**TOWN OF WHITBY** 

# Traffic Calming Guidelines

(DRAFT May 2025)



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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*<sup>1</sup>, 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 best 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

<sup>&</sup>lt;sup>1</sup> 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; and
- 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; and
- 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 and criteria to identify and prioritize locations for traffic calming on

Town roads. Adopted by Town Council in 2025, the policy applies to Local Roads, Collector Roads, and select Type C Arterial Roads<sup>2</sup> 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.<sup>3</sup>

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.

<sup>&</sup>lt;sup>2</sup> As designated on Schedule D (Transportation) of the Town's Official Plan

<sup>&</sup>lt;sup>3</sup> Land use designations per Schedule A (Land Use) of the Town's Official Plan

### 2 Developing a Traffic Calming Plan

#### 2.1 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; and
- Confirming availability and limitations of funding, staff, equipment, community, and other resources to prepare and implement the plan.

#### 2.2 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.

The following factors should be considered when defining the study area limits:

- 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)

#### 2.3 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(s), 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(s)
- Emergency response operations
- Streetlighting
- Transit

#### 2.4 Data Collection

Traffic data collection helps in developing an understanding of the study area transportation network. The data provides objective information to make evidencebased 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. ATRs typically record data 24 hours a day for at least seven (7) 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(s) 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.

#### 2.5 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.

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; and
- Explaining how resident and stakeholder feedback influences the decisionmaking 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 become 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 2.1** 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.

#### TABLE 2.1: PUBLIC ENGAGEMENT ACTIVITIES FOR TRAFFIC CALMING STUDY

| Activity                           | Approach   | Purpose   | Key Questions   | Complimentary<br>Communications   |
|------------------------------------|--|---|---|---|
| Invite Input on<br>Proposed Plan   | Connect Whitby will serve as the<br>primary portal for capturing<br>input on the proposed Traffic<br>Calming Plan(s). Pop-up<br>information centres and surveys<br>may be used to supplement the<br>information presented on the<br>Connect Whitby portal.<br>A workshop (virtual or in-person)<br>may be held with study area<br>residents to present the<br>proposed Traffic Calming Plan<br>(options) and solicit input. The<br>workshop should include an<br>educational component and<br>provide opportunities for<br>feedback. | To receive feedback on<br>the proposed Traffic<br>Calming Plan from<br>residents of the study<br>area.<br><i>If options:</i> To determine<br>the Traffic Calming<br>Plans to present as the<br>proposed option(s) for<br>the neighbourhood<br>survey. | <ul> <li>What do you like about the proposed Traffic Calming Plan (options)?</li> <li><i>If options:</i> Do you have a preference between the alternatives presented?</li> <li>Do you have any questions or concerns about what is being recommended?</li> <li>Do you feel comfortable with the proposed solution?</li> <li>Is there anything that needs to change before this plan moves forward?</li> </ul> | <ul> <li>Notice of Engagement:</li> <li>Mailed and/or<br/>handed out to the<br/>intended audience.<br/>Includes use of door<br/>hangers.</li> <li>Posted on Connect<br/>Whitby, with<br/>notification via social<br/>media</li> <li>Displayed on<br/>message signs<br/>and/or posters set<br/>up in the study area</li> </ul> |
| Conduct<br>Neighbourhood<br>Survey | A <b>survey</b> (delivered by mail and<br>returned online or by mail) will<br>be sent to each household<br>(dwelling unit) in the study area,<br>regardless of the number of<br>residents, to gauge support for<br>implementing the proposed<br>Traffic Calming Plan and<br>determine the preferred plan<br>alternative if more than one<br>option exists.<br>The survey package should<br>include information about the<br>proposed plan.   | To determine if resident<br>support exists to<br>implement the proposed<br>Traffic Calming Plan.<br><i>If options:</i> To determine<br>the preferred Traffic<br>Calming Plan to<br>implement.   | <ul> <li>Do you support the installation of the proposed Traffic Calming Plan?</li> <li>Yes</li> <li>No</li> <li>Unsure/neutral</li> <li><i>If options:</i> Do you support the installation of proposed Traffic Calming Plan:</li> <li>Option #1</li> <li>Option #2</li> <li>Option #n (typically no more than 3)</li> <li>None of the options</li> <li>Unsure/neutral</li> </ul>                             | <ul> <li>Handouts with<br/>information about the<br/>proposed Traffic<br/>Calming Plan (options):</li> <li>Mailed and/or<br/>handed out to the<br/>intended audience</li> <li>Posted on Connect<br/>Whitby, with<br/>notification via social<br/>media</li> <li>Email correspondence</li> <li>Phone calls</li> </ul>          |

#### 2.6 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; and
- Document the rationale when deviating from the guidance in this document.

