CAPITAL CITY DEVELOPMENT CORP

BOISE CITY OF TREES

DOWNTOWN BOISE

Parking Strategic Plan

APPENDIX L4

Regional Municipality of Waterloo

Public Meeting of the Planning and Works Committee

Kimley»Horn

Expect More. Experience Better.

MEDIA RELEASE: Friday, April 5, 2013, 4:30 p.m.

REGIONAL MUNICIPALITY OF WATERLOO
PUBLIC MEETING OF THE
PLANNING AND WORKS COMMITTEE
AGENDA

Tuesday, April 9, 2013
Immediately following Public Meeting
Council Chamber
2nd Floor, Regional Administration Building
150 Frederick Street, Kitchener, Ontario

---

1. DECLARATIONS OF PECUNIARY INTEREST UNDER THE MUNICIPAL CONFLICT OF INTEREST ACT

2. REPORT – PLANNING, HOUSING AND COMMUNITY SERVICES - COMMUNITY PLANNING

a) Report P-13-031, Proposed Modifications to the Regional Transportation Impact Study Guidelines – Public Meeting 1

STAFF PRESENTATION

3. DELEGATIONS

4. ADJOURN

REGION OF WATERLOO

PLANNING, HOUSING AND COMMUNITY SERVICES
Transportation Planning

TO: Chair Jim Wideman and Members of the Planning and Works Committee

DATE: April 9, 2013 **FILE CODE:** D10-70

SUBJECT: PROPOSED MODIFICATIONS TO THE REGIONAL TRANSPORTATION IMPACT STUDY GUIDELINES – PUBLIC MEETING

RECOMMENDATION:

For information.

SUMMARY:

On February 26, 2013, Regional Council authorized a Public Meeting of the Planning and Works Committee for April 9, 2013 to receive comments on the proposed Transportation Demand Management (TDM) Checklist and Parking Management Worksheet from agencies and interested members of the public (Report No. P-12-021). It is proposed that the Region of Waterloo incorporate the TDM Checklist as part of the Region's Transportation Impact Study (TIS) Guidelines.

As one of the tools to create a vibrant and sustainable community, TDM uses policies and programs to make active and sustainable transportation more convenient for residents. A TDM approach to transportation can deliver long-term environmental sustainability, improve public health, create stronger communities, and build more prosperous and livable cities. In Waterloo Region, TDM has typically focused on travel incentives and new infrastructure to encourage people to travel by foot, bike, carpool, or bus.

Regional Council adopted the current TIS guidelines on November 26, 2008 (Report No. P-08-102). The TIS guidelines are an important tool in the overall development planning process because they help developers and public agencies identify the impacts of proposed developments on the existing street network and recommend mitigation measures for the impacts identified. An emerging strategy to enhance the effectiveness of the TIS guidelines at managing growth is to incorporate the TDM Checklist to encourage developments that are located near transit, incorporate mixed uses at higher densities, and include cycling and walking amenities and lower overall parking rates.

TDM research indicates that a strong but complex relationship exists between parking management policies and decisions on urban development and travel mode choice. As communities focus on reurbanization and making the most efficient use of existing land and infrastructure, ensuring that an appropriate supply of parking is provided at the right price and in the right form is becoming an increasing priority. In urban areas, land used for extensive surface parking represents lost opportunities for other uses, such as housing, employment or recreation. It may also translate into lost tax revenue for the community and an increase in development costs due to the high cost of providing parking facilities.

Where rapid transit systems exist, parking management can play a critical role in the success of the system. For example, if too much parking is provided at low (or no) cost to the end user, the relative attractiveness of public transit or other active forms of transportation may be diminished.

Reflecting the growing understanding of using parking management to achieve a more sustainable and transit-oriented community the Region partnered with the Cities of Cambridge, Kitchener and Waterloo in 2010 to consider innovative strategies that incorporate TDM-supportive elements into the development review process. Over the following two years, a project team consisting of planners and transportation engineers from the Region and all three Cities worked with BA Group to develop a customized strategy for Waterloo Region. The three Cities which are key partners responsible for the implementation of parking requirements are supportive of the new parking strategy.

The strategy recommended by the project team, consists of:

a) Form 1, TDM Checklist; and
b) Form 2, TDM Parking Management Worksheet.

The TDM Checklist (Checklist) rates developments on how TDM-supportive they are. Points are assigned based on the level of transit service available within walking distance of the site, whether cycling and pedestrian amenities are provided (e.g. showers, change and locker facilities, bike parking), and whether parking rates and parking facilities support walking and transit use. Conversely, the TDM Parking Management Worksheet (Worksheet) uses TDM and transit-related factors to calculate potential parking reductions, subject to approval by the Area Municipality. The parking reductions generated by the worksheet are context-dependent. For instance, a development in an Urban Growth Centre would generate a larger potential parking reduction than the same development in an Intensification Corridor or a suburban location because there are more transportation services and amenities available.

To support transit oriented development, the Project Team recommends incorporating the TDM Checklist into the Region's Transportation Impact Study (TIS) guidelines for non-residential developments in the Urban Growth Centres, major transit station areas, and reurbanization corridors of Cambridge, Kitchener, and Waterloo. In general, a TIS is requested whenever a proposed development will generate 100 or more new peak direction auto trips to or from the site during the morning or afternoon peak hour. In some cases, a study may be requested due to localized safety or roadway/intersection capacity deficiencies.

As part of the revised TIS process, the Region will consider lower trip generation rates for developments that negotiate a reduced parking rate with the appropriate Area Municipal planning authority. Lower parking rates are often negotiated for mixed-use developments because different land uses can often share parking in a complementary way, which reduces the need for additional parking. An Area Municipality may also choose to use the TDM Parking Management Worksheet to calculate a proposed parking reduction but it is necessary to first contact the appropriate Area Municipal planning authority to determine whether the Worksheet applies in a specific area. Any proposed parking rate below the established Zoning By-Law minimum will also require the approval of the Area Municipality before it can be considered as part of the TIS.

This project was funded in part by Transport Canada's ecoMOBILITY grant program.

REPORT:

The Region's Official Plan and Transportation Master Plan support TDM as a growth management strategy that supports higher transit ridership and more sustainable travel patterns. Parking management can be an effective TDM tool to increase transit ridership as well as to encourage higher densities. The most successful approaches manage the oversupply of parking in suburban areas and create incentives for developments in the core to increase densities.

BA Group was selected by the Region and the Cities of Cambridge, Kitchener and Waterloo to develop a transit-supportive flexible parking strategy to support transit-oriented development in rapid transit

station areas. A working group of Area Municipal and Regional staff was established and a preferred strategy was developed over the spring and summer of 2010. A consultation session was held with the Reurbanization Working Group on November 3, 2010 and BA Group completed a draft report in January 2011. The recommendations were presented to City and Regional staff on January 14, 2011 and February 14, 2011. The Cities of Cambridge, Kitchener and Waterloo committed to testing the strategy between January and June 2011 and in one instance it was used to justify lower parking rates for an adaptive reuse development in Downtown Kitchener. Final comments were submitted by the Cities to BA Group in August 2011. BA Group adjusted the wording of the strategy to reflect the City's comments and added parking reductions for intensification corridors. The final report and recommendations were submitted to the Region in November 2011.

The study conducted by BA Group is intended to guide the effective integration of TDM into the existing development review process. Their final report summarizes North American best practices, provides 18 case studies in different urban contexts in Waterloo Region, and outlines a recommended implementation approach. Using the existing parking minimums in each City's Zoning By-Law, the recommended strategy consists of a TDM Checklist and a TDM Parking Management Worksheet that rationalizes a preferred parking supply based on the mode share targets of the Regional Transportation Master Plan (RTMP), the transit context of the site, and the planned transit oriented development features of the site. The proposed Checklist and Worksheet also recommend effective TDM programs and services.

The three Cities have indicated that the recommendations could be used to complement their urban design guidelines. In the near term, the Project Team recommends that the Region integrate the TDM Checklist with the Region's TIS Guidelines to encourage higher densities in major transit station areas and reurbanization corridors. BA Group's recommendation to incorporate the TDM Checklist and Parking Management Worksheet in Area Municipal Zoning By-Laws and design guidelines will continue to be explored by the Parking Coordinating Committee. City of Waterloo staff has indicated it is their intent to focus on considering transportation demand management as part of parking strategies in Station Area Planning.

Best Practices Review

BA Group provided a comprehensive review of transit supportive land-use policies. The most common approach used in North America includes parking and trip generation reduction strategies. Some municipalities opt for generic policies that allow voluntary reductions in the parking supply, while others require developers to complete complex trip generation reduction calculations. The three general types of policies include:

1. **Trip generation reductions** are applied to the number of trips a project is anticipated to generate upon completion. These reductions assume that TDM initiatives and parking management will successfully lower the number of private automobile trips generated compared to what the development would generate without any strategies.
2. **Parking reductions** below the Zoning By-Law minimum make it less expensive to increase the density of a site. They are typically applied to standard minimum parking requirements and are given in exchange for the provision of TDM initiatives in a new development (e.g. carpool spaces, transit passes, proximity to transit). Municipalities often incorporate these provisions within their Zoning By-Law.
3. **Traffic impact fee reductions** are applied to developments in exchange for the provision of certain TDM initiatives. Locally this approach would reduce the direct costs of road improvements or private accesses. This approach has yet to be implemented consistently in Canada.

In Canada, parking and trip management policies typically focus on voluntary parking reductions, parking maximums and the removal of parking minimums. Such measures permit, but do not force, developers to reduce their minimum parking requirement in exchange for TDM. In comparison,

American municipalities have a greater ability to require TDM because of “clean air” legislation at the federal and state levels. In the United States, TDM requirements are clearly linked with these greenhouse gas regulations. Trip generation reductions, or more precisely, traffic impact fee reductions, are a common type of TDM-based reduction. In many cases, municipalities mandate that developments reduce the traffic generation of the site through zoning ordinances and TDM strategies must be employed to reduce the traffic generation of the project. The required trip reductions depend on the type of TDM strategy proposed, the number of parking spaces, the size of the development, and the number of employees a development has. In Canada, the regulatory environment is different which leaves provincial planning acts as the primary vehicle for implementing TDM.

