



City of Greater Sudbury

TRAFFIC CALMING POLICY

TECHNICAL MEMORANDUM #4

OCTOBER 2008



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1. INTRODUCTION

City of Greater Sudbury staff receive numerous requests each year for traffic calming features such as speed humps, curb extensions and raised intersections. The city currently has no process for responding to such requests. IBI Group has been retained by the City of Greater Sudbury to develop a traffic calming policy, including a warrant and prioritization process, which will aid City staff in the evaluation of these requests and the application of traffic calming devices.

1.1 What is Traffic Calming?

Communities throughout North America have experienced significant growth in traffic due to automobile dependence and urban sprawl. These trends in automobile travel have placed considerable strain on the roadway network's ability to safely accommodate all road users within the public right-of-way. In many cases, a lack of arterial road capacity has resulted in motorists choosing to use collector and residential roadways to circumvent a congested turning movement, intersection or corridor.

A number of negative traffic impacts result in some communities from inappropriate use of neighbourhood streets by drivers, including:

- Arterial road congestion results in motorists looking for parallel or alternative routes to reach their destinations;
- These parallel/alternative roads accommodate greater traffic volumes and begin to function as they were never intended. For example a local residential or collector roadway becomes a mid-block arterial road;
- Motorists operate vehicles at speeds which are not appropriate for the residential roadway and/or the roadside environment;
- The safety of all road users is decreased due to volume, speed and other compliance issues; and/or
- Enforcement resources are called upon to provide frequent enforcement of numerous problem areas and cannot sustain the level of enforcement to effectively address these traffic related issues.

In general, the above impacts typically occur in older established neighbourhoods next to busy traffic areas. However, traffic issues may also occur in newer subdivisions depending on the road network and adjacent activities. One response to these problems is the self-enforcing option of traffic calming devices. Traffic calming represents a component of traffic management techniques to reduce the impacts of traffic on neighbourhood communities and other public facilities such as parks, school areas, and community centres. Traffic calming has been used in North America to:

- Improve neighbourhood liveability;
- Increase road user safety; and
- Promote urban redevelopment.



1.2 Why is a Traffic Calming Policy Necessary?

The roadway network within the City of Greater Sudbury is a five-category hierarchy. In any jurisdiction, the roadway classification system is designed to establish the intended function of a given road. Sudbury's roadway classification system and associated functions are described as follows¹:

- **Primary Arterial (Major Highway):** Connecting City with other major centres outside the City and/or interconnecting communities. Long distance person or goods movement. Travel through the City or between major activity areas within the City. Traffic movement primary consideration.
- **Secondary Arterial:** Connecting two or more communities or major activity centres; or Connecting between two primary arterial roads; or Connecting a community or activity centre with a primary arterial road. Trip origin and/or destination along it, an intersecting tertiary arterial, intersecting collector or a local street intersecting with the collector. Traffic movement major consideration
- **Tertiary Arterial:** Connecting small communities or Connecting communities to primary or secondary arterial leading to a recreational area. Trip origin and/or destination along it, an intersecting collector or a local street intersecting with the collector. Traffic movement major consideration
- **Collector:** Connecting neighbourhoods or Connecting a neighbourhood with an arterial road. Trip origin and/or destination along it or an intersecting local street. Traffic movement and land access of equal importance
- **Local:** Connecting properties within a neighbourhood. Trip origin and/or destination along its right-of-way. Traffic movement secondary consideration, land access primary function.

As a jurisdiction develops, neighbourhoods begin to mature and travel patterns develop. Some motorists may use a road or series of roads in a manner inconsistent with intended usage. The most common example is using local roads for through traffic, although travelling at high speed on lower speed roadways is also very common. The installation of traffic calming measures is a typical response to these situations, e.g. install speed humps in a road to slow traffic speeds.

Unfortunately, when traffic calming measures are applied without a governing policy, new problems may be created just as old problems are solved. Examples of these potential problems include:

- Traffic calming measures may cause traffic to divert into a different neighbourhood;
- Improperly designed measures may need to be removed shortly after installation; or
- Funding may be spent on a minor problem, while a major problem that is discovered later has no funding available for mitigation.

In light of the above, the City of Greater Sudbury's traffic calming policy is intended to:

- Avoid the above mistakes and inconsistencies that may result from piecemeal traffic calming implementation;

¹ The City of Greater Sudbury Official Plan (Meridian Planning Consultants and the Planning Services Division, adopted by City Council June 2006).

- Provide a process for the application of traffic calming measures throughout the city in a manner that is fair, reasonable, consistent and cost-effective;
- Provide a standardized process to address complaints regarding speeding and safety concerns;
- Provide a proactive tool to address concerns before they become complaints;
- Reduce the workload and duplication of effort for city staff in responding to traffic calming requests; and
- Encourage public involvement in the traffic calming activities.

The policy is not intended to address traffic calming implementations in new subdivisions or future developments. Developers should be required to incorporate traffic calming measures throughout their subdivisions and ensure they are consistent with the policy, i.e. appropriate for roadway classification and function.

1.3 Canadian Guide to Neighbourhood Traffic Calming

The *Canadian Guide to Neighbourhood Traffic Calming* is a document developed jointly by the Transportation Association of Canada and the Institute of Transportation Engineers. Since its December 1998 publication, municipalities and consultants throughout Canada and abroad have used the Guide for traffic calming guidance and application. From the foreword of the Guide, its intent is to:

- “Develop a document to assist practitioners;
- Achieve an appropriate level of national standardization;
- Minimize liability; and
- Maximize safety.”

To that end, the Guide provides a detailed introduction to traffic calming, discusses community involvement, the applicability and effectiveness of traffic calming, and offers technical guidelines. Many municipalities have adapted its guidelines to suit their own traffic calming needs and goals. The City of Greater Sudbury shall adopt the traffic calming guidelines contained within the Guide, except where it differs from this document and in specific, case-by-case installations where local conditions dictate.

1.4 Project Steering Committee

This policy was developed with the assistance of a project steering committee consisting of City of Greater Sudbury staff and City Councillors, as follows:

- Roads and Transportation Services;
- Fire;
- EMS;
- Transit; and

- Sudbury City Council.

