

Town of Caledon

Traffic Calming Strategy



Town of Caledon

Transportation Division

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Town of Caledon

FINAL REPORT

Traffic Calming Strategy

TOWN OF CALEDON
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1 Executive Summary

Traffic calming refers to measures aimed at improving safety for all road users by reducing speed and encourage safe driving. Main objectives of traffic calming measures are to:

- Reduce the speed of traffic;
- Reduce collision severity and frequency;
- Improve safety for drivers and pedestrians;
- Enhance safety of pedestrians and cyclists;
- Increase the quality of rural and urban life.

The Town of Caledon has experienced a population increase and will continue to grow as development continues to be built. This corresponds with the Town's Transportation Master Plan recommendation to investigate the need for traffic calming measures to reduce the adverse effects of motorized vehicle use, which include excessive speeding and cut-through traffic.

The purpose of the Town's Traffic Calming Strategy is to incorporate best practices in traffic calming with local context to provide a more appropriate, efficient, flexible and systematic framework through which to address traffic safety issues relating to excessive speeding, traffic infiltration, and collision frequency.

The Strategy provides the Town with a systematic process to follow in the development of traffic calming plans to address public concerns related to traffic calming issues. The Strategy outline a five-step process to determine if a traffic calming plan is needed and, how to go about developing and implementing that plan. The five steps outlined within the Strategy are: Initiation; Screening; Evaluation and Prioritization; Implementation and Monitoring.

To accomplish this goal, the development of the Town's Traffic Calming Strategy considered the following objectives:

- Provide an established process to fairly evaluate all neighbourhood requests for the installation of traffic calming measures;
- Determine what type of calming measures can be used – where deemed appropriate – to improve safety for all road users in Caledon;
- Avoid adversely affecting operational costs and Emergency Services;
- Develop a proactive approach towards implementing traffic calming measures; and
- Achieve the “5E” approach to traffic safety: Engineering, Education, Enhancement, Enforcement, and Evaluation.

To support the identification of elements within the Traffic Calming Strategy that required changes, a review of industry standards and best practices followed by other municipalities in Ontario and Canada was completed.

At the same time, a robust engagement program, supported by best practice research, was undertaken. This engagement program was designed to generate conversation about speeding in Caledon and collect feedback on how speeding and traffic issues in communities across the Town should be addressed. Moreover, the engagement program was developed to ensure that residents, businesses, visitors, and other stakeholders were made aware of traffic calming efforts in Caledon and were provided with the opportunity to provide their feedback to influence the conversation.

Over 900 participants provided input and several key insights were garnered from their feedback, including the following:

- Traffic calming in Caledon should ensure that drivers obey the posted speed limits using both physical changes to street design and traffic safety campaigns to improve community safety; and
- Different types of dangerous driving behaviour can be found across Caledon, including speeding throughout the Town, street racing on the Forks of the Credit Road, disobeying stop signs, tailgating, and speeding in school zones and near community spaces such as parks.

After juxtaposing the results of the review against industry standards and best practices, as well as the community's input with Town Staff, it was recommended that:

- The traffic calming review process should consider stand-alone requests (reactive) from residents and or members of Council, as well as locations identified as part of the capital and new development processes (proactive); and
- A Context-Sensitive approach to Traffic Calming should be applied during the development of the Traffic Calming Warrant Analysis to acknowledge the fact that traffic calming measures should not be applied to all types of roadways – for a variety of operational and public safety reasons – and that specific installation criteria must always be met and adhered to.

Following these recommendations, a five-step Traffic Calming Warrant process was developed. The process can be initiated by an application from either member of the public or Town staff as part of a proactive effort to identify “hot spot” areas in Caledon which may benefit from traffic calming.

When a candidate location is identified via this proactive approach, it will be assessed following the same process as requests initiated by members of the public. No preference will be given to locations identified via this proactive approach over requests from the public. Although candidate locations may be initiated through different channels, they will be evaluated through the same scoring process and served based on their resulting score.

After the scoring process is completed, it is expected that Town staff will review the list of available traffic calming measures as part of the Traffic Calming Toolbox and determine the most appropriate measure(s) for implementation based on the characteristics of the identified locations, scoring and budget availability.

The Traffic Calming Toolbox was developed based on the content and recommendations of TAC's Canadian Guide to Traffic Calming and customized to address the Town's context-sensitive approach to traffic calming. The Town's Traffic Calming Toolbox is complemented by a set of individual, informational sheets presenting detailed information regarding operational characteristics, potential benefits, potential drawbacks / costs (in a qualitative format), and applicability indicators of each measure for different types of roads.

Town Staff will continue to obtain the input of Emergency Services and Road Operations when evaluating the need for traffic calming and use sound engineering judgment when selecting a traffic calming measure.

With respect of new developments, it is expected that the design of new road networks and subdivisions will include features that maintain operating speeds below target thresholds thus allowing for a more efficient use of the Town's resources. Furthermore, standardizing a proactive approach for a new development design to be specific, yet easy to understand and apply, can result in further efficiency gains for developers and the Town.

Using a standardized set of design principles, new subdivisions may have built-in speed reducing features that will ensure vehicle speeds remain below acceptable speeding thresholds and reduce, or even eliminate, the need for expensive retrofits.

2 Introduction

Traffic calming refers to measures aimed at improving safety for all road users by reducing speed and encourage safe driving.

The Town of Caledon has experienced a population increase and will continue to grow as development continues to be built. This corresponds with the Town's Transportation Master Plan recommendation to investigate the need for traffic calming measures to reduce the adverse effects of motorized vehicle use, which include excessive speeding and cut-through traffic.

The Strategy provides the Town with a systematic process to follow in the development of traffic calming plans to address public concerns related to traffic calming issues. The Strategy outline a five-step process to determine if a traffic calming plan is needed and, how to go about developing and implementing that plan.

2.1 Goals and Objectives

The goal of the Town's Traffic Calming Strategy is to incorporate best practices in traffic calming with local context to provide a more appropriate, efficient, and flexible framework to address the variety of traffic complains relating to excessive speeding, traffic infiltration and collision frequency.

To accomplish this goal and development of the Town's Traffic Calming Strategy considered the following objectives:

- Provide an established process to fairly evaluate all neighbourhood requests for the installation of traffic calming measures;
- Determine what type of calming measures can be used – where deemed appropriate – to improve safety for all road users on Caledon;
- Avoid adversely affect operational costs and Emergency Services;
- Develop a proactive approach towards implementing traffic calming measures; and
- Achieve the “5E” approach to traffic safety: Engineering, Education, Enhancement, Enforcement, and Evaluation.

2.2 What is Traffic Calming

Traffic calming involves implementing safety measures or programs to reduce speed and encourage safe driving behaviour for the conform of all road users.

These negative effects are usually associated with excessive vehicle speed and, in some instances, the impacts of cut through traffic in a neighbourhood. A successful traffic calming program is one which will alter the street in such a way that motorists will

drive slower, exercise caution, and bring the street back closer to its intended use while limiting the negative effects on emergency response agencies and operational costs.

To successfully achieve this objective, traffic calming usually involves the following measures:

- Installation of visual treatments that may include entrance or gateways features, roadside trees, and/or ground cover;
- Changes to the roadways texture and/or colour;
- Changes to the vertical and/or horizontal alignment of the roadway; and
- Changes to the travelled portion of the roadway through pavement and/or lane narrowing, such as vertical centre line treatment;
- Enforcement and Education (i.e. radar speed signs)

2.3 Why is a Traffic Calming Policy Necessary?

Traffic Calming may be necessary when the amount of vehicular traffic, speed levels, and/or observed driver behaviour does not correspond with the type of roadway, the context of the surrounding areas, or the activities of other roadway users.

Although introduction of traffic calming measures can mitigate the negative effects of motor vehicle use, they can also have potentially negative effects on other modes of transportation, operations and maintenance activities conducted by the road authority, and emergency vehicle response times.

Depending on the location, some traffic calming measures can be difficult to implement or the cost for implementation (monetary and operational) may be incompatible with public expectations and Town's allocated budget.

As such, the Town of Caledon's traffic calming Strategy is intended to:

- Support the decision-making process from the moment that a traffic related issue is identified to implementation of the selected measure;
- Inform the general public about the different elements composing the traffic calming review process; and
- Promote a fair allocation of financial resources through an incremental implementation of required traffic calming measures.

2.4 Traffic Calming Principles

The following principles are generally applied by road authorities, including the Town of Caledon, when selecting and implementing traffic calming measures. This ensures that

appropriate traffic calming measures are selected, they are compatible with the community's needs, and any potential negative impacts are minimized.

While each situation is unique, the principles of traffic calming are relevant to each situation. Application of these principles will maximize effectiveness of the traffic calming plans and help build community acceptance and support of the final traffic calming plans.

Those principles consider that traffic calming is only applicable when the results of a traffic study indicates an 85th percentile speed greater than 15 km/h over the posted speed limit. The 85th percentile speed is defined as the speed at or below which 85 percent of all vehicles are observed to travel under free-flowing conditions (i.e. unaffected by slow traffic or poor weather) past a monitored point.

2.4.1 Identify the Real Problem

It is important to identify the real problem so that appropriate traffic calming measures are selected. Traffic issues or road safety issues can be emotional subjects for many people; it is important to keep the issues and problems in perspective to maximize the limited resources on proven problems and not perceived problems.

2.4.2 Quantify the Problem

To select the appropriate measure(s), it is important to quantify the extent of the problem. This requires gathering data, including traffic counts, speeds, accident data, and pedestrian usage, while also taking into consideration the adjacent land uses of the subject road, including the presence of schools, parks, and other pedestrian generators.

2.4.3 Maintain and Minimize Impacts on Delivery of Emergency Services

Consideration of emergency services when identifying appropriate traffic calming measures for implementation will minimize delays/impacts to these services. This will also aid in building support for traffic calming in general. When selecting traffic calming measures, staff will strive to balance the needs of these services with slowing traffic on residential streets. In addition, the Town will work with Fire, Emergency Services and Road Operations to ensure that any negative impacts resulting from the implementation of traffic calming measures are minimized.

2.4.4 Maintain and Minimize Impacts on Delivery of Public Services

Consideration of snow plowing, street sweeping, drainage, waste collection, and school bus services when identifying appropriate traffic calming measures for implementation will minimize delays/impacts to these services.

2.4.5 Minimize Impacts on Adjacent Residential Streets

Prior to considering traffic calming, any potential negative impact on adjacent streets must be considered. Impacts may include traffic diverted to another street or changes in turning movements with increased delays at other intersections. These effects will be considered in advance of approval so that traffic calming solutions do not create or exacerbate existing problems.

2.4.6 Target Automobiles and Not Non-Motorized Modes

The purpose of traffic calming is to reduce the negative affects of motor vehicles while improving conditions for other road users. Traffic calming measures will be designed to permit cyclists and pedestrians to travel unaffected, while slowing down motor vehicles.

2.4.7 Monitor and Follow-up

It is important to report to Council and the community the successes of implemented traffic calming measures. It also provides an opportunity to receive adverse community reactions and allows the community to provide feedback and identify any measures which do not produce the desired results.

Comparable traffic volumes, speed, and collision data will be collected before and after implementations.

2.5 Review of Industry Standard and Best Practices

To support the identification of elements within the Urban Traffic Calming Manual that required changes, a review of industry standards and best practices was completed as part of the update process.

The review was complete in three phases:

- A Literature Search to identify technical elements that may be considered as part of the review and update process;
- A review of recent efforts conducted by the Town related to Traffic Calming; and

- A Jurisdictional Scan to identify the main elements of the traffic calming review and implementation process currently conducted by other municipalities in the Province of Ontario.

2.5.1 Literature Search

The literature search conducted as part of this assignment focused on policies and communication campaigns, as well as engineering, education, and enforcement measures associated with traffic calming. It identifies, to the best of our ability, information regarding elements that (1) are already included as part of the current Manual and, (2) elements that, although not currently included as part of the Manual, are in use provincially and nationally.

The following points summarize the main findings of the literature search:

- **Limited evidence-based information regarding the effects of traffic calming.** Many jurisdictions in Canada and the U.S. have implemented traffic calming measures since the Manual was prepared in 2004, but few have documented their existence and effectiveness. Thus, only anecdotal information is available in most cases. Although sources of information regarding the use and implementation of traffic calming treatments are expanding, the number of articles and/or reports describing the results of well-constructed evaluations is still limited and has mostly been conducted as part of academic research;
- **Information regarding the use of engineering measures is the most prevalent.** Although a number of road jurisdictions recommend the use of educational and enforcement measures prior to the implementation of engineering measures, the effects of those types of measures are mostly presented from a qualitative perspective;
- **Interaction between traffic calming and other modes of transportation is limited.** The impacts on transportation modes other than vehicular traffic is mostly discussed at treatment level (site specific);
- **Traffic calming campaigns should convey a constructive message** – based on empirical research regarding how dangerous driving behaviour impacts everyone;
- **Traffic calming campaigns should focus their messaging to specific targets.** Rather than an encompassing campaign, communication should focus on specific road users and locations where dangerous driving behaviour is occurring; and
- **Traffic calming campaigns are effective when residents are well informed about what traffic calming measures look like and how they work.** This is

best when done through a variety of print and digital media that clearly conveys information about traffic calming

2.5.1.1 TAC Canadian Guide to Traffic Calming – Second Edition

The literature search also included the review of the recently updated Transportation Association of Canada (TAC)'s Canadian Guide to Traffic Calming (the TAC Guide) which provides guidance for the application of traffic calming measures on neighbourhood local/collectors, and urban and rural arterials.

The updated version of the TAC Guide identifies the purpose of traffic calming as the restoration of streets to their desired function. This function is to provide both mobility and access, but in differing combinations, depending on the specific location, role, and classification of the street.

The TAC Guide also established model procedures for developing and implementing a traffic calming plan in response to community traffic concerns through a 5-stage process. This process is schematically presented in **Figure 1**.

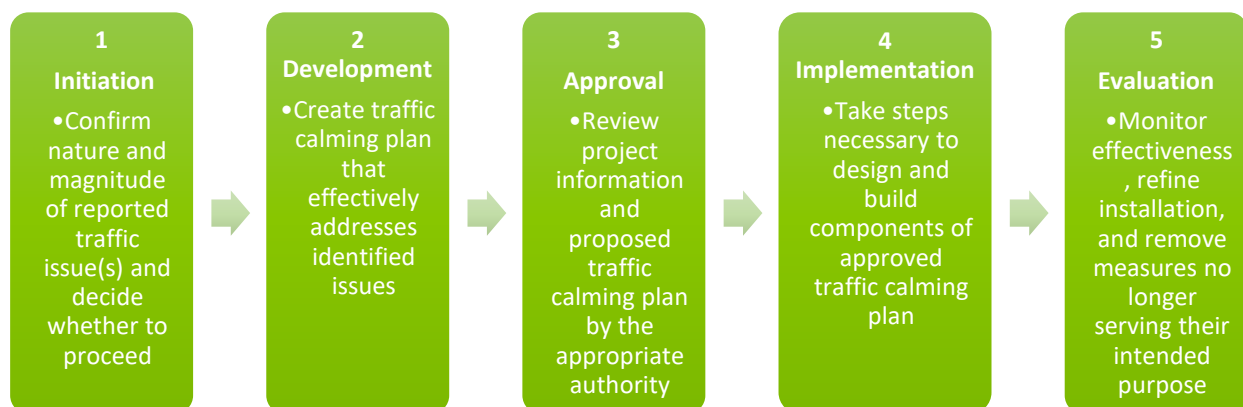


Figure 1 - TAC Traffic Calming Process and Procedures

2.5.1.2 FHWA – Speed Management: A Manual for Local Rural Road Owners

Extensive research, completed in 2012 by the U.S. Department of Transportation Federal Highway Administration (FHWA), regarding traffic calming on main roads through rural communities (e.g. villages and hamlets in the context of the Town of Caledon) identified that this type of roads presents both an enforcement challenge for the community and a perceived safety issue for the general public.

The Manual indicates that trying to solve an identified speeding problem along this type of rural corridor through law enforcement alone generally leads to an increase in compliance with the posted speed followed by a quick return to the speeding behaviour after enforcement is terminated.

Acknowledging that this type of roadway not only serves local traffic, but also provides connectivity to the rest of the community at a relatively higher speed, the Manual discuss the use of the following set of measures:

- Installation of traffic control devices to reduce speed: advisory speed signs including pavement marking and speed activated signs;
- Changes on road design: lane narrowing, road diet;
- Road rehabilitation or reconstruction: horizontal deflections, vertical deflections, gateways;
- Enforcement: traditional and automated enforcement; and
- Education: public information and educational campaigns.

The Manual recommends measures that can be implemented quickly such as colored pavement and/or physical lane narrowing and signing, rather than deflection measures that may require road reconstruction.

The Manual states that ‘changing the look and feel of the road, the installation of this type of traffic calming measures transmits a message to the drivers that the function of the road is changing and may reinforce the need to reduce speed’.

2.5.2 Town of Caledon Current Practices

The Town of Caledon currently addresses traffic calming requests on an ad hoc and independent basis. Staff undertake a traffic study, develop options to address any issues identified and implement. However, as the number of requests has increased over the past few years, it is prudent to establish a formal guidelines to ensure consistency in the analysis and application of traffic calming measures, and prioritize requests.

2.5.3 Jurisdictional Scan

A review of publicly available information regarding traffic calming policies and regulations recently implemented by several municipalities of the Province of Ontario was completed to provide answers to the following questions:

- Which are the most common elements of the traffic calming process? and
- How the traffic calming process is implemented?

The results of the jurisdictional scan are summarized below:

- **Use of specific thresholds as part of a pre-screening process.** All municipalities identified a set of values for specific elements of the roadway system. If characteristics of the location under review does not match those

thresholds, the request for traffic calming is refused. The most common elements identified as part of the pre-screening process are:

- Grade;
- Traffic volumes (vehicles per day);
- Block length;
- Speed;
- Collision Data; and
- Presence of other roadway users (i.e. pedestrians and cyclists).
- **Use of a Scoring and Ranking System.** Most of the municipalities have implemented a scoring/ranking system to help them to prioritize sites with higher degrees of concerns as well as to efficiently allocate resources. Elements considered as part of the scoring and ranking process are:
 - School zones, parks, or designated pedestrian crossings;
 - Road classification;
 - Intensity of speeding;
 - Traffic volumes;
 - Number of collisions; and
 - Percentage of cut-through traffic.
- **Public Input.** Involvement of general public as part of the traffic calming process varies from minimal engagement to extensive participation during the entire evaluation and implementation process.
- **Information regarding Traffic Calming Measures.** Most of the municipalities provide a table describing the list of possible measures. Additional details for each type of measure varies from a list of measures to a full description of each measure – applicability based on the type or road, and an estimated cost range.
- **Use of a standardized Traffic Calming Warrant Process.** Most of the municipalities identified a specific approach to determine if a traffic calming request is warranted. Although elements of the warrant vary depending of the municipality, the following are the most common:
 - Petition of residents or identification of a location based on internal process;
 - Confirm if the location is suitable for traffic calming;
 - Complete a traffic operations review;
 - Ensure that technical and safety warrants are met;
 - Identify the most suitable type of traffic calming measure;

- Complete ranking process;
- Approval; and
- Implementation and evaluation of measure(s).

