NEIGHBOURHOOD TRAFFIC PLANS
- A PLANNING APPROVALS PROCESS

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1.0 ABSRACT

Canadian municipalities are recognizing the merits of conducting formal traffic management reviews of proposed development plans to avert potential traffic calming concerns, particularly during the planning process. Traditionally, traffic impact assessment of development has focused primarily on travel forecasting, traffic assignment and capacity analysis. Through wise application of traffic engineering principles in subdivision planning, traffic calming measures can either be avoided or introduced in a variety of ways that don't create regrettable operating conditions or costly precedents.

In the year 2000, staff of two municipalities in the west of the Greater Toronto Area separately resolved to systematically troubleshoot development plans to prevent or mitigate potential transportation operational impacts from being built into development. They recognized that draft planning of subdivisions was lacking in traffic planning and impact assessment reporting while servicing studies and storm water management planning was well established.

Recognizing the different technical complexities and planning requirements associated with the various stages of development approval, a two-tiered traffic management review process was developed. The first level of review established the planning principles that, where possible, preclude the need for traffic calming

Performing the transportation review is critical to ensuring that the future operating conditions on roadways in the plan and on adjacent streets are predictable and acceptable. This level of review has the greatest influence on future traffic safety. In some jurisdictions the required documentation is referred to as a Safety Impact Study (SIS). The documentation provided at the draft plan and at the engineering drawing stage is comprised of a Traffic Management Plan (TMP) and report documentation for the development.

The benefit of a traffic planning review is that, if required, all traffic management measures can be designed and in place as a community is built. In this way, the prospective homeowners are apprized of the proposed traffic measures that are necessary to ensure desired operating conditions in their community. Residents can be assured that the street system has been thoroughly checked to avoid potential operating deficiencies.

The development review guidelines herein place an emphasis on traffic equal to servicing studies, stormwater studies and noise studies to achieve a balanced assessment of all planning criteria. This is not a 'recipe' for how to prepare a subdivision plan so that traffic safety and efficiency are maximized. Instead, the document guides staff and proponents to principles and considerations that are essential when developing modern street systems. It is assumed that proponents have knowledge of standards and how to apply them specific to each site.

Other municipalities using this document have found it convenient to separate the review checklists from the report to be used as stand-alone references for day-to-day use by staff. In this way, implementation of the recommended planning and design principles can be tracked throughout the review process. The checklists are also designed to aid staff in replying to consultants' submissions. In almost all cases, the first submission of the traffic management plan will identify the major traffic planning issues that need to be discussed and addressed in subsequent submissions.

2.0 INTRODUCTION

In the year 2000, staff of two municipalities in the west of the Greater Toronto Area resolved to systematically troubleshoot development plans to prevent or mitigate potential transportation operational impacts from being built into development. They recognized that draft planning of subdivisions was lacking in traffic planning and impact assessment reporting while servicing studies and storm water management reporting was well established.

Traffic management planning became part of the draft submission package for proposed residential developments. The review process prescribed herein while absorbing time and cost initially can save costly review time from repetitive submissions. The following traffic planning aspects are therefore reviewed to ensure balanced efficient transportation service internal and external to new development.

a) Traffic impact of development on surrounding communities and study area roads.
b) Projected traffic patterns internal to the development.
c) Land use, road class and geometric (both horizontal and vertical) elements in the establishment of their road patterns and lot fabric.
d) Traffic controls necessary to anticipate and alleviate problematic areas.
e) Pedestrian crossings and associated elements located to minimize conflicts.

The following is intended to be a guideline for the development review process. The detailed standards to be applied in any planning or design exercise are not prescribed in detail in this guideline. There are no shortage of technical references for this purpose; however, the application of technical principles applied in a timely co-ordinated fashion can mean the difference between discovering a problem after build-out, to anticipating and resolving a problem during the planning process – a much less costly affair. Studies related to the traffic management planning process include corridor management plans (urban design, streetscape and access) and secondary planning area studies.

3.0 APPLICABLE STANDARDS AND GUIDELINES

Road networks that serve the current trend of low-density development are planned and designed according to the function of each class of roadway – whether it is traffic service, local access or a balance of both. Implementation of a roadway hierarchy of arterials, collectors and local streets requires prudent planning that recognizes the operational outcomes of altering the basic function of each roadway in the hierarchy.

A successfully planned road network will have each roadway facility operating according to its planned functioning to the extent that operating characteristics are predictable and match the expectations of drivers and roadside users. When roadways fail to server their intended function the resulting operating conditions can include operating speeds deviating from design criteria, inefficient movement of traffic, poor accessibility, increased crashes and poor pedestrian service. A balanced road network accommodates all users but allocates capacity and access according to desired classification.

Although much of the need for traffic calming has been attributed to negligent driver behaviour, the degree to which the roadway design contributes to inordinate speeds and traffic volumes, particularly for local streets, is becoming more widely recognized. Nevertheless, adherence to common road design standards and operating criteria is essential to promote uniform, safe and cost-effective operation and maintenance and predictability for all users.

The typical roadway planning and design standards that municipalities subscribe to are referenced as follows:

- Design Criteria, General Information, Checklist for Subdivision Design (this document is likely to be amended to include the checklists contained in this report)
- Design Criteria – Roadways
  - Street Classification, Roadway Cross-sections, Geometric Design Elements, Design Elements, Pavement Design, etc.
- Design Criteria – Signs
- Design Criteria – Street Lighting
- Site Plan Manual (primarily for commercial development)
- Geometric Design Guide for Canadian Roads, 1999 Edition, Transportation Association of Canada
- Canadian Guide to Neighbourhood Traffic Calming, TAC/ITE, December, 1998

Traffic capacity studies undertaken for developments in the GTA commonly employ the following typical references:

- EMME\2 travel forecasting model
- Transportation Tomorrow Survey Data (origin/destination surveys)
- Trip Generation, 6th Edition, Institute of Transportation Engineers

4.0 A TWO-LAYERED PLANNING AND ENGINEERING REVIEW

In order to preserve transportation system capacity and to provide safe and efficient use of streets, a systematic processing of development plans is required. For this process to be useful in mitigating 'built-in' traffic problems, it must prescribe these elements:

- The components of development plans that require examination,
- The level of technical review required, and
- The appropriate timing of the review.

4.1 DRAFT PLAN REVIEW

Recognizing the different technical complexities and planning requirements associated with the various stages of development approval, a two-tiered traffic management review process has been developed. The first level of review would establish the planning principles that, where possible, preclude the need for traffic calming. This review considers elements such as:

- Street pattern,
- Street function/classification
- Right-of-way
- Lane configuration
- Uninterrupted length of streets,
- Horizontal and vertical curvature,
- Intersection spacing,
- Type of traffic control,
- Intersection daylighting, and
- Elements that cannot be easily altered following Draft Plan approval.

A component of the assessment of a proposed road network is the review of link and intersection capacity to establish lane requirements and intersection configuration. This applies to streets internal to the development but also to existing external streets affected by traffic generated from the proposed development. The need for a traffic impact assessment report at the Draft Plan stage is to be determined by

staff. The decision will consider the size or density of the development and the potential external intersection and roadway impacts, particularly when a project might impact an already congested or high crash location. Generally 100 new peak hour trips is a practical guideline to determine the need for a traffic impact study. Appendix D provides a checklist of information requirements for a typical traffic impact report.