2. TRAFFIC CALMING IN GREATER SUDBURY

2.1 Goals and Objectives

The two primary goals of Sudbury's traffic calming policy are to **improve safety and liveability** within the city. When properly designed and implemented, traffic calming measures have the ability to improve safety for all road users, particularly vulnerable users such as pedestrians and cyclists. Safety improvements are directly related to reducing vehicle speeds and volumes on traffic calmed roadways, while liveability may be improved by a reduction of traffic's negative impacts, namely noise, exhaust emissions and congestion. As well, many traffic calming features can be designed to improve the streetscape through plantings and decorative pavement treatments.

The objective of the policy is to restore roads to their original functions as defined by the established classification system and restore motorist behaviour to acceptable and appropriate levels of compliance within the system. Specific objectives for local streets and collectors include:

- Slower vehicular speeds;
- Fewer and less severe collisions;
- Increased safety for all road users, particularly vulnerable road users (pedestrians and cyclists);
- Reduced reliance on police enforcement;
- Enhanced roadway environment and streetscape;
- Improved access to all modes of transportation; and,
- Reduced 'cut-through' or non-local traffic.

Collectively, these factors determine how 'liveable' a street or community is.

2.2 Traffic Calming Principles

A number of principles are common to the application of all traffic calming measures, regardless of problem, type of road or mitigation measure. This traffic calming policy has been developed to ensure that these principles are applied in a consistent manner for all requests. These principles strive to be consistent with North American jurisdictions that have traditionally been at the forefront of traffic calming implementation, either through early adoption, comprehensive policies or innovative approaches. Consistent application of this traffic calming policy and the following principles will ensure that Sudbury does not repeat the often costly and disruptive mistakes that other jurisdictions have made in the past. These principles are also intended to foster community support to ensure that traffic calming plans meet the needs of those who made the initial request, as well as those of the affected local community.

- **Find out what the community thinks:** Community support may be the single most important principle when applying traffic calming measures. A citywide traffic calming policy is appropriate for general selection and implementation criteria and requirements, but every neighbourhood is different and experiences its own special

problems. When the entire community is given the opportunity for participation, it minimizes the chance that vocal residents, influential businesses or special interest groups can monopolize the dialogue to serve their own agenda without considering the needs and input of others. This leads to a plan that everyone can support—or at least have the opportunity to state their opposition. Furthermore, given that each community is different, there is a great chance that city staff and/or outside consultants will not recognize special attributes or problems that are unique to a particular request, unless the input of everyone is requested. Subsequent sections of this document will discuss the public support components and requirements of the policy.

- **Identify the real problem:** While it is critical to listen to and consider every issue raised by the community, care must be taken to separate the real problem(s) from the perceived problem(s). Incorrect assessment of a situation may lead to making problems worse than before, or possibly the introduction of new problems.
- **Quantify the problem:** How fast is “speeding”? How much traffic is “too much”? This policy describes a two-step warrant process by which the traffic conditions surrounding requests for traffic calming can be quantified. The process requires the collection of traffic volume, speed and collision data, along with an assortment of neighbourhood characteristics (e.g. sidewalks, pedestrian generators, land use) to score a particular location and rank it against other locations throughout the city. This process is designed to ensure that those locations with the most severe problems score the highest and receive priority over other locations. Residents are more likely to understand and accept why their request is not scheduled for implementation when a fair, equitable and defensible process can be demonstrated.
- **Consider improvements to the major road network first:** it is understood that Sudbury’s topography may limit the number and location of arterial roads in some parts of the city. This can be seen by the average daily traffic volumes of some collectors and local roads in the city. Simply put, there may not be enough arterial capacity in some locations, and drivers are therefore choosing other routes for their trips. Whenever possible, if a traffic problem at a particular location can be traced with some degree of certainty to a shortcoming of the arterial road network, every effort should be made to address the source of the problem, rather than applying a potentially short-sighted solution on the local or collector road. In some cases, fixing the problem could be as simple as changing the signal timing at an arterial intersection. In others, when it becomes clear that a simple arterial fix is not possible, then it is appropriate to consider what can be done on the lower-order roads.
- **Use self-enforcing measures:** As discussed above, one of the objectives of this traffic calming policy is to reduce reliance on police enforcement. In most communities, the police presence simply does not exist to enforce every speed limit sign and stop sign throughout the jurisdiction. Traffic calming measures are designed to be self-enforcing. Vehicles must slow down over speed humps, and more restrictive measures like diverters or partial closures prevent unwanted movements far more effectively than turn restriction signs.
- **Start with the least restrictive measures:** When considering the public support principle, it becomes clear that residents are less likely to support a plan that makes it more difficult for them to access their own neighbourhoods or homes. Restrictive devices such as full or partial closures should only be implemented with strong levels of community support, and only when it can be proven that other measures are unlikely to achieve desired results.

- **Do not impact cyclists or pedestrians:** Traffic calming should improve safety for all road users, but its application should not negatively impact pedestrians and cyclists. Some traffic calming measures may in fact make it more difficult for pedestrians and cyclists to navigate a neighbourhood, and such impacts should be considered equally as important as those to cars and trucks. As well, it is necessary to consider the impact to transit and emergency vehicles when implementing traffic calming, to ensure that service is not disrupted and emergency response times are not increased.
- **Trial and error (or, temporary measures):** in some cases it may not be clear exactly what needs to be done to address a particular request. For example, the impacts of placing a curb extension at one location in a corridor versus another may not be known until the device is installed. Many traffic calming measures can be installed on a temporary basis and monitored for performance. These devices are recommended for use where possible. It is far less expensive to remove and replace a temporary device than a permanent device, and it demonstrates a willingness of the City to follow through with its commitment to address a problem to completion.
- **Implementation does not mean completion:** Conditions must be monitored to determine if the traffic calming devices fully addressed the problem, or if the problem was moved elsewhere, e.g. to a parallel street. Post-implementation data collection is equally important as pre-implementation.

2.3 Application

This traffic calming policy is designed for application to Local Roads, Collectors and Tertiary Arterials only. The logic behind the decision to limit the application of traffic calming policy is again based on the city's roadway classification system and the function of higher order arterials to move large volumes of people and goods throughout Greater Sudbury and beyond.