Recommendations for Waterloo Region

It is recommended that the TDM Checklist be incorporated as part of the Region’s TIS Guidelines in the Urban Growth Centres, major transit station areas and reurbanization corridors of Cambridge, Kitchener and Waterloo. Developments in these areas that are asked to submit a TIS would be required to submit a completed TDM Checklist satisfactory to the Region and the appropriate Area Municipality.

Incorporating TDM into the development review process supports transit oriented development and the provision of transportation choice in Waterloo Region as described in the ROP and the Region Official Policies Plan (ROPP). The project team considered different options for implementing the TDM Checklist in the development approval process, including mandatory and voluntary compliance. It was determined that a mandatory approach that requires completion of the TDM Checklist as part of a TIS for commercial, office, retail, and institutional developments in Urban Growth Centres, major transit station areas, and reurbanization corridors would be the most appropriate to facilitate Waterloo Region’s transition towards greater transit, cycling and walking use.

The TDM Checklist gives more weight to some transportation elements, programs and amenities than others. The different weightings are based on North American best practices research conducted by BA Group. High weights are given specifically to parking management strategies because research shows that it is the most effective tool at shifting travel behaviour. TDM-related parking management options are also consistent with the best practices of other municipalities and serve to reduce the costs of higher density developments. From a policy perspective, the Region can permit trip generation reductions as an incentive to provide better transportation choice. A maximum number of points are available for each category of the Checklist. Features and incentives can be customized based on the needs of each application.

TDM Checklist

The Checklist rates developments on how TDM and transit supportive they are. Points are assigned based on the level of transit service available, whether cycling and pedestrian amenities are provided, and whether parking rates and parking facilities support walking and transit use. The TDM Checklist is intended to be part of the standard development application review process as part of a TIS. It could also be used for a zoning by-law amendment, plan of subdivision, or through the site plan approval process. The TDM Checklist is weighted to encourage sites with access to transit to provide parking rates consistent with the mode split targets of the Regional Transportation Master Plan; these transit-supportive parking rates may be lower than the approved zoning by-law minimums. In some locations, a developer may wish to provide more parking than the zoning by-law minimum which makes it harder to submit a Checklist satisfactory to the Region. However, the Checklist includes several elements to help these developments achieve a TDM-supportive designation for their TIS that complement Area Municipal urban design guidelines, such as locating the building façade adjacent to the road right-of-way, or by providing:

- Preferential carpool spaces
- Bike parking
- Car sharing spaces

- Mixed uses with retail, commercial and food services
- Structured, higher-density parking
- Shower and change room facilities for active commuters

The Checklist also encourages developers to provide trip reduction incentives such as subsidized transit passes, emergency ride home services, and online carpool matching. A TIS satisfactory to the Region would use customized combinations of these options to complete the TDM Checklist and to demonstrate that the proposed development is transit-supportive.

Benefits of the TDM Checklist

- **Provides transportation choice** – the proposed TDM strategy will support the Region's strategic objective to provide transportation choice and to support sustainable and vibrant urban spaces. The proposed strategy will encourage new developments to consider all modes of travel and to consider reducing the traffic impact of their site and related parking provisions.
- **Promotes compact development** – reductions in parking supply will ensure that new developments use space more efficiently. More compact development will result in an improved urban form that is more walkable.
- **Improves healthy active living** – the proposed TDM strategy will promote the use of urban design elements in new developments that encourage active transportation (i.e. walking and cycling) by permitting reductions in vehicle parking location and supply.
- **Supports transit use and transit development** – future developments surrounding the Region's planned Rapid Transit (RT) should be constructed with transit-supportive parking rates to maximize the return on investment. The TDM Checklist supports the goal of transit-supportive parking rates in appropriate areas, such as the RT stations, and in doing so, support area transit use.
- **Supports Official Plan objectives** – the proposed TDM strategy will support the Region's Official Plan policies for sustainable development.
- **Educational Component** – regardless of whether or not a developer uses/ implements the voluntary Trip Reduction Incentives included in the TDM Checklist, their introduction to the development review process has an important educational component about the TDM options that are available.

Challenges of the TDM Checklist

- **Minimal use of voluntary parking reductions** – for economic reasons, some developers provide more parking than zoning by-laws require, and thus may not be interested in reducing their parking supply. However, developers in Downtown Kitchener have shown interest in using the TDM Checklist and Worksheet to support their reurbanization efforts.
- **Perceived economic development impacts** – transit-supportive parking rates effectively reduce peak period traffic and encourage compact land development. However, business owners often perceive abundant parking supply as an important factor in attracting business. As such, there is resistance to limiting the amount of parking provided by the development industry even if much of the surplus parking goes unused. To address this, the TDM Checklist leaves the option open for developers to provide more parking than the Zoning By-Law requirement. However, these developments will be asked to commit to TDM features or incentives to improve transportation choice in their area. The Checklist also encourages structured parking, which is more valuable to a site if it goes unused than surface parking.
- **Different Zoning By-Law parking requirements** – each municipality within Waterloo Region has a different set of parking requirements in its Zoning By-Law. Therefore, it is necessary to first contact the appropriate Area Municipal planning authority to determine whether the Worksheet applies in a specific area. The variation in parking rates presents an implementation challenge that will need to be monitored and adjusted in consultation with the Regional Parking Coordinating Committee. Also, some properties may already have parking reductions through

site-specific Zoning By-law amendments or Minor Variances and consideration of the Parking Reduction Worksheet may not be appropriate in these circumstances.

- **Different Zoning By-Law Definitions** – each municipality currently uses a different definition of floor area to calculate parking requirements. The different definitions result in parking requirement variations between municipalities of up to 40 per cent. The proposed TDM Checklist and Worksheet is a first step in addressing these differences and the oversupply of parking that is resulting in some areas. Project team members are interested in exploring revised minimum and/or maximum parking ranges through the Waterloo Region Parking Coordinating Committee.
- **Increased demand for staff resources** – the implementation of any TDM parking or trip reduction policies will create additional demand for municipal staff time and resources. However, the impact of new policies is reduced when they are implemented through existing and complimentary processes. The Region's TIS process is limited to developments with a substantial impact on the transportation system, which effectively reduces the number of proposals immediately affected by the new Checklist. It will also provide the Region and the Area Municipalities an opportunity to refine the process as it is expanded over time.
- **Difficulty enforcing and implementing trip reduction incentives** – new building owners and the changing needs of tenants makes transferring and implementing TDM strategies at specific locations challenging. While some jurisdictions enforce TDM strategies through the planning process, the preferred strategy for Waterloo Region is keep to these features voluntary but to include them on the Checklist for educational and incentive purposes. The TravelWise program makes it easier to implement TDM programming, to continue implementing programming if the ownership changes, and to transfer TDM program benefits to new tenants.

<u>Proposed changes to Transportation Impact Study Guidelines (TIS)</u>

Existing Wording (Transportation Impact Study Guidelines, DOCS #544990, Pg. 8-9*)*

Estimation of Adjustments to Transportation Demand Management Initiatives

A Transportation Demand Management (TDM) Plan should be prepared to influence how, when, where, and why trips will be made to and from the site, thereby reducing single occupant auto use. The plan should include a description of the initiatives proposed and any consequent measures required to enhance alternatives to the single-occupant auto.

The effects of the proposed TDM Plan should be identified and evaluated. These measures may reduce trip generation, reduce the proportion of trips in the peak hour, and increase the modal share of trips by walking, cycling, and transit, and/or increase auto occupancy. The effects should be calculated as adjustments to the basic travel demand estimates.

The report should identify steps to be taken with respect to the proposed development or redevelopment to support walking, cycling, carpooling, telecommuting, and the use of transit.

Specific consideration should be given to the proposed developments adjacent to Rapid Transit stations. The impacts of the Rapid Transit on the proposed development should be identified and evaluated.

Proposed Wording

Estimation of Adjustments to Transportation Demand Management Initiatives

A Transportation Demand Management (TDM) Plan should be prepared to influence how, when, where, and why trips will be made to and from the site. To reduce single occupant vehicle use, the plan should include a description of the initiatives proposed and any consequent measures required to enhance opportunities for active and sustainable transportation use and improve auto occupancy rates.

To demonstrate that the proposed development is transit-supportive, an acceptable TDM Plan for commercial, office, retail, and institutional developments in Urban Growth Centres, major transit station areas, and reurbanization corridors will include a completed TDM Checklist (see Appendix H) that achieves a passing score of 24 points or higher.

The TDM Checklist rates developments on how transit-oriented and TDM-supportive they are. Points are assigned based on the level of transit service available within walking distance of the site, whether cycling and pedestrian amenities are intended (e.g. showers, change and locker facilities, bike parking), and whether parking rates and parking facilities support walking and transit use.

The TDM Checklist includes several elements to help the TIS achieve a TDM-supportive designation, such as locating the building façade adjacent to the road right-of-way, or by providing:

- Preferential carpool spaces
- Bike parking
- Car sharing spaces
- Mixed uses with retail, commercial and food services
- Structured, higher-density parking
- Shower and change room facilities for active commuters

The TDM Checklist encourages trip reduction incentives such as subsidized transit passes, emergency ride home services, and online carpool matching. Features and incentives can be customized based on the context of the site.

The effects of the proposed TDM Plan should be identified and evaluated. These measures may reduce trip generation, reduce the proportion of trips in the peak hour, and increase the modal share of trips by walking, cycling, and transit, and/or increase auto occupancy. The effects should be calculated as adjustments to the basic travel demand estimates.

