 - Location Triggers

Review the development’s location to determine if:

- The development proposes a new driveway to a boundary street that is designated as part of the City’s Transit Priority, Rapid Transit or Spine Bicycle Networks; or
- The development is in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone.*

**DPA and TOD are identified in the City of Ottawa Official Plan (DPA in Section 2.5.1 and Schedules A and B; TOD in Annex 6). See Chapter 4 for a list of City of Ottawa Planning and Engineering documents that support the completion of TIA.*

Module 1.4 - Safety Triggers

Review development and boundary street conditions to determine if there is an elevated potential for safety concerns:

- Posted speed limits on a boundary street are 80 km/hr or greater;
- Horizontal/vertical curvature on a boundary street limits sight lines at a proposed driveway;

- A proposed 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 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 development; or
- The development includes a drive-thru facility.

If neither the Location nor the Safety trigger is satisfied, and the development generates fewer than 60 peak hour person trips, the TIA is complete and the TIA Screening Form is to be submitted to the City with the Development Application.

TIA Screening Form

The proponent will complete the TIA Screening Form in Appendix B. If one or more of the triggers is satisfied, the proponent must proceed to and complete Step 2 – Scoping. If none of the triggers is satisfied, the TIA is complete and the TIA Screening Form is to be submitted to the City with the Development Application.

Summary of Key Thoughts:

- The proponent will complete the TIA Screening Form. If one or more of the triggers is satisfied, the proponent must proceed to and complete Step 2 – Scoping. If none of the triggers are satisfied, the TIA study is complete and the TIA Screening Form is to be submitted to the City with the Development Application.
- Both the Design Review and Network Impact components must be addressed in the TIA study if the development satisfies the Trip Generation Trigger (i.e., the development generates 60 person-trips or more during weekday peak hours). The proponent must complete the TIA Screening Form and proceed to and complete Step 2 – Scoping.
- If the proposed development generates fewer than 60 peak hour person trips, the proponent must consider the Location and Safety Triggers to determine if a TIA study must be prepared to address the Design Review component. If either of these conditions exists, a TIA study must be prepared to address the Design Review component only. The proponent must complete the TIA Screening Form and proceed to and complete Step 2 – Scoping.

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Step 2 - Scoping

Step 2 identifies the range of analysis required to understand how well the development proposal aligns with City of Ottawa policies and objectives and if the transportation network requires modification to offset development impacts. TIA studies vary considerably in scale and complexity, based on the location and nature of the development and the anticipated network conditions.

Step 2 is divided into three modules:



NOTE: The City of Ottawa reserves the right to determine the scope of any TIA study based on its professional judgement despite these guidelines.

Module 2.1 - Existing and Planned Conditions

In this module, proponents prepare a characterization of site conditions, documenting the existing and planned network conditions in the vicinity of the development property and a summary of the expected site transportation conditions.

Element 2.1.1 - Proposed Development

Prepare a description of the proposed development, including:

- Existing land uses or permitted use provisions in the Official Plan, Zoning By-law, etc.;
- Land uses and relevant planning regulations to be used in the analysis;
- Development size (building size, number of units, etc.) and location on site;
- Estimated date of occupancy;

- Planned phasing of development;
- Number of parking spaces; and
- Access points for all modes, noting any restrictions (e.g., full movements, right-in/right-out, turning restrictions, etc.)

The description must provide a site plan of a suitable scale that shows the general location of the development and the proposed accesses. If the proposed development/ redevelopment is to be constructed in phases, a description must be provided for each phase, identifying the proposed timing of implementation.

Element 2.1.2 - Existing Conditions

Document the data described below, using figures to show existing networks and travel demands by mode as well as photographs to show transportation network elements near proposed access points:

- Existing roads and ramps in the study area, including jurisdiction, classification, number of lanes, and posted speed limit;
- Existing intersections, indicating type of control, lane configurations, turning restrictions, and any other relevant data (e.g., extraordinary lane widths, grades, etc.);
- Existing driveways to adjacent developments (both sides of all roads bordering the site) within 200 m of proposed site driveway, indicating the land use associated with the driveway;
- Existing on- and off-road bicycle facilities and pedestrian sidewalks and multi-use pathway networks;
- Existing transit system, including location of stations and stops;
- Existing area traffic management measures;
- Existing peak hour travel demands by mode; and
- Five-year collision history on boundary streets, based on collision records, with identification of relevant patterns.

Consult Element 2.2.1 for guidance on the limits of the study area to identify transportation network elements that need to be documented.

Element 2.1.3 - Planned Conditions

Prepare a summary of planned conditions in the vicinity of the development site, including:

- *Changes to the study area transportation network*—The City of Ottawa anticipates significant changes to its transportation network over time. Planned changes to the study area transportation network are identified in the Schedules of the City of Ottawa’s Official Plan and TMP, and in completed EA studies; however the City’s Long-Range Financial Plan is the only accepted source for the anticipated timing of major projects. Smaller-scale transportation projects may also be

associated with other local developments and should be accounted for, where they impact the assignment of traffic from the subject development.

- *Other study area developments*—All significant developments under construction, approved, or in the approval process within the study area that are likely to occur within the proposed horizon years must be identified. City of Ottawa staff can assist with identifying the type and magnitude of probable future developments.

Module 2.2 - Study Area and Time Periods

This module provides guidance to proponents and staff when establishing the basic parameters for completing the analysis required by the TIA study. If information from Module 2.1 is submitted to the City prior to the pre-consultation meeting, decisions on study area and time period can be made at the pre-consultation meeting.

Element 2.2.1 - Study Area

The study area for the modules in the Design Review component (see Chapter 1) is the development property and the boundary roads.

Discussion will be required to determine the limits of the study area for the modules in the Network Impact component:

- *Module 4.7—Transit*: Elements 4.7.1 and 4.7.2 need to consider any transit routes serving the development property.
- *Module 4.8—Network Concept*: needs to consider the closest Strategic Planning Screenline.
- *Module 4.9—Intersection Design*: Elements 4.9.1 and 4.9.2 need to consider intersections on walking and cycling access routes within 600m of site, and arterial intersections impacted by auto demands from development (typically within 1 km in rural and suburban conditions or 400 m in urban conditions).

Element 2.2.2 - Time Periods

In determining the time periods for operational analysis (e.g. safety and multimodal levels of service), TIA studies need to consider the impacts of development on the adjacent network during both the peak hour of background travel demand and the peak hour of development-generated demand (if different) to determine which is critical, or if both are critical in different ways.

Typically, the weekday morning and afternoon peak hours on adjacent streets will constitute the “worst case” of the combination of development-generated and background traffic. However, in the case of retail, entertainment, recreational, religious, institutional, or special events uses, mid-day or evening periods on Thursdays, Fridays or weekends may also require analysis. As part of the pre-consultation process prior to commencing the analysis, the consultant should discuss with City staff the possible time periods for analysis.

Element 2.2.3 - Horizon Years

TIA reports must consider two horizon periods for analysis:

- The expected year of development build-out or full occupancy (if not the same as build-out)
- Five years after development build-out or full occupancy.

Where a development will proceed in phases, TIA analysis must be completed for each development phase. Depending on the timing of phases, the City may waive the need to analyze a “build-out plus five years” horizon.

Module 2.3 - Exemptions Review

The intention of these guidelines is to require analysis only when it informs decisions about development design or street design and/or the need for mitigation measures. This module reviews possible reductions to the scope of the TIA study depending on the specifics of the development proposal and its context. **NOTE: The City of Ottawa reserves the right to determine the scope of any TIA study based on its professional judgement despite these guidelines.**

Table 4 identifies possible exemptions to individual elements. The proponent should review development and network conditions to identify any elements that could be exempted based on these considerations; other exemptions may be approved by the City on a case-by-case basis if supporting explanation is provided.

Table 4: Possible Exemptions

Module	Element	Exemption Considerations
Design Review Component		
4.1 Development Design	4.1.2 Circulation and Access	<ul style="list-style-type: none"> • Only required for site plans
	4.1.3 New Street Networks	<ul style="list-style-type: none"> • Only required for plans of subdivision
4.2 Parking	4.2.1 Parking Supply	<ul style="list-style-type: none"> • Only required for site plans
	4.2.2 Spillover Parking	<ul style="list-style-type: none"> • Only required for site plans where parking supply is 15% below unconstrained demand
Network Impact Component		
4.5 Transportation Demand Management	All elements	<ul style="list-style-type: none"> • Not required for site plans expected to have fewer than 60 employees and/or students on location at any given time

Table 4: Possible Exemptions

Module	Element	Exemption Considerations
4.6 Neighbourhood Traffic Management	4.6.1 Adjacent Neighbourhoods	<ul style="list-style-type: none"> Only required when the development relies on local or collector streets for access and total volumes exceed ATM capacity thresholds
4.8 Network Concept		<ul style="list-style-type: none"> Only required when proposed development generates more than 200 person-trips during the peak hour in excess of the equivalent volume permitted by established zoning

TIA Screening & Scoping Report

TIA Screening & Scoping Reports should adhere to the following Table of Contents:

1. SCREENING FORM
2. DESCRIPTION OF PROPOSED DEVELOPMENT
3. EXISTING CONDITIONS
4. PLANNED CONDITIONS
5. STUDY AREA
6. TIME PERIODS
7. HORIZON YEARS
8. EXEMPTIONS REVIEW

Summary of Key Thoughts:

- All TIA studies that proceed beyond Step 1 – Screening must include a summary of Existing and Planned Conditions
- The study area for the Design Review component is the development property and the boundary roads.
- Discussion will be required to determine the limits of the study area for the Network Impact component
- TIA studies will be based on the worst case of peak street conditions or peak development-generated traffic conditions
- Exemptions may be considered for some Design Review modules (Circulation and Access, Street Network Layout, and Parking).
- Exemptions may be considered for most Network Impact modules, depending on anticipated conditions (TDM, NTM, Transit, and Network Concept Review).

Chapter 3 TIA Submission



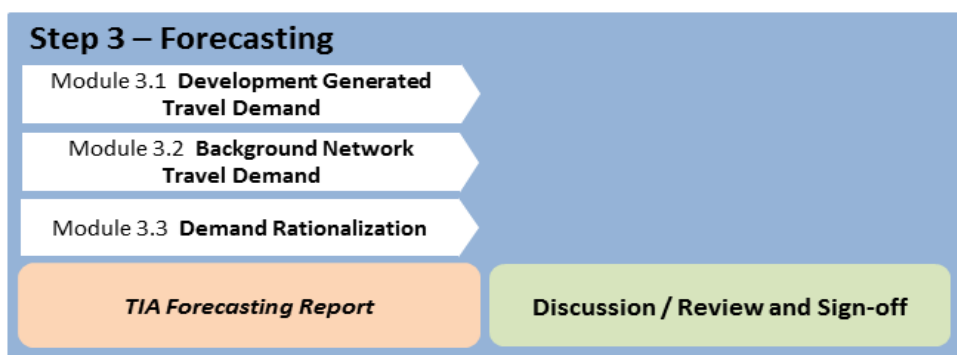
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Step 3 - Forecasting

Step 3 generates the future transportation demand numbers required to analyze pre and post-development network performance to determine if a network modification is required to offset development impacts. Future travel demands are forecasted by accounting for development-generated traffic and background travel demands in the horizon year(s) of the planned development.

Step 3 is divided into three modules:



Module 3.1 - Development-generated Travel Demand

This module outlines the accepted method for forecasting travel demands generated by the proposed development.

Element 3.1.1 - Trip Generation and Mode Shares

Trips generated by new or redeveloped properties are to be calculated through the following six-step methodology. All trip generation, trip distribution, and trip assignment assumptions should be in accordance with standard accepted techniques and based on local conditions. Sources should be well documented and any assumptions that may be considered as being less than conservative should be rigorously justified. Sensitivity analysis should be completed for any parameter surrounded by significant uncertainty.

