The Township of
UXBRIDGE
Trail Capital of Canada

Urban Traffic Calming Policy

paradigm
TRANSPORTATION SOLUTIONS LIMITED

June 2021

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1 Introduction

1.1 Purpose

The **Township of Uxbridge Urban Traffic Calming Policy** is intended to aid the municipality in identifying eligible locations for traffic calming and provide guidance on the application of traffic calming measures. The policy is intended for use on existing and future residential local and collector roads within the Uxbridge Urban Area and rural Hamlets. The Township will not consider requests for traffic calming measures on arterial roads under its jurisdiction.

1.2 Background

Growth in traffic volumes and heightened resident concerns about excessive speeding, traffic infiltration/shortcutting, and other undesirable driver behaviour has led to an increase in requests for traffic calming interventions on neighbourhood streets in Uxbridge. To provide a transparent, fair, and standardized process for addressing all traffic calming requests submitted for review, the Township has developed this policy, which includes a:

- Process for receiving, evaluating, and responding to citizen requests for traffic calming, including a typical community engagement protocol;
- Methodology and evaluation criteria to determine if traffic calming is appropriate for a given street and prioritize locations being considered for measures;
- List of traffic calming measures (the “toolbox”) the Township will consider implementing on streets in Uxbridge; and
- Procedure for monitoring and assessing the effectiveness of traffic calming measures after installation.

The policy incorporates best practices in traffic calming with local context to provide an appropriate, efficient, and flexible framework for addressing the variety of neighbourhood traffic inquiries received by the Township. It supplements guidance contained in the Transportation Association of Canada (TAC) *Canadian Guide to Traffic Calming*[1] and *Geometric Design Guide for Canadian Roads*[2] with considerations specific to Uxbridge. The protocol also reflects applicable Provincial legislation including the *Accessibility for Ontarians with Disabilities Act (AODA)* and the *Highway Traffic Act (HTA)*.

[1] Transportation Association of Canada. *Canadian Guide to Traffic Calming*. February 2018.
[2] Transportation Association of Canada. *Geometric Design Guide for Canadian Roads*. June 2017.

Development of the policy was informed by a jurisdictional scan of current traffic calming practices applied by other municipalities in Ontario. The research examined both urban and rural municipalities to assess similarities and differences between approaches to help guide the Uxbridge policy.

1.3 Policy Basis

The Township of Uxbridge Official Plan[3] provides the framework and basis for the Traffic Calming Policy. Section 2.6.2.2 (Road Planning) includes the following policy direction on the application of traffic calming:

v) New roads under the Township's jurisdiction shall be designed to integrate "traffic calming" measures as appropriate. In addition, where traffic problems are identified in existing areas through studies carried out by the municipality, the Township shall consider the introduction of "traffic calming" measures where appropriate to assist in the resolution of such concerns, and the Township shall work with the Region, with respect to Regional Roads.

As noted in **Section 1.1**, the policy is intended for use on existing and future urban residential local and collector roads in Uxbridge. Table 2.4 (Function of Road Facilities) of the Official Plan defines the intended function of these roads as follows:

- **Local roads** serve local and neighbourhood travel demand and connect individual properties to collector and arterial roads. Local roads are all streets in the Township not classified as a higher-order road (e.g., collector or arterial) and do not include non-assumed roads.
- **Collector roads** serve local travel demands and connect arterial and local roads.

[3] Township of Uxbridge. *Official Plan.* Office Consolidation January 2014.

2 Overview and Application

2.1 What is 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.[4]

Traffic calming measures are usually applied in locations experiencing excessive vehicle speed and/or high volumes of shortcutting traffic. The application of these measures is intended to restore streets to their desired function of providing mobility and access in differing combinations depending on the specific location, role, and classification of the roadway.

When applied properly, traffic calming can help "reduce the negative effects of motor vehicle use, alter driver behaviour, and improve conditions for non-motorized street users."[5] But installation of traffic calming measures can also cause unintended consequences if used inappropriately. As such, careful consideration and proper planning, design, and implementation is key to success.

2.2 Advantages and Disadvantages of Traffic Calming

Like any tool, traffic calming provides specific advantages and disadvantages depending on its application. Advantages of traffic calming can include:

- Reduced motor vehicle speeds;
- Reduced traffic volumes;
- Less shortcutting;
- Improved neighbourhood livability; and
- Reduced conflicts between roadway users.

Disadvantages of traffic calming can include:

- Increased emergency vehicle response and transit operating times;
- Reduced or impeded access and egress from neighbourhoods;
- Shifting or diverting traffic volumes or speeding concerns onto other roadways;

[4] Transportation Association of Canada. *Canadian Guide to Traffic Calming*. February 2018. p. 1.
[5] Institute of Transportation Engineers Subcommittee of Traffic Calming. Washington, D.C. 1997.

- Increased maintenance costs, including show clearing and curbside waste collection;
- Increased vehicle emissions and/or noise pollution; and
- Visual unattractiveness.

2.3 Application of Traffic Calming Measures

The Township may consider the implementation of traffic calming measures on local and collector roads within the residential communities of the Uxbridge Urban Area and rural Hamlets of the municipality shown on Schedule “A” (Land Use and Transportation Plan Uxbridge Urban Area) and “C” (Community Improvement Areas) of the Township of Uxbridge Official Plan, respectively:

- When there is a demonstrated safety, excessive speed, and/or shortcutting traffic concern and acceptable alternative measures have been exhausted or are not appropriate;
- After exploring methods to improve operation of the arterial road network, such as signal timing optimization; and
- Only after education, enforcement, and traffic engineering efforts have failed to produce the desired results.

The Township may also consider implementing traffic calming in new developments and as part of road reconstruction projects where safety, excessive speed, and/or shortcutting traffic concerns are anticipated to occur upon (re)opening the road to vehicles.

Where the installation of traffic calming measures is deemed the preferred course of action, the Township will:

- Determine whether an area-wide plan or street-specific scheme is more suitable. An area-wide plan will be pursued if a street-specific scheme would likely result in the displacement of traffic onto adjacent streets. The area-wide approach will typically be applied in assessing traffic calming requests on collector roads; and
- Not impede non-motorized modes of transportation through the introduction of traffic calming. Measures will be designed to enhance and minimize impacts to pedestrian and cyclist movement.