#### 2.7 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(s) 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.

#### 2.8 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.

### 3 The Toolkit

#### 3.1 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.

#### 3.2 Potential Traffic Calming Measures

**Appendix A** 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*<sup>4</sup> and adjusted to reflect Canadian dollars and inflation. Other municipal traffic calming guidelines were also referenced in deriving the cost data.

<sup>&</sup>lt;sup>4</sup> Institute of Transportation Engineers. *Traffic Calming Fact Sheets*. <u>https://www.ite.org/technical-resources/traffic-calming/traffic-calming-measures</u>. Accessed July 29, 2021.

#### 3.2.1 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
- Automated Speed Enforcement (ASE)

#### 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:
  - Rumble Strips
  - Sidewalk Extension/Textured Crosswalk
  - Pavement Markings
  - Dragon's Teeth
  - On-Road 'Sign' Pavement Markings

**Table 3.1** 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.

#### 3.2.2 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.

#### 3.3 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 Traffic Calming Policy, locations meeting the technical assessment minimum score 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
  - Heavy vehicles
- 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
  - 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 3.1: TRAFFIC CALMING MEASURES FOR USE IN THE TOWN OF WHITBY

|                                | Арр         | licable         | e Loca                | tion               | Po              | otentia          | l Bene             | efit                | Im                   | pleme                         | ntatio      | n Cons              | iderat          | ion                | ж<br>Х                        |  |
|--------------------------------|-------------|-----------------|-----------------------|--------------------|-----------------|------------------|--------------------|---------------------|----------------------|-------------------------------|-------------|---------------------|-----------------|--------------------|-------------------------------|--|
| Measure                        | Local Roads | Collector Roads | Type C Arterial Roads | Outside Urban Area | Speed Reduction | Volume Reduction | Conflict Reduction | Natural Environment | Local Vehicle Access | Emergency Vehicle<br>Response | Cycling Use | Traffic Enforcement | Vehicle Parking | Street Maintenance | Relative<br>Implementation Co | Notes  |
| Education and Enforcer         | nent        |                 |                       |                    | -               |                  | -                  |                     |                      |                               | -           |                     |                 |                    |                               |  |
| Radar Speed<br>Feedback Sign   | ~           | ~               | ~                     | ~                  |                 |                  |                    |                     | 0                    | 0                             | 0           | 0                   | 0               | 0                  | \$                            | Use prior to   |
| Education Campaign             | ✓           | ✓               | ✓                     | ✓                  |                 |                  |                    |                     | 0                    | 0                             | 0           | 0                   | 0               | 0                  | \$-\$\$\$                     | implementing physical  |
| Targeted Enforcement           | ✓           | ✓               | ✓                     | ✓                  |                 |                  |                    |                     | 0                    | 0                             | 0           |                     | 0               | 0                  | \$-\$\$\$                     | compliments other  |
| Automated Speed<br>Enforcement | ~           | ~               | ~                     | ~                  |                 |                  |                    |                     | 0                    | 0                             | 0           | 0                   | 0               | 0                  | \$\$-\$\$\$                   | measures   |
| Vertical Deflection            |             |                 |                       |                    |                 |                  |                    |                     | ·                    |                               |             |                     |                 | ·                  |                               |  |
| Speed Hump                     | ✓           | *               | *                     |                    |                 |                  |                    |                     | 0                    |                               | 0           | 0                   | 0               | 0                  | \$-\$\$                       | Conditional use only   |
| Speed Cushion                  | ✓           | *               | *                     |                    |                 |                  |                    |                     | 0                    | 0                             | 0           | 0                   | 0               | 0                  | \$-\$\$                       | (see Legend notes)   |
| Raised Crosswalk               | 1           | ~               | ~                     |                    |                 |                  |                    |                     | 0                    | 0                             | 0           | 0                   | 0               | 0                  | \$-\$\$                       | Implement to facilitate pedestrian connections   |
| Raised Intersection            | ~           | ~               | ~                     |                    |                 |                  | •                  | ٥                   | 0                    | 0                             | 0           | 0                   | 0               | 0                  | \$\$-\$\$\$                   | Site specific,<br>considered as part of<br>road reconstruction<br>projects or new<br>development |