4.2 ENGINEERING PHASE REVIEW

The second level of review and documentation would occur at the engineering drawing stage. This detailed review includes but is not limited to identification of:

- Traffic control signage,
- Pavement marking,
- Parking restrictions, and
- Design of any traffic calming measures.

The review occurring at the engineering drawing stage will require added detail on the original Traffic Management Plan showing the original concepts 'fleshed' into design detail, cross-sections, pavement marking and traffic signage. This plan, together with by-law appropriate documentation, will constitute the permanent traffic control and operating plan for the proposed development.

The sum of these two parts is called a "Traffic Management Plan". The development and identification of this information and proposed traffic control features, unique to the specific development, are mandatory to systematically assess the future operation of a planned street network.

4.3 THE IMPORTANCE OF TIMING

Performing the transportation review at Draft Plan stage is critical to ensuring that the future operating conditions on roadways in the plan and on adjacent streets are predictable and acceptable. This level of review has the greatest influence on future traffic safety. At this stage the review must identify whether capacity improvements to existing intersections or traffic calming measures are required and the anticipated conditions that will constitute a traffic management concern when the development is built-out.

The benefit of review and initial design at the Draft Plan stage, and subsequent final design at the engineering stage is that, if required, all traffic management measures can be designed and in place as a community is built. In this way, the prospective homeowners are apprized of the proposed traffic measures that are necessary to ensure desired operating conditions in their community. Residents can be assured that the street system has been thoroughly checked to avoid potential operating deficiencies.

5.0 TRAFFIC MANAGEMENT PLANNING PRINCIPLES

The methodology for identifying potential traffic management problems in a subdivision planning context is primarily qualitative at the Draft Plan stage. A first principles approach is employed to determine whether sound transportation planning principles are being applied. The review must draw on such references as the "Canadian Guide to Neighbourhood Traffic Calming", "Transit Supportive Land Use Guidelines", industry prescribed traffic engineering principles and local official plan, coupled with an understanding of the functional classification of streets in a roadway hierarchy.

During the traffic management review of Draft Plans, the development street network and its subcomponents are evaluated for the degree to which they adhere to the criteria for street function. In some jurisdictions, this principle is becoming known as 'sustainable road safety' and is facilitated through the rationalization of a street pattern. Where street components are found lacking in adherence to desired

function, measures are recommended to mitigate the anticipated problems. The more closely a street is designed to comply with its intended function, the less likely it is to contribute to undesirable operating conditions.

The proposed planning principles to be applied in the review of development plans are as follows:

- Review the distribution of land uses such as commercial and institutional blocks with respect to accessibility by all modes and connectivity to user origins and patterns.
- Have regard for the requirements of relevant zoning components of the proposed land uses, e.g. sight distances and clearances.
- Work with the developers to provide street designs that minimize infiltration traffic and encourage reduced vehicle speeds by proactively applying traffic planning principles.
- Review adjacent development to ensure that road patterns will not encourage commercial or residential traffic to infiltrate a residential area and that institutional traffic is minimized.
- Review proposed school sites and proposed student catchment areas to ensure minimal conflict with arterial road systems (i.e. crossing guard locations).
- Ensure that school sites are large enough to contain all required parking including provision for acceptable student delivery and pick up area(s).
- Review impact of the proposed subdivision on adjacent road network and neighboring developments.
- Establish a preliminary Traffic Management Plan to identify traffic operations concerns that might be eliminated or minimized through a design modification or introduction of traffic calming measures. Where necessary, provide a preliminary location and identify candidate traffic calming treatments for consideration at the subsequent engineering review.
- Identify any potential traffic or physical modifications that might be required to adjacent roads as a result of the new development (road widening, traffic signals, signs, road closures etc.)
- Locate traffic controls, pavement markings, any traffic calming devices and traffic control signage identifying any unusual or non-standard conditions requiring special attention.

6.0 TRAFFIC CALMING IN NEW DEVELOPMENT

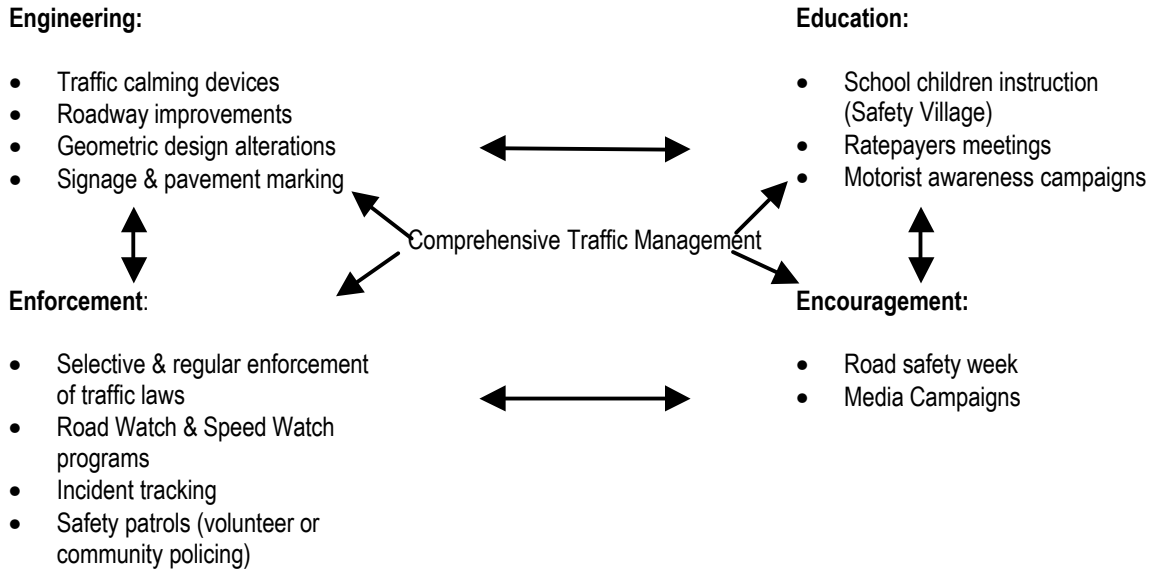
Municipalities have begun to implement traffic management measures in new subdivisions to anticipate and prevent potential traffic safety related problems from developing. When guidelines for traffic calming were first developed, the aim was to study and document existing problematic conditions that require retrofitting of traffic calming measures. The recently published The Canadian Guide to Neighbourhood Traffic Calming (December 1998) was developed with this intent, i.e. *"The purpose of traffic calming is to restore streets to their intended function".* A further benefit becoming widely accepted in some communities, e.g. the former City of York, is the aesthetic benefits of some traffic calming devices in areas such as crosswalks and boulevards.

Reducing the negative effects of automobile traffic such as excessive speed, particularly on residential collector and local streets for new development, requires evaluation of a street system by individuals with both planning and operations backgrounds. The process for new development is even less scientific than for retrofit situations. Given the fact that most of the published guidelines have not established thresholds or warrants for installation of traffic calming devices, traffic calming for new development must be applied with caution to avoid miss-use of devices. A maxim of traffic management is that non-warranted use or miss-use of traffic control devices results in non-observance by motorists.

Traffic calming devices are to be used sparingly at selected locations based on a review of need and operational impacts. Use of devices must recognize the potential for inordinate traffic displacement to adjacent streets. A sample listing of several types of traffic concerns and their probable causes is tabulated below.