2.6 Applications

Since traffic calming measures should not be applied to all types of roadways for a variety of operational and public safety reasons, specific installation criteria (as schematically presented in **Figure 2**) should always be met and adhered to.

- **Rehabilitation vs Roadway Reconstruction:** Traffic calming measures that involve physical interventions (e.g. horizontal deflection) will be limited to roadways considered for reconstruction as part of new or capital projects, as they usually require detailed engineering designs and take time to be implemented.
- **Urban vs Rural Environment:** Aside of the road classification and its related geometric characteristics, the environment surrounding the roadway limits the type of traffic calming measures suitable for each location. For rural environments in which the roadway network plays the dual role of connecting different sections of the Town at relatively high speeds and main roads to hamlets and villages, traffic calming measures that involve physical interventions (e.g. horizontal deflection) should be implemented with care and further site investigation to ensure it does not create any barriers for farm vehicles and trucks.
- **Grade:** If the grade of the roadway is equal to or greater than the maximum threshold of 8%, the location will not be considered for implementation of traffic calming measures. This is due to the fact that traffic calming devices implemented on steep grades could cause safety concerns.
- **Block Length:** If the distance between consecutive controlled intersections along the requested route (measure from stop bar to stop bar: intersections with stop control on only the side street are not considered) is shorter than 110 m, the location will not be considered for implementation of traffic calming measures. One of the main goals of traffic calming is to reduce speeds by using physical interventions to influence driver behavior. At locations where, for example, the distance between two adjacent controlled intersections is too short, drivers may not have sufficient space to develop high speeds before having to slow down again for the next intersection (i.e. a minimum amount of space is required to build up speed to contribute to a problem).
- **Daily Traffic Volume:** If the average daily traffic (ADT) along the roadway section is less than 750 ADT for a local road or 1500 ADT for a collect road the location will not be considered for implementation of traffic calming measures, and speeding issues should be addressed through enforcement.

- **Collision Data:** If the number of qualifying collisions within the past three years is equal to or greater than the maximum threshold, the location should be considered for review as part of the scoring process. The collision data threshold was determined to be 6 local roads and 11 for collector roads after reviewing a 3-year midblock collision dataset within the Town.
- **Speed:** If the results of the traffic study indicates an 85th percentile speed greater than 15 km/h over the posted speed limit, the location should be considered for review as part of the scoring process.

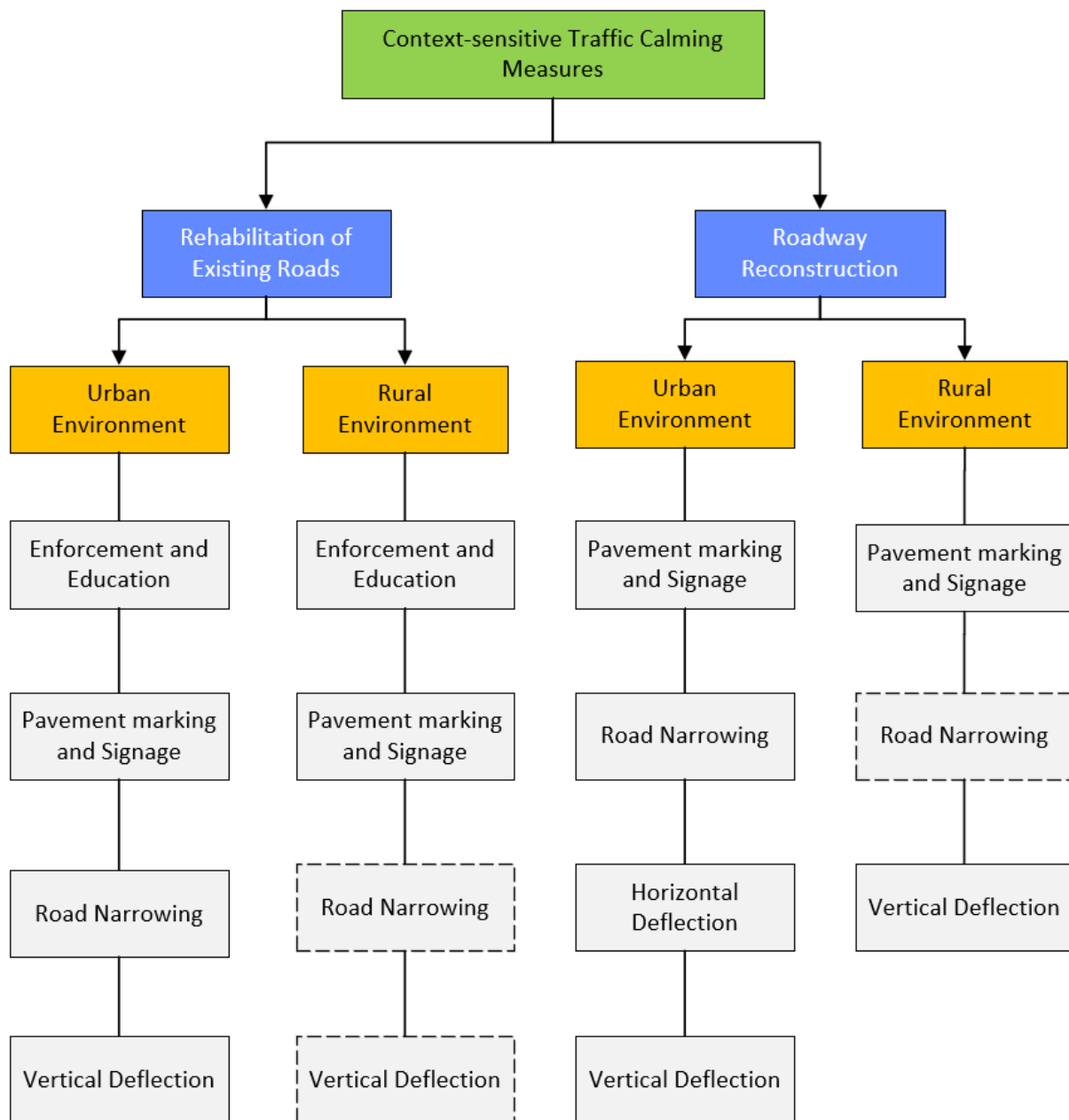


Figure 2 - Caledon – Context-Sensitive Traffic Calming Measures

Dotted line above indicated measures that should be applied subject to further and site investigation with caution. In addition to the criteria listed previously, if Town staff understand that, based on existing conditions, traffic calming is not the best strategy to address the request, the subject location will be ineligible for traffic calming.

Examples of existing conditions for which traffic calming may not be the best strategy include:

- Where the location presents a sequence of small-radius curves;

- Where the location presents visibility and movements restrictions;
- Where the location is a gravel road;
- Cul-de-sac;
- Where roadway network improvements could reduce cut-through traffic and volumes, potentially solving the concern that originated the request.

Additional conditions may also be considered incompatible with traffic calming measures based on engineering judgement.

A speeding issue of this magnitude may indicate an inconsistency between the existing speed limit and the design and/or function of the road, and a more detailed study is recommended.

3 Public Consultation and Engagement

During the completion of this assignment, a robust engagement program, supported by best practice research, was undertaken. This engagement program was designed to generate conversation about speeding in Caledon and collect feedback on how speeding and traffic issues in communities across the Town should be addressed.

The engagement program was developed to ensure that residents, businesses, visitors, and other stakeholders were made aware of traffic calming efforts in Caledon and were provided with the opportunity to provide their feedback to influence the conversation. A secondary goal of engagement was to gain insight into the reasons why people speed in Caledon.



3.1 Communication Methods

The project team used a mix of print and digital media for communicating the purpose, process, and how to get involved in the Traffic Calming Study including:

- A **project webpage** (<http://caledon.ca/TrafficCalming>) provided updates, information, and digital engagement opportunities, including FAQs background information, project documents, and an overview of the project purpose and process;
- Dedicated **social media** accounts (@YourCaledon) were used to promote the project and encourage participation; and
- **Information postcards** were distributed for public events and included project information and instructions as to how to access the digital engagement platform.

3.2 Engagement Activities

The project team developed a variety of ways for participants to provide their ideas including:

- Two **Coffee with Council Events** hosting informal conversations between the project team and residents about a series of questions on traffic and road behaviour.

- A **Safety and Speeding Sign Design Contest** was held to create new eye-catching signs to encourage drivers to slow down and drive mindfully through school zones. All designs were created by students at Allan Drive Public School.
- **Digital Engagement** using an online survey and Social Pinpoint to provide comments on an interactive map.
- A **Pop-Up Booth at Caledon Day** to gather feedback and vote on participants' favourite "Slow Down" sign, as designed by local students.

3.3 Engagement Feedback

Over 900 participants provided input: this input is reflected in the Traffic Calming Study's engagement findings and recommendations. Participants provided several key insights in their feedback including the following:

- Traffic calming in Caledon should ensure that drivers obey the posted speed limit through the use of both physical changes to street design and traffic safety campaigns to improve community safety;
- Drivers speed for different reasons including a lack of enforcement, rushing, road design, and social pressure;
- Different types of dangerous driving behaviour can be found across Caledon including speeding throughout the Town, street racing on the Forks of the Credit Road, disobeying stop signs, tailgating, and speeding in school zones and near community spaces such as parks;
- Traffic calming initiatives such as speedbumps and flashing lights have helped remediate speeding issues. Some also mentioned unpaved roads as contributing to reduced speeds in some areas; and
- The Town of Caledon should make traffic calming around school zones its top priority.

3.4 Traffic Calming Toolkit

Responding to community feedback and insight on the Town's road conditions, a Traffic Calming Toolkit was developed to provide information on traffic calming techniques and included materials to raise awareness and inform the public about localized dangerous driving behaviour and how to address concerns.

Caledon's Traffic Calming Toolkit includes the following:

Toolkit Item	Intended Use
“Slow Down, Think of Us” lawn sign	Remind drivers to drive according to the speed limit and road conditions.
Traffic calming awareness materials including information handout cards, webpage content and social media messaging	Provide information and educate the public about what traffic calming is, why it’s important, what techniques are used to address concerns, and where to get more information.
Information on the traffic calming request process employed by the Town of Caledon	Provide information on how traffic calming requests are reviewed and assessed by Town of Caledon staff.
A traffic concern reporting form	Provide an easy-to-use form for consistent reporting of traffic concerns, including identifying the type of behaviour, the time of day, the behaviour witnessed, and the location.

Information collected and generated during the public consultation and engagement process is provided as part of **Appendix B**.

4 Traffic Calming Warrant Analysis

4.1 Methodology

The Traffic Calming Warrant Analysis will be completed in accordance with the flowcharts provided in this section. The flowcharts detail the procedure by which each request for traffic calming will be evaluated on a first-come first-served basis and will be subject initially to traffic studies, minimum justification criteria, evaluation process, feasibility of treatments, and funding availability. (See **Figure 3 to 5**)

The process can be initiated by an application from members of the public, as described in **Section 4.1.1**, or by Town staff as part of a proactive effort to identify “hot spot” areas in Caledon that may benefit from traffic calming.

The Town collects and receives traffic related data from other agencies (volume, classification, speed, collisions) and maintains a database of this information to assist in the analysis and identification of candidate locations for traffic calming.

When a candidate location is identified via this proactive approach, it will be assessed following the same process as requests initiated by members of the public, as described in the following sections. No preference will be given to locations identified via this proactive approach over requests from the public. Although they are initiated through different channels, they will be added to the same scoring process and served based on their resulting score.

All traffic calming measures involving vertical deflection such as speed hump/bump will be circulated to Fire and Emergency Services, and the Town’s Road Operations for their feedback. Discussions with the Emergency services will determine how to minimize the negative impacts of implementing vertical deflection traffic calming measures.

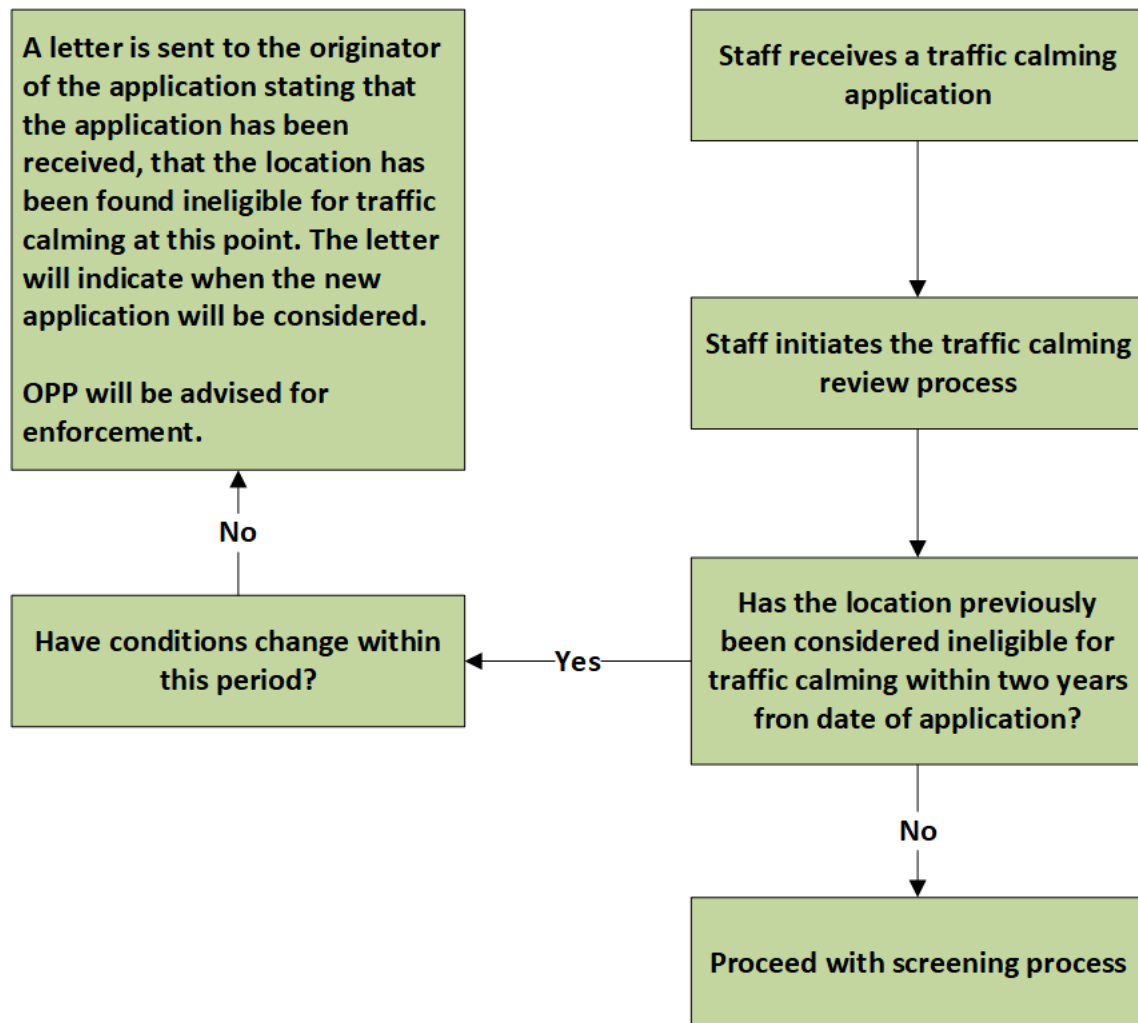


Figure 3 - Traffic Calming Warrant Analysis Methodology (Step 1 – Request for Traffic Calming)

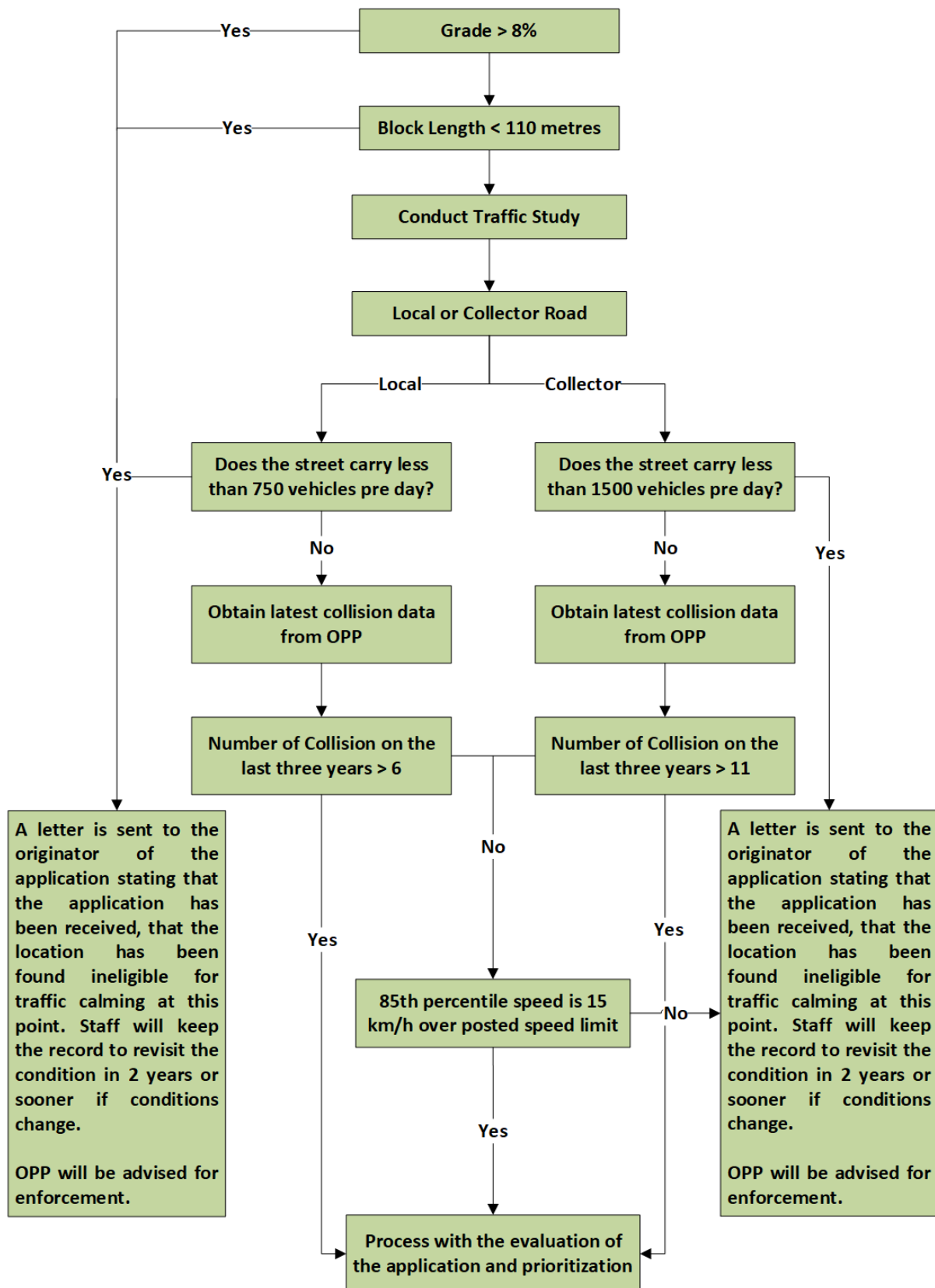


Figure 4 - Traffic Calming Warrant Analysis Methodology (Step 2 – Screening Process)

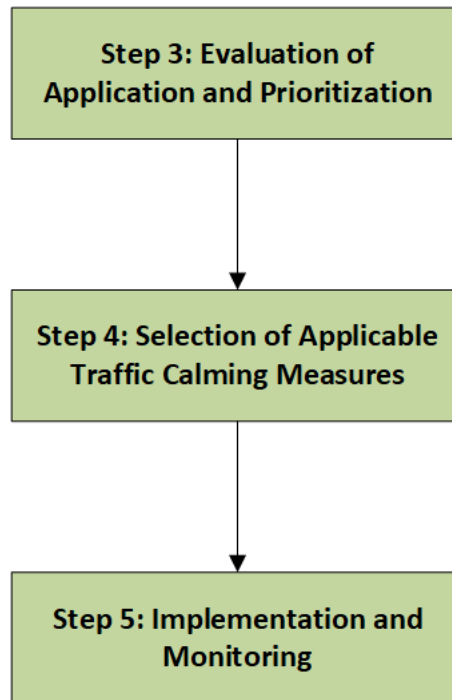


Figure 5 - Traffic Calming Warrant Analysis Methodology (Steps 3 to 5)

4.1.1 Step 1. Request for Traffic Calming

When the process is initiated, a completed “Traffic Calming Application” must be received by Staff (**Figure 6 and 7**). The application requires the applicant to describe the location where traffic calming measures are being requested and select the issues that most accurately describe the nature of the traffic concern.