It should be noted that traffic calming measures may not be appropriate in every situation and, if considered, should ensure the equitable and consistent treatment of those who use Township streets following the guidance in **Sections 3 and 4** of this document.

2.4 Community and Stakeholder Involvement

Achieving the primary traffic calming objectives of restoring neighbourhood streets to their intended function, improving livability, and enhancing safety for all road users depends considerably on the degree of community and stakeholder involvement in the planning process. Strong and active participation helps to generate support (and avert opposition) for the resulting Traffic Calming Plan, which ultimately aids in the success of implementation. Neighbourhood involvement also enhances the credibility of the traffic calming initiative, particularly when it is eventually presented to Township Council for approval.

The assessment and implementation of traffic calming measures can be a time consuming and expensive undertaking requiring many resources. Without proper support, the measures intended to alleviate traffic concerns could be met with adverse community and/or stakeholder opinion as a result, jeopardizing the outcome of the initiative and its potential positive impacts to the neighbourhood. The only means of gaining this commitment is to involve interested parties early and throughout the process. Encouraging participation at all stages will ensure traffic concerns are properly identified, proposed solutions are thoroughly vetted, and implementation plans are well supported.

After defining the target audiences, it is important to make sure the community and stakeholders are effectively reached and appropriately engaged. Key considerations include (but are not limited to):

- Providing sufficient time and notification to allow the target audiences to become informed/educated about the project to participate in a meaningful way;
- Allowing participation early enough in the process, before a decision or design concept is advanced too far to be modified;
- Allowing for consideration of equity and inclusion in the engagement strategy; and
- Considering input from each of the target audiences equitably.

The Township will engage with the community and stakeholders at various stages of the traffic calming study to obtain their input and feedback. Traffic Calming Plans will be developed with an understanding of current and historical traffic patterns within the area under investigation. Early in the process, a description of the study will be issued in a notice along with a survey delivered to residents likely affected by the implementation of the proposed traffic calming measures. Pending comments received from residents regarding the notification and survey, the Township may offer to host a Public Information Meeting (or more) to discuss potential options for traffic calming measures. All these points of contact help create a “working partnership” and provide the community and stakeholders with opportunities to offer input into plan development, as well as publicize and increase awareness of the initiative.

There may be instances when traffic calming measures are warranted but affected residents have conflicting opinions on the preferred approach to mitigating the identified concerns. In these circumstances, the Township may need to conduct additional engagement with the potentially impacted residents to help resolve the situation. Similarly, stakeholders (including emergency responders like Township Fire and Emergency Services, Durham Region Police Services, and Durham Region Emergency Medical Services) may have concerns specific to their mandates requiring further dialogue and resolution.

2.5 Trial Installations

The Township may elect to trial a Traffic Calming Plan with temporary or seasonal materials prior to committing to a permanent installation where:

- Further understanding of the plan potential and its desirability is needed before investing in permanent construction, thereby allowing for refinement of the design;
- An initial capital cost savings for more expensive permanent construction is desired;
- Gauging community reaction on a concept in reality prior to permanent construction is desired; and
- Flexibility may be of value if there is a need to remove traffic calming measures seasonally.

Products typically used for trial traffic calming installations include:

- Removable rubber products (e.g., curbing, speed humps, tables, cushions);
- Removable/flexible posts and bollards;
- Pavement markings; and
- Temporary speed display boards.

In developing a Traffic Calming Plan considering trial measures, possible negative aspects to be considered include:

- Lower aesthetic value;
- On-going operational costs and/or additional operational resource requirements;
- Requirements for seasonal installation and removal;
- Potential to have similar or higher overall costs than permanent measures;
- Potentially lower effectiveness than permanent materials; and
- Quicker degradation of roadway surfaces (specifically where measures are anchored into existing road surfaces).

3 Process

3.1 Neighbourhood Traffic Calming Study

Figure 3.1 illustrates the **Neighbourhood Traffic Calming Study Process** for assessing traffic calming requests received from residents of the Township of Uxbridge. The process, which involves both community and stakeholder engagement and technical evaluation tasks, can be distilled into the following seven steps:

Step 1 – Traffic Calming Request

Residents will submit their written request for traffic calming to the Township Public Works Department using the "Traffic Calming Request Form" included in **Appendix A**. The request must specify the subject street and the nature of the traffic concern. Township will only accept requests from residents living on the subject street. Requests for traffic calming can also be made by the Mayor or Ward Councillors on behalf of their constituents.

Step 2 – Initial Screening

Township staff will conduct an initial screening of the request to determine if the subject street satisfies the thresholds for traffic calming measures. Eligible locations will meet the criteria listed in **Table 3.1**. **Requests that do not satisfy these minimum thresholds will be denied.**

After completing the initial screening, Township staff will inform the original requester whether the location satisfies the thresholds.

Step 3 – Neighbourhood Survey

If the subject street is deemed to be eligible for traffic calming based on the initial screening, Township staff will confirm the study area boundaries and seek broader input from affected households within the area through a survey.

For local roads, the study area will include all households with direct frontage onto the subject street. For collector roads, the study area will include all households with direct frontage onto the subject street plus local roads connecting to the subject street, recognizing collector roads typically serve a broader neighbourhood. Key considerations when defining the study area include:

- Subject street (segment(s) of concern);
- Traffic data;
- Location and context of sensitive land uses near, or adjacent to, streets of interest;

- Other Township policies (e.g., Official Plan, Active Transportation Plan);
- Opportunities and limitations such as available resources and partnerships; and
- Environmental factors (e.g., geographic features, major streets, key intersections).

Consideration will also be given to including households from surrounding roads that could be directly impacted by potential traffic diversion resulting from a Traffic Calming Plan.

Each household within the study area will be issued one survey regardless of the number of residents. **A minimum survey response rate of 25% of all eligible households is required with a minimum of 51% of respondents in favour of moving forward with traffic calming**. If resident support is not attained, the request will be denied regardless of the screening results from Step 2. Township staff will inform all study area households of the survey results.

Step 4 – Assessment and Prioritization

Requests that satisfy the initial screening and meet the threshold for neighbourhood support will be assessed against other eligible locations to determine relative implementation priority. The method involves assigning a point score to the criteria outlined in **Table 3.2**. The score for the subject street, calculated by summing the individual criteria points, provides the basis for ranking locations, with projects exhibiting the highest scores given top priority. Operating speeds and traffic volume are assigned higher weights in the matrix.