TRAFFIC CALMING CONCERN	PROBABLE CAUSES
Excessive speed: Excessive speed constitutes a traffic calming concern, as motorists are less able to stop safely if confronted with conflict situations such as a child darting into the street. Other safety concerns about speed relate to driveway ingress, egress and cyclists. Speed is also a contributor to road noise and detracts from the livability of a neighbourhood.	Unacceptably high operating speed on local roads can be attributed to long, straight and unimpeded sections of road (200 to 300m) available to the motorist. Motorists select operating speed based on many factors including lane width, clear zone, intersection sight, presence of parked vehicles and sidewalk setbacks. These factors influence a motorist's perceived risk of a collision, which in turn influences their choice of speed.
Excessive traffic volumes and/or traffic infiltration: High traffic volumes multiply the potential for traffic conflicts in a neighbourhood. Excessive volumes cause delays and increase safety risk to pedestrians, cyclists and motorists accessing driveways. Undue road noise is also a by-product of excess traffic volumes. Through traffic often travels at higher speeds than local traffic on local streets.	A poorly developed roadway hierarchy that allows local streets to connect to arterials or the absence of a collector road can create opportunities for neighbourhood traffic infiltration. Conversely, imposing too many controls on a collector road may encourage use of alternate local streets to bypass delay and conflict areas.
Potential conflicts, vehicle-vehicle and vehicle-pedestrian: Pedestrian-vehicle conflicts are of utmost concern in school and park areas where close adult supervision is not always available. Vehicle conflicts contribute to higher collision rates, personal injury and property damage.	Geometric deficiencies such as sight lines, offset intersections, access location and location of on-street parking can exacerbate conflict potential between various street users.

The above list of possible mitigation measures require mainly physical treatments to mitigate their effects. Wise traffic managers subscribe a balanced approach that employs the four E's in developing solutions to traffic concerns. A model for comprehensive traffic management recognizes the role of technical and non-technical elements and the interaction of stakeholders and administrators through the planning design and operation of infrastructure. The figure below illustrates the role and interaction of the four principles of traffic management problem solving. In practice, applying the four (4) E's of Engineering, Enforcement, Education and Encouragement will afford the most balanced and cost-effective approach to neighbourhood traffic management.



Successful traffic management requires inputs from each of the functions. A limited amount of activity in one function cannot be compensated for by increased activity in another function. Traffic calming and red-light cameras are examples of where one function has had to compensate for deficiencies in another. Motorists must take responsibility for their actions through education and enforcement since engineered solutions cannot completely compensate for lack of either element.

While the education of drivers, enforcement and encouragement elements of a balanced traffic management program are primarily the municipal responsibility, proponents of new development have a responsibility with their municipal counterparts for the engineering input.

6.1 SELECTION OF TRAFFIC CALMING TREATMENTS

The primary function of residential local streets is to provide access to adjacent properties. Residential local streets are not intended for use as through routes or to by-pass congested arterial intersections. In a similar way, but with a greater emphasis on the automobile, residential collector streets function properly when access to adjacent properties is balanced by the need to collect and distribute residential traffic travelling into and out of a neighbourhood.

In the specific application of traffic calming to built developments, The Canadian Guide to Neighbourhood Traffic Calming further documents the conditions for selection of traffic calming treatments. Since 1999, many Canadian municipalities have begun to subscribe to the Canadian Guide to Neighbourhood Traffic Calming. The appropriateness of traffic calming treatments for new development at a planning stage must be thoroughly examined. Traffic calming treatments must be applied with caution, recognizing the risk that inappropriately applied measures may be negatively perceived and result in undesirable or unaffordable precedents.

It is neither practical nor possible in every case to avoid potential traffic management concerns being raised by residents since the complaints of high speeds and volume of traffic can at times be based on perception. In such cases other measures such as Road Watch, radar message boards and additional enforcement are preferred over imposing more costly physical roadway restrictions.

7.0 DEVELOPMENT REVIEW CHECKLISTS

In order to streamline the transportation review processes, create a traceable and systematic method of assessing development plans, a two-stage review is proposed. It will be comprised of the tasks identified in Appendices A, B and D. The detailed checklist documentation is summarized below.

7.1 DRAFT PLAN REVIEW

- Complete a planning review checklist for review of Draft Plans of subdivision including: the need for a capacity review, traffic calming measures, school site traffic controls, intersection spacing, roadway hierarchy that precludes overloading and infiltrating traffic, daylighting, right-of-way, etc.
- A traffic impact assessment may also be required of the development subject to municipal adopted guidelines (Master Transportation Study).

The documentation of this review will be comprised of a Traffic Management Plan and accompanying letter report documenting the proposed traffic management concepts and traffic impact mitigation measures. Geometric design and traffic calming concepts will be identified in principle for further detailing at a subsequent stage. The Traffic Management Plan may be combined with the Traffic Impact Assessment in cases where external intersections are affected by the development.

Planning review guidelines are prescribed for all classes of roads including those under upper tier municipalities. An overall integrated review is necessary because the system itself is seamless and integrated. While some of the checks and reviews may overlap jurisdictional divisions, it is prudent to have one agency oversee the co-ordination of transportation comments. It is understood that through the transfer of approvals, municipalities are already taking on added responsibilities in planning reviews.

7.2 ENGINEERING DRAWING REVIEW

The processing of engineering drawings with regard for traffic impact pertains to the implementation of principles and concepts articulated in the Draft Plan review Traffic Management Plan. The process is summarized as follows:

- Undertake an engineering review using a checklist of items required with the submission of engineering drawings including: design of traffic calming measures, pavement marking and traffic signage, intersection traffic controls, channelization, traffic roundabouts, etc.
- Document the requirements for traffic controls, pavement markings, traffic calming, parking and warning signage on a Traffic Management Plan.

7.3 CONTENTS OF THE TRAFFIC MANAGEMENT PLAN DOCUMENTATION

This document is to be prepared in two stages – Draft Plan submission and engineering drawing submission. The Draft Plan submission is comprised of a letter report with a concept plan that shows the through street and stop controls, traffic signals and potential traffic calming features. The letter report rationalizes the proposed traffic management and documents the treatment of any unusual circumstances identified during the review. Where standards can't be met, the proponent must rationalize and document the exceptions using 'first principles' and industry accepted techniques.

An example of a Draft Plan Traffic Management review is contained in Appendix C.

Traffic calming measures, as well as all required traffic control and warning signs, and pavement markings, form an overall "Traffic Management Plan" developed for each specific development proposal. When possible, this Plan would be developed in concert with adjacent development plans to ensure compatibility with the neighbouring road networks. In addition, the Traffic Management Plan ensures the traffic flow and capacity requirements for the area are maintained.

The Traffic Management Plan shall be developed consistent with the Manuals of Uniform Traffic Control Devices for Ontario and Canada, using accepted Traffic Engineering principles for establishment of signage and pavement markings.

APPENDIX A

DRAFT PLAN SUBMISSION CHECKLIST

File No:_____ Submission No._____ Date:_____ Reviewer:_____

GENERAL PLANNING PRINCIPLES

During the draft plan traffic management review, the development street network and its subcomponents are evaluated for the degree to which they adhere to the criteria for street function. The best defense against traffic infiltration, unacceptably high vehicular speed and excessive traffic volume on neighbourhood streets is a well planned road pattern based on a functional hierarchy whereby each class of road is designed to operate according to its desired function. The underlying goal of this approach is to minimize violation of driver and pedestrian expectancies. At the earliest stages of road network planning review, the layout of streets and intersections is critical to achieving this objective.

