REGION OF DURHAM TRAFFIC MANAGEMENT GUIDELINE FOR HAMLETS

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ABSTRACT

Hamlets are small, rural communities of predominately single-detached dwellings and limited commercial uses and community facilities to serve local residents and surrounding agricultural lands. The majority of hamlets in the Regional Municipality of Durham, Ontario (Durham Region) have developed around the primary roads serving the community, which in many cases are arterial roads. These roads physically define the settlement and contribute to its rural character as much as the abutting land uses and activities. The road functions as the community's "main street" and is typically the focal point of local activity.

With population growth in Durham Region, rural arterial roads previously carrying only modest traffic volumes are now serving significant commuter flows, as these routes become the outlet for area-wide traffic congestion. Heavy vehicle traffic has also become more pronounced with the increase in trucking for goods movement and the haulage of aggregate and surplus fill material for construction activity in the Greater Toronto Area. The result has been an increase in complaints from hamlet residents about speeding, noise, pedestrian conflicts and trucks on the arterials passing through their communities.

In an attempt to respond to these concerns, Durham Region initiated development of the **Traffic Management Guide for Hamlets**. The Guideline:

- Defines a process for addressing hamlet traffic concerns;
- Identifies traffic management measures that can be applied on arterial roads within hamlets; and
- Specifies which measures are most effective and the context in which they should be applied.

This paper provides an overview of the Guideline, outlining:

- The rationale for developing the Guideline;
- The research completed in preparing the document;
- The key elements of the Guideline; and
- How Durham Region intends to use the document.

RATIONALE FOR DEVELOPING THE GUIDELINE

The rural area of Durham Region features nearly 50 hamlet settlements consisting of clusters of homes situated in proximity to an intersection or other place of interest (i.e., a mill, general store, etc.). Challenges occur where these smaller communities exist with a

rural posted 80 km/h arterial road that transitions to an urban community “Main Street” that defines the area. Balancing competing transportation, land use and livability needs can be difficult in these hamlets. In addition, what is perceived as a safety issue by residents and what is justified as a safety issue from a technical perspective are often quite different.

Often, the Traffic Engineering and Operations Division of the Region’s Works Department is in a reactive mode with regard to traffic management issues in hamlets. The process usually begins as a complaint or enquiry from a local resident that escalates to the political forum when the individual perceives that his/her issue is not being addressed to their satisfaction. In many instances, Regional staff is forced to apply engineering judgment in establishing traffic management measures within these rural communities, sometimes in contradiction to the Region’s Official Plan and accepted traffic engineering practices.

Forcing traffic to reduce speeds through hamlets is a common request. In many cases, remedial measures such as painted edge lines, oversized stop signs, flashing beacons, gateway features, etc. are installed in an attempt to heighten driver awareness and communicate to motorists that they are entering a residential community and need to reduce speed and modify their driving behaviour. Often the community feels that these measures are less successful than they would like. Factors contributing to their concerns include a lack of pedestrian amenities, commuter traffic, intersections where heritage or other buildings obstruct vehicle sight lines, and a perception that engineering standards should be applied in a unique way to these communities. Other potential “triggers” include:

- Commuter Patterns – More people moving to the rural areas and commuting to/from urban areas for work results in higher volumes traveling through these smaller communities;
- Speeds – An increase in commuter traffic results in higher speeds and aggressive driving behaviour. Drivers using rural roads as shortcuts fail to recognize the risks inherent in their actions;
- Connection with the Community – Drivers rarely have a connection with the communities they drive through and are not influenced by local messaging. Advances in vehicle technology create a barrier that separates a driver from the driving environment. This separation diminishes a driver’s awareness of the impacts of their actions;
- Impacts and Effectiveness of Measures – Certain treatments applied in the wrong circumstances can cause more harm than good;
- Traffic Composition – A diverse mix of vehicles, including large trucks and farm equipment, have to function in areas with compromised right-of-way widths, schools and other sensitive land uses fronting on the Regional Road network. These roads must allow goods movement for agriculture and resource development while providing local residents a safe environment for all road users;
- Perspectives – Local residents’ perception of a safety/speeding issue quite often differs from measured field studies. What is perceived as a problem is not always borne out by the data;

- Service Function of Roads – Road through these communities serve more than one function in most cases. Diverse travel demands are in conflict with each other;
- Gateways – Applicability and specific design criteria are needed for the entry or "gateway" to these rural communities;
- Bypasses – In some cases, a bypass around the community may be the most appropriate long-term solution. Guidelines and warrants for implementation are required given the cost and potential community impact;
- Legacy Geometry/Sight Lines – Substandard intersection design (especially due to heritage buildings), approach geometry and offsets impact safety for all road users;
- Access Density – The density of intersections and driveways in hamlets is higher than the adjoining rural road sections, which increases the collision risk; and
- Quality of Life – The negative externalities of unwanted vehicle traffic, such as noise, visual intrusion and emissions, impact quality of life for local residents.