Application limitations exist within the accepted classifications, as follows:

- **Urbanized vs. Rural Areas:** traffic calming is typically applied only to roads in urban areas, and not in rural or agricultural areas. Speed reduction on rural roads presents specific challenges that may be better served through increased enforcement, Sudbury's Speed Watch Program or possibly even changes to the road's design. Some jurisdictions have experimented with traffic calming measures, generally speed humps, on rural roads and have found motorists often drive around the measure on the shoulder. In response, bollards were installed adjacent to the measure to prevent shoulder use. While this did force motorists to traverse the device, it presented specific challenges to pedestrians in winter, as the bollards prevented maintenance crews from pushing snow off the shoulder.
- **Cross Section:** Roads with rural cross-sections within urbanized areas should be given the same traffic calming consideration as those with urban cross-sections; however, the available options are limited due to the absence of a curb and gutter system. Horizontal deflection treatments such as median islands, traffic circles and lane narrowing shall be considered appropriate for all rural cross-sections, while vertical traffic calming measures may be appropriate for rural cross-sections within urbanized areas that do not serve as transit or emergency routes, on a case-by-case basis and in accordance with the traffic calming toolbox presented in **Exhibit 3-10**.
- **Posted Speed Limit:** traffic calming shall only be applied to roads with posted speeds of 50 km/h or below. Roads posted at 60 km/h or greater may be candidates for

greater police enforcement or changes to design in order to reduce speeding or collisions, but the techniques and measures described below are suited for lower-speed roads;

- **Grade:** if the grade of the subject segment of roadway is equal to or greater than of 8%, then traffic calming shall not be permitted on the roadway at all. This is consistent with many other jurisdictions and is due to the fact that traffic calming devices implemented on steep grades may cause safety concerns, particularly during winter;
- **Transit and Emergency Routes:** Traffic calming devices shall be permitted on local roads or collectors that serve as transit routes or primary emergency routes. However, such devices shall be limited to horizontal measures and signing only, as discussed below. Studies and prior experience indicate that vertical traffic calming measures such as speed humps and raised crosswalks slow emergency vehicle response times, create uncomfortable rides for transit passengers and potentially increase the maintenance required to keep transit and emergency vehicles operational; and
- **New Developments:** while this policy is designed for existing roads, new developments should be required to follow its principles so that proactive measures can be applied before traffic problems manifest themselves.

3. PLANNING

3.1 Traffic Calming Process

The following sections describe a six-step process for the implementation of traffic calming measures on City roads, beginning with a request for traffic calming and ending with design, approval and implementation. **Appendix A** contains a flowchart of the entire framework, and the relevant sections of the flowchart are included within each step.

3.1.1 STEP 1: REQUEST FOR TRAFFIC CALMING

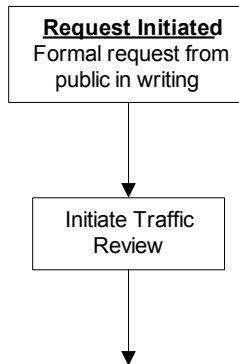
Requests for traffic calming typically come from City residents, business owners, schools or members of Council. Identification of potential locations may also come from on-going staff reviews. Roads and Transportation Division staff shall be responsible for the review of all requests.

Exhibit 3-1 describes the request process. In the case of a request from the public, a formal request in writing is required. City staff shall then respond in writing to inform the applicant that a Traffic Review will be initiated, described in **Sections 3.1.2 and 3.1.3**.

Some jurisdictions incorporate a public support requirement at this stage. If this requirement were implemented, the City would circulate a petition to affected residents. The petition would require a specific response rate from affected residents, with a specific percentage of support.

Through experience with other jurisdictions, it was determined that it is generally not desirable to conduct a resident poll prior to the detailed review of data. It is possible that residents would sign an initial petition, which would only serve to raise expectations of traffic calming. Alternatively, residents may not respond if they are not familiar with the purpose or origin of the request. As such, this approach was removed from consideration, and the simplified initiation process shown in **Exhibit 3-1** was carried forward for the policy.

Exhibit 3-1: Step 1: Request for Traffic Calming



3.1.2 STEP 2: TRAFFIC CALMING SCREENING PROCESS

Step 2 in the process is an initial screening process undertaken by City staff. The screening process sets requirements in five areas. A combination of these requirements must be met for a site to be eligible for traffic calming. **Exhibit 3-2** defines the screening criteria and associated thresholds. Screening criteria are tailored to local and Collector/Tertiary Arterial streets, each of which has different functional characteristics.

Exhibit 3-2: Step 2: Criteria and Thresholds

Criteria	Threshold		Notes
	Local Road	Collector / Tertiary Arterial	
Grade	< 8%		If the grade is equal to or greater than 8%, traffic calming is not permitted
Collision History	≥ 6	≥ 12	Number of collisions within the last three years involving vulnerable road users and/or which may potentially be corrected by traffic calming measures
Volume	≥ 900 vpd	≥ 3,000 vpd (Collector) ≥ 5,000 vpd (Tertiary Arterial)	Two-way ADT volume
Speeds	≥ posted speed limit		85 th percentile speed
Non-Local Traffic	≥ 30%		'Cut-through traffic'

The screening can be summarized as follows:

- **Grade:** if the grade of the roadway is equal to or greater than the maximum threshold of 8%, then traffic calming is not permitted on the roadway at all. This is consistent with other jurisdictions and is due to the fact that traffic calming devices implemented on steep grades may cause safety concerns, particularly during winter.
- **Collision History:** if the number of collisions within the past three years involving vulnerable road users (primarily pedestrians and cyclists) and/or which could be

potentially corrected by traffic calming measures is equal to or greater than the minimum threshold, then the volume, speed and non-local traffic requirements do not need to be met, and the site moves directly to the ranking process.

Tertiary Arterials and Collectors are required to have 12 collisions to satisfy this component of the warrant and bypass the volume, speed and non-local traffic requirements. This value is midway between the number of collisions within the past three years required to satisfy OTM Book 5 criteria for all-way stop signs (three or more right angle or turning collisions per year over a three year period) and former OTM Book 12 criteria for traffic signals (five 'correctable' collisions per year over a three year period)². The minimum threshold was also set high enough so that relatively few sites will be expected to qualify for traffic calming measures on the basis of collisions alone.