The objectives of a draft plan review are to address the following transportation related criteria reflecting balanced transportation service to all users and modes of travel. At the draft plan stage, the road pattern, traffic controls and accesses are set leaving only detailed engineering design issues outstanding.

- Mitigate traffic impact by the development on surrounding communities.
- Predict traffic patterns internal to their development
- Provide street designs that minimize infiltration traffic and encourage reduced vehicle speeds by using accepted traffic planning principles.
- Review adjacent land uses to ensure that road patterns will not encourage commercial or residential traffic to infiltrate a residential area and that institutional traffic is minimized.
- Review proposed school sites and proposed student catchment areas to ensure minimal conflict with arterial road systems (i.e. Crossing Guard locations)
- Ensure that school sites are large enough to contain all required parking including provision for acceptable student delivery and pick up area(s).
- Review pedestrian desire lines to ensure sidewalks are appropriately located.
- Identify sidewalk requirements on roads abutting the subdivision for external pedestrian traffic to external schools.
- Formulate a preliminary Traffic Management Plan for the entire development not just the proposed phase. The plan, at a conceptual stage will identify traffic management controls necessary to alleviate problematic areas that can be eliminated or minimized through a modification of street layout or lotting or by introduction of traffic calming measures. Where appropriate, the Traffic Management Plan will identify preliminary locations and candidate traffic calming treatments for consideration at the engineering phase.
- Identify any potential traffic improvements/modifications that are required to adjacent roads as a result of the new development (road widening, traffic signals, control signs, road closures, sidewalk connections, etc.).
- Identify the need for pedestrian crossings and associated elements on external streets abutting the development.

The proponent must rationalize and document instances where normally accepted standards cannot be adhered to. With regard for traffic impact assessment, commercial development or large residential blocks generating >100 trips per hour, staff may elect to request a report documenting the forecast traffic, development related traffic impacts and recommended mitigation measures. Consideration for where the 100 or more trips occur is also significant. In some cases where less than 100 trips will add considerable new traffic to an existing congested intersection, a traffic impact study is warranted. This report may be combined with the Traffic Management Plan.

APPENDIX A

DRAFT PLAN SUBMISSION CHECKLIST

This checklist does not provide the detailed technical standards to which the proponent must adhere. Instead it guides the reviewer to the proper timing and co-ordinated application of planning principles to reinforce the effectiveness of applying technical standards.

SUBMISSION REQUIREMENTS

The contents of the draft plan submission pertaining to transportation shall include but not be limited to the following items. The Traffic Impact Assessment Report will be used as a reference for traffic capacity and circulation.

	YES	NO
1. A preliminary Traffic Management Plan at a size or scale sufficient to illustrate the road pattern, right-of-way and lotting.		
2. Identify the road classification and design speed of all roads on the plan using local and regional official plan designations. Indicate lane configurations, at intersections as per the Traffic Impact Study recommendations.		
3. Show the designation of through streets, stop controlled intersections (two-way or all-way) and location of traffic signal controlled intersection(s).		
4. Diagram, schematically, any locations on the plan that are candidates for traffic calming measures (physical changes in pavement width and profile).		
5. Show internal/external pedestrian patterns and preliminary schematic location of sidewalks		

DETAILED REVIEW

A) General Street Pattern

	YES	NO
1. Does the road pattern conform to the local and regional Official Plans? • Is the roadway hierarchy well established such that the street pattern reflects connectivity to ensure gradation of traffic function from local to arterial, i.e. will each street function according to its O.P. classification – right-of-way volume, speed, access spacing, geometry?		
2. Is there a need for road allowance widening(s) on adjacent roads to meet O.P. standards?		
3. If the plan is to be phased, is there adequate access to prevent excessive traffic on inappropriate classes of roads.		
4. Are secondary (emergency) access roads required during phased construction of the plan?		
5. Is the overall subdivision layout conducive for the movement of children to the area schools? In this regard, close contact must been maintained with the school boards with respect to proposed boundaries for existing and new schools. Arterial roads must be used when establishing school boundaries to avoid having students cross an arterial street or require the assistance of a crossing guard.		

DRAFT PLAN SUBMISSION CHECKLIST

6. If more than 100 units are located on a cul-de-sac or enclave, is there alternate emergency vehicle access, e.g. easements?		
7. Ensure horizontal and vertical alignment geometry is appropriate for design speed (Municipal and TAC standards), and intersection locations to preclude sight deficiencies.		

B) Arterial Roads (Adhering to or satisfying these requirements does not preclude or imply that a review by Durham Region is not required)**:**

	YES	NO
1. Does intersection and access spacing and location conform to Regional O.P. criteria and TAC Geometric Design Guide Sections 3.2.9.8 and 3.2.9.9?		
2. Has access control been considered for high density or commercial sites contained as blocks in a subdivision plan? (Municipal or Regional criteria). Depending on the number of new trips generated (100 trips as a guideline), a traffic impact assessment study may be requested.		
3. Is there adequate setback of access from adjacent intersections (TAC Geometric Design Guidelines Manual Section 3.2.4.3)?		
4. Identify the lane configurations for affected intersections – storage, tapers and radii based on forecast traffic volumes. Are auxiliary lanes required based on speed and volume of turning traffic?		
5. Generally, local roads are not to intersect arterial roads. In most cases any exceptions to this would require approval by the Region as most arterial roads are under its jurisdiction.		
6. Ensure adequate intersection corner daylighting requirements based on type of traffic control, roadway approach angle, curvature and road allowance widths. (Municipal minimum corner daylighting 3m x 3m; TAC standards vary by the above criteria.)		

C) Collector Roads:

	YES	NO
1. What is the proposed traffic control at intersecting roads? Collector to collector intersections requires investigation of warrants for traffic signals or all-way stop controls. (Avoid all-way stop control by offsetting intersections or considering roundabout design.)		
2. Is commercial or high density access to the collector road proposed? (Review access spacing and location as per arterial guidelines above.)		
3. Ensure horizontal and vertical alignment geometry is appropriate for design speed (Municipal and TAC standards), and intersection locations to preclude sight deficiencies.		
4. Review length and connectivity of collector road and forecast traffic volumes to ensure future operating conditions don't exceed the classification of the roadway.		
5. Is width of pavement appropriate for forecast traffic and roadside conditions, e.g. on-street parking and transit requirements? Apply Municipal Standards for cross-section plus the		

parking and transit requirements? Apply Municipal Standards for cross-section plus the need for turn lanes that accommodate large vehicle turning paths at intersections.)		
6. Determine whether exclusive bike lanes or shared width bike lanes are required as per the Muncipal Leisure Trails and Bikeway Master Plan.		
7. Check sight requirements for driveways.		

D) Local Roads:

	YES	NO
1. Does the subdivision layout provide an isolated pocket that will result in pedestrians short-cutting through or across private lands?		
2. Confirm that the length of isolated street sections and specific courts do not exceed the maximum length of streets permitted before a secondary emergency access is required. In this regard it may be required to provide a temporary year round secondary access until additional phases are constructed. In some cases it may be required to have a permanent year round emergency access easement in the subdivision.		
3. Identify maximum walking distance to transit routes. <400m?		
4. Examine the uninterrupted length of local streets, i.e. through streets not interrupted by stop control or sharp curvature (candidates for traffic calming if over 300m+/- of roadway is straight and uninterrupted).		

