TOWN OF WHITBY

Traffic Calming Guidelines

June 2026

Whitby

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1 Introduction

1.1 Overview

The **Town of Whitby Traffic Calming Guidelines** provide guidance to Town staff in planning and designing traffic calming on Town roads. The Guidelines supplement information presented in the Transportation Association of Canada's (TAC) *Canadian Guide to Traffic Calming*[1], combining recommended practices in traffic calming with local "Whitby-specific" context. The Guidelines also consider relevant Provincial legislation including the *Accessibility for Ontarians with Disabilities Act, 2005* (AODA) and *Highway Traffic Act* (HTA) as traffic calming installations must comply with these statutes.

The Guidelines focus on traffic calming for retrofits to existing roads but can also inform designs for new and reconstructed streets.

It should be emphasized that this document is a guide and should be used in conjunction with other technical/policy guidance combined with sound engineering judgment. The details of any traffic calming installation must comply with all relevant Town design and construction standards and specifications, unless otherwise noted.

The Guidelines are a living document that may be modified from time to time based on new and emerging practices.

1.2 About Traffic Calming

The *Canadian Guide to Traffic Calming* describes traffic calming as:

> *The process and measures applied by road authorities to address concerns about the behaviour of motor vehicle drivers travelling on streets within their jurisdictions.*

Traffic calming aims to improve road safety and enhance community livability by reducing the negative effects of motor vehicle use, altering driver behaviour, and

[1] Transportation Association of Canada (TAC), *Canadian Guide to Traffic Calming,* 2nd ed. (2018)

improving conditions for pedestrians and cyclists. Calming traffic also aligns with broader municipal objectives to foster accessibility, support active travel (walking and cycling), promote public health, and enrich “quality of life” – to name a few – demonstrating the interdependence between street design and strong, vibrant neighbourhoods.

When properly used, traffic calming can help reduce:

- Motor vehicle speeds
- Neighbourhood traffic infiltration
- Pedestrian crossing distances and times
- Conflicts between roadway users
- The risk and severity of motor vehicle collisions

While offering potential benefits, some traffic calming measures can be costly and time-consuming to install and if used inappropriately can also:

- Increase emergency vehicle response and transit operating times
- Impede resident access to neighbourhoods
- Divert traffic problems to other roads
- Escalate costs for snow clearing, curbside waste collection, and other maintenance functions
- Intensify vehicle emissions and/or noise pollution

Careful consideration and proper planning – following these Guidelines – helps to ensure successful implementation, avoid unintended consequences, and allow for equitable and consistent treatment of all road users.

1.3 Traffic Calming in Whitby

The **Town of Whitby Traffic Calming Policy** establishes a transparent, standardized process for assessing and responding to citizen requests for traffic calming and sets out the method for implementing traffic calming on Town roads. Adopted by Town

Council in 2026, the policy applies to Local Roads, Collector Roads, and select Type C Arterial Roads[2] under the municipality's jurisdiction. It does not apply to Durham Regional Roads or Provincial Highways.

The Town applies traffic calming measures mostly on roads in Residential neighbourhoods and Central Areas within the Town's Urban Area. Traffic calming may also be used on rural roads, primarily within Hamlets and Estate Residential areas.[3] Chapter 2 sets out the warrant process for their implementation.

Traffic calming measures can be introduced on Town roads through:

- Individual, localized retrofit projects, following the completion of a Traffic Calming Study according to the process defined in the policy;
- A street re-design undertaken as part of a planned road, water, and/or sewer reconstruction project; or
- The land development process as a condition of approval, for both existing and new roads.

The Town and developers may have planned or ongoing projects for roads prioritized for traffic calming. Opportunities to coordinate efforts should be explored.

1.4 Use of Regulatory Signs for Traffic Calming

The Town will not install regulatory signs for the sole purpose of traffic calming. In most cases, signs alone will not discourage motorists from speeding or shortcutting on neighbourhood roads. Their use can also lead to other problems. For example, placing an all-way stop at an intersection not meeting the warrants specified in *Ontario Traffic Manual Book 5 – Regulatory Signs* for its installation can cause poor driver compliance, a false sense of security for pedestrians, speeding between intersections, longer emergency response times, and noise and air pollution. Even when justified, all-way stops can increase the risk of rear-end and fixed object collisions.

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2 As designated on Schedule D (Transportation) of the Town's Official Plan

3 Land use designations per Schedule A (Land Use) of the Town's Official Plan

2 Warrant Process for Implementing Traffic Calming

Resident requests satisfying the initial screening requirements set out in the Town's Traffic Calming Policy will undergo a technical assessment to evaluate the potential benefit of installing traffic calming measures and to prioritize the subject street against other eligible locations for implementation. The warrant process involves assigning a point score to the factors set out in **Table 2.1** using data on existing traffic and road conditions.

Maximum point scores vary based on whether the subject street meets the criteria for traffic calming in the initial screening based on speeding (maximum 90 points) or excessive shortcutting traffic (maximum 100 points). The minimum point scores typically needed to qualify for traffic calming measures also differ based on the rationale (speeding or shortcutting traffic), as noted in **Table 2.1**.

TABLE 2.1: WARRANT PROCESS FOR IMPLEMENTING TRAFFIC CALMING

Factor	Factor Scoring			Maximum Points
	Local Road	Collector Road	Type C Arterial Road	
Vulnerable Road Users	5 points for each adjacent pedestrian generator[1]	10 points for each adjacent pedestrian generator[1]	10 points for each adjacent pedestrian generator[1]	20
Pedestrian Facilities	5 points if no sidewalks on either side	5 points if sidewalk on only one side 10 points if no sidewalk on either side	5 points if sidewalk on only one side 10 points if no sidewalk on either side	10
Cycling Facilities	5 points for on-road designated facilities			5
Residential Frontage	5 points for primarily residential frontage (> 10 entrances per km)			5
Speed Differential[2]	2 points for every 1 km/h the 85th Percentile Speed exceeds the posted speed limit	1 point for every 1 km/h the 85th Percentile Speed exceeds the posted speed limit	1 point for every 1 km/h the 85th Percentile Speed exceeds the posted speed limit	25
Excessive Speed[2]	5 points if the 85th Percentile Speed exceeds the posted speed limit by 20 km/h			5
Total Traffic Volume[3]	1 point for every 50 vpd over 1,000 vpd	1 point for every 100 vpd over 3,500 vpd	1 point for every 250 vpd over 5,000 vpd	15
Collision History[5]	1 point for each qualifying collision over the last three (3) years			5
Minimum point scores if the subject street meets the criteria for traffic calming based on speeding in the initial screening (subject to consideration of local conditions)				
	20	30	40	90
Shortcutting Traffic[4]	10 points if more than 30%	10 points if more than 60%	10 points if more than 60%	10
Minimum point scores if the subject street meets the criteria for traffic calming based on excessive shortcutting traffic in the initial screening (subject to consideration of local conditions)				
	30	40	50	100

Notes:

1. Examples of pedestrian generators include recreation centres, parks/playgrounds, places of worship, seniors' centres/residences, schools, shopping areas, libraries, and transit routes.
2. The 85th Percentile Speed is calculated from data collected using automated traffic recorders (or similar units) over a minimum 24-hour period.
3. Two-way average daily traffic (ADT) volumes over a 24-hour period (vehicles per day or vpd). Volume thresholds consistent with guidance contained in the TAC *Geometric Design Guide for Canadian Roads*, Table 2.6.5: Characteristics of Urban Roads.
4. See **Appendix A** to estimate the percentage of Shortcutting Traffic.
5. Includes all collisions along the subject street except for collisions occurring at intersections with arterial roads and collisions involving animals.

3 Traffic Calming Plan Development

3.1 Approach

The development of a Traffic Calming Plan is a planning exercise involving both technical and communication activities. When the process works as intended, the resulting plan will effectively address resident and stakeholder interests and be sensitive to a broad range of factors and concerns, allowing the Town and its citizens to work towards a clearly defined common outcome.

The approach to developing a successful Traffic Calming Plan involves:

- Forming a clear understanding of the issue(s) requiring attention (e.g., speeding, shortcutting traffic) and identifying which of these concerns the plan intends to address
- Establishing both technical objectives (e.g., reduce speeding, limit shortcutting traffic, encourage appropriate driver behaviour, etc.) and project goals (e.g., help meet policy objectives, educate the public about the benefits and impacts of traffic calming, manage public expectations, develop community partnerships) for the plan
- Identifying and communicating key deliverables and timelines to project participants
- Confirming availability and limitations of funding, staff, equipment, community, and other resources to prepare and implement the plan

3.2 Study Area

The study area for a Traffic Calming Plan will depend on the specific approach strategy (per above), particularly the issue(s) requiring attention. For concerns primarily related to speeding, the study area will generally be more localized to the street segment(s) of concern. For concerns primarily related to shortcutting traffic, larger study areas may apply.

In most cases, for Local Roads, the study area will typically comprise properties with direct frontage on the subject street. For Collector Roads and Type C Arterial Roads, the study area will include all properties with direct frontage on the subject street and the Local Roads connecting to the subject street, recognizing Collector Roads and Type C Arterial Roads generally serve the broader neighbourhood.

The study area may be expanded to capture potentially impacted households on other streets, especially if shortcutting traffic is the primary concern and traffic diversion is a possible outcome of implementing the traffic calming measures. Other factors to consider when defining the study area limits include:

- Issue(s) requiring attention and problem context
- Neighbourhood size
- Key street segment(s) of concern
- Traffic and roadway data
- Location and context of sensitive land uses near, or adjacent to, streets of interest
- Town policies and guidelines (e.g., Transportation Master Plan, Official Plan)
- Potential opportunities and limitations such as available resources and partnerships
- Environmental factors (e.g. geographic features, major streets, key intersections)

3.3 Existing Conditions

It is important to understand existing conditions and context when developing a Traffic Calming Plan. Gaining a sound appreciation for the study area characteristics can help frame opportunities and constraints for the plan. This includes:

- Knowing the land uses within and adjacent to the study area (past, present, and future). This provides insight into the types of users frequenting the subject street, potential delivery and curbside loading needs, school and park related activity, and other considerations.