A. Select Base Trip Generation Rate

Select a supported source for the base trip generation rate. In order of preference, they are:

1. The 2009 TRANS Trip Generation Study for residential rates (see TRANS Trip Generation Study 2009);
2. Trip generation surveys of similar developments in the City. Surveyed developments should have similar operating and market characteristics to the development proposal (supporting statistical analysis demonstrating the relevance of surveyed rate would be beneficial);

3. Institute of Transportation Engineers (ITE) Trip Generation rates, as documented in the latest edition of the Trip Generation Manual or in other technical sources from ITE; and
4. “First principles” calculations of anticipated trips to/from the development.

Final base rates selected for all land uses must be identified within the Forecasting Report. Any deviations from recommended values must be justified and documented to the satisfaction of City of Ottawa staff.

B. Estimate Total Development-Generated Person-Trips

Estimate the auto mode share associated with the base auto-trip generation rate. Use the auto mode share and the projected auto-trips forecasted for the development to calculate the total development-generated person-trips.

When using TRANS Survey data

The TRANS trip generation manual provides transit mode share rates for different residential land use categories in Ottawa. These rates must be used to translate auto-trips into person-trips.

When using ITE Trip Generation rates

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

C. Identify Existing Mode Shares for Traffic Assessment Zones

Consult the most recent National Capital Region Origin-Destination survey to identify existing mode shares for transit, walking, cycling, auto passengers and auto drivers for equivalent trip purposes (i.e. work, school, home-based, etc.) in the Traffic Assessment Zone (TAZ)¹ 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 considered to be more representative and are justified as such to the satisfaction of City of Ottawa staff.

¹ A Traffic Assessment Zone is the unit of geography most commonly used in conventional transportation planning models to break down population and employment data in a city for the purpose of forecasting travel demand. The size of zones varies in models, ranging from very large areas outside the urban area to zones as small as city blocks or buildings in central business districts.

D. Set Future Mode Share Targets for the Development

Set future mode share targets for the development, taking into account:

- The development’s horizon year;
- Current and future maturity of the transportation network and different travel options;
- Policy directions and objectives of the City of Ottawa;
- Development type and location;
- Development design, parking supply and potential of transportation demand management measures.

Consultants must include a completed **Table 5** in the Forecasting Report justifying their assumptions.

Table 5: Future Mode Share Targets for the Development		
Travel Mode	Mode Share Target	Rationale
Transit		
Walking		
Cycling		
Auto Passenger		
Auto Driver		

Future transit mode share targets must be consistent with expected transit infrastructure and service levels. Planned transit infrastructure improvements identified in the TMP should be confirmed with the actual timing of capital infrastructure projects in the City’s Long-Range Financial Plan. Changes to conventional transit service that are required to meet the forecasted transit mode share must be identified and confirmed with City of Ottawa staff.

E. Project Development Trips By Mode and Phase

Determine the projected development-generated trips for all modes (including auto passenger) for each phase of development based on the future mode share targets.

F. Apply Appropriate Trip Reduction Factors

There are three general adjustments that may be considered in this final step (outlined below). They may be applied to trip rates or generated trips as appropriate. If used, general adjustments should be documented within the Forecasting Report and justified to the satisfaction of City of Ottawa staff.

Deduction of existing development trips – total redevelopment scenario

Where the development proposal is for the total redevelopment of an existing development (i.e. the existing use is removed and replaced by the proposed use), it is acceptable to deduct existing development trips generated by the existing use from the projected development trips to calculate the net impact on the transportation system. Similarly, where the application is for an expansion to an existing development, it is appropriate to consider only the additional trips to be generated by the expanded development. However, operational analysis of development accesses must consider the total volume of development traffic following redevelopment (i.e. existing + new trips).

Pass-by vehicle trips

Trips attracted from the adjacent roadway are usually referred to as “pass-by” trips. Pass-by trips are already on the adjacent road traveling from primary origin to ultimate destination, and make an intermediate stop at the proposed development to execute a transaction. For example, if a driver stops at a convenience market or gas station on his/her way home from work, the development-generated trip is not a new addition to the road system—rather, it is diverted from the adjacent traffic stream. If pass-by trip assumptions are used as an adjustment factor in determining trip generation, these trips must still be accounted for in the turning movements into and out of the development.

The Recommended Practices appendix to the ITE Trip Generation Manual (7th Edition) suggests acceptable pass-by trip percentages. Deviations from these pass-by percentages must be defended.

Synergy or internalization

Trips attracted to two or more uses on the same development are usually referred to as having “synergy”. For example, a trip to a multi-use development may be destined to both a grocery store and a restaurant. Synergy between uses should reduce the number of trips generated by the development to below the simple sum of trip generation forecasts for the development’s individual components.

The rate of internalization for multi-use sites varies from development to development, depending on the combination of uses. Because of this, no “typical rate” data is available for the rate of trip internalization on multi-use sites. Assumptions in the TIA report must be justified to the satisfaction of City of Ottawa staff and, preferably, supported by the results of site trip-generation surveys.

Element 3.1.2 - Trip Distribution

Assign the development-generated trips to the transportation network by cardinal direction (i.e. north, south, east, and west). The directions from which traffic will approach and depart the 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 road network.

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

- Origin-destination surveys or comprehensive travel surveys;
- Market studies;
- Census tract data;
- Population and employment distribution data provided by City of Ottawa staff;
- Output from the City of Ottawa's Long Range Transportation Model; and/or
- Existing or anticipated travel patterns.

Element 3.1.3 - Trip Assignment

Assign the development-generated demands to the transportation network, considering logical routings, available, current and projected roadway capacities, and travel times. Traffic assignments may be estimated using a transportation planning model or manual assignment based on knowledge of the study area.

Existing access rights should not be assumed where the TIA report concerns redevelopment of an existing property. A review of the proposed land use and conditions on the adjacent transportation network should identify an acceptable access pattern. This review must be documented and included in the report to the City of Ottawa staff.

Module 3.2 - Background Network Travel Demands

This module outlines the accepted approach for forecasting background travel demands on the transportation networks serving the proposed development.

As a first step, the following anticipated background conditions should be confirmed with City of Ottawa staff:

- Potential or planned changes to the study area road and transit route networks;
- The rate of general background traffic growth on the arterial network; and
- Other anticipated developments in the study area.

Element 3.2.1 - Transportation Network Plans

The City of Ottawa anticipates significant changes to its transportation network over time, particularly the road and transit route components. These changes need to be reflected in the future background demand volumes to create an appropriate foundation for the TIA study. While planned transportation network changes are identified in the Schedules of the City of Ottawa's Official Plan and in the City's Transportation Master Plan, the City's Long-Range Financial Plan is the only accepted source for the anticipated timing of major projects. Smaller-scale transportation projects may also be associated with other local developments and should be accounted for, where they impact the assignment of demand from the subject development.

The Consultant must project and demonstrate the impact of the planned network changes on all travel modes and travel patterns, particularly those associated with new facilities (as opposed to widened facilities). Significant assumptions related to the reassignment of travel patterns must be detailed in the Consultant's report. Input may be available from the City of Ottawa's Long-range Transportation Model.

Element 3.2.2 - Background Growth

The rate of growth of background traffic should be established through one of the following methods:

- Regression analysis of historical traffic growth;
- A growth rate based on an area or neighbourhood transportation study;
- Estimation of growth across nearby strategic planning screenlines; or
- Projected rates of growth in area population and/or employment.

Historic traffic volume data and population/employment data may be obtained from the City of Ottawa staff. Where growth in the area of the development under consideration has been significant in the recent past or will be significant within the horizon years of the assessment, regression-based methods may be inappropriate.

Element 3.2.3 - Other Developments

All significant developments that are under construction, approved, or in the approval process within the study area, and that are likely to occur within the identified horizon years, must be identified and recognized in the TIA report. The consultant should identify all active development applications through the City of Ottawa on-line search tool DevApps and confirm their list of other background developments with City staff.

Module 3.3 - Demand Rationalization

This module outlines the accepted approach to rationalizing future travel demands in the study area to account for capacity limitations of the transportation network.

The bottom-up forecasting methodology employed in TIA studies occasionally results in the estimation of future peak hour auto demands that cannot physically be carried on the 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 adjustments 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 development-generated travel. The purpose of this module is, where necessary, to adjust projected background and/or development-generated travel demands to create a more realistic picture of future conditions.

The tasks required for this element include:

- Combine initial projections of development-generated and background travel auto demands at study area intersections.
- Identify any locations and approaches where total auto demand is projected to exceed capacity, and what reductions in peak hour approach auto volumes are required for demand to meet capacity.
- Identify how the required reductions are expected to be attributed to background travel and development-generated travel.
- For development-generated travel, identify any required changes in trip generation assumptions and identify additional measures (e.g. development size or design, parking reductions, TDM measures) to support those changes.
- For background travel, review potential to shift auto demand to alternative routes, modes or times.
- Prepare a detailed justification for the shifts in auto demands, and discuss with City staff.

TIA Forecasting Report

Forecasting Reports should adhere to the following Table of Contents:

<p>1. DEVELOPMENT-GENERATED TRAFFIC</p> <p><i>Trip Generation</i></p> <p> Trip Generation Rates</p> <p> Mode Shares</p> <p><i>Trip Distribution</i></p> <p><i>Trip Assignment</i></p> <p>2. BACKGROUND NETWORK TRAFFIC</p> <p><i>Changes to the Background Transportation Network</i></p> <p><i>General Background Growth Rates</i></p> <p><i>Other Area Development</i></p> <p>3. DEMAND RATIONALIZATION</p> <p><i>Description of Capacity Issue(s)</i></p> <p><i>Adjustment to Development Generated Demands</i></p> <p><i>Adjustments to Background Network Demands</i></p>

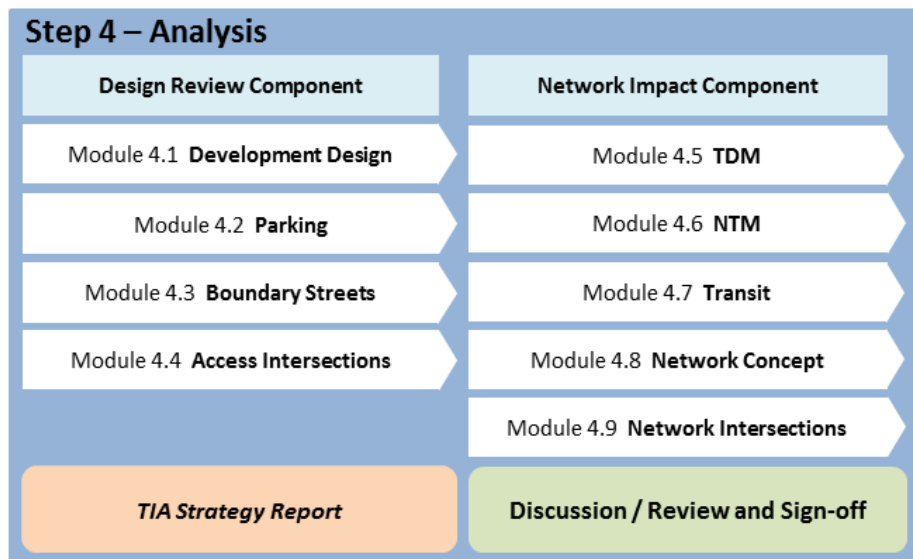
Summary of Key Thoughts:

- Development-generated trips and future background travel demands are estimated for all modes.
- Mode shares for development-generated trips for the development horizon year are estimated considering existing and planned mode shares in the vicinity of the development, proposed land use, development design, proposed TDM measures, proposed parking supply, planned network elements and planned transit service.
- Changes in background transportation demands are estimated considering planned changes to the transportation networks, general growth in demands on the boundary streets, and approved local developments.
- Network demands will be rationalized where the sum of development-generated demands and forecasted background demands exceed the capacity of network elements. Rationalization is expected to consider increases in sustainable modes, shifting of demands outside the peak hour, and rerouting of background demands.

Step 4 - Analysis

Step 4 requires the proponent to assess the alignment between the transportation elements of the proposed development and the City of Ottawa’s city-building objectives and identifies any opportunities to improve alignment. Step 4 also evaluates the post-development performance of the planned transportation network based on the City’s established performance measures and targets and identifies potential mitigation measures to off-set development impact.