SIDEWALKS AND PATHS

	YES	NO
1. Are walkways required to provide links to schools, parks, transit and/or street to street?		
2. Have sidewalk locations been established that reflect anticipated pedestrian patterns and crossing locations – internal and external destinations?		
3. Do any sidewalks terminate mid-block?		
4. Have "safe routes" been reviewed and addressed to all school sites that will be influenced by this subdivision, i.e. minimized pedestrian crossing of collector roads, and avoided midblock crossings?		
5. Consult with the Municipal Leisure Trails and Bikeways Master Plan for location and classification of on-road, greenways and off-road trails. Ensure that segments of trail created in the new plan can create close circuits or complete other trail loops.		

OTHER CONSIDERATIONS

	YES	NO
1. Determine whether residential access to corner lots can be permitted from the lot frontage, depending on minimum corner clearances and driveway sight requirements (if so at what point) or designate it to the side street.		
2. Can access to a high density site or commercial site be permitted to the arterial or collector street system, or will access to the local street be detrimental to local traffic operations? (Municipal or Regional)		
3. Is individual street access proposed to townhouses; if so, determine the impact to on-street parking in the neighbourhood and adjacent or opposite driveways or development at lower densities.		

APPENDIX B

ENGINEERING REVIEW CHECKLIST

TRANSPORTATION SERVICES REVIEW

File No:_____ Submission No._____ Date:_____ Reviewer:_____

GENERAL PRINCIPLES

The Traffic Management Plan prepared at the Draft Plan submission phase will be referenced in this review to ensure conformance in the engineering review. The objectives of the engineering review of traffic impacts are as follows:

- Traffic calming features, their design and location, must be consistent with sites elsewhere in the Municipal in accordance with the Municipal's policy and practice.
- Selection of traffic calming treatments will require consultation with Operations staff and design rationale documented in a letter report.
- Ensure driveway locations and drainage are not impacted by traffic calming measures.
- Review the preliminary school sites to ensure that access locations, grades and school crossings etc. are acceptable and that adequate on-site parking and student delivery methods are amply provided for.
- Provide a Traffic Management Plan for the proposed phase of development.
- Identify required traffic and subdivision by-laws to implement traffic controls (stop, parking, etc.) for the development.
- Finalize required traffic control measures and design modifications that are required to adjacent roads or in neighbouring developments, as identified at the draft plan stage.
- Provide geometric design details for improvements at external intersections.

SUBMISSION REQUIREMENTS - TRAFFIC MANAGEMENT PLAN

The contents of the engineering submission pertaining to transportation shall include but not be limited to the following items:

	YES	NO
1. A detailed Traffic Management Plan, typically the same size as the engineering drawings, showing the curb locations, right-of-way, daylighting and lotting.	☐	☐
2. Show the traffic controls and sign locations for: stop controlled intersections (two-way or all-way) and location of existing or future traffic signal controlled intersection(s) and pre-installation of signal underground equipment.	☐	☐
3. Provide final design of formal traffic calming measures including any proposed, turning circles, intersection channelization, raised medians, speed control devices, etc.	☐	☐
4. Provide details of any traffic impact mitigation measures such as access controls, road widening, lane tapers, turn lanes and medians, in plan and by cross-section.	☐	☐
5. Pavement marking, traffic warning, parking and street name signs located as per Municipal standards and the Ontario Traffic Manual.	☐	☐
6. A tabulated schedule of proposed traffic by-law provisions indicating parking and traffic control provisions suitable for attachment to a staff report to Council.	☐	☐

	YES	NO
7. Streets that are dead-ended on a temporary basis due to the phasing of the subdivision must not have driveways permitted off the end of the street.		

SIDEWALKS AND PATHWAYS

	YES	NO
1. Sidewalks generally are not to terminate in a mid-block location. A mid-block location of a walkway on a court may require a sidewalk from the cross street to the walkway but not to the end of the court.		
2. Sidewalks must be reviewed with respect to which side of the street they are to be provided on (one or both sides) and the proposed width.		
3. Courts normally will not require a sidewalk unless it provides pedestrian access to a high pedestrian generator such as a school, apartment block or active parks, or is part of a pedestrian linkage between streets or courts.		
4. Ensure that sidewalk stubs align on the opposite sides of the road. Particularly at "T" intersections, sidewalk stubs on one side of the street are not to lead to a driveway on the opposite side of the street. In such circumstances, modify or relocate the driveway away from the sidewalk stub.		
5. Pavement markings and signage must accompany bike path design.		
6. Transit stops must be accessible by sidewalk connections from collector roads.		
7. Consider locations of sidewalks between streets (on easement) or accessing commercial blocks (ownership, design, lighting and maintenance).		

OTHER CONSIDERATIONS

A) Postal Boxes (This normally is the responsibility of Canada Post, however, the Municipality should review the acceptance of proposed locations to ensure they will not create operational problems.)

	YES	NO
Are proposed postal box locations away from high conflict locations, e.g. pedestrian crosswalks, high volume intersections or in locations requiring crossing of a high volume road?		

B) Streetscape Treatments

	YES	NO
1. Determine if proposed plantings will affect operations such as snow clearing.		
2. Sight triangles at intersection and major driveways must be in accordance with Municipal by-law standards or TAC Section 2.3.3, whichever is deemed to apply.		

ENGINEERING REVIEW CHECKLIST

	YES	NO
3. Critical review must be given to tree planting avoiding the picket fence effect that trees create when planted too close together on the major street, in close proximity to a minor or other major street intersection.		
4. Review gateway/entry features for intersection sight requirements.		
5. Review planting locations that may impede sight to traffic control signs, e.g. foliage blocking view of a stop sign.		

C) Street Naming

	YES	NO
1. Ensure there are no duplications or confusing layouts such as courts intersecting courts or crescents that are not in fact crescents.		
2. In general terms, roads running north/south are identified as "streets" and roads running east/west are identified as 'avenues'.		
3. Review the Regional summary list of street names to avoid duplicate names.		

D) Future Traffic Signals

	YES	NO
1. Determine where traffic signals might be placed in the future and have underground duct and handwells placed to save future pavement disturbance.		
2. Any required detector loops should be saw cut at the time of traffic signal installation.		

E) Street Lighting

Street lighting is a major component of street design in any subdivision. While the classification of the road will normally dictate the street light design features to be used, each development plan must be reviewed to ensure the street light designs are correct for the specific facility. Alternative street light designs in subdivisions also need to be reviewed on a site-specific basis.

	YES	NO
1. Is street lighting required for a walkway or tunnel?		
2. Are there raised median treatments or physical features in the roadway that require lighting for motorists to avoid physical conflicts?		

(The street light design must be approved by the Municipality through its hydro-electric agent.)

Date

Municipality of…..

Attention: Development Approvals Co-ordinator

Dear Sir:

Re: Traffic Management Plan
Proposed Plan of Subdivision

Introduction

On behalf of developer client., we are pleased to present our findings of a preliminary Traffic Management Study for the above mentioned draft plan of subdivision. Our review methodology follows the Municipality's draft guidelines entitled: "Traffic Management of Development – A Review Process", August, 2001 and the "Canadian Guide to Neighbourhood Traffic Calming", TAC/ITE, 1999.

