Guidelines for the Submission of a Transportation Study – Level 2

For Site Development Applications in the City of North Vancouver

Transportation Group,
City of North Vancouver Engineering, Parks & Environment Department

This document was updated on date by CNV Engineering staff and applies to the proposed development at: address.

Guidelines for the Submission of a Level 2 Transportation Study – Site Specific Requirements from City Staff

Above and beyond the guidelines contained within this document, City of North Vancouver staff may have requirements or exemptions for individual developments, as transportation conditions are unique from site-to -site. This page generally provides (where applicable) staff requirements related to a specific development proposal.

Development Name and Address:
Date:
CNV Engineering (Transportation) Staff Contact:

Staff requirements regarding preparation of Level 2 TS for this development proposal:

SAMPLE

This terms of reference is a sample only. A specific terms of reference for each development is produced by staff as part of our pre-application review.

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1.0 INTRODUCTION

The City of North Vancouver requires that the transportation implications of new developments be assessed and documented. Such reviews are necessary for City staff to ascertain how proposed developments could affect transportation and mobility in the development's area of influence. The City therefore requires that each development submission be accompanied by a transportation review that is proportionate in scope to the development's magnitude. With staff guidance, developers are advised what type of transportation study is required to accompany their development submission, and are provided with a set of guidelines to follow. The various types of transportation studies are described in the following section.

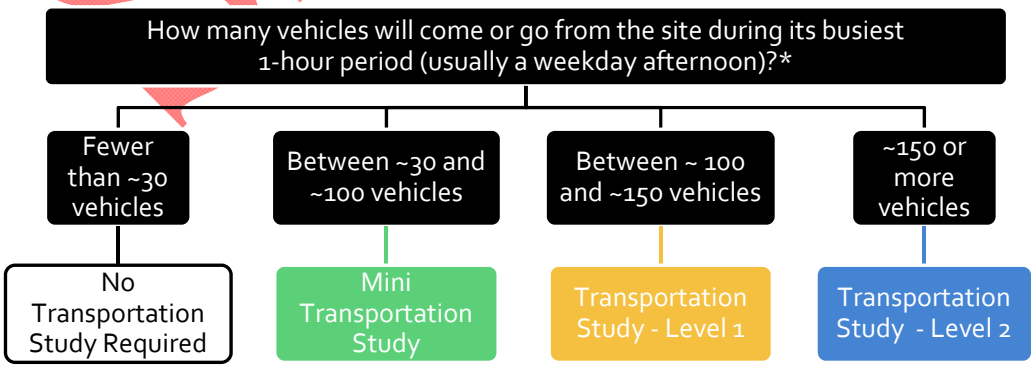
This document contains the City's guidelines for preparation of a **full (Level 2) Transportation Study**. The City of North Vancouver Engineering Department generally adheres to Institute of Transportation Engineering recommended practice. Occasionally there are elements of a Transportation Study (also referred to as a "TS") that are unique, or for which there are multiple methods for analysis; in these cases it is recommended to confirm technical assumptions with City staff prior to proceeding with analysis work.

1.1 What Type of Transportation Study is Required?

Development proposals are associated with a change in travel patterns in the vicinity of the site. This change is generally measured in terms of how many cars, pedestrians or bicycles will travel to or from the site, during the site's busiest hour. Usually, the weekday late afternoon period is when City streets have the most vehicular traffic.

In general, if a development is expected to add fewer than 30 vehicle trips to or from the site in the afternoon peak hour period, the City does not require a transportation study to accompany the development submission. When staff estimates that site traffic will exceed this threshold, it is necessary to submit either:

- a "Mini Transportation Study" for developments that could add between 30 and 100 vehicle trips during the PM peak hour;
- a "Transportation Study – Level 1" for developments that could add between 100 and 150 peak hour vehicle trips; or
- "Transportation Study – Level 2" for any development that has the potential to add 150 or more PM peak hour vehicle trips.