Step 4 is divided into nine modules, as shown below:



DESIGN REVIEW COMPONENT

Module 4.1 - Development Design

This module reviews the proposed transportation network elements on the development property to ensure that they provide safe and efficient access for all users while creating an environment that encourages walking, cycling and transit use.

Focus of Analysis

- Are the location, design and connectivity of development transportation facilities consistent with the City of Ottawa’s urban design guidelines and transportation policies?
- Does the layout of new or modified street networks meet the needs of pedestrians, cyclists and transit users?
- Does the layout of new or modified street networks reinforce the preferred roles and functions of the streets in the network?
- Does the site design provide safe and efficient access for municipal services (e.g. waste collection)?

Element 4.1.1 - Design for Sustainable Modes

Assess consistency of the following with City of Ottawa Planning and Design Guidelines:

- The location and design of proposed auto and bicycle parking areas;
- The design of pedestrian routes and facilities; and
- The design and location of transit amenities.

Assess the opportunity to implement development facilities that are supportive of sustainable modes using the City of Ottawa’s *TDM-supportive Development Design and Infrastructure Checklist*.

Identify the actual walking distance from all exterior access doors in the proposed development to reach existing and proposed transit stops or stations. Calculate the percent of units/ doors that are within a 400m walk of the potential transit route and identify opportunities that increase the percent of units within the 400m walk distance (i.e. additional pedestrian connections, relocation of proposed land uses/ densities to be closer to transit). Note that OC Transpo’s service design guideline for peak period service is to provide service within a five minute (400m) walk of the home, school and work location of 95% of urban residents.

Element 4.1.2 - Circulation and Access

Assess the ability of the proposed access and circulation route for municipal services to accommodate the expected design vehicle. Assess the design and impact of loading and/or short-stay delivery service facilities if loading and/or short-stay delivery are expected to be accommodated on the public street. The assessment must consider policy direction from the City's various Urban Design Guidelines.

Exemption: This Element is not required for applications involving plans of subdivision.

Element 4.1.3 - New Street Networks

Assess the planned street network using the methods described in *the Traffic Calming Manual for Greenfield Neighbourhoods*.

Review should confirm:

- Network design results in demands and driver behaviour that is consistent with road classifications;
- Neighbourhood traffic management features are included as necessary to support desired driver behaviour;
- Connectivity encourages travel by sustainable modes

Exemption: This element is not required for applications involving site plans.

Reference Documents and Methods

The following City of Ottawa guidelines and documents are referenced in Module 4.1:

- Approved Design Guidelines
- Traffic Calming Manual for Greenfield Neighbourhoods (under development); and
- OC Transpo's Transit Service and Fare Policy Manual

Module 4.2 - Parking

This module reviews the development's planned parking supply to ensure a balance between operational needs, the encouragement of sustainable travel modes, and the desire to minimize neighbourhood impacts.

Focus of Analysis

- What is the planned on-site parking supply for autos and bicycles?
- What is the likelihood of spillover parking in the adjacent neighbourhood?

Element 4.2.1 - Parking Supply

Auto parking

Comment on the adequacy of the proposed parking supply through a comparison to:

- The minimum/maximum auto parking supply required by zoning by-law, for common land uses; and
- A first-principles estimate of parking demand, for unique and largely auto-focused land uses.

Review the potential for off-site parking, including shared parking with adjacent developments.

Bicycle parking

Determine minimum bicycle parking supply in the City of Ottawa Zoning By-law.

Element 4.2.2 - Spillover Parking

Estimate Magnitude of Potential Spillover Parking Demand

Project the accumulation and distribution of development parking demand, both long-term and short-term, over a peak demand day.

Compare peak demand to available supply to identify the magnitude of residual demand.

Estimate Existing Off-Site Supply and Demand

Determine if there is a recent, relevant Local Area Parking Study.

Develop an inventory of on and off-street parking that is available for use to travelers to the subject development that is within 400 metres walking distance, and complete a survey of parking demand for that inventory over a peak day.

Identify Mitigation Strategy

If the addition of projected spillover parking would cause total demand for the local on-street and off-street parking inventory to exceed 85% of supply, identify required measures to accommodate or modify the development's parking demand (e.g. increased on-site parking, additional off-site parking, or TDM measures).

Exemption: This element is only required if the proposed number of on-site parking stalls is lower than the anticipated parking demand generated by the site.

Reference Documents

The following City of Ottawa guidelines and documents are referenced in Module 4.2:

- Zoning By-law;
- staff contact for Local Area Parking Studies

Module 4.3—Boundary Street Design

This module determines design elements of boundary streets required to accommodate the proposed development, consistent with the City’s complete streets philosophy and its urban design objectives for the development area.

Focus of Analysis

- What are the preferred mid-block design elements for the development’s boundary streets?

If the City has prepared a complete street concept for the boundary street

- Identify the design at the interface of the street and the subject development;
- Assess the potential impact of the subject development on the design; and
- If changes to the design are required, develop an interim design concept for the boundary street.

If the City has not prepared a complete street concept for the boundary street

Develop a design concept for the boundary streets considering:

Mobility

- Assess Segment MMLOS for boundary streets for future background conditions;
- Identify any gaps in the City’s designated walking, cycling, transit and freight networks;
- Identify preferred treatments at intersections;
- Develop a concept for boundary streets between intersections that maximizes the achievement of MMLOS objectives.

Road Safety

Review historical collision records for boundary streets to identify any existing safety concerns that should be considered in the design of any transportation improvements to be completed:

- Prepare a collision diagram based on most recent available five years of collision records;
- Identify patterns with more than six collisions in five years; and
- For any such pattern, review the location in-field and identify measures that could be taken to reduce collisions where transportation improvements are proposed

Neighbourhood Traffic Management (NTM)

Review development location with City of Ottawa staff and determine if the proposed site will exacerbate existing operational concerns on boundary streets, or if existing issues can be resolved during the construction of site driveways.

Reference Documents

The following City of Ottawa guidelines and documents are referenced in Module 4.3:

- Complete Streets strategy
- MMLOS Guidelines
- networks for walking, cycling, and transit
- staff contact for collision data
- staff contact for Neighbourhood Traffic Management (NTM) issues

Module 4.4 - Access Intersections Design

This module determines design elements of the points of access to the development, consistent with the City's complete streets philosophy, MMLoS guidelines, and its urban design objectives for the development area.

Focus of Analysis

- What are the appropriate intersection control measures (i.e. roundabouts, traffic signals, stop control) to serve future background and total travel demands?
- What are the appropriate intersection configurations (i.e. lane geometry, medians, cycling lanes) to serve future background and total travel demands?
- Are there any control strategies required to meet other complete street-based performance objectives including transit priority or pedestrian phasing?

Element 4.4.1 - Location and Design of Access

Review the location and design of the proposed driveway(s) to check consistency with *City of Ottawa Access Management Guidelines* and identify potential safety concerns. The assessment must include an in-field review, and consider:

- Proximity to adjacent driveways, driveways on the opposite side of the street;
- Proximity to adjacent signalized intersections;
- Whether the driveway is being added to an existing median opening, and whether the use of the existing opening will be changed; and
- Design parameters of access (e.g. grade, width, clear throat length, location of parking gates, etc.).

Element 4.4.2 - Intersection Control

Identify the preferred intersection controls for the development accesses by:

- screening the intersection(s) using the City of Ottawa roundabout screening guidelines;
- completing the TAC Traffic Signal Warrant analysis; and
- determining if isolated transit priority is desirable or required to reduce transit delays.

Element 4.4.3 - Intersection Design

Complete intersection MMLOS analysis for existing, future background and future total travel demands by all modes.

Complete detailed performance analyses (i.e. Synchro analyses) at study area intersections for existing, future background and future total traffic demands. Apply the analysis parameters described in **Appendix C**.

Determine the required design elements for each intersection, and identify where trade-offs between competing objectives are required based on City MMLOS targets.

Reference Documents

The following City of Ottawa guidelines and documents are referenced in Module 4.4:

- Complete Streets strategy
- MMLOS Guidelines
- Roundabout Screening Tool
- staff contact for travel demands
- Access Management Guidelines (under development)
- Private Approach By-law

NETWORK IMPACT COMPONENT

Module 4.5 - Transportation Demand Management

This module identifies post-occupancy TDM program measures that could complement the development's proposed design and infrastructure elements to ensure acceptable performance, benefit occupants and visitors, and improve marketability.

Focus of Analysis

- Describe key aspects of the context for post-occupancy TDM measures.
- Evaluate the need and opportunity for post-occupancy TDM program measures.
- Identify the nature and proposed delivery of post-occupancy TDM program measures.

Exemption: This module is not required for non-residential site plans that are projected to have fewer than 60 employees and/or students on location at any given time.

Element 4.5.1—Context for TDM

Compare the development's proposed mode shares to those for equivalent trip purposes (i.e. work, school, home-based, etc.) in the Traffic Assessment Zone (TAZ) that contains the proposed development (refer to work completed in Module 3.1—Development-generated Travel Demand). 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 considered to be more representative and are justified as such to the satisfaction of City of Ottawa staff). Data for similar existing developments in the study area may also be used, where information is available.

Identify any residential, institutional, recreational or natural land uses that would be impacted if traffic volumes generated by the proposed development are higher than expected.

Describe key aspects of the proposed development, as follows:

Development Location and Involved Parties

State whether the proposed development is in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone (as determined by Official Plan).

Identify the development's eventual owner, property manager and tenant(s), if known. Identify the current location of any tenant employers that will relocate from elsewhere in Ottawa-Gatineau.

Development Operation

For non-residential uses, identify operating hours (i.e. opening, closing, shift schedules) and estimate the proportion of peak period person-trips to and from the site that will be made for different purposes (i.e. employees engaged in commuting, employees engaged in business travel, visitors, suppliers, customers, students).

For all employment uses, estimate the number and proportion of employees by type of occupation (i.e. trade, administrative, service, managerial, professional).

For retail or service uses, estimate the proportion of customers or clients travelling from different catchment areas in Ottawa-Gatineau and particularly those travelling less than 2 km.

For grade schools, estimate the number of employees and the number of students by grade.

For residential uses, identify the planned proportion of units by number of bedrooms, and identify any age restrictions.

Element 4.5.2 - Need and Opportunity

Identify possible negative impacts of a failure to meet the proposed sustainable mode share targets on:

- The development's owner, property manager, tenants, occupants or visitors;
- Other land uses in the study area; and
- Other transportation network users.

Identify whether and how a program of post-occupancy TDM measures would improve the likelihood of achieving the proposed sustainable mode share targets, and reduce the risks of development non-performance. Consider the development's TDM-supportive design and infrastructure elements (Module 4.1), parking supply (Module 4.2), contextual issues (Element 4.5.1), and its general quality of existing and future access by walking, cycling, transit and motor vehicle.

Element 4.5.3 - TDM Program

Identify a suite of post-occupancy TDM measures to enable and encourage travel by sustainable modes (i.e. to make walking, cycling, transit, carpooling and telework more convenient, accessible, safe and comfortable). At a minimum, complete the City of Ottawa's *TDM Measures Checklist*; the City may require additional analysis for large or complex development proposals, or those that represent a higher degree of performance risk.

Propose an implementation plan for post-occupancy TDM program measures that addresses planning and coordination, funding and human resources, timelines for action, performance targets and monitoring requirements.

Reference Documents

The following City of Ottawa guidelines and documents are referenced in Module 4.5:

- Complete Streets strategy
- MMLOS Guidelines
- Roundabout Screening Tool
- staff contact for travel demands

Module 4.6 - Neighbourhood Traffic Management

This module reviews significant access routes to the development and identifies any required neighbourhood traffic management (NTM) measures to mitigate impacts on collector and local roads.

Focus of Analysis

- Are neighbourhood streets impacted by the development (i.e. subject to increased traffic volumes and/ or a change in role or function)?