The report should identify steps to be taken with respect to the proposed development or redevelopment to support walking, cycling, carpooling, telecommuting, and the use of transit.

Specific consideration should be given to the proposed developments adjacent to Rapid Transit stations. The impacts of the Rapid Transit on the proposed development should be identified and evaluated.

Implementation and Next Steps

Sections 10.B.11 to 10.B.14 of the Council Adopted Regional Official Plan (ROP) dated June 16, 2009, requires the Regional Municipality of Waterloo to provide public and agency notification for proposed modifications to Implementation Guidelines. The previous Regional Official Policies Plan had similar requirements. On March 12, 2013, a draft of the proposed modifications to the current TIS guidelines were circulated to the Area Municipalities and other interested parties, including posting on the Regional website. Formal comments will be accepted until April 19, 2013, providing five weeks for review.

On March 26, 2013, the Region held an information and consultation session with 9 planning and engineering consultants to discuss the proposed changes to the TIS Guidelines. Information on the proposed changes was presented and participants provided detailed comments to help inform the final recommendation to Council. No objections were received at the meeting and the majority of participants expressed an interest in continuing to expand the role of TDM in the development review process.

The purpose of this Public Input Meeting of the Planning and Works Committee is to receive additional comments from interested agencies and members of the public. The following promotional steps are also recommended to inform the development community of the proposed changes:

- Invite developers to discuss the TDM Checklist in pre-application reviews;
- Brand the program in a way that adds to the profile of the strategy; and
- Develop and provide promotional material to the development community.

The three Cities have indicated that the recommendations could be used to complement their urban design guidelines and may influence changes to their Zoning By-Laws. BA Group's recommendations as well as incentives to complete the Checklist will continue to be explored by the Region and its Area Municipal partners through the Waterloo Region Parking Coordinating Committee.

Following the Public Meeting and the close of the comment period, staff will revise the TIS guidelines as necessary and bring to the Planning and Works Committee a revised guideline for consideration. Consistent with ROP sections 10.B.9 and 10.B.10 and ROPP section 12.2.2.3, the proposed modifications detail the manner in which policies established in the ROP will be implemented and they are not a new policy instrument that could be the basis for refusing development applications under the Planning Act.

Area Municipal Consultation/Coordination

Parking and parking requirements are an Area Municipal responsibility. The Region of Waterloo served as the project lead for developing the TDM Parking and Trip Generation Management Strategy, which was a coordinated effort to establish recommendations for a stepwise approach toward transit-supportive parking policies. Funding for this initiative was provided by the Region of Waterloo, the Cities of Cambridge, Kitchener, Waterloo, and Transport Canada's ecoMOBILITY program. The Cities of Cambridge, Kitchener and Waterloo were consulted throughout the process and staff members attended one of two training sessions held in 2012. On Nov. 3, 2010, the preferred strategy was developed and reviewed by the Reurbanization Working Group, which includes representatives from the development community. Several changes were made to the TDM Checklist, Worksheet, implementation strategy and Council report in response to the feedback from this group and the Area Municipalities. The project team which included Area Municipal representation is in concurrence with this report, recognizing that implementation strategies will vary depending on the context of each Area Municipality. A copy of this report was provided to the project team and the Waterloo Region Parking Coordinating Committee.

CORPORATE STRATEGIC PLAN:

The TDM Checklist will help to more effectively encourage compact, livable urban communities (Objective 2.1) that support greater use of active transportation and transit infrastructure (Objectives 3.1, 3.2 and 3.3). An additional outcome of implementation will be lower greenhouse gas emissions (Objective 1.2) resulting from changes in travel behaviour.

FINANCIAL IMPLICATIONS:

NIL

OTHER DEPARTMENT CONSULTATIONS/CONCURRENCE:

NIL

ATTACHMENTS:

Attachment 1 – TDM Checklist
Attachment 2 – TDM Parking Management Checklist
Attachment 3 – Transportation Impact Study Guidelines

PREPARED BY: *John Hill*, Principal Planner, Transit Development

APPROVED BY: *Rob Horne*, Commissioner of Planning, Housing and Community Services

ATTACHMENT 1 - TDM Checklist

Site Address: _____ **Site Context:** _____

Date: _____ **ZBL Parking Requirement:** _____

Applicable Parking Reduction: _____

The Transportation Demand Management (TDM) Checklist and Parking Management Worksheet are not designed for residential properties, but can be used to inform mixed-use developments.

TABLE A		Site Access					
In creating an environment that supports pedestrian and cycling activity, the public realm must be accessible, safe, and comfortable to encourage movement on the street and in the surrounding area(s). These facilities and features should encourage walking and cycling.							
Points		**Features**				**Yes**	**N/A**
A1	**2**	Development incorporates functional building entrances that are oriented to public space or to locations where pedestrians and transit users arrive from such as a street, square, park or plaza.					
A2	**1**	External to site: Continuous sidewalks are provided along both sides of all adjacent public streets (over and above requirement)					
		Internal to site: Pedestrian walkways (1.5m min width) are provided through large parking areas to link the building with the public street sidewalk system (over and above requirement)					
A3	**3**	Non-residential: development provides secure bike storage for 4% of the building occupants.					
A4	**4**	Shower and change facilities for employees provided on-site consistent with LEED requirements.					
A5	**2**	Provision of active uses at-grade along street frontages.					
Category Max =		10	**Total Points Applicable =**	10	**Score =**		

TABLE B		Public Transportation Access					
The availability and proximity of convenient public transit service with direct pedestrian linkages to the building will provide viable travel options for employees, visitors and residents.							
Points		**Features**				**Yes**	**N/A**
B1	**1**	Bus shelters with seating are provided at the transit stop immediately adjacent to the development in consultation with Transportation Planning at the Region of Waterloo					
B2	**1**	Information regarding public transit routes, schedules and fares are provided in an accessible and visible location on site and in adjacent bus stops					
B3a	**5**	Located within 800m of a Rapid Transit Station					
B3b	**3**	Located within 600 m of a bus service with headways of 15 min or less or is located in a designated mixed use corridor or node. **Note: Points are awarded for either B3a, B3b or B3c only. Please choose whichever represents the highest order of transit.**					
B3c	**1**	Located within 400 m of a bus service with headways of 16 min to 30 min. **Note: Points are awarded for either B3a, B3b or B3c only. Please choose whichever represents the highest order of transit.**					
Category Max =		5	**Total Points Applicable =**	5	**Score =**		

TABLE C		Parking					
Vehicle parking facilities can affect the character, travel mode and cost of a development. Reducing parking supply to match expected demand can a have a positive influence on the selection of alternative travel modes.							
Points		**Features**				**Yes**	**N/A**
C1	**24**	Utilizes reduced parking supply consistent with the TDM Parking Management Worksheet. Contact your Area Municipal planning authority to determine whether the Worksheet is applicable to your development. **Note: Points are awarded for either C1, C2, or C3 only. Please choose whichever applies with the highest value.**					
C2	**24**	Includes allowances for shared parking in mixed-use zones. **Note: Points are awarded for C1, C2, or C3 only. Please choose whichever applies after consulting with the Area Municipal planning authority.**					
C3	**15**	Provides no more than the minimum number of parking spaces, as required by applicable Zoning By-Law. **Note: Points are awarded for either C1, C2, or C3 only. Please choose whichever applies.**					
C4	**10**	Implements paid parking on part or all of the site (e.g. parking permits, paid parking zones near main entrances)					
C5	**3**	Provides priority parking for carpooling/vanpooling participants equivalent to 5% of employee spaces					

C6	**5**	Commercial Uses: Provide car-share spaces equivalent to 2% of building occupants					
C7	**3**	Parking is not located on major street frontage or between a road right of way and the building facade.					
C8	**5**	25% to 50% of parking is located underground or in a structure					
C9	**10**	50% to 75% of parking is located underground or in a structure					
C10	**15**	75% of parking or more is located underground or in a structure					
C11	**3**	Parking spaces provided off-site on a lot within 300 metres of the lot containing such use.					
Category Max =		25	**Total Points Applicable =**	25	**Score =**		

TABLE D		**Trip Reduction Incentives**		
A formal TDM plan will identify specific initiatives that will be initiated in order to encourage reduced single occupant vehicle travel.				
Points		**Features**	**Yes**	**N/A**
D1	**2**	The building owner/occupant will provide a ride matching service for car/vanpooling		
D2	**2**	The building owner/occupant will provide emergency ride home options		
D3	**5**	The building owner/occupant will provide subsidized transit passes for all occupants for a period of two years		
D4	**5**	The building owner/occupant agrees to charge for parking as an unbundled cost to occupants		
D5	**2**	The building owner/occupant agrees to provide reduced cost for users of car/van pool, bicycle, moped/motorcycle spaces		
D6	**10**	The building owner/occupant has prepared a TDM plan to the satisfaction of the Region of Waterloo and the Area Municipality that targets a 10% reduction in peak hour trips using forecast trip generation with status quo travel characteristics		
D7	**5**	The employer has provided flexible working hours, telework or shift work arrangements.		
D8	**14**	The development agrees to join Travelwise (TMA) that provides the same services outlined under items D1, D2, D6		
D9	**2**	The development includes mixed uses (i.e. retail, commercial or food services, daycares, or other complementary uses) on-site or located within 400 metres.		
Category Max =		25	**Total Points Applicable =** 25	**Score =**

TABLE E **Checklist Summary**

For each item, a "Yes" answer is equivalent to the points as indicated in the section. N/A sections should be explained in an attachment to this table. The score for each section is reflected as a percentage and calculated by dividing the points by the "Total Applicable".