**Note: PM peak hour trips are estimated by staff, accounting for the size of development and land use type*

Above and beyond the thresholds outlined above, other circumstances may trigger the need for a specific scope of transportation study. In these situations, City staff will advise the development applicant what the circumstances are and what specific issues need to be incorporated into the scope of their transportation study. Two examples of such scenarios include:

- When the location of a development site is adjacent to a roadway or intersection with known safety or capacity deficiencies; or
- When the road adjacent to the development site has unique traffic or geometric conditions that may affect the ability of the road system to accommodate the proposed development.

2.0 TRANSPORTATION STUDY STRUCTURE

The following sections describe the standard contents of a Level 2 Transportation Study, with extra technical information provided in appendices at the end of this document.

2.1 Study Area

The study area boundary is determined in consultation with City staff. The study area is typically defined based on the magnitude, location and accessibility of the proposed development as well as prevailing conditions in the nearby area.

For a Level 2 TS, the City requires that the study area include **all site access points, plus all intersections (signalized and unsignalized) adjacent to the site**. Signalized intersections on streets serving the site should also be included in the study area **if they are within 300 meters of the development** and are anticipated to handle new development traffic. Engineering staff will determine whether additional intersections or road segments are necessary to include in the study area, based on known safety or operational issues that may be adversely impacted by the development proposal.

2.2 Description of Development Proposal

The applicant's submission must provide a concise description of the development proposal for which the TS is accompanying. An introductory section within the report should include the items listed below.

1-Title and address of project

2-Location of development and description of the local neighbourhood

3-A site plan with accesses and parking areas shown

4-A description of the purpose and nature of the project, with a description of the market area or area of influence (where appropriate)

5-Land use type and density – and details of re-zoning when relevant

6-Development phasing (if relevant) and expected opening day

7-Description of nearby developments that are recently re-zoned/close-to or under construction that will affect the same street network or portions of it

8-A study area boundary map, with the site, study intersections and other notable landmarks noted

2.3 Required Report Elements

The City requires TS reports to be structured in a logical order and to reflect transportation engineering best practices. The TS should incorporate (at minimum) the components listed below in a logical sequence. These components are discussed individually in subsequent sections of this document.

- Existing Conditions
  - Description of Transportation Network
  - Traffic Data Collection
  - Operational analysis (existing)
- Background Conditions (for opening plus horizon years)
  - Identify influences that will affect future background traffic
  - Determine growth rate and horizon years
  - Project future background traffic growth
  - Operational analysis (background traffic for opening plus horizon years)
- Future Development Conditions
  - Description of Project
  - Trip Generation
    - Multi Modal Approach
    - Trip Reductions (for TDM Initiatives or other)
    - Pass-by Traffic and Internal Trip Capture
    - Trip Comparison
  - Trip Distribution and Traffic Assignment
  - Total Trips
  - Multi-Modal Operational Analysis (total traffic-horizon years)
- Access Review
- Parking Review
- TDM Review
- Conclusion and Recommendations

3. EXISTING CONDITIONS

3.1 Description of Existing Transportation Network

An inventory of the transportation network is required in order to define the base conditions for further analysis. The inventory shall encompass any road segment or intersection within 300 meters of the site's outer perimeter, with the possibility of a broader area required for large developments, per City staff requirement. Field reconnaissance visits must be undertaken to confirm existing facilities and traffic operations. The following categories should be included in the existing transportation network review (but not limited to):

- **Roads** (laning, widths, road classification, traffic restrictions, speed limits, signage, relevant accesses);
- **Intersections and accesses** (geometric layout, intersection control devices - details on signal phasing and cycle lengths will be provided by the City);
- **Pedestrian and bicycle facilities** (sidewalks, crossings, bike facilities, paths, nearby trails);

- **Transit facilities and operations** (bus stops, bus bays/bulges, bus service numbers, routes, service levels);
- **Connectivity to other destinations** (an overview of how all travel modes connect within the neighbourhood and to external zones); and
- **General Planning** (a review of the City's relevant planning documents, including the Transportation Plan, Bicycle Master Plan, Official Community Plan, North Shore Area Transit Plan, etc).

