

# A Traffic Calming Toolbox

This appendix provides the "toolbox" of traffic calming measures with a description and photo of each treatment. Indicative costs and design guidance for implementation are also included.

The Traffic Calming Toolbox notes whether the measures are intended for use on Local Roads/Low-Capacity Collectors and/or High-Capacity Collectors, sets out typical criteria for their applicability, and highlights potential traffic calming benefits and other implementation considerations. Table A.1 summarizes the traffic calming measures applicable for use on roads in Peterborough. Detailed descriptions of the measures follow the introductory section.

Applying the toolbox consistently will assist the City in selecting appropriate measures to address specific neighbourhood traffic issues and help to avoid the undesirable consequences of traffic calming. It is important to note that not all traffic calming measures are appropriate under all circumstances. The selection of suitable measures will depend on the specific issues being addressed and careful consideration of site-specific conditions.

## A.1 Selecting Measures from the Toolbox

The following outlines the typical decision process for selecting the most appropriate measures from the Traffic Calming Toolbox. Note that other, site-specific factors can also influence the measures selected:

- Step 1 Determine if the subject street is a candidate for physical traffic calming measures. Per Chapter 3 of the Neighbourhood Traffic Calming Policy, locations meeting the initial screening criteria in Table 3.1 would be candidates for physical treatments. Streets not satisfying these criteria may be considered for non-physical traffic calming measures such as education and enforcement to address resident concerns as an alternative or a first step.
- Step 2 Identify the list of potential traffic calming measures based on roadway classification. For Local Streets and Low Capacity Collectors, use Column 2 in Table A.1 (Applicability Local Street and Low Capacity Collector). For High Capacity Collectors, use Column 3 of the table (Applicability High Capacity Collector).
- 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



- Pedestrian crossings
- Vehicle and pedestrian/cyclist conflicts
- Heavy vehicles
- Step 4 Shortlist the measures that address the issue(s) to address 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, with consideration for midblock versus intersection application:
  - School Zones and Community Safety Zones
  - Active transportation (cycling) routes
  - Adjacent park
  - High pedestrian generators, particularly more vulnerable users
  - Adjacent land uses (residential versus non-residential)
  - Planned reconstruction
  - Available budget
  - Applicability for temporary installation
- Step 6 Confirm measures can be used under current roadway characteristics. 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

## A.2 Indicative Costs

**Table A.1** provides indicative costs for trial (temporary) and permanent installations of the potential traffic calming measures identified, where available. The range of costs for permanent measures cited in Column 4 (Indicative Cost – Low) and Column 5 (Indicative Cost – High) were sourced primarily from the Institute of Transportation Engineers (ITE) *Traffic* 

## CALM STREETS PTBO

*Calming Fact Sheets*<sup>10</sup> and adjusted to reflect Canadian dollars and inflation (from 2017 to 2021 dollars). Other municipal traffic calming policies<sup>11</sup> were also referenced in deriving the permanent indicative costs. Costs are not provided for uncommon (i.e., speed kidney), sitespecific (i.e., shared space), and primarily operational (i.e., targeted speed enforcement and targeted education campaign) measures, as denoted by "n/a".

For trial installations, the indicative costs included in Column 6 of **Table A.1** (Indicative Cost – Trial) were estimated based on quotes obtained from suppliers for the materials. The prices were factored up to account for installation and removal following the trial. Costs are not provided in cases where trial installations are unlikely (e.g., raised intersection) or inappropriate (e.g., any measure primarily signing or pavement marking), as denoted by "n/a".

The indicative costs cited in **Table A.1** provide useful 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, number of signals);
- Property acquisition (if required);
- Landscaping;
- Labour and materials; and
- Design and contingency.

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

<sup>&</sup>lt;sup>10</sup> Institute of Transportation Engineers. *Traffic Calming Fact Sheets*. <u>https://www.ite.org/technical-resources/traffic-calming/traffic-calming-measures</u>. Accessed April 26, 2021.

<sup>&</sup>lt;sup>11</sup> City of Toronto. *Traffic Calming Guide for Toronto*. 2016. <u>https://www.toronto.ca/wp-</u> <u>content/uploads/2017/11/97d0-2016-Traffic-Calming-Guide\_March2017.pdf</u>. Accessed April 26, 2021.



## A.3 Design Guidelines

The City will generally follow the recommended design guidance provided in Chapter 4 of the TAC *Canadian Guide to Traffic Calming* when implementing the traffic calming measures identified in **Table A.1**. Column 7 of the table (Design Details) denotes the relevant section in the guidebook to consult. The TAC *Geometric Design Guide for Canadian Roads* should also be referenced in the design process.