#### Legend:

Applicable Location: Potential Benefit: Implementation Consideration: Relative Implementation Cost: ✓ Applicable, \* Conditional (only on roads with traffic volumes less than 8,000 vehicles per day), + Seasonal

■ Substantial, ■ Moderate, □ None or Limited Data

• Substantial, • Moderate, • None or Limited Data

\$ Low (\$0-\$10,000), \$\$ Moderate (\$10,000-\$100,000), \$\$\$ High (\$100,000+)

#### TABLE 3.1: TRAFFIC CALMING MEASURES FOR USE IN THE TOWN OF WHITBY

|                                    | Арр         | licable         | e Loca                | tion               | Po              | otentia          | I Bene             | əfit                | Im                   | pleme                         | ntatio      | n Cons              | siderat         | ion                | st (                          |   |
|------------------------------------|-------------|-----------------|-----------------------|--------------------|-----------------|------------------|--------------------|---------------------|----------------------|-------------------------------|-------------|---------------------|-----------------|--------------------|-------------------------------|---|
| Measure                            | Local Roads | Collector Roads | Type C Arterial Roads | Outside Urban Area | Speed Reduction | Volume Reduction | Conflict Reduction | Natural Environment | Local Vehicle Access | Emergency Vehicle<br>Response | Cycling Use | Traffic Enforcement | Vehicle Parking | Street Maintenance | Relative<br>Implementation Co | Notes   |
| Horizontal Deflection              |             |                 |                       |                    |                 |                  |                    |                     |                      |                               |             |                     |                 |                    |                               |   |
| Curb Radius<br>Reduction           | ~           | ~               | ~                     |                    |                 |                  |                    |                     | 0                    | 0                             | ο           | 0                   | 0               | 0                  | \$\$-\$\$\$                   |   |
| Chicane                            | ~           |                 |                       |                    |                 |                  |                    |                     | 0                    | 0                             | 0           | 0                   | •               | 0                  | \$\$                          | Implement under special circumstances                                   |
| Mini (Neighbourhood)<br>Roundabout | ~           | ~               |                       |                    |                 |                  |                    |                     | 0                    | 0                             | 0           | 0                   | 0               | 0                  | \$-\$\$\$                     | Implement to address<br>intersection conflicts<br>(where space permits) |
| Road Narrowing                     |             |                 |                       |                    |                 |                  |                    |                     |                      |                               |             |                     |                 |                    |                               |   |
| Curb Extension<br>(Bump Out)       | ~           | ~               | ~                     |                    |                 |                  |                    |                     | 0                    | 0                             | 0           | 0                   | •               | •                  | \$\$-\$\$\$                   |   |
| Raised Median Island               | ~           | ~               | ~                     |                    |                 |                  |                    |                     | 0                    | 0                             | 0           | 0                   | 0               | 0                  | \$\$-\$\$\$                   | Implement where width permits and/or with reconstruction projects       |
| Gateway                            | ~           | ~               | ~                     | ~                  |                 |                  |                    |                     | 0                    | 0                             | 0           | 0                   | 0               |                    | \$-\$\$                       | Site specific,<br>compliments other<br>measures                         |
| Centreline Signage                 | +           | +               | +                     |                    |                 |                  |                    |                     | 0                    | 0                             | 0           | 0                   | 0               | 0                  | \$                            | Soconal uso only  |
| Edgeline Bollards                  | +           | +               | +                     |                    |                 |                  |                    |                     | 0                    | 0                             | 0           | 0                   | 0               | 0                  | \$                            | Seasonal use only   |