Category	Minimum Requirement	Total Applicable	Points Scored	Comments
Pedestrian & Cyclist Orientation	24	10		
Public Transit Access		5		
Parking		25		
SUB-TOTAL		**40**		
Trip Reduction Incentives		*25*		
OVERALL TOTAL	***65***	***65***		

TABLE F **Scoring Summary**

FINAL SCORE		RATING	
50 - 65	********		**TDM-SUPPORTIVE DEVELOPMENT**
40 -49	***		
30 - 39	**		
24 - 29	*		
0 - 23		**X**	Non-TDM-Supportive Development

ATTACHMENT 2 - Parking Management Worksheet

Site Address: _____ **Site Context:** _____

Date: _____ **Worksheet No.:** _____

"**Urban Growth Centres -** (UGC) area classification includes the downtown and RT Station Areas of Kitchener, Waterloo and Cambridge.

"**Intensification Corridor**" (IC) classification is applied to sites within 800 metres of the future CTC line

"**Other**" classification applies to all other sites

Please highlight the cell percentages applicable to your development under the appropriate classification. Please note that the Parking Management Worksheet and the Transportation Demand Management (TDM) Checklist are not designed for residential properties, but can be used for mixed-use developments. Local municipalities are the decision-making bodies with respect to consideration of parking reductions below Zoning By-law requirements.

TABLE A	**Pedestrian and Cyclist Orientation**			
In creating an environment that supports pedestrian and cycling activity, the public realm must be accessible, safe, and comfortable to encourage movement on the street and in the surrounding area(s). These facilities and features should encourage walking and cycling.				
	Features	**UGC**	**IC**	**Other**
A1	Development incorporates functional building entrances that are oriented to public space or to locations where pedestrians and transit users arrive from such as a street, square, park or plaza.	1%	1%	1%
A2	Continuous sidewalks (1.5m min. width) are provided along both sides of all adjacent public streets and pedestrian walkways (1.5m min width) are provided through large parking areas to link the building with the public street sidewalk system	0%	0%	1%
A3	Non-Residential: Development provides secure bike storage for 4% of the building occupants	2%	2%	1%
A4	Shower and change facilities for employees provided on-site consistent with LEED requirements.	1%	1%	1%
A5	Provision of active uses at-grade along street frontages.	1%	1%	1%
	Category Maximum	**4%**	**4%**	**4%**
	Available Parking Reduction			
TABLE B	**Public Transportation Access**			
The availability and proximity of convenient public transit service with direct pedestrian linkages to the building will provide viable travel options for employees, visitors and residents.				
	Features	**UGC**	**IC**	**Other**
B1	Bus shelters with seating are provided at the transit stop immediately adjacent to the development, in consultation with Grand River Transit / transit provider	0%	0%	1%
B2	Information regarding public transit routes, schedules and fares are provided in an accessible and visible location on site and in adjacent bus stops	0%	0%	1%
B3a	Located in an UGC or within 800 m of a future Rapid Transit Station	24%	12%	0%
B3b	Located within 600m a transit route with 15 minute headways (or less) or is located in a designated mixed use corridor or node. **Note: Points are awarded for either B3a, B3b or B3c only. Please choose whichever represents the highest order of transit.**	-	5%	3%

B3c	Located within 400 metres of a bus service with headways of 15 min to 30 min. **Note: Points are awarded for either B3a, B3b or B3c only. Please choose whichever represents the highest order of transit.**	-	-	1%
	Category Maximum	**24%**	**12%**	**5%**
	Available Parking Reduction			

TABLE C	**Parking**			
Vehicle parking facilities can affect the character, travel mode and cost of a development. Reducing parking supply to match expected demand can have a positive influence on the selection of alternative travel modes.				
	Features	**UGC**	**IC**	**Other**
C1	Provides priority parking for carpooling/vanpooling participants equivalent to 5% of employee spaces	0%	0%	5%
C2	Commercial Uses: Provide car-share spaces equivalent to 2% of building occupants	2%	2%	0%
C3	Implements paid parking system on all or part of the site (e.g. parking permits, paid parking zones near main entrances)	2%	2%	1%
C4	Parking is not located on major street frontage.	0%	0%	1%
C5	25% to 50% of parking is located underground or in a structure	2%	1%	0%
C6	50% to 75% of parking is located underground or in a structure	4%	2%	0%
C7	75% of parking or more is located underground or in a structure	5%	3%	0%
	Category Maximum	**6%**	**4%**	**6%**
	Available Parking Reduction			

TABLE D	**Trip Reduction Incentives**			
A formal TDM plan will identify specific initiatives that will be initiated in order to encourage reduced single occupant vehicle travel.				
	Features	**UGC**	**IC**	**Other**
D1	The building owner/occupant will provide a ride matching service for car/vanpooling	0%	0%	1%
D2	The building owner/occupant will provide emergency ride home options	3%	2%	1%
D3	The building owner/occupant will provide subsidized transit passes for all occupants for a period of two years	10%	4%	2%
D4	The building owner/occupant agrees to charge for parking as an separate cost to occupants	10%	5%	2%
D5	The building owner/occupant agrees to provide reduced cost for users of car/van pool, bicycle, moped/motorcycle spaces	0%	0%	1%
D6	The development agrees to join Travelwise (TMA) that provides the same services outlined under items D1 and D2	9%	6%	4%
	Category Maximum	**23%**	**11%**	**7%**
	Available Parking Reduction			

TABLE E **Parking Reduction Summary**

Please indicate the total reduction available based upon Tables A through D above.

Category	**Reduction Achieved**	**Maximum Achievable Reduction**			**Comments**
		UGC	**IC**	**Other**	
Pedestrian & Cyclist Orientation	**0%**	4%	4%	4%	
Public Transit Access	**0%**	24%	12%	5%	
Parking	**0%**	6%	4%	6%	
Trip Reduction Incentives	**0%**	23%	11%	7%	
TOTAL	**0%**	**57%**	**31%**	**22%**	

TABLE F	**TOTAL REDUCTION ACHIEVED**	**0%**

Transportation Impact Study Guidelines

AS ADOPTED BY REGION OF WATERLOO COUNCIL
NOVEMBER 26, 2008 REPORT NO. P-08-102

TABLE OF CONTENTS

TRANSPORTATION IMPACT STUDY GUIDELINES

TRANSPORTATION IMPACT STUDY REPORT FORMAT & CONTENTS

INTRODUCTION

One of the Region of Waterloo's key strategies is to "provide high quality infrastructure and asset management to meet current needs and future growth". The main objectives of this strategy are to optimize the use of the existing transportation network and provide adequate infrastructure capacity to accommodate planned growth. The review and management of development generated trips is an integral part of these objectives. The Transportation Impact Study (TIS) guidelines outlined in this document have been established in support of these objectives.

The TIS is an important tool in the overall development planning process. It assists developers and public agencies in making land use decisions, and provides information that identifies the impacts of proposed development on the existing streets and circulation networks and recommends mitigation measures for the impacts identified.

RECOMMENDED THRESHOLD FOR STUDY

In general, a TIS will be requested whenever a proposed development will generate 100 or more new peak direction auto trips to or from the site during the adjacent roadway's peak hour or the development's peak hour (i.e. 100 new trips inbound/outbound). In some cases, although a development will generate fewer trips than the peak hour, peak direction threshold of 100 trips, a study may be requested due to localized safety or roadway/intersection capacity deficiencies.

A TIS will also be requested when two or more proposed developments will generate 100 or additional peak direction auto trips to or from the site during the adjacent roadway's peak hour.

QUALIFICATIONS TO CONDUCT TRANSPORTATION IMPACT STUDY

Transportation impact studies must be prepared under the supervision of a qualified, experienced and registered Professional Engineer in the Province of Ontario with specific training in traffic and transportation engineering and several years of experience related to preparing traffic studies for existing or proposed developments.

PROCESS

A schematic of the TIS process is provided in Appendix A.

1.1 Pre-Study Conference Preparation

The consultant/applicant is required to arrange for a pre-study conference with the Region of Waterloo and other relevant reviewing agencies (e.g. Area Municipalities, Ministry of Transportation, etc.). In preparation for the pre-study conference, the consultant/applicant is required to prepare an estimate of the trip

generation, prepare a preliminary growth rate based on review of the historic traffic counts and Regional Transportation Model, and propose the limits of the study area based on the anticipated impact of the development.

The consultant must obtain a pre-study conference form (Appendix B) and submit it with the required information in advance of the pre-study conference meeting.

1.2 Pre-Study Conference

The purpose of the pre-study conference is to ensure that the consultant/applicant is familiar with the TIS process and the relevant policies, procedures and approvals, and to agree on assumptions, as well as to facilitate discussions between the consultant/applicant, the Region of Waterloo, and other relevant reviewing agencies (e.g. Area Municipalities, Ministry of Transportation, etc.). Discussions may include but are not limited to the:

- TIS process, assumptions and reporting requirements
- Region of Waterloo policies, procedures and approvals
- Requirements of the other relevant reviewing agencies
- Characteristics of the proposed development
- Scope of the study
  - Horizon years
  - Study area limits
  - Other developments in study area
  - Specific concerns to be addressed
  - Level of detail
- Technical analysis needed
- Data requirements and their availability
- Public meeting requirements, if applicable. A public meeting might be held for large size projects (e.g. community plan, plan of subdivision) to allow public input to the scope and recommendations of the study. All costs associated with the public meetings (signs, room rental, notification mailing, etc.) shall be the responsibility of the developer/consultant.

1.3 Preliminary Review

The consultant/applicant is responsible for preparing minutes of the pre-study conference, outlining items agreed to during the pre-study conference, and distributing them to all appropriate parties for review/approval. The approved minutes must be included as an appendix in the TIS report.

Along with the minutes, the consultant must provide existing and background traffic analyses, trip generation, and trip distribution for review/approval.

1.4 Data Collection

The consultant/applicant is responsible for collecting, assembling, analyzing, and presenting all types of data required for the study.