In response to these concerns, Durham Region initiated development of the Traffic Management Guideline for Hamlets. The Guideline is intended to:

- Provide Regional staff and stakeholders with a toolbox of standard policies and procedures for assessing the need for Hamlet Traffic Management measures;
- List the techniques Durham Region is willing to consider in addressing hamlet traffic concerns, and explain the criteria for implementation;
- Provide a proactive approach for administering, preparing, implementing and maintaining Hamlet Traffic Management Plans; and
- Clarify and supplement existing policies, practices, guidelines and standards already applied by Durham Region in the planning, design, operation and maintenance of Regional Roads within hamlets.

The Guideline also helps to:

- Clarify public expectations and explain how Durham Region will respond to requests for traffic management treatments on Regional Roads within hamlets;
- Address resource constraints and help identify the most pressing issues;
- Promote a common understanding of the "real" issues, since residents and stakeholders may perceive a Hamlet traffic concern differently than Regional staff;
- Provide the basis for further policy direction needed to supplement the Guideline, which may include updates to the Regional Official Plan, Transportation Master Plan, and design standards; and
- Ensure consistency in addressing hamlet traffic concerns and developing Hamlet Traffic Management Plans.

RESEARCH COMPLETED IN PREPARING THE GUIDELINE

Literature Review

A comprehensive literature review of several transportation research databases was conducted to identify best practices and prevailing guidance for addressing traffic management issues in small, rural communities. The research focused on guidebooks, study reports and journal articles detailing the processes, techniques used, and outcomes of representative traffic management installations. The review identified the following six documents as most relevant to development of the Guideline:

- *Guidelines on Traffic Calming for Towns and Villages on National Routes* (National Roads Authority, Ireland, 2005)
  http://www.nra.ie/Publications/DownloadableDocumentation/RoadSafety/file,3651,en.pdf
- *Evaluation of Gateway and Low-Cost Traffic-Calming Treatments for Major Routes in Small Rural Communities* (Center for Transportation Research and Education, Iowa State University, 2007)
  http://www.ctre.iastate.edu/reports/traffic-calming-rural.pdf
- *When Main Street is a State Highway: Blending Function, Beauty and Identity: A Handbook for Communities and Designers* (Maryland State Highway Administration, 2001)
  http://sha.md.gov/ohd/MainStreet.pdf
- *Smart Transportation Guidebook: Planning and Designing Highways and Streets that Support Sustainable and Livable Communities* (New Jersey Department of Transportation and Pennsylvania Department of Transportation, 2008)
  http://www.state.nj.us/transportation/community/mobility/pdf/smarttransportationguidebook2008.pdf
- *Effects of Traffic Calming Schemes in Denmark* (Merter, J. and Jorgesen, L. Effects of Traffic Calming Schemes in Denmark. Transactions on the Built Environment, Volume 33, 1998)
- *Traffic Management in Rural Settlements* (Center for the Assessment of Road Safety in Ontario (CARSON), 2006)

Municipal Survey

A survey of six municipalities in Ontario was also carried out to obtain further insight into how other jurisdictions address traffic management issues in small, rural communities. The following upper and single tier jurisdictions with land use structures and growth trends similar to Durham Region participated in the survey:

- Regional Municipality of York
- Regional Municipality of Peel
- Regional Municipality of Niagara
- Regional Municipality of Waterloo
- City of Hamilton
- City of Ottawa

The survey was conducted using a structured questionnaire administered by email or through a scheduled telephone interview. The survey instrument included nine questions, with the first part devoted to soliciting data about the small, rural communities within the municipality. The second group of questions requested information about the criteria, procedures and guidelines used to address traffic-related complaints/requests. The final questions asked the jurisdiction to identify typical treatments and case studies found effective in addressing traffic issues in villages and hamlets.