Element 4.6.1 - Adjacent Neighbourhoods

Consistency with Existing Road Classification

Review significant access routes to/from the proposed development, and identify any collector or local streets on those access routes. **If route does not contain collector or local roads, analysis is complete;** if routes include collector or local roads, assess whether the addition of development-related traffic would change the existing classification (i.e. role and function), and if so determine:

1. Can changes to the development access scheme and routes be made to reduce or eliminate use of collector and local roads?; or
2. Can NTM measures be introduced to mitigate impact of development traffic?

Compare future traffic volumes against the following thresholds:

- Local roads—a maximum of 1,000 vehicles per day, or 120 vehicles during the peak hour;
- Collector roads—a maximum of 2,500 vehicles per day, or 300 vehicles during the peak hour; and
- Major collector roads—a maximum of 5,000 vehicles per day, or 600 vehicles during the peak hour.

If development impacts cannot be avoided, develop an NTM plan for impacted roads according to methods outlined in the Integrated NTM/TIA Planning process.

Exemption: This Element is only required when the development relies on local or collector streets for access.

Reference Documents

The following City of Ottawa guidelines and documents are referenced in Module 4.6:

- Area Traffic Management Guidelines
- Integrated NTM/TIA Planning process (currently under development)

Module 4.7 - Transit

This module reviews the potential impacts on existing and planned transit networks and service to ensure that level of service is not unacceptably impacted.

Focus of Analysis

- Can the capacity of existing/planned transit services accommodate development-generated demand?
- Are isolated transit priority measures needed to offset transit delays created by adding development driveways and development-generated transit passengers?

Element 4.7.1 - Route Capacity

Identify Possible Capacity Changes

Compare total future transit passenger demands (i.e. background plus development-generated transit passengers) to the capacity of existing transit routes serving the development, to determine if additional capacity is required.

Identify Impacts

Assess the capital and operating cost implications (including vehicle requirements) and the potential rate of cost-recovery associated with new or modified routes.

Element 4.7.2 - Transit Priority

Assess the impact on transit travel times of adding development driveways and development-generated transit passenger demands. Identify the need for and benefit of possible transit priority measures to offset delays.

Reference Documents

The following City of Ottawa guidelines and documents are referenced in Module 4.7:

- transit network maps
- OC Transpo Transit Service and Fare Policy Manual

Module 4.8 - Review of Network Concept

This module determines if changes to the Transportation Master Plan (TMP) concepts for auto or transit networks are required to accommodate the development-generated travel demands.

Focus of Analysis

- Does the development change the TMP concepts for auto or transit networks?

Identify affected links

Identify links in the automobile and transit networks (as identified in the most recent TMP and any subsequent integrated transportation and land use plans) that cross any planning screenline(s) adjacent to the development.

Review network adequacy

For those automobile and transit links at the horizon year(s), identify projected morning peak period capacities, background demands and total (background plus development-generated) future demands.

Determine if the network concepts require modification to perform acceptably.

Exemption: This element is only required when a proposed development generates more than 200 peak-hour person-trips more than the equivalent volume permitted by established zoning.

Reference Documents

The following City of Ottawa guidelines and documents are referenced in Module 4.8:

- transit network maps
- Transportation Master Plan
- Long Range Financial Plan
- staff contact for strategic transportation planning

Module 4.9 - Intersection Design

This module determines the design elements of study area intersections required to accommodate the proposed development, consistent with the City's complete streets philosophy and MMLOS practices.

Focus of Analysis

- What are the appropriate intersection control measures (i.e. roundabouts, traffic signals, stop control) to serve future background and total travel demands?
- What are the appropriate intersection configurations (i.e. lane geometry, medians, cycling lanes) to serve future background and total travel demands?
- Are there any control strategies required to meet other complete street-based performance objectives including transit priority or pedestrian phasing?

Element 4.9.1 - Intersection Control

Identify the preferred intersection controls for the network intersections by:

- screening the intersection(s) using the City of Ottawa roundabout screening guidelines;
- completing the TAC Traffic Signal Warrant;
- determining if isolated transit priority is desirable or required to reduce transit delays.

Element 4.9.2 - Intersection Design

Complete intersection MMLOS analysis for existing, future background and future total travel demands by all modes.

Complete detailed performance analyses (i.e. Synchro analyses) at study area intersections for existing, future background and future total traffic demands. Apply the analysis parameters described in **Appendix C**.

Determine the required design elements for each intersection, and identify where trade-offs between competing objectives are required based on City MMLOS targets.

Reference Documents

The following City of Ottawa guidelines and documents are referenced in Module 4.9:

- Complete Streets strategy
- MMLOS Guidelines
- Roundabout Screening Tool
- staff contact for travel demands

TIA Strategy Report

The TIA Strategy Report must clearly identify all physical modifications required to align the development to the transportation network policy objectives and to offset impacts on the network. Design options may need to be developed where potential modifications do not meet City MMLOS targets for each mode. These design options may require the City to make decisions on priority for individual modes of transportation. Consultants should evaluate options following the City of Ottawa Complete Streets and MMLOS philosophies. Recommendations should be made recognizing the planning designation, location and need to provide safe travel for all users.

Throughout the preparation of the TIA Strategy Report, the proponent will engage in discussions with City staff regarding trade-offs between design options and the City's MMLOS priorities. Proponents may also propose deferral of modifications for the City's consideration, subject to post-development monitoring (discussed in more detail in the Monitoring Plans Section – Step 5). Deferral of modifications usually requires implementation of TDM measures to ensure successful shift in mode share. It is important that staff support the proposed strategy plan prior to finalizing the TIA Strategy Report.

TIA Strategy Reports should adhere to the following Table of Contents:

- 1. INTRODUCTION**
- 2. DEVELOPMENT DESIGN**
- 3. PARKING**
- 4. BOUNDARY STREETS**
- 5. ACCESS INTERSECTIONS**
- 6. TRANSPORTATION DEMAND MANAGEMENT**
- 7. NEIGHBOURHOOD TRAFFIC MANAGEMENT**
- 8. TRANSIT**
- 9. REVIEW OF NETWORK CONCEPT**
- 10. INTERSECTION DESIGN**
- 11. SUMMARY OF IMPROVEMENTS INDICATED AND MODIFICATION OPTIONS**

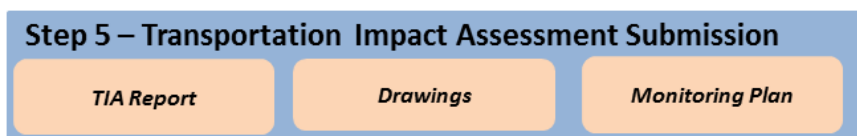
Summary of Key Thoughts:

- The Design Review component consists of four modules: Development Design, Parking, Boundary Streets, and Access Intersections.
- The Network Impact component consists of five modules: Transportation Demand Management (TDM), Neighbourhood Traffic Management (NTM), Transit, Review of Network Concept, and Network Intersections.
- The TIA Strategy Report must clearly identify all physical modifications required to align the development to the transportation network policy objectives and to offset impacts on the network. Design options may need to be developed and evaluated in consultation with the City on priority for individual modes of transportation.

Step 5 - Transportation Impact Assessment Submission

Step 5 compiles the final TIA Plan deliverables for the proposed development. All project reports from Steps 1 to 4 will be packaged into the TIA Final Report along with required Road Modification Approval (RMA) report figures and functional design drawings. If required, a Monitoring Plan will be prepared where post-development monitoring is required to verify modal share and site generated volumes (all modes) meet projected values.

Step 5 is divided into three modules, as shown below:



TIA Report

The TIA Report compiles the TIA Screening and Scoping, Forecasting and Strategy Reports into a single document that will be used as a final submission for the development application. The TIA Report should provide sufficient information to include the proposed road modifications and any monitoring requirements into the development legal agreements. If the functional plan is insufficient to develop accurate cost estimates, including any required property needs, or determination of impacts on the right of way, detailed designs may be necessary for approval of the TIA Report.

Drawings

Both the Road Modification Approval report figures and the functional design plan must be submitted with the TIA final report submission. Once the RMA report is approved under delegated authority, the functional plan can be developed to a detailed design submission following the Ideal Submission format (**Appendix E**).

Road Modification Approval (RMA) Report Figures

Modifications to the City right of way require specific approval from the City's Transportation Committee and Council. The approval for localized road modifications is satisfied under delegated authority of the General Manager, Transportation Services and is included as part of the Development Approvals Process. A separate document outside of the TIA Guidelines is used to facilitate this approval. This document, the Roadway Modification Approval (RMA) Report, is completed by the City's Transportation Service Department and is produced in parallel with the development application approval process.

The proponent must provide figures for the RMA report and the cost estimate for the proposed works. **Appendix D** provides samples of the required RMA figures (key plan and proposed roadway modifications) and provides a flow chart illustrating the process undertaken by City staff. The RMA report figure templates in both PDF and CAD format are provided by City staff.

Functional Design Plan

A functional design plan illustrating the geometry and general layout of the network modifications as illustrated in the RMA figures must be submitted on a 1:500 scale current aerial base map with all dimensions of the proposed design illustrated. The plan must show all confirmed utility locations and landscaping features to identify any possible conflicts. The proposed works must show sufficient length to illustrate appropriate connection to existing conditions. Underground sewer and water services must not be shown on the plan, however, surface iron works must be visible. All pavement markings and signage must be shown to confirm curb side use of the roadway and provide sufficient information regarding lane usage. In summary, the functional design plan must ensure that construction of the proposed network modifications is feasible.

Detailed Design

Engineering drawings required for Municipal Consent Circulation must be prepared according to the Ideal Submission Guidelines provided in **Appendix E**.

Monitoring Plan

INTRODUCTION

The Monitoring Plan identifies the proposed approach to monitoring future conditions or outcomes of the proposed development that may require remedial actions by the developer, the City or other party.

Note: This section focuses on identifying monitoring measures that the developer proposes to undertake in exchange for the temporary deferral of specific mitigation actions (e.g. new lane construction, turn prohibitions or TDM measures); if the results of monitoring show that certain conditions have been achieved, those mitigation actions may be subject to additional or permanent deferral. This section does not address monitoring actions to confirm developer compliance with commitments made in a development agreement (i.e. enforcement), and does not address monitoring actions to gather information for purposes of knowledge transfer to benefit of the City of Ottawa (i.e. learning).

Focus of Analysis

For each issue for which monitoring is proposed:

- What condition or outcome requires monitoring?
- Why is monitoring, with the possibility of future remedial action, preferable to immediate action?
- How will monitoring be conducted?
- What target or trigger will lead to the need for remedial action, and how will a decision on action or inaction be made?
- What remedial action could be required (if known), and how would it be implemented?

Each of the subsequent four analytical steps must be completed for each issue for which monitoring is proposed.

PART 1—RATIONALE

- Identify the condition or outcome for which monitoring is proposed (e.g. trip generation, mode shares, loading/unloading activities, parking demands, motor vehicle speeds, neighbourhood traffic infiltration, queue lengths, pedestrian delays or collision frequencies).
- Explain why monitoring and possible future remedial action are preferable to immediate action (e.g. a desire to reduce capital costs or land consumption, to avoid external impacts on adjacent land uses or neighbourhoods, or to maximize the chances of achieving other important outcomes).

PART 2—MONITORING ACTIVITIES

- Identify actions, tools and/or processes that will be followed to monitor the condition or outcome.
- Identify when monitoring will start, how frequently it will occur, and when it will end.
- Identify who will be responsible for conducting monitoring activities.
- Identify how and where observations will be recorded and stored.
- Identify how and when observations will be submitted to the City.

PART 3—EVALUATION

- Propose timelines for evaluation (i.e. dates, frequency).
- Identify the target or trigger that would lead to a decision to take remedial action.
- Identify who will be responsible (individually or jointly) for that decision.
- Explain what would occur if the evaluation of the condition or outcome being monitored is deemed to be (a) inconclusive, or (b) acceptable and thus resolved.