In a few instances, the table refers to the Ontario Traffic Manual (OTM) for guidance pertaining solely to signing or pavement marking measures. References are not provided for measures without available guidance (e.g., lateral shift) or for non-physical measures (e.g., targeted speed enforcement), as denoted by "n/a".



#### TABLE A.1: POTENTIAL TRAFFIC CALMING MEASURES

	Applico	ıbility	Indicative Cost <sup>1</sup>			
Measure	Local Street and Low Capacity Collector	High Capacity Collector	Low	High	Trial	Design Details <sup>2</sup>
1. Vertical Deflection			-		-	
1.1 Raised Crosswalk			\$5,000	\$20,000	\$10,000	4.2.1
1.2 Raised Intersection			\$30,000	\$150,000	n/a	4.2.2
1.3 Speed Cushion			\$6,000	\$10,000	\$8,500	4.2.3
1.4 Speed Hump/			\$4,000	\$10,000	\$6,000	4.2.4
Speed Table			\$5,000	\$20,000	\$10,000	4.2.4
2. Horizontal Deflection						
2.1 Chicane (One-Lane, Two- Lane) <sup>3</sup>	•		\$16,000	\$62,500	\$25,000	4.3.1
2.2 Curb Radius Reduction <sup>4</sup>			\$60,000	\$125,000	\$10,000	4.3.2
2.3 Lateral Shift	•		\$16,000	\$62,500	\$25,000	n/a
2.4 Speed Kidney			n/a	n/a	n/a	4.3.3
2.5 Traffic Button/			\$3,000	\$50,000	\$10,000	4.3.4
Traffic Circle/Mini- Roundabout	•		\$20,000	\$125,000	\$15,000	4.3.4
3. Roadway Narrowing						
3.1 Curb Extension	•		\$3,000	\$50,000	\$10,000	4.4.1
3.2 Lane Narrowing	•	•	\$12,000	\$20,000	n/a	OTM 11
3.3 On-Street Parking			\$12,000	\$20,000	n/a	4.4.2
3.4 Raised Median Island	•		\$3,000	\$125,000	\$8,000	4.4.3
3.5 Vertical Centreline Treatment (per km)	•		\$2,500	\$4,000	n/a	OTM 6
4. Surface Treatment						
4.1 Sidewalk Extension/ Textured Crosswalk	•	•	\$12,000	\$30,000	n/a	4.5.1
4.2 Textured Pavement (per m <sup>2</sup> )	•		\$75	\$190	n/a	n/a



#### TABLE A.1: POTENTIAL TRAFFIC CALMING MEASURES

	Applicc	ıbility	Indicative Cost <sup>1</sup>		st <sup>1</sup>	
Measure	Local Street and Low Capacity Collector	High Capacity Collector	Low	High	Trial	Design Details²
5. Pavement Markings						
5.1 On-Road 'Sign' Pavement Markings (per symbol)	•	•	\$150	\$200	n/a	OTM 11
6. Access Restriction						
6.1 Directional Closure <sup>3</sup>			\$6,000	\$100,000	\$5,000	4.7.1
6.2 Diverter <sup>1</sup>	•		\$12,000	\$125,000	\$5,000	4.7.2
6.3 Full Closure			\$20,000	\$250,000	\$5,000	4.7.3
6.4 Intersection Channelization	•		\$3,000	\$50,000	\$5,000	4.7.4
6.5 Raised Median Through Intersection	•		\$3,000	\$50,000	\$5,000	4.7.5
6.6 Right-in/Right-out Island			\$3,000	\$50,000	\$5,000	4.7.6
7. Gateways						
7.1 Gateways <sup>5</sup>			\$10,000	\$50,000	\$5,000	n/a
8. Shared Space		1				
8.1 Shared Space <sup>3, 6</sup>			n/a	n/a	n/a	n/a
9. Enforcement and Education						
9.1 Speed Display Devices			\$4,000	\$7,500	n/a	n/a
9.2 Targeted Speed Enforcement	•	•	n/a	n/a	n/a	n/a
9.3 Targeted Education Campaign	•	•	n/a	n/a	n/a	n/a

Notes:

1. See Section A.2 for explanation of indicative costs and sources.

- 2. See Section A.3 for explanation of design details and sources.
- 3. Measure typically not implemented on Low Capacity Collector roads
- 4. Assumes all corners of the intersection.
- 5. To be used in conjunction with other traffic calming measures. Typically consider for new development.
- 6. Measure is site-specific. Implemented as part of road reconstruction or new development.