Research Findings

The research showed that:

- Traffic concerns are common in small, rural communities;
- Limited research and guidance exists to address the issue outside Europe and Australia. Some North American reference material is available;
- Minimal quantitative data regarding the effectiveness of traffic management measures in hamlets is available. Data that is available suggests physical measures (i.e. roundabouts, narrowings, gateway treatments, etc.) are more effective in reducing speeds and improving safety than signs, markings and other non-physical techniques;
- European experience highlights the importance of addressing three critical areas – *the transition, the gateway and the settlement* – with distinct traffic management schemes to signal a change in character and operating conditions to the driver. The fundamental relationships between land use, urban design and transportation, and form and function are noted;
- Speed reduction appears to be the primary focus of most traffic management schemes in rural areas;
- The need to accommodate unique rural road users like heavy vehicles and farm equipment is not overly emphasized. Specific techniques are limited;
- The rural character of hamlets and their inhabitants should be reflected in the traffic management scheme selected. The specific factors that make the rural environment unique and different from the urban area must be considered;
- Traffic issues are best addressed through a holistic, structured approach, involving all stakeholders, and based on quantitative before and after data. Engineering judgment is an important and indispensable component of the process; and
- The surveyed Ontario municipalities have minimal reference and resource material specific to traffic management in small, rural communities. Most apply general guidelines and processes.

The literature review and municipal survey identified useful information, but did not uncover a comprehensive reference document to base the Guideline on. This necessitated the preparation of a “made-in-Durham Region” Guideline, based on the best practices assembled through the research.

KEY ELEMENTS OF THE GUIDELINE

The Guideline is structured as a stand-alone document with links to complementary Regional policy (e.g. Official Plan, Uniform Traffic Policy) and industry reference (e.g. TAC Geometric Design Guide, Ontario Traffic Manual) material. The document also serves as an "educational tool" for stakeholders involved in the process, and does not require any specific (additional) instructional materials to facilitate its use.

The practices outlined in the Guideline are generally presented with a recommended condition ("should"), acknowledging that transportation design and operations guidelines are necessarily general because they cannot encompass all location-specific conditions. In some cases, a variety of options/alternatives are provided in a permissive condition and described by the use of the term "may", recognizing the need for flexibility in planning and design to account for the differences between hamlets, as well as, the variety of roadway operating conditions. In the few circumstances where a Regional policy or standard is definitive in nature, the direction is specified with the term "shall" or "must".

The document is organized into three chapters:

Chapter 1: The Guideline

This chapter explains the need and guiding principles for Hamlet Traffic Management, outlines the responsibilities of the various stakeholders in the process, identifies opportunities for coordination with other initiatives, and discusses the scope and use of this document. Specific items discussed include:

- Approach to Hamlet Traffic Management – Hamlet Traffic Management requires a different approach than urban traffic calming. Since volume reduction is often neither feasible nor desirable for a Regional Road, the primary goals of Hamlet Traffic Management are to reduce excessive vehicle speeds, alleviate conflicts between road users and eliminate inappropriate driver behaviour within the built-up settlement area. These goals are accomplished primarily through the use of engineering techniques such as regulatory traffic control devices and physical features (excluding measures that restrict or limit traffic, or introduce vertical or significant horizontal deflections into the roadway). Education and enforcement techniques like Road Watch and selective police enforcement can also be effective under certain circumstances, and may be used as a first step in responding to hamlet traffic concerns or to supplement regulatory and physical measures.

- Guiding Principles – The following guiding principles form the basis of the Hamlet Traffic Management policy and are taken into consideration in investigating, selecting and implementing techniques suitable for Regional Roads:
  - Public safety is the primary consideration;
  - Clearly identify the problem and gather sufficient data to quantify the extent;
  - Capacity and operational improvements should be considered for parallel routes first;

- As arterial roads, Regional Roads are intended to serve larger volumes of traffic over longer distances, and need to function consistent with their environment;
- Techniques must be implemented in the Transition and Gateway areas to achieve speed reductions within the hamlet, but can be optional in the Settlement area;
- Hamlet Traffic Management is not meant to resolve traffic issues resulting from construction disruptions or seasonal fluctuations;
- Physical measures are to be considered only after education, enforcement and traffic engineering efforts have failed to produce the desired results;
- Self-enforcing measures should be considered before measures requiring police presence to ensure compliance;
- Strategies that restrict access and egress should be carefully considered and accompanied by public consultation;
- Improvements should not unduly impede the movement of cyclists, pedestrians, or emergency, transit and maintenance service vehicles unless alternate measures are agreed upon;
- The process should involve effective public and stakeholder consultation;
- Implementation of Hamlet Traffic Management Plans shall be undertaken in accordance with Regional policy, municipal by-laws, industry practices (if appropriate) and within available funding capabilities; and
- Effectiveness will be monitored and reported to stakeholders.