#### Legend:

Applicable Location: Potential Benefit: Implementation Consideration: Relative Implementation Cost: ✓ Applicable, \* Conditional (only on roads with traffic volumes less than 8,000 vehicles per day), + Seasonal

■ Substantial, ■ Moderate, □ None or Limited Data

• Substantial, • Moderate, • None or Limited Data

t: **\$** Low (\$0-\$10,000), **\$\$** Moderate (\$10,000-\$100,000), **\$\$\$** High (\$100,000+)

#### TABLE 3.1: TRAFFIC CALMING MEASURES FOR USE IN THE TOWN OF WHITBY

|   | Арр         | licable         | e Loca                | tion               | Pc              | otentia          | l Bene             | efit                | Im                   | pleme                         | ntatio      | n Cons              | iderat          | ion                | st                             |  |  |  |
|---|-------------|-----------------|-----------------------|--------------------|-----------------|------------------|--------------------|---------------------|----------------------|-------------------------------|-------------|---------------------|-----------------|--------------------|--------------------------------|--|--|--|
| Measure                                   | Local Roads | Collector Roads | Type C Arterial Roads | Outside Urban Area | Speed Reduction | Volume Reduction | Conflict Reduction | Natural Environment | Local Vehicle Access | Emergency Vehicle<br>Response | Cycling Use | Traffic Enforcement | Vehicle Parking | Street Maintenance | Relative<br>Implementation Cos | Notes  |  |  |
| Surface Treatments and                    | d Pave      | ment            | Markir                | ngs                |                 |                  |                    |                     |                      |                               |             | •                   |                 |                    |                                |  |  |  |
| Rumble Strips                             |             |                 |                       | ✓                  |                 |                  |                    |                     | 0                    | 0                             | 0           | 0                   | 0               | 0                  | \$                             |  |  |  |
| Sidewalk Extension/<br>Textured Crosswalk | ~           | ~               |                       |                    |                 |                  |                    |                     | 0                    | 0                             | 0           | 0                   | 0               | •                  | \$-\$\$                        | Implement to facilitate<br>pedestrian crossings,<br>streetscape projects |  |  |
| Lane Narrowing                            | ✓           | ✓               | ✓                     | ✓                  |                 |                  |                    |                     | 0                    | 0                             | 0           | 0                   | 0               | 0                  | \$-\$\$                        |  |  |  |
| Dragon's Teeth                            | ✓           | ✓               | ✓                     | ✓                  |                 |                  |                    |                     | 0                    | 0                             | 0           | 0                   | 0               | 0                  | \$                             |  |  |  |
| On-Road 'Sign'<br>Pavement Markings       | ~           | ~               | ~                     | ~                  |                 |                  |                    |                     | 0                    | 0                             | 0           | 0                   | 0               | 0                  | \$                             | 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+)

### 4 Design Considerations

#### 4.1 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*<sup>5</sup> 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 4.1** denotes the relevant guidebook and section 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 B** (and described in **Section 4.6**) provide further design guidance specific to Whitby.

#### 4.2 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:

<sup>&</sup>lt;sup>5</sup> TAC, Geometric Design Guide for Canadian Roads, (2017)

#### TABLE 4.1: DESIGN GUIDANCE FOR PHYSICAL TRAFFIC CALMING MEASURES

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

#### 4.2.1 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

#### 4.2.2 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)

#### 4.2.3 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)

#### 4.3 Design Integration

#### 4.3.1 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.

#### 4.3.2 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<sup>6</sup> 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; and
- 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 4.1** illustrates the difference between corner radius and effective turning radius at an intersection. **Table 4.2** provides the effective turning radius for different intersection contexts to consider as a starting point when developing designs for traffic calming plans.