Recognizing the different technical complexities and planning requirements associated with the various stages of development approval, a two-tiered traffic management plan has been developed for the subject lands. The first level of review establishes the planning principles that, where possible, preclude the need for traffic calming. This review is now complete and has considered the following:

- Street pattern;
- Street function/classification;
- Right-of-way;
- Lane configuration;
- Uninterrupted length of streets;
- Horizontal and vertical curvature;
- Intersection spacing;
- Type of traffic control; and
- Intersection daylighting.

…2/

A component of the assessment of a proposed road network and lane configurations is the review of projected link and intersection volumes to establish lane requirements and intersection configuration. This applies to streets internal to the development but also to existing external streets affected by traffic generated from the proposed development. The need for a formal traffic impact assessment report at the Draft Plan stage is unnecessary. However, the traffic volumes have been generated to determine lane configurations, link volumes and required traffic controls.

Included in this review and documentation is the identification of the need for any traffic calming measures. This information is depicted on the attached Traffic Management Plan (Draft Plan Stage).

The subsequent engineering drawing stage will require added detail on the original Traffic Management Plan showing the original concepts 'fleshed' into design detail, cross-sections, pavement marking and traffic signage. This plan, together with by-law appropriate documentation, will constitute the permanent traffic control and operating plan for the proposed development.

Development Scope and Timing Assumptions

Developer X has proposed the development of approximately 360 single-family residential units located between Rossland Road and the future Kerrison Drive. One school block with an adjacent park is proposed within the subdivision. Access to the development will be provided via two intersections on Kerrison Drive and an intersection on Audley Road.

The development is expected to progress in two stages with approximately 190 units per year starting in 2003. External roadway infrastructure will accompany development in stages as discussed elsewhere in this report. Future phases of development outside the current draft plan are assumed to progress at approximately 200 lots per year. Therefore the lands south of Rossland Road and west of Audley Road will be substantially built-out by 2007. In terms of traffic forecasts, the 2007 horizon has been chosen to represent traffic and infrastructure conditions.

Proposed Street Pattern and Roadway Functional Classification

The roadway hierarchy is established such that the street pattern reflects connectivity to ensure gradation of traffic function from local to arterial. The rights-of-way volume, speed and horizontal alignment is shown on the attached TMP.

The short tangent lengths of the internal local street segments will result in reduced traffic speed and should contribute to more prudent operating speeds consistent with residential development streets.

…3/

The following table summarizes the road classification, posted speed limits and right-of-way, and anticipated pavement widths for both local and collector roads within the proposed subdivision.

STREET CLASSIFICATION AND FUNCTIONAL REQUIREMENTS						
Street	Road Class	Posted Speed	R.O.W. (m)	Paved Width (m)	Sidewalk	Traffic Class (ADT)
Kerrison Drive	Type 'C" Arterial	50 km/h	26	12.0	Both Sides	<12,000
Street 'A'	Collector	50 km/h	21	10.0	Both Sides	<3,000
Street 'B'	Collector	50 km/h	21	10.0	Both sides	<4,500
Street 'C'	Collector	50 km/h 40 km/h in school zone	21	10.0	Both sides	<4,500
All Others	Local	50 km/h	16.5	8.5	One Side	<1,000

The estimated traffic classes are based on the level of connectivity, which translates into the traffic loading and based on the density of development, which contributes to local traffic loadings. If a roadway hierarchy is well established and balanced, then traffic loadings will not be unbalanced such that any one facility carries flows above normal for its classification. The proposed network will result in traffic flows that are within the Transportation Association of Canada guidelines for each classification of roadway.

Collector Streets 'B' and 'C' are more lengthy subdivision streets extending north to Rossland Road, again in stages as development progresses northerly. The length and straight alignment of the two north/south collector roads suggests the need for mitigation of potential traffic speeding. Particularly in the school zone on Street 'C', traffic calming will be necessary to control speeds near the crossing locations. The TMP illustrates proposed traffic calming locations.

The type of traffic calming should consider horizontal features, not vertical deflections. A variety of measures are available and will be considered in consultation with Municipal staff at the engineering stage. A preferred treatment would be to narrow the pavement in the vicinity of a pedestrian crossing. Restriction of road width near the school access may also be necessary to avoid sight impediments.

Street 'D' has a roadway bend with a deflection greater than 90 degrees. The attached TMP shows the path of a 12 metre transit bus while providing for on-street parking on both sides of the roadway. The corner right-of-way and street layout is therefore satisfactory.

The Municipal horizontal alignment criteria have been adhered to in the proposed street layout.

Forecast Traffic Volumes and Lane Configurations

The traffic forecasts for the development plan and the surrounding lands were derived from ITE trip rates for residential development, together with traffic volumes forecast pertaining to the proposed racetrack and gaming facility on the lands south of Kerrison Drive. The attached Traffic Management Plan (TMP) illustrates the forecast average daily traffic volumes and turning movements at critical intersections for 2007, assuming a progressive build-out of the subject plan in phases progressing from south to north.

The vacant blocks designated as medium density are expected to generate commercial and residential trips. Medium density is based on 40 units per hectare for residential and 6 trips per 100 square feet based on 5,200 square feet of retail convenience commercial development. These blocks are assumed to be built out by 2007.

Without the proposed development, Kerrison Drive is expected to have a background traffic flow of 3,500 vehicles per day or 350 to 400 vehicles per hour in the p.m. peak period. This flow is below the guideline for this class of arterial, however, the termination of Kerrison Drive at Audley Road implies lower traffic volumes as compared to a continuous arterial road. Therefore, provision of one lane in each direction, plus turn lanes, will accommodate the projected future traffic flows up to 12,000 vehicles per day. A 12.0 metre pavement cross-section will be sufficient for this corridor east of Carruthers Creek.

Timing of External Road Improvements

The subdivision is reasonably served and accessible from the minor arterials of Audley Road, Kerrison Drive with further connections to Highway 2 to the south; and, to Rossland Road and Taunton Road to the north. Under the first phase of development existing conditions, access to Audley Road and Highway 2 will be through unsignalized intersections. The initial implementation of 190 lots ± will generate approximately 1700 vehicles per day or 170 vehicles per p.m. peak hour according to ITE trip generation rates. The Region advises that the Highway 2/Audley Road and Audley Road/Taunton Road intersections are not expected to be warranted for several years, except for future development traffic.

Improvements to Audley Road, south of Kerrison Drive and extension of Kerrison Drive west of Street 'C' and across Carruthers Creek are also not required to service the first 190 units in the subject plan. The first phase road limits are shown with solid street lines on the attached TMP. As the remainder of the 360 lots (dashed street lines) are implemented, improvements to Audley Road at Highway 2 including traffic signals and turn lane construction is recommended in the absence of the extension of Kerrison Drive across Carruthers Creek.

By 2004, the second phase of the Picov-Monarch Plan north of the current proposal is expected to commence which will require Kerrison Drive to be extended west to Carruthers Creek Drive. The Rossland Road/Audley Road intersection will require monitoring subject to the progress of other area developments such as in the A8-Hampstock development located in the southwest quadrant of the Taunton Road/Audley Road intersection.

As development progresses north along the west side of Audley Road, the upgrading of Rossland Road and Audley Road is expected to be underway by 2004. This will ensure that a good quality riding surface and appropriate intersection lane configurations are available consistent with the level of service afforded to existing developments elsewhere in the Municipality.

Intersection Spacing

Transportation Association of Canada guidelines for minimum intersection spacing have been adhered to in the preparation of this plan. The minimum separation distance afforded on the draft plan is 70m, which exceeds the TAC guideline of 60m. Based on the short length of local streets, the low volume of turning movements will preclude overlapping left turn movements.