- Stakeholder Participation – Stakeholder participation is an important component of the Hamlet Traffic Management process. Through the process, interested parties are provided an opportunity to become better informed on local traffic concerns, offer input on potential solutions, and participate in developing the proposed Hamlet Traffic Management Plan. The stakeholders invited/encouraged to participate should represent a broad range of views.

Chapter 2: The Process

The chapter outlines the three-stage, seven-step process for responding to hamlet traffic concerns. Figure 1 provides an overview of the **Hamlet Traffic Management Study Process**, which is described as follows:

Stage 1 – Assessment

The objectives of the Assessment Stage are to confirm the nature and magnitude of the reported traffic issues and decide whether to proceed with Hamlet Traffic Management measures. If the screening suggests measures are warranted, a formal plan will be developed. Stage 1 involves two steps:

- Step 1: Receive and Assess Request – An initial assessment is conducted to determine if the request is a candidate for a Hamlet Traffic Management Plan. The

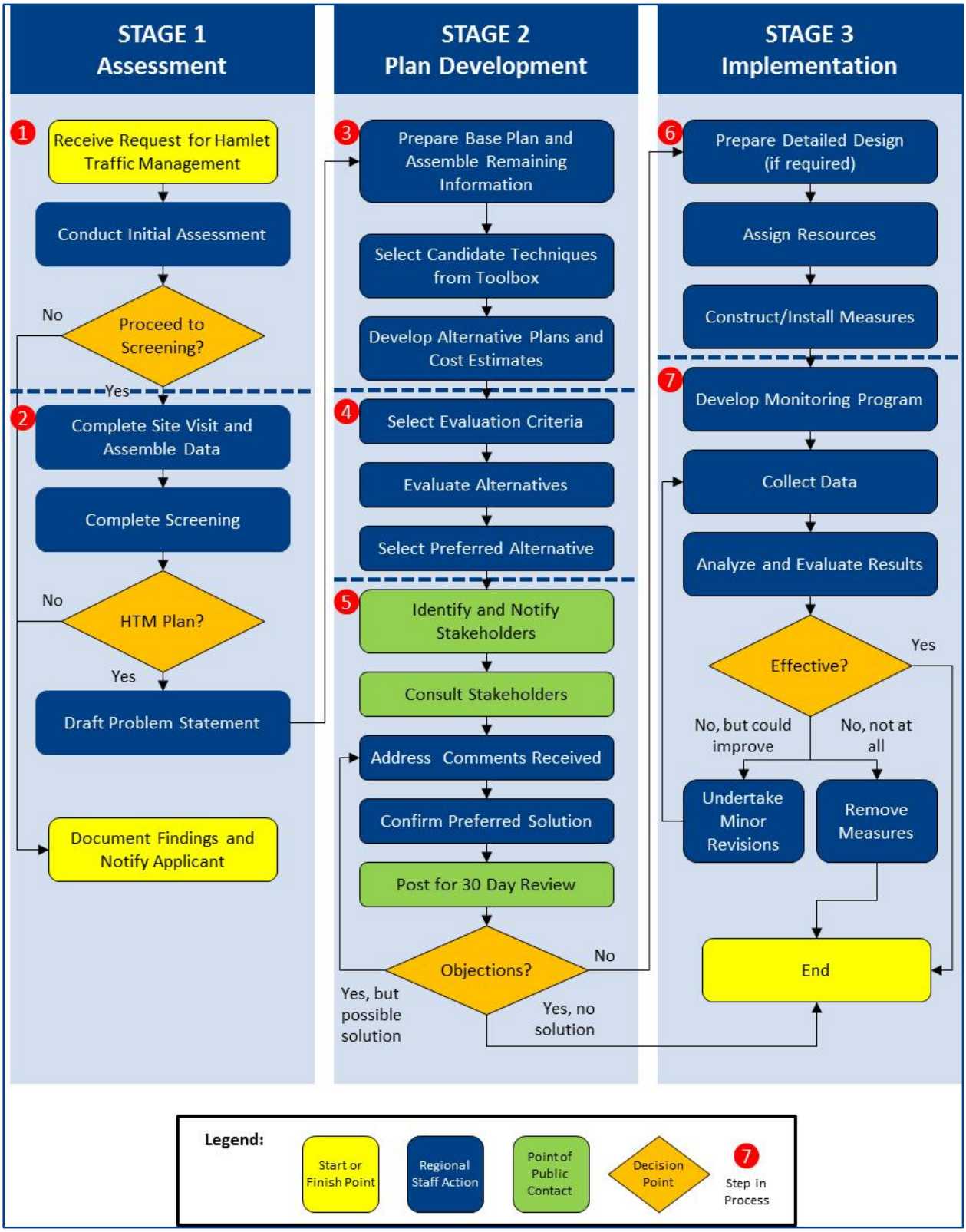

FIGURE 1 – Hamlet Traffic Management Study Process

applicant, which may be local resident or group, is provided a brief explanation as to what action is being taken, if any, once the assessment is complete.

- Step 2: Screen Request – Candidate locations are screened to confirm the merit of proceeding with a Hamlet Traffic Management Plan. Two screening tests are used to assess merit. If both tests are met, a Problem Statement will be drafted to detail the scope and specifics of the traffic issues under consideration.

Stage 2 – Plan Development

The objective of the Plan Development Stage is to create a Hamlet Traffic Management Plan that effectively addresses the Problem Statement. This process involves the development and evaluation of potential solutions to the stated traffic problems, and confirmation of the preferred strategy through consultation with affected stakeholders. Stage 2 consists of three steps:

- Step 3: Develop Alternative Solutions – Alternative solutions of Engineering Techniques (see below for description) are developed to mitigate the traffic concern(s) noted in the Problem Statement. In most cases, two to three options, in addition to the Status Quo alternative, provide sufficient variation to ensure that a range of concepts is considered. Order of magnitude estimates of capital (implementation) and operating (on-going) costs are developed for each alternative to assist in the subsequent evaluation phase.

- Step 4: Evaluate Alternative Solutions – The alternative solutions are evaluated based on benefits, secondary impacts and costs of implementation to identify the Proposed Plan.