#### FIGURE 4.1 CORNER RADII AND EFFECTIVE TURNING RADIUS

(Source: Geometric Design Guide for Canadian Roads (TAC, 2017)

<sup>&</sup>lt;sup>6</sup> 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 singleunit 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 4.2: INITIAL MINIMUM EFFECTIVE TURNING RADII

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

| Land Use Context | Functional Classifications of<br>Connecting Roads | Minimum Effective<br>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 <sup>1</sup>                 |
|                  | Collector to Arterial                             | 12.0 m <sup>1</sup>                 |
| Commercial       | Local to Local                                    | 9.0 m                               |
|                  | Local to Collector                                | 12.0 m <sup>1</sup>                 |
|                  | Collector to Collector                            | 15.0 m <sup>2</sup>                 |
|                  | Collector to Arterial                             | 15.0 m <sup>2</sup>                 |
| Industrial       | Local to Collector                                | 12.0 m <sup>1</sup>                 |
|                  | Collector to Collector                            | 15.0 m <sup>2</sup>                 |
|                  | Collector to Arterial                             | 15.0 m <sup>2</sup>                 |

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 4.2**. 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.

#### 4.3.3 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.

#### 4.3.4 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.

#### 4.3.5 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

#### 4.3.6 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

#### 4.3.7 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. Please refer to the OTM Books, the *Canadian Guide to Traffic Calming*, and the TAC *Manual of Uniform Traffic Control Devices for Canada*<sup>7</sup> for exact sign information.

#### 4.4 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.

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

<sup>&</sup>lt;sup>7</sup> 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.

#### 4.5 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.

#### 4.6 Standard Drawings

**Appendix B** provides a series of standard drawings specific to Whitby for the design and construction of select traffic calming measures.

### **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 multilane 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 and Enforcement**

### **Education Campaign**

#### **Education and Enforcement**

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 selfreported 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<br>Raise Awareness |
|------------------------------------|
| Indicative Cost                    |
| Minima                             |
| winimai                            |
|                                    |
| limeline                           |
| Temporary                          |
|                                    |
| Signage                            |
|                                    |
|                                    |
|                                    |

### **Targeted Enforcement**

#### **Education and 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

**Timeline** Temporary

### **Automated Speed Enforcement**

Automated Speed Enforcement (ASE) is an automated system that uses a camera and a speed measurement device to enforce speed limits in identified areas. ASE is designed to work in tandem with other road safety measures, such as engineering activities, education initiatives, and police enforcement, to help improve safety for people of all ages by increasing speed compliance, altering driver behaviour, and increasing public awareness about the consequences of inappropriate vehicle operating speeds and the critical need for drivers to slow down.

#### Applicability

- Road Classification Local Roads, Collector Roads, and Type C Arterial Roads
- Roadway Cross-Section Urban and rural
- Speed Limit 70 km/h or less
- Average Daily Traffic All volumes

#### Design

- Can only be used in Community Safety Zones and School Zones
- Avoid speed transition zones
- Avoid at the bottom of hills or corners, or 200 m upstream of speed limit ahead signage

#### **Potential Benefits**

- Vehicle Speeds Reduction in average speed between 8 and 14 km/h within enforced area
- Conflicts Substaintial reduction in speed related collisions at camera location

#### **Implementation Considerations**

 Drivers may start to use alternate routes to avoid ASE cameras





Durham Region

Primary Purpose Speed Reduction

Indicative Cost

**Timeline** Temporary or Permanent



### **Speed Hump**

#### **Vertical Deflection**

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 100 to 200 m depending on the desired 85th percentile speed
- Grade < 8%
- Maximum Block Length (between controlled intersections) 200 m

#### **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



City of Surrey

#### Primary Purpose Speed Reduction

Indicative Cost

\$7,000 – \$10,000 (Permanent) \$6,000 (Temporary)

**Timeline** Temporary or Permanent



### **Speed Cushion**

#### **Vertical Deflection**

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 100 to 200 m depending on the desired 85th percentile speed
- Grade < 8%
- Maximum Block Length (between controlled intersections) – 200 m

#### **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 Calgary

Primary Purpose Speed Reduction

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

**Timeline** Temporary or Permanent



### **Raised Crosswalk**

#### **Vertical Deflection**

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-ofway
- Consistent configuration throughout a community is desirable
- Grade  $\geq$  1%, but  $\leq$  8%

#### **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



Federal Highway Administration

Primary Purpose Speed Reduction

Indicative Cost \$5,000 - \$20,000 (Permanent)