Given the difference in minimum volume thresholds for local roads compared to collectors, a minimum of 6 collisions within the last three years was accordingly selected as the threshold. This is consistent with the City of Greater Sudbury's own all-way stop control warrant, which requires an average of two collisions per year over a three year period.

Collision statistics are often recorded as a rate, expressed as collisions per million vehicles entering an intersection, or collisions per million vehicle-kilometres for a roadway segment. Given that the collision criteria of the traffic calming warrant is only intended to address a specific subset of collisions, raw numbers are preferable to a rate.

- **Speeds and Non-Local Traffic:** at least one of these must meet the minimum threshold for further consideration; and
- **Volume:** regardless of speed and percentage of non-local traffic, the minimum volume threshold must be met. Only a high frequency of collisions can qualify a site for traffic calming without meeting the volume threshold. It is recognized that there may be roads that have very high speeds, but do not meet the volume criteria, and therefore do not qualify for traffic calming under the formal warrant process. Rural roads would be most likely to fall under this category. For these roads, it may be appropriate to implement other solutions, such as speed enforcement or Sudbury's Speed Watch Program. Changes to a rural road's design may also be warranted in some situations.

Exhibit 3-3 graphically represents the screening process, while **Exhibit 3-4** shows the possible scenarios that can arise from application of this screening process.

² The November 2007 update to OTM Book 12 has since changed the collision signal warrant from raw 'correctable' collisions to a collision severity index.

Exhibit 3-3: Step 2: Screening Process

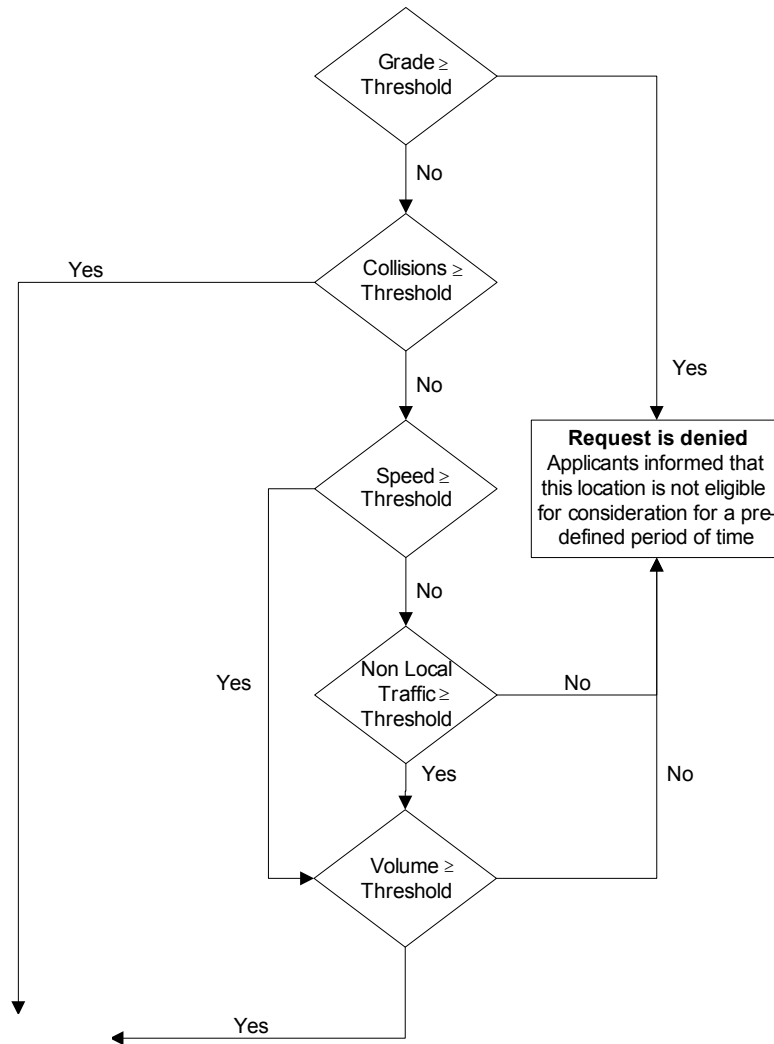


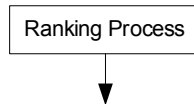
Exhibit 3-4: Step 2: Sample Screening Scenarios

Scenario	Grade	Collisions	Speed	Non-Local	Volume	Result
1	≥ Max	Any	Any	Any	Any	Not eligible for traffic calming
2	< Max	≥ Min	Any	Any	Any	Eligible; continue evaluation
3	< Max	< Min	≥ Min	Any	≥ Min	Eligible; continue evaluation
4	< Max	< Min	Any	≥ Min	≥ Min	Eligible; continue evaluation
5	< Max	< Min	Any	Any	< Min	Not eligible for traffic calming

3.1.3 STEP 3: EVALUATION SCORING AND RANKING

Sites that pass the initial screening are then ranked against each other in Step 3. The evaluation, scoring and ranking process incorporates 10 criteria, with appropriate weighting applied to each. Each eligible traffic calming request is awarded points based on its score for each factor, with a maximum score of 100 points. Based on an objective analysis of the evaluation scoring, a score of 30 points has been established as a minimum threshold to qualify for traffic calming consideration.

Exhibit 3-5: Step 3: Evaluation Scoring and Ranking



3.1.3.1 Scoring

A separate evaluation of Local Roads and Collectors/Tertiary Arterials is recommended due to the intended function of each road classification, including transit service and emergency services needs. **Exhibit 3-6** and **Exhibit 3-7** show the scoring for Local Roads and Collectors/Tertiary Arterials, respectively.