## **1. VERTICAL DEFLECTION**

#### 1.1 Raised Crosswalk

#### **Description and Purpose**

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 Class Local Street, Low Capacity Collector, and High Capacity Collector
- Roadway Cross-Section Urban, sidewalk on at least one side of road
- Speed Limit 50 km/h or less
- Average Daily Traffic All volumes
- Grade  $\ge 1\%$ , but  $\le 8\%$
- **City** Implement to facilitate pedestrian connections

## Cost -to \$\$



#### Potential Traffic Calming Benefits

Speed Reduction Volume Reduction Conflict Reduction Natural Environment	
mplementation Considerations	
Local Vehicle Access Emergency Vehicle Response Cycling Use Traffic Enforcement Vehicle Parking Street Maintenance	
<ul> <li>No Benefit/Impact</li> <li>Minor Benefit/Impact</li> <li>Substantial Benefit/Impact</li> </ul>	

## CALM STREETS PTBO

#### Neighbourhood Traffic Calming Policy April 2021

## **1. VERTICAL DEFLECTION**

#### **1.2 Raised Intersection**

## **Description and Purpose**

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 Class Local Street, Low Capacity Collector, and High Capacity Collector
- Roadway Cross-Section Urban
- Speed Limit 50 km/h or less
- Average Daily Traffic All volumes
- Grade  $\ge 1\%$ , but  $\le 8\%$
- City Site specific, considered as part of road reconstruction projects or new developments

Cost – \$ to \$



Speed Reduction Volume Reduction Conflict Reduction Natural Environment	
Implementation Considerations	
Local Vehicle Access Emergency Vehicle Response Cycling Use Traffic Enforcement Vehicle Parking Street Maintenance	
<ul> <li>No Benefit/Impact</li> <li>Minor Benefit/Impact</li> <li>Substantial Benefit/Impact</li> </ul>	



## **1. VERTICAL DEFLECTION**

CALM

**PTBO** 

STREETS

1.3 Speed Cushion

## **Description and Purpose**

A raised area on a road, similar to 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 Class Local Street and Low Capacity Collector
- Roadway Cross-Section Urban
- Speed Limit 50 km/h or less
- Average Daily Traffic All volumes
- Grade < 8%
- City Primary measure
- Cost \$



### Potential Traffic Calming Benefits

Speed Reduction	
Volume Reduction	
Conflict Reduction	
Natural Environment	

#### Implementation Considerations

ام	al Vahiela Assass	
LOC	al venicle Access	
Em	ergency Vehicle Response	
Сус	cling Use	
Tra	ffic Enforcement	
Veł	nicle Parking	
Stre	eet Maintenance	
_		
	No Benetit/Impact	
	Minor Benefit/Impact	

Substantial Benefit/Impact

### **1. VERTICAL DEFLECTION**

CALM

**PTBO** 

STREETS

#### 1.4 Speed Hump/Table

#### **Description and Purpose**

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.

A speed table is an elongated raised speed hump with a flat-topped section that is long enough to raise the entire wheelbase of a vehicle. They may be constructed with brick or other textured materials on the flat section.

## Applicability

- Road Class Local Street and Low Capacity Collector
- Roadway Cross-Section Urban
- Speed Limit 50 km/h or less
- Average Daily Traffic All volumes
- Grade < 8%
- City Implement where a speed cushion is not effective

Cost - \$-\$\$



Speed Reduction Volume Reduction Conflict Reduction Natural Environment	
Implementation Considerations	
Local Vehicle Access Emergency Vehicle Response Cycling Use Traffic Enforcement Vehicle Parking Street Maintenance	
<ul> <li>No Benefit/Impact</li> <li>Minor Benefit/Impact</li> <li>Substantial Benefit/Impact</li> </ul>	



## 2.1 Chicane

## **Description and Purpose**

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 Class Local Street and Low Capacity Collector
- Roadway Cross-Section Urban
- Speed Limit 50 km/h or less
- Average Daily Traffic  $\ge 750 \text{ vpd}$
- Grade < 8%
- **City** Implement under special circumstances

Cost – \$\$



Speed Reduction Volume Reduction Conflict Reduction Natural Environment	
Implementation Considerations	
Local Vehicle Access Emergency Vehicle Response Cycling Use Traffic Enforcement Vehicle Parking Street Maintenance	
<ul> <li>No Benefit/Impact</li> <li>Minor Benefit/Impact</li> <li>Substantial Benefit/Impact</li> </ul>	