Timeline Permanent



### **Raised Intersection**

#### **Vertical Deflection**

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 commercial areas and business districts with high pedestrian activity
- Grade  $\geq$  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



### **Curb Radius Reduction**

**Horizontal Deflection** 

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  $\ge 750 \text{ vpd}$

#### 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 onelane, and between 6 and 11 km/h for two-lane
- Traffic Volumes Reduction of up to 47% for one-lane, and 22% for twolane
- **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

#### **Horizontal Deflection**



City of Alexandria

Primary Purpose Speed Reduction

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

**Timeline** Temporary or Permanent





### Mini (Neighbourhood) Roundabout

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

Mini roundabouts have a smaller diameter and traversable islands compared to fullsize 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 < 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

#### **Horizontal Deflection**



City of Vancouver

#### Primary Purpose Speed Reduction

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

**Timeline** Temporary or Permanent



### **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

#### **Potential Benefits**

- Vehicle Speeds Reduction between 2 and 8 km/h
- Conflicts May reduce pedestrianvehicle 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

#### **Roadway Narrowing**



City of Surrey

#### Primary Purpose Speed Reduction

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

**Timeline** Temporary or Permanent



### **Raised Median Island**

#### **Roadway Narrowing**

A raised median island is an elevated median constructed on the centerline of a twoway 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 pedestrianvehicle 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 onstreet parking



PED BIKE SAFE

Primary Purpose Speed Reduction

Indicative Cost \$3,000 - \$125,000 (Permanent)

**Timeline** Permanent



### Gateway

#### **Roadway Narrowing**

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

### **Centreline Signage**

**Roadway Narrowing** 

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

#### **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



City of Ottawa

Primary Purpose Speed Reduction

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

**Timeline** Temporary or Permanent



### **Edgeline Bollards**

#### **Roadway Narrowing**

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

#### **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

### **Rumble Strips**

#### **Surface Treatments and Pavement Markings**

Transverse rumble strips are raised buttons, bars or grooves closely spaced at regular intervals on the roadway that create both noise and vibration in a moving vehicle.

The purpose of a rumble strip is to alert motorists to a traffic control device which is associated with unusual or changing conditions ahead. Rumble strips are sometimes incorrectly used in a standalone mode as a speed control device.

With rumble strips, motorists are alerted by minor vertical deflection of vehicle wheels and audible warning created as vehicles wheels pass over.

#### Applicability

- Road Classification Local Roads, Collector Roads, and Type C Arterial Roads outside the urban area
- Roadway Cross-Section Rural (usually one lane per direction)
- Speed Limit All speed limits
- Average Daily Traffic All volumes

#### Design

- Intended for changing conditions
   ahead
- Use only when standard warning or regulatory signing has been shown to be ineffective
- Most commonly used on approaches to Stop signs
- Not considered in locations adjacent to homes

#### **Potential Benefits**

 Vehicle Speeds – Reduction in 85th percentile speed between 3 and 8 km/h

#### **Implementation Considerations**

- Active Transportation Negative impact on cyclists
- Maintenance Negative effects on snow plowing operations



Iowa State University Institute for Transportation

#### Primary Purpose Speed Reduction

Indicative Cost \$3,000 – \$4,000 (Permanent) \$6,000 (Temporary)

**Timeline** Temporary or Permanent

### Sidewalk Extension/Textured Crosswalk

#### **Surface Treatments and Pavement Markings**

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.

#### 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 pedestrianvehicle 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



West Side Action

Primary Purpose Speed Reduction

Indicative Cost \$12,000 - \$30,000 (Permanent)

Timeline Permanent

### **Lane Narrowing**

#### **Surface Treatments and Pavement Markings**

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 pedestrianvehicle 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

### **Dragon's Teeth**

#### **Surface Treatments and Pavement Markings**

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 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

#### **Potential Benefits**

 Vehicle Speeds – Reduction in 85<sup>th</sup> 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

### **On-Road 'Sign' Pavement Markings**

#### **Surface Treatments and 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

#### **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

## **Appendix B – Standard Drawings**

IN DEVELOPMENT