New applications for locations that were previously determined to be ineligible for traffic calming measures will be kept in records to be reviewed and revisited after 2 years beginning at the date of the original application, unless conditions change. If this is the case, staff will send a response letter to the applicant indicating that the application has been received and that the location has been found ineligible for traffic calming and will also indicate when a new application will be considered.



Traffic Calming Request Form

Please provide, in as much detail as possible, information about your traffic calming request.
Responses from these forms will be reviewed by Town of Caledon Staff.

Your Name:

Your E-mail:

Your Full Address (including postal code):

Your Telephone Number:

What is the location zone of your traffic concern/issue?

(Please select all that apply):

- | | |
|---|---|
| <input type="checkbox"/> School Zone | <input type="checkbox"/> Hamlet/Village |
| <input type="checkbox"/> Park/Community Centre | <input type="checkbox"/> Road with Limited Visibility |
| <input type="checkbox"/> Seniors Home | <input type="checkbox"/> Unsure |
| <input type="checkbox"/> Community Safety Zone ¹ | <input type="checkbox"/> Other (please specify) |
| <input type="checkbox"/> Subdivision | <hr/> |

What is the location you would like investigated?

(Please indicate either an intersection or a segment of road between two intersections)

¹ Defined as a roadways near schools, daycare centres, playgrounds, parks, hospitals, senior citizen residences and may also be used for collision-prone areas within a Community

Figure 6 – Traffic Calming Request Form (Part 1)



What is the priority traffic concern/issue?

(Please select any one of the following traffic concerns):

- | | |
|--|--|
| <input type="checkbox"/> High speed | <input type="checkbox"/> Cut-through traffic |
| <input type="checkbox"/> Pedestrian safety | <input type="checkbox"/> Collision concern |
| <input type="checkbox"/> High volume of automobile traffic | <input type="checkbox"/> Other _____ |

Which seasons does the problem occur (please select all that apply):

- | | |
|---------------------------------|---------------------------------|
| <input type="checkbox"/> Summer | <input type="checkbox"/> Fall |
| <input type="checkbox"/> Spring | <input type="checkbox"/> Winter |

When does the problem typically occur? (please select all that apply):

- | | |
|--|--|
| <input type="checkbox"/> Early morning | <input type="checkbox"/> Afternoon rush hour |
| <input type="checkbox"/> Morning rush hour | <input type="checkbox"/> Late evening |
| <input type="checkbox"/> Mid-day | |

Please provide any additional information in the space provided below.

Thank-You for your Feedback Message

Thank you for taking the time to report your traffic calming request. These requests will be reviewed by Town of Caledon Staff to better understand how traffic calming can be implemented going forward.

For more information about traffic calming including the process for reporting a concern, measures to address traffic calming issues and other materials please visit <http://caledon.ca/TrafficCalming>

Figure 7 – Traffic Calming Request Form (Part 2)

4.1.2 Step 2. Screening Process

Staff will review the location to determine if the roadway meets the criteria for implementing traffic calming measures.

The screening process sets requirements that must be met for a location to be eligible for traffic calming measures involving physical interventions: i.e., horizontal deflection, vertical deflection, roadway narrowing, pavement marking or enforcement. The screening criteria will also help identify whether a more complex issue exist that may need to be addressed using a different approach.

Screening criteria include:

- **Grade:** if the grade of the roadway is equal to or greater than the **maximum threshold of 8%**, the location will not be considered for implementation of traffic calming measures.
- **Block Length:** if the distance between consecutive controlled intersections along the requested route is **shorter than 110 m**, the location will not be considered for implementation of traffic calming measures.
- **Speed:** the 85th percentile speed should be 15km/h over the posted speed limit, in order for locations to be considered for implementation of traffic calming measures. 85th Percentile is the speed that 85% of vehicles are observed to travel below that speed.
- **Daily Traffic Volume:** if the average daily traffic (ADT) along the roadway section is **less than 750 ADT for local roads**, and **1500 ADT for collector roads** the location will not be considered for implementation of traffic calming measures.
- **Collision Data:** If the number of qualifying collisions within the past three years is equal to or greater than the maximum threshold, the location should be considered for implementation of traffic calming measures. The collision data threshold was determined to be **6 local roads and 11 for collector roads** after reviewing a 3-year midblock collision dataset within the Town. The latest Collision data should be obtained from OPP.

4.1.2.1 Traffic Study

As a part of the review, Town staff will complete a volume and speed study to determine 85th percentile speed, daily volumes, and peak hour volumes present at the location under review. If the traffic study indicates an 85th percentile speed lower than 15 km/h over the posted speed limit, the location will not be considered for implementation of traffic calming measures.

If any of the screening criteria is not met, Town staff will send a response letter to the applicant indicating that, based on the data collected, the location is not considered to present a speeding concern and therefore is not eligible for traffic calming.

4.1.3 Step 3. Evaluation of Application and Prioritization

Applications that present a speeding issue that can be addressed by traffic calming will be evaluated based on the context-sensitive traffic calming measures and prioritization according to points for each of the criteria shown in the tables below. **Table 1** refers to urban road segments and **Table 2** refers to rural road segments.

Pilot testing was conducted in order to ensure that the selected scoring system (points awarded for each criterion, maximum points awarded for each criterion, and overall score threshold) are adequate and can fairly address traffic calming requests among rural and urban areas. The pilot testing involved reviewed data from multiple locations and refinement of the scoring system to avoid the following situations:

- Number of points awarded for a specific criterion reaching the maximum for a disproportionate number of candidate locations (either too high or too low);
- Overall score threshold making a disproportionate number of locations eligible or not eligible for traffic calming; and
- Single criterion (such as traffic speed or traffic volumes) score making a candidate location eligible or ineligible for traffic calming, regardless of the scores obtained by other criteria.

Table 1: Evaluation of Urban Road Segments

Factor	Point Criteria	Maximum Points
Traffic Speeds	1 point for every 1 km/h the 85 th percentile speed is above the posted speed limit	25
Traffic Volumes	Local: 1 point for each 50 vehicles above 750 vehicles per day Collector: 1 point for each 100 vehicles above 1500 vehicles per day	20
Collision data	5 points to any location where there is any number of accidents disregarding the cause of the collision.	5
Pedestrian Generators or Facilities	5 points for each school, park, or designated pedestrian crossing within the study area (other Pedestrian Generators may be defined by the Town)	10
Bicycle Facilities or Routes	10 points if bicycle lanes, multi-use trails, or designated routes or trails are present in the study area	10
Adjacent Land Uses	1 point for each 20% of residential land use	5

Table 2: Evaluation of Rural Road Segments

Factor	Point Criteria	Maximum Points
Traffic Speeds	1 point for every 1 km/h the 85 th percentile speed is above the posted speed limit	25
Traffic Volumes	Local: 1 point for each 50 vehicles above 750 vehicles Collector: 1 point for each 100 vehicles above 1500 vehicles	20
Collision data	5 points to any location where there is any number of accidents disregarding the cause of the collision.	5
Pedestrian Generators or Facilities	5 points if schools, parks, or designated pedestrian crossings are present in the study area (other Pedestrian Generators may be defined by the Town)	10
Bicycle Facilities or Routes	5 points if bicycle lanes, multi-use trails, or designated routes or trails are present in the study area	10
Driveway Density (ρ, driveways per km)	<ul style="list-style-type: none"> - 0 points if $\rho < 0.5$ - 1 point if $0.5 \leq \rho < 6.5$ - 2 points if $6.5 \leq \rho < 11$ - 3 points if $11 \leq \rho < 18.5$ - 4 points if $18.5 \leq \rho < 24.5$ - 5 points if $\rho \geq 24.5$ 	5

The total number of points (score) determines ranks and priority of locations for implementing traffic calming measures as part of roadway rehabilitation or if the location needs to be considered as part of road reconstruction projects.

The appropriate measures will be selected based on the specific characteristics of the road segment.

4.1.4 Step 4. Selection of Available Traffic Calming Measures

Based on the results of the evaluation and prioritization process, Staff will review the list of available traffic calming measures as part of the Traffic Calming Toolbox and determine the most appropriate measure(s) based on the characteristics of the identified location.

The Town's Traffic Calming Toolbox was developed based on the content and recommendations of TAC's Canadian Guide to Traffic Calming and customized to

address the Town's context-sensitive approach to traffic calming, as described in **Section 2.6** of this document.

4.1.4.1 Type of Road and Environment

Caledon Traffic Calming Strategy is a context-sensitive and balanced approach for initiation, investigation, implementation and monitoring of traffic calming measures within residential areas and on connector roads. Also, traffic calming is an incremental process and over-deployed measures is as less effective as under-deployed measures as it may divert traffic to adjacent roads and effectively, shift the issue to somewhere else. Therefore, it is critically important to adopt a context-sensitive measures to achieve the best outcomes.

For example, If a traffic calming project is being considered on a road, a comprehensive solution that will benefit adjacent streets, and not just the subject street, must be considered. Town staff should perform the investigation of the subject street and the area to identify the locations of measures. traffic calming is typically applied only to roads in urban areas, and not in rural or agricultural areas. Speed reduction on rural roads presents specific challenges that may be better served through increased enforcement or possibly changes to the road's design.

For rural locations, the selection of traffic calming measures needs to consider the potential effect on drivers, vehicular traffic, and other roadway users. For example, farm vehicles and heavy truck traffic are normally present on this type of environment and must be accommodated. Similarly, although the benefits of traffic calming in reducing the frequency and severity of collisions, especially involving pedestrians and cyclists, are indisputable, increasing emergency response times and the resulting outcomes at emergency scenes due to implementation of traffic calming measures, should also be considered.

4.1.4.2 Traffic Calming Measures

As described in the TAC Guide, timing of implementation of traffic calming measures not only depends of the type of measure but also of funding availability. The TAC Guide states that measures that do not require detailed engineering or which can be conducted as part of the standard operational and maintenance process can often proceed more expeditiously.¹

This type of traffic calming measure includes enforcement, education, pavement marking, road narrowing, vertical centreline treatment, and vertical deflection.

- **Enforcement:** intended to modify driver behavior/speeding. Enforcing through OPP, using warranted All-Way Stop Controls, Automated Speed Enforcement (ASE) and designation of an area Community Safety Zone designation are major

¹ Transportation Association of Canada, "Canadian Guide to Traffic Calming", Second Edition, 2017

measures under this category. Community Safety Zones help to change driver behaviour, including reducing speed and distracted driving, and improving safety on certain sections of road where safety of vulnerable road users is of special concern. Community Safety Zones may include roadways near schools, day care centres, playgrounds, parks, hospitals, senior citizen residences. Community Safety Zones is to indicate to the motorist that they are within a zone where fines have been increased through a special designation under the Highway Traffic Act.

Automated speed enforcement (ASE) is a modern and newer tool used to help enforce speed limits in school zones and community safety zone. As per the Safer School Zone Act, ASE can only be installed within those areas.

- **Education:** Measures such as Speed Radar Signs and Variable Message Signs aim at informing drivers about their over speeding instantly.
- **Pavement Marking and Road Diet:** Pavement Markings follow the same basic principle as vertical deflections in that the driver is expected to lower vehicular speed to avoid unpleasant sensations when traversing the measure. However, vertical deflection measures effectively raise the vehicle when driven over, while Pavement marking generally does not cause vibration.
- **Road Narrowing:** intended to increase drivers' feeling of "confinement", resulting in reduced speeds.
- **Vertical Deflection:** cause a vertical upward movement of the vehicle, generally resulting in lowered vehicle speeds because motorists slow to avoid unpleasant sensations when traversing the measure.
- **Horizontal Deflection:** Cause a horizontal change in a road alignment such as roundabouts. Physical Horizontal Deflection such as roundabouts, chicanes, curb extensions, curb radius reduction and other traffic calming measures cause a change in a road alignment and the path of a vehicle, and speed reduction accordingly. However, due to the characteristics of this type of traffic calming measures, implementation of this type of measures require detailed engineering, land and times to be implemented and as such, should be considered as a part of road reconstruction of capital projects and EA studies.

Following the TAC Guide's recommendations and based on the restrictions imposed by the type of environment (urban and rural), as well as timing for implementation (road rehabilitation or reconstruction), the traffic calming measures presented in **Tables 3 and 4** were integrated as part of the Town of Caledon's Traffic Calming Toolbox.

Table 3: Town of Caledon, Traffic Calming Toolbox – Road Rehabilitation

Measure		As part of Rehabilitation of Existing Roadways			
		Urban Streets		Rural Streets	
		Local	Collector	Local	Collector
Vertical Deflection	Speed Cushion	✓	▲	✓	▲
	Speed Hump	✓	▲	✓	▲
	Speed Table	✓	x	✓	x
	Raised Crosswalk	✓	▲	▲	x
Roadway Narrowing	Curb Extension	✓	✓	x	x
	Lane Narrowing	✓	✓	▲	▲
	Raised Median Island	✓	✓	x	x
	Vertical Centreline Treatment	✓	✓	▲	▲
Pavement Marking and Road Diet	Textured Crosswalk	✓	✓	▲	▲
	Texture Pavement	✓	✓	✓	✓
	Converging Chevrons	✓	✓	✓	✓
	Dragon's Teeth	✓	✓	✓	✓
	Full-Lane Transverse Bars	✓	✓	✓	✓

Measure		As part of Rehabilitation of Existing Roadways			
		Urban Streets		Rural Streets	
		Local	Collector	Local	Collector
	On-Road Sign Pavement Markings	✓	✓	✓	✓
	Peripheral Transverse Bars	✓	✓	✓	✓
Enforcement and Education	Conventional Enforcement	✓	✓	✓	✓
	Radar Speed Signs	✓	✓	✓	✓
	Lawn Signs Encouraging Slower Driving	✓	✓	✓	✓
	Mobile Changeable Message Signs	✓	✓	✓	✓
	Warranted All-Way Stop Control	✓	✓	✓	✓
	Community Safety Zone Designation*	✓	✓	✓	✓
	Automated Speed Enforcement **	✓	✓	✓	✓
✓ = Appropriate Measures ▲ = Use with Caution ✗ = Not Recommended					

* At locations where safety is of major concerns, e.g. community centres, schools, playgrounds, etc.

** At Community Safety Zones and School Zones only.

Table 4: Town of Caledon, Traffic Calming Toolbox – New or Road Reconstruction

Measure		As part of Rehabilitation of Road Reconstruction			
		Urban Streets		Rural Streets	
		Local	Collector	Local	Collector
Horizontal Deflection	Chicane, 1-Lane	✓	✓	✗	✗
	Chicane, 2-Lane	✓	✓	✗	✗
	Curb Radius Reduction	✓	✓	✗	✗
	Traffic Circle	✓	✓	✗	✗
	Mini Roundabout	✓	✓	✗	✗
Vertical Deflection	Speed Cushion	✓	▲	✓	▲
	Speed Hump	✓	▲	✓	▲
	Speed Table	✓	✗	✓	✗
	Raised Crosswalk	✓	▲	▲	✗
Roadway Narrowing	Curb Extension	✓	✓	✗	✗
	Lane Narrowing	✓	✓	▲	▲
	Raised Median Island	✓	✓	✗	✗
	Vertical Centreline Treatment	✓	✓	▲	▲
Pavement Marking and Road Diet	Textured Crosswalk	✓	✓	▲	▲

Measure		As part of Rehabilitation of Road Reconstruction			
		Urban Streets		Rural Streets	
		Local	Collector	Local	Collector
	Texture Pavement	✓	✓	✓	✓
	Converging Chevrons	✓	✓	✓	✓
	Dragon's Teeth	✓	✓	✓	✓
	Full-Lane Transverse Bars	✓	✓	✓	✓
	On-Road Sign Pavement Markings	✓	✓	✓	✓
	Peripheral Transverse Bars	✓	✓	✓	✓
Enforcement and Education	Conventional Enforcement	✓	✓	✓	✓
	Radar Speed Signs	✓	✓	✓	✓
	Lawn Signs Encouraging Slower Driving	✓	✓	✓	✓
	Mobile Changeable Message	✓	✓	✓	✓
	Community Safety Zone Designation*	✓	✓	✓	✓
✓ =Appropriate Measures ▲= Use with Caution ✗=Not Recommended					

4.1.5 Traffic Calming Toolbox

The Traffic Calming Toolbox is complemented by a set of individual, informational sheets presenting detailed information regarding operational characteristics, potential benefits, potential drawbacks / costs (in a qualitative format), and applicability indicators of each measure for different types of roads.

Town staff will continue to obtain and take into account the input of Emergency Services and Road Operations when evaluating the need for traffic calming, as well as use sound engineering judgment when selecting a traffic calming measure.

It is recommended that physical traffic calming measures be implemented every 150 m along a segment (based on its area of influence), Pavement marking be implemented within 150 m of any form of traffic control, and Radar Speed Signs are installed near the middle of a segment. It is to be noted that implementation of traffic calming measures is an incremental process and over-deployed of measures can be as less efficient as less-deployed as it can create aggressive driving behaviour. It is therefore important to implement a right measure and monitor the condition before changing or adding additional measures.