3.2 Existing Traffic Data Collection

A set of existing traffic counts must be assembled for all study intersections and access points. Traffic count data (such as manual turning movement counts, hose counts or count data uploaded from the traffic signals) may be acquired from the City. In many cases the City's data may not be current or available, and therefore the consultant will be expected to undertake traffic counts for all study intersections and accesses.

- The traffic count schedule must take into consideration the times of day when volumes are highest – for both the surrounding road network and site. A review of recent daily/24-hour count data in the vicinity (which may be provided by the City, where available) and the type of proposed development will assist in establishing the peak hours. Typically, the periods selected for analysis include weekday (AM, PM and midday) as well as the Saturday peak period. It may not always be necessary to analyse all time periods - the final selection of time periods should be reviewed with the City prior to proceeding with the subsequent analysis.

- Traffic counts should be undertaken in 15 minute intervals within the selected peak periods.

- All modes of transportation must be accounted for when turning movement counts are being done:
  - vehicle volumes (with trucks and buses distinguished);
  - bicycle volumes (whether on road, sidewalk, multi-use path, or being walked at crossings by pedestrian); and,
  - pedestrian crossing volumes.

- Depending on development characteristics and traffic flow conditions, there may be a need for the consultant to undertake additional traffic surveys. In this case, the City will specify what type of analysis is required to address the issue(s). Typical examples of additional analyses include link (mid-block) pedestrian or bicycle volume counts, signal warrant calculations, collision analysis, speed surveys, parking surveys, customer interviews and sight visibility reviews.

- All count data must be displayed in a map format within the TS.

3.3 Operational Analysis – Existing Conditions

The City prioritizes sustainable modes of transportation and recognizes the importance of providing safe and comfortable conditions for pedestrians and cyclists. Thus, in the context of development proposals, consultants are required to consider the operational conditions of pedestrians and cyclists (active mode) and transit users, alongside motor vehicles. The TS must ensure that needs of the most vulnerable road users are not compromised by any changes in vehicular traffic patterns or transportation infrastructure that result from the development.

Vehicle Mode

The operational performance of the transportation system from a vehicular perspective must be primarily expressed in terms of intersection level of service (LOS) and v/c ratio. For the purpose of capacity analysis, 2010 Highway Capacity Manual (HCM) methods must be adhered to. The City requires that consultants use Synchro software as their analysis tool when assessing capacity, with care taken to include the components listed below.

- Synchro summaries must be provided in tabular or graphical format, clearly identifying intersection performance indicators.
- The volume–to-capacity ratio (v/c) and LOS should be provided for each intersection overall, as well as per each movement.
- Detailed output from Synchro must be provided in an attachment to the report, as well as electronically (upon finalization of the study).
- LOS D is the minimum accepted level of service for both signalized and unsignalized intersections in the CNV; and overall at signalized intersections the minimum acceptable v/c is 0.9, while the minimum v/c for individual movements is 0.95.
- The report should provide a brief summary in text regarding the analysis highlights, including identification of locations where existing operational issues exist.

Active Modes

As of 2012, City requires that the 2010 Highway Capacity Manual's integrated multi-modal approach for assessing pedestrian and bicycle conditions be used when undertaking a Level 2 Transportation Study. This analysis is required for all site access points, study intersections and sidewalk or bicycle facility segments (adjacent to the site). In certain cases, the development magnitude or location may not necessitate the full LOS analysis for active modes. Staff will advise on a project- and intersection-specific basis which locations may be exempt from the multi-modal LOS analysis.