The maximum score based on this methodology is 100 points. In the event of a tied score between locations, priority will be given to the lower cost project as it would create more benefit per dollar spent. When project costs are similar, priority should be given to streets that serve more vulnerable users such as seniors and children.

Locations attaining the minimum score of 50 points will be added to the List of Potential Traffic Calming Plans for future implementation consideration.

Locations not attaining the minimum score will be deemed ineligible for a Traffic Calming Plan. In these locations, the Township may consider more passive forms of traffic calming such as education and enforcement.

Step 5 – Capital Budget Approval

Each year as part of Capital Budget preparation, Township staff may propose traffic calming implementation locations for the following year (if any) with preliminary high-level budget estimates. The locations will be selected from the **List of Potential Traffic Calming Plans** based on relative priority and forwarded to Council for approval with the Capital Budget.

Step 6 – Design and Implementation

Once Capital Budget approval is received, Township staff will initiate design of a Traffic Calming Plan for each approved location relying on the toolkit of measures in **Appendix B.** The data collected during prior steps, in addition to site visits, historical information, future maintenance and construction plans, and resident feedback will be taken into consideration in selecting potential traffic calming measures and designing the plan.

The Township will typically engage participants in the design task as follows:

- **Stakeholders** – The Township will typically provide the draft Traffic Calming Plan to relevant stakeholders (including emergency responders like Township Fire and Emergency Services, Durham Region Police Services, and Durham Region Emergency Medical Services) for comment. The plan will be revised to address the feedback received, if feasible, in collaboration with the stakeholder.
- **Community** – The Township will host a Public Information Meeting (or other appropriate engagement event) to involve neighbourhood residents in the Traffic Calming Plan design. The meeting will provide information on the purpose and objectives of the study process and present the draft plan to attendees for feedback. The Township will hand deliver, mail, post on its website, and/or publish in the local newspaper notification of the event to inform interested parties.

Following engagement, the recommended Traffic Calming Plan will be presented to Council for approval before being implemented.

Step 7 – Evaluation and Monitoring

Following implementation, Township staff will monitor the subject street(s) (and entire Study Area in some cases) to determine the effectiveness of the Traffic Calming Plan and its impact on the surrounding road network. The scope of the post-installation evaluation(s) should be consistent with the investigations conducted prior to installation. Potential studies may include speed surveys (to assess change in vehicle speeds), traffic counts (to determine changes in volumes) and/or origin-destination surveys (to estimate the volume of traffic diverting to adjacent streets).

The Traffic Calming Plan should avoid transference of traffic from the subject street to adjacent roadways. If post-installation evaluation studies indicate traffic volumes have increased 15% (with a minimum of 150 vehicles) on a parallel or adjacent street due to the traffic calming measures, the Township will explore corrective action to remedy the situation and/or minimize the impact.