Table 5 provides a quantitative and qualitative guidelines to select potential major traffic calming measure for warranted locations. Prior to an implementation of a traffic calming measure site visit field investigations should be conducted by staff to ensure that the measure will not negatively impacts function of the road. For example, physical lane narrowing in rural and agricultural lands should be used with care and cautions to ensure that the road can still accommodate trucks and farm vehicles. It is to be noted that the implementation of horizontal traffic calming measures is usually subject to the conducting of engineering design. Therefore, it requires more time and budget and should be considered as a part of road reconstruction capital projects and EA studies.

Table 5: Incremental Traffic Calming Measures Guidelines

ID	Measure	Appropriate Locations	Considerations
1	Reduced Uncontrolled Block length using Stop Signs	<ul style="list-style-type: none"> Block Length is more than 300 metre; 85% percentile speed is more than 15km/h above the posted speed limit Rural and urbanized area; Local and Collector Roads; 	<ul style="list-style-type: none"> Stop sign control shall be warranted as per the Town's policy as well as OTM Book 5 guidelines.
2	Community Safety Zone Designation	<ul style="list-style-type: none"> Near schools, daycare centres, playgrounds, parks, hospitals, senior citizen or collision prone areas within a community. Rural and Urban area; Local and Collector Roads. 	<ul style="list-style-type: none"> OTM Book 5 has highlighted appropriate locations. Hamlets and Villages, subject to meeting conditions are appropriate locations.
3	Automated Speed Enforcement	<ul style="list-style-type: none"> Shall be used in Community Safety Zones and School Zones 	<ul style="list-style-type: none"> It can not be used in other locations as per the Safer School Zone Act.
4	Pavement Marking and Road Diet	<ul style="list-style-type: none"> 85% percentile speed is between 15km/h to 20km/h above the posted speed limit; Rural and Urban areas; Local and Collector Roads; 	<ul style="list-style-type: none"> It is recommended at locations where pavement width is more than 9.0 metre.
5	Speed Radar Signs	<ul style="list-style-type: none"> 85% percentile speed is more than 15km/h above the posted speed limit; Rural and Urban areas; Local and Collector Roads; Maximum 4 lanes Average Daily Traffic is more than 2,000. 	<ul style="list-style-type: none"> It is recommended to be installed in pedestrian centric and sensitive areas such as school zones, community centers, and major residential and industrial collector roads.
6	Speed Cushions	<ul style="list-style-type: none"> The speed limit is 50km/h or less; 85% percentile is more than 15km/h above the posted speed limit; Urban and rural areas; 	<ul style="list-style-type: none"> It is recommended at locations within Parks, schools and community centres entrances, or at locations where previous methods are not feasible;

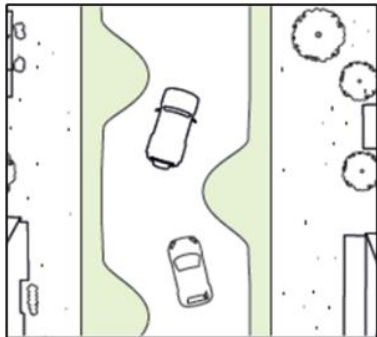
		<ul style="list-style-type: none"> • 2 lanes Local and minor collector roads; • Average Daily Traffic is between 1,000 to 5,000. 	<ul style="list-style-type: none"> • Not recommended at areas with limited sight distance; • Should be consulted with emergency services before implementation.
7	Vertical Centreline Treatment	<ul style="list-style-type: none"> • The speed limit is 60km/h or less; • 85% percentile speed is more than 20km/h above the posted speed limit; • Urban areas and rural residential areas (with care); • Local Roads and collector roads; • 2 lanes roads. 	<p>Not recommended on:</p> <ul style="list-style-type: none"> • Multi-lane roadways; • If ADT is more than 1000, parking is allowed on both sides and pavement width is 10 metre or less; • If pavement width is more than 11 metre; • Agricultural lands.
8	Speed humps	<ul style="list-style-type: none"> • The speed limit is 50km/h or less; • 85% percentile is more than 20km/h above the posted speed limit; • Urban and rural area; • 2 lanes Local roads (one lane in each direction) • Average Daily Traffic is more than 1,000 to 5,000. 	<ul style="list-style-type: none"> • It is recommended at locations within Parks, schools and community centres entrances, or at locations where previous methods are not feasible; • Not recommended at areas with limited sight distance; • Should be consulted with emergency services before implementation.

Horizontal Deflection

CHICANE, ONE-LANE



Richard Drdul (2006)



Toronto (2016)

Figure 8 - Horizontal Deflection – Chicane 1 Lane

Cost
High

Chicanes are curb extensions that alternate from one side of the road to the other. In general, a series of three or more curb extensions are used to force vehicles to slow down and travel in an S-shaped path through the chicane. A one-lane chicane narrows a two-lane roadway into the width of one-lane, requiring one vehicle to yield if two vehicles arrive at the same time in opposite directions. They are most effective on local roads with regular traffic in both directions to minimize opportunities for motorists to drive down the center unimpeded.

Potential Benefits

Speed Reduction	<input checked="" type="checkbox"/>
Volume Reduction	<input checked="" type="checkbox"/>
Conflict Reduction	<input checked="" type="checkbox"/>
Environment	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Substantial (Dis)Benefits	
<input checked="" type="checkbox"/> Minor (Dis)Benefits <input type="checkbox"/> No (Dis)Benefits	

Potential Disbenefits

Local Access	<input type="checkbox"/>
Emergency Response	<input checked="" type="checkbox"/>
Active Transportation	<input checked="" type="checkbox"/>
Enforcement	<input type="checkbox"/>
Parking	<input checked="" type="checkbox"/>
Maintenance	<input checked="" type="checkbox"/>

Applicability

Roadway Cross-Section:

- Max. 2 lane roadway (one each direction)

Environment: Urban

Road Class: Local (one-way, two-way), Collector (two-way)

Location: Midblock

Speed Limit: ≤ 50 km/h

ADT: Min. 750 vpd or 100 vph during peak hour
For roads with bike routes:
< 1000 vpd

Block Length: ≥ 110 m

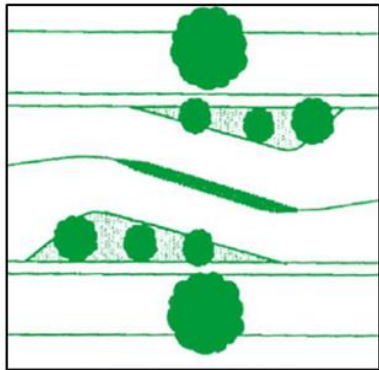
Grade: ≤ 8%

Horizontal Deflection

CHICANE, TWO-LANE



Spacing Toronto (2011)



Thunder Bay (2017)

High

Chicanes are curb extensions that alternate from one side of the road to the other. In general, a series of three or more curb extensions are used to force vehicles to slow down and travel in an S-shaped path through the chicane. Two-lane chicanes allow vehicles to remain in their travel lane. They are not as effective at reducing vehicle speeds as one-lane chicanes and may not reduce vehicle volumes. The safety benefits of reduced vehicle speeds may be offset by an increased potential for conflict as motorists have been found to cross the road centerline to maintain a straight trajectory.

Potential Benefits

Speed Reduction	<input checked="" type="checkbox"/>
Volume Reduction	<input type="checkbox"/>
Conflict Reduction	<input checked="" type="checkbox"/>
Environment	<input checked="" type="checkbox"/>

☒ Substantial (Dis)Benefits
☒ Minor (Dis)Benefits ☐ No (Dis)Benefits

Potential Disbenefits

Local Access	<input type="checkbox"/>
Emergency Response	<input type="checkbox"/>
Active Transportation	<input type="checkbox"/>
Enforcement	<input type="checkbox"/>
Parking	<input checked="" type="checkbox"/>
Maintenance	<input checked="" type="checkbox"/>

Applicability

Roadway Cross-Section:

- Only 2 lane roadway (one each direction)
- Min. roadway width of 12 m

Environment: Urban

Road Class: Local (one-way, two-way), Collector (two-way)

Location: Midblock

Speed Limit: ≤ 50 km/h

ADT: Min. 750 vpd or 100 vph during peak hour
For roads with bike routes:
< 1000 vpd

Block Length: ≥ 110 m

Grade: ≤ 8%

Horizontal Deflection → CURB RADIUS REDUCTION



Richard Drdul (2006)



Toronto (2016)

Cost

High

A curb radius reduction is a reconstruction of an intersection corner with a smaller radius, generally between 3 and 5 metres. A smaller corner radius requires vehicles to slow their speed to make a right turn but may make right turns difficult for larger vehicles. In addition, they reduce the distance pedestrians must walk from curb to curb in a crosswalk.

Potential Benefits

Speed Reduction	<input checked="" type="checkbox"/>
Volume Reduction	<input type="checkbox"/>
Conflict Reduction	<input type="checkbox"/>
Environment	<input checked="" type="checkbox"/>

☒ Substantial (Dis)Benefits
☒ Minor (Dis)Benefits ☐ No (Dis)Benefits

Potential Disbenefits

Local Access	<input type="checkbox"/>
Emergency Response	<input type="checkbox"/>
Active Transportation	<input checked="" type="checkbox"/>
Enforcement	<input type="checkbox"/>
Parking	<input type="checkbox"/>
Maintenance	<input checked="" type="checkbox"/>

Applicability

Roadway Cross-Section:

- All number of lanes
- Road must be able to accommodate introduction of min. curb radius of 3 m
- Road width must be at least 6 m after curb radius reduction

Environment: Urban

Road Class: Local, Collector, Arterial (low volume)

Location: Intersection, Major driveway

Speed Limit: No restrictions

ADT: ≥ 500 vpd

Block Length: ≥ 110 m

Grade: ≤ 8%

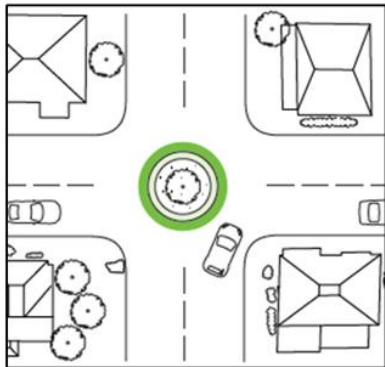
Figure 10 - Horizontal Deflection – Curb Radius Reduction

Horizontal Deflection

TRAFFIC CIRCLE



Lynnwood (2013)



Toronto (2016)

Cost

High

Potential Benefits

Speed Reduction	<input checked="" type="checkbox"/>
Volume Reduction	<input checked="" type="checkbox"/>
Conflict Reduction	<input checked="" type="checkbox"/>
Environment	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Substantial (Dis)Benefits	
<input checked="" type="checkbox"/> Minor (Dis)Benefits <input type="checkbox"/> No (Dis)Benefits	

Potential Disbenefits

Local Access	<input type="checkbox"/>
Emergency Response	<input checked="" type="checkbox"/>
Active Transportation	<input checked="" type="checkbox"/>
Enforcement	<input type="checkbox"/>
Parking	<input checked="" type="checkbox"/>
Maintenance	<input checked="" type="checkbox"/>

Applicability

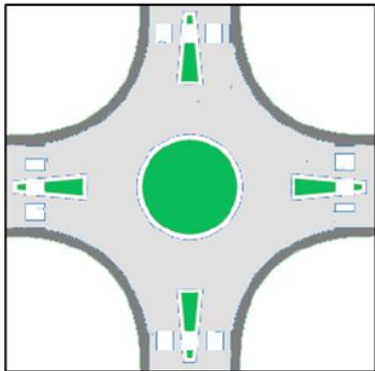
- Roadway Cross-Section:**
- Max. 2 lane roadway (one each direction)
 - Min. roadway width of 6 m

- Environment:** Urban
- Road Class:** Local, Collector
- Location:** Intersection
- Speed Limit:** ≤ 50 km/h
- ADT:** ≥ 500 vpd, but < 1500 vpd
- Block Length:** ≥ 110 m
- Grade:** ≤ 8%

Horizontal Deflection → MINI-ROUNDAABOUT



Tollazzi (2015)



Thunder Bay (2017)

Cost

High

Mini-roundabouts are raised islands located in the centre of an intersection that motorists navigate around in a counter clockwise direction. They also include median islands on all approaches to guide vehicles into the mini-roundabout and may include a truck apron on the outer island circumference to enable the passage of transit and emergency vehicles.

Potential Benefits

Speed Reduction	<input checked="" type="checkbox"/>
Volume Reduction	<input checked="" type="checkbox"/>
Conflict Reduction	<input checked="" type="checkbox"/>
Environment	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Substantial (Dis)Benefits	
<input checked="" type="checkbox"/> Minor (Dis)Benefits <input type="checkbox"/> No (Dis)Benefits	

Potential Disbenefits

Local Access	<input type="checkbox"/>
Emergency Response	<input checked="" type="checkbox"/>
Active Transportation	<input checked="" type="checkbox"/>
Enforcement	<input type="checkbox"/>
Parking	<input checked="" type="checkbox"/>
Maintenance	<input checked="" type="checkbox"/>

Applicability

Roadway Cross-Section:

- Max. 2 lane roadway (one each direction)
- Min. roadway width of 7.5 m

Environment: Urban

Road Class: Local, Collector

Location: Intersection

Speed Limit: ≤ 50 km/h

ADT: ≥ 500 vpd, but < 1500 vpd

Block Length: ≥ 110 m

Grade: ≤ 8%

Figure 12 - Horizontal Deflection – Mini-Roundabout

Figure 13 - Vertical Deflection – Speed Cushion

Vertical Deflection SPEED CUSHION



City of Ottawa



NACTO (2013)

Cost
Moderate

Speed cushions are a narrower version of a speed hump and are installed in the middle of each travel lane. They are generally six feet wide and designed to slow passenger vehicles while allowing vehicles with larger wheel bases (emergency vehicles and buses) to pass unimpeded. Speed cushions should be considered rather than speed humps on emergency response and transit routes. Speed cushions are preferable on collector roads.

Potential Benefits

Speed Reduction	<input checked="" type="checkbox"/>
Volume Reduction	<input checked="" type="checkbox"/>
Conflict Reduction	<input checked="" type="checkbox"/>
Environment	<input checked="" type="checkbox"/>

☒ Substantial (Dis)Benefits
☒ Minor (Dis)Benefits ☐ No (Dis)Benefits

Potential Disbenefits

Local Access	<input type="checkbox"/>
Emergency Response	<input checked="" type="checkbox"/>
Active Transportation	<input checked="" type="checkbox"/>
Enforcement	<input type="checkbox"/>
Parking	<input checked="" type="checkbox"/>
Maintenance	<input checked="" type="checkbox"/>

Applicability

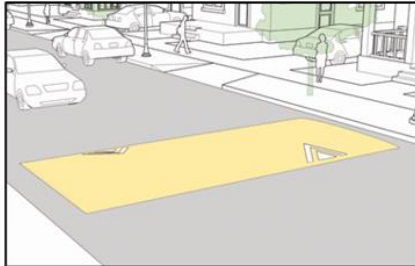
Roadway Cross-Section:
 • 2 lanes (one each direction)

Environment: Urban and Rural
Road Class: Local
Location: Mid-blocks
Speed Limit: <50km/h
ADT: between 1000 to 4000
Block Length: > 110 m
Grade: < 8%

Vertical Deflection SPEED HUMP



NACTO (2013)



NACTO (2013)

Speed humps are a vertical structure spanning across the width of a roadway (excluding gutters) designed to slow vehicle speeds. Motorist discomfort is related to the size of the speed hump and the speed they are travelling. Speed humps are typically installed in series.

Potential Benefits

Speed Reduction	<input checked="" type="checkbox"/>
Volume Reduction	<input checked="" type="checkbox"/>
Conflict Reduction	<input checked="" type="checkbox"/>
Environment	<input checked="" type="checkbox"/>

☒ Substantial (Dis)Benefits
☒ Minor (Dis)Benefits ☐ No (Dis)Benefits

Potential Disbenefits

Local Access	<input type="checkbox"/>
Emergency Response	<input checked="" type="checkbox"/>
Active Transportation	<input checked="" type="checkbox"/>
Enforcement	<input type="checkbox"/>
Parking	<input checked="" type="checkbox"/>
Maintenance	<input checked="" type="checkbox"/>

Applicability

Roadway Cross-Section:
 • 2 lanes (one each direction)

Environment: Urban and Rural
Road Class: Local
Location: Mid-blocks
Speed Limit: <50km/h
ADT: between 1000 to 4000
Block Length: > 110 m
Grade: < 8%

Cost

Moderate

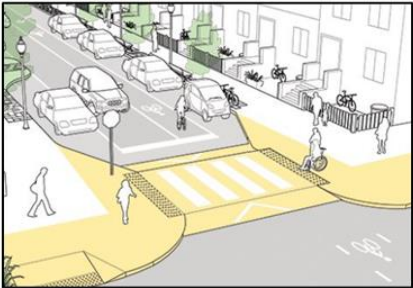
Figure 14 - Vertical Deflection – Speed Hump

Figure 15 - Vertical Deflection – Raised Crosswalk

Vertical Deflection → **RAISED CROSSWALK**



City of Ottawa



NACTO (2013)

Cost
High

Potential Benefits

Speed Reduction	<input checked="" type="checkbox"/>
Volume Reduction	<input type="checkbox"/>
Conflict Reduction	<input checked="" type="checkbox"/>
Environment	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Substantial (Dis)Benefits	
<input checked="" type="checkbox"/> Minor (Dis)Benefits	<input type="checkbox"/> No (Dis)Benefits

Potential Disbenefits

Local Access	<input type="checkbox"/>
Emergency Response	<input checked="" type="checkbox"/>
Active Transportation	<input checked="" type="checkbox"/>
Enforcement	<input type="checkbox"/>
Parking	<input type="checkbox"/>
Maintenance	<input checked="" type="checkbox"/>

Applicability

Roadway Cross-Section: <ul style="list-style-type: none">There must be a sidewalk on at least one side of the road	Environment: Urban
	Road Class: Local, Collector
	Location: Midblock, Intersection
	Speed Limit: ≤ 50 km/h
	ADT: ≥ 500 vpd
	Block Length: ≥ 110 m
	Grade: ≥ 1%, but ≤ 8%

Figure 16 - Roadway Narrowing – Curb Extension

Roadway Narrowing → CURB EXTENSION



Watt Consulting Group



NACTO (2013)

Cost

Moderate - High

A curb extension (also known as a neckdown, choker, curb bulb, or bulb-out) is a horizontal intrusion of the curb into the roadway, resulting in a narrow section of roadway. The curb is extended on one or both sides of the roadway to reduce its width. The purpose of a curb extension is to reduce vehicle speeds, reduce crossing distance for pedestrians, increase visibility of pedestrians, and prevent parking close to an intersection.