#### 2.2 Curb Radius Reduction

#### **Description and Purpose**

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 Class Local Street, Low Capacity Collector, and High Capacity Collector
- Roadway Cross-Section Urban
- Speed Limit All speed limits
- Average Daily Traffic All volumes
- City Primary measure

#### Cost - \$-\$



Potential Traffic Calming Benefits	
Speed Reduction Volume Reduction Conflict Reduction Natural Environment	
Implementation Considerations	
Local Vehicle Access Emergency Vehicle Response Cycling Use Traffic Enforcement Vehicle Parking Street Maintenance	
<ul> <li>No Benefit/Impact</li> <li>Minor Benefit/Impact</li> <li>Substantial Benefit/Impact</li> </ul>	



## 2.3 Lateral Shift

## **Description and Purpose**

A lateral shift in a roadway occurs where an otherwise straight section is redesigned using pavement markings or curb extensions to create a curvilinear alignment (a 'jog') in the roadway like a chicane. This effect can also be achieved with the use of a central island.

A lateral shift causes drivers to have to negotiate the alignment and increases awareness aimed at reducing vehicle speeds.

## Applicability

- Road Class Local Street, Low Capacity Collector, and High Capacity Collector
- Roadway Cross-Section Urban
- Speed Limit 50 km/h or less
- Average Daily Traffic All volumes
- Grade < 8%
- City Primary measure

## Cost - \$-\$\$



Potential Traffic Calming Benefits	
Speed Reduction Volume Reduction Conflict Reduction Natural Environment	
Implementation Considerations	
Local Vehicle Access Emergency Vehicle Response Cycling Use Traffic Enforcement Vehicle Parking Street Maintenance	
<ul> <li>No Benefit/Impact</li> <li>Minor Benefit/Impact</li> <li>Substantial Benefit/Impact</li> </ul>	



2.4 Speed Kidney

## Description and Purpose

A speed kidney is an arrangement of three speed humps elongated with a curvilinear shape in the direction of traffic. Vehicle drivers choosing to drive in a straight path will experience discomfort as two or four wheels traverse the different parts of the speed kidney. Vehicles are required to take a curvilinear path to avoid the vertical deflection.

## Applicability

- Road Class Local Street and Low Capacity Collector
- Roadway Cross-Section Urban
- Location Midblock, Intersection
- Speed Limit 50 km/h or less
- Average Daily Traffic All volumes
- Grade < 5%
- City Implement under special circumstances

## Cost - \$-\$\$



#### Potential Traffic Calming Benefits Speed Reduction Volume Reduction Conflict Reduction Natural Environment Implementation Considerations Local Vehicle Access Emergency Vehicle Response Cycling Use **Traffic Enforcement** Vehicle Parking Street Maintenance No Benefit/Impact Minor Benefit/Impact Substantial Benefit/Impact



2.5 Traffic Button/Traffic Circle/Mini-Roundabout

### **Description and Purpose**

A traffic button/traffic circle/miniroundabout 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 are designed in accordance with full-size roundabout design principles incorporating splitter islands and deflection of vehicles on all approaches, except that they have a smaller diameter and traversable islands. A traffic circle is typically smaller than a mini-roundabout and does not have splitter islands on the approaches. A traffic button is like a traffic circle. However, the former is typically made of coloured asphalt while the latter is landscaped.

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.

## Cost – \$-\$\$



### Applicability

- Road Class Local Street and Low Capacity Collector
- Roadway Cross-Section Urban and rural
- Speed Limit 50 km/h or less
- Average Daily Traffic < 1500 vpd
- **City** Implement to address intersection conflicts, where space permits

Spe Vol Co Na	ed Reduction ume Reduction nflict Reduction tural Environment	
Imple	mentation Considerations	
Loc Em Cyc Tra Veł Stre	al Vehicle Access ergency Vehicle Response cling Use ffic Enforcement nicle Parking eet Maintenance	
	No Benefit/Impact Minor Benefit/Impact Substantial Benefit/Impact	



3.1 Curb Extension

## **Description and Purpose**

A curb extension (also known as 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 Class Local Street, Low Capacity Collector, and High Capacity Collector
- Roadway Cross-Section Urban
- Speed Limit 60 km/h or less
- Average Daily Traffic All volumes
- City Primary measure