- Developing an understanding of the study area transportation network, including:
  - Street user volumes (by mode, peak and off-peak)
  - Motor vehicle traffic volumes (through and shortcutting)
  - Collision history (including all types of street users)
  - Vehicle speeds
  - Driveway access locations and configurations
  - Curbside regulations
  - Signs and pavement markings
  - Active transportation facilities
  - Road designations within the Official Plan
  - Traffic signals
  - Maintenance class of subject street
  - Emergency response operations
  - Streetlighting
  - Transit

3.4 Data Collection

Traffic data collection helps in developing an understanding of the study area transportation network. The data provides objective information to make evidence-based decisions on where to implement traffic calming and the types of measures used. It also aids in assessing effectiveness and determining needed refinements to the Traffic Calming Plan after installing measures.

Speed surveys and traffic counts are the most common data collected when developing a Traffic Calming Plan and monitoring its implementation. This data provides prevailing vehicle speeds and traffic volumes on roads in the study area. In some instances, origin-destination surveys may be conducted to quantify the extent of shortcutting traffic.

Typically, the Town carries out speed surveys and traffic counts using Automatic Traffic Recorders (ATRs). These devices can take the form of black tubes laid across the road or video/detection units mounted to poles beside the street. Typically, traffic data are collected continuously over a 24-hour period each day for at least seven consecutive days. Origin-destinations surveys will involve either manual data

recording or use digital technology to determine the percentage of vehicles passing through compared to those that begin or end their trip within the study area.

In some instances, the Town may already have traffic data for the subject street from previous collection efforts. If the information is more than three (3) years old (or does not exist), the Town will schedule new traffic data collection at the earliest opportunity. Requests received in the winter season may be investigated the following spring.

3.5 Support for Traffic Calming Review

The community support process to consider traffic calming where screening criteria are met is intended to be primarily resident-led. A petition may be undertaken by the Originator of the request, or the neighbourhood could select an individual to champion support, to be provided through a petition or correspondence with the Town. Agreement or disagreement with traffic calming correspondence may be provided through a variety of methods, including, but not limited to, signing a petition form, mailout requesting an online, email or telephone response to the Transportation Service section, etc. Town staff will support Originators of the request who require accessibility accommodations or assistance participating in the process.

3.6 Resident and Stakeholder Engagement

Resident and stakeholder involvement plays a vital role in the development of a successful Traffic Calming Plan. Active and robust participation helps foster support for potential traffic calming measures and ultimately aids in ensuring a positive outcome with the neighbourhood and Town Council. In general, residents living within or adjacent to the study area will be most engaged in the study.

The Town aims to build consensus on the preferred traffic calming strategy by involving residents and stakeholders in a consistent and meaningful manner at critical points throughout the planning process. Communication between the Town and project participants is key to developing a common understanding. Ensuring the process feels open, understandable, transparent, and inclusive involves:

- Providing convenient and accessible methods for interested parties to participate and offer feedback
- Presenting relevant technical information and data to allow informed input
- Inviting participants to contribute to identifying key issues and developing proposed solutions
- Identifying areas of agreement as early as possible in the process and concentrate resources on areas of contention
- Clearly defining what is (and is not) within the project scope
- Explaining how resident and stakeholder feedback influences the decision-making process, including why specific suggestions are (or are not) included

A single method of resident and stakeholder involvement is not suitable for all situations. A variety of techniques may be employed to engage project participants, such as workshops, online presentations, pop-up information centres, surveys, meetings, and mailouts. More complex and contentious issues typically require greater levels of outreach and consultation.

There may be instances when traffic calming measures are warranted, but residents have conflicting opinions on the preferred approach to addressing the identified concerns. In these circumstances, additional community engagement and direct outreach to potentially impacted residents may be needed to resolve concerns.

The Town will communicate with residents throughout the Traffic Calming Plan development process, primarily through the **Connect Whitby** engagement site [https://connectwhitby.ca/]. The site will serve as a "one-stop portal" for all study-related information and online engagement efforts. The Town may also communicate through their social media feeds and in local newspapers, as deemed appropriate. Dissemination and distribution methods will depend on the size and nature of the study area.

Several Town departments and external agencies may be involved in the process, including emergency services (Town Fire and Emergency Services, Durham Regional Police Service, and Region of Durham Paramedic Services) and Durham Region Transit. In some cases, stakeholders may also include Town advisory committees and school boards.

Table 3.1 summarizes the public engagement activities that form part of the Traffic Calming Study Process set out in the Town's Traffic Calming Policy. The table:

- Lists typical engagement **activities**. These activities occur in the Plan Development (Step 4) phase of the study process;
- Describes the **approach** for engaging residents in this phase;
- Outlines the **purpose** and **key questions** for the engagement activities; and
- Details the **complimentary communications** supporting the activities.

Town staff will lead all public engagement activities. For specific projects, the Town may choose to host additional consultation sessions to gather input from study area residents.

TABLE 3.1: PUBLIC ENGAGEMENT ACTIVITIES FOR TRAFFIC CALMING STUDY

Activity	Approach	Purpose	Key Questions	Complimentary Communications
Conduct Neighbourhood Survey	A **survey** (communication delivered by mail, roadside signage (Curbex) or social media platforms with direction to online survey) will be sent to each household (dwelling unit) in the study area, regardless of the number of residents, to gauge support for implementing the proposed Traffic Calming Plan and determine the preferred plan alternative if more than one option exists. The survey package will include information about the proposed plan.	To determine if resident support exists to implement the proposed Traffic Calming Plan. *If options:* To determine the preferred Traffic Calming Plan to implement.	Do you support the installation of the proposed Traffic Calming Plan? • Yes • No • Unsure/neutral *If options:* Do you support the installation of proposed Traffic Calming Plan: • Option #1 • Option #2 • Option #n (typically no more than 3) • None of the options • Unsure/neutral Does anything need to change before this plan moves forward?	**Connect Whitby** site with information about the Traffic Calming Study and the proposed Traffic Calming Plan (options) **Social media blast** **Handouts** with information about the Traffic Calming Study and the proposed Traffic Calming Plan (options) mailed and/or handed out to the intended audience. Includes use of door hangers, if appropriate. **Email correspondence** **Phone calls**
OPTIONAL (if the Town chooses to carry out additional consultation for specific projects) Hold Workshop	A **workshop** (virtual or in-person) may be held with study area residents to discuss the Traffic Calming Plan (options). The workshop should include an educational component and provide opportunities for feedback.	To provide information about and receive feedback on the Traffic Calming Study from residents of the study area.	What are the key traffic concerns in the study area? What potential measures could solve these concerns? What do you like about the proposed Traffic Calming Plan (options)? *If options:* Do you have a preference between the alternatives presented? Do you feel comfortable with the proposed solution? Does anything need to change before this plan moves forward? Do you have any questions or concerns about what is being discussed?	**Connect Whitby** site with information about the Traffic Calming Study **Social media blast** **Notice of Engagement** with information about the Traffic Calming Study mailed and/or handed out to the intended audience. Includes use of door hangers, if appropriate. **Email correspondence** **Phone calls**

3.7 Accessibility, Equity, and Inclusion

Traffic Calming Plans should support use by all people in an inclusive and equitable manner. When developing the plan:

- Consider all individuals, groups, and stakeholders that may be affected by the traffic calming measures
- Use different notification and consultation strategies and deployment timings to reach and engage diverse audiences
- Evaluate plans through an equity and inclusion lens to better understand potential benefits and disadvantages from various user perspectives
- Adhere to the principles of universal design and the Integrated Accessibility Standards (Design of Public Spaces) under the AODA
- Balance competing interests as some traffic calming measures can introduce unintended barriers from an equity and inclusion perspective
- Document the rationale when deviating from the guidance in this document

3.8 Design Concepts

A design concept is an illustration and description of the combination of traffic calming measures (and locations of those measures) intended to achieve the stated objectives. It helps communicate the form of a potential Traffic Calming Plan to the public in an easily understood format. Design concepts can be as detailed as necessary to achieve the project objectives.

When developing design concepts, consider the following factors:

- Effectiveness of the plan in meeting Town policy and neighbourhood objectives
- Effectiveness of the plan in addressing the problem or opportunity
- Transportation system effects (including active transportation, public transit, vehicle traffic, goods movement, emergency response, and street maintenance)

- Effects on persons with disabilities
- Potential changes to noise, vibration, aesthetics, and the environment
- Effects on pedestrians, cyclists, and vehicle occupants (e.g., comfort, familiarity, etc.)
- Effects on road safety
- Effects on transportation system efficiency and intersection operations
- Constructability and durability
- Lifecycle costs (including capital implementation, ongoing maintenance, and potential renewal)

Other planning tools used in concept development to aid in assessing potential viability and effectiveness include:

- Creating “mock-ups” using temporary materials;
- Inspecting the subject street during inclement weather – particularly instructive in reviewing drainage conditions and vehicle tracking manoeuvres around corners; and
- Reviewing other similar locations with comparable traffic calming measures.

3.9 Monitoring

Monitoring helps to determine if the Traffic Calming Plan is functioning as intended. When conducted, the monitoring process typically involves developing evaluation criteria, collecting data, conducting site observations, gathering resident and stakeholder feedback, undertaking “before and after” analysis, and recommending refinements, if any, based on the comparative evaluation. In rare circumstances, this could also include removing some or all traffic calming measures. Reporting and public education following the monitoring process allows for the exchange of information and knowledge.