Transit Mode

The North Shore Area Transit Plan should be consulted for background information regarding existing transit operations. In addition, it is necessary to contact TransLink (or Coast Mountain Bus Company where appropriate) to discuss current transit conditions (such as demand and capacity) and operational issues in the vicinity of the development. There may be project-specific circumstances that require transit level of service to be calculated. If City staff determines that this is required, the appropriate methodology outlined in the 2010 HCM should be followed to calculate transit LOS.

4. FUTURE BACKGROUND CONDITIONS

4.1 Future Background Traffic Influences

A set of future background traffic volumes must be developed (and illustrated in a map format). The purpose of defining background traffic is to establish future conditions in the study area without the proposed development. Background traffic volumes must be forecast for both opening day and horizon year scenarios. The background traffic volumes must be based on the following key considerations.

A) Unless indicated otherwise by City staff, the growth rate method should be used to project non-site traffic. The traffic growth rate to be applied must be confirmed at the start of the study with City staff, prior to proceeding with any analysis.

B) Background traffic volumes should take into consideration any funded or planned transportation network improvements that may affect travel patterns in the future. City staff can provide this information.

C) The growth rates to be assumed for active modes of transportation and transit use should be discussed with City staff. Future shares to be assumed for these modes may take into consideration target modal splits endorsed by the City.

D) The background traffic conditions should take into consideration the amount of traffic currently being generated by the development site.

- In the case of a development where the existing site is being **only added to** (and the existing developed component of the site is not going to experience change in traffic patterns or access to the road network), then the existing site traffic does not need to be removed from the network when establishing background traffic volume. If the development proposal involves changes to access points that will affect the road network, then it is necessary to re-assign the existing site traffic on the road network when establishing background traffic conditions.
- In the case of a redevelopment where the current land use is being **replaced or modified** by a new land use, then it is necessary for all site traffic to be removed from the network in order to establish the background traffic conditions.

4.2 Growth and Horizon Years

For projecting future traffic volumes, the (simple) growth rate method may be used, unless otherwise indicated by City staff. In certain cases, City staff may require that the build-up method (or similar) be applied, in order to account for the impacts of concurring major developments in close proximity.

The City generally requires that a Level 2 TS establish background traffic volumes for two scenarios: (1) opening day and (2) a horizon year. The horizon year is typically chosen to be 5 years following the opening day, but a 10-year horizon may be required depending on the magnitude of the development. If the development will be completed in phases, multiple horizon year analyses will be required. In those cases, the TS should include details regarding the phasing schedule and projected date for full

build-out. Regardless of whether the project involves multiple phases, all horizon year assumptions should be confirmed with City staff prior to proceeding with the analysis.

4.3 Operational Analysis-Future Background Traffic

The consultant must complete a multi-modal operational analysis using background traffic volumes developed for both opening day and the horizon year. The outcome of this analysis will be used subsequently to detect impacts on the transportation system resulting from the addition of development traffic.

> **The operational analysis of future background traffic volumes must follow the same procedures outlined in Section 3.3 for existing traffic.** The multi-modal approach for analyzing traffic performance must be followed. All supporting documentation from Synchro must be provided, and a textual summary of analysis highlights should be included in the TS.

5. FUTURE DEVELOPMENT CONDITIONS

The Level 2 TS guidelines require that all methods and assumptions used for traffic demand forecasting be in accordance with standard ITE techniques and based on local parameters. City staff strongly encourages consultants to confirm any assumptions at any point in the process of preparing a TS. This facilitates the study process, and ensures that the numerous assumptions required for this analysis are consistent with local practice.

5.1 Trip Generation

The City of North Vancouver is a compact municipality and records a high level of active transportation in many areas. As such, care must be taken to ensure that appropriate trip generation rates are established for each development by using a multi-modal approach. Further details regarding Trip Generation requirements are provided in the Attachment, Section A.

5.2 Trip Distribution and Assignment

The traffic generated by the proposed development must be distributed and assigned to the road network in order to subsequently assess the overall impact. All assumptions regarding the distribution and assignment of trips must be documented within the TS. Further details regarding Trip Distribution and Assignment requirements are provided in the Attachment, Section B.