Cost - \$\$-\$\$\$



Speed Reduction Volume Reduction Conflict Reduction Natural Environment	
Implementation Considerations	
Local Vehicle Access Emergency Vehicle Response Cycling Use Traffic Enforcement Vehicle Parking Street Maintenance	
<ul> <li>No Benefit/Impact</li> <li>Minor Benefit/Impact</li> <li>Substantial Benefit/Impact</li> </ul>	



#### **3. ROADWAY NARROWING**

#### 3.2 Lane Narrowing

#### **Description and Purpose**

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 Class Local Street, Low Capacity Collector, and High Capacity Collector
- Roadway Cross-Section Urban
- Speed Limit 60 km/h or less
- Average Daily Traffic All volumes
- City Primary measure

#### Cost – \$-\$\$



#### Potential Traffic Calming Benefits Speed Reduction Volume Reduction Conflict Reduction Natural Environment Implementation Considerations Local Vehicle Access Emergency Vehicle Response Cycling Use Traffic Enforcement Vehicle Parking Street Maintenance No Benefit/Impact Minor Benefit/Impact Substantial Benefit/Impact



## 3.3 On-Street Parking

## **Description and Purpose**

On-street parking is the reduction of the roadway width available for vehicle movement by allowing motor vehicles to park adjacent and parallel to the curb. Angled parking is not appropriate as a traffic calming measure, due to the increased potential for conflicts.

The effect of using on-street parking to narrow the effective roadway space is to reduce vehicle speeds and to reduce possible short-cutting or through traffic.

## Applicability

- Road Class Local Street, Low Capacity Collector, and High Capacity Collector
- Roadway Cross-Section Urban
- Speed Limit 50 km/h or less
- Average Daily Traffic All volumes
- City Implement in accordance with City By-laws

Cost - \$-\$\$



## Potential Traffic Calming Benefits

Speed Reduction	
Volume Reduction	
Conflict Reduction	
Natural Environment	

#### Implementation Considerations

Local Vehicle Access	
Emergency Vehicle Response	
Cycling Use	
Traffic Enforcement	
Vehicle Parking	
Street Maintenance	
<ul> <li>No Benefit/Impact</li> <li>Minor Benefit/Impact</li> </ul>	

Substantial Benefit/Impact



#### 3.4 Raised Median Island

#### **Description and Purpose**

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

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

#### Applicability

- Road Class Local Street, Low Capacity Collector, and High Capacity Collector
- Roadway Cross-Section Urban
- Speed Limit 60 km/h or less
- Average Daily Traffic All volumes
- **City** Implement where width permits and/or road reconstruction projects

Cost - \$\$-\$\$\$



#### Potential Traffic Calming Benefits

I

Speed Reduction Volume Reduction Conflict Reduction Natural Environment	
mplementation Considerations	
Local Vehicle Access Emergency Vehicle Response Cycling Use Traffic Enforcement Vehicle Parking Street Maintenance	
<ul> <li>No Benefit/Impact</li> <li>Minor Benefit/Impact</li> <li>Substantial Benefit/Impact</li> </ul>	



CALM

**PTBO** 

STREETS

#### **3.5 Vertical Centreline Treatment**

### **Description and Purpose**

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, highoccupancy vehicle (HOV) lanes, and onramp exits to direct vehicles or prevent certain movements.

## Applicability

- Road Class Local Street and Low Capacity Collector
- Roadway Cross-Section Urban and rural, two-lane
- Speed Limit 50 km/h or less
- Average Daily Traffic All volumes
- City Primary measure

## Cost – \$



#### Potential Traffic Calming Benefits

Speed Reduction	
Volume Reduction	
Conflict Reduction	
Natural Environment	

#### Implementation Considerations

Local Vehicle Access Emergency Vehicle Response Cycling Use Traffic Enforcement	
Vehicle Parking Street Maintenance	
<ul><li>No Benefit/Impact</li><li>Minor Benefit/Impact</li></ul>	

Substantial Benefit/Impact



#### **4. SURFACE TREATMENT**

4.1 Sidewalk Extension/ Textured Crosswalk

#### **Description and Purpose**

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 Class Local Street, Low Capacity Collector, and High Capacity Collector
- Roadway Cross-Section Urban, sidewalks on both sides
- Speed Limit 50 km/h or less
- Average Daily Traffic All volumes
- **City** Implement to facilitate pedestrian crossings, streetscape projects



## Cost – \$-\$\$

#### Potential Traffic Calming Benefits Speed Reduction Volume Reduction Conflict Reduction Natural Environment Implementation Considerations Local Vehicle Access Emergency Vehicle Response Cycling Use Traffic Enforcement Vehicle Parking Street Maintenance No Benefit/Impact Minor Benefit/Impact Substantial Benefit/Impact



#### **4. SURFACE TREATMENT**

#### **4.2 Textured Pavement**

#### **Description and Purpose**

Textured pavement is roadway pavement that incorporates a textured and/or patterned surface which contrasts other adjacent roadways in the surrounding area. The difference in texture alerts drivers of the potential need to reduce speed.