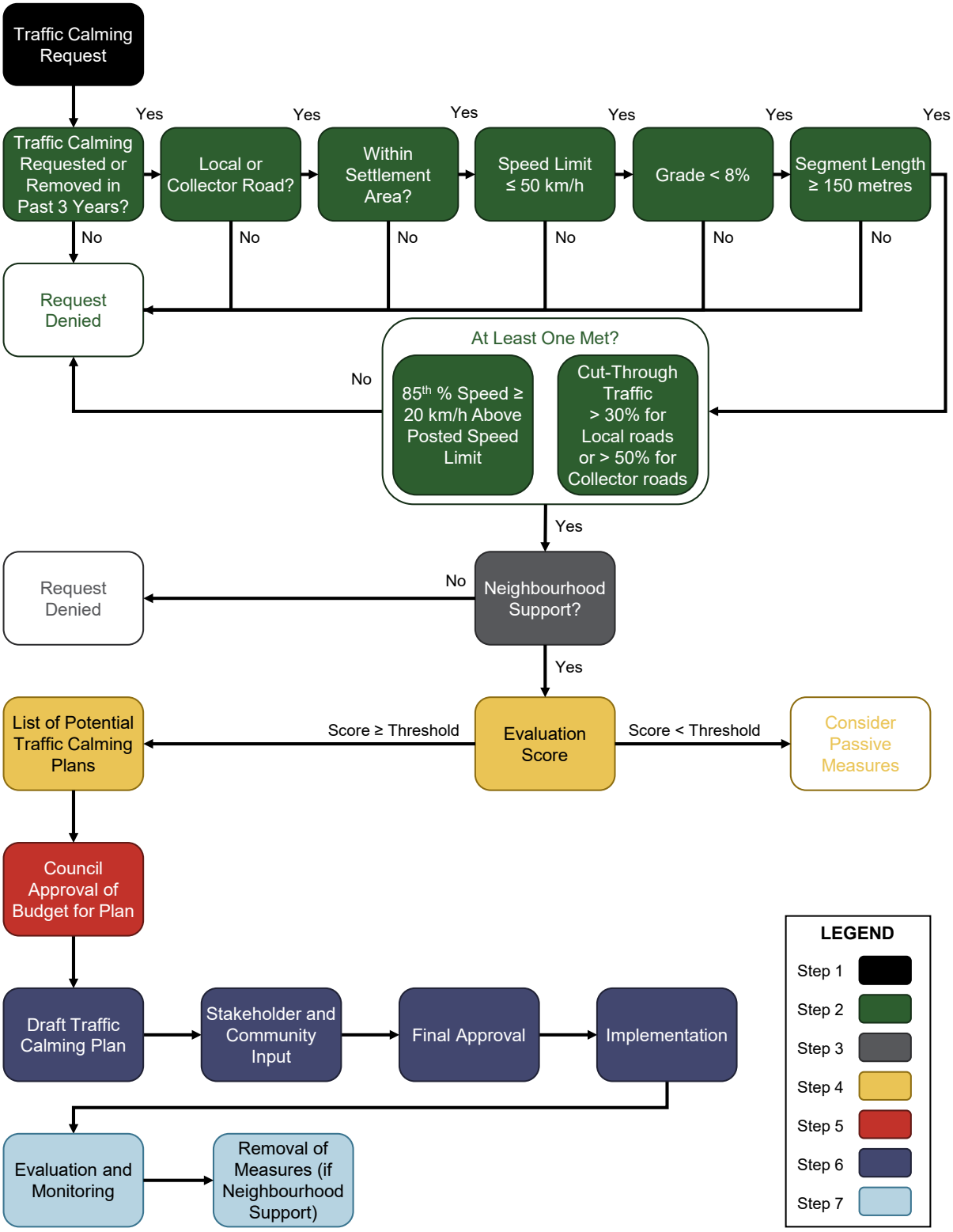


FIGURE 3.1: NEIGHBOURHOOD TRAFFIC CALMING STUDY PROCESS

TABLE 3.1: SCREENING CRITERIA

Criteria	Threshold	Traffic calming may be considered if:
All Criteria Must be Met		
Previously Requested or Removed	Within Last Three Years	A prior request has not been received or traffic calming measures have not been removed within the last three years.
Roadway Classification	Local or Collector Road	The subject street is designated a local or collector road in the Township Official Plan (Schedule A).
Land Use Designation	Within Settlement Area	The subject street is located within the Uxbridge Urban Area or a rural Hamlet as designated in the Township Official Plan (Schedules A and C).
Speed Limit	≤ 50 km/h	The posted speed limit on the subject street is 50 km/h or less.
Grade	< 8%	The grade of the subject street is less than 8%.
Segment Length	≥ 150 metres	The distance between stop-controlled intersections along the subject street is 150 metres or more.
At Least One Criteria Must be Met		
Operating Speed	≥ 20 km/h Above Posted Speed Limit	The 85th percentile speed on the subject street is 20 km/h or more above the posted speed limit. The data will be collected using automated traffic recorders (or similar units) over two 7-day periods at least 6 months apart.
Shortcutting Traffic	> 30% for Local Roads or > 50% for Collector Roads	The percentage of shortcutting traffic on the subject street is more than 30% for local roads or 50% for collector roads. The data will be collected through a license plate trace survey or other appropriate technique. Alternatively, the expected trip generation for an area may be compared to the actual volume counts to estimate shortcutting traffic share.

TABLE 3.2: ASSESSMENT AND PRIORITIZATION CRITERIA

Criteria	Point Assignment	Maximum Points
Operating Speed	Based on the 85th percentile speed (see **Table 3.1**), 1 point for each: • 1 km/h over the posted speed limit; and • 1% of vehicles observed 20 km/h or more over the posted speed limit	30
Total Traffic Volume	Based on total daily traffic volumes[2], 1 point for each 50 vehicles over: • 500 vehicles per day for local roads; or • 1,000 vehicles per day for collector roads	20
Collision History	5 points for each qualifying collision[1] over the last three years	15
Pedestrian Generators	5 points for each pedestrian generator (school, recreation centre, senior's home, etc.) within the study area	15
Shortcutting Traffic	Based on estimated shortcutting traffic (see **Table 3.1**), 5 points for each 10% increment in share above: • 30% for local roads; or • 50% for collector roads	10
Sidewalks	10 points if there are: • No sidewalks on the subject street for local roads; or • Sidewalk on only one side of the subject street for collector roads.	10
	Total Maximum Points	**100**

Notes:

1. Qualifying collisions are defined as crashes that can potentially be corrected by traffic calming plus any collisions involving a vulnerable road users (i.e. pedestrians, cyclists) or reported as "exceeding speed limit" or "speed too fast for condition" in the Motor Vehicle Accident Report (MVAR).
2. Traffic volumes used in the evaluation are two-way average daily volumes over a 24-hour period.

3.2 Other Implementation Options

Traffic calming measures can also be implemented in the Township through land development and road reconstruction projects. In both cases, measures will still be selected from the **Traffic Calming Toolbox** provided in **Appendix B**. The resulting Traffic Calming Plans will also be monitored and evaluated after implementation following the procedure described in Step 7 of the **Neighbourhood Traffic Calming Study Process** set out in **Section 3.1**.

3.2.1 New Developments

The Township may require the implementation of traffic calming measures on streets in new developments through the development approval process, potentially as a condition of approval for Plan of Subdivision and Site Plan Control applications. Given new development can change travel demand, proponents may be requested to investigate the potential need for changes to the street network (including consideration of traffic calming measures) as part of the Transportation Impact Assessment completed in support of the proposed development. Specific requirements may include identifying traffic calming opportunities on existing roads (i.e., to mitigate anticipated negative impacts of introducing the new development) and identifying, planning, and constructing traffic calming measures on new roads (e.g., road network internal to new subdivisions or future planned roads).

3.2.2 Road Reconstruction Projects

The Township may implement traffic calming measures, when suitable, as part of capital road, water, and sewer reconstruction projects. Traffic calming recommendations will be based on the existing operational characteristics, constraints, and context of the subject street, and consultations with the Ward Councillor and community as required. Advantages of this approach are the potential for cost savings and reduced impact of construction on communities. This approach also provides an opportunity to potentially achieve lower prices for traffic calming features through economies of scale.

3.3 Removal of Traffic Calming Measures

Permanent traffic calming measures may be removed at the request of the neighbourhood provided majority support exists among residents directly fronting the subject street. The Traffic Calming Plan must remain installed for at least three years before removal can be initiated. If the measures are removed, the subject street must wait at least three years before submitting a new request for traffic calming.

If the Township receives a request to remove one traffic calming measure within an overall Traffic Calming Plan, all measures may be considered for removal. While it

may be possible in certain circumstances to remove only one traffic calming measure, in most cases, the entire plan will need to remain to be effective.

The Township reserves the right to remove traffic calming measures determined to be ineffective or causing a safety risk, or if the measures have created unintended consequences that cannot be rectified. This may include an unintended diversion of traffic onto a parallel or adjacent local or collector road rather than onto the arterial road network. The Township will notify affected residents by mail and advertise in local newspapers and on its website if considering the removal of traffic calming measures.

4 Measures

4.1 Traffic Calming Toolbox

The *Canadian Guide to Traffic Calming* identifies a broad range of traffic calming techniques. From this catalogue of options, the Township has established a shortlist of potential traffic calming measures for use in Uxbridge in consultation with key stakeholders. The list, as presented to Township Council in September 2020, captures a range of different approaches to traffic calming for use in Uxbridge.