The assembly of available data should be accompanied by a detailed

investigation of the project site, area streets and the surrounding vicinity. This process should include recording all relevant characteristics needed for the analysis (e.g. land use type, intensity, and arrangement of the building, parking and access) plus observations of existing traffic conditions.

Current data should be collected to supplement the available data as necessary. Such data should be obtained through surveys consistent with procedures described in the current edition of the Manual of Traffic Engineering Studies published by the Institute of Transportation Engineers.

Traffic data may be obtained from the following Regional offices:

- Traffic growth rates, trip distribution, and transit data are available from:

  Transportation Planning Division

  E-mail: transportationplan@region.waterloo.on.ca

  Phone: 519-575-4036 Fax: 519-575-4449

- Traffic counts, collision data, traffic control signal timing plans, operational characteristics, capacity analysis input parameters, approved software program information, are available from

  Transportation Division

  E-mail: transportation@region.waterloo.on.ca

  Phone: 519-575-4558 Fax: 519-575-4453

- Collision data for local roads may be obtained from the relevant local municipality.

Any factors utilized in the transportation impact study that are not in concurrence with the recognized standards must be agreed upon with Regional Staff prior to submission of the final report.

1.5 Transportation impact Study Report Review

The TIS report must follow the format outlined in the following Report Format and Contents section of these guidelines. This format will facilitate review, discussion, and communication. Any variation from this format without prior consultation with the reviewing agency will result in delays to the processing of the application and in some cases the report may be denied and returned for revision.

The report should consist of a main document containing the text and exhibits including summary tables, supplemented by technical appendices detailing the analysis.

All elements of the TIS report may not be requested depending on size and nature of development. This will be determined at the pre-study conference.

The report must be signed, dated and stamped by a professional engineer.

Three paper copies of the TIS report along with one electronic copy of all

computer analyses on CD or DVD must be submitted to the Region of Waterloo for review. Additional copies, with supporting documentation, must be provided to the other relevant reviewing agencies as determined at the pre-study conference.

A preliminary review of the submitted TIS will occur after the receipt of the TIS and if the basic format or content are not to the standard outlined in the guideline, the study will be sent back to the consultant immediately for correction.

Any revision, supplementary analysis, or change to the original study, must be documented and a consolidated final version must be submitted to the Region of Waterloo.

Approval of the TIS does not constitute approval of the development application. Conditions imposed by other Regional reviewers must also be resolved.

TRANSPORTATION IMPACT STUDY
REPORT FORMAT & CONTENTS

1. TITLE PAGE

2. EXECUTIVE SUMMARY

Summary of key findings and recommendations of the transportation impact study should be provided.

3. TABLE OF CONTENTS

- List of Exhibits
- List of Appendices

4. INTRODUCTION

The introduction should include the identification of the applicant, site location, municipal address, site plan, the nature of the application (e.g. Official Plan Amendment, Zoning Amendment, Site Plan Control Application, etc.), study assumptions, and summary of key issues.

5. CONTEXT

1.6 Study Area

The study area must include all local, regional and provincial roads, expressways, intersections, interchanges, transit services, pedestrian and cycling facilities, etc. that will be affected by the proposed development. A map showing the study area should be provided.

In general, the study area and study intersections will be agreed upon during the pre-study conference. The study area might be revised as a result of the trip assignment analysis.

1.7 Proposed Land Use on Site

Type of land uses proposed and size of individual land use components expressed in units related to transportation analysis (e.g. floor area, number of residential units, population, employment, number of parking spaces, etc.) should be identified with special attention being paid to gross versus net definitions.

Identify any phasing schemes, along with their associated land use statistics.

Expected dates of completion and full occupancy of the ultimate development and of any interim phases, should be mentioned, if known.

1.8 Other Developments within Study Area

Identify other developments under construction, approved, or in the approval process within the study area, along with the type and size of development.

1.9 Map(s) and Text

Map(s) and text to show the existing transportation system in the study area should be provided; the following information must be included:

- existing roads, jurisdiction, number and widths of lanes, posted speeds;
- existing signalized intersections, lane configuration, restrictions on movements;
- other traffic controls, restrictions on movements;
- heavy vehicle (i.e. truck) restrictions;
- existing transit routes and service frequencies;
- existing transit stops and stations;
- existing cycling lanes/routes and facilities
- existing sidewalks and crosswalks
- other features of interest;
- anticipated nearby development; and
- if appropriate, on-street parking spaces, operation restrictions in the vicinity of the development site and those that would affect the operation of intersections subject to the analysis.

1.10 Transportation Network Improvements

Identify the nature and timing of planned transportation system improvements in the approved Regional, Provincial, and Area Municipal capital programs that are within the study area, and may affect transportation to/from the proposed development.

1.11 Transit, Cycling, and Walking Consideration

The existing and planned transit service, cycling and pedestrian facilities in the study area must be identified and the potential impact and possible changes in modal split should be evaluated.

6. TRAVEL DEMAND

1.12 Horizon Year

The horizon year will be agreed upon during the pre-study conference. In general, the horizon years will be established based on the development size and the date of full occupancy per the following:

- < 500 peak hour peak direction trips = 5 years from the date of TIS submission;
- 500-1000 peak hour peak direction trips = 5 years after full occupancy; and

- >1000 peak hour peak direction trips = 5 years after full occupancy or Transportation Plan Horizon for large-scale projects.

Horizon years should also be identified for any interim phases of development.

For the purpose of a roundabout initial screening and an Intersection Control Study, a 10-year horizon is required for the functional design of each alternative traffic control.

1.13 Time Periods of Analysis

In general, the weekday morning and afternoon peak hours should be evaluated. The peak hours should be identified based on the "worst-case" combination of site-generated trips plus background traffic/transit volumes across the study area.

Other peak hours, such as Saturdays should be examined if they would result in a "worst-case" situation.

Examination of the seasonal variation in trip generation may be required for particular development applications.

1.14 Existing Traffic Conditions

The study should include map(s) to show existing traffic/transit volumes, turning movements for roadways and intersections, heavy truck movements, pedestrian and cyclist volumes in the study area. The traffic data for all modes must be based on the most recent traffic/transit counts available. The consultant should undertake additional traffic counts, where existing count data is more than two years old or where existing data appears to be inconsistent.

Transit counts should be based on the peak points of the routes involved. Particular care should be taken in conducting/reviewing traffic counts in congested situations to identify/account for distortions caused by capacity constraints.

1.15 Background Traffic and Transit Growth

Existing traffic/transit volumes should be factored to account for growth between the dates of the counts used and the horizon year(s).

The consultant should conduct historical traffic count analysis and may need to review or use the Regional Traffic Forecasting Model to determine the appropriate growth factors.

The growth forecasting technique to be used for the TIS will be agreed upon with Regional Transportation Planning staff prior to submission of the report. This component of background traffic growth will be deemed to represent travel increases resulting from general growth outside the study area.

Other development projects included as part of the context for the TIS should be

specifically accounted for.

1.16 Site-Generated Traffic and Transit Volumes

Trip generation, trip distribution, assignment and modal split assumptions must be in accordance with standard/accepted parameters and techniques or based on surveys or other local knowledge. Sources should be clearly documented and any assumptions that may be considered less-than-conservative should be rigorously justified. Any "soft" parameters where there is significant uncertainty or a range of possible values should be subjected to sensitivity analysis unless a demonstrated "worst-case" situation is assumed.

Assumed travel demand parameters for trip generation, distribution, modal split, etc. must be clearly summarized. Sample table formats for trip generation and trip distribution are attached as Appendices C and D. The trip distribution table should be accompanied by a trip distribution map.

Methods, sources and assumptions used for adjusting trip generation for site interaction rates for large commercial developments should be described in the report. Any significant differences between sums of single-use rates and proposed mixed-use estimates must be justified in the study report.

Only limited data are available to adjust the trip generation rates for pass-by trips. The information on pass-by trips included in the Institute of Transportation Engineers, Trip Generation Handbook should be reviewed. If pass-by trips are a major consideration for the land use in question, studies and interviews at similar land uses may be requested. The pass-by trips should not be discounted from the total generated trips. They can be subtracted from the through traffic on the adjacent roads, but need to be assigned to the specific accesses.

1.17 Estimation of Adjustments to Transportation Demand Management Initiatives

A Transportation Demand Management (TDM) Plan should be prepared to influence how, when, where, and why trips will be made to and from the site, thereby reducing single occupant auto use. The plan should include a description of the initiatives proposed and any consequent measures required to enhance alternatives to the single-occupant auto.

The effects of the proposed TDM Plan should be identified and evaluated. These measures may reduce trip generation, reduce the proportion of trips in the peak hour, and increase the modal share of trips by walking, cycling, and transit, and/or increase auto occupancy. The effects should be calculated as adjustments to the basic travel demand estimates.

The report should identify steps to be taken with respect to the proposed development or redevelopment to support walking, cycling, carpooling, telecommuting, and the use of transit.

Specific consideration should be given to the proposed developments adjacent to Rapid Transit stations. The impacts of the Rapid Transit on the proposed development should be identified and evaluated.

1.18 Map(s) to Summarize

Maps summarizing the following should be included for each time analysis period:

- existing traffic volumes including pedestrians and cyclists, and transit volumes and the date of the traffic counts;
- future background volumes (i.e. existing traffic volumes plus background growth);
- site trip distribution.
- any major transportation improvements, committed or planned, within the interim development phases or study horizon that may significantly affect the travel demand pattern associated with the development proposal should be considered. Scenarios with and without such improvements should be summarized as appropriate;
- site generated volumes;
- changes to traffic and transit volumes that are anticipated to result from TDM measures; and
- future total volumes (i.e. background plus site generated volumes) for each interim development phase and horizon year, and scenario.