Exhibit 3-6: Scoring: Local Roads

Factor	Point Criteria	Maximum Points
Collision History	4 points for each qualifying collision in the past three years	20
Traffic Speeds	1 point for each km/h above posted speed	15
Non-Local Traffic	3 points for each 10% of non-local traffic above 20% (maximum reached at 60% non-local traffic)	15
Traffic Volumes	1 point for each 50 vehicles above 900	20
Pedestrian Generators	5 points for each school or park within the study area (other Pedestrian Generators may be defined by Sudbury)	10
Pedestrian Facilities	5 points if there are no sidewalks in the study area	5
Emergency Services and Routes	-4 points if the study area is a primary EMS route	0
Transit Services and Routes	-2 points if the study area is an existing or planned transit route	0
Block Length	1 point for each 50m increment between stop-controlled points	10
Adjacent Land Uses (residential)	1 point for each 20% of residential land use	5
		100

Exhibit 3-7: Scoring: Collectors and Tertiary Arterials

Factor	Point Criteria	Maximum Points
Collision History	3 points for each qualifying collision in the past three years	15
Traffic Speeds	1 point for each km/h above posted speed	20
Non-Local Traffic	2 points for each 10% of non-local traffic above 20% (maximum reached at 60% non-local traffic)	10
Traffic Volumes	1 point for every 100 vehicles above the Collector/Tertiary Arterial volume threshold	20
Pedestrian Generators	5 points for each school or park within the study area (other Pedestrian Generators may be defined by Sudbury)	10
Pedestrian Facilities	10 points if there are no sidewalks within the study area, 5 if only on one side	10
Emergency Services and Routes	-6 points if the study area is a primary EMS route	0
Transit Services and Routes	-4 points if the study area is an existing or planned transit route	0
Block Length	1 point for each 50m increment between stop-controlled points	10
Adjacent Land Uses (residential)	1 point for each 20% of residential land use	5
		100

3.1.3.2 Emergency and Transit Routes

Traffic calming devices are often considered to be a problem for emergency vehicles and buses. The scoring system developed for Sudbury recognizes this concern and scores potential sites accordingly. Under this scoring system, if a particular road is not an emergency or transit route, it receives zero points in each category, i.e. the maximum. The presence of one or more of these routes would therefore subtract points from the overall score. The scoring also reflects that these routes are more likely to be present on Collectors or Tertiary Arterials than on Local Roads, and subtracts more points for those roadway classifications. Further considerations of the impacts of traffic calming devices on emergency and transit vehicles are addressed in **Section 2.3** of this report and in Step 4 of the framework, which guides the selection of measures.

3.1.3.3 Non-Local Traffic

It is also understood that determining the percentage of non-local traffic within a study area may be a costly and time-consuming process. The City may not have the resources to conduct a full survey and may be required to estimate the percentage of cut-through traffic. As a result, the scoring for non-local traffic falls into 'bins' of 10 percent each. The following list contains four recommendations of how non-local traffic may be recorded or estimated, beginning with the method requiring least effort. Each alternative requires that the City determine an appropriate 'local' area prior to estimation.

1. Determine the peak hour trip generation potential of the local area based on its land uses and compare it to the recorded peak hour traffic counts;
2. Apply the following formulas:

$$\text{Local Road Non- Local Traffic Percentage} = 1 - \left(\frac{1,000}{ADT} \right)$$

$$\text{Collector Non- Local Traffic Percentage} = 1 - \left(\frac{3,000}{ADT} \right)$$

This formula implies that a Local Road with an ADT less than 1,000 vehicles has a low potential for cut-through traffic. The formula may also be applied to Tertiary Arterials using a numerator volume of 5,000; however, given the function of a Tertiary Arterial and the variation in typical arterial volumes, other methods should be explored.

3. Record the license plates of all vehicles that pass through one or more points of the local area. The recorded license plates are then submitted to MTO, which in turn will supply the Forward Sortation Area (FSA) of the address where each vehicle is registered. The FSA is the first three characters of the postal code, and each FSA represents a geographical area of the province. It can then be determined which of these trips originate or end within the local area. It should be noted however, that the urban area of the Sudbury is covered by a total of five FSAs, so this approach will not accurately identify traffic that is explicitly local to the study area; or
4. Conduct a full origin-destination study at all entry and exit points of the local area. Match the license plates of entering and exiting vehicles to determine the percentage of vehicles that pass through the entire local area compared to those that begin or end their trips within. This approach is the most accurate of the four approaches, and it is recommended if staff/budget resources are available.

3.1.3.4 Determining the Local Area

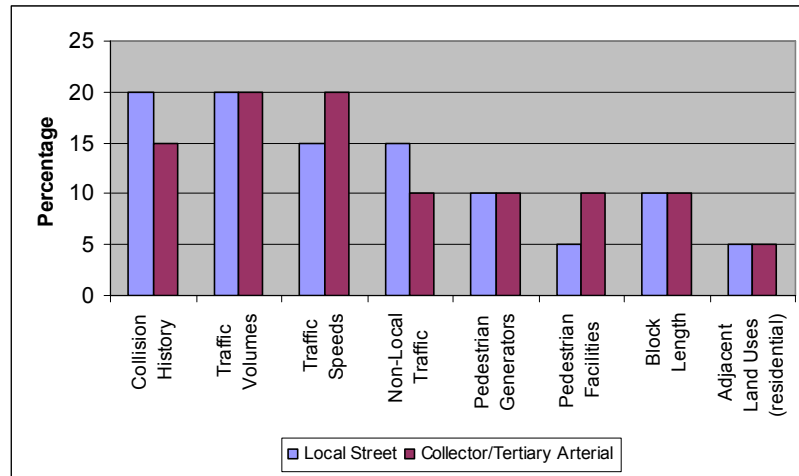
For a Local Road, the local area should be comprised of the Local Road, at a minimum; while for a Collector or Tertiary Arterial, the local area may be defined as the section of the roadway that connects the nearest higher-order roads, as well as the other intersecting roadways.

3.1.3.5 Ranking Comparison between Local Roads and Collectors/Tertiary Arterials

Exhibit 3-8 compares the ranking criteria for Local Roads and Collectors/Tertiary Arterials. It can be seen that for Local Roads, more emphasis is placed on factors such as non-local traffic and the collision history of the street.

The primary function of a Tertiary Arterial is to connect with other arterial and collector roads and have limited local road access, while the primary function of a Collector is to move traffic from Local Roads to higher-order roads. As such, higher volumes and perhaps higher speeds are expected. More weight is therefore given to the speed of these roadways, as well as the presence or lack of pedestrian facilities on a Collector, because of the associated safety risks of higher speeds and volumes.