Appendix B provides the "toolbox" of traffic calming measures with a description and photo of each treatment. The **Traffic Calming Toolbox** also notes whether the measures are applicable on local and/or collector roads and summarizes potential benefits and disbenefits.

Applying the toolbox will assist the Township in selecting appropriate measures to address specific neighbourhood traffic issues and help to avoid the undesirable consequences of traffic calming noted in **Section 2.2**. It is important to note that not all traffic calming measures are appropriate under all circumstances. Selection of suitable measures will depend on the specific issues being addressed and careful consideration of site-specific conditions.

4.2 Use of Regulatory Signs for Traffic Calming Purposes

The Township will not consider the use of regulatory signs for the sole purpose of traffic calming. Traffic control devices in this category include:

4.2.1 All-Way Stop Control

The Township is often requested to install an all-way stop to discourage excessive speeding and/or traffic infiltration on neighbourhood streets. While appropriate in select instances, all-way stop control is generally not intended or useful for this purpose.

Ontario Traffic Manual (OTM) Book 5 – Regulatory Signs[6] provides guidance on the use of regulatory traffic controls, signs, and pavement markings. The book indicates the purpose of a stop sign is to assign right-of-way between vehicles approaching an intersection from different directions when traffic signals are not warranted or not yet installed. The document also explicitly states all-way stop control should not be used:

- Where the protection of pedestrians, particularly school children, is a prime concern. This concern can usually be addressed by other means;

[6] Ministry of Transportation, Ontario. *Ontario Traffic Manual Book 5: Regulatory Signs*. March 2000.

- As a speed control device; and/or
- As a means of deterring the movement of through traffic in a residential area.

Using all-way stops indiscriminately can lead to increased driver delay and frustration, greater speeding between intersections, and/or reduced compliance with all-way stop control at the subject location and in general. Even when warranted, all-way stops can increase the risk of certain collision types, most notably rear-end crashes.

The Township uses warrants to determine where all-way stop control is merited. These warrants consider vehicle and pedestrian volumes, traffic distribution (percent of vehicles on the major street versus the minor street), and collision history.

4.2.2 Speed Reduction and Movement Restriction Signs

Regulatory signs intended to reduce vehicle speeds (i.e., speed limits, Community Safety Zones) or restrict movement (i.e., turn prohibitions, one-way) generally require ongoing enforcement to ensure driver compliance and effectiveness. For this reason, the *Canadian Guide to Traffic Calming* recommends using these signs only to supplement and reinforce desired driver behaviour and not as traffic calming measures on their own.

Appendix A

Traffic Calming Request Form

Name: _____

Mailing Address: _____

Phone: _____

Email: _____

Please indicate the location (street or area) of the traffic concern:

_____

What is the area/zone of your traffic speeding concern?

- ☐ School Zone/Community Safety Zone
- ☐ Residential Area
- ☐ Hamlet
- ☐ Park
- ☐ Road with Limited Visibility
- ☐ Other

Please select any of the following traffic concerns:

- ☐ Speeding
- ☐ Vehicle Volumes
- ☐ Pedestrian Safety
- ☐ Collision Concerns
- ☐ Shortcutting Traffic

When does the problem typically occur?

- ☐ Morning Rush Hour
- ☐ Mid-Day
- ☐ Afternoon Rush Hour
- ☐ Weekdays
- ☐ Weekends
- ☐ Other

Which seasons does the problem occur?

- ☐ Winter
- ☐ Spring
- ☐ Summer
- ☐ Fall

Please provide any further comments:

_____

_____

_____

_____

Appendix B

Traffic Calming Toolbox

VERTICAL DEFLECTION
Raised Crosswalk

Description and Purpose

A raised crosswalk is a marked pedestrian crosswalk at an intersection or mid-block 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 or Collector
- *Roadway Cross-Section* – Urban, sidewalk on at least one side of road
- *Location* – Midblock, Intersection
- *Speed Limit* – 50 km/h or less
- *ADT* – All volumes
- *Grade* – ≥ 1%, but ≤ 8%

Cost – $ to $$

Potential Benefits

Speed Reduction	■
Volume Reduction	☐
Conflict Reduction	◘
Environment	◘

Potential Disbenefits

Local Access	☐
Emergency Response	◘
Active Transportation	◘
Enforcement	☐
Parking	☐
Maintenance	◘

☐ No (Dis)benefits
◘ Minor (Dis)benefits
■ Substantial (Dis)benefits

VERTICAL DEFLECTION
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 or Collector
- *Roadway Cross-Section* – Urban
- *Location* – Intersection
- *Speed Limit* – 50 km/h or less
- *ADT* – All volumes
- *Grade* – ≥ 1%, but ≤ 8%

Cost – $$ to $$$

Potential Benefits

Speed Reduction	■
Volume Reduction	☐
Conflict Reduction	◘
Environment	◘

Potential Disbenefits

Local Access	☐
Emergency Response	◘
Active Transportation	◘
Enforcement	☐
Parking	☐
Maintenance	◘

☐ No (Dis)benefits
◘ Minor (Dis)benefits
■ Substantial (Dis)benefits

HORIZONTAL DEFLECTION
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 or Collector
- *Roadway Cross-Section* – Urban
- *Speed Limit* – 50 km/h or less
- *ADT* – ≥ 750 vpd
- *Grade* – < 8%

Cost – $$

Potential Benefits

Speed Reduction	■
Volume Reduction	■
Conflict Reduction	■
Environment	◘

Potential Disbenefits

Local Access	□
Emergency Response	◘
Active Transportation	◘
Enforcement	□
Parking	■
Maintenance	◘

□ No (Dis)benefits
◘ Minor (Dis)benefits
■ Substantial (Dis)benefits

HORIZONTAL DEFLECTION
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.

Applicability

- *Road Class* – Local or Collector
- *Roadway Cross-Section* – Urban
- *Speed Limit* – All speed limits
- *ADT* – All volumes

Cost – $-$$

Potential Benefits

Speed Reduction	◘
Volume Reduction	☐
Conflict Reduction	☐
Environment	◘

Potential Disbenefits

Local Access	☐
Emergency Response	☐
Active Transportation	◘
Enforcement	☐
Parking	☐
Maintenance	◘

☐ No (Dis)benefits
◘ Minor (Dis)benefits
■ Substantial (Dis)benefits

HORIZONTAL DEFLECTION
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 similar to 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 in attempt to reduce vehicle speeds.