Potential Benefits

Speed Reduction	<input checked="" type="checkbox"/>
Volume Reduction	<input type="checkbox"/>
Conflict Reduction	<input type="checkbox"/>
Environment	<input checked="" type="checkbox"/>

☒ Substantial (Dis)Benefits
☒ Minor (Dis)Benefits ☐ No (Dis)Benefits

Potential Disbenefits

Local Access	<input type="checkbox"/>
Emergency Response	<input type="checkbox"/>
Active Transportation	<input checked="" type="checkbox"/>
Enforcement	<input type="checkbox"/>
Parking	<input checked="" type="checkbox"/>
Maintenance	<input checked="" type="checkbox"/>

Applicability

Roadway Cross-Section:

- Max. 2 lane roadway

Environment: Urban

Road Class: Local, Collector, Arterial

Location: Midblock, Intersection

Speed Limit: ≤ 60 km/h

ADT: ≥ 500 vpd

Block Length: ≥ 110 m

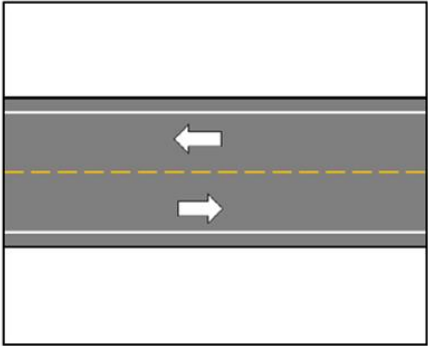
Grade: ≤ 8%

Roadway Narrowing

LANE NARROWING



Federal Highway Administration



Thunder Bay (2017)

Cost

Lane narrowing is the reduction of lane width using painted lines that may be supplemented with bollards, raised curbs, or other physical delineation to make the lane width feel smaller to motorists. The additional roadway space can be used to add bike lanes, widen sidewalks, or widen the median. Lane narrowing is less effective if implemented with pavement markings only.

Potential Benefits

Speed Reduction	<input checked="" type="checkbox"/>
Volume Reduction	<input type="checkbox"/>
Conflict Reduction	<input type="checkbox"/>
Environment	<input type="checkbox"/>

☒ Substantial (Dis)Benefits
☒ Minor (Dis)Benefits ☐ No (Dis)Benefits

Potential Disbenefits

Local Access	<input type="checkbox"/>
Emergency Response	<input type="checkbox"/>
Active Transportation	<input checked="" type="checkbox"/>
Enforcement	<input type="checkbox"/>
Parking	<input checked="" type="checkbox"/>
Maintenance	<input type="checkbox"/>

Applicability

Roadway Cross-Section:
• Suitable for all cross-sections
Locations to Avoid:
• None

Environment: Urban and Rural
Road Class: Local and Collector
Location: Pavement width is 9m or wider
Speed Limit: <60km/h
ADT: No Restrictions
Block Length: > 110 m
Grade: < 8%

Figure 17 - Roadway Narrowing – Lane Narrowing

Roadway
Narrowing

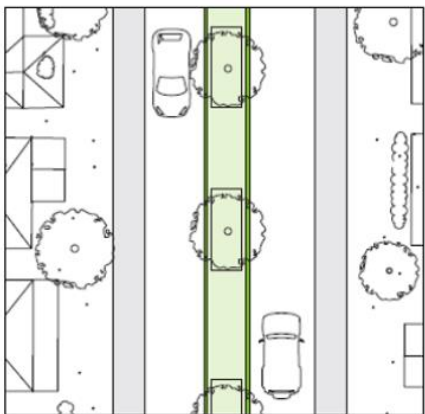


RAISED MEDIAN ISLAND

Raised median islands are a physical barrier located in the median between directions of traffic and are typically installed on two-way roadways. Median islands narrow the roadway causing motorists to slow down. They may be used as a pedestrian crossing refuge as well.



Watt Consulting Group



Toronto (2016)

Potential Benefits

Speed Reduction	<input checked="" type="checkbox"/>
Volume Reduction	<input type="checkbox"/>
Conflict Reduction	<input checked="" type="checkbox"/>
Environment	<input type="checkbox"/>
■ Substantial (Dis)Benefits	
<input checked="" type="checkbox"/> Minor (Dis)Benefits	<input type="checkbox"/> No (Dis)Benefits

Potential Disbenefits

Local Access	<input checked="" type="checkbox"/>
Emergency Response	<input type="checkbox"/>
Active Transportation	<input type="checkbox"/>
Enforcement	<input type="checkbox"/>
Parking	<input checked="" type="checkbox"/>
Maintenance	<input checked="" type="checkbox"/>

Applicability

Roadway Cross-Section:

- Most effective on two lane roads (one each direction)
- Min. road width of 8 m

Environment: Urban, Rural

Road Class: Local, Collector, Arterial

Location: Midblock

Speed Limit: ≤ 60 km/h

ADT: ≥ 500 vpd

Block Length: ≥ 110 m

Grade: ≤ 8%

Cost

High

Figure 18 - Roadway Narrowing – Raised Median Island

Figure 19 - Roadway Narrowing – Vertical Centreline Treatment

Roadway Narrowing → VERTICAL CENTRELINE TREATMENT



City of Ottawa

Cost
Moderate

Vertical centerline treatment involves the use of vertical treatments such as flexible post-mounted delineators or raised pavement markers to create a centre median. This gives drivers a perception of lane narrowing and create a sense of constriction, which causes them to slow down.

Potential Benefits

Speed Reduction	<input checked="" type="checkbox"/>
Volume Reduction	<input type="checkbox"/>
Conflict Reduction	<input type="checkbox"/>
Environment	<input type="checkbox"/>

☒ Substantial (Dis)Benefits
☒ Minor (Dis)Benefits ☐ No (Dis)Benefits

Potential Disbenefits

Local Access	<input type="checkbox"/>
Emergency Response	<input type="checkbox"/>
Active Transportation	<input type="checkbox"/>
Enforcement	<input type="checkbox"/>
Parking	<input type="checkbox"/>
Maintenance	<input checked="" type="checkbox"/>

Applicability

Roadway Cross-Section:
• Two lane roadways

Environment: Urban and Rural
Road Class: Local and Collector
Location: Pavement width is 9m or wider
Speed Limit: No Restrictions
ADT: No Restrictions
Block Length: > 110 m
Grade: < 8%

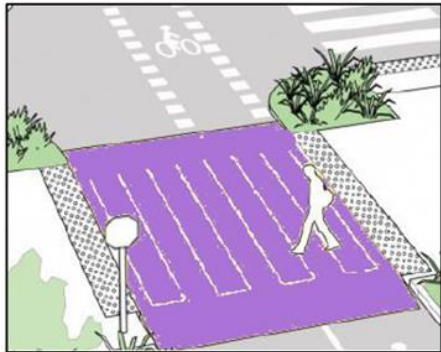
Figure 20 - Signage and Pavement Marking– Textured Crosswalk

Signage and Surface Treatment

TEXTURED CROSSWALK



City of Ottawa



NACTO (2013)

Cost

Moderate

Textured crosswalks may have a different colour and/or surface texture than the roadway to highlight the pedestrian crossing area and reduce the number of conflicts. The conspicuity of the colour and texture reduces over time as they wear out.

Potential Benefits

Speed Reduction	<input checked="" type="checkbox"/>
Volume Reduction	<input type="checkbox"/>
Conflict Reduction	<input checked="" type="checkbox"/>
Environment	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Substantial (Dis)Benefits	
<input checked="" type="checkbox"/> Minor (Dis)Benefits	<input type="checkbox"/> No (Dis)Benefits

Potential Disbenefits

Local Access	<input type="checkbox"/>
Emergency Response	<input type="checkbox"/>
Active Transportation	<input checked="" type="checkbox"/>
Enforcement	<input type="checkbox"/>
Parking	<input type="checkbox"/>
Maintenance	<input checked="" type="checkbox"/>

Applicability

Roadway Cross-Section:

- All cross-sections

Environment: Urban

Road Class: Local, Collector, Arterial

Location: Intersection

Speed Limit: ≤ 60 km/h

ADT: ≥ 500 vpd
(with consideration of buses and heavy vehicles on truck routes)

Block Length: ≥ 110 m

Grade: ≤ 8%

Figure 21 - Signage and Pavement Marking– Converging Chevrons

Signage and
Surface
Treatment



CONVERGING CHEVRONS

Converging chevrons are pavement markings painted in the shape of a forward facing “V” pointing in the travel direction of the roadway. They can be spaced close together or painted thinner as distance increases to create the illusion that a vehicle’s speed is increasing. This is done to alert the driver of the need to reduce speed.



Centre for Transportation Research & Education - Iowa

Potential Benefits

Speed Reduction	<input checked="" type="checkbox"/>
Volume Reduction	<input type="checkbox"/>
Conflict Reduction	<input type="checkbox"/>
Environment	<input type="checkbox"/>

☒ Substantial (Dis)Benefits
☒ Minor (Dis)Benefits ☐ No (Dis)Benefits

Potential Disbenefits

Local Access	<input type="checkbox"/>
Emergency Response	<input type="checkbox"/>
Active Transportation	<input type="checkbox"/>
Enforcement	<input type="checkbox"/>
Parking	<input type="checkbox"/>
Maintenance	<input checked="" type="checkbox"/>

Applicability

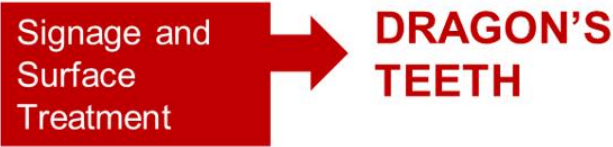
Roadway Cross-Section:

- Two lane roadways (one in each direction)

Environment: Urban and Rural
Road Class: Local and Collector
Location: Pavement width is 9m or wider
Speed Limit: No Restrictions
ADT: No Restrictions
Block Length: > 110 m
Grade: < 8%

Cost
Moderate

Figure 22 - Signage and Pavement Marking – Dragon's Teeth



International Road Assessment Programme

Cost
Moderate

Dragon's teeth are a series of triangular pavement markings along the edge of the travelled lanes. They may be painted with increasing size to give the impression of roadway narrowing. They provide a visual change of the roadway and are commonly used to alert drivers that they are entering a rural community.

Potential Benefits

Speed Reduction	<input checked="" type="checkbox"/>
Volume Reduction	<input type="checkbox"/>
Conflict Reduction	<input type="checkbox"/>
Environment	<input type="checkbox"/>

☒ Substantial (Dis)Benefits
☒ Minor (Dis)Benefits ☐ No (Dis)Benefits

Potential Disbenefits

Local Access	<input type="checkbox"/>
Emergency Response	<input type="checkbox"/>
Active Transportation	<input type="checkbox"/>
Enforcement	<input type="checkbox"/>
Parking	<input type="checkbox"/>
Maintenance	<input checked="" type="checkbox"/>

Applicability

Roadway Cross-Section:
• Two lane roadways (one in each direction)

Environment: Urban and Rural
Road Class: Local and Collector
Location: Pavement width is 9m or wider
Speed Limit: No Restrictions
ADT: No Restrictions
Block Length: > 110 m
Grade: < 8%

Figure 23 - Signage and Pavement Marking – Full Lane Transverse Bars

Signage and Surface Treatment

FULL-LANE TRANSVERSE BARS



Federal Highway Administration

Full-lane transverse bars are a series of parallel pavement markings which extend across the majority of the travelled lane width. The series of markings may be placed closer together with distance to create the illusion that a vehicle's speed is increasing to alert the driver of the need to reduce speed. Full-lane transverse bars are preferable on approach to intersections, bridges, and deficient horizontal curves.

Potential Benefits

Speed Reduction	<input checked="" type="checkbox"/>
Volume Reduction	<input type="checkbox"/>
Conflict Reduction	<input type="checkbox"/>
Environment	<input type="checkbox"/>
<input checked="" type="checkbox"/> Substantial (Dis)Benefits <input checked="" type="checkbox"/> Minor (Dis)Benefits <input type="checkbox"/> No (Dis)Benefits	

Potential Disbenefits

Local Access	<input type="checkbox"/>
Emergency Response	<input type="checkbox"/>
Active Transportation	<input type="checkbox"/>
Enforcement	<input type="checkbox"/>
Parking	<input type="checkbox"/>
Maintenance	<input checked="" type="checkbox"/>

Applicability

Roadway Cross-Section:
• All cross-sections

Environment: Urban and Rural
Road Class: Local and Collector
Location: Pavement width is 9m or wider
Speed Limit: No Restrictions
ADT: No Restrictions
Block Length: > 110 m
Grade: < 8%

Cost

Moderate

Figure 24 - Signage and Pavement Marking – On-Road “SIGN” Pavement Markings



On-road ‘sign’ pavement markings provide information that would typically be shown to drivers through signage but are painted on the roadway to provide a larger image, and one that is directly in the driver’s line of sight. Some examples could be the speed limit, ‘SLOW’, ‘Stop ahead’, etc. On-road ‘sign’ pavement markings are preferable in advance of hazards/curves.



City of Ottawa

Potential Benefits

Speed Reduction	<input checked="" type="checkbox"/>
Volume Reduction	<input type="checkbox"/>
Conflict Reduction	<input type="checkbox"/>
Environment	<input type="checkbox"/>

☒ Substantial (Dis)Benefits
☒ Minor (Dis)Benefits ☐ No (Dis)Benefits

Potential Disbenefits

Local Access	<input type="checkbox"/>
Emergency Response	<input type="checkbox"/>
Active Transportation	<input type="checkbox"/>
Enforcement	<input type="checkbox"/>
Parking	<input type="checkbox"/>
Maintenance	<input checked="" type="checkbox"/>

Applicability

Roadway Cross-Section:
• All cross-sections

Environment: Urban and Rural
Road Class: Local and Collector
Location: Pavement width is 9m or wider
Speed Limit: No Restrictions
ADT: No Restrictions
Block Length: > 110 m
Grade: < 8%

Cost
Moderate

Figure 25 - Signage and Pavement Marking – Peripheral Transverse Bars

Signage and Surface Treatment

PERIPHERAL TRANSVERSE BARS



Federal Highway Administration

Cost
Moderate

Peripheral transverse bars are a series of parallel pavement markings along the edge of the travelled lane widths. The series of markings may be placed closer together with distance to create the illusion that a vehicle’s speed is increasing. This is done to alert the driver’s awareness of the need to reduce speed. Peripheral transverse bars are similar to full-lane transverse bars but require less maintenance of pavement markings. Peripheral transverse bars are preferable where edge and centre lines are provided and are typically used on approach to intersections, bridges, and deficient horizontal curves.

Potential Benefits

Speed Reduction	<input checked="" type="checkbox"/>
Volume Reduction	<input type="checkbox"/>
Conflict Reduction	<input type="checkbox"/>
Environment	<input type="checkbox"/>

☒ Substantial (Dis)Benefits
☒ Minor (Dis)Benefits ☐ No (Dis)Benefits

Potential Disbenefits

Local Access	<input type="checkbox"/>
Emergency Response	<input type="checkbox"/>
Active Transportation	<input type="checkbox"/>
Enforcement	<input type="checkbox"/>
Parking	<input type="checkbox"/>
Maintenance	<input checked="" type="checkbox"/>

Applicability

Roadway Cross-Section:
• Two lane roadways (one in each direction)

Environment: Urban and Rural
Road Class: Local and Collector
Location: Pavement width is 9m or wider
Speed Limit: No Restrictions
ADT: No Restrictions
Block Length: > 110 m
Grade: < 8%

Figure 26 - Enforcement & Education – Radar Speed Signs

Enforcement & Education → SPEED DISPLAY DEVICES



City of Ottawa

Cost
Low to Moderate

A speed display device is an interactive sign that displays vehicle speeds as oncoming motorists approach. Vehicle speed is captured using radar and can trigger the display board to show when vehicles approach at predetermined unsafe speeds. Can be used upstream of manned speed enforcement. Speed display devices are most effective on single lane roads.

Potential Benefits

Speed Reduction	<input checked="" type="checkbox"/>
Volume Reduction	<input type="checkbox"/>
Conflict Reduction	<input type="checkbox"/>
Environment	<input type="checkbox"/>
<input checked="" type="checkbox"/> Substantial (Dis)Benefits <input checked="" type="checkbox"/> Minor (Dis)Benefits <input type="checkbox"/> No (Dis)Benefits	

Potential Disbenefits

Local Access	<input type="checkbox"/>
Emergency Response	<input type="checkbox"/>
Active Transportation	<input type="checkbox"/>
Enforcement	<input checked="" type="checkbox"/>
Parking	<input type="checkbox"/>
Maintenance	<input checked="" type="checkbox"/>

Applicability

Roadway Cross-Section:
• Max. two lanes per direction
Locations to Avoid:
• None

Environment: Urban, Rural
Road Class: Local, Collector, Arterial
Location: Midblock
Speed Limit: No restrictions
ADT: All traffic volumes
Block Length: ≥ 110 m
Grade: No restrictions

Figure 27 - Enforcement & Education – Lawn Signs Encouraging Slower Driving

Enforcement & Education

LAWN SIGNS ENCOURAGING SLOWER DRIVING



Spacing Toronto (2016)

Lawn signs encouraging slower driving are typically produced by towns/cities and placed on lawns by local residents. The purposes of these signs are to encourage safe driving habits and to lower vehicle operating speeds on neighbourhood streets.

Potential Benefits

Speed Reduction	<input checked="" type="checkbox"/>
Volume Reduction	<input type="checkbox"/>
Conflict Reduction	<input type="checkbox"/>
Environment	<input type="checkbox"/>

☒ Substantial (Dis)Benefits
☒ Minor (Dis)Benefits ☐ No (Dis)Benefits

Potential Disbenefits

Local Access	<input type="checkbox"/>
Emergency Response	<input type="checkbox"/>
Active Transportation	<input type="checkbox"/>
Enforcement	<input type="checkbox"/>
Parking	<input type="checkbox"/>
Maintenance	<input type="checkbox"/>

Applicability

Roadway Cross-Section: <ul style="list-style-type: none">All cross-sections
Locations to Avoid: <ul style="list-style-type: none">None

Environment: Urban, Rural
Road Class: Local, Collector, Arterial
Location: Midblock
Speed Limit: No restrictions
ADT: All traffic volumes
Block Length: No restrictions
Grade: No restrictions

Cost
Low

Figure 28 - Enforcement & Education – Mobile Changeable Message Signs

Enforcement & Education → MOBILE CHANGEABLE MESSAGE SIGNS



Signature Ltd

Mobile changeable message signs are electronic roadside warning signs with an illuminated screen that displays messages related to road safety. The purpose of these signs is to alert drivers with the aim that they reduce their travel speed as they approach specific conditions or hazards ahead.

Potential Benefits

Speed Reduction	<input checked="" type="checkbox"/>
Volume Reduction	<input type="checkbox"/>
Conflict Reduction	<input checked="" type="checkbox"/>
Environment	<input type="checkbox"/>

☒ Substantial (Dis)Benefits
☒ Minor (Dis)Benefits ☐ No (Dis)Benefits

Potential Disbenefits

Local Access	<input type="checkbox"/>
Emergency Response	<input type="checkbox"/>
Active Transportation	<input type="checkbox"/>
Enforcement	<input type="checkbox"/>
Parking	<input type="checkbox"/>
Maintenance	<input checked="" type="checkbox"/>

Applicability

Roadway Cross-Section:

- All cross-sections

Locations to Avoid:

- None

Environment: Urban, Rural

Road Class: Local, Collector, Arterial

Location: Midblock

Speed Limit: No restrictions

ADT: All traffic volumes

Block Length: ≥ 110 m

Grade: No restrictions

Cost
Moderate to High

Enforcement & Education



Automated Speed Enforcement

Automated Speed Enforcement (ASE) is an automated system that uses a camera and a speed measurement device to detect and capture images of vehicles travelling in excess of the posted speed limit. It shall be used only in Community Safety Zones and School Zones.