7. EVALUATION OF IMPACTS

Impacts on streets and transit facilities will be evaluated for each time analysis period, taking into consideration the horizon year(s) for full development and interim phases. The evaluation will be undertaken for:

- existing conditions;
- existing plus background growth (i.e. future background traffic conditions);
- existing plus background growth plus site-generated travel (i.e. future total traffic conditions);
- scenarios with and without relevant major transportation system improvements as identified in the pre-study conference; and
- scenarios with different driveway/access locations if queuing or traffic operations become an issue.

1.19 Traffic Impact Analysis

All intersection capacity analyses must use electronic software and input parameters approved by the Region of Waterloo, which reflect the current practice. Refer to the Region of Waterloo document Transportation Impact Studies, Requirements for Capacity Analysis, Roundabouts, and Turn Lanes.

- All **signalized** and major unsignalized intersections defined as critical intersections or that have critical movements in the study area must be

evaluated;

- **Any street segment** deemed sensitive to traffic including pedestrians and cyclists such as weaving sections, ramps, internal site roadways, parking facility access points and reservoirs for vehicles queuing off site and on site must be evaluated;
- **Operational analysis** for signalized and unsignalized intersections must be conducted using software approved by the Region of Waterloo and supplemented if necessary by field studies of gap availability, possible queue, spillback, etc.;
- **All assumptions** concerning lane configuration/use, pedestrian activity, cycling activity, cycle length, phasing and signal timings, should be clearly documented. Existing signal timings should be used to analyze existing conditions. The consultant should confirm that any such assumptions, where applicable, conform with the standards/practice of the Region of Waterloo;
- **Future pedestrian activity** associated with the development and related implications for signal warrant calculations and signal timing requirements to provide adequate pedestrian road-crossing links should be evaluated and documented. Pedestrian connections to transit services are of particular interest;
- **Mid-block traffic** volume including pedestrians and cyclists should be documented and summarized in the body of the report. Pedestrian crosswalks and curb ramps should be evaluated taking into consideration the sight distance, existing on-road parking, the posted speed, and pedestrian demands;
- Traffic volumes, turning movement volumes, level of service, delay, queue, and volume/capacity ratios, must be documented in a clearly understandable table in an appendix for all signalized intersections (overall volume/capacity ratio) and for each individual traffic movement. A sample table format is attached as Appendix E;
- The criteria for identifying "**critical**" intersections are:
    - overall Level of Service E or F (i.e. average control delay per vehicle greater than 55 seconds) for signalized intersections; and
    - overall Level of Service E or F (i.e. average control delay per vehicle greater than 35 seconds) for unsignalized intersections.
- The criteria for identifying "**critical**" movements are:
    - the average control delay for individual movements is greater that 55 seconds;
    - estimated 95th percentile queue length for an exclusive movement exceeds the available storage space;
    - estimated 95th percentile queue length for an individual movement will block an existing access;
    - exclusive turning lanes are inaccessible because of queue lengths in adjacent through lanes; and
    - poor quality of service for non-auto modes (as per the assessment in 7.3 section).

Operational analysis for all "critical" intersections/individual movements in those peak hours that meet the criteria noted above, must be summarized in a table in

the body of the report. This table should include traffic volumes, volume/capacity ratios, levels of service, delay, and back of queue for the existing conditions, future background conditions, and future total conditions for scenarios with and without relevant major transportation system improvements.

- **All queuing analysis** of existing and future traffic volumes should be presented in a clear format where available storage and required storage for all movements are clearly recognized. A sample figure format is attached as Appendix F.
- All **level of service** analysis of existing traffic volumes/movements at major signalized intersections where delays will exceed 55 seconds may need to be supplemented by field evaluation of average delays and queue lengths. Evaluation of future scenarios should be supplemented by estimates of these parameters as available from the capacity analysis technique utilized;
- **All intersections/individual movements** identified above as "critical" should be discussed in terms of contribution of the development proposal to the situation, possible remedial measures, a recommended solution, and the effectiveness of the solution towards resolving the situation. In general, the objective should be to ensure that no new “critical” movement is created by the development and that “critical” movements that exist are not worsened by addition of site-generated traffic;
- All **exclusive turning lanes** used by site-generated traffic must be examined to ensure adequate queue storage space. Adequate storage lengths will be designed for 95th percentile back of queue;
- **Left turn lane warrant** analysis for unsignalized intersections should be conducted using the MTO Geometric Design Guidelines. Based on level of service and operating conditions at unsignalized intersections, **right turn** lanes should be considered;
- All **proposed adjustments** to signal phasing, signal timing and new signals should be evaluated in terms of pedestrian crossing time, effect on queue lengths and adequacy of existing storage, and effects on existing signal co-ordination;
- **Supplementary analysis** of traffic signal system/network operations may be required to assess impacts on traffic signal co-ordination;
- All **proposed new traffic signals** should be evaluated according to the current signal warrant practice of the Region of Waterloo;
- **Other alternatives** to the proposed traffic control modes, including traffic signals should be considered where possible; a roundabout must be considered as an alternative means of traffic control whenever traffic signals are warranted and proposed or whenever road improvements (e.g. additional dedicated turning lanes or additional through lanes) are being considered to address a safety or a capacity deficiency;
- For the purpose of these guidelines, an **Intersection Control Study** is a study that determines the feasibility of implementing a roundabout at particular locations by comparing the roundabout to other forms of traffic control such as traffic signals.
- The **roundabout option** must be investigated based on various factors

including capacity, safety performance, and site conditions.

1.20 Roundabout Feasibility

Prior to the undertaking of a detailed Intersection Control Study to determine the feasibility of a roundabout, an Initial Screening must be done. The **Initial Screening** shall involve the following:

- determine the scope of intersection improvements to implement the traffic signals and other turning lanes and scope of work to implement a roundabout;
- complete a Traffic Flow worksheet and preliminary lane configuration for the proposed roundabout ;
- develop a preliminary cost estimate to implement each of the traffic control alternatives (roundabouts and signals);
- develop a 20-year injury collision cost for each of the alternatives, adjusted to Present Value; and
- compare the sum of injury collision costs and implementation costs for each alternative.

The Initial Screening tool and Traffic Flow worksheet forms can be obtained from the Region of Waterloo.

Should the total cost for the roundabout be significantly more than the total cost of the signals, the roundabout would not be considered feasible unless other issues warrant additional consideration of a roundabout; otherwise, a more detailed Intersection Control Study will be required to determine the feasibility of a roundabout.

A detailed **Intersection Control Study** will involve the following:

- functional design of both the roundabout and other alternative road improvement such as a signalized intersection
- preliminary cost estimate of each alternative including:
    - property acquisition
    - utility relocations
    - construction
    - signing and marking
    - engineering
    - contingency
- a comparative evaluation of each alternative using the following criteria
    - safety for all users
    - traffic operations
    - property impacts
    - fuel consumption and emissions
    - pedestrian and cyclist issues
    - persons with disabilities
    - compatibility with area land use, accesses and corridor traffic signal

timings
- aesthetic value
- 20-year life cycle costs

A functional design of the proposed roundabout and alternative road improvement indicating dimensions, required pedestrian and cyclist facilities and other significant characteristics, should be included in an Intersection Control Study report.

All methodologies and assumptions should be documented as to source and their use should be justified.

The functional design of the roundabout should:

- be adequately sized to provide the required capacity to accommodate the 10-year traffic volume;
- be adequately sized to accommodate the appropriate design vehicle;
- include adequate deflection to achieve the required speed reduction;
- consider nearby accesses, property and utility impacts; and
- include necessary facilities for transit, cyclists and pedestrians.

Please refer to Appendix G for parameters and assumptions to be used for the Intersection Control Study.

The horizon year to be used for any Intersection Control Study is to be 10 years from the date of the traffic impact study; however, a sensitivity analysis is also required to determine when the proposed design based on the 10-year horizon starts to operate at a poor level of service (i.e. Level of Service E or worse).

Intersection Control Studies must be prepared under the supervision of a qualified, experienced and registered Professional Engineer in the Province of Ontario with specific training in traffic and transportation engineering and several years of experience related to roundabout feasibility and design.

1.21 Non-Auto Modes, Transit, Pedestrians, Bicycles

The study should analyze and evaluate the roadway's performance with regard to accommodating transit, pedestrians, and cyclists in the study area using the Highway Capacity Manual and any other generally acceptable guidelines.

The assessment considerations for transit include but are not limited to:

- frequency and hours of service
- presence of bus stops
- reliability of service
- passenger loads
- travel time

The assessment considerations for pedestrians may include but are not limited to:

- presence, connectivity, and width of sidewalks
- barriers and buffers from traffic
- crossing opportunities at signalized and unsignalized intersections
- delay at intersections
- number of driveways and traffic volumes at the driveways
- presence of illumination

The assessment considerations for bicycles may include but are not limited to:

- presence of a dedicated facility
- network connectivity
- number and width of travel lanes adjacent to the route
- volume and speed of traffic
- percentage of trucks and buses encountered
- pavement condition
- presence of parking /showers/change rooms in the study area

The recommended measures to improve walking, cycling, and transit environment in the study area must comply with Region of Waterloo policies and practices including the most recent Bus Stop Zones guidelines.

1.22 Safety Analysis

The study should include a safety impact analysis to identify the effects of the development on the collision risk of the site and the adjacent road system. The study should recommend countermeasures where warranted and modifications to the site plan and the road system to enhance the level of safety for motorists, cyclists and pedestrians.

Designs and recommendations should comply with the Ministry of Transportation of Ontario (MTO) Geometric Design Standards for Ontario Highways, the Ontario Traffic Manuals, and the Transportation Association of Canada Geometric Design Guide for Canadian Roads, as well as Region of Waterloo policies and practices.