Typical evaluation criteria used to assess the impacts (positive and negative) of a Traffic Calming Plan may include:

- **Effectiveness**. For example, level of vehicle speed reduction.
- **Costs and/or Benefits**. For example, benefit of reduction in collision rate compared to cost of installation.
- **Stakeholder Feedback**. For example, the number of similar reported complaints or positive feedback received after installation.
- **Secondary Impacts or Benefits**. For example, vibration and noise level changes.

Preferably, evaluation criteria will be quantitative in nature but could be qualitative for difficult to measure factors.

4 The Toolkit

4.1 Basis

The *Canadian Guide to Traffic Calming* is the preeminent source of information and guidance about traffic calming in Canada. Originally published in 1998, the guide was updated in 2018 to incorporate the latest and best practices that evolved in the field over the 20 years since its original release. Much of the document is devoted to describing and providing information about the applicability, effectiveness, and design of different traffic calming measures.

From this catalogue of options, the Town has established a shortlist of potential traffic calming measures for use on roads in Whitby. This "toolkit" of measures captures a range of approaches to addressing different types of traffic problems (i.e., speeding, shortcutting traffic, collisions, pedestrian conflicts, etc.) in various contexts (i.e., on different road classifications, urban versus rural environments, etc.) and reflects input received from Town stakeholders.

4.2 Potential Traffic Calming Measures

Appendix B details the Toolkit of traffic calming measures applied in Whitby. The Toolkit includes a description and photo of each treatment along with detailed guidance on the applicability, design, potential benefits, and implementation considerations of each technique. Information on related signage, implementation timelines (permanent versus temporary), and indicative costs is also provided. The costs noted in the Toolkit were sourced primarily from the Institute of Transportation Engineers (ITE) *Traffic Calming Fact Sheets*[4] and adjusted to reflect Canadian dollars and inflation. Other municipal traffic calming guidelines were also referenced in deriving the cost data.

[4] Institute of Transportation Engineers. *Traffic Calming Fact Sheets*. https://www.ite.org/technical-resources/traffic-calming/traffic-calming-measures. Accessed July 29, 2021.

4.2.1 Categories of Measures

The Toolkit separates the shortlisted measures into two categories:

Education and Enforcement Measures

Education and enforcement techniques and strategies raise awareness and influence motorist behaviour (education) or use the force of law to deter unsafe driving practices and ensure compliance with traffic regulations (enforcement). Measures in this category do not change the design and/or configuration of the roadway and include the following:

- Radar Speed Feedback Signs
- Education Campaigns
- Targeted Enforcement

Physical Traffic Calming Measures

Physical traffic calming measures change the design and/or configuration of the roadway with the aim of forcing motorists to slow down or select different routes. These measures tend to be "self-enforcing", reducing reliance on enforcement to ensure compliance. This category comprises four groups of measures:

- **Vertical deflection** measures raise the height of the road surface, forcing motorists to slow their vehicles to comfortably navigate the change in profile. This group includes:
  - Speed Hump
  - Speed Cushion
  - Raised Crosswalk
  - Raised Intersection
- **Horizontal deflection** measures shift the driving path, forcing motorists to slow their vehicles to comfortably navigate the change in direction. This group includes:
  - Curb Radius Reduction
  - Chicane
  - Mini (Neighbourhood) Roundabout

- **Road narrowing** measures reduce the road width, forcing motorists to slow their vehicles by constricting the available driving space. This group includes:
  - Curb Extension (Bump Out)
  - Raised Median Island
  - Gateway
  - Centreline Signage
  - Edgeline Bollards

- **Surface treatment and pavement marking** measures cause vibration, draw attention, or create optical effects, forcing motorists to slow their vehicles. This group includes:
  - Sidewalk Extension/Textured Crosswalk
  - Lane Narrowing
  - Dragon's Teeth
  - Peripheral Transverse Bars
  - On-Road 'Sign' Pavement Markings

Table 4.1 provides a simplified, visual comparison of the different measures, highlighting their applicable location, potential benefits, implementation considerations, and relative costs. This table provides useful information for the selection process discussed further below.

4.2.2 Indicative Costs

The indicative costs cited in the Toolkit provide order of magnitude estimates for planning purposes, but should be applied with caution given the many factors affecting actual implementation costs, such as:

- Width of roadway(s)
- Corner radii
- Existing infrastructure and utilities (e.g., catch basins, maintenance holes, utility poles, streetlights)
- Dimensions of proposed feature(s) (e.g., island size, length of extensions, width/height of raised feature)

- Quantity (e.g., number of signs, length of pavement markings, numbers of signals)
- Property acquisition (if required)
- Landscaping
- Labour and materials
- Design and contingency

Closer to implementation, the Town will typically estimate installation costs based on more detailed design plans and current unit/benchmark prices derived from recent contracts.

4.3 Selecting Measures from the Toolkit

Applying the Toolkit consistently will assist the Town in selecting the most effective traffic calming measures to address identified traffic concerns. It is important to remember that not all traffic calming measures are appropriate under all circumstances.

The selection and design of traffic calming measure(s) is the culmination of a series of sequential activities that depends directly on the type and magnitude of the traffic issue being addressed. The major planning considerations in this process – location and frequency of the devices, geometric design, and materials – will vary considerably by location, with the following site-specific factors influencing the measures selected:

- Roadway designation (Local Road, Collector Road, Type C Arterial Road)
- Roadway cross-section (rural, urban)
- Roadway geometric features (right-of-way, pavement widths, radii, parking, etc.)
- Presence of transit route
- Implications of diverting traffic to adjacent streets
- Cost (capital and operating)

- Presence of pedestrian facilities
- Presence of cycling facilities

The following outlines the typical decision process for selecting measures from the Toolkit. As noted above, other factors can influence selection:

- **Step 1** – Determine if the subject street is a candidate for traffic calming measures. Per the Town's Traffic Calming Policy, locations meeting the minimum point score in the warrant process set out in **Chapter 2** would be candidates for physical traffic calming measures. Roads not satisfying the minimum score will be considered for Education and Enforcement.
- **Step 2** – Identify the list of potential traffic calming measures based on roadway classification.
- **Step 3** – Confirm and rank (based on severity) the primary issue(s) to be addressed through the Traffic Calming Plan. Potential issues include:
  - Speeding
  - Shortcutting traffic
  - Vehicle and pedestrian/cyclist conflicts
- **Step 4** – Shortlist the measures that address the issue(s) and severity/priority from the initial list assembled in Step 2.
- **Step 5** – Focus on/eliminate measures that would/would not be appropriate under the following conditions:
  - School Zones and Community Safety Zones
  - Active transportation (cycling) routes
  - Transit routes
  - Adjacent to park
  - High pedestrian generators, particularly more vulnerable users
  - Adjacent land uses (residential versus non-residential)
  - Planned reconstruction
  - Noise to surrounding area
  - Applicability for temporary installation

- Step 6 – Confirm measures can be used under current roadway conditions. Factors to consider include:
  - Existing intersections and control
  - Midblock pedestrian/cyclist crossings and control
  - Cross-section width
  - Need for on-street parking
  - Roadway alignment (i.e., horizontal and vertical curvature)
  - Grade
  - Block length
  - Driveway density
  - Pavement condition and materials
  - Drainage
  - Utilities and street furniture (e.g., poles, boxes, benches)
  - Streetlighting

TABLE 4.1: TRAFFIC CALMING MEASURES FOR USE IN THE TOWN OF WHITBY

Measure	Applicable Location				Potential Benefit				Implementation Consideration						Relative Implementation Cost	Notes
	Local Roads	Collector Roads	Type C Arterial Roads	Outside Urban Area	Speed Reduction	Volume Reduction	Conflict Reduction	Natural Environment	Local Vehicle Access	Emergency Vehicle Response	Cycling Use	Traffic Enforcement	Vehicle Parking	Street Maintenance		
Education and Enforcement																
Radar Speed Feedback Sign	✓	✓	✓	✓	■	□	□	□	○	○	○	◉	○	○	$	Use prior to implementing physical traffic calming and/or compliments other measures
Education Campaign	✓	✓	✓	✓	◘	□	□	□	○	○	○	○	○	○	$-$$	
Targeted Enforcement	✓	✓	✓	✓	◘	□	□	□	○	○	○	●	○	○	$-$$$	
Vertical Deflection																
Speed Hump	✓	*	*		■	◘	■	◘	○	●	◉	○	◉	◉	$-$$	Conditional use only (see Legend notes)
Speed Cushion	✓	*	*		■	◘	■	◘	○	○	◉	○	◉	◉	$-$$	
Raised Crosswalk	✓	✓	✓		■	□	◘	◘	○	◉	◉	○	○	◉	$-$$	Implement to facilitate pedestrian connections
Raised Intersection	✓	✓	✓		■	□	◘	◘	○	◉	◉	○	○	◉	$$-$$$	Site specific, considered as part of road reconstruction projects or new development

Legend:

Applicable Location: ✓ Applicable, * Conditional (only on roads with traffic volumes less than 8,000 vehicles per day), + Seasonal
Potential Benefit: ■ Substantial, ◘ Moderate, □ None or Limited Data
Implementation Consideration: ● Substantial, ◉ Moderate, ○ None or Limited Data
Relative Implementation Cost: **$** Low ($0-$10,000), **$$** Moderate ($10,000-$100,000), **$$$** High ($100,000+)