5.3 Total Future Traffic Volumes

The consultant is required to establish a set of turning movement volumes for the accesses and study intersections that provide the best estimate of conditions on opening day and the horizon year(s). The total traffic volumes constitute the sum of background traffic plus development traffic, and must be illustrated in map format. Traffic volume sets for the applicable peak periods must be developed for the following scenarios:

- Total traffic volume on opening day;
- Total traffic volume for the horizon year(s); and
- Total traffic volume for each intermediate phase (where applicable).

5.4 Operational Analysis – Total Future Traffic

The consultant must complete a multi-modal operational analysis using the total traffic volumes developed for both opening day and the horizon year(s). The outcome of this analysis will detect impacts on the transportation system resulting from the addition of development traffic.

> **The operational analysis of total future traffic volumes must follow the same procedures outlined in Section 3.3 for existing traffic**. The multi-modal approach for analyzing traffic performance must be followed. All supporting documentation from Synchro must be provided, and a textual summary of analysis highlights should be included in the TS.

6. ACCESS AND CIRCULATION REVIEW

The City requires that all traffic interaction at the point where the development site joins the transportation network be reviewed. The purpose of this component of the TS is to determine how safe and efficient traffic operations can be achieved at each site access point for each mode. The ultimate goal is to minimize the impact of new access points on the existing network, while allowing traffic to flow to and from the site as efficiently as possible.

The access review should generally include the following components, with additional site-specific reviews required as needed.

- A discussion of vehicular capacity and performance indicators (such as queuing) at the access points for all movements.
- A discussion of how the geometric aspects such as laning, visibility and overall positioning of the accesses relate to each type of user. In particular, there should be focus on ensuring that the needs and safety of active mode users (who are most vulnerable) are not compromised by efforts to facilitate vehicular traffic.
- An assessment of the locations of proposed accesses in relation to nearby intersections.
- An assessment of sight line visibility at accesses.
- A discussion of how any (future) infrastructure for cyclists in the area relates to the proposed site accesses.

Truck Access and Loading

The access and circulation discussion must also summarize the proposed loading arrangements for the types of commercial trucks that will make regular trips to the site (for example store deliveries, waste collection, moving trucks). The TS must demonstrate the turning paths for the largest vehicles that will access/exit the site through the use of turning templates. The proposed loading configuration must not impact the external transportation network and it must ensure that safe conditions are being provided within site for all circulating modes.

Site Circulation

The on-site circulation also needs to be reviewed from the perspective of efficiency and safety. This review must identify any unusual elements of the site layout that require extra attention, and comment any potential issues. The circulation review should examine internal flow within the site for all modes, and ensure that the external transportation network will not be adversely impacted by any internal friction (such as awkward parking space layout and poorly functioning internal intersections).

7. PARKING REVIEW

The parking review component of the TS should generally address the issue of parking proposed versus how much is required per the City's bylaw. The City promotes active modes of transportation in order to reduce dependency on cars for everyday trips. Given the relatively high density of the City and the availability of transit service, reducing the parking requirement (below the minimum bylaw requirement) for new developments generally results in fewer car trips. Therefore, the City occasionally endorses a reduction in parking spaces with new developments, in lieu of a commitment towards Transportation Demand Management (TDM) strategies. The developer should discuss with City staff whether the development site is a candidate for reduced parking.

A parking occupancy survey should be completed:

- For the length of the block of all block frontages with a portion of the block within 400m from the proposed development.
- at the following times:
    - Weekday – Daytime (9am to 11am 0r 2pm to 4pm)
    - Weekday - Overnight (9pm or later)
    - Sunday – Daytime (9am to 4pm)

A record should be made of the parking restrictions on any surveyed blocks.