The safety impact analysis should include but is not limited to:

- A road safety review as per current Region of Waterloo practice. A check list is available from the Region of Waterloo;
- An estimate of the impacts that the development will have on collision patterns; and
- In particular, any new access should be designed to restrict the inbound and outbound left turns if they conflict with an expected queue on the main road.

8. SITE ACCESS AND CIRCULATION

The access points should be located on minor roads where possible. The number and location of access points should be reviewed to ensure that only the minimum number necessary are provided to serve the development adequately

without negatively affecting the flow of traffic along the road network abutting the development; justification for more than one access should be based on traffic capacity and safety and not design preference.

- All site access points on Regional roads should be evaluated in terms of capacity, safety and adequacy of queue storage. The evaluation should be similar in scope to that for signalized/unsignalized intersections described previously;
- Proposed access points should be evaluated with respect to possible mutual interference with other access points, including those of other sites, on-street weaving problems, need for acceleration/deceleration lanes, and safety for all modes of transportation, etc.;
- On site parking/circulation systems should be evaluated to demonstrate a high safety factor with respect to the possibility of queues backing on Regional roads, the need for vehicles to reverse onto Regional roads, etc.;
- Sight distance should be evaluated to ensure safe conditions in accordance with Transportation Association of Canada-Geometric Design Guide for Canadian Roads;
- Proposed truck/courier loading facilities and access to these facilities should be evaluated to ensure that they are adequately sized, designed, and provided with suitable access so that they will not adversely affect traffic and transit operations on Regional roads;
- Any required turning restrictions or other restrictions should be identified;
- All accesses should be designed with sufficient on-site queuing storage in accordance with the Region of Waterloo Policy and Procedures for Access onto Regional Roads;
- Adequate access for emergency vehicles should be provided; and
- Adequate access for garbage/recycling services and delivery/moving should be provided.

9. REMEDIAL MEASURES

- All transportation system improvements identified as necessary or desirable to serve the proposed development or to accommodate the background traffic should be listed and the timing of their implementation should be identified;
- All street improvements should be shown on a functional sketch indicating dimensions, required pavement widening, required right-of-way widening, traffic control and other significant characteristics including the location of all driveways/intersections/points of access opposite the property being developed. In some cases a detailed design and cost estimates may be required;
- When improvements to an intersection are proposed, the design plans should show all legs of the intersection so that turning paths and lane continuity can be reviewed;
- All "critical" traffic movements or other traffic (including pedestrians and cyclists) /transit impacts that cannot be successfully mitigated should be identified;

- A table should be prepared, similar to that shown in Appendix E, to show the volume/capacity ratios, levels of service, delays, and back of queue of intersections/individual movements as affected by the recommended remedial measures;
- Once the traffic analysis has been accepted, approval of the Transportation Impact Study will be granted conditional upon the feasibility of the recommended plan;
- A sufficient amount of design should be undertaken to ensure all recommended improvements could be physically constructed. In some cases where new roads or road widening are recommended a public meeting may be required; and
- Cost estimates must be provided for all recommended improvements.
- The approved transportation impact study is valid for one year from the original submission date. If a transportation impact study is older than one year, it will be reviewed by Region of Waterloo staff and based on the review, the consultant/developer may be required to provide an update.

10. CONCLUSIONS AND RECOMMENDATIONS

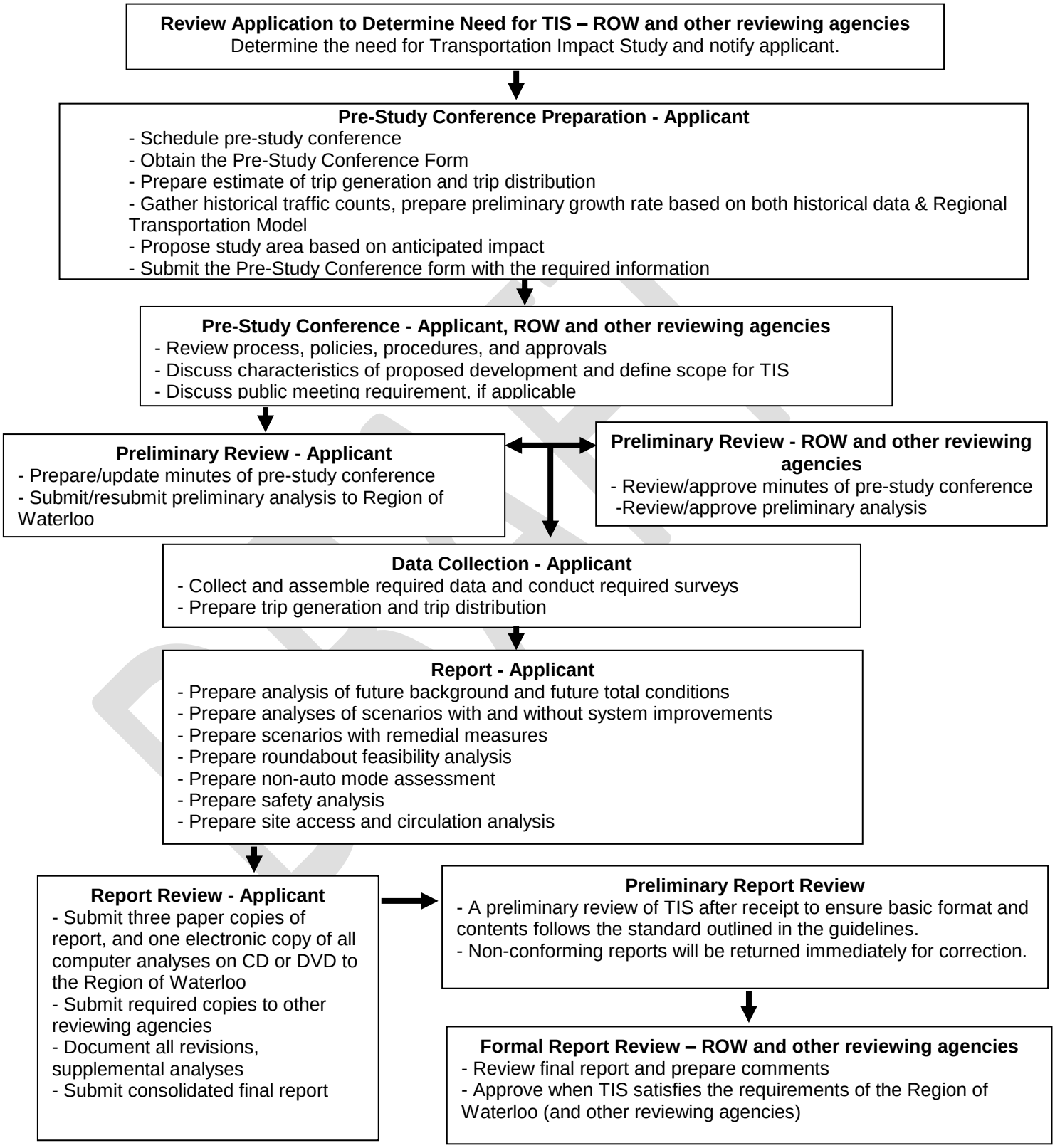
- Summary of key study conclusions with respect to the transportation and safety impact of the proposed development; and
- Summary of recommended improvements and unresolved problems/issues.

11. APPENDICES

- Approved minutes of the pre-study conference;
- A list of the traffic counts, collision data, and traffic signal timings that were used in the study, including the dates and sources of the counts/data;
- Calculations for intersection and roundabout capacity analyses, using software approved by the Region of Waterloo including all input parameters and full printouts detailing the traffic volumes, turning movement volumes, level of service, volume/capacity ratios, delays, and queues;
- Calculations for any auxiliary lane warrants;
- Calculations for any traffic control warrants;
- Calculations for any roundabout Initial Screening; and
- Calculations for any Intersection Control Study.

APPENDICES

APPENDIX A : TRANSPORTATION IMPACT STUDY – PROCESS



APPENDIX B
PRE-STUDY CONFERENCE FORM

Item	Description	Details
INTRODUCTION		
1	Nature of application (Attach a drawing)	○ Official Plan Amendment ○ Zoning Amendment ○ Site Plan Control Application ○ Plan of Subdivision ○ Community Plan ○ Other
2	TIS process, and relevant policies, procedures and approvals	○ Guidelines for the preparation of Transportation Impact Studies in Support of Development Applications ○ Transportation Impact Studies Requirements for Capacity Analysis, Roundabouts, Turn Lanes ○ Safety Analysis Checklist ○ Policy and Procedures for Access onto Regional Roads
3	Public Meeting	○ Required ○ Not Required
CONTEXT		
4	Study intersections (Intersections to be analyzed) Note: the consultant is responsible to identify any further intersections impacted as the study progresses.	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○
5	Size and number of phases of development	○ Phase 1: ○ Phase 2: ○ Phase 3: ○ Phase 4: ○ Phase 5:
6	Approved and pending approval development applications	○ ○ ○ ○
7	Planned transportation system improvements	○ ○ ○ ○

Item	Description	Details
TRAVEL DEMAND		
8	Horizon years	○ 5 years from date of TIS ○ 5 years after full occupancy ○ Transportation Plan horizon for large scale projects ○ Interim years ○ Other…
9	Peak hour determination	○ AM weekday peak hour of adjacent roadway ○ PM weekday peak hour of adjacent roadway ○ Saturday peak of adjacent roadway ○ AM weekday peak hour of development ○ PM weekday peak hour of development ○ Saturday peak of development ○ Other…
10	Background	○ Historical traffic/transit counts ○ ROW travel demand forecasts ○ Approved and pending approval development applications ○ Other…
11	Trip generation	○ ITE average rates ○ ITE fitted equation ○ Rates published elsewhere ○ Observed rates for similar areas ○ Observed rates for similar developments in the local area ○ Other…
12	Trip reductions (TDM, internal, pass-by)	○ Published Travel Demand Management reductions ○ Observed Travel Demand Management reductions ○ ITE internal capture reductions for mixed-use developments ○ Observed internal capture reductions for mixed-use developments ○ ITE pass-by reductions ○ Observed pass-by reductions for similar developments ○ Other…
13	Trip distribution	○ ITE trip distribution IN/OUT split ○ Regional travel demand ○ Population and employment distribution ○ Market analysis of catchment area ○ Other…
14	Trip assignment	○ Local traffic pattern ○ Site layout and access design ○ Existing turning movements ○ Other…