TABLE 4.1: TRAFFIC CALMING MEASURES FOR USE IN THE TOWN OF WHITBY

Measure	Applicable Location				Potential Benefit				Implementation Consideration						Relative Implementation Cost	Notes
	Local Roads	Collector Roads	Type C Arterial Roads	Outside Urban Area	Speed Reduction	Volume Reduction	Conflict Reduction	Natural Environment	Local Vehicle Access	Emergency Vehicle Response	Cycling Use	Traffic Enforcement	Vehicle Parking	Street Maintenance		
Horizontal Deflection																
Curb Radius Reduction	✓	✓	✓		◘	□	□	◘	○	○	O	○	○	O	**$$-$$$**	
Chicane	✓				■	■	■	◘	○	O	O	○	●	O	**$$**	Implement under special circumstances
Mini (Neighbourhood) Roundabout	✓	✓			■	□	■	■	○	O	O	○	O	O	**$$-$$$**	Implement to address intersection conflicts (where space permits)
Road Narrowing																
Curb Extension (Bump Out)	✓	✓	✓		◘	□	□	■	○	○	O	○	●	●	**$$-$$$**	
Raised Median Island	✓	✓	✓		◘	□	◘	□	O	○	○	○	O	O	**$$-$$$**	Implement where width permits and/or with reconstruction projects
Gateway	✓	✓	✓	✓	◘	□	□	■	○	○	○	○	○	●	**$-$$**	Site specific, compliments other measures
Centreline Signage	+	+	+		◘	□	□	□	○	○	○	○	○	O	**$**	Seasonal use only
Edgeline Bollards	+	+	+		◘	□	□	□	○	○	○	○	○	O	**$**	

Legend:

Applicable Location: ✓ Applicable, * Conditional (only on roads with traffic volumes less than 8,000 vehicles per day), + Seasonal
Potential Benefit: ■ Substantial, ◘ Moderate, □ None or Limited Data
Implementation Consideration: ● Substantial, O Moderate, ○ None or Limited Data
Relative Implementation Cost: **$** Low ($0-$10,000), **$$** Moderate ($10,000-$100,000), **$$$** High ($100,000+)

TABLE 4.1: TRAFFIC CALMING MEASURES FOR USE IN THE TOWN OF WHITBY

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	Local Roads	Collector Roads	Type C Arterial Roads	Outside Urban Area	Speed Reduction	Volume Reduction	Conflict Reduction	Natural Environment	Local Vehicle Access	Emergency Vehicle Response	Cycling Use	Traffic Enforcement	Vehicle Parking	Street Maintenance		
Surface Treatments and Pavement Markings																
Sidewalk Extension/ Textured Crosswalk	✓	✓			◘	□	◘	◘	○	○	◍	○	○	●	**$-$$**	Implement to facilitate pedestrian crossings, streetscape projects
Lane Narrowing	✓	✓	✓	✓	◘	□	◘	□	○	◍	◍	○	◍	○	**$-$$**	
Dragon's Teeth	✓	✓	✓	✓	□	□	□	□	○	○	○	○	○	◍	**$**	
Peripheral Transverse Bars	✓	✓	✓	✓	■	□	□	□	○	○	○	○	○	◍	**$**	
On-Road 'Sign' Pavement Markings	✓	✓	✓	✓	◘	□	□	□	○	○	○	○	○	◍	**$**	Compliments other measures

Legend:

Applicable Location: ✓ Applicable, * Conditional (only on roads with traffic volumes less than 8,000 vehicles per day), + Seasonal
Potential Benefit: ■ Substantial, ◘ Moderate, □ None or Limited Data
Implementation Consideration: ● Substantial, ◍ Moderate, ○ None or Limited Data
Relative Implementation Cost: **$** Low ($0-$10,000), **$$** Moderate ($10,000-$100,000), **$$$** High ($100,000+)

5 Design Considerations

5.1 Pertinent Guidelines and Manuals

The Town will generally follow the recommended design guidance provided in Chapter 4 of the *Canadian Guide to Traffic Calming* when implementing traffic calming measures. The TAC *Geometric Design Guide for Canadian Roads*[5] may also be referenced for broader street design practices.

The Ontario Traffic Manual (OTM) provides information relating to regulatory and warning signs (Books 5 and 6), pavement markings (Book 11), pedestrian crossing treatments (Book 15), and cycling facilities (Book 18). These manuals should be used to determine signage and pavement marking plans as well as integrating active transportation facilities. The use of non-standard or non-traditional signs and markings is discouraged in most instances.

Table 5.1 denotes the relevant guidebook and section of the *Canadian Guide to Traffic Calming* or OTM to consult in traffic calming design. References are not provided for measures without available guidance (as indicated by "n/a") or for Education and Enforcement measures. The standard drawings in **Appendix C** (and described in **Section 5.6**) provide further design guidance specific to Whitby.

5.2 Specific Road User Considerations

Traffic Calming Plans should consider the needs of and effects on all road users and balance potential impacts against overall project objectives, recognizing some designs can improve conditions for certain groups while unintentionally hindering others. The following sections address design considerations for specific users or perspectives:

[5] TAC, *Geometric Design Guide for Canadian Roads*, (2017)

TABLE 5.1: DESIGN GUIDANCE FOR PHYSICAL TRAFFIC CALMING MEASURES

Traffic Calming Measure	Design Reference[1]
Vertical Deflection	
Speed Hump	TAC CGTC s. 4.2.4
Speed Cushion	TAC CGTC s. 4.2.3
Raised Crosswalk	TAC CGTC s. 4.2.1
Raised Intersection	TAC CGTC s. 4.2.2
Horizontal Deflection	
Curb Radius Reduction	TAC CGTC s. 4.3.2
Chicane	TAC CGTC s. 4.3.1
Mini (Neighbourhood) Roundabout	TAC CGTC s. 4.3.4
Road Narrowing	
Curb Extension (Bump Out)	TAC CGTC s. 4.4.1
Raised Median Island	TAC CGTC s. 4.4.3
Gateway	n/a
Centreline Signage	OTM Book 6
Edgeline Bollards	n/a
Surface Treatments and Pavement Markings	
Sidewalk Extension/Textured Crosswalk	TAC CGTC s. 4.5.1
Lane Narrowing	OTM Book 11
Dragon's Teeth	n/a
Peripheral Transverse Bars	n/a
On-Road 'Sign' Pavement Markings	OTM Book 11

Legend:

CGTC = *Canadian Guide to Traffic Calming*

5.2.1 Active Transportation

Specific design considerations for active transportation include:

- Understand the intended function of the street for active transportation per the Town's *Active Transportation Plan*
- Aim to reduce vehicle speeds near pedestrian crossings and locations of high crossing desire lines such as near schools, transit stops, parks, etc.
- Protect pedestrians to the extent possible through traffic calming designs that reduce vehicle speeds and create lateral buffer space between vehicle travel lanes and adjacent sidewalks
- Provide the safest environment possible for pedestrians in locations without sidewalks
- Buffer cyclists from motorists to the extent possible through design features

5.2.2 Maintenance Operations

Specific design considerations for maintenance operations include:

- Understand the implications of the Town's prescribed road maintenance standards/requirements for the traffic calming design, particularly provisions related to winter maintenance
- Minimize complexity to winter maintenance operations
- Accommodate regular maintenance and operational activities, including waste collection, street sweeping, pothole repair, shoulder and boulevard maintenance, sidewalk repair, catch basin cleaning, litter and debris clearing, signage repairs, pavement marking refresh, and streetscaping/ landscaping care
- Maintain the following clearance widths in locations where no additional maintenance resources are planned:
    - At least 1.8 m (preferably 2.0 m or more) clear width for sidewalks, cycling facilities (where segregated from vehicle traffic), adjacent sidewalk-cycle track facilities, and multi-use paths where present

    - A clear width for roadway surfaces that accommodates a typical snow plow used on the subject street plus 0.25 m buffers on both sides

- Accommodate road maintenance and operational vehicle turning requirements (can use turning movement templates for TAC HSU (Heavy Single-Unit Truck) design vehicle to confirm suitability)

5.2.3 Emergency Response

Specific design considerations for emergency response include:

- Avoid placing speed humps and introducing mountable curb on emergency response routes identified by Town Fire and Emergency Services
- Consider breaks/depressions in centre medians to allow emergency response vehicles to navigate around regularly occurring obstructions such as queued traffic
- Account for the dimensions of the largest fire truck that could use the subject street
- Use mountable curb instead of barrier curb where possible
- Avoid placing signs in the path of turning emergency vehicles at intersections
- Accommodate emergency vehicle turning requirements (can use turning movement templates for TAC HSU (Heavy Single-Unit Truck) design vehicle to confirm suitability)

5.3 Design Integration

5.3.1 Pinch Points

“Pinch points” – locations where a road becomes narrower than typical – can help calm traffic but need to provide sufficient width for school and transit buses, road maintenance equipment, waste collection trucks, and emergency vehicles to function properly and safely.

For the purposes of the Minimum Maintenance Standards for Municipal Highways (O.Reg. 239/02) under the *Municipal Act, 2001*, each municipal road in Ontario is assigned a classification based on its speed limit and average daily traffic volume. Class 1 roads (highest speeds and volumes) require the highest standard of maintenance and Class 5 the lowest.

Narrowing Class 1, 2, and 3 roads significantly at "pinch points" through traffic calming can hinder the Town's ability to maintain the road surface under winter storm events to the prescribed standards with current equipment while preserving continuous two-way traffic flow during plowing activities. Continuous two-way traffic flow is not as impacted on Class 4 and 5 roads given the lower frequency of plowing, road surface maintenance standards, and typical traffic volumes.

Considering the operational requirements of the Town's typical road maintenance equipment, minimum clearance widths (curb-to-curb) were established according to road class. For Class 1, 2, and 3 roads, the curb-to-curb roadway surface width (i.e., the narrowest "pinch point") should exceed:

- 7.0 m for two-way road segments
- 4.0 m for one-way road segments

For Class 4 and 5 roads, the curb-to-curb roadway surface width should exceed:

- 6.0 m for short two-way road segments serving more than 240 vehicles per hour (during the busiest hour) or 1,000 vehicles per day
- 4.0 m for short two-way road segments serving 240 vehicles per hour or less (during the busiest hour) or 1,000 vehicles per day or less
- 4.0 m for single lane roads

Additional width beyond the 4.0 m minimum roadway surface widths stated above should be provided in cases where the typical road maintenance equipment used on the subject street exceeds 3.5 m in width.