Potential Benefits

Speed Reduction	<input checked="" type="checkbox"/>
Volume Reduction	<input type="checkbox"/>
Conflict Reduction	<input type="checkbox"/>
Environment	<input type="checkbox"/>
<div><div><input checked="" type="checkbox"/> Substantial (Dis)Benefits</div><div><input checked="" type="checkbox"/> Minor (Dis)Benefits</div><div><input type="checkbox"/> No (Dis)Benefits</div></div>	

Potential Disbenefits

Local Access	<input type="checkbox"/>
Emergency Response	<input type="checkbox"/>
Active Transportation	<input type="checkbox"/>
Enforcement	<input checked="" type="checkbox"/>
Parking	<input type="checkbox"/>
Maintenance	<input checked="" type="checkbox"/>

Applicability

Roadway Cross-Section:

- All cross-sections

Environment: Urban and Rural

Road Class: Local and Collector

Location: School Zone and Community Safety Zones

Speed Limit: No Restrictions

ADT: No Restrictions

Block Length: No Restrictions

Grade: No Restrictions

Cost

Extremely High

4.1.5.1 Design Considerations

The design of all Traffic Calming Measures shall be subject to the guidelines of the Institute of Transportation Engineers (ITE), TAC Canadian Guide to Traffic Calming, Ontario Traffic Manuals, and all relevant Town of Caledon design and construction standards and specifications.

Relevant Guidelines and Manuals	
Canadian Guide to Traffic Calming	<p>Transportation Association of Canada (TAC) and Canadian Institute of Transportation Engineers (CITE)</p> <ul style="list-style-type: none">• General considerations• Raised Crosswalk• Raised Intersection• Speed Cushion• Speed Hump/Table• Chicanes• Curb Radius Reduction• Speed Kidney• Traffic Circle/Button/Mini-roundabout• Curb extension/Neckdown/Choker• On-street Parking• Raised Median Island• Road Diet• Sidewalk Extension / Textured Crosswalk• Peripheral Transverse Bars (which comes from the not yet published update of OTM Book 11)• Several access restrictions measures
Ontario Traffic Manuals (OTMs) <ul style="list-style-type: none">• Book 5 and Book 6• Book 11• Book 15• Book 18	<p>Ontario Ministry of Transportation (MTO)</p> <ul style="list-style-type: none">• These manuals should be used to determine signage and pavement marking plans when designing traffic calming measures.

Where considered necessary, staff from other municipalities or engineering consultants may be contacted for their experience with the implementation of new specific traffic calming measures.

Designs will strive to improve the "quality of life" in the neighbourhood but must always be respectful of the safety of all road users and have regard for operational matters.

4.1.6 Step 5. Implementation and Monitoring

Once the traffic calming plan has been warranted and prioritize against other requests, the project will be put forward in priority sequence to proceed with installation. As a part of the process, the Town is recommended to circle back and consult with the OPP and consider their recommendations before implementations.

Town staff will conduct a traffic study six months after the completion of a traffic calming project to assess the effectiveness of measures. If the study shows that the 85th percentile speed has been lowered to below 15 km/h over the speed limit, it indicates the selected measure was effective.

If the study shows that the 85th percentile speed has not been lowered to below 15 km/h over the speed limit, Town staff will evaluate whether the design should be enhanced or consideration for incremental traffic calming measures.

Another speed study will be conducted after six months of implementing any changes to the design. If still not effective, the need for targeted speed enforcement will be considered. The results of these studies will also be sent to OPP for enforcement, and as a long-term solution, the issues should be reviewed during reconstruction and capital work project.

5 Traffic Calming in New/Road Reconstruction Projects

It is expected that the design of new roads will include features that maintain operating speeds below target thresholds allowing a more efficient use of the Town's resources. Furthermore, standardizing a proactive approach for new roadway designs to be specific, yet easy to understand and apply, can result in further efficiency gains for developers and the Town.

Using a standardized set of design principles, new roadways may have built-in speed reducing features that will ensure vehicle speeds remain below acceptable speeding thresholds and reduce or even eliminate the need for expensive retrofits.

To accomplish this objective, a comprehensive review of current practices and relevant technical literature was conducted to identify those design elements that may provide a safer environment by discouraging speeding and can be easily identified during the application process review.

A summary of the recommended practices identified during our review is presented in **Table 6**.

Table 6: Recommended Practices – Design of New Developments – Traffic Calming

Recommended Practices	Description
Reduce Tangent Lengths	Spacing between measures or stop controls will directly affect the effectiveness of the selected measure in a corridor. Longer distances between them provide drivers with more space to develop higher speeds at the midpoint between traffic calming measures.
Reduce Road Cross-Sections Widths	Reduced pavement widths and lane widths will provide a form of reducing operating speeds that is built directly into the road design.
Use of Horizontal Curves	A curvilinear design applied throughout a neighbourhood will ensure that a constant operating speed is maintained, while also reducing noise, fuel consumption, and maintenance

Recommended Practices	Description
	associated with traffic calming measures.
Breaks in Continuity	Conditions that require motorist to come to a complete stop; such as a T-intersection between a residential and collector or arterial road.
Implementation of Traffic Calming Measures	Traffic calming measures to be considered for use in the design process can be chicanes, traffic circles, median islands, and roundabouts.
Introduction of Slow Points	<p>Slow points include intersections, school areas, pedestrian or bicycle facility interfaces with roadways, etc.</p> <p>Use passive traffic calming measures or horizontal deflection measures at “slow points” to draw the attention of road users.</p>

To achieve the goal of implementing a proactive traffic calming approach as part of new roadway design, the Town may consider the best practices of other municipalities and findings of related technical studies. For this purpose, a comparison between the Town’s current policies and procedures and the recommendations identified as part of our review, as well as a set of practical recommendations for implementation, are presented in the following section of this document.

5.1 Practical Recommendations

Reduce the length of straight/uncontrolled segments of roadways or implement a curvilinear design where curves can be negotiated safely at operating speeds of 50 km/h or less. Shorter distances between slow-points or curves reduce opportunities for drivers to develop higher speeds.

- Maintaining the length of straight roadway segments to under 200 to 300 metres. An effective method is to use more curves with shorter radii.² In existing subdivisions, the Town is recommended revisiting traffic control plans at intersections and conducting an all-way stop control warrant analysis to ensure that the most appropriate traffic control plan is in place.
- Consider installation of all-way stop controls to reduce uncontrolled road length to be 200 to 300 meters subject to warrant analysis.

Consider reducing pavement and lane widths at the site planning stage for entire segments of the roadway and/or at specific locations.

- Design intersections and the beginning section of each street in a way that slows vehicles down to an appropriate speed from the start, rather than further along the street.
- Introduce raised median islands to help pedestrians cross and slow vehicular speed. Traffic calming devices that may be considered for use in the design process are curb extensions, traffic circles, median islands, and mini-roundabouts/roundabouts.
- Use traffic calming measures such as reducing roadway width or textured pavement at conflict areas.

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Appendix A: Pedestrian Crossover Warrant Analysis

Pedestrian Crossover Warrant Analysis

One of the most dangerous and stressful situations for vulnerable road users can be crossing a roadway. Therefore, construction of pedestrian crossings should be planned in order to increase the safety of all users. Pedestrian crossovers (PXOs) provide pedestrians with protected crossing opportunities by requiring motorists to yield to pedestrians within the crossing area when the PXO is activated.

As part of the update of the Urban Traffic Calming Manual, the Town of Caledon requested a review and determination of a suitable methodology to prioritize the implementation of warranted PXOs on the Town's roads, in order to support the decision process for where to invest the available capital funding and leverage the greatest benefit to the public.

To this purpose, a comprehensive literature review was conducted to identify criteria for ranking the list of potential locations for implementing pedestrian crossovers. The findings from our literature review and the recommended PXO prioritization methodology are summarized in the following sections.

Literature Review Summary

The **Federal Highway Administration (FHWA)** has developed a safety index methodology³ to proactively prioritize intersection crosswalks with respect to pedestrian safety. The methodology calculates a Pedestrian Safety Index (Ped SI) for each location based on a model consisting of an equation (Equation 1) that determines the safety index value for a single pedestrian crossing.

Although the FHWA methodology provides a consistent and defensible framework for prioritizing pedestrian crossings, the Ped ISI index values have limitations as they are developed based on a regression model that considers only factors that have been shown through research to have a statistically significant relationship to safety.

The **Department of Transportation and Main Road in Queensland, Australia** has developed a Traffic and Road Use Management manual. The manual⁴ provides, under Pedestrian crossing facility guidelines and prioritization system user guide, a priority system for selecting an appropriate pedestrian facility by allocating points to pedestrian and vehicular flow characteristics, collision performance, road network performance, and other relevant attributes such as:

- Pedestrian Level of Service
- Pedestrian Volume
- Collision Data

³ Pedestrian and Bicyclist Intersection Safety Indices; Final Report, FHWA-HRT-06-125, November 2006

⁴ Traffic and Road Use Management manual, Queensland Department of Transport and Main Roads, April 2015

- Sight Distance
- Proximity to alternative crossing
- Road Network Performance
- Pedestrian connectivity factors.

The **County of Warwickshire, UK** has established a policy and technical procedure⁵ to assess the need and the type of a pedestrian crossing. The level of need for a pedestrian crossing is determined by calculating the degree of conflict between pedestrians crossing the road and two-way traffic flow. In a similar way, **the County of Dorset, UK** has developed a method⁶ to calculate the degree of difficulty in order to weight the overall assessment of site conditions and merits. The degree of conflict will help the County of Dorset to prioritize and rank different locations.

In Canada, the **City of Ottawa** launched **the Pedestrian Safety Evaluation Program** on April 2010 as a three-year pilot study to develop a process that combines traffic engineering with public engagement, for ranking and programming road safety improvements for pedestrians crossing roadways at intersections.

The program contains four phases, one of which is the prioritization phase that is intended to identify high risk locations. It was determined that the FHWA module for prioritization is appropriate for use in the context of the City of Ottawa. The City of Ottawa Ped ISI process is identical to the FHWA calculations, however; the City calculates an overall Ped ISI based on the average of all crosswalks at the same intersection. It noteworthy that the City of Ottawa's final ranked list not only depends on the calculated index but also takes into consideration inputs from the public during the ranking process.

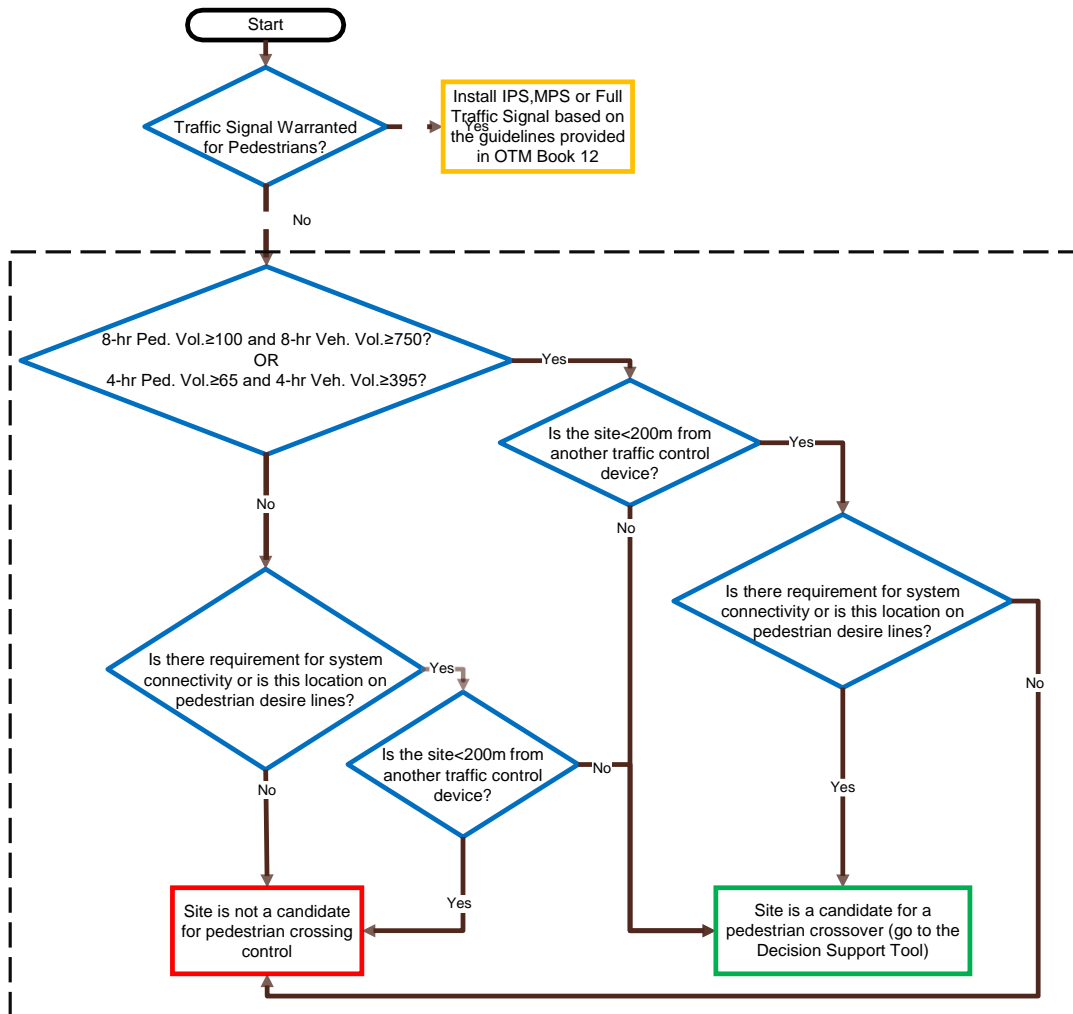
Ontario Traffic Manual Book 15

Ontario Traffic Manual (OTM) Book 15 provides a hierarchy of pedestrian crossing treatments based on the complexity of the roadway environmental conditions. The treatments provided with the manual are consistent with the intent of the Highway Traffic Act and Regulation.

OTM Book 15 provides a decision support tool for the selection of the pedestrian crossing control composed by two elements: (1) Preliminary Assessment, and (2) Pedestrian Crossing Selection. The preliminary assessment is used to confirm if the use of a traffic control is warranted, as schematically described in the following Figure

⁵ Policy for the Provision of Pedestrian Crossing and Pedestrian Facility at Traffic Signal Junctions, Warwickshire UK

⁶ Selection and Priority Assessment Procedure for the Provision of Pedestrian Crossings and Associated Facilities, Dorset UK.



OTM Book 15 Figure 2 - Decision Support Tool

As shown in the decision support tool, the first step is checking if the installation of the traffic signal is required by using justification 6 of OTM Book 12. If the traffic signal is not warranted, then the next step is to check if the PXO is warranted based on traffic and pedestrian volume, crossing distance, and pedestrian connectivity.

Proposed Methodology

Based on the results of our literature review, it was found that the FHWA and the OTM methodologies were the least data intensive and hence would be the simplest to use on an ongoing basis. The OTM method was modified to include factors of importance to the pedestrians, such as proximity to schools, bus stops and parks, to be consistent with the Town's expectations.

The OTM method consists of two main steps: warrant analysis, to determine whether the candidate location is a candidate for PXO implementation, and scoring, to compare it with other candidate locations and determine the relative level of priority.

The warrant analysis is a simple application of the OTM Book 15 decision support tool. If this step indicates that the site under review is a candidate for PXO, the location score is calculated using the following equation:

$$\begin{aligned} \text{Location Score} &= \frac{8\text{hourPedVolume}}{\text{Highest8hourPedVolume}} + \frac{8\text{hourVehVolume}}{\text{Highest8hourVehVolume}} \\ &+ \frac{\text{DistancetoClosestTCD}}{\text{HighestDistancetoTCD}} + 1(\text{if} < 400\text{m to busstop}) \\ &+ 1(\text{if} < 400\text{m to park}) + 1(\text{if} < 400\text{m to school}) \end{aligned}$$

All warranted locations are then added to the ranking list, in descending order of their respective scores. It should be noted, however, that the weight of the proximity to bus stops, parks and schools may need to be calibrated based on Caledon data to prevent an excessive influence of these factors on the location score compared to the other factors.

It is recommended that the Town conducts a pilot study using Caledon data for 5 or 6 locations that meet the OTM warrant. The data required includes 4- or 8-hour pedestrian and vehicle volumes for each location. It is also important to note that the count period selected should become the standard for the application of this procedure in order to fairly assess all locations.

Since different sites may have different peak hours (particularly for pedestrian volumes), 8-hour counts are preferred as they cover any substantial fluctuations that could be missed in a 4-hour count.

B

Appendix B: Public Consultation and Engagement

See PDF version of this document

Caledon Traffic Calming Study



LURA's Communications and Engagement Products

Prepared by LURA Consulting

For the Town of Caledon



Caledon Traffic Calming Study

Engagement Process and Best Practice Research

Introduction

The Town of Caledon's new Traffic Calming Study seeks to proactively implement traffic calming measures that aim to address issues of excessive motorized vehicle speed across the Town. A robust engagement program supported by best practice research was undertaken, aimed at generating a conversation about speeding in Caledon and collecting feedback on how speeding and traffic issues in communities across the Town should be addressed.

Traffic Calming Research

The project team examined current and past campaigns to improve road safety from across North America, the United Kingdom, and Australia. Research explored road safety campaign approaches and audiences, and how driving behaviour responds to behaviour change techniques. Compiling best practices from this research helped inform the development of a Traffic Calming Toolkit. Key findings from this best practice research include the following:

- Traffic calming campaigns should convey a constructive message based in empirical research on how dangerous driving behaviour impacts everyone
- Traffic calming campaigns should focus their messaging to target specific road users and locations where dangerous driving behaviour is occurring, gathering feedback to understand why this behaviour is occurring to propose solutions.
- Traffic calming campaigns are effective when residents have the knowledge what traffic calming measures look like and how they function, and the process for requesting new traffic calming measures. This is best informed through a variety of print and digital media that clearly conveys information about traffic calming.

Engagement Objectives

The engagement program was developed to ensure that residents, businesses, visitors and other stakeholders were made aware of traffic calming efforts in Caledon and had the opportunity to provide their feedback to influence the conversation. A secondary goal of engagement was to gain insight into the reasons why people speed in Caledon.

Communication Methods

The project team used a mix of print and digital media for communicating the purpose, process, and how to get involved in the Traffic Calming Study including:

- A **project webpage** (<http://caledon.ca/TrafficCalming>) provided updates, information, and digital engagement opportunities, including FAQs background

information, project documents, and an overview of the project purpose and process.

- Dedicated **social media** accounts (@YourCaledon) were used to promote the project and encourage participation.
- **Information postcards** distributed for public events including project information, and how to access the digital engagement platform.