Exhibit 3-8: Comparison of Local Roads vs. Collectors/Tertiary Arterials



3.1.4 STEP 4: AVAILABLE TRAFFIC CALMING MEASURES

Some jurisdictions throughout North America have used an approach whereby the final score awarded from the warrant evaluation would apply to a toolbox of traffic calming measures. Higher-ranking requests may be flagged for physical traffic calming measures, while lower-ranking requests would be restricted to less intrusive forms such as signing. This method is advantageous in that it does not dismiss the lower ranking request that may be accommodated through low cost and low maintenance traffic calming features.

Given that each road and surrounding neighbourhood is unique and presents individual characteristics, the toolbox approach of identifying traffic calming measures can be used as a guideline for the various types of traffic calming measures that may be applied to a particular case. An initial staff review of all outstanding requests is recommended at this point, before a public support component is implemented for selected projects. (Data collection for subsequent requests should be carried out on a semi-annual basis with the screening and evaluation process carried out on an annual basis.)

Exhibit 3-9: Step 4: Available Traffic Calming Measures

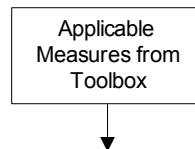


Exhibit 3-10 shows the recommended toolbox for the City of Greater Sudbury. This toolbox identifies a variety of traffic calming devices, as well as signage often used for traffic calming purposes. Care should be taken in the application of any measures marked with ♦, particularly in the case of designated emergency or transit routes. As well, vertical deflection measures are not permitted for application on existing or planned transit routes, or designated primary emergency routes. **Appendix B** provides information on the applicability and implications of each measure.

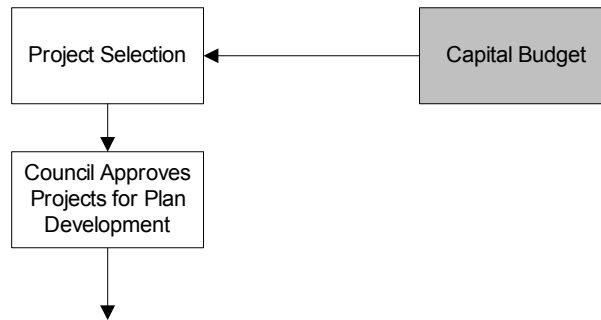
Exhibit 3-10: Step 4: Traffic Calming Toolbox

Measures		Local Road	Low-Volume Collector	Other Collector	Tertiary Arterial
Horizontal Deflection	Curb Extension	✓	✓	✓	✓
	Traffic Circle / Mini Roundabout	✓	✓	◆	✗
	Raised Median Island	✓	✓	✓	✓
	Corner Radius Reduction	✓	✓	✓	◆
	Chicane, 1-Lane	✓	✗	✗	✗
	On-Street Parking	✓	✓	✓	◆
Vertical Deflection	Speed Hump / Table	✓	◆	◆	✗
	Speed Cushion	✗	◆	◆	✗
	Raised Crosswalk	✓	◆	✗	✗
	Raised Intersection	◆	✗	✗	✗
Obstruction / Closure	Directional Closure	✓	◆	✗	✗
	Right-In/Right-Out Island	✓	◆	✗	✗
	Raised Median	✓	✓	✗	✗
	Intersection Channelization	✓	✓	◆	◆
	Full Closure	◆	✗	✗	✗
Signage (when primarily application is traffic calming)	Traffic-Calmed Neighbourhood	✓	✓	◆	◆
	Turn Prohibited	◆	◆	◆	◆
	Through Traffic Prohibited	◆	◆	◆	◆
	One Way	◆	◆	✗	✗
	Warning signs (playground, school, etc)	◆	◆	◆	◆
	Maximum Speed	◆	◆	◆	◆
	Yield	✗	✗	✗	✗
	Stop	✗	✗	✗	✗
✓ = Appropriate Measures ◆ = Use with Caution ✗ = Not Recommended					

3.1.5 STEP 5: PROJECT SELECTION AND COUNCIL STUDY APPROVAL

In this step, staff prepare preliminary estimate ranges for the higher-ranking projects and for any projects that may be served through advisory, warning, or traffic control signage features. If a project can be tied into a current or following year’s Capital Projects, it shall receive priority. Staff shall then forward a list of the recommended project(s) to Council for approval, in full awareness of the allotted Traffic Calming budget.

Exhibit 3-11: Step 5: Project Selection and Council Approval



3.1.6 STEP 6: DESIGN, PUBLIC SUPPORT, FINAL COUNCIL APPROVAL, IMPLEMENTATION

Exhibit 3-12 shows the final step of design, approval and implementation. Once Council approves a project or series of projects in principle and the funding envelope is established (Step 5), a public support component is to be initialized to determine residential support for traffic calming measures to be implemented. If the required support is realized, a detailed plan shall be developed. City staff or a consultant shall prepare a preliminary design receiving input from City departments, including emergency, fire and transit, as well as residents. This plan shall be sent back to the public for final comment and forwarded to Council for implementation approval.