Street 'A' is located 300m to the north of Kerrison Drive along Audley Road. Traffic signals are not anticipated or proposed for Street 'A' in order to limit the volume of traffic that would otherwise be perceptively high to local residents. Maintaining limited intersection capacity will appropriately redirect traffic to a future traffic signal at Kerrison Drive.

Traffic Controls

The posted speed limit within the subdivision street system is assumed to be 50 km/h. Stop controls are planned for all the intersections except Kerrison Drive at Audley Road. Although Kerrison Drive will initially be stop controlled, traffic signals underground should be placed concurrent with initial construction in anticipation of higher traffic volumes arising from future external developments.

Traffic signals underground should also be placed at the Street 'B' and Street 'C' intersections with Kerrison Drive. Although unsignalized levels of service are reasonable, it would be prudent to monitor the intersections with underground traffic ducts in place, particularly given the scope of development of the race track/casino on the lands to the south.

…6/

General parking restrictions applying to all roads, i.e. statutory setbacks from all intersections are adequate in consideration of intersection sight availability. A subsequent review of parking restrictions will be undertaken at the engineering stage of the project to account for site-specific driveway and lotting arrangements.

Pedestrian Movements and Transit Accessibility

Standard practice dictates that the pedestrian route to transit shall be less than 400 metres for at least 90 percent of units in a subdivision in order to provide a reasonable level of service. It is recommended that transit service be provided on Street 'C' within the subdivision. With transit service along Street 'C', approximately 80 percent of the units within the subdivision are within 400 metres of transit. The remaining 20 percent of units can be accommodated provided future transit service is located along Audley Road.

The attached transportation management plan (TMP) presents proposed sidewalk configuration. This has been developed through analysis of pedestrian routes to school and transit. Local streets may have sidewalks on one side only if located as shown on the TMP. Streets 'A', 'B' and 'C' have been designated as collectors and it is recommended that sidewalks be placed on both sides of the roadway.

Once the school is built, the intersection of Street 'E' and Street 'C' should have significant pedestrian activity because of its location in front of the school. A school crossing guard may be necessary at this location subject to warrants being established. Similarly, the sidewalk connection proposed opposite Street 'K' will require monitoring to assess the warrants for a school crossing guard.

Sidewalks are shown along the perimeter of the future medium density block but will not be necessary until those lands are built-out.

School Site Issues

The sidewalk location proposed opposite Block 172 is the suggested location for a potential future school crossing guard along the maximum tangent length of Street 'C'. This location is also the farthest distance from the preferred location for a school access that accounts for the roadway curvature. The ideal location for the school access to maximize driveway sight is therefore in the midblock.

The proposed access location will require careful planning of internal driveway circulation and parking layout to preclude on-street drop-off activity that will create a driveway sight deficiency. A no-stopping restriction will be required on the east side of the school frontage.

Intersection Corner Sight Distances

The Street 'G'/Street 'C' intersection creates poor sight to the north for exiting left turns. It is recommended that a 2m sight corridor be provided in addition to the 21.0 metre right-of-way, therefore Lot 57 will be 2.0 metres narrower than shown on the current draft plan.

All other corner sight clearances meet a 50 km/hr safe sight distance.

Conclusion

The proposed draft plan of subdivision represents reasonable conditions to proceed to the next stage of plan implementation while protecting for the necessary transportation services and traffic controls for vehicular and pedestrian traffic. The street pattern, sidewalk locations and accesses are not expected to create adverse traffic operating conditions that would require additional traffic calming based on prudent motorists and pedestrians.

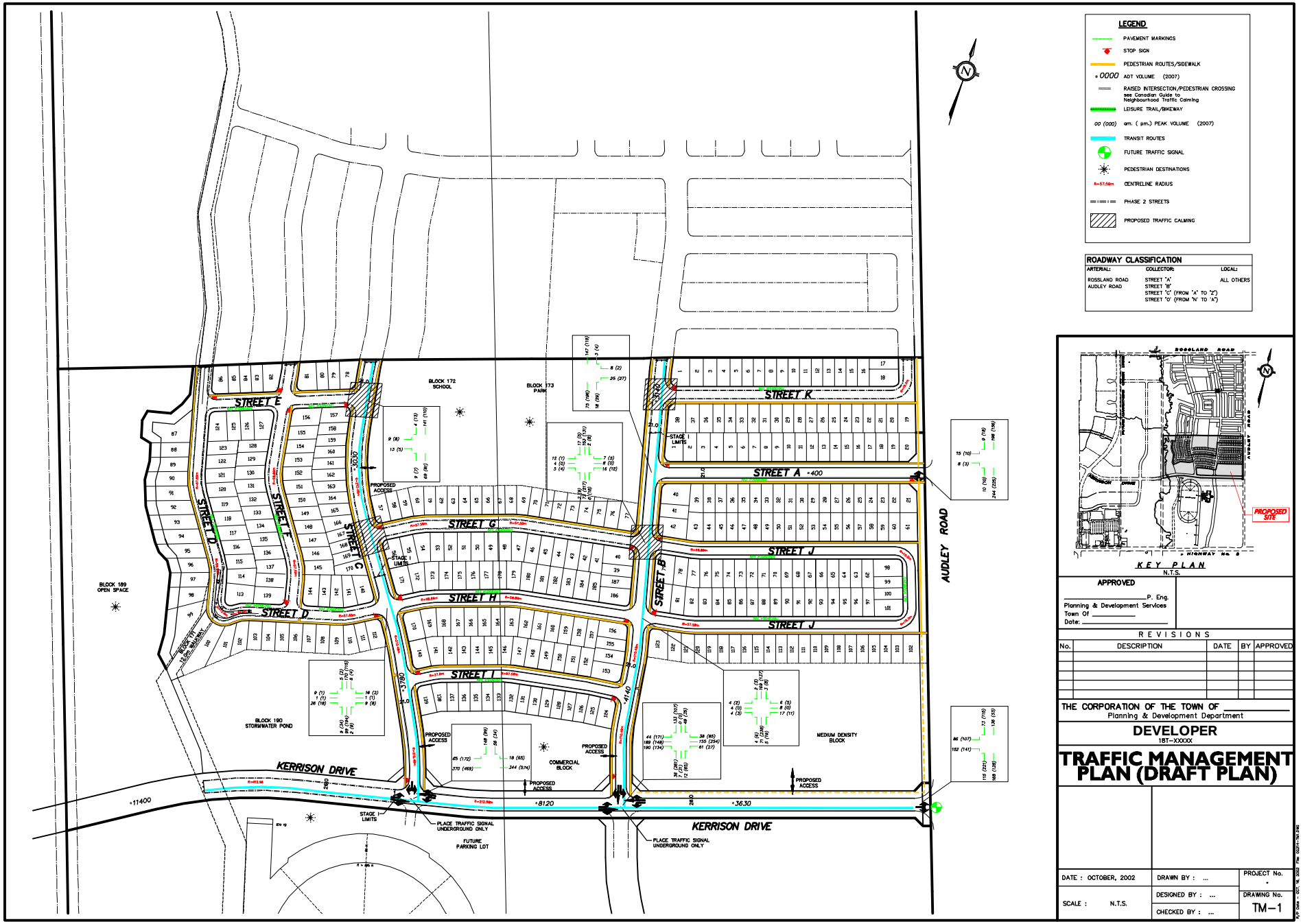
The level of traffic control required for the subdivision is minimal and the internal roadway characteristics should be sufficient to prevent significant cut-through traffic on local residential roads. Both Street 'B' and 'C' provide a direct route from Kerrison Drive to Rossland Drive; accordingly, additional traffic calming measures along both these streets is necessary to control anticipated speeding. The locations of proposed traffic calming features, to be detailed at the engineering stage, are shown on the attached Traffic Management Plan.