Applicability

- *Road Class* – Local or Collector
- *Roadway Cross-Section* – Urban
- *Speed Limit* – 50 km/h or less
- *ADT* – All volumes

Cost – $-$$

Potential Benefits

Speed Reduction	☐
Volume Reduction	☐
Conflict Reduction	☐
Environment	☐

Potential Disbenefits

Local Access	☐
Emergency Response	☐
Active Transportation	☐
Enforcement	☐
Parking	◘
Maintenance	☐

☐ No (Dis)benefits
◘ Minor (Dis)benefits
■ Substantial (Dis)benefits

HORIZONTAL DEFLECTION

Traffic Circle/Traffic Button/ Mini-Roundabout

Description and Purpose

A traffic circle/traffic button/mini-roundabout is an island located at the centre of an intersection, which requires vehicles to travel through the intersection in a counter-clockwise direction around the island.

Mini-roundabouts are designed in accordance with full-size roundabout design principles presenting 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 similar to 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 commonly available. Consequently, vehicles may turn in left in front of the traffic circle or mount the centre raised island rather than travelling around it.

Yield traffic control is recommended.

Applicability

- *Road Class* – Local or Collector
- *Roadway Cross-Section* – Urban or rural two-lane
- *Speed Limit* – 50 km/h or less
- *ADT* – < 1500 vpd

Cost – $-$$

Potential Benefits

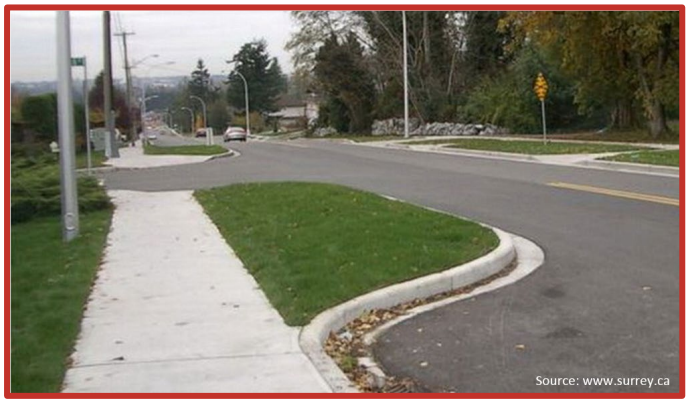
Speed Reduction	■
Volume Reduction	□
Conflict Reduction	■
Environment	■

Potential Disbenefits

Local Access	□
Emergency Response	◘
Active Transportation	◘
Enforcement	□
Parking	◘
Maintenance	◘

□ No (Dis)benefits
◘ Minor (Dis)benefits
■ Substantial (Dis)benefits

ROADWAY NARROWING
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 or Collector
- *Roadway Cross-Section* – Urban
- *Speed Limit* – 60 km/h or less
- *ADT* – All volumes

Cost – $$-$$$

Potential Benefits

Speed Reduction	■
Volume Reduction	□
Conflict Reduction	□
Environment	■

Potential Disbenefits

Local Access	□
Emergency Response	□
Active Transportation	◘
Enforcement	□
Parking	■
Maintenance	■

□ No (Dis)benefits
◘ Minor (Dis)benefits
■ Substantial (Dis)benefits

ROADWAY NARROWING
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 or Collector
- *Roadway Cross-Section* – Urban
- *Speed Limit* – 60 km/h or less
- *ADT* – All volumes

Cost – $-$$

Potential Benefits

Speed Reduction	◘
Volume Reduction	☐
Conflict Reduction	☐
Environment	☐

Potential Disbenefits

Local Access	☐
Emergency Response	☐
Active Transportation	◘
Enforcement	☐
Parking	◘
Maintenance	☐

☐ No (Dis)benefits
◘ Minor (Dis)benefits
■ Substantial (Dis)benefits

ROADWAY NARROWING
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 or Collector
- *Roadway Cross-Section* – Urban
- *Speed Limit* – 60 km/h or less
- *ADT* – All volumes

Cost – $$-$$$

Potential Benefits

Speed Reduction	◘
Volume Reduction	☐
Conflict Reduction	◘
Environment	☐

Potential Disbenefits

Local Access	◘
Emergency Response	☐
Active Transportation	☐
Enforcement	☐
Parking	◘
Maintenance	◘

☐ No (Dis)benefits
◘ Minor (Dis)benefits
■ Substantial (Dis)benefits

ROADWAY NARROWING
Road Diet

Description and Purpose

A road diet is a reconfiguration of a roadway where the number of travelled lanes and/or the effective width of the road is reduced in order to allocate the reclaimed space for other uses, such as wider sidewalks, turning lanes, bus lanes, pedestrian refuge islands, bike lanes, parking, etc.

Typically, a Road Diet involves converting an existing four-lane, undivided roadway segment to a three-lane segment consisting of two through lanes, a centre two-way left-turn lane, and two bicycle lanes. However, other conversions are possible, such as 4-lane to 5-lane, 2-lane to 3-lane, 3-lane to 3-lane, and 5-lane to 3-lane.

Applicability

- *Road Class* – Collector
- *Roadway Cross-Section* – Urban
- *Speed Limit* – 60 km/h or less
- *ADT* – Moderate volumes

Cost – $-$$$

Potential Benefits

Speed Reduction	■
Volume Reduction	☐
Conflict Reduction	■
Environment	■

Potential Disbenefits

Local Access	☐
Emergency Response	◘
Active Transportation	☐
Enforcement	☐
Parking	☐
Maintenance	☐

☐ No (Dis)benefits
◘ Minor (Dis)benefits
■ Substantial (Dis)benefits

ROADWAY NARROWING
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, high-occupancy vehicle (HOV) lanes, and on-ramp exits to direct vehicles or prevent particular movements.