PART 4—REMEDIATION

If the condition or outcome being monitored is deemed to be unacceptable and in need of remediation:

- Describe the nature of remedial actions (if known).
- Describe who will be responsible for identifying, designing, approving, funding and implementing those actions.
- Describe the timelines for implementing those actions.
- Describe any subsequent monitoring that would be required to confirm the effectiveness of those actions.

REFERENCE DOCUMENTS

- None

Summary of Key Thoughts:

- The final TIA Report compiles the TIA Screening and Scoping, Forecasting and Strategy Reports.
- The drawing package includes the RMA drawings and functional design drawings for all proposed modifications.
- The Monitoring Plan identifies strategies for monitoring deferred infrastructure, TDM commitments, and any other monitoring initiatives agreed to by both parties through the Development Agreement.

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Chapter 4

City Planning Documents/ References and Staff Contacts



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Required Data Sets: City Planning/Engineering Documents

The following table identifies the planning and engineering documents required from the City of Ottawa to complete a TIA.

City Planning/Engineering Documents	
Data Sets needed to complete TIA	Source
transit network maps	Transportation Master Plan
cycling network	Transportation Master Plan
map of Design Priority Areas (DPA) and Transit-oriented Development (TOD) Zones	Official Plan
planning regulations for development lands	Official Plan, Zoning Bylaw
boundary street classifications	Transportation Master Plan
planned Capital projects	Long Range Financial Plan
Location and composition of strategic planning screenlines	Transportation Master Plan
mode share and origin-destination data – all strategic transportation model traffic zones (TAZ)	National Capital Region TRANS Origin-Destination Survey (TRANS website)
mode share targets for City and for strategic planning screenlines	Transportation Master Plan
policies and guidelines for design of streets and active transportation elements	<p>Relevant urban design guidelines for development design review (available from City of Ottawa website) – Ottawa.ca/completed guidelines</p> <ul style="list-style-type: none"> • Urban Design Guidelines for Developments Along Traditional Mainstreets • Urban Design Guidelines for Developments Along Arterial Mainstreets • Urban Design Guidelines for Greenfield Neighbourhoods • Transit-Oriented Design Guidelines • Urban Design Guidelines for Large Format Retail • Regional Road Design Guidelines
guidelines for designing infrastructure elements of developments to support and encourage TDM objectives	TDM-supportive Development Design and Infrastructure Checklist

City Planning/Engineering Documents	
methods for assessing street network design, determining need for Neighbourhood Traffic Management elements and assessing Active Transportation networks in new subdivisions	<i>Traffic Calming Manual for Greenfield Subdivisions</i>
guidelines for development access location and design	Private approach bylaw for access design TAC Geometric Design Guide for Canadian Roads
methods for planning Area Traffic Management measures on existing streets	Area Traffic Management Guidelines <i>City of Ottawa Integrated TIA/ Neighbourhood Traffic Management Planning Process</i>
guidelines for calculating Level of Service for intersections and street segments for all travel modes	MMLOS Report to Committee
guidance for making trade-offs between infrastructure elements where conflicts occur	Complete Streets Implementation Framework
methods for determining need for a roundabout and guidelines for roundabout design	Roundabout Screening Tool TAC Geometric Design Guide and Roundabout Design Guide

* **Bold text** indicates that the reference is under development

Contacts

Traffic volumes – cristina.ferrante@ottawa.ca

Transit demands – genya.stefanoff@ottawa.ca

Collision data – sophie.gauvreau@ottawa.ca

Mode shares – jenniferm.armstrong@ottawa.ca

Strategic transportation planning (travel demands) - jenniferm.armstrong@ottawa.ca

Maps

Cycling network - geoOttawa

Transit network - geoOttawa

Strategic planning screenlines - TMP

Street classifications – geoOttawa

Reference Documents – Planning

Official Plan (including information on Design Priority Areas and Transit-Oriented Development)

Transportation Master Plan

Long Range Financial Plan

Zoning Bylaw (By-law No. 2008-250)

Provincial Policy Statement

GeoOttawa

Completed Guidelines

Urban Design Guidelines for Developments Along Traditional Mainstreets

Urban Design Guidelines for Developments Along Arterial Mainstreets

Urban Design Guidelines for Greenfield Neighbourhoods

Transit-Oriented Design Guidelines

Urban Design Guidelines for Large Format Retail

Regional Road Design Guidelines

Technical Documents

Complete

Roundabout Screening Tool

Area Traffic Management Guidelines

Private Approach By-law (By-law No. 2003-447)

Complete Streets Implementation Framework

MMLOS (Multi-modal Level of Service) Guide

TDM-supportive Development Design and Infrastructure Checklist – travelwise@ottawa.ca

TDM Measures Checklist – travelwise@ottawa.ca

Under development

Traffic Calming Manual for Greenfield Subdivisions

Neighbourhood Traffic Management Planning Process – heidi.cousineau@ottawa.ca



Chapter 5 Appendices

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Appendix A: Certification Form for TIA Study PM

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TIA Plan Reports

On 14 June 2017, the Council of the City of Ottawa adopted new Transportation Impact Assessment (TIA) Guidelines. In adopting the guidelines, Council established a requirement for those preparing and delivering transportation impact assessments and reports to sign a letter of certification.

Individuals submitting TIA 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 Ottawa's Official Plan, the Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines.

By submitting the attached TIA report (and any associated documents) and signing this document, the individual acknowledges that s/he meets the four criteria listed below.

CERTIFICATION

1. I have reviewed and have a sound understanding of the objectives, needs and requirements of the City of Ottawa's Official Plan, Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines;
2. I have a sound knowledge of industry standard practice with respect to the preparation of transportation impact assessment reports, including multi modal level of service review;
3. I have substantial experience (more than 5 years) in undertaking and delivering transportation impact studies (analysis, reporting and geometric design) with strong background knowledge in transportation planning, engineering or traffic operations; and
4. I am either a licensed¹ or registered² professional in good standing, whose field of expertise [check appropriate field(s)] is either transportation engineering or transportation planning .

1,2 License of registration body that oversees the profession is required to have a code of conduct and ethics guidelines that will ensure appropriate conduct and representation for transportation planning and/or transportation engineering works.

City Of Ottawa
Infrastructure Services and Community
Sustainability
Planning and Growth Management
110 Laurier Avenue West, 4th fl.
Ottawa, ON K1P 1J1
Tel. : 613-580-2424
Fax: 613-560-6006

Ville d'Ottawa
Services d'infrastructure et Viabilité des
collectivités
Urbanisme et Gestion de la croissance
110, avenue Laurier Ouest
Ottawa (Ontario) K1P 1J1
Tél. : 613-580-2424
Télécopieur: 613-560-6006

Dated at _____ this _____ day of _____, 20____.
(City)

Name: _____
(Please Print)

Professional Title: _____

Signature of Individual certifier that s/he meets the above four criteria

Office Contact Information (Please Print)
Address:
City / Postal Code:
Telephone / Extension:
E-Mail Address:

Stamp

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Appendix B: TIA Screening Form

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City of Ottawa 2017 TIA Guidelines Screening Form

1. Description of Proposed Development

Municipal Address	
Description of Location	
Land Use Classification	
Development Size (units)	
Development Size (m ²)	
Number of Accesses and Locations	
Phase of Development	
Buildout Year	

If available, please attach a sketch of the development or site plan to this form.

2. Trip Generation Trigger

Considering the Development’s Land Use type and Size (as filled out in the previous section), please refer to the Trip Generation Trigger checks below.

Land Use Type	Minimum Development Size
Single-family homes	40 units
Townhomes or apartments	90 units
Office	3,500 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

** If the development has a land use type other than what is presented in the table above, estimates of person-trip generation may be made based on average trip generation characteristics represented in the current edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual.*

If the proposed development size is greater than the sizes identified above, the Trip Generation Trigger is satisfied.

3. Location Triggers

	Yes	No
Does the development propose a new driveway to a boundary street that is designated as part of the City’s Transit Priority, Rapid Transit or Spine Bicycle Networks?		
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?*		

*DPA and TOD are identified in the City of Ottawa Official Plan (DPA in Section 2.5.1 and Schedules A and B; TOD in Annex 6). See Chapter 4 for a list of City of Ottawa Planning and Engineering documents that support the completion of TIA).

If any of the above questions were answered with ‘Yes,’ the Location Trigger is satisfied.

4. Safety Triggers

	Yes	No
Are posted speed limits on a boundary street are 80 km/hr or greater?		
Are there any horizontal/vertical curvatures on a boundary street limits sight lines at a proposed driveway?		
Is the proposed driveway 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)?		
Is the proposed driveway within auxiliary lanes of an intersection?		
Does the proposed driveway make use of an existing median break that serves an existing site?		
Is there is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development?		
Does the development include a drive-thru facility?		

If any of the above questions were answered with ‘Yes,’ the Safety Trigger is satisfied.

5. Summary

	Yes	No
Does the development satisfy the Trip Generation Trigger?		
Does the development satisfy the Location Trigger?		
Does the development satisfy the Safety Trigger?		

If none of the triggers are satisfied, the TIA Study is complete. If one or more of the triggers is satisfied, the TIA Study must continue into the next stage (Screening and Scoping).

Appendix C: Synchro Analysis Parameters

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GENERAL TIMING STANDARDS	
Optimum cycle length for analysis	<ul style="list-style-type: none"> • 120 sec
Maximum cycle length for analysis	<ul style="list-style-type: none"> • 130 sec
Minimum green time	<ul style="list-style-type: none"> • 10 sec for side street through movements • 5 sec for left-turn phases
Vehicle clearance	<ul style="list-style-type: none"> • Must consist of amber and all-red display. Duration in accordance with Ontario Traffic Manual Book 12.
PEDESTRIAN PHASES	
Minimum walk time	<ul style="list-style-type: none"> • 7 sec
Walking speed	<ul style="list-style-type: none"> • 1.0 m/sec, or 0.8-0.9 m/sec if near high elderly population
Pedestrian clearance	<ul style="list-style-type: none"> • Must be sufficient to allow crossing from curb to curb (including central medians). Includes vehicle clearance time in accordance with Ontario Traffic Manual Book 12.
Median storage	<ul style="list-style-type: none"> • If centre median storage for pedestrians is provided, then the minimum walk time must be of sufficient 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 sufficient 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 City of Ottawa staff.
AUXILIARY TURN LANE PHASING	
Overlap left-turn	<ul style="list-style-type: none"> • 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 in order 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.
Protected only left-turn phasing	<ul style="list-style-type: none"> • 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).
Shared lane operation	<ul style="list-style-type: none"> • All movements permitted from a shared use lane must operate on the same signal phase.
Dual right/left-turn movements	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • A right/left-turn arrow shall not be displayed at the same time that a conflicting pedestrian movement is permitted.