In addition, the TS must identify whether the development will result in a reduction in on-street parking supply. On-street parking is highly utilized in many parts of the City, and any possible impact of the proposed development on the on-street parking need to be reviewed. If necessary, options for mitigating the parking loss should be recommended. The parking review should also recommend measures to reduce vehicle idling in accordance with the Cities anti-idling bylaw.

8. TRANSPORTATION DEMAND MANAGEMENT

Transportation Demand Management Strategies may be considered by developers to reduce car trips to the site. In the context of trip generation, the developer may (subsequent to City staff approval) be able to apply a reduction to the vehicle trip estimates, provided that adequate long-term TDM commitments are confirmed. By reducing the number of car trips to the site, the overall impact on the transportation network is less and the parking supply can also be reduced.

For developments where TDM strategies are proposed as a tool to reduce car trips, the TS must outline the exact measures committed by the developer. The TS must describe quantitatively how the TDM strategy will accomplish the desired trip reduction; including the mechanism (for example, development covenants) for ensuring its long-term success.

Some examples of successful TDM measures include:

- Car-sharing programs;
- Employer-initiated flexible work arrangements;
- On-site parking reduction;
- Pedestrian improvements that would encourage more walking trips;
- Bicycle improvements that encourage more bike trip, such as destination facilities;
- Transit pass programs;
- Transit signal priority measures; and
- Converting unassigned parking spaces into pay-parking.

9. FINDINGS AND RECOMMENDATIONS

Findings

Based on the analytic findings compiled within the TS, the consultant must highlight how the proposed development will impact the transportation system. This discussion should include both operational issues revealed through the Synchro analysis as well as other multi-modal issues related to the site interface with the surrounding network.

Recommendations

The TS should then recommend engineering measures, where required, that would mitigate any adverse impacts on the transportation system. Recommended mitigating measures should be investigated from a multimodal perspective, to ensure that the needs of active mode users are not compromised by efforts to improve vehicular operations and safety.

For locations with high vehicular traffic, potential mitigating measures could include incorporating pedestrian countdown signals, audible signals, pedestrian refuge islands, corner bulges, bike boxes, bike push buttons and marked crosswalks on all approaches. In general, any other innovative safety features that encourage pedestrian and bicycle activity and safety requirements should be investigated.

The recommendations should take into consideration any future planned transit improvements (per TransLink's long-term infrastructure priorities list) that would be affected by the new development traffic. This could help determine whether the proposed development justifies reprioritization of specific future transit improvement projects.

10. CONCLUSION

A concluding section at the end of the TS is suggested, in order to provide a brief overview of the report outcome.

Attachment

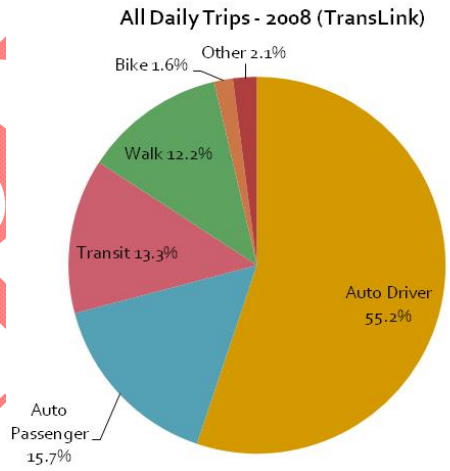
Section A: Trip Generation Requirements

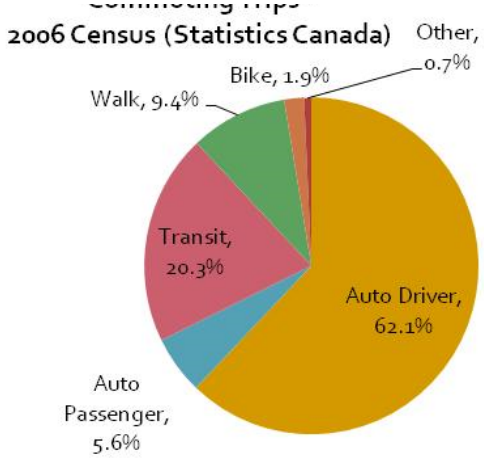
Where necessary, overall trip generation rates may be based on information from The *Trip Generation Manual*, 8th Edition, published by the Institute of Transportation Engineers (ITE). However, since the City generally has a lower auto mode share than most of the sites used to develop the ITE rates, it is preferable to rely on locally developed (or Metro Vancouver) rates or proxy site surveys.