Applicability

- *Road Class* – Local or Collector
- *Roadway Cross-Section* – Urban and rural, two-lane
- *Speed Limit* – 60 km/h or less
- *ADT* – All volumes

Cost – $

Potential Benefits

Speed Reduction	◘
Volume Reduction	☐
Conflict Reduction	☐
Environment	☐

Potential Disbenefits

Local Access	☐
Emergency Response	☐
Active Transportation	☐
Enforcement	☐
Parking	☐
Maintenance	◘

☐ No (Dis)benefits
◘ Minor (Dis)benefits
■ Substantial (Dis)benefits

SURFACE TREATMENT

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 or Collector
- *Roadway Cross-Section* – Urban, sidewalks on both sides
- *Speed Limit* – 60 km/h or less
- *ADT* – All volumes

Cost – $-$$

Potential Benefits

Speed Reduction	◘
Volume Reduction	☐
Conflict Reduction	◘
Environment	◘

Potential Disbenefits

Local Access	☐
Emergency Response	☐
Active Transportation	◘
Enforcement	☐
Parking	☐
Maintenance	■

☐ No (Dis)benefits
◘ Minor (Dis)benefits
■ Substantial (Dis)benefits

SURFACE TREATMENT
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 or Collector
- *Roadway Cross-Section* – Urban
- *Speed Limit* – 60 km/h or less
- *ADT* – All volumes

Cost – $-$$

Potential Benefits

Speed Reduction	◘
Volume Reduction	☐
Conflict Reduction	☐
Environment	◘

Potential Disbenefits

Local Access	☐
Emergency Response	☐
Active Transportation	◘
Enforcement	☐
Parking	☐
Maintenance	■

☐ No (Dis)benefits
◘ Minor (Dis)benefits
■ Substantial (Dis)benefits

SURFACE TREATMENT
Transverse Rumble Strips

Description and Purpose

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 vehicle wheels pass over.

Applicability

- *Road Class* – Local or Collector
- *Roadway Cross-Section* – Rural
- *Speed Limit* – All speed limits
- *ADT* – All volumes

Cost – $

Potential Benefits

Speed Reduction	◘
Volume Reduction	☐
Conflict Reduction	☐
Environment	☐

Potential Disbenefits

Local Access	☐
Emergency Response	☐
Active Transportation	◘
Enforcement	☐
Parking	☐
Maintenance	◘

☐ No (Dis)benefits
◘ Minor (Dis)benefits
■ Substantial (Dis)benefits

PAVEMENT MARKINGS
Converging Chevrons

Description and Purpose

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

Applicability

- *Road Class* – Local or Collector
- *Roadway Cross-Section* – Rural, entrances to communities
- *Speed Limit* – All speed limits
- *ADT* – All volumes

Cost – $

Potential Benefits

Speed Reduction	■
Volume Reduction	☐
Conflict Reduction	☐
Environment	☐

Potential Disbenefits

Local Access	☐
Emergency Response	☐
Active Transportation	☐
Enforcement	☐
Parking	☐
Maintenance	◘

☐ No (Dis)benefits
◘ Minor (Dis)benefits
■ Substantial (Dis)benefits

PAVEMENT MARKINGS
Dragon's Teeth

Description and Purpose

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 Class* – Local or Collector
- *Roadway Cross-Section* – Rural, entrances to communities
- *Speed Limit* – All speed limits
- *ADT* – All volumes

Cost – $

Potential Benefits

Speed Reduction	☐
Volume Reduction	☐
Conflict Reduction	☐
Environment	☐

Potential Disbenefits

Local Access	☐
Emergency Response	☐
Active Transportation	☐
Enforcement	☐
Parking	☐
Maintenance	◘

☐ No (Dis)benefits
◘ Minor (Dis)benefits
■ Substantial (Dis)benefits

PAVEMENT MARKINGS
Full-Lane Transverse Bars

Description and Purpose

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

Applicability

- *Road Class* – Local or Collector
- *Roadway Cross-Section* – Rural, entrances to communities
- *Speed Limit* – All speed limits
- *ADT* – All volumes

Cost – $

Potential Benefits

Speed Reduction	■
Volume Reduction	☐
Conflict Reduction	☐
Environment	☐

Potential Disbenefits

Local Access	☐
Emergency Response	☐
Active Transportation	☐
Enforcement	☐
Parking	☐
Maintenance	◘

☐ No (Dis)benefits
◘ Minor (Dis)benefits
■ Substantial (Dis)benefits

PAVEMENT MARKINGS
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 or Collector
- *Roadway Cross-Section* – Urban and rural
- *Speed Limit* – All speed limits
- *ADT* – All volumes

Cost – $

Potential Benefits

Speed Reduction	■
Volume Reduction	☐
Conflict Reduction	☐
Environment	☐

Potential Disbenefits

Local Access	☐
Emergency Response	☐
Active Transportation	☐
Enforcement	☐
Parking	☐
Maintenance	◘

☐ No (Dis)benefits
◘ Minor (Dis)benefits
■ Substantial (Dis)benefits

PAVEMENT MARKINGS
Peripheral Transverse Bars

Description and Purpose

Peripheral transverse bars are a series of parallel pavement markings along the edge of the travelled lane widths. The series of markings may be placed closer together with distance to create the illusion that a vehicle's speed is increasing. This is done to alert the driver's awareness of the need to reduce speed. Peripheral transverse bars are similar to full-lane transverse bars but require less maintenance of pavement markings.

Applicability

- *Road Class* – Local or Collector
- *Roadway Cross-Section* – Rural, entrances to communities
- *Speed Limit* – All speed limits
- *ADT* – All volumes

Cost – $

Potential Benefits

Speed Reduction	■
Volume Reduction	☐
Conflict Reduction	☐
Environment	☐

Potential Disbenefits

Local Access	☐
Emergency Response	☐
Active Transportation	☐
Enforcement	☐
Parking	☐
Maintenance	◘

☐ No (Dis)benefits
◘ Minor (Dis)benefits
■ Substantial (Dis)benefits

ACCESS RESTRICTIONS
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 or Collector
- *Roadway Cross-Section* – Urban
- *Speed Limit* – All speed limits
- *ADT* – All volumes