INTERSECTION SPACING AND MINIMUM STORAGE LENGTHS	
Visibility	<ul style="list-style-type: none"> As per the requirements of the Ontario Traffic Manual, Book 12, signalized intersection spacing must be determined based on posted speed, to ensure adequate visibility of the signal heads.
Through vehicle storage between intersections	<ul style="list-style-type: none"> Signalized intersections must be sufficiently 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 (assuming an average vehicle length of 7 metres).
Storage lane lengths	<ul style="list-style-type: none"> Left-turn storage lanes must be long enough to accommodate 1.5 times the average number of arrivals per cycle in the heaviest 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. All calculations must assume an average vehicle length of 7 metres.
PARAMETERS FOR INTERSECTION ANALYSIS	
Heavy vehicle equivalent	<ul style="list-style-type: none"> Heavy vehicles or buses 1.7
Saturation flow rate	<ul style="list-style-type: none"> The maximum assumed ideal unadjusted saturation flow rate shall not exceed 1800 passenger cars per hour of green per lane, unless a higher or lower rate can be justified by the Consultant through data.
Peak Hour factor	<ul style="list-style-type: none"> Existing Conditions: 0.90 Future Conditions: 1.0
Analysis Period	<ul style="list-style-type: none"> 15 minutes
Area Type	<ul style="list-style-type: none"> CBD within the Urban Core Other outside the Urban Core

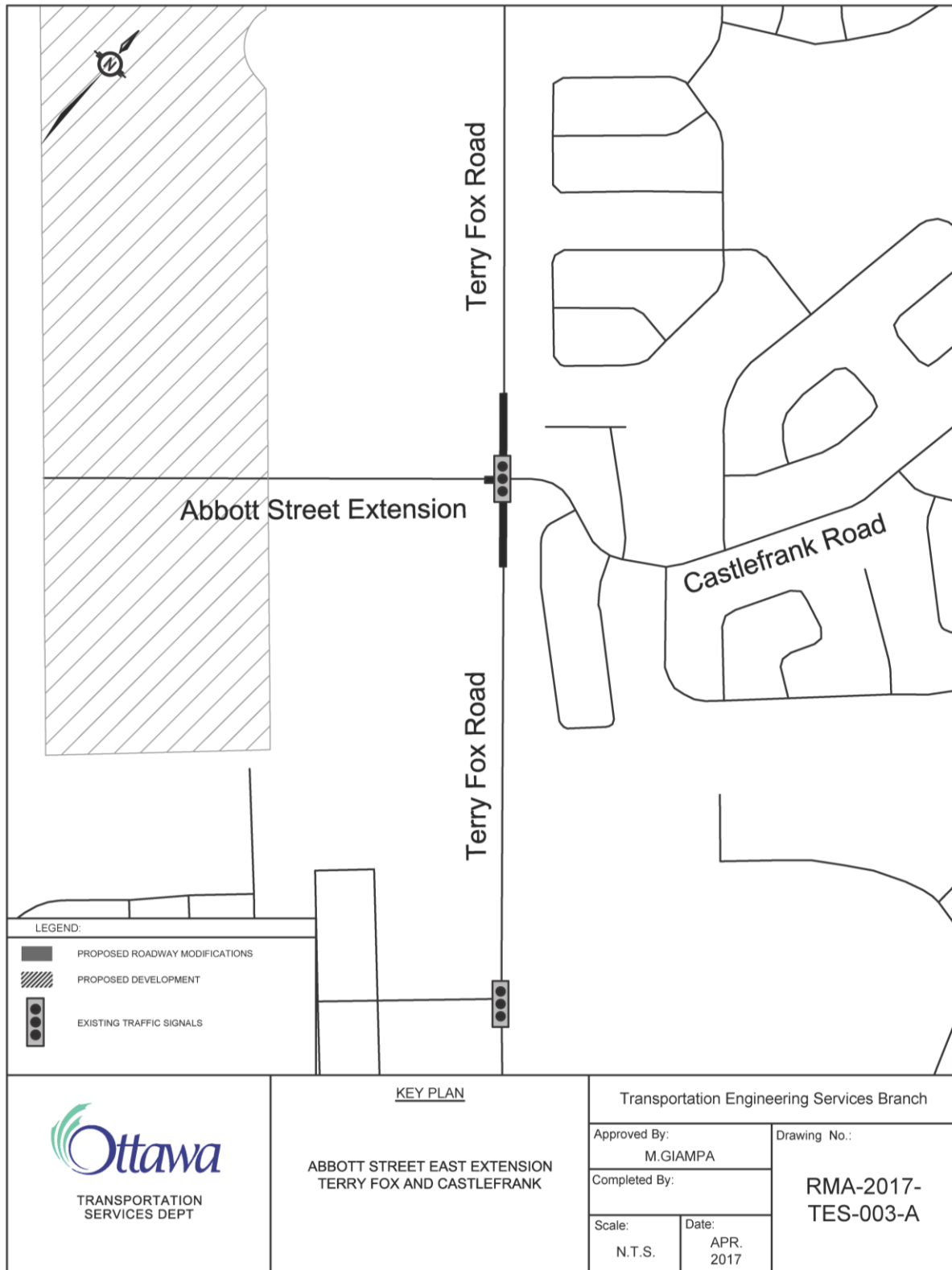
Note:

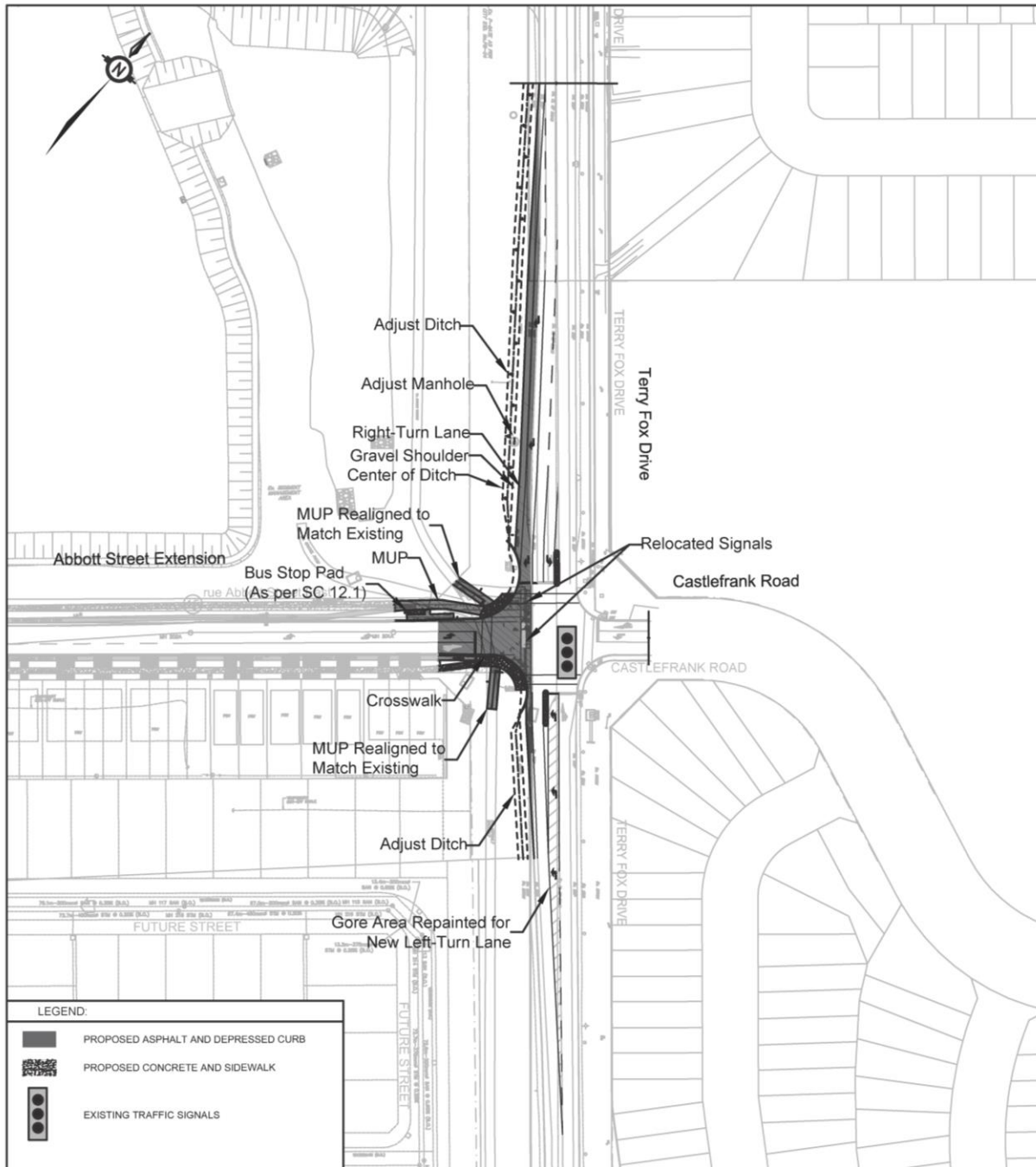
City of Ottawa Transportation Services staff requires use of Synchro release 9.0 or higher for intersection analysis

Appendix D: RMA Report Figures

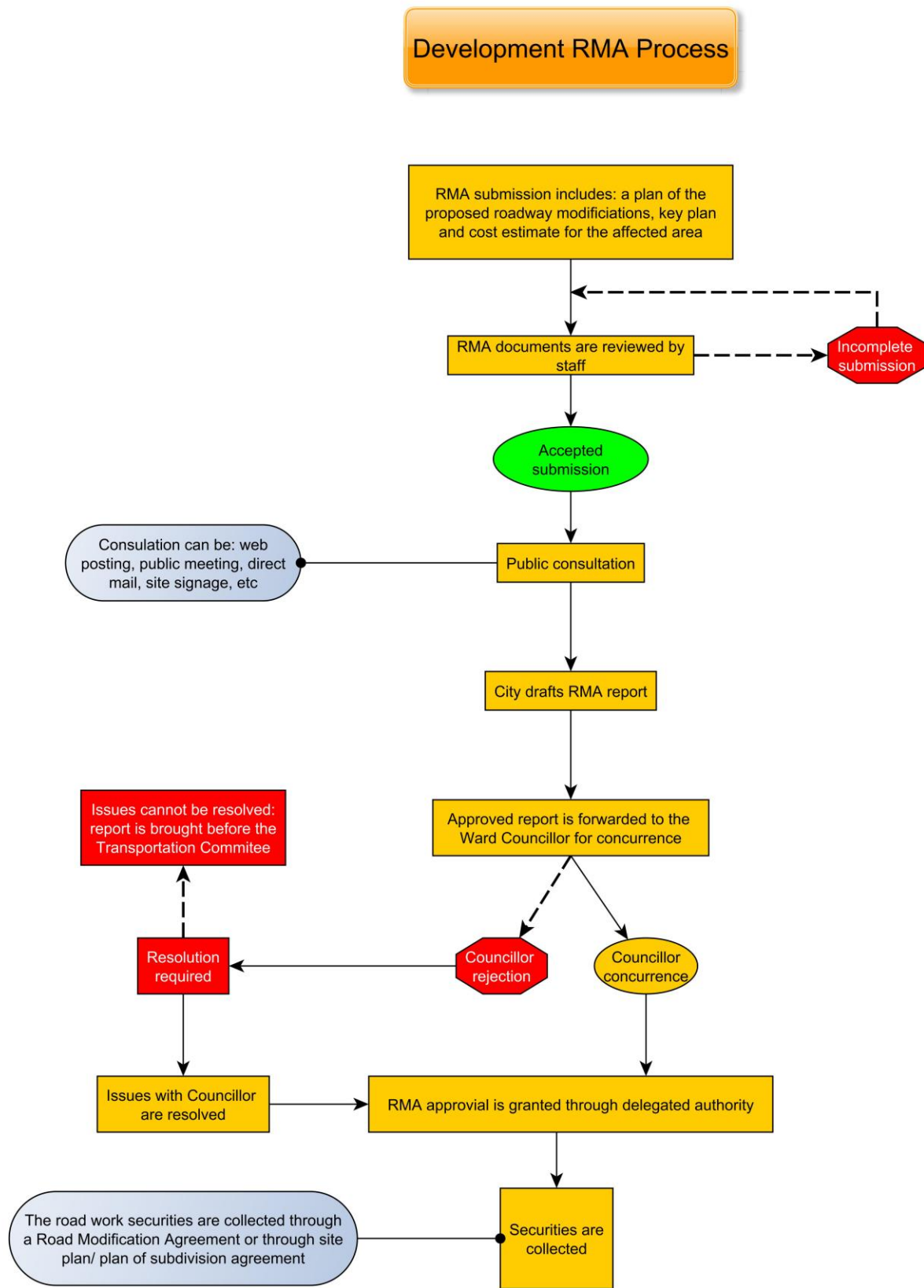
- Key plan
- Concept plan
- Functional Design Drawing

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 TRANSPORTATION SERVICES DEPT	PROPOSED ROADWAY MODIFICATIONS		Transportation Engineering Services Branch	
	ABBOTT STREET EAST EXTENSION TERRY FOX AND CASTLEFRANK		Approved By: M. GIAMPA	Drawing No.:
			Completed By:	RMA-2017- TES-003-B
	Scale: N.T.S.	Date: APR. 2017		



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Appendix E: Ideal Engineering Submission

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Ideal Submission for Transportation Improvements Detailed Design Drawing Set

The Ideal Submission for approved Road Modifications detailed design drawing package for Municipal Consent is to be submitted as a set consisting of the following sheets in the sequence shown:

1. Title Page –see details below
2. Index and Notes – to be modified as required
3. Legend
4. Alignment and survey control data
5. Removals Plan
6. Geometry and General Layout Plan of Proposed Road Works showing all dimensions and proposed lane arrangements – see details below
7. Pavement Elevations and Grading Plan on 1:500 scale base mapping – see details below
8. Existing Pavement and Signage Plan – see details below
9. Proposed Pavement and Signage Plan – see details below
10. Cross-sections including pavement structure

These plans must be submitted in the following Sheet Size: ANSI-D (22" by 34") = 559 mm x 864 mm. Plans must include the Title Block, Revision Table etc. located in the top right hand corner. In general, follow the City of Ottawa Drafting Standards.