#### Applicability

- Road Class Local Street and Low
   Capacity Collector
- Roadway Cross-Section Urban
- Speed Limit 50 km/h or less
- Average Daily Traffic All volumes
- City Streetscape projects

Cost - \$-\$\$



#### **Potential Traffic Calming Benefits** Speed Reduction Volume Reduction Conflict Reduction Natural Environment Implementation Considerations Local Vehicle Access **Emergency Vehicle Response** Cycling Use Traffic Enforcement Vehicle Parking Street Maintenance No Benefit/Impact Minor Benefit/Impact Substantial Benefit/Impact



#### **5. PAVEMENT MARKINGS**

5.1 On-Road Sign Pavement Markings

#### **Description and Purpose**

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 Class Local Street, Low Capacity Collector, and High Capacity Collector
- Roadway Cross-Section Urban and rural
- Speed Limit All speed limits
- Average Daily Traffic All volumes
- City Compliments other measures

Cost – \$



Potential Traffic Calming Benefits	
Speed Reduction Volume Reduction Conflict Reduction Natural Environment	
Implementation Considerations	
Local Vehicle Access Emergency Vehicle Response Cycling Use Traffic Enforcement Vehicle Parking Street Maintenance	
<ul> <li>No Benefit/Impact</li> <li>Minor Benefit/Impact</li> <li>Substantial Benefit/Impact</li> </ul>	



## 6. ACCESS RESTRICTIONS

CALM

**PTBO** 

STREETS

#### 6.1 Directional Closure

#### **Description and Purpose**

A directional closure is a curb extension or vertical barrier extending to approximately the centerline of a roadway, effectively obstructing (prohibiting) one direction of traffic.

When combined with other measures elsewhere in a neighborhood, directional closures obstruct short-cutting or through traffic routes.

Bicycles are typically permitted to travel through a directional closure in both directions, including the direction in which motor vehicle traffic is obstructed. In some cases, gaps or a contra-flow bicycle lane are used to provide bicycle access.

#### Applicability

- Road Class Local Street and Low Capacity Collector
- Roadway Cross-Section Urban
- Location Midblock, Intersection
- Speed Limit All speed limits
- Average Daily Traffic <1500 vpd Local, 1500 to 5000 vpd Low Capacity Collector
- **City** Consider for volume reduction in the context of the network design

#### Cost – \$-\$\$\$



Spe Voli Coi Nat	ed Reduction ume Reduction nflict Reduction rural Environment	
Implei	mentation Considerations	
Loc Eme Cyc Tra Veh Stre	al Vehicle Access ergency Vehicle Response Iling Use ffic Enforcement nicle Parking eet Maintenance	
	No Benefit/Impact Minor Benefit/Impact Substantial Benefit/Impact	



## 6. ACCESS RESTRICTIONS

6.2 Diverter

### **Description and Purpose**

A diverter is a raised barrier placed diagonally across an intersection that forces traffic to turn and prevents traffic from proceeding straight through the intersection. Diverters can incorporate gaps for pedestrians, wheelchairs and bicycles and can be mountable by emergency vehicles.

The purpose of a diverter is to obstruct and redirect short-cutting or through traffic.

### Applicability

- Road Class Local Street and Low Capacity Collector
- Roadway Cross-Section Urban and rural
- Speed Limit 50 km/h or less
- Average Daily Traffic < 1500 vpd, use with caution for volumes up to 5000 vpd
- **City** Consider for volume reduction in the context of the network design

## Cost - \$-\$\$



Potent	ial Traffic Calming Benefits	
Spe Volu Cor Nat	ed Reduction ume Reduction nflict Reduction rural Environment	
Impler	mentation Considerations	
Loca Ema Cyc Traf Veh Stre	al Vehicle Access ergency Vehicle Response Iling Use ffic Enforcement icle Parking et Maintenance	
	No Benefit/Impact Minor Benefit/Impact Substantial Benefit/Impact	



## CALM STREETS PTBO

## 6. ACCESS RESTRICTIONS 6.3 Full Closure

## Description and Purpose

A full closure is a barrier extending the entire width of a roadway, which obstructs all motor vehicle traffic movements from continuing along the roadway. A closure can change a four-way intersection to a threeway intersection, or a three-way intersection to a non-intersection. Gaps can be provided for cyclists or to allow for emergency vehicles.