5.3.2 Corner Radius

Reducing the *effective turning radius* encourages lower turn speeds, which helps to calm traffic but may challenge operations for school and transit buses, road maintenance equipment, waste collection trucks, and emergency vehicles. The corner radii should allow the design vehicle[6] to make permitted turns into large private accesses and onto intersecting streets:

- Within the road surface area intended for vehicular operation
- Without mounting the curb
- Without encroaching onto or traversing adjacent street side features, such as sidewalks, multi-use paths, cycling facilities, transit stop waiting areas, street furniture, or streetscaping

Corner radii should be designed based on analysis of effective turning radii. **Figure 5.1** illustrates the difference between corner radius and effective turning radius at an intersection. **Table 5.2** provides the effective turning radius for different intersection contexts to consider as a starting point when developing designs for traffic calming plans.

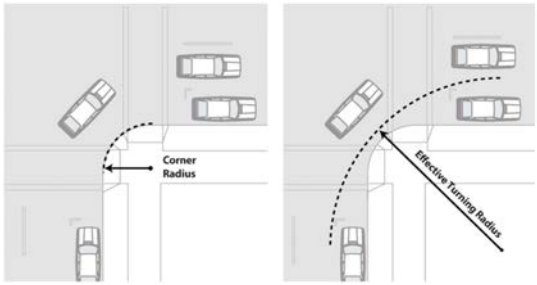

FIGURE 5.1 CORNER RADII AND EFFECTIVE TURNING RADIUS
(Source: *Geometric Design Guide for Canadian Roads* (TAC, 2017)

[6] A typical vehicle type permitted to use the subject street that generally requires the largest turning radius or space to make a right turn at an intersection. Designs typically consider the heavy single-unit truck (HSU), tractor semitrailer (WB-20), or passenger car (P) as defined in the *Geometric Design Guide for Canadian Roads*. See Town's *Engineering Design Criteria* for further information.

TABLE 5.2: INITIAL MINIMUM EFFECTIVE TURNING RADII

(Source: Traffic Calming Design Guide (City of Ottawa, 2019)

Land Use Context	Functional Classifications of Connecting Roads	Minimum Effective Turning Radius
Residential	Local to Local	5.0 m
	Local to Collector	5.0 m
	Local to Arterial	9.0 m
	Collector to Collector	12.0 m[1]
	Collector to Arterial	12.0 m[1]
Commercial	Local to Local	9.0 m
	Local to Collector	12.0 m[1]
	Collector to Collector	15.0 m[2]
	Collector to Arterial	15.0 m[2]
Industrial	Local to Collector	12.0 m[1]
	Collector to Collector	15.0 m[2]
	Collector to Arterial	15.0 m[2]

Notes:

1. The 12 m effective turning radius accommodates single-axle delivery trucks and transit buses where there is a high probability that these vehicle types will be frequent users.
2. The 15 m effective turning radius accommodates the large tractor semi-trailer vehicles (TAC WB-20) where there is a high probability that these vehicle types will be reasonably frequent users.

The target effective turning radius can be determined in addition to service vehicle operational considerations after selecting the initial minimum effective turning radius. Under unconstrained conditions (i.e., streets and areas with abundant right-of-way, good visibility, limited street side activity, greater distances between intersections, and/or high operating speeds), the radius selected should aim to reduce the potential for excessive vehicle speed differential between through and turning vehicles. Measures may be required on the approach street to reduce operating speeds in advance of the subject turning movement. In constrained

environments, trade-offs may be needed to balance competing service vehicle operation and traffic calming objectives.

Reductions from the minimum curb radius dimensions specified in Table C3.03 of the Town's *Engineering Design Criteria* may be considered for any intersection corner exceeding the minimum effective turning radius listed in **Table 5.2**. In locations where physical reductions are not feasible, traffic calming designs may consider measures like mountable curbs or aprons, pavement markings, textured pavement, and/or flexible bollards to "psychologically" tighten effective turning radii. This treatment can create a calming effect for smaller vehicles while still allowing larger vehicles to complete the turning movement unimpeded. Extending the crosswalk towards the barrier curb can indicate to pedestrians, cyclists, and visually impaired individuals that the textured/painted area is not intended as a waiting area or space to reduce crossing distance.

5.3.3 Surface Drainage

Traffic calming designs need to consider the effects on roadway and sidewalk drainage to avoid ponding and ice build-up and the related adverse effects on road user safety and roadway maintenance. Catch basin location and placement is particularly important in siting traffic calming features. Catch basins should be located on the uphill side of measures installed on a grade, where the device does not include gaps for drainage.

5.3.4 Underground Utilities

Traffic calming designs need to consider service access to underground utilities and the potential effect of roots from a heavily landscaped measure on underground utility plant.

5.3.5 Streetscaping/Landscaping

While some traffic calming designs can introduce new streetscaping opportunities, construction of the measures can damage existing landscaping (such as trees) when done within or close to the root zone.

When implementing new streetscaping/landscaping:

- Select new trees, where applicable, from the Town's recommended species list
- Apply treatments that require low levels of ongoing maintenance, provide sufficient opportunity to thrive, and/or intercept stormwater run-off (also known as low-impact development (LID) techniques)
- Explore formal partnerships (e.g., with residents' associations or business groups) to maintain the landscaping

For hard surface plantings (i.e., planting surrounded by hard surface materials that water cannot penetrate):

- Raise the soil bed and landscaping base above the adjacent surfaces (e.g. sidewalk) to provide greater protection from maintenance activities
- Offset plantings from the adjacent sidewalk and road edge to reduce the impacts of road maintenance activities

5.3.6 Accessibility, Equity, and Inclusion

When designing from an accessibility, equity, and inclusion perspective:

- Adhere to the requirements set out in the Integrated Accessibility Standards (Design of Public Spaces) under the AODA
- Consider implications for curbside loading/unloading of accessible vehicles (e.g., Durham Region Transit Specialized Transit vehicles, taxis, vans, etc.)
- Avoid introducing designs that increase potential for criminal danger, eliminate the possibility of casual surveillance, create excessive darkness, or create a general sense of discomfort for vulnerable road users
- Place poles, signage, and landscaping in a manner that avoids path-of-travel obstructions
- Use colour contrasting to emphasize path-of-travel and presence of hazards, particularly for individuals with low vision. Where used, follow a standard approach

5.3.7 Signs

While some traffic calming measures require signs to advise street users of their location, the introduction of signs to provide advance warning of each feature should be avoided in the interest of maintaining community aesthetics. None of the traffic calming measures described in these Guidelines represent a hazard to motorists operating their vehicles at appropriate speeds, hence signing can be minimized without compromising safety. Refer to the OTM Books, the *Canadian Guide to Traffic Calming*, and the TAC *Manual of Uniform Traffic Control Devices for Canada*[7] for exact sign information.

5.4 Temporary and Seasonal Installations

As noted in the Town's Traffic Calming Policy, the Town may implement traffic calming measures on a temporary (trial) basis to:

- Assess the effectiveness of the measures and allow for refinement of the Traffic Calming Plan prior to permanent installation;
- Stage or defer full implementation (particularly for more costly measures); and/or
- Gauge community reaction to proposed traffic calming measures.

The Town may also implement traffic calming measures seasonally to:

- Alleviate anticipated operational or maintenance concerns (e.g., snow and ice removal in winter); and/or
- Target conditions specific to certain times of year (e.g., school area).

Temporary and seasonal traffic calming installations will typically feature some combination of:

- Removable rubber products (e.g., curbing, speed humps, tables, cushions)
- Removable/flexible posts and bollards

[7] TAC, *Manual of Uniform Traffic Control Devices for Canada,* 6th ed. (2021)

- Signs and pavement markings
- Temporary speed display boards

Other materials, such as precast concrete, wood, and/or plastic planters, offer potential opportunities but should be used with consideration of ongoing maintenance requirements.

Measures that require a significant number of anchors (e.g., rubber speed humps) should only be considered in locations planned for rehabilitation or reconstruction in the near term.

Temporary and/or seasonal materials can be used for longer term traffic calming installations that are not removed and re-installed regularly. Potential impacts to, and appropriate mitigation for (where applicable), any interaction with road maintenance operations and the durability and longevity of the materials used under varying exposure conditions should be considered in these circumstances.

5.5 Design Exceptions

Situations may arise where these Guidelines may not be sensitive to the nuance of a unique context and require deviation from the specified guidance. The following factors should be considered when exploring potential design exceptions:

- **Turning, Routing, and Access of Design Vehicles** – Ability to perform permitted turns and access land uses where intended
- **Maintenance Operations and Routing** – Ability to perform required functions
- **Road User Volume and Vehicle Speed Characteristics** – Potential risk/likelihood of incident
- **Visibility and/or Advanced Warning for Road Users** – Ability to safely negotiate the location
- **Contingency Options** – Ability to adjust or potentially remove traffic calming measures necessitating exception
- **Key Emergency Response Streets and School Zones** – Potential impacts to identified locations

- **Community/Urban Design and Public Realm Objectives** – Potential impacts to the broader built environment (refer to the Town's Official Plan and relevant guidelines for further information)
- **Use of Temporary/Seasonal Materials to Test Exception**– Ability to trial measures prior to committing to a permanent installation
- **Public Input** – Potential impacts to the public, particularly where access or turning restrictions are proposed
- **Other Locations with Similar Installations** – Ability to learn from experience at another location

All design exceptions should be documented in the project file.