We trust that this documentation will provide the basis to support the draft plan as proposed.

Yours truly,

Traffic Planner/Engineer

Encl.


LEGEND
PAVEMENT MARKINGS
STOP SIGN
PEDESTRIAN ROUTES/SIDEWALK
0000 ADT VOLUME (2007)
RAISED INTERSECTION/PEDESTRIAN CROSSING see Canadian Guide to Neighbourhood Traffic Calming
LEISURE TRAIL/BIKEWAY
00 (000) am. (pm.) PEAK VOLUME (2007)
TRANSIT ROUTES
FUTURE TRAFFIC SIGNAL
PEDESTRIAN DESTINATIONS
R=57.50m CENTRELINE RADIUS
PHASE 2 STREETS
PROPOSED TRAFFIC CALMING
ROADWAY CLASSIFICATION
ARTERIAL: ROSSLAND ROAD, AUDLEY ROAD
COLLECTOR: STREET 'A', STREET 'B', STREET 'C' (FROM 'A' TO '2'), STREET 'G' (FROM 'N' TO 'A')
LOCAL: ALL OTHERS
STREET A
STREET B
STREET C
STREET D
STREET E
STREET F
STREET G
STREET H
STREET I
STREET J
STREET K
AUDLEY ROAD
KERRISON DRIVE
ROSSLAND ROAD
BLOCK 172 SCHOOL
BLOCK 173 PARK
BLOCK 189 OPEN SPACE
BLOCK 190 STORMWATER POND
COMMERCIAL BLOCK
MEDIUM DENSITY BLOCK
FUTURE PARKING LOT
PROPOSED ACCESS
STAGE I LIMITS
PLACE TRAFFIC SIGNAL UNDERGROUND ONLY
KEY PLAN
N.T.S.
PROPOSED SITE
HIGHWAY No. 8
APPROVED
P. Eng.
Planning & Development Services
Town Of
Date:
REVISIONS
No. DESCRIPTION DATE BY APPROVED
THE CORPORATION OF THE TOWN OF
Planning & Development Department
DEVELOPER
1BT–XXXXX
TRAFFIC MANAGEMENT PLAN (DRAFT PLAN)
DATE : OCTOBER, 2002
SCALE : N.T.S.
DRAWN BY : ...
DESIGNED BY : ...
CHECKED BY : ...
PROJECT No. -
DRAWING No. TM–1

APPENDIX D
INFORMATION REQUIRED IN A TRANSPORTATION IMPACT STUDY REPORT

JUSTIFICATION FOR TRANSPORTATION IMPACT STUDIES

A Transportation Impact Study (TIS) is an important tool used to determine the impact of a proposed land development project and to identify the need for any improvements to a transportation system to reduce congestion, maintain and improve safety and provide site access and impact mitigation associated with the project. Although TIS's should not take the place of area-wide transportation studies, they provide a framework in making critical land use and site planning decisions regarding traffic and transportation issues local to the development in question.

The Town of Ajax has developed a recommended practice to provide a basis for consistency in these studies, with the primary purpose of providing reliable guidance for site access, on-site circulation and off-site improvement planning in accommodating site and other traffic safely and efficiently.

TIMING OF TRANSPORTATION IMPACT STUDIES

Traffic should be a major consideration in the planning of new or expanding developments. A TIS should start in the earliest planning stages of a project, including at site selection. This would assist in the preparation of a more responsive and cost-effective site plan.

Developers are being asked to have a TIS undertaken in advance of submitting a project to the Town of Ajax. TIS's are typically appropriate for the following processes:

- Zoning and rezoning application
- Land subdivision application
- Site plan approval
- Permits for major driveways

The Town of Ajax requires that TIS's be conducted for any land development project that is expected to generate 100 or more peak hour vehicles, or when a project might impact an already congested or high-accident location, or when specific site access and safety issues are of concern.

Threshold levels of traffic may vary due to local conditions and priorities. These local thresholds will be established in consultation with Town staff and shall govern in TIS preparation requirements.

INFORMATION REQUIRED IN A TRANSPORTATION IMPACT STUDY REPORT

The TIS report should be presented in a straightforward and logical sequence. It should lead the reader step-by-step through the various stages of the process and to the resulting conclusions and recommendations. Sufficient detail should be included so the Town will be able to follow the methodology of the analysis and associated findings and recommendations. TIS's should be prepared under the supervision of a qualified and experienced professional who has specific training in traffic and transportation engineering related to preparing such studies for land development projects.

The documentation for a TIS should include, at a minimum:

	Checklist items:	YES	NO
1.	A description of the proposed land use (size, type, location, staging) and site plan at a scale agreed to by the governing authority.		
2.	Study purpose and objectives.		
3.	A description of the site including property boundaries, site accessibility and study area along with assumptions of additional development or other significant changes in the study area.		
4.	Determination and identification of the area of influence of the development (impacted study area).		

APPENDIX D
INFORMATION REQUIRED IN A TRANSPORTATION IMPACT STUDY REPORT

5.	Anticipated nearby land development (planned or under construction) and associated traffic, and overall traffic growth trends in the area.	☐	☐
6.	Description of existing roadway/transportation conditions including traffic volumes, transit accessibility, accidents, geometrics, pedestrians, traffic signals and overall traffic operations and circulation.	☐	☐
7.	Identification of traffic congestion, accident areas and other deficiencies of the transportation system in the study area.	☐	☐
8.	Anticipated trip generation based on the facility and street peak hour traffic volumes of the proposed development at full build-out and at any interim construction phase (ITE trip rates or local study data, i.e. peak volumes and effects may not occur during roadway peaks and therefore should be documented in the impact study).	☐	☐
9.	A rationale for proposed reductions in trip generation owing to pass-by traffic, diverted like trips or site captive.	☐	☐
9.	Trip distribution/assignment of site traffic on the transportation system (use of TTS or local study data).	☐	☐
10.	Projection of existing traffic to a future design year (normally 5 years after build-out) or as determined by the developer/governing agencies.	☐	☐
11.	A future combined traffic volume plan for typical daily and key peak hours of the development and roadway system.	☐	☐
12.	Identification of traffic congestion, safety problems and/or other deficiencies of the future transportation system, with and without the proposed development, including identified transportation improvements that are expected to be in operation by the future years under study.	☐	☐
13.	An assessment of the change in roadway operating conditions resulting from the development (quantifying the impact of the development).	☐	☐
14.	Development and evaluation of potential improvement measures needed to mitigate the impact of the development (intersection v/c < 0.85).	☐	☐
15.	Recommendations for site access and transportation improvements needed to maintain traffic flow to, from, within and past the site at an acceptable and safe level of service. Improvements typically include roadway widenings, turn lanes, traffic signals, pedestrian and transit amenities, safety (sight distance) measures and transportation demand management strategies. Detailed improvements and their costs specifically associated with the development should be identified.	☐	☐
16.	On-site issues including number and location of driveways, parking needs/layout, circulation, pedestrians, truck access and operations, transit and emergency vehicle access.	☐	☐