Engagement Activities

The project team developed a variety of ways for participants to provide their ideas including:

- Two **Coffee with Council Events** hosting informal conversations between the project team and residents about a series of questions on traffic and road behaviour.
- A **Safety and Speeding Sign Design Contest** was held to create new eye-catching signs to encourage drivers to slow down and drive mindfully through school zones. All designs were created by students at Allan Drive Public School.
- **Digital Engagement** using Social Pinpoint to provide comments on an interactive map, and an online survey.
- A **pop-up booth at Caledon Day** to gather feedback and vote on participants' favourite "Slow Down" sign designed by local students.

Engagement Feedback

Over 900 participants provided input that is reflected in the Traffic Calming Study's engagement findings and recommendations. Participants provided several key insights in their feedback including the following:

- Traffic calming in Caledon should ensure that drivers are obeying the posted speed limit using both physical changes to street design and traffic safety campaigns to improve community safety.
- Drivers speed for different reasons including a lack of enforcement, rushing, road design, and social pressure.
- Different types of dangerous driving behaviour can be found across Caledon including speeding throughout the Town, street racing on the Forks of the Credit Road, disobeying stop signs, tailgating, and speeding in school zones and near community spaces such as parks.
- Traffic calming initiatives such as speedbumps and flashing lights have helped remediate speeding issues. Some also mentioned unpaved roads as contributing to reduced speeds in some areas.
- The Town of Caledon should make traffic calming around school zones its top priority.

Traffic Calming Toolkit

Responding to community feedback and insight on the Town's road conditions, a Traffic Calming Toolkit was developed to provide information on traffic calming techniques, materials to raise awareness and inform the public about localized dangerous driving behaviour and how to address concerns. Caledon's Traffic Calming Toolkit includes the following:

Toolkit Item	Intended Use
"Slow Down, Think of Us" lawn sign.	To remind drivers to drive according to the speed limit and road conditions.
Traffic Calming awareness materials including information handout cards, webpage content and social media messaging.	To provide information and educate the public about what traffic calming is, why it's important, what techniques are used to address concerns and where to get more information.
Information on the traffic calming request process employed by the Town of Caledon.	To provide information on how traffic calming requests are reviewed and assessed by Town of Caledon staff.
A traffic concern reporting form.	To provide an easy to use form for consistent reporting of traffic concerns including identifying the type of behaviour, the time of day, the behaviour was witnessed, and the location.

Caledon Traffic Calming Study Engagement Summary Report



Prepared by LURA Consulting
For the Town of Caledon
August 2019



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Introduction

The Town of Caledon is developing a new Traffic Calming Strategy to proactively implement traffic calming measures that aim to address issues of excessive motorized vehicle speed across the Town. The project team developed and executed an engagement program aimed at generating a conversation about speeding in Caledon and collecting feedback as to how the issues should be addressed.

This engagement summary report has aggregated the feedback from both the online and face-to-face engagement activities. Over 900 participants provided input that is reflected in this summary. The report is not intended to be a verbatim report of all comments heard, but instead a high-level summary noting the top trends from participant feedback.

Engagement Objectives

The engagement program was developed to ensure that residents, businesses, visitors and other stakeholders were made aware of traffic calming efforts in Caledon and were provided with the opportunity to give their feedback to influence the conversation. A secondary goal of engagement was to gain insight into the reasons why people speed in Caledon. The list below demonstrates the firm goals of the engagement plan:

Engagement

- Educate and increase understanding of different traffic calming techniques as well as how these may be used to improve traffic safety in Caledon;
- Identify motivators and barriers to traffic calming behaviours;
- Shape and define how future decisions about specific traffic calming projects in Caledon will be made, in consultation with local communities and residents.

Behaviour Change

- Explore and solicit feedback on the role of traffic calming as well as other measures and new ideas to promote traffic safety in the Town;
- Inform the Town's Traffic Calming Manual updates and development of the Five-Year Traffic Calming Program for Caledon; and
- Shape and define how future decisions about specific traffic calming projects in Caledon will be made, in consultation with local communities and residents.

Communication Methods

Communication Method	Description
Project Webpage	A project webpage (http://caledon.ca/TrafficCalming) was developed as a landing page for all project related updates, information and digital engagement opportunities. Information on the webpage included the project overview and process, background information, FAQs, opportunities to participate, sign up forms for more information, project documents and status updates.
Social Media	<p>The Town's established Twitter and Facebook accounts (@YourCaledon) were used to promote the project and encourage participation. The social media tools were used to:</p> <ul style="list-style-type: none"> • Introduce the project and direct people to the project webpage and digital engagement platform; • Broadcast and market engagement events; • Increase public participation; and • Promote engagement activities.
Information Postcard	An information postcard was developed to hand out to event participants. The postcard included a tagline, project information, and a link to the digital engagement platform.

Engagement Activities & Participation Rates

Engagement Activity	Description	Participation
Coffee with Council Events	<p>Two pop-ups were held at pre-scheduled Coffee with Council events to act as informal conversations between the project team and residents. Participants were asked to provide feedback to the following questions:</p> <ul style="list-style-type: none"> • What does traffic calming mean to you? • Why do you think people speed in Caledon? • Where do people speed in Caledon? • Where are traffic flows working well? 	80

Engagement Activity	Description	Participation
Caledon Day Pop Up	Like the Coffee with Council events, the project team hosted a booth at Caledon Day to spread awareness about the project and gather feedback. Participants were asked the same questions as those who attended the previous events. However, participants at Caledon Day were also asked to vote on their favourite Slow Down sign designed by local elementary school students as part of the Safety and Speeding Design Contest.	235
Digital Engagement	Mirroring the face-to-face engagement opportunities, an online engagement platform was developed to capture those unable to attend the in-person events. Using Social PinPoint, all the engagement questions were available online to be responded by using a drag and drop map to leave comments and a traditional survey.	468
Safety and Speeding Sign Design Contest	To engage Caledon's Youth, a Safety and Speeding Design Contest was developed. Students at Allan Drive Public School were invited to design eye-catching signs to encourage drivers to reduce speed and use caution when traveling through school zones. The top five designs were then voted on with the winner and runner up having their sign installed outside the school.	150
TOTAL		933

What We Heard

The following section provides a thematic overview of the feedback heard from participants. Feedback themes have been divided by the questions asked through engagement opportunities.

What does traffic calming mean to you?

- Several participants said that traffic calming means that vehicles follow the posted speed limit and that overall speeds are reduced.
- Many participants said that traffic calming means making changes to the roads to ensure that drivers are not speeding. This would include physical changes such as lane narrowing, implementing speed bumps and signs that display vehicle speeds. Alternatively, some said traffic calming meant non-physical road changes such as reduced speed limits and routine enforcement blitzes.

- For some, the meaning of traffic calming was directly related to improved community safety. Reducing speeding would result in safer streets for pedestrians, cyclists and other drivers.

Where should traffic calming be prioritized in Caledon?

Participants were asked to rank six types of places where traffic calming measures could be implemented in Caledon in order of priority. Overall, participants ranked “School Zones” as the top priority for implementing traffic calming measures followed by “Parks and Community Centres” (second priority), “Community Safety Zones” (third priority), “Villages and Hamlet Centres” (fourth priority), “Seniors Homes” (fifth priority), and “Roads with Limited Visibility” (sixth priority).

The detailed results of this ranked prioritization of different places is represented in Figure 1 using a weighted average method. Further detail on this method is included in **Appendix A**.

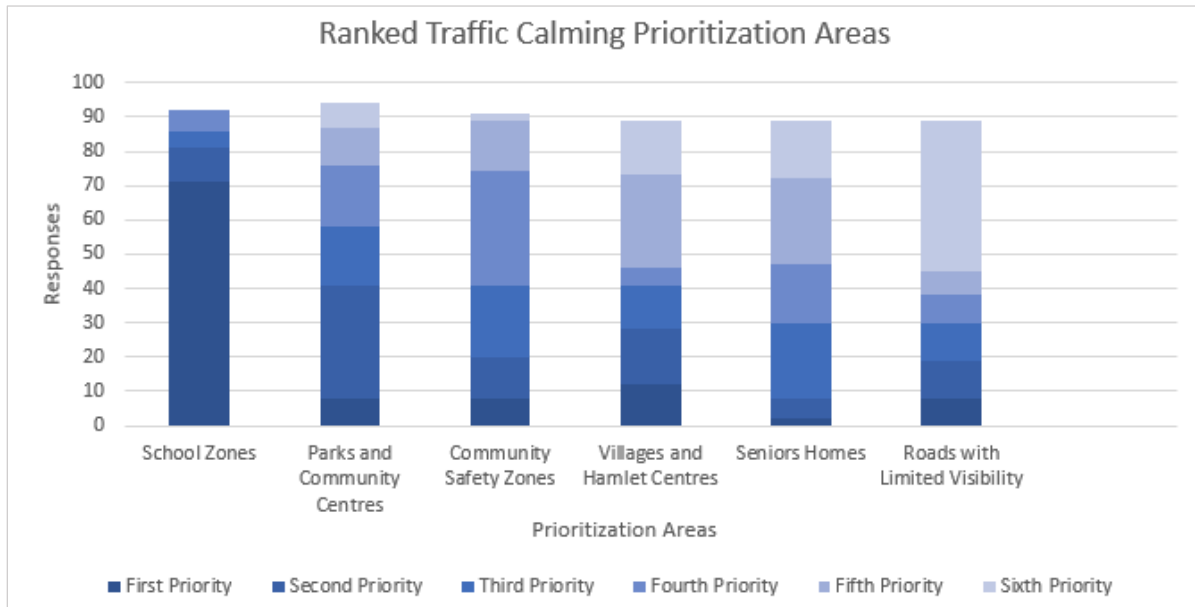


Figure 1. Ranked Traffic Calming Prioritization Areas (n=89 to 94)

Places ranked as a higher priority have a darker blue overall gradient as they are composed on more first, second, and third priority rankings. In contrast, places ranked lower priority have a lighter blue gradient as they are composed of more fourth, fifth, and sixth priority rankings.

A full description of how places were ranked is included in **Appendix A**.

What are the most common reasons for speeding in Caledon?

Participants were asked to select the reasons that they felt people speed in the Town. Participants were able to choose as many options as they liked and were also able to provide their own explanations for speeding.

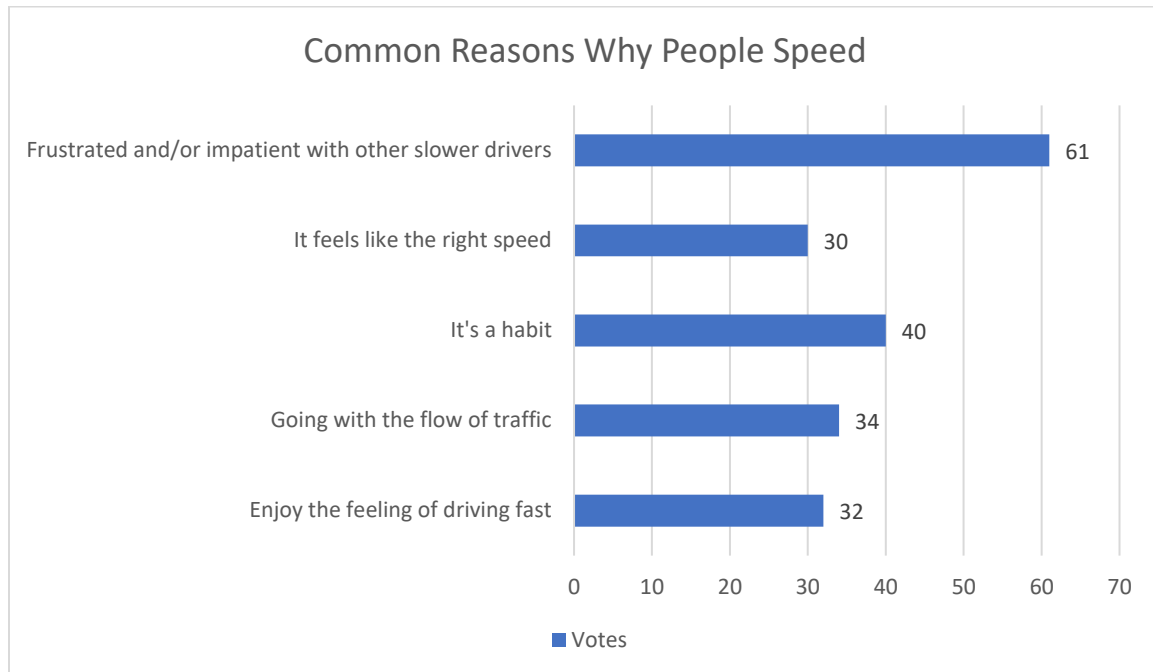


Figure 2. Common Reasons Why People Speed (n=197)

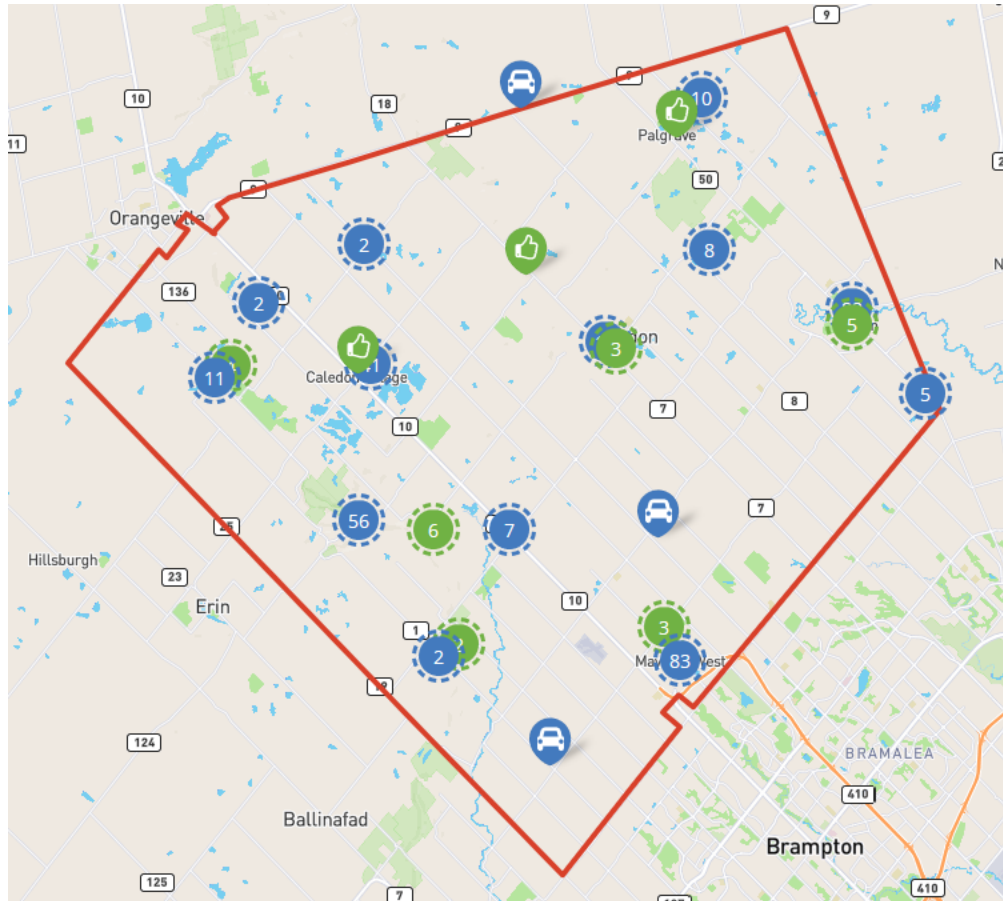
What are other reasons that people speed in Caledon?

There are several additional explanations for speeding listed by participants, including:

- Several participants said that people speed in Caledon because they feel there are no consequences. This includes a perceived lack of enforcement that participants feel allows regular speeders get away with the bad habit.
- Many participants said that drivers are often in a rush, either because they are too busy or do not leave enough time to get to their destination traveling at the posted limit.
- A few participants said that some roads feel like highways, which encourage drivers to drive faster either on purpose or mindlessly.
- Interestingly, some said that speed limits may be too low in some areas, which causes drivers to travel faster than the posted limit. One participant listed Highway 10 as an example.
- Some participants said that another explanation for speeding is racing and joy riding.

Where do people speed in Caledon?

Participants were asked to share where people speed in Caledon using a digital tool called Social Pinpoint. The following screenshot taken from the interactive map [shows](#) the locations where participants noted speeding occurs (indicated by blue dots) and where participants feel traffic is moving safely (indicated by green dots).



The interactive map can be viewed on the project webpage (<http://caledon.ca/TrafficCalming>). Zooming in to areas across the town map reveals specific locations and comments that inform how participants experience these roads.

Participants were also invited to provide additional comments related to the locations they identified on the interactive map where they believe that speeding occurs (blue dots). The following highlights key themes from comments on where participants identified speeding occurs:

- Many participants noted areas where speeding is particularly prevalent. Highway 50 was singled out as perhaps the most common area for speeding. Others major routes included Highway 10, Albion Trail, and Kennedy Road.
- Local roads such as Columbia Way, Kingsview Drive, Allan Drive, Dougal Avenue, Snellview Boulevard were also mentioned for speeding issues.

- Several participants identified the Forks of the Credit Road as the most common street listed for racing in Caledon.
- Participants frequently mentioned that drivers regularly disobey stop signs and red lights throughout the Town.
- Some said that drivers regularly speed in residential areas, in school zones and near community spaces such as parks.
- A few comments stated that tailgating has become an increasing issue in recent years.

Where are traffic flows currently working well?

Participants were also invited to provide additional comments related to the locations they identified on interactive map where they believe that traffic flows well (green dots). The following themes emerged from comments on where traffic flows well:

- Speed bumps on several roads have remediated speeding issues. Ellwood Drive was noted by a few participants as being a positive example of traffic calming in Caledon.
- Some participants noted specific roads where speed limits and traffic flows are working well, such as Inglewood, King, rural Kennedy, and East Caledon.
- A few participants said that flashing lights work in some areas to discourage speeding.
- Some said that unpaved roads have contributed to reduced speeds in some areas.

Next Steps

Feedback from participants will be used to inform results of the Caledon Traffic Calming Study. These results will be used to make decisions regarding traffic calming in the future. In addition, a toolkit will be designed with relevant materials for citizens to promote traffic calming in their communities. Lastly, the winning signs from the design contest will be posted outside Allan Drive Public School.

Appendix A – Ranked Traffic Calming Prioritization Areas Results

Prioritization Areas	1 st Priority (P ₁)	2 nd Priority (P ₂)	3 rd Priority (P ₃)	4 th Priority (P ₄)	5 th Priority (P ₅)	6 th Priority (P ₆)	Total Responses (n)	Weighted Average
School Zones	71	10	5	6	0	0	92	0.92
Parks and Community Centres	8	33	17	18	11	7	89	0.57
Community Safety Zones	8	12	21	33	15	2	94	0.51
Villages and Hamlet Centres	12	16	13	5	27	16	91	0.45
Seniors Homes	2	6	22	17	25	17	89	0.36
Roads with Limited Visibility	8	11	11	8	7	44	89	0.32

Ranking Methods

Places in Caledon where Traffic Calming should be prioritized were ranked using a weighted average. Weights were assigned based on priority ranging from 1st Priority (Weight = 1) to 6th Priority (Weight = 0) with 0.2 increments in between. The formula used is included below:

$$((P_1/n)*1) + (P_2/n)*0.8 + (P_3/n)*0.6 + (P_4/n)*0.4 + (P_5/n)*0.2 + (P_6/n)*0)/6$$

Caledon Traffic Calming Toolkit



Prepared by LURA Consulting
For the Town of Caledon
January 2020



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1. Webpage Content

Note: This content is intended to be embedded into the Caledon.ca/TrafficCalming webpage with hyperlinks where indicated.