A.1 Multi Modal Approach

Various methods are available for estimating trips for non-auto modes. Methods range from proxy site surveys or interviews for predicting modal choice, to utilizing travel mode statistics. Since many assumptions and approaches are possible, the method proposed for the TS should be verified with City staff.

In general, in the absence of relevant proxy site survey data, The City's preferred methodology for estimating multi-modal trips involves utilizing local data collected by Statistics Canada (census data) or TransLink (trip data) to adjust total trip estimates. These data sources provide a general snapshot of transportation mode choice (for the entire City as well per neighbourhood, in certain cases). The 2008 TransLink mode shares (top right) account for ALL trips made by City residents; whereas the 2006 Census data (bottom right) account for only commuting trips.





Using this method, transportation mode choice statistics are applied to the overall trip generation estimates to distribute trips amongst modes. Since mode share and directional splits vary by land use and time-of-day, the mode share assumptions and resulting trips calculated must be separated for each component of a multi-use development. A detailed step-by-step summary in text and tabular format must be included in the report to document all assumptions and the logic supporting the multi-modal trip generation process.

A.2 Trip Reduction for Transportation Demand Management (TDM) Initiatives

As discussed in Section 7, there may be justification for reducing vehicular trip generation estimates to account for TDM measures that are incorporated into the development proposal. The level of trip reduction should be discussed with City staff to ensure that the TDM proposal is satisfactory.

A.3 Trip Reduction for Special Land Uses

In certain cases a development is expected to generate less vehicular traffic (and need less parking) than can be predicted using established trip and parking generation rates. Examples may include senior's housing, non-market housing, or similar. In these cases it may be appropriate to reduce the trip estimates and on-site parking supply, to recognize the unique attributes of the development. Staff should be consulted regarding any such assumptions prior to proceeding with the analysis.

A.4 Pass-by Traffic and Internal Trip Capture Analyses

These components may be appropriate as part of the trip generation work. The need to include a pass-by analysis or internal trip capture analysis to reduce trip estimates is determined based on the magnitude and composition of each development. Where required (per City staff consultation), standard ITE methods for judging pass-by traffic and/or internal trip capture must be adhered to. All assumptions and the resulting trip estimates from this analysis must be clearly documented in a tabular format.

A.5 Trip Comparison

For a development that requires re-zoning, subdivision or OCP amendment, a table comparing the proposed land use and the currently permitted land use must be included. This table should indicate the potential trip generation for all land uses assuming the lot is developed to its maximum density.

Section B: Trip Distribution and Assignment

B.1 Trip Distribution

The consultant must determine how the site traffic will be distributed within the development's area of influence. The proposed distribution must be depicted in percentages for each direction of travel in a map and/or table. The traffic distribution process should be based on experience, judgement and knowledge of local conditions, using gravity model principles where possible. The distribution of trips needs to consider the following:

- The type of development and its market area;
- Competing developments in the local area (where applicable);
- The size of the development;
- The surrounding land use and population;
- Existing traffic patterns; and
- The relative attractiveness of the local transportation network links.

B.2 Traffic Assignment

The consultant must determine the amount of traffic that will use certain routes on the transportation network. The traffic assignment process must follow a multi-modal approach: each land use and each travel mode should reflect a unique traffic assignment. The TS needs to include maps depicting traffic assigned to the road network for all scenarios (by mode, by land use, and by time period). The assigned traffic must then be summed for the various land uses and time periods, with the data illustrated in summary maps.