The purpose of a full closure is to eliminate short-cutting or through traffic.

## Applicability

- Road Class Local Street and Low Capacity Collector
- Roadway Cross-Section Urban
- Speed Limit 50 km/h or less
- Average Daily Traffic All volumes
- **City** Consider for volume reduction in the context of the network design

Cost -



## Potential Traffic Calming Benefits

Speed Reduction	
Volume Reduction	
Conflict Reduction	
Natural Environment	

#### Implementation Considerations

Loc	al Vehicle Access		
Eme	ergency Vehicle Response		
Сус	ling Use		
Tra	ffic Enforcement	E	
Vehicle Parking		E	
Street Maintenance			
	No Benetit/Impact		
	Minor Benefit/Impact		
	Substantial Benefit/Impact		



#### 6. ACCESS RESTRICTIONS

**6.4 Intersection Channelization** 

### **Description and Purpose**

Intersection channelization is the use of raised islands or bollards located in an intersection to obstruct specific traffic movements and physically direct traffic through an intersection.

Intersection channelization can improve pedestrian crossing safety by reducing crossing distances and providing refuge areas.

Bicycles are typically permitted to make all movements, including those which motor vehicles are prevented from making. Gaps in channelization islands may be used to accommodate bicycles.

## Applicability

- Road Class Local Street and Low Capacity Collector
- Roadway Cross-Section Urban
- Speed Limit All speed limits
- Average Daily Traffic All volumes
- **City** Consider for volume reduction in the context of the network design

Cost - \$-\$\$



Potential Traffic Calming Benefits	
Speed Reduction Volume Reduction Conflict Reduction Natural Environment	
Implementation Considerations	
Local Vehicle Access Emergency Vehicle Response Cycling Use Traffic Enforcement Vehicle Parking Street Maintenance	
<ul> <li>No Benefit/Impact</li> <li>Minor Benefit/Impact</li> <li>Substantial Benefit/Impact</li> </ul>	

#### 6. ACCESS RESTRICTIONS

CALM

**PTBO** 

STREETS

#### 6.5 Raised Median through Intersection

#### **Description and Purpose**

A raised median through an intersection is a concrete or asphalt island located on the centerline of a two-way roadway through an intersection, which prevents left turns and through movements to and from the intersecting roadways. It can create a refuge for pedestrians and cyclists, enabling them to cross one direction of travel at a time, thereby reducing waiting time for gaps when crossing the roadway.

The purpose of a raised median through an intersection is to obstruct short-cutting or through traffic and reduce crossing distance for pedestrians.

#### Applicability

- Road Class Local Street and Low Capacity Collector
- Roadway Cross-Section Urban
- Speed Limit All speed limits
- Average Daily Traffic All volumes
- **City** Consider for volume reduction in the context of the network design

Cost - \$-\$\$



#### Potential Traffic Calming Benefits

Speed Reduction	
Volume Reduction	
Conflict Reduction	
Natural Environment	

#### Implementation Considerations

Local Vehicle Access	
Emergency Vehicle Response	
Cycling Use	
Traffic Enforcement	
Vehicle Parking	
Street Maintenance	

- No Benefit/Impact
- Minor Benefit/Impact
  - Substantial Benefit/Impact



#### 6. ACCESS RESTRICTIONS

#### 6.6 Right-In/Right-Out Island

#### **Description and Purpose**

A right-in / right-out island is a raised triangular island at an intersection approach which obstructs left turns and through movements to and from the intersecting street or driveway.

Bicycles are typically permitted to make left turns and through movements from the side street, either through gaps or depressions in the island, or by travelling around the island.

The purpose of a right-in / right-out island is to obstruct short-cutting or through traffic.