5.6 Standard Drawings

Appendix C provides a series of standard drawings specific to Whitby for the design and construction of select traffic calming measures. These drawings will be incorporated into a future version of **The Town of Whitby Design Criteria and Engineering Standards** document.

Appendix A – Process for Estimating Shortcutting Traffic

The extent of shortcutting traffic on the subject street will typically be estimated using one of the following two methods:

Method #1 – Trip Generation Calculation

The Trip Generation Calculation method can be used to estimate the proportion of shortcutting traffic for a single road section or block without multiple points of entry/exit to the neighbourhood, as trip routing assumptions would otherwise be required. Two variations of the technique exist:

Simplified Calculation

Apply this method to approximate the percentage of shortcutting traffic on streets in predominately residential areas. Use the following formula to compare the estimated volume of trips generated to the recorded daily traffic counts:

$$Percentage\ Shortcutting\ Traffic = \frac{ADT - (10\ x\ Dwellings)}{ADT}$$

where,

ADT = Average Daily Traffic volume recorded (vehicles per day)
Dwellings = Number of houses on the subject street

Each dwelling on the subject street is assumed to generate 10 vehicle trips per day, roughly the weekday trip generation rate for a single-family detached dwelling cited in the Institute of Transportation Engineers (ITE) *Trip Generation Manual*.

Detailed Calculation

Apply this method to estimate the percentage of shortcutting traffic on streets featuring a mix of adjacent land uses, such as residential, commercial, schools and parks. Determine the daily or peak hour trip generation potential based on ITE *Trip*

Generation Manual rates. Use the following formula to compare the estimated volume of trips generated to the recorded daily or peak hour traffic counts:

$$Percentage\ Shortcutting\ Traffic = \frac{Volume - Estimated\ Trip\ Generation}{Volume}$$

where,

Volume = Daily or peak hour traffic volume recorded from counts
Estimated Trip Generation = Total daily or peak hour trips generated by land uses adjacent to the subject street, as calculated using *ITE Trip Generation Manual* rates

Table A.1 summarizes applicable trip generation rates from the ITE *Trip Generation Manual* (12th Edition). These values may change over time as the Manual is updated. Rates from the most current edition should be used.

TABLE A.1: TRIP GENERATION RATES

Land Use		Trip Generation Rate			
Description	ITE Manual Land Use Code	AM Peak Hour	PM Peak Hour	Daily	Variable
Detached House	210	0.70	0.94	9.34	per unit
Low-Rise Residential (Townhouse/Condominium/ Apartment) (2-3 floors)	220	0.40	0.51	6.74	per unit
Mid-Rise Residential (4 to 10 floors)	221	0.37	0.39	4.54	per unit
High-Rise Residential (more than 10 floors)	222	0.27	0.32	4.54	per unit
Elementary School	520	0.74	0.16	2.27	per student
High School	525	0.52	0.14	1.94	per student
Day Care Centre	565	0.78	0.79	4.09	per student

Method #2 – Origin-Destination Study

The Origin-Destination Study method is typically used to estimate the proportion of shortcutting traffic for a broader study area comprising several roads and multiple points of entry/exit to the neighbourhood.

Record vehicle license plates at all entry and exit points to the study area manually or using digital technology, such as Bluetooth readers, video detection, and “big data” sources (like StreetLight and SMATS). Match the license plates of vehicles entering and exiting to determine the percentage of vehicles passing through compared to those that begin or end their trip within the area.

Appendix B – Toolkit of Traffic Calming Measures

Education and Enforcement Measures

- Radar Speed Feedback Signs
- Education Campaigns
- Targeted Enforcement

Physical Traffic Calming Measures

- Vertical Deflection
  - Speed Hump
  - Speed Cushion
  - Raised Crosswalk
  - Raised Intersection
- Horizontal Deflection
  - Curb Radius Reduction
  - Chicane
  - Mini (Neighbourhood) Roundabout
- Road Narrowing
  - Curb Extension (Bump Out)
  - Raised Median Island
  - Gateway
  - Centreline Signage
  - Edgeline Bollards
- Surface Treatment and Pavement Marking
  - Sidewalk Extension/Textured Crosswalk
  - Lane Narrowing
  - Dragon's Teeth
  - Peripheral Transverse Bars
  - On-Road 'Sign' Pavement Markings

Radar Speed Feedback Sign

A radar speed feedback sign 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 undesirable speeds. Can be used upstream of targeted speed enforcement.

Applicability

- **Road Classification** – Local Roads, Collector Roads, and Type C Arterial Roads
- **Roadway Cross-Section** – Urban and rural
- **Speed Limit** – All speed limits
- **Average Daily Traffic** – All volumes

Design

- Can be used as curve advisory systems
- Can be used on a weather-related basis
- Can be very effective if occassionally used with manned enforcement downstream

Potential Benefits

- **Vehicle Speeds –** Reduction in 85th percentile speed between 3 and 14 km/h
- **Conflicts** – Reduction in speed related collisions

Implementation Considerations

- **Enforcement** – Drivers may become immune to devices; May be less effective or less accurate on multi-lane or heavily trafficked roads
- **Maintenance** – Requires regular maintenance and a source of power

City of Ottawa

Primary Purpose
Speed Reduction

Indicative Cost
$4,000 – $7,500
(Temporary and Permanent)

Timeline
Temporary or Permanent

Signage

Education Campaign

Targeted education campaigns are initiatives to raise awareness of road safety issues. Education campaigns can address multiple types of driver awareness. In some cases, these will be an integral component of an overall strategic road safety program.

Applicability

- **Road Classification** – Local Roads, Collector Roads, and Type C Arterial Roads
- **Roadway Cross-Section** – Urban and rural
- **Speed Limit** – All speed limits
- **Average Daily Traffic** – All volumes

Design

- Works better when combined with other prevention efforts

Potential Benefits

- May be effective at raising awareness and changing self-reported attitudes and perceptions

Implementation Considerations

- More successfully influence behaviour with a solid theoretical and data foundation
- More effective with messages delivered through personal communications or at the roadside
- Effectiveness is linked to its duration

Town of Whitby

Primary Purpose
Raise Awareness

Indicative Cost
$1,000 to $100,000 depending on the extent of the campaign

Timeline
Temporary

Signage
N/A

Targeted Enforcement

Targeted enforcement involves employing additional police enforcement in locations when speed, collision, citation, resident comments, or other sources of information suggest that the site is unusually hazardous due to illegal driving practices.

Applicability

- **Road Classification** – Local Roads, Collector Roads, and Type C Arterial Roads
- **Roadway Cross-Section** – Urban and rural
- **Speed Limit** – All speed limits
- **Average Daily Traffic** – All volumes

Design

- Avoid at the bottom of hills or corners, or 200 m upstream of speed limit ahead signage
- Site should safely accommodate enforcement vehicle/operator

Potential Benefits

- **Vehicle Speeds –** Reduction in average speed between 2 and 6 km/h
- **Conflicts** – Reduction in overall and speed related collisions

Implementation Considerations

- Possible disfavour from local residents/community

Waterloo Regional Police Service

Primary Purpose
Speed Reduction

Indicative Cost
$1,000 to $100,000 + depending on the extent of the campaign

Timeline
Temporary

Signage
N/A

Speed Hump

A speed hump is a raised area of a roadway, which causes the vertical upward movement of a traversing vehicle. The purpose of a speed hump is to cause discomfort for drivers travelling at higher speeds and to reduce vehicle speeds.

Applicability

- **Road Classification** – Local Roads, Collector Roads and Type C Arterial Roads
- **Roadway Cross-Section** – Urban
- **Speed Limit** – 50 km/h or less
- **Average Daily Traffic** – Maximum 8,000 vpd

Design

- Series of speed humps is more effective
- **Spacing** – 80 to 200 m depending on the desired 85th percentile speed
- **Grade** < 8%
- **Maximum Block Length** (between controlled intersections) – 200 m
- See **Town's Design Criteria and Engineering Standards** for typical design

Potential Benefits

- **Vehicle Speeds –** Reduction in 85th percentile speed between 6 and 13 km/h
- **Traffic Volumes** – Reduction between 15% and 27%
- **Conflicts** – Reduction in conflict reduction has been reported

Implementation Considerations

- **Emergency Response** – 2.3 to 15 s delay in emergency vehicle response times
- **Active Transportation** – Cyclists may experience loss of control at higher speeds
- **Transit** – Negative effects on transit route travel times
- **Maintenance** – Negative effects on snow plowing/removal

Town of Whitby

Primary Purpose
Speed Reduction

Indicative Cost
$7,000 – $10,000 (Permanent)
$6,000 (Temporary)

Timeline
Temporary or Permanent

Signage

Speed Cushion

A raised area on a road, like a speed hump, but does not cover the entire width of the road. The width is designed to allow a large vehicle, such as a fire truck or bus, to "straddle" the cushion, while light vehicles will have at least one side of the vehicle deflected upward.

Speed cushions are intended to produce sufficient discomfort to limit passenger vehicle travel speeds yet allow the driver to maintain vehicle control, while allowing larger vehicles to pass without difficulty.

Applicability

- **Road Classification** – Local Roads, Collector Roads and Type C Arterial Roads
- **Roadway Cross-Section** – Primarily urban
- **Speed Limit** – 50 km/h or less
- **Average Daily Traffic** – Maximum 8,000 vpd

Design

- Series of speed cushions is more effective
- **Spacing** – 80 to 200 m depending on the desired 85th percentile speed
- **Grade** < 8%
- **Maximum Block Length** (between controlled intersections) – 200 m
- See **Town's Design Criteria and Engineering Standards** for typical design

Potential Benefits

- **Vehicle Speeds –** Reduction in 85th percentile speed up to 8 km/h
- **Traffic Volumes** – Reduction of approximately 30%
- **Conflicts** – Reduction in conflict reduction has been reported

Implementation Considerations

- **Emergency Response** – May slightly affect vehicle response times
- **Transit** – May slightly affect transit routes and increase travel time
- **Maintenance** – Negative effects on snow plowing/removal

City of Hamilton

Primary Purpose
Speed Reduction

Indicative Cost
$6,000 – $10,000 (Permanent)
$8,500 (Temporary)

Timeline
Temporary or Permanent

Signage

Raised Crosswalk

A raised crosswalk is a marked pedestrian crosswalk at an intersection or midblock location constructed at a higher elevation than the adjacent roadway.