Drawing Content & Format

1. Title Page –

- i. City Logo/Transportation Services department title
- ii. Name of Developer/Owner (including address)
- iii. Consultant Identification with complete address, phone, e-mail address and Project No. and/or Contract No. (signed stamp)
- iv. Project Name and Phase No.
- v. Key Plan to show entire subdivision/site plan and adjacent roads to clearly show location
- vi. Planning Dept. Application File No. (shown on all drawings).

6. Geometry and General Layout Plan-

- i. 1:500 scale base map must show all existing features including curb lines, contour lines, trees, poles (street lighting, signals, etc.), iron works (CB's, MH's, etc) and existing utilities.
- ii. Existing known borehole locations should be shown on the plan
- iii. Sufficient base mapping should be provided to show any horizontal or vertical alignment issues and connections to side streets even if outside of the construction limits
- iv. Illustrate all proposed lanes and dimensions of lanes and road works

7. Pavement Elevations and Grading Plan-

- i. 1:500 scale base map must show all existing features including curb lines, contour lines, trees, poles (street lighting, signals, etc.), iron works (CB's, MH's, etc) and existing utilities.
- ii. Sufficient base mapping should be provided to show any horizontal or vertical alignment issues and connections to side streets even if outside of the construction limits
- iii. The limit of widening (fill or cut) must be shown on the plan and a corresponding cross section must be shown on Sheet 10 to identify any critical points.
- iv. Drainage areas or overland flow routes that have been altered due to the construction of a ditch/ culvert/ swale/ catch basins/ catch basin manholes, etc would require a Storm Water Management Report to be reviewed by the Infrastructure Approval Division Project Manager.
- v. Catch basin invert elevation or grade change will require a profile drawing to be reviewed by the Infrastructure Approval Division Project Manager.

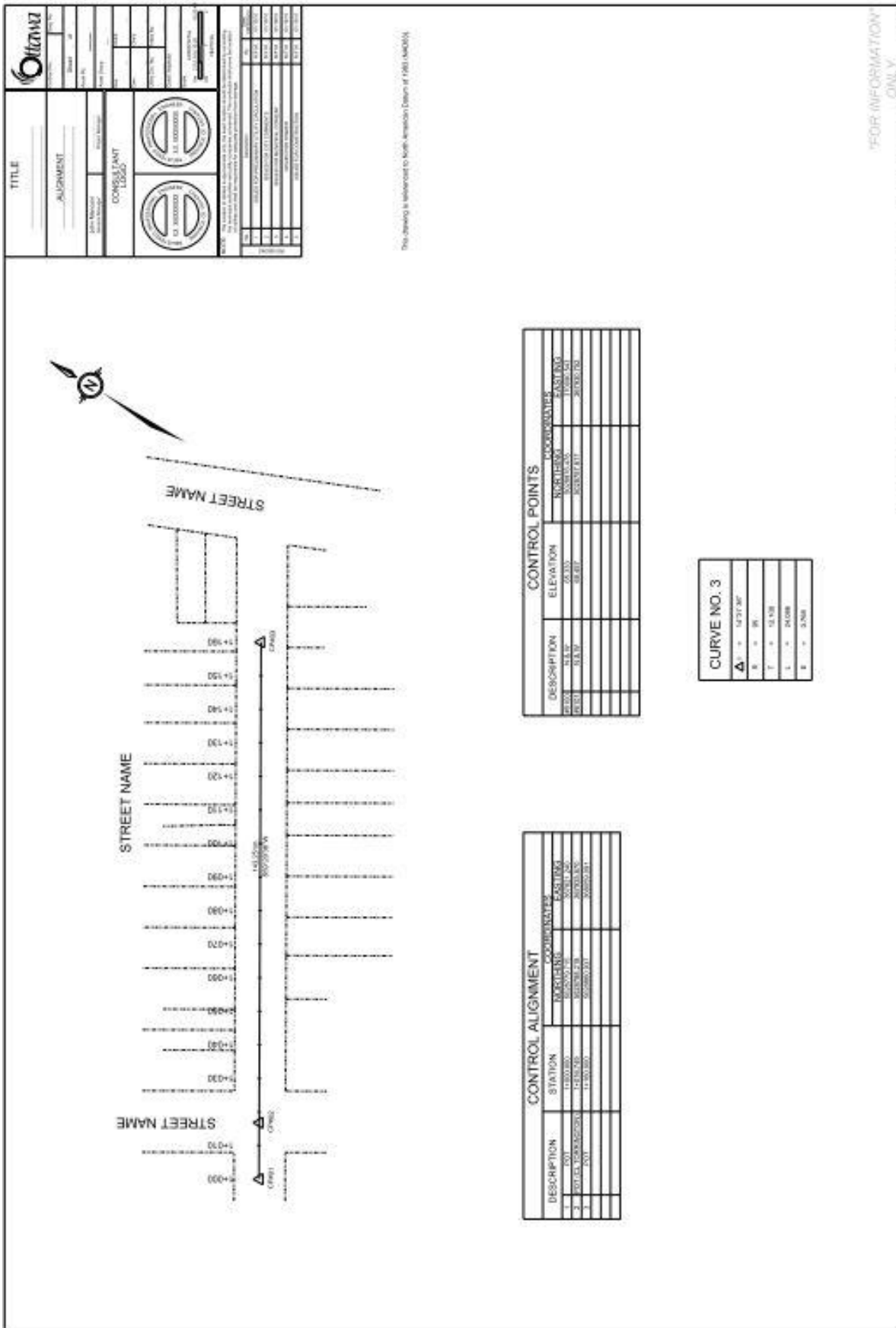
8. Existing Signing and Pavement Marking Plan –

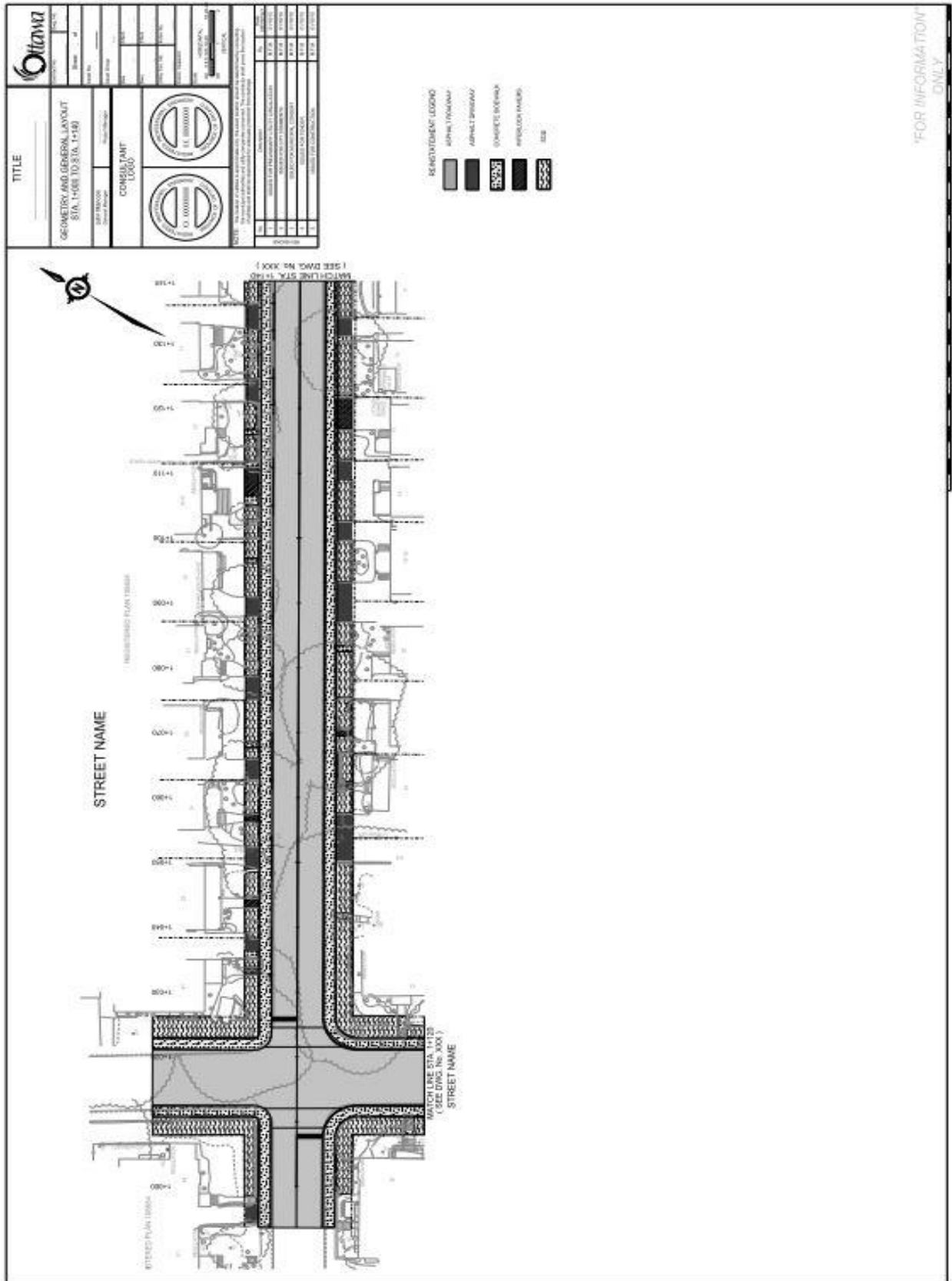
- i. All signing must be illustrated and its location must be identified with either symbols that are easily identifiable or with a corresponding legend on the same sheet.
- ii. Pavement Markings must be field verified.