#### Applicability

- Road Class Local Street, Low Capacity Collector, and High Capacity Collector
- Roadway Cross-Section Urban
- Speed Limit All speed limits
- Average Daily Traffic All volumes
- **City** Consider for volume reduction in the context of the network design

Cost - \$-\$\$



Speed Reduction Volume Reduction Conflict Reduction Natural Environment	
Implementation Considerations	
Local Access Emergency Vehicle Response Cycling Use Traffic Enforcement Vehicle Parking Street Maintenance	
<ul> <li>No Benefit/Impact</li> <li>Minor Benefit/Impact</li> <li>Substantial Benefit/Impact</li> </ul>	

## 7. GATEWAYS

CALM

**PTBO** 

STREETS

#### **Description and Purpose**

Gateways are 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 Class Local Street, Low Capacity Collector, and High Capacity Collector
- Roadway Cross-Section Urban and rural
- Speed Limit All speed limits
- Average Daily Traffic All volumes
- City Site specific, compliments other measures

Cost - \$-\$\$



Potential Traffic Calming Benefits	
Speed Reduction Volume Reduction Conflict Reduction Natural Environment	
Implementation Considerations	
Local Vehicle Access Emergency Vehicle Response Cycling Use Traffic Enforcement Vehicle Parking Street Maintenance	
<ul> <li>No Benefit/Impact</li> <li>Minor Benefit/Impact</li> <li>Substantial Benefit/Impact</li> </ul>	

## 8. SHARED SPACE

CALM

**PTBO** 

STREETS

#### **Description and Purpose**

Shared space is a design concept commonly used in Europe where the priority for users is shifted from vehicles towards cyclists and pedestrians as they are free to cross anywhere. Often, there are no pavement markings, traffic signals, signs or barriers which requires drivers to be more attentive. There may also be trees or street furniture in the roadway to act as deflections. This shared use reduces vehicles speeds and encourages better public spaces for the community.

#### Applicability

- Road Class Local Street and Low Capacity Collector
- Roadway Cross-Section Urban
- Speed Limit 50 km/h or less, lower to 20-30 km/h
- Average Daily Traffic <15,000 vpd
- **City** Site specific, implemented as part of road reconstruction or new development

Cost - \$-\$\$



Potential Traffic Calming Benefits	
Speed Reduction Volume Reduction Conflict Reduction Natural Environment	
Implementation Considerations	
Local Vehicle Access Emergency Vehicle Response Cycling Use Traffic Enforcement Vehicle Parking Street Maintenance	
<ul> <li>No Benefit/Impact</li> <li>Minor Benefit/Impact</li> <li>Substantial Benefit/Impact</li> </ul>	



## 9. ENFORCEMENT AND EDUCATION

CALM

**PTBO** 

STREETS

#### 9.1 Speed Display Devices

#### **Description and Purpose**

A speed display device is an interactive sign that displays vehicle speeds as oncoming motorists approach. Vehicle speed is captured using radar and can trigger the display board to show when vehicles approach at predetermined undesirable speeds. Can be used upstream of targeted speed enforcement.

### Applicability

- Road Class Local Street, Low Capacity Collector, High Capacity Collector, and Arterial Roads (all types)
- City Prior to implementing physical traffic calming and/or compliments other measures

#### Cost – \$



## Potential Traffic Calming Benefits

I

Speed Reduction	
Volume Reduction	
Conflict Reduction	
Natural Environment	
mplementation Considerations	
Local Vehicle Access	
Emergency Vehicle Response	
Cycling Use	
Traffic Enforcement	
Vehicle Parking	
Street Maintenance	
No Benefit/Impact	
Minor Benefit/Impact	
Substantial Benefit/Impact	



## 9. ENFORCEMENT AND EDUCATION

## 9.2 Targeted Speed Enforcement

#### **Description and Purpose**

Targeted speed 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 Class Local Street, Low Capacity Collector, High Capacity Collector, and Arterial Roads (all types)
- **City** Prior to implementing physical traffic calming and/or compliments other measures

Cost -



Spe Vol Cor Nat	ed Reduction ume Reduction nflict Reduction tural Environment	
Imple	mentation Considerations	
Loc Eme Cyc Tra Veh Stre	al Vehicle Access ergency Vehicle Response ling Use ffic Enforcement iicle Parking eet Maintenance	
	No Benefit/Impact Minor Benefit/Impact Substantial Benefit/Impact	



### 9. ENFORCEMENT AND EDUCATION

#### 9.3 Targeted Education Campaign

#### **Description and Purpose**

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 Class Local Street, Low Capacity Collector, High Capacity Collector, and Arterial Roads (all types)
- **City** Prior to implementing physical traffic calming and/or compliments other measures

Cost - \$-\$\$\$



## Potential Traffic Calming Benefits

Speed Reduction	
Volume Reduction	
Conflict Reduction	
Natural Environment	

#### Other Implementation Considerations

Local Vehicle Access Emergency Vehicle Response Cycling Use Traffic Enforcement Vehicle Parking Street Maintenance	
<ul> <li>No Benefit/Impact</li> <li>Minor Benefit/Impact</li> <li>Substantial Benefit/Impact</li> </ul>	