Item	Description	Details
EVALUATION OF IMPACTS		
15	Traffic impact analysis (Use approved software)	○ Unsignalized intersections ○ left turn warrant analysis ○ signal warrant analysis ○ Signalized intersections ○ LOS, v/c, delay, queuing ○ ROW saturation flow rates ○ Existing signal timings for existing conditions ○ Optimize signal timings for future conditions ○ Queuing analysis ○ Roundabouts ○ Other…
16	Roundabout feasibility (Use approved software)	○ Initial screening ○ Intersection control study (10 year horizon)
17	Transit assessment	○ Frequency and hours of service ○ Presence of bus stops ○ Reliability of service ○ Passenger loads ○ Travel time ○ Other
18	Pedestrian assessment	○ Presence, connectivity, and width of sidewalks ○ Barriers and buffers from traffic ○ Crossing opportunities at intersections ○ Delay at intersections ○ Number of driveways and traffic volumes at the driveways ○ Presence of illumination ○ Other
19	Cycling assessment	○ Presence of a dedicated facility ○ Network connectivity ○ Number and width of travel lanes adjacent to the route ○ Volume and speed of traffic ○ Percentage of trucks and buses encountered ○ Pavement condition ○ Presence of parking /showers/change rooms ○ Other
20	Safety analysis	○ Road safety review ○ Collision risk analysis ○ Access conflict evaluation
21	Site access and circulation	○ Review sight distances at all new access points ○ Internal traffic controls ○ Loading facilities and access ○ Service/maintenance vehicle access ○ Emergency vehicle access

APPENDIX C
FORMAT FOR TRIP GENERATION TABLES

Land Use	ITE Code	Size	AM Peak Hour				PM Peak Hour			
			Rate/Equation	In	Out	Total	Rate/Equation	In	Out	Total

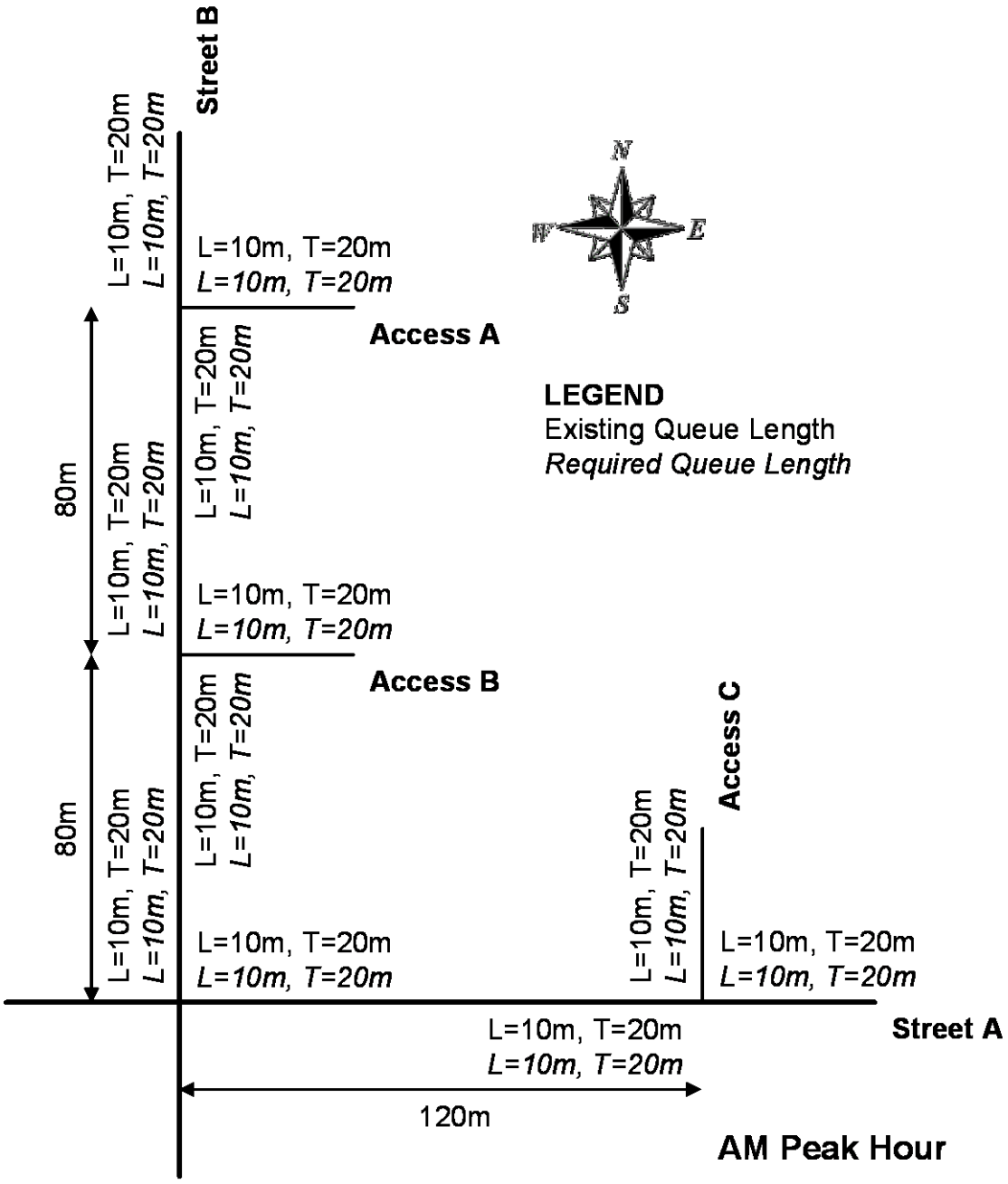
APPENDIX D
FORMAT FOR TRIP DISTRIBUTION TABLES

Origin / Destination	Percent Distribution			
	AM Peak Hour		PM Peak Hour	
To / From the North:	In	Out	In	Out
Via Via Street A				
Via Via Street B				
Via Via Street C etc…				
To / From the South:				
Via Via Street A				
Via Via Street B				
Via Via Street C etc…				
To / From the East:				
Via Via Street A				
Via Via Street B				
Via Via Street C etc…				
To / From West:				
Via Via Street A				
Via Via Street B				
Via Via Street C etc…				

APPENDIX E
TABULAR FORMAT FOR ANALYSIS AND IMPACT SUMMARIES

Analysis Period	Intersection	Control Type	MOE		Direction/Movement/Approach																	
					OVERALL	EB-LEFT	EB-THOUGH	EB-RIGHT	EB-APPROACH	WB-LEFT	WB-THOUGH	WB-RIGHT	WB-APPROACH	NB-LEFT	NB-THROUGH	NB-RIGHT	NB-APPROACH	SB-LEFT	SB-THROUGH	SB-RIGHT	SB-APPROACH
AM Peak Hour	St. A @ St. B		Los																		
			Del																		
			v/c																		
			Q	Required																	
				Existing																	
				Available																	
	St. C @ St. D		Los																		
			Del																		
			v/c																		
			Q	Required																	
				Existing																	
				Available																	
PM Peak Hour	St. A @ St. B		Los																		
			Del																		
			v/c																		
			Q	Required																	
				Existing																	
				Available																	
	St. C @ St. D		Los																		
			Del																		
			v/c																		
			Q	Required																	
				Existing																	
				Available																	

APPENDIX F
QUEUING ANALYSIS FORMAT



APPENDIX G
ROUNDABOUT / INITIAL SCREENING AND TRAFFIC CONTROL STUDY CRITERIA

Horizon Year	10 years with sensitivity analysis of when 10 year design will start to perform at a LOS D or worse
Capacity Analysis	Use Region of Waterloo approved software
Cost Assumptions	○ Cost of traffic signals to include all road widening to provide required turning lanes and in the case of a project identified for widening in the Region's 10 Year Capital Program cost of the ultimate widening is to be included. ○ For illumination, the cost of the implementation, operation, and maintenance of both traffic signals and roundabout should be calculated as per current Region of Waterloo practice. A check list is available. ○ For the operation of traffic signals use the most recent estimation. Check the list available from the Region of Waterloo ○ For traffic signals, assume full equipment replacement after15 years
Present Value Calculations	Use the most recent calculated value of the discount rate, and the injury collision cost as per current Region of Waterloo estimation. The Region of Waterloo will provide a list for the most recent values.
RODEL Confidence Level	○ use 50% confidence level for capacity analysis and concept development ○ use 85% confidence level for sensitivity analysis ○ use 95% confidence level for estimating queue length
ARCADY Parameters	○ use 100% capacity for initial analysis and concept development ○ use Y-intercept adjustment to 85% capacity for sensitivity analysis
Collision Rates	The Region of Waterloo will supply expected collision rates for the signals. Expected collision rates for the roundabout are assumed to be 50% or less of the signalized rate.
Design Vehicle	WB-20

Please refer to the following link for more information regarding the Roundabout Control Study and sample of the preliminary design. "Roundabout Workshop Guide":

www.region.waterloo.on.ca
Living Here-Transportation-Other Transportation and Related Projects-Transportation Impact Study Guidelines-Roundabout Workshop-May7, 2009.

http://www.region.waterloo.on.ca/web/region.nsf/97dfc347666efede85256e590071a3d4/f97a7c3f47dc74128525750f00512b13!OpenDocument