- Step 5: Consult with Stakeholders – Stakeholders are consulted to obtain feedback on the Problem Statement and Proposed Plan. As a general rule, the Durham Regional Police Service, Region of Durham Emergency Medical Services (ambulance), Durham Region Transit (if applicable) and the area municipal fire services and public works departments are invited to participate. An open house is also held in most cases. Although stakeholder consensus is desirable, complete agreement is not necessary to proceed with implementation of the plan.

Stage 3 – Implementation

The objectives of the Implementation Stage are to install/construct the recommended measures, monitor effectiveness, and refine the plan as required. Stage 3 features two steps:

- Step 6: Implement Preferred Solution – Implementation of the Final Plan will proceed when resources (staff and financing) become available. Schemes featuring lower cost measures not requiring detailed engineering design can typically proceed more expeditiously.

- Step 7: Monitor and Refine – The implemented measures are monitored to assess their effectiveness in achieving study objectives and identify the need for refinements to the plan. The monitoring will be completed one to two years post installation and under a variety of operating and weather conditions, in particular winter.

Chapter 3: The Techniques

This chapter describes a wide range of Hamlet Traffic Management techniques suitable for use on Regional Roads, and provides guidance on the selection of measures and design of plans. The techniques are separated into the following two groups, consistent with the "three E's" of:

Education and Enforcement Techniques

Intended to address issues of speeding and inappropriate driver behaviour through targeted messages and actions, techniques in this category include:

- Radar Message Board Program
- Road Watch Program
- Public Education Campaign
- Safe Routes to School Program
- Targeted Enforcement Program

These non-intrusive measures typically pose no secondary impacts, but can be relatively costly if widely and regularly implemented. In many cases, these programs serve as a first step or complementary action in addressing hamlet traffic concerns. But most do not produce sustained behaviour change and have limited long-term effectiveness unless regularly applied.

Education and enforcement programs will typically be conducted for a period of one to six months. During this period, progress will be monitored to determine whether program refinements should be considered. If no discernible and sustained change in driver behaviour is noted, a Hamlet Traffic Management Plan featuring Engineering Techniques, as described below, should be considered.