Cost – $-$$

Potential Benefits

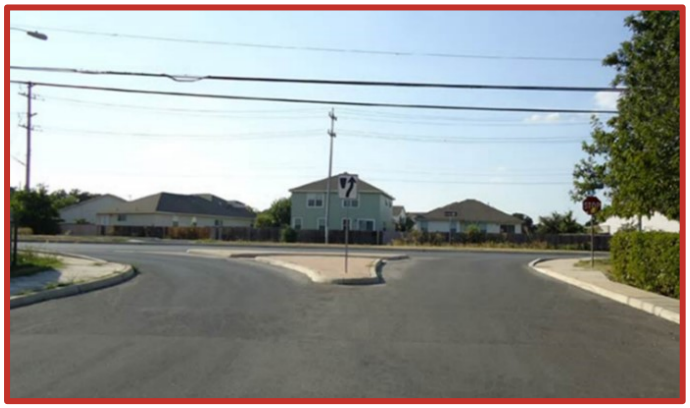
Speed Reduction	☐
Volume Reduction	◘
Conflict Reduction	◘
Environment	◘

Potential Disbenefits

Local Access	■
Emergency Response	◘
Active Transportation	☐
Enforcement	☐
Parking	☐
Maintenance	◘

☐ No (Dis)benefits
◘ Minor (Dis)benefits
■ Substantial (Dis)benefits

ACCESS RESTRICTIONS
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 or Collector
- *Roadway Cross-Section* – Urban
- *Speed Limit* – All speed limits
- *ADT* – All volumes

Cost – $-$$

Potential Benefits

Speed Reduction	☐
Volume Reduction	■
Conflict Reduction	◘
Environment	◘

Potential Disbenefits

Local Access	◘
Emergency Response	◘
Active Transportation	◘
Enforcement	◘
Parking	☐
Maintenance	◘

☐ No (Dis)benefits
◘ Minor (Dis)benefits
■ Substantial (Dis)benefits

GATEWAYS

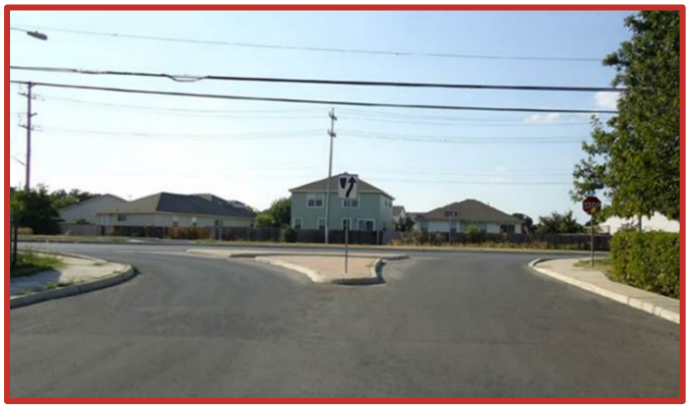
Description and Purpose

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 or Collector
- *Roadway Cross-Section* – Urban and rural
- *Speed Limit* – All speed limits
- *ADT* – All volumes

Cost – $-$$



Potential Benefits

Speed Reduction	■
Volume Reduction	☐
Conflict Reduction	☐
Environment	■

Potential Disbenefits

Local Access	☐
Emergency Response	☐
Active Transportation	☐
Enforcement	☐
Parking	☐
Maintenance	■

☐ No (Dis)benefits
◘ Minor (Dis)benefits
■ Substantial (Dis)benefits

ENFORCEMENT AND EDUCATION
Fixed Speed Enforcement

Description and Purpose

Fixed speed enforcement involves permanently installed radar cameras that photograph vehicles operating exceeding the speed limit without the presence of police officers. Legal provision is required.

Applicability

- *Road Class* – Local or Collector
- *Roadway Cross-Section* – Urban and rural
- *Location* – Community Safety and School Zones
- *Speed Limit* – All speed limits
- *ADT* – All volumes

Cost – $$$

Potential Benefits

Speed Reduction	■
Volume Reduction	☐
Conflict Reduction	☐
Environment	☐

Potential Disbenefits

Local Access	☐
Emergency Response	☐
Active Transportation	☐
Enforcement	◘
Parking	☐
Maintenance	■

☐ No (Dis)benefits
◘ Minor (Dis)benefits
■ Substantial (Dis)benefits

ENFORCEMENT AND EDUCATION
Mobile Speed Enforcement

Description and Purpose

Mobile speed enforcement involves radar photography units that are mounted in a mobile vehicle or trailer that can be moved depending on the need for speed enforcement. Marked or unmarked inconspicuous vehicles can be used for mobile speed enforcement. Legal provision is required.

Applicability

- *Road Class* – Local or Collector
- *Roadway Cross-Section* – Urban and rural
- *Speed Limit* – All speed limits
- *ADT* – All volumes

Cost – $$$

Potential Benefits

Speed Reduction	◘
Volume Reduction	☐
Conflict Reduction	☐
Environment	☐

Potential Disbenefits

Local Access	☐
Emergency Response	☐
Active Transportation	☐
Enforcement	■
Parking	☐
Maintenance	☐

☐ No (Dis)benefits
◘ Minor (Dis)benefits
■ Substantial (Dis)benefits

ENFORCEMENT AND EDUCATION
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 unsafe speeds. Can be used upstream of manned speed enforcement.

Applicability

- *Road Class* – Local or Collector
- *Roadway Cross-Section* – Urban and rural
- *Speed Limit* – All speed limits
- *ADT* – All volumes

Cost – $

Potential Benefits

Speed Reduction	■
Volume Reduction	☐
Conflict Reduction	☐
Environment	☐

Potential Disbenefits

Local Access	☐
Emergency Response	☐
Active Transportation	☐
Enforcement	◘
Parking	☐
Maintenance	■

☐ No (Dis)benefits
◘ Minor (Dis)benefits
■ Substantial (Dis)benefits

ENFORCEMENT AND EDUCATION
Vehicle Activated Signs

Description and Purpose

Vehicle activated signs are electronic roadside warning signs equipped with radar speed detectors and an illuminated display. The vehicle speed is used to activate a symbol displaying the actual hazard ahead when a predetermined speed threshold is exceeded. Otherwise, the sign shows no message.

Applicability

- *Road Class* – Local or Collector
- *Roadway Cross-Section* – Urban and rural
- *Speed Limit* – All speed limits
- *ADT* – All volumes

Cost – $

Potential Benefits

Speed Reduction	◘
Volume Reduction	☐
Conflict Reduction	☐
Environment	☐

Potential Disbenefits

Local Access	☐
Emergency Response	☐
Active Transportation	☐
Enforcement	■
Parking	☐
Maintenance	☐

☐ No (Dis)benefits
◘ Minor (Dis)benefits
■ Substantial (Dis)benefits