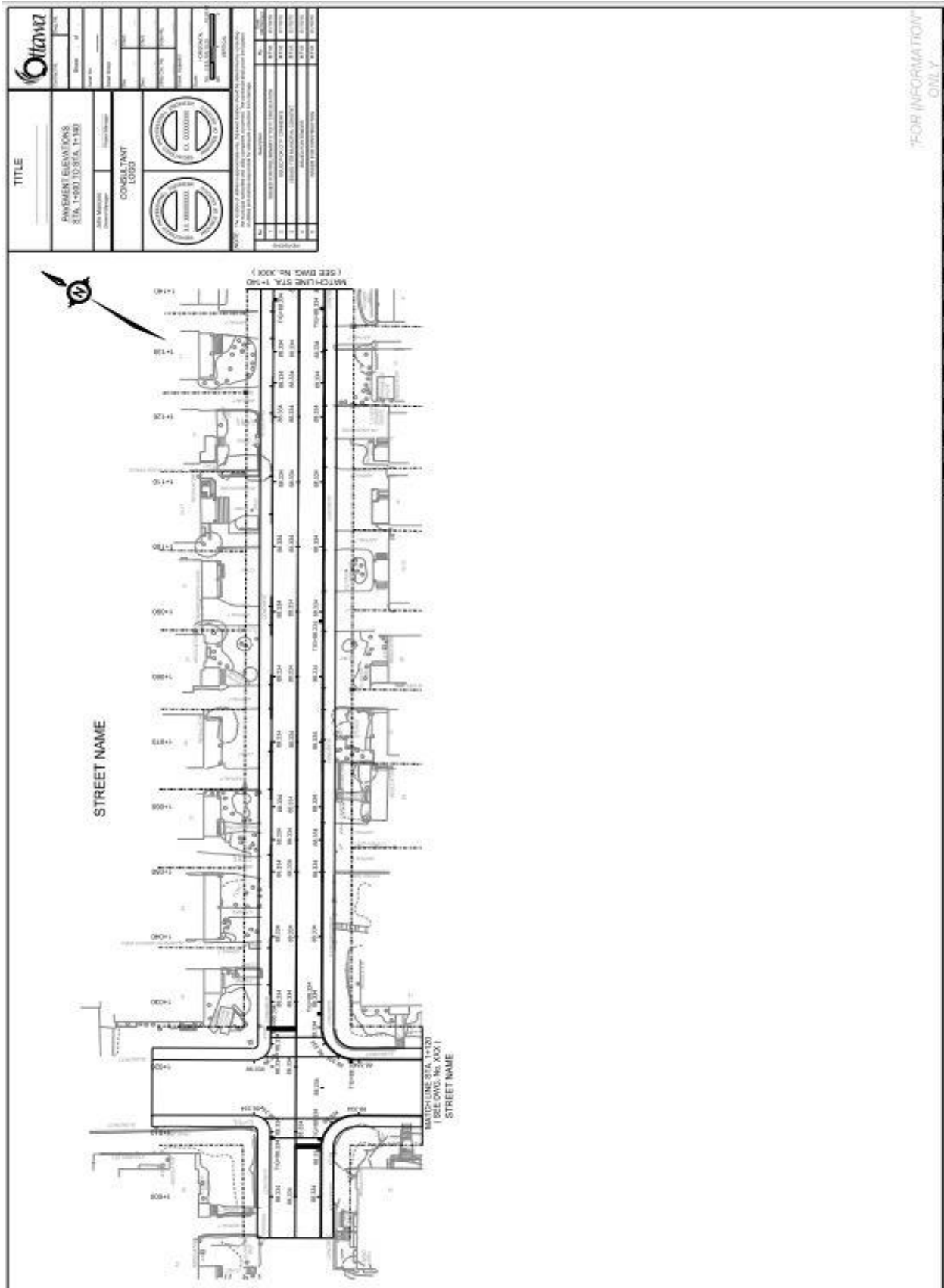
9. Proposed Signing and Pavement Marking Plan –

- i. The proposed pavement markings should be shown on the plan to illustrate any proposed changes to lane usage.
- ii. Note on the drawing that the proposed pavement marking plan in the ideal submission is “For Information Only”.
- iii. A final plan must be submitted separately for review and approval for application of pavement markings and installation of signage. All signing must be illustrated and location identified with either symbols that are easily identifiable or with a corresponding legend to identify the sign.

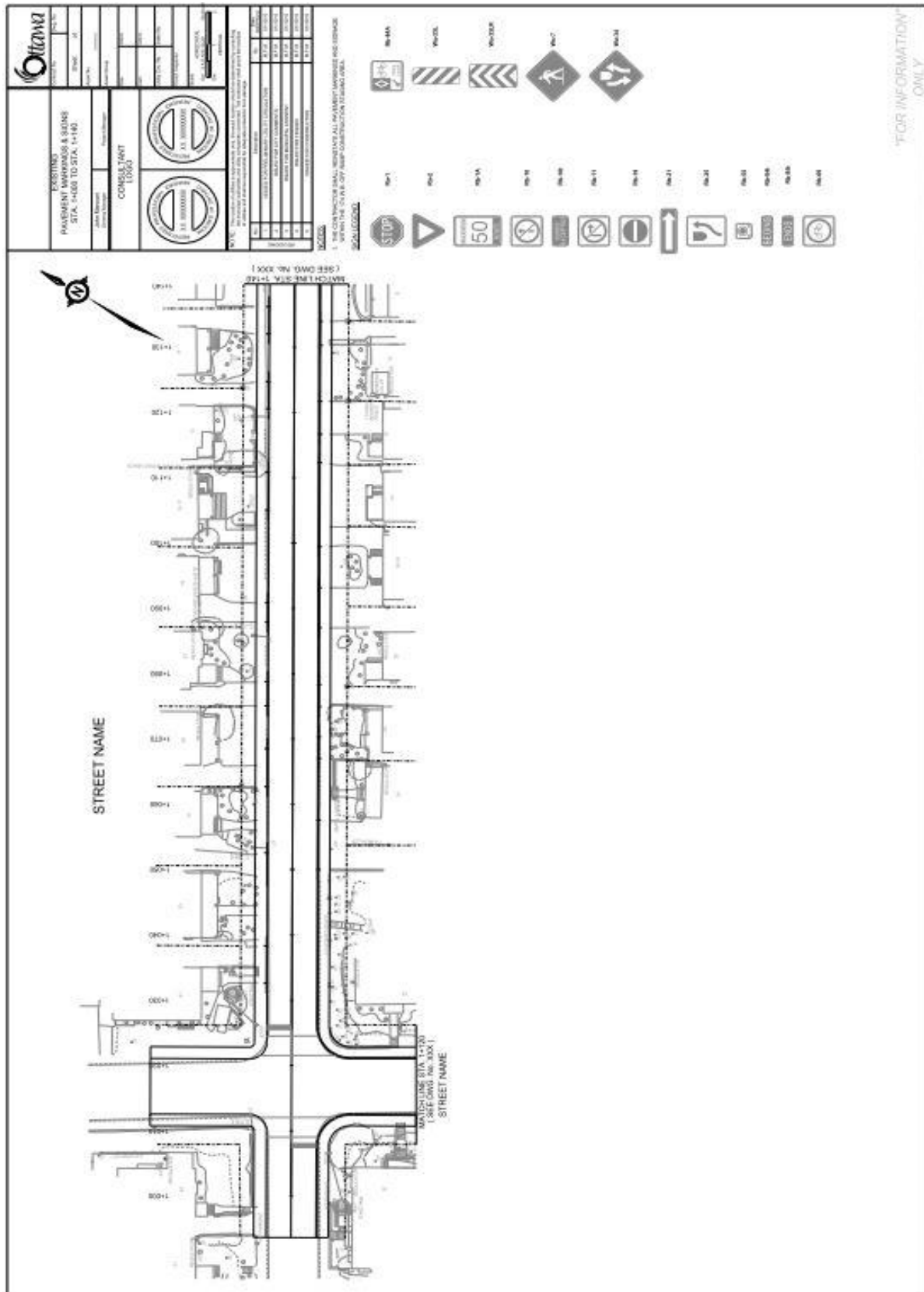
	<p>TRANSPORTATION SERVICES</p>		<p>GENERAL MANAGER TRANSPORTATION SERVICES DEPARTMENT</p>	<p>CONSULTANT LOGO DEVELOPER LOGO</p>	<p>ROAD OR INTERSECTION NAME ROAD MODIFICATIONS TO AND FROM LOCATION CITY FILE NUMBER</p>	<p>ISSUED FOR TENDER APRIL 1, 2017</p>
--	--------------------------------	--	---	---	---	--







FOR INFORMATION ONLY

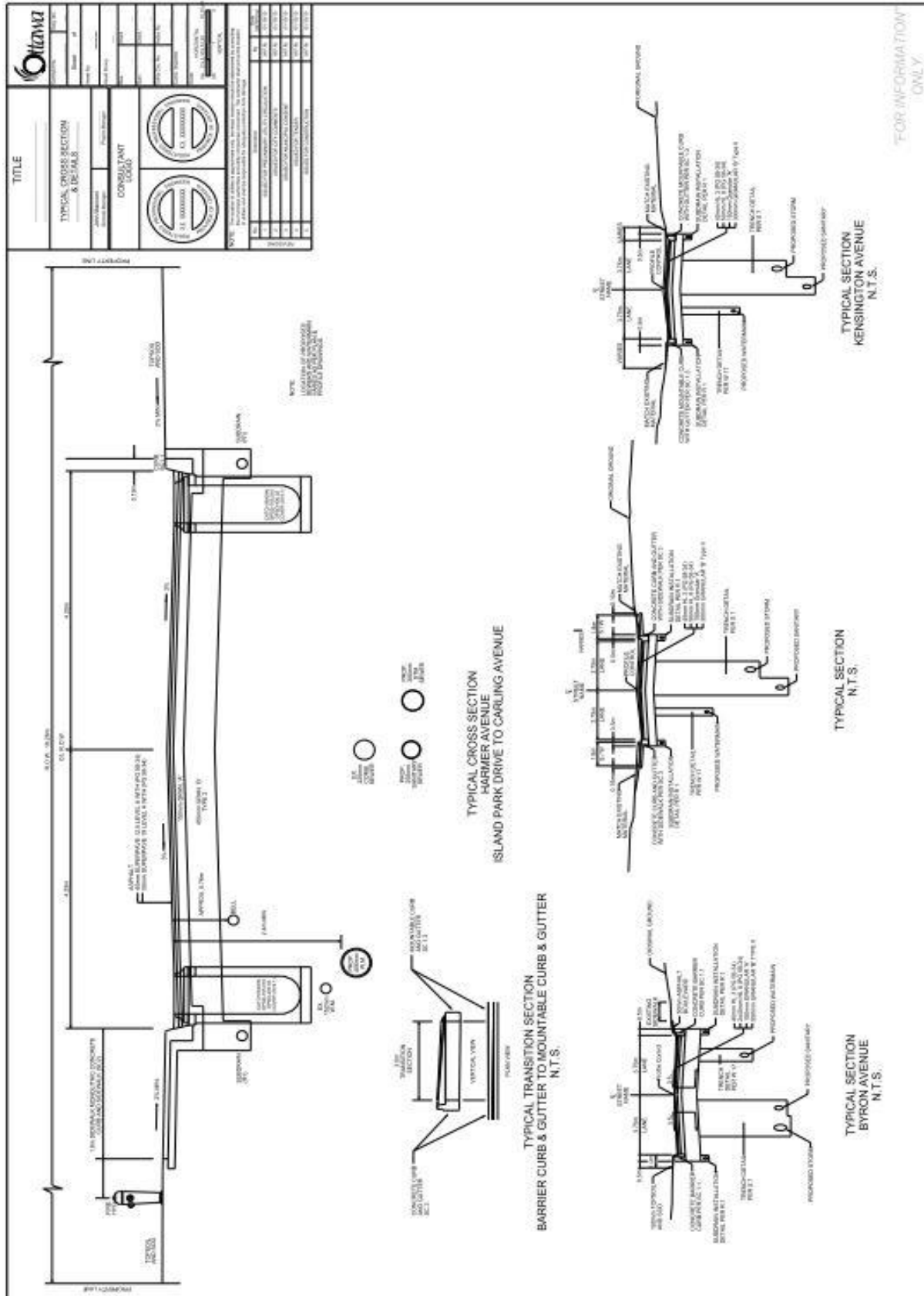


	PROJECT NO.	DATE	DRAWN BY	CHECKED BY	SCALE
PROPOSED PAVEMENT MARKINGS & SIGNS STA. 1+000 TO STA. 1+140					
CONSULTANT LOGO					
<small>NOTE: THE CONSULTANT HAS REVIEWED THIS PLAN AND FOUND IT TO BE IN ACCORDANCE WITH THE CITY OF OTTAWA'S STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION AND MAINTENANCE. THE CONSULTANT'S LIABILITY IS LIMITED TO THE PROFESSIONAL SERVICES PROVIDED BY THIS CONSULTANT. THE CONSULTANT DOES NOT WARRANT THE ACCURACY OF THE INFORMATION PROVIDED HEREON.</small>					
<small>THE CONTRACTOR SHALL INSTALLED ALL PAVEMENT MARKINGS AND SIGNS UPON THE COMPLETION OF ALL CONSTRUCTION WORK.</small>					

LOCAL SIGNS

PAVEMENT MARKINGS

FOR INFORMATION ONLY



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