Engineering Techniques

The toolbox of Engineering Techniques is structured into a tiered system of increasingly effective yet intrusive Hamlet Traffic Management treatments. The three categories of techniques suitable for application on Regional Roads in Durham Region are:

- Category 1 – Traffic Control Devices can aid in addressing issues of speeding and inappropriate driver behaviour. Traditional devices such as signs, pavement markings, delineation and signals typically have limited secondary effects, posing minimal impact to emergency vehicles, maintenance operations or drainage. However, these devices will have limited effectiveness if the measure does not affect the appearance of the

road, or requires enforcement to achieve full compliance. Devices in this category often supplement or complement Category 2 or 3 techniques.

- Category 2 – Street Environment Treatments typically have limited secondary impacts (posing no impact to emergency vehicles, maintenance operations or drainage) and are self-enforcing, but can be relatively costly if widely implemented, especially in terms of on-going maintenance. The design of any scheme involving street environment treatments should take into consideration factors such as sight distance requirements, existing intersections and entrances, existing and future services, and required clearances.

- Category 3 – Physical Measures attempt to reduce vehicular speeds by causing a change in the vehicle's travel path. The intent of such measures is to alter the driver's perception of the road layout or appearance, influencing them to modify their driving habits and foster improved driver behaviour. These techniques can be effective in reducing speeds and are self-enforcing. However, implementation costs and undesired secondary impacts, including noise and restrictions on large agricultural vehicles, can be a concern.

The **Applicability and Impact Matrix** shown in Figure 2 list the techniques by category and provides a simplified visual comparison of the potential applicability, benefits and impacts of the measures. This general overview assists in selecting treatments to address specific issues, and helps to avoid the adverse effects of inappropriate techniques. For simplicity, only key potential impacts are listed.

The Guideline details the techniques within each category individually, providing a description of the measure, its advantages and disadvantages, and application and placement criteria. Figure 3 provides a **sample of the detailed guidance** for edge line longitudinal pavement markings. The information provided in these individual assessments should be read in conjunction with Table 1 when selecting appropriate engineering techniques for use in Hamlet Traffic Management Plans.

The process of selecting suitable Hamlet Traffic Management techniques using the matrix involves three (3) steps:

- Step 1 – Identify potential engineering techniques to address the three distinct areas of influence along a Regional Road through a hamlet, being:
  - The Transition (the segments of road immediately preceding and following the hamlet);
  - The Gateway (the entry point to the settlement); and
  - The Settlement (the built-up section of the hamlet).

  The techniques applied within each area of influence may vary and may not be a homogenous group of treatments.

- Step 2 – Select candidate engineering techniques for the specific area of influence that address the identified issue(s), which include:

FIGURE 2 – Applicability and Impact Matrix

Categories and Techniques	GREATEST APPLICABILITY IN DURHAM REGION	Location			Issues						Potential Impacts: Traffic					Potential Impacts: Environ.		Potential Impacts: Other Modes			Potential Impacts: Op. & Maint.			Cost	
		Transition	Gateway	Settlement	High Vehicle Speeds	Aggressive Driver Behavior	Vehicle Safety Concerns/Conflicts	Pedestrian Safety Concerns/Conflicts	Bicycle Safety Concerns/Conflicts	Excessive Heavy Vehicle Traffic	Traffic Diversion	Emergency Vehicle Access/Safety	Heavy Vehicle Access/Operation	Local Access	On-Street Parking	Local Noise/Air	Urban Environment	Transit Service/Facilities	Pedestrian Environment/Facilities	Cyclist Environment/Facilities	Operation and Maintenance Issues	Winter Maintenance Issues	Enforcement Requirements	Capital	Operating
CATEGORY 1 - Traffic Control Devices																								
Speed Zone Signs	✓	●	●	●	●														■	■	○	●	×	$	$
School Zone Maximum Speed (When Flashing) Signs	✓			●	●	●		●											■	■	○	●	×	$	$
Truck Route Signs	✓	●						●	●	●	■		■			■					○	●	○	$$	$
Pedestrian Warning Signs	✓		○	●				●	●										■		○	●	○	$	$
Community Safety Zone Signs		○	○	●																	○	●	○	$	$$
Vehicle Speed Mitigation Transverse Pavement Markings	✓	●	●		●	●													■	■	×	●	●	$$	$$
Pedestrian Crossing Transverse Pavement Markings	✓			●				●	●									■	■	■	×	●	●	$	$
Flush Median Island Longitudinal Pavement Markings	✓	●	●	●	●		●												■	■	×	●	●	$$	$$
Edge Line Longitudinal Pavement Markings	✓	●	●	●	●		●												■	■	×	●	●	$$	$$
On-Street Bike Lanes	✓	●	●	●	●		●		●							■		■		■	×	×	○	$$	$$
On-Street Parking				●	●		●						■		■			■	■	■	×	×	×	$$	$$
Delineators and Bollards	✓	●	●	●			●	●	●					■	■			■	■	■	○	×	●	$$	$$
Flashing Beacons		○	○	○																	×	●	●	$	$$
CATEGORY 2 - Street Environment Treatments																									
Gateway Signs	✓		●			●											■				○	●	●	$$	$$
Streetscaping	✓	○	●	●		●		●							■	■	■	■	■	■	×	×	●	$$$	$$
Street Lighting	✓	○	●	●			●	●	●								■				×	○	●	$$	$$
Surface Treatments	✓	○	●	●				●	●								■				○	○	●	$$	$
Sidewalks and Multi-Use Paths	✓		○	●				●								■	■	■	■	■	×	×	●	$$	$$
CATEGORY 3 - Physical Measures																									
Urbanization	✓		○	●	●		●	●	●							■	■	■	■	■	×	○	●	$$$	$$
Bump-Outs (Intersection and Mid-Block)			○	●	●		●	●					■	■	■		■		■		○	×	●	$$	$
Raised Median Islands		○	●	●	●		●	●				■	■	■	■		■		■		○	×	●	$$	$
Transverse Rumble Strips		●	●		●	●		●								■	■			■	○	○	●	$$	$
Roundabouts			●	●	●		●						■		■	■	■		■	■	○	×	●	$$$	$

LEGEND
(See Section 3.1 for an explanation of the criteria)

LOCATION
- ● Appropriate
- ○ Conditional
- Not Appropriate

ISSUES
- ● Addresses
- Does Not Address

POTENTIAL IMPACTS
- ■ Positive Impact
- Neutral
- ■ Negative Impact

OP. & MAINT. IMPACTS
- ● Low/None
- ○ Moderate
- × High

COST
- $ Minimal (<$2,500)
- $$ Moderate ($2,500-100,000)
- $$$ High (>$100,000)

EDGE LINE LONGITUDINAL PAVEMENT MARKINGS

Description

Edge Line Longitudinal Pavement Markings can be used to visually narrow the perceived width of the travel portion of the road by creating a shoulder or parking area. Narrowed lanes provide a feeling of constraint, which in turn can influence drivers to lower their speeds. Driving speed usually decreases because narrower lanes require more accurate steering behaviour and increase perceived risk of running off the road or colliding with another vehicle. Greater concentration is typically required when driving in narrower lanes as the driver focuses harder to stay in the lane.

Advantages

- Can be effective in decreasing speeds
- May smooth traffic flow
- Are relatively low cost and cost-effective to implement
- Are readily understood by drivers
- Can be rapidly implemented
- Unlike curbing, does not impede maintenance activities, impact large vehicles or introduce safety hazard due to physical feature
- Can improve street appearance

Disadvantages

- Reduces separation between oncoming vehicles
- Less effective than curbing since vehicles can still traverse the paved area
- Requires regular maintenance (reduced with durable markings)
- May be less effective in winter conditions when markings are not visible
- May affect skid resistance, particularly for motorcycles and bicycles

Application and Placement

In locations where use of curbing could increase safety risk, poses technical challenge, or is prohibitively expensive. Transition markings should be provided in advance to ensure vehicles can safely shift position within the roadway. Care should be taken not to create unacceptable risk of head-on collisions. Section 3 (Pavement Markings) of OTM Book 11 (Pavement, Hazard and Delineation Markings) provides further information regarding the proper application of longitudinal pavement markings.

FIGURE 3 – Sample of Detailed Guidance

  - High Vehicle Speeds
  - Aggressive Driver Behaviour
  - Vehicle Safety Concerns/Conflicts
  - Pedestrian Safety Concerns/Conflicts
  - Cyclist Safety Concerns/Conflicts
  - Excessive Heavy Vehicle Traffic

- Step 3 – Assess the potential impacts and costs (operating and capital) of the candidate engineering techniques. Impacts are assessed in terms of the effect on:
  - Traffic
  - Environment
  - Other Modes
  - Operations and Maintenance

The final list of candidate techniques include measures that address the identified issue(s), and pose acceptable impacts or cause effects that can be effectively mitigated. Ideally, the list will include a range of Engineering Techniques, which can then be combined into an effective plan.