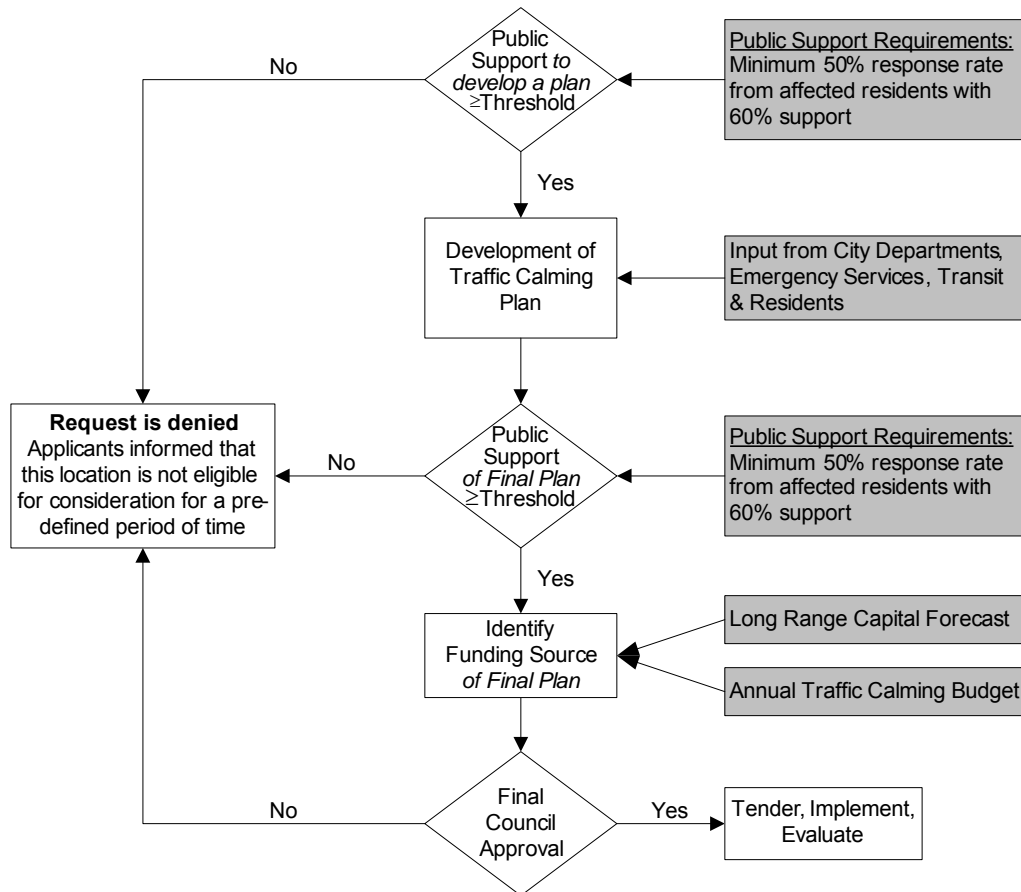
A minimum 50% response rate from affected residents with 60% support shall be required to proceed with the development of a Traffic Calming Plan. The same requirements shall apply to public approval of a recommended plan.

After the final plan is developed by the City or its consultant and is endorsed by the public, its funding source is to be identified. Possible funding sources include the Long Range Capital Forecast or an Annual Traffic Calming Budget. The plan shall then be sent to Council for final approval. Upon final Council approval, the process shall commence of tendering, implementing and evaluating/monitoring the plan.

If the request is rejected at any point in the process, the applicants and affected residents shall be notified in writing, and traffic calming shall not be considered for the same section of road for a pre-determined period of time. The recommended time frame is two years. Requests may be rejected on the basis of:

- Failure to meet the minimum screening criteria;
- Lack of public support; or
- Council rejection.

Exhibit 3-12: Step 6: Design, Approval, Implementation



3.2 Public Awareness and Involvement

As discussed throughout this policy, public involvement is critical to the traffic calming process. The same residents and community groups who object to traffic conditions in their neighbourhoods are the same residents and community groups who must live with whatever solution is ultimately implemented. The City of Greater Sudbury traffic calming policy shall continue to support and encourage public requests for traffic calming, as residents often have the greatest knowledge and understanding of traffic conditions in their neighbourhoods.

City staff shall initiate a public involvement process once a requested site has been established as a candidate for implementation in Step 5 of the process. At a minimum, two public meetings will be held with affected residents, as follows:

1. Project initiation meeting:
 - Describe the purpose, objectives, process and timelines of the study;
 - Describe the study approach and methodology;
 - Review initial preliminary findings based on a review of background information;

- Provide examples of typical solutions to traffic issues;
 - Receive community input on current traffic and safety problems in the neighbourhood; and
 - Initiate survey process for plan development.
2. If the public support level satisfies minimum criteria, a meeting shall be held after the draft traffic calming plan is developed:
- Review the draft traffic calming plan and receive public input; and
 - Initiate survey process for final plan approval.

If input and comments received at meeting #2 suggest that the final plan will differ significantly from the draft plan, the plan approval petition process should be deferred and a third meeting should be held to review the revised plan.

All meetings are to be advertised in the newspaper, the City of Greater Sudbury website and in community centres or other places of interest within the affected neighbourhood. In addition, meeting notice flyers should be hand delivered to all homes in the study area whenever possible. Two weeks notice is required for all public meetings.

Neighbourhood and resident responsibilities include:

- Identify traffic related issues in the neighbourhood;
- Respond to all surveys;
- Attend public meetings for traffic calming studies;
- Approve or reject the development of a traffic calming plan;
- Select from the options presented by staff, traffic calming concepts which address the identified issues; and
- Approve or reject the implementation of the preferred traffic calming plan.

3.3 Community Initiatives

A number of community initiatives should be considered prior to the decision to implement traffic calming, or in conjunction with it. Often, these will incur little to no cost to the City using existing resources, frameworks and materials. Some possible initiatives that may address driver behaviour and traffic concerns include:

- **Community-Based Publications and Events:** Neighbourhoods and Business Improvement Areas often publish their own newsletters and bulletins, or maintain their own websites. These are excellent resources for spreading the word of traffic concerns within an area, especially to neighbourhood residents who may themselves be a component of the traffic problem, e.g. speeding on local roads. City staff could be invited to submit articles, advice or recommendations for the newsletters and websites, or to attend community meetings and events to listen to residents' concerns.

- **Speed Watch Program:** The Traffic and Transportation Section already invites City residents to participate in its Speed Watch Program, in partnership with the Greater Sudbury Police Service. Speed Watch is an initiative to reduce speeding on area roads through public awareness and community action. A portable radar unit is available for loan to citizens of the City of Greater Sudbury. Volunteers monitor traffic in their neighbourhood and submit results to the Traffic and Transportation section. If City employees confirm results, the Greater Sudbury Police Service will schedule and conduct, within a reasonable time frame, a "zero tolerance" speed enforcement campaign in the area identified by Speed Watch volunteers. Licence numbers of vehicles observed exceeding municipal speed limits will also be submitted to Greater Sudbury Police;
- **City of Greater Sudbury Publications:** the City provides a wealth of information on its website related to traffic and transportation, including the city's official plan, transit schedules, street and walking trail maps and information regarding the roadway classification system and its intended functions. Additional information may be available at City Hall or at various service centres. Residents should be aware of the availability of this material, inasmuch as some of it may begin to address concerns without the need to initiate a request for traffic calming;
- **Trip Reduction Initiatives:** The City maintains a ride-sharing website at <http://greatersudbury.carpoolzone.ca>. This website, along with business community initiatives including flex-time schedules and work from home arrangements, as well as other programs designed to reduce the reliance on single-occupant vehicle travel, can have a major impact on the number of trips on Greater Sudbury's streets, and may reduce or eliminate the need for many traffic calming requests.