The purpose of a raised crosswalk is to reduce vehicle speeds, improve pedestrian visibility, and reduce pedestrian–vehicle conflicts.

Applicability

- **Road Classification** – Local Roads, Collector Roads, and Type C Arterial Roads
- **Roadway Cross-Section** – Urban, sidewalk on at least one side of road
- **Speed Limit** – 50 km/h or less
- **Average Daily Traffic** – Maximum 8,000 vpd

Design

- Not recommended unless there is a controlled crossing
- Not recommended in limited right-of-way
- Consistent configuration throughout a community is desirable
- **Grade** ≥ 1%, but ≤ 8%
- See **Town's Design Criteria and Engineering Standards** for typical design

Potential Benefits

- **Vehicle Speeds –** Reduction in 85th percentile speed up from 5 km/h to 13 km/h
- **Traffic Volumes** – Reduction of up to 26%, increase of up to 7% on neighbouring streets
- **Conflicts** – Reduction for pedestrians
- Benefits pedestrians in crossing the road and aids accessibility

Implementation Considerations

- **Emergency Response** – Impacts and delays to emergency vehicles
- **Active Transportation** – May cause false sense of pedestrian security; Cyclists may experience loss of control at higher speeds
- **Transit** – May slightly affect transit routes and increase travel time
- **Maintenance** – Negative effects on snow plowing/removal

Town of Innisfil

Primary Purpose
Speed Reduction

Indicative Cost
$5,000 – $20,000 (Permanent)

Timeline
Permanent

Signage

Raised Intersection

A raised intersection is an intersection, that may include crosswalks, constructed at a higher elevation than the adjacent approach roadways.

The purpose of a raised intersection is to reduce vehicle speeds, better define crosswalk areas, and reduce pedestrian–vehicle conflicts.

Applicability

- **Road Classification** – Local Roads, Collector Roads, and Type C Arterial Roads
- **Roadway Cross-Section** – Urban
- **Speed Limit** – 50 km/h or less
- **Average Daily Traffic** – Maximum 8,000 vpd

Design

- Install at controlled intersections
- Implement in commericial areas and business districts with high pedestrian activity
- **Grade** ≥ 1%, but < 8%

Potential Benefits

- **Vehicle Speeds –** Reduction in 85th percentile speed up to 10 km/h
- **Conflicts** – Improvement in drivers yielding to pedestrians

Implementation Considerations

- **Emergency Response** – Slows emergency vehicles to approximately 25 km/h
- **Active Transportation** – Cyclists may experience loss of control at higher speeds
- **Transit** – May slightly affect transit routes and increase travel time
- **Maintenance** – Snow clearing time may be increased

Transit Utopia

Primary Purpose
Speed Reduction

Cost Estimate
$30,000 – $150,000 (Permanent)

Timeline
Permanent

Signage

Curb Radius Reduction

A curb radius reduction is the reconstruction or modification of an intersection corner with a smaller radius, usually between the 3.0 m to 5.0 m range.

The purpose is to slow down right-turning vehicles, reduce crossing distances for pedestrians, and to improve visibility of pedestrians. This measure will not be considered where there is frequent bus/truck turning.

Applicability

- **Road Classification** – Local Roads, Collector Roads, and Type C Arterial Roads
- **Roadway Cross-Section** – Urban
- **Speed Limit** – All speed limits
- **Average Daily Traffic** – All volumes

Design

- Emergency services will not be impacted if sufficient road width for turning radius is provided
- Implication of chosen radius on larger vehicles (e.g., transit bus) must be checked

Potential Benefits

- **Vehicle Speeds –** Speed reduction for right-turning vehicles
- **Traffic Volumes** – No effect
- **Conflicts** – Reduced pedestrian crossing distance and improved visibility

Implementation Considerations

- **Active Transportation** – Large vehicles and buses possibly mounting the curb could increase maintenance and pedestrian conflicts
- **Transit** – May increase transit times
- **Maintenance** – Negative effects on snow plowing/removal

Richard Drdul

Primary Purpose
Speed Reduction

Indicative Cost
$60,000 – $125,000 (Permanent)
$10,000 (Temporary)

Timeline
Temporary or Permanent

Signage

Only in combination with curb extension

Chicane

A chicane is a series of curb extensions on alternating sides of a roadway, which narrow the roadway and require drivers to steer from one side of the roadway to the other to travel through the chicane. Multiple series of curb extensions can be used.

The purpose of this measure is to discourage shortcutting or through traffic and reduce overall speeds by forcing the lateral shifting of vehicles travelling through the chicane.

Applicability

- **Road Classification** – Local Roads
- **Roadway Cross-Section** – Urban
- **Speed Limit** – 50 km/h or less
- **Average Daily Traffic** – ≥ 750 vpd

Design

- Traffic volumes in each direction should be similar
- May be combined with other traffic calming tools
- Proper advance warning signage is important
- Use with caution on roads with significant bicycle volumes
- **Grade** < 8%

Potential Benefits

- **Vehicle Speeds –** Reduction between 6 and 10 km/h for one-lane, and between 6 and 11 km/h for two-lane
- **Traffic Volumes** – Reduction of up to 47% for one-lane, and 22% for two-lane
- **Conflicts** – Collistion rate reduction up to 40% for one-lane
- **Environment** – Traffic noise may be reduced; Air quality may be improve

Implementation Considerations

- **Emergency Response** – May affect vehicle response times
- **Parking** – Loss of on-street parking
- **Transit** – May increase transit times
- **Maintenance** – Negative effects on snow plowing/removal

City of Alexandria

Primary Purpose
Speed Reduction

Indicative Cost
$16,000 – $62,500 (Permanent)
$25,000 (Temporary)

Timeline
Temporary or Permanent

Signage

Needed for two-way one lane chicane

Mini (Neighbourhood) Roundabout

A mini (neighbourhood) roundabout is an island located at the centre of an intersection, which requires vehicles to travel in a counterclockwise direction around the island.

Mini roundabouts have a smaller diameter and traversable islands compared to full-size roundabouts. The turning radius for left-turning trucks, buses, or emergency vehicles may require a diameter which would be larger than the intersection space available. Consequently, vehicles may turn left in front of the traffic circle or mount the centre raised island rather than travelling around the measure. Yield traffic control is recommended.

Applicability

- **Road Classification** – Local Roads and Collector Roads
- **Roadway Cross-Section** – Urban and rural
- **Speed Limit** – 50 km/h or less
- **Average Daily Traffic** – Intersection < 1500 vpd

Design

- Avoid emergency and transit routes
- Avoid intersections with high pedestrian volumes
- Preferred with textured crosswalks
- Series of mini roundabouts is more effective
- Sight lines should be respected

Potential Benefits

- **Vehicle Speeds –** Reduction in 85th percentile speed up to 14 km/h
- **Traffic Volumes** – Reduction of up to 20%
- **Conflicts** – Reduction of vehicle conflicts compared to other locations
- **Environment** – Traffic noise reduction of 3 dBA

Implementation Considerations

- **Emergency Response** – Delay between 1.3 and 10.7 s
- **Maintenance** – Minor effects on winter maintenance

City of Vaughan

Primary Purpose
Speed Reduction

Indicative Cost
$20,000 – $125,000 (Permanent)
$10,000 - $15,000 (Temporary)

Timeline
Temporary or Permanent

Signage

Curb Extension (Bump Out)

A curb extension (also known as bump out, 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 to as a little as 6.0 m for two-lane, two-way traffic. In urban environments, it is possible to implement curb extensions by removing existing parking spaces. 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.

Applicability

- **Road Classification** – Local Roads, Collector Roads, and Type C Arterial Roads
- **Roadway Cross-Section** – Urban
- **Speed Limit** – 60 km/h or less
- **Average Daily Traffic** – All volumes

Design

- Increased effectiveness when combined with other traffic calming measures
- Often used with on-street parking
- May require drainage system adjustments
- Should be marked with signs or other objects
- Sight lines should be respected
- Pavement markings may be required
- See **Town's Design Criteria and Engineering Standards** for typical design

Potential Benefits

- **Vehicle Speeds –** Reduction between 2 and 8 km/h
- **Conflicts –** May reduce pedestrian-vehicle conflicts
- **Environment** – Landscaped curb extensions can improve street appearance

Implementation Considerations

- **Active Transportation** – Not compatible with bicycle lanes
- **Maintenance** – Increased snow removal cost; reduced effective roadway width between snow removals in winter

Municipality of Clarington

Primary Purpose
Speed Reduction

Indicative Cost
$3,000 – $50,000 (Permanent)
$10,000 (Temporary)

Timeline
Temporary or Permanent

Signage

Raised Median Island

A raised median island is an elevated median constructed on the centerline of a two-way roadway to reduce the overall width of the adjacent travel lanes.

The purpose of a raised median island is to reduce vehicle speeds and to reduce pedestrian–vehicle conflicts.