All techniques listed in the matrix are considered appropriate for addressing hamlet traffic concerns on Regional Roads in Durham Region, but may not be suitable for all situations. The applicability, effectiveness and impacts of the individual techniques will depend on:

- Posted and desired speed;
- Hamlet layout;
- Community characteristics;
- Traffic conditions (speeds, volumes, heavy vehicles, pedestrians, cyclists);
- Roadway cross-section (rural / urban); and
- Roadway geometric features (road allowance and pavement widths, horizontal and vertical alignment, radii, on-street parking, etc.).

In deciding which techniques will work best for a particular hamlet, a number of considerations must be weighed:

- Measures can have both benefits and disadvantages. For example, a measure that effectively slows traffic may impact emergency vehicle response time.
- Some techniques cannot be used on certain roads because of traffic or physical conditions.
- Specific hamlet characteristics must be taken into account, as certain measure(s) might affect livability, parking needs, or other issues important to the community.

Engineering Techniques Not Recommended for Hamlets

The following traffic management techniques are not recommended for application in hamlets on Regional Roads in Durham Region:

- Unrealistic speed limits and over signing;
- Unwarranted traffic control devices, especially all-way stop controls;
- Obstructions to through traffic, such as closure, diverters and barriers; and
- Changes to vertical alignment ("humps and bumps" in the road).

Design Guidelines

The following guidelines should be observed in the design of engineering techniques for Hamlet Traffic Management Plans:

- The Transition – Transition areas should signal to the driver that the upcoming urban environment is different than the previous rural segment and behaviour needs to change. A combination of roadway narrowing, appropriate landscape treatment and the introduction of vertical elements used progressively throughout the length of the transition area and culminating in the gateway help to create this effect.
- The Gateway – Effective gateway features mark a definite change in the character of the surrounding area and denote the transition from a rural roadway to an urban street where land use, pedestrian, and motor vehicle activities will be more intense. Enhancing the attractiveness of the gateway can also help revitalize the image and perception of the Hamlet. In most cases, the gateway will consist of sign installations, streetscaping, and/or an intersection with a warranted traffic signal or roundabout to clearly define the hamlet entrance.
- The Settlement – If the speed reduction and behavior modifications are to be maintained throughout the settlement area, then traffic management techniques need to be applied to the built-up section.
- Overall Design Considerations – Hamlet Traffic Management Plans are generally designed to fit into existing road allowances with minimal new infrastructure construction, utility relocation, repair or property acquisition. Variable conditions in the roadway environment make it essential that plans be designed for each specific site, rather than done as a "cookie cutter" approach. Factors to be considered in preparing the design include:
    - Design speed
    - Treatment spacing
    - Driveways
    - Intersection angle and configuration
    - Vehicle turning requirements
    - Emergency vehicles
    - Drainage
    - Visibility
    - Maintenance

USING THE GUIDELINE

Presently, the Guideline is being applied to rehabilitation/reconstruction projects and complaints and enquiries. Through rehabilitation contracts or restriping exercises, opportunities to reduce lane widths to 3.35 metres through the use of longitudinal markings, on-road bike lanes along designated cycling routes (Greenbelt or Regional), painting on-street parking stalls and installing two-way centre left turns lane are being implemented where operating speeds are 10 to 15 km/h above posted and/or where the improvements can be justified. The stages outlined in the Guideline are being followed for the most part except where stakeholder involvement is concerned. In some situations, stakeholder consultation is not necessary to proceed with the planned improvement depending on the area.

Other features like Dynamic Speed Display Boards and post mounted flashing beacons will or have been installed in known areas where speeds and truck volumes are high and for heavy truck entrance locations where the sightlines are marginal due to a grade.

Durham Region is in the process of finalizing a policy/warrant for Ladder crosswalk lines. Once enacted, Ladder crosswalk lines at controlled locations will be considered pursuant to this direction. In addition, Durham Region is in the process of updating its Transportation Master Plan. The intent is to include or reference the Traffic Management Guideline for Hamlets as policy within the updated plan.

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