Traffic Calming in Caledon ensures safety is a top priority for all road users!

Traffic calming involves physically changing the design of roads to reduce speed and encourage safe driving behaviour for the comfort of all road users.

Traffic calming is also a great way to reduce traffic as well as beautify streets!

Traffic calming techniques are implemented in both new developments and existing neighbourhoods and are achieved through various measures such as:

- Horizontal Deflection
- Vertical Deflection
- Roadway Narrowing
- Surface Treatments
- Pavement Markings,
- Education; and
- Enforcement



Speed Humps



Raised Medians



Vertical Centreline

Check out a detailed overview of [Caledon Traffic Calming Measures](#) (hyperlink) including descriptions and images.

Report an Issue

Do you have a concern in your community that the Town should be aware of? Fill out a [Traffic Report Issues Form](#) (hyperlink) so we can learn more about the problem and work to get it resolved.

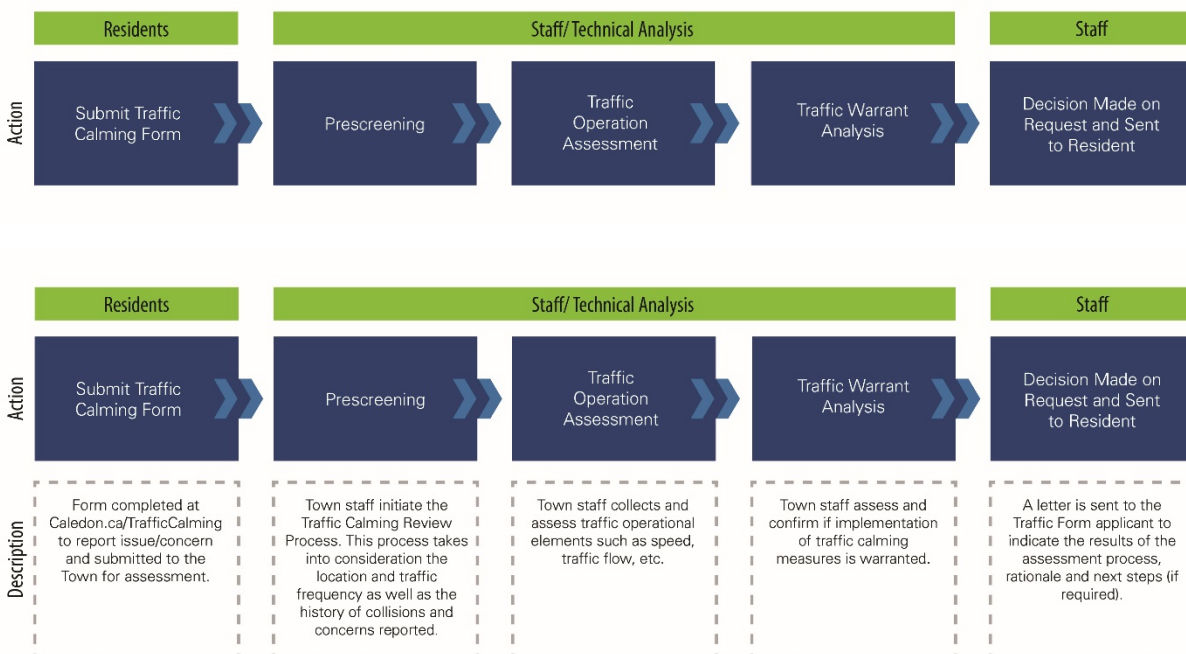
Traffic Report Issue Process

Wonder what happens after you submit a Traffic Report Issue Form? Check out the process below. [Click on the image for more details](#)

Note: These graphics were provided to the Town of Caledon as an Illustrator, PDF and jpeg format. The jpegs have been saved in three different formats:

- **CMYK – for print**
- **RGB – for screens**
- **For Web Use -**

These graphics were developed to explain the process for reporting a traffic calming concern to the Town. It is recommended that the Town use these graphics on the traffic calming webpage. The simple graphic should appear on the webpage and be clickable to open a pop-up with the more detailed graphic.



Caledon Traffic Calming Strategy

Recent population increases and developments have resulted in an increase in vehicles cutting through hamlets and neighbourhoods, traffic, collisions, and speeding throughout Caledon. With the community's feedback, the Town has developed a Traffic Calming Strategy that will help Town Council and staff to proactively improve road safety.

For more information check out the following materials:

[The Caledon Traffic Calming Strategy](#) (hyperlink)

[The Engagement Summary Report](#) (hyperlink)

[Traffic Calming Measures Details](#) (hyperlink)

Note: LURA recommends making the above referenced materials publicly available on the webpage.

Contact (optional)

For more information, please contact:

Arash Olia, Ph.D., P.Eng.

Transportation Manager

arash.olia@caledon.ca | 905.584.2272 x.4073

2. Social Media Messaging

Note: These social media template messages are intended to provide consistent standard messaging to communicate traffic calming importance and where to get more information and submit a concern. Additional messaging has also been provided to communicate the implementation of traffic calming measures

Standard Messaging

- Safety is a top priority for all road users, and we are '*Putting the Brakes on Speeding*' with different techniques to help reduce speeding and improve road safety for all! Visit [Caledon.ca/TrafficCalming](https://caledon.ca/TrafficCalming) to learn more.
- Have a complaint about speeding vehicles or the amount of traffic on your street? The Town is '*Putting the Brakes on Speeding*' with different techniques to ensure safety and comfort for all road users. Visit [Caledon.ca/TrafficCalming](https://caledon.ca/TrafficCalming) to report an issue in your neighbourhood.
- Have you noticed these Safety and Speeding Signs? They were designed by students at Allan Drive Public School to remind us all that we should be '*Putting the Brakes on Speeding*', especially in school zones. Visit [Caledon.ca/TrafficCalming](https://caledon.ca/TrafficCalming) to learn more.
- Traffic calming can take many forms, all of which help improve road safety across the Town of Caledon for everyone. Visit [Caledon.ca/TrafficCalming](https://caledon.ca/TrafficCalming) to learn more about what traffic calming is and how traffic concerns are being addressed in your neighbourhood.
- You've likely encountered a series of speedbumps when driving in Caledon, but did you know there are over 25 different ways to calm traffic? Visit [Caledon.ca/TrafficCalming](https://caledon.ca/TrafficCalming) to learn more about their design and implementation.
- Wondering how to make your roads safer? The Town of Caledon has a helpful guide to understand how traffic concerns are being addressed. Visit [Caledon.ca/TrafficCalming](https://caledon.ca/TrafficCalming) to learn about how speeding is being addressed in Caledon..
- How does the Town of Caledon decide where and which type of traffic calming measures are used? We developed a helpful guide that shows how traffic calming requests are processed. Visit [Caledon.ca/TrafficCalming](https://caledon.ca/TrafficCalming) to learn more.
- Are Caledon roads fast and furious? Help us ensure drivers SLOW DOWN and THINK OF US! Visit caledon.ca/TrafficCalming for more information.

- What is the need for speed? SLOW DOWN and THINK OF US! Visit caledon.ca/TrafficCalming for FREE materials to share this message and keep our communities safe.

Update on Implementation of Different Measures

If testing/pilot project -

- “Come check out the new _____ at _____. They are installed _____ to help _____. Let us know if they are working! Visit our website Caledon.ca/TrafficCalming or comment below!”

(Come check out the new speed humps at Tiny St. They are installed at regular intervals to help control the speed of vehicles. Let us know if they are working! Comment below or visit our website Caledon.ca/TrafficCalming.)

When implemented -

- “Do you know what _____ are? They are _____ that will help _____, now installed at _____. Check out the photos or visit the website Caledon.ca/TrafficCalming to learn more!”

(“Do you know what bollards are? They are short vertical posts that will help address vehicle-pedestrian conflicts, now installed at Extraordinary Square! Check out the photos or visit Caledon.ca/TrafficCalming to learn more.”)

- “Have you spotted _____ in the Town yet? These have been installed on _____ to _____. So far, the measure has been a success as indicated _____.”

(“Have you spotted any curb extensions in the Town yet? These have been installed on Genius School’s street to reduce vehicular speed and increase landscaping opportunities. So far, the measure has been well received by the school management and parents.”)

- “_____ is installed on _____! These will help _____. Walk, cycle, or drive through to experience the change!”

(Curbs extensions have been installed on Calm Street! These will force drivers to slow down. Walk, cycle, or drive through to experience the change!)

Social Media Graphics

Note: These social media graphics have been provided to the Town in a PDF and various jpeg formats. The jpegs have been saved in three different formats:

- CMYK – for print
- RGB – for screens
- For Web Use –











These graphics were developed to promote traffic calming in the Town. They are a series of graphics with the slogan “Slow Down, Think of Us!”. These graphics can be used as part of an education campaign to encourage slower driving. These graphics can also be used in social media posts directing the public to the traffic calming webpage or promoting an event.

3. Traffic Calming Measures

Note: This graphic has been provided to the Town of Caledon as an Illustrator, PDF and jpeg format. The jpegs have been saved in three different formats:

- **CMYK – for print**
- **RGB – for screens**
- **For Web Use -**

This graphic was developed to show the different traffic calming measures in Caledon. It is recommended that the Town use these graphics on the traffic calming webpage.

Caledon Traffic Calming Measures			
	NAME	PHOTO	DESCRIPTION
ROADWAY NARROWING	Raised Median		Raised medians are a physical barrier located in the median between directions of traffic and are typically installed on two-way roadways.
	Vertical Centreline		Vertical centerline treatment involves the use of vertical treatments such as flexible post-mounted delineators or raised pavement markers to create a centre median.
SURFACE TREATMENT	Texture Pavement		Textured pavement is roadway pavement that incorporates a textured and/or patterned surface which contrasts other adjacent roadways in the surrounding area.
	Enhanced Pavement Marking		Enhanced pavement markings provide information that would typically be shown to drivers through signage but are painted on the roadway to provide a larger image, and one that is directly in the driver's line of sight.
EDUCATION	Speed Display Devices		A speed display device is an interactive sign that displays vehicle speeds as oncoming motorists approach. Vehicle speed is captured using radar and can trigger the display board to show when vehicles approach at predetermined unsafe speeds.
ENFORCEMENT	OPP		OPP enforcement of the speed limit will assist with reducing vehicle operating speeds in areas where other traffic calming measures cannot be implemented.
VERTICAL DEFLECTION	Speed Hump		Speed humps are a vertical structure spanning across the width of a roadway (excluding curbs) designed to slow vehicle speeds.
HORIZONTAL DEFLECTION	Mini-Roundabout		Mini-roundabouts are raised islands located in the centre of an intersection that motorists navigate around in a counter clockwise direction.

4. Traffic Report Issues Form

Note: This form has been provided to the Town of Caledon as a Microsoft Word Document as to provide the questions and response options that the Town will use to embed the traffic concern reporting form onto their website.

Your Name:

Your E-mail:

Your Full Address (including postal code):

Your Telephone Number:

**What is the location zone of your traffic concern/issue?
(please select all that apply):**

- | | |
|---|---|
| <input type="checkbox"/> School Zone | <input type="checkbox"/> Road with Limited Visibility |
| <input type="checkbox"/> Park/Community Centre | <input type="checkbox"/> Unsure |
| <input type="checkbox"/> Seniors Home | <input type="checkbox"/> Other (please specify) |
| <input type="checkbox"/> Community Safety Zone ¹ | <hr/> |
| <input type="checkbox"/> Hamlet/Village | |

¹ Defined as a roadways near schools, daycare centres, playgrounds, parks, hospitals, senior citizen residences and may also be used for collision-prone areas within a Community

What is the priority traffic concern/issue?

(please select any one of the following traffic concerns):

- | | |
|--|--|
| <input type="checkbox"/> High speed | <input type="checkbox"/> Cut-through traffic |
| <input type="checkbox"/> Pedestrian safety | <input type="checkbox"/> Collision concern |
| <input type="checkbox"/> High volume of automobile traffic | <input type="checkbox"/> Other |
-

Which seasons does the problem occur (please select all that apply):

- | | |
|---------------------------------|---------------------------------|
| <input type="checkbox"/> Summer | <input type="checkbox"/> Fall |
| <input type="checkbox"/> Spring | <input type="checkbox"/> Winter |

When does the problem typically occur? (please select all that apply):

- | | |
|--|-----------------------------------|
| <input type="checkbox"/> Early morning | <input type="checkbox"/> Weekdays |
| <input type="checkbox"/> Morning rush hour | <input type="checkbox"/> Weekends |
| <input type="checkbox"/> Mid-day | <input type="checkbox"/> Other |
| <input type="checkbox"/> Weekdays | |
| <input type="checkbox"/> Late-evening | |
-

Please provide any additional information in the space provided below.

5. Traffic Report Issues Form – Thank You Message

Note: After the participant has submitted their form, the following message could appear.

Thank you for taking the time to report your traffic concerns. For more information about traffic calming including the process for reporting a concern, measures to address traffic calming issues and other materials please visit: <http://caledon.ca/TrafficCalming>

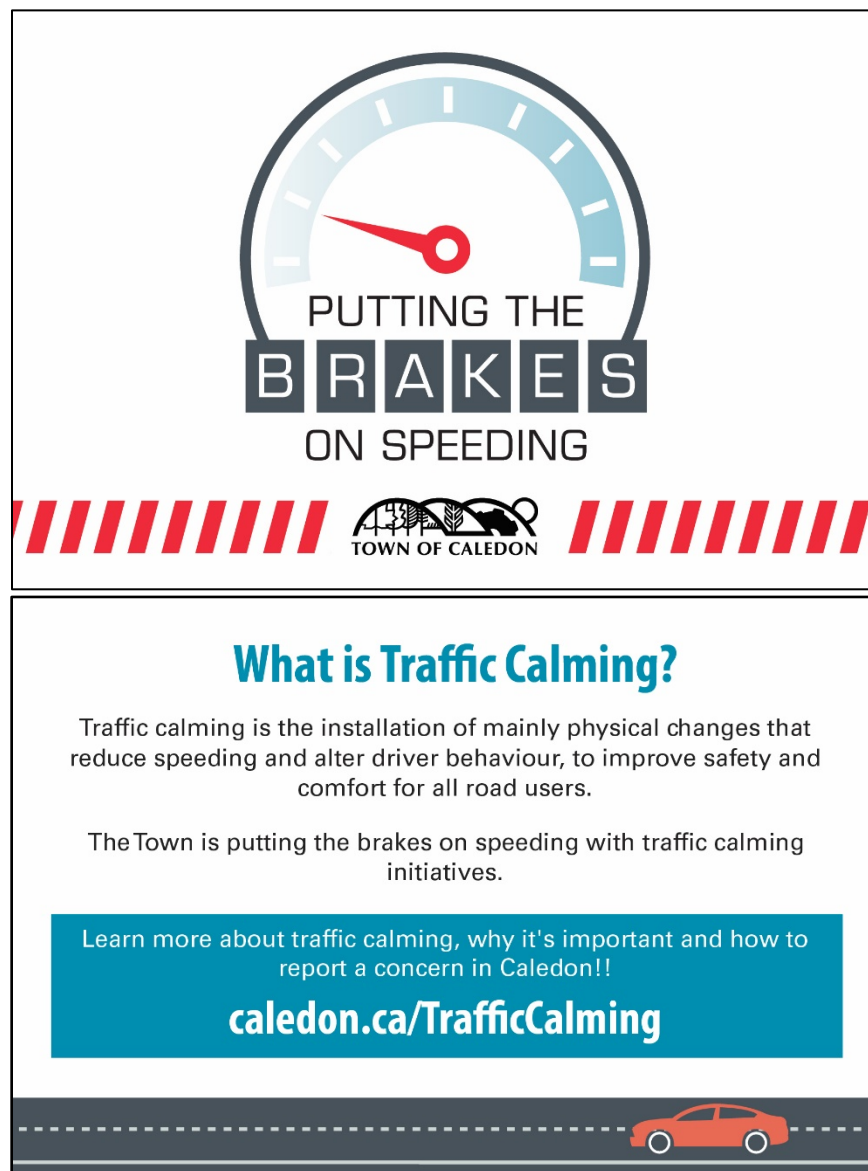
6. Lawn Sign

Note: These lawn sign options have been provided to the Town of Caledon as a PDF and Illustrator document. These lawn signs are at a dimension of 22"x15" which were the dimensions provided by the Town. There were no cutline directions given. The Town will need to adjust the bleed/cutlines in Illustrator when the correct bleeds are confirmed and export a new pdf file for printing. The images below are of the lawn sign design options provided to the Town.



7. Handout Information Card

Note: This handout card has been provided to the Town of Caledon as a PDF with 0.25 inch cutlines and bleeds, and as an Illustrator file. The dimensions of this card are 4'x6'. This handout card was developed for the Town as an informative piece for their traffic calming initiatives. This card will direct the public to the Town's website where they can learn more about traffic calming or report a concern. It is recommended that this card be printed on a heavier cardstock with a semi-gloss finish for durability. The image below is the front and back of the handout card.





Traffic Calming Request Form

Please provide, in as much detail as possible, information about your traffic calming request.
Responses from these forms will be reviewed by Town of Caledon Staff.

Your Name:

Your E-mail:

Your Full Address (including postal code):

Your Telephone Number:

What is the location zone of your traffic concern/issue?

(Please select all that apply):

School Zone

Park/Community Centre

Seniors Home

Community Safety Zone¹

Subdivision

Hamlet/Village

Road with Limited Visibility

Unsure

Other (please specify)

What is the location you would like investigated?

(Please indicate either an intersection or a segment of road between two intersections)

What is the priority traffic concern/issue?

(Please select any one of the following traffic concerns):

High speed

Pedestrian safety

High volume of
automobile traffic

Cut-through traffic

Collision concern

Other

¹ Defined as a roadways near schools, daycare centres, playgrounds, parks, hospitals, senior citizen residences and may also be used for collision-prone areas within a Community



Which seasons does the problem occur (please select all that apply):

Summer

Fall

Spring

Winter

When does the problem typically occur? (please select all that apply):

Early morning

Afternoon rush-hour

Morning rush hour

Late evening

Mid-day

Please provide any additional information in the space provided below.

Thank-You for your Feedback Message

Thank you for taking the time to report your traffic calming request. These requests will be reviewed by Town of Caledon Staff to better understand how traffic calming can be implemented going forward.

For more information about traffic calming including the process for reporting a concern, measures to address traffic calming issues and other materials please visit

<http://caledon.ca/TrafficCalming>

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