Applicability

- **Road Classification** – Local Roads, Collector Roads, and Type C Arterial Roads
- **Roadway Cross-Section** – Urban and rural, two-lane
- **Speed Limit** – 60 km/h or less
- **Average Daily Traffic** – All volumes

Design

- More effective if combined with curb extensions before and/or after raised median islands
- Bicycle lanes can be included, if required
- Median lanscaping should not negatively impact pedestrian visibility

Potential Benefits

- **Vehicle Speeds –** Reduction between 3 and 8 km/h
- **Conflicts –** Can reduce pedestrian-vehicle conflicts
- **Environment** – Aesthetic benefit

Implementation Considerations

- **Local Access** – May restrict access to driveways
- **Active Transportation** – Cyclists may feel squeezed
- **Parking** – May require additional right-of-way and/or removal of on-street parking

City of Kitchener

Primary Purpose
Speed Reduction

Indicative Cost
$3,000 – $125,000 (Permanent)

Timeline
Permanent

Signage

Gateway

A Gateway is the combination of traffic calming devices, that help to provide an entry or "gateway" which identifies transitional zones such as between commercial/rural areas and urban/rural residential zones, villages, or hamlets.

Applicability

- **Road Classification** – Local Roads, Collector Roads, and Type C Arterial Roads
- **Roadway Cross-Section** – Urban and rural
- **Speed Limit** – All speed limits
- **Average Daily Traffic** – All volumes

Design

- Best be placed in the speed transition zones
- Most effective on infrequent users of the corridor
- Should meet clear-zone, structual, and protection requirements
- Needs to be large enough to attract drivers attention

Potential Benefits

- **Vehicle Speeds –** Reduction in 85th percentile speed up to 10 km/h
- **Environment** – May improve aesthetics

Implementation Considerations

- **Maintenance** – Requires ongoing maintenance

Washington State Department of Transportation

Primary Purpose
Speed Reduction

Indicative Cost
$10,000 – $50,000 (Permanent)
$5,000 (Temporary)

Timeline
Permanent

Signage
N/A

Centreline Signage

The use of vertical treatments such as flexible post-mounted delineators or raised pavement markers to create a centre median. This could be used to give drivers a perception of lane narrowing and create a sense of constriction.

Flexible post-mounted delineators are similar in appearance to bollards. They are commonly used in work zones, high-occupancy vehicle (HOV) lanes, and on-ramp exits to direct vehicles or prevent certain movements.

Applicability

- **Road Classification** – Local Roads, Collector Roads, and Type C Arterial Roads
- **Roadway Cross-Section** – Urban and rural, two-lane
- **Speed Limit** – 80 km/h or less
- **Average Daily Traffic** – All volumes

Design

- Typically are between 450 and 900 mm (18 and 36 inches) tall
- May be used in conjunction with edgeline bollards
- See **Town's Design Criteria and Engineering Standards** for typical design

Potential Benefits

- **Vehicle Speeds –** Reduction in 85th percentile speed up to 5 km/h
- **Conflicts** – Potential reduction in collisions due to separation of traffic

Implementation Considerations

- **Maintenance** – May require regular maintenance; May cause difficulty of snow removal

Town of Innisfil

Primary Purpose
Speed Reduction

Indicative Cost
$2,500 – $4,000 (per km)
(Temporary and Permanent)

Timeline
Temporary or Permanent

Signage

Edgeline Bollards

Edgeline bollard narrowing is a traffic management technique involving the placement of bollards along the road's edge to create a narrowed lane width, which helps slow traffic and improve safety by reducing available road space.

Applicability

- **Road Classification** – Local Roads, Collector Roads, and Type C Arterial Roads
- **Roadway Cross-Section** – Urban and rural, two-lane
- **Speed Limit** – 80 km/h or less
- **Average Daily Traffic** – All volumes

Design

- Typically are between 450 and 900 mm (18 and 36 inches) tall
- May be used in conjunction with centreline signage
- May be used to reinforce curb radius reductions and curb extensions
- See **Town's Design Criteria and Engineering Standards** for typical design

Potential Benefits

- **Vehicle Speeds –** Reduction in 85th percentile speed up to 5 km/h
- **Conflicts** – Potential reduction in collisions due to separation of traffic

Implementation Considerations

- **Maintenance** – May require regular maintenance; May cause difficulty of snow removal

Ville de Montreal

Primary Purpose
Speed Reduction

Indicative Cost
$2,500 – $4,000 (per km)
(Temporary and Permanent)

Timeline
Temporary or Permanent

Signage
N/A

Sidewalk Extension/Textured Crosswalk

A sidewalk extension is a sidewalk continued across a local street intersection at the level of the roadway. Textured/patterned elements that contrast the roadway can be incorporated into the sidewalk extension.

The purpose of a sidewalk extension is to visually enhance a pedestrian crossing location so drivers become more aware of its presence. It is not intended to indicate whether drivers or pedestrians are required to yield (traffic must comply with local or provincial regulations governing the type of pedestrian crossing system being enhanced by the sidewalk extension / textured crosswalk).

With a sidewalk extension/textured crosswalk the continuation of the surface and enhanced visual/tactile identification of the crosswalk area emphasizes pedestrian priority.

West Side Action

Applicability

- **Road Classification** – Local Roads and Collector Roads
- **Roadway Cross-Section** – Urban, sidewalks on both sides
- **Speed Limit** – 50 km/h or less
- **Average Daily Traffic** – All volumes

Design

- May be used in combination with other measures
- Only used at controlled locations

Potential Benefits

- **Conflicts** – May reduce pedestrian-vehicle conflict
- **Environment** – Enhance appearance of streets

Implementation Considerations

- **Active Transportation** – May result in a false sense of pedestrian safety; May create traction and/or stability problems
- **Maintenance** – Requires ongoing maintenance

Primary Purpose
Speed Reduction

Indicative Cost
$12,000 – $30,000 (Permanent)

Timeline
Permanent

Signage
N/A

Lane Narrowing

Lane narrowing is the process of reducing lane widths using pavement markings or other features (for example, bicycle lanes, street beautification programs, pavement texture).

The intention is for drivers to perceive the roadway to be less comfortable at higher speeds due to the narrowing of the lanes and ultimately reduce operating speeds.

Applicability

- **Road Classification** – Local Roads, Collector Roads, and Type C Arterial Roads
- **Roadway Cross-Section** – Urban
- **Speed Limit** – 60 km/h or less
- **Average Daily Traffic** – All volumes

Design

- Physical lane narrowing is more effective than simple pavement markings
- Ensure consistency to avoid driver confusion

Potential Benefits

- **Vehicle Speeds –** Reduction in 85th percentile speed up to 10 km/h
- **Conflicts** – May reduce pedestrian-vehicle conflicts

Implementation Considerations

- **Active Transportation** – Cyclists can feel squeezed closer to vehicles if no bike lanes are provided
- **Maintenance** – Pavement markings requires regular maintenance, and may be less effective in winter due to snow/ice cover

Township of King

Primary Purpose
Speed Reduction

Indicative Cost
$12,000 – $20,000 (Permanent)

Timeline
Temporary or Permanent

Signage
N/A

Dragon's Teeth

Dragon's teeth are a series of triangular pavement markings along the edge of the travelled lanes. Typically spaced increasingly closer approaching the location of a speed limit change, they may also be painted with increasing size to give the impression of roadway narrowing. They provide a visual change of the roadway and alert drivers that they are entering a rural community.

Applicability

- **Road Classification** – Local Roads, Collector Roads, and Type C Arterial Roads
- **Roadway Cross-Section** – Urban and rural
- **Speed Limit** – All speed limits
- **Average Daily Traffic** – All volumes

Design

- Primarily used as a gateway feature to alert drivers they are entering a rural community
- See **Town's Design Criteria and Engineering Standards** for typical design

Potential Benefits

- **Vehicle Speeds –** Reduction in 85th percentile speed

Implementation Considerations

- **Maintenance** – Pavement markings requires regular maintenance, and may be less effective in winter due to snow/ice cover

Road Safety Toolkit

Primary Purpose
Speed Reduction

Indicative Cost
$4,000 (Temporary and Permanent)

Timeline
Temporary or Permanent

Signage
N/A

Peripheral Transverse Bars

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.

Applicability

- **Road Classification** – Local Roads, Collector Roads, and Type C Arterial Roads
- **Roadway Cross-Section** – Urban and rural
- **Speed Limit** – All speed limits
- **Average Daily Traffic** – All volumes

Design

- Primarily used as a gateway feature to alert drivers they are entering a rural community
- See **Town's Design Criteria and Engineering Standards** for typical design of Dragon's Teeth (similar treatment)

Potential Benefits

- **Vehicle Speeds –** Reduction in 85th percentile speed up to 8 km/h

Implementation Considerations

- **Maintenance** – Pavement markings requires regular maintenance, and may be less effective in winter due to snow/ice cover

Federal Highway Administration

Primary Purpose
Speed Reduction

Indicative Cost
$4,000 (Temporary and Permanent)

Timeline
Temporary or Permanent

Signage
N/A

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 speed limit, 'SLOW', 'Stop ahead, etc.

Applicability

- **Road Classification** – Local Roads, Collector Roads, and Type C Arterial Roads
- **Roadway Cross-Section** – Urban and rural
- **Speed Limit** – All speed limits
- **Average Daily Traffic** – All volumes

Design

- May be used as part of gateways
- See **Town's Design Criteria and Engineering Standards** for typical design

Potential Benefits

- **Vehicle Speeds –** Reduction between 6 and 14 km/h
- **Environment** – No increase in noise

Implementation Considerations

- **Maintenance** – Require regular maintenance; Less effective in winter due to snow/ice cover

Sherwin Industries

Primary Purpose
Speed Reduction

Indicative Cost
$150 – $200 (per symbol)
(Temporary and Permanent)

Timeline
Temporary or Permanent

Signage
N/A

Appendix C – Standard Drawings

Physical Traffic Calming Measures

- Vertical Deflection
  - Speed Cushion
  - Raised Crosswalk
- Road Narrowing
  - Curb Extension (Bump Out)
  - Centreline Signage and Edgeline Bollards
- Surface Treatment and Pavement Marking
  - Dragon's Teeth
  - On-Road 'Sign' Pavement Markings