4. TRAFFIC CALMING MEASURES

This section discusses traffic calming measures that have been identified as appropriate for the City of Greater Sudbury. The section aggregates each type of measure into one of four categories and describes the associated advantages and disadvantages. Technical guidelines and figures are provided for some of the more common traffic calming features. These guidelines and figures are based on those found in the *Canadian Guide to Neighbourhood Traffic Calming*, and modified where suitable to reflect needs and conditions of Sudbury.

4.1 Horizontal Deflection

Horizontal deflection measures are those devices which require a motorist to steer around them, altering the vehicle's path within the roadway cross section. Most horizontal deflection devices are appropriate for all roadways, although care needs to be taken when installing higher-deflection devices such as chicanes and traffic circles on higher volume roads.

Advantages

- Effective in reducing average and/or higher operating speeds;
- Devices such as curb extensions reduce road user conflict potential; and
- Devices typically do not impact emergency vehicle response times on lower order roads.

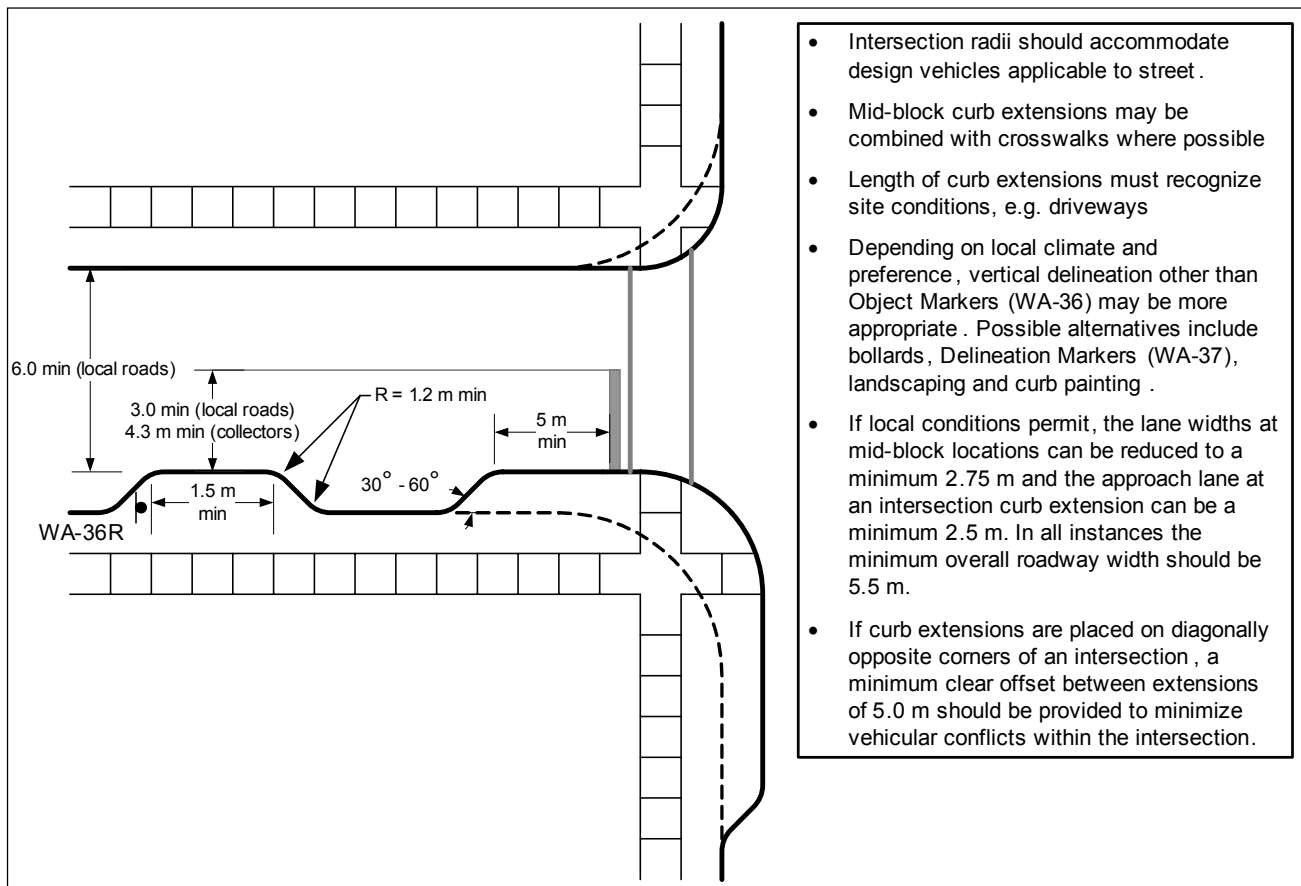
Disadvantages

- Maintenance activities such as street cleaning and snow removal may be complicated in the vicinity of the device;
- A number of the devices may impact transit and cyclist operations due to constrained travel portions of the roadway; and
- Typically do not impact through traffic volumes.

4.1.1 CURB EXTENSION

Curb extensions (also known as bump-outs) reduce the width of the roadway by extending the boulevard and/or sidewalk into what is currently either a travel lane or a parking lane. They are appropriate for all roadways. For maximum effectiveness, the approach lane width is typically reduced to 3.0 metres on local roads, as shown in **Exhibit 4-1**. For collector roadways and designated cycling routes, the lane width should be 4.3 metres to provide additional room for cyclists. On-street parking will typically be lost opposite a curb extension. Curb extensions are often used at intersections to reduce crossing width, or they can be used in conjunction with median islands or traffic circles.

Exhibit 4-1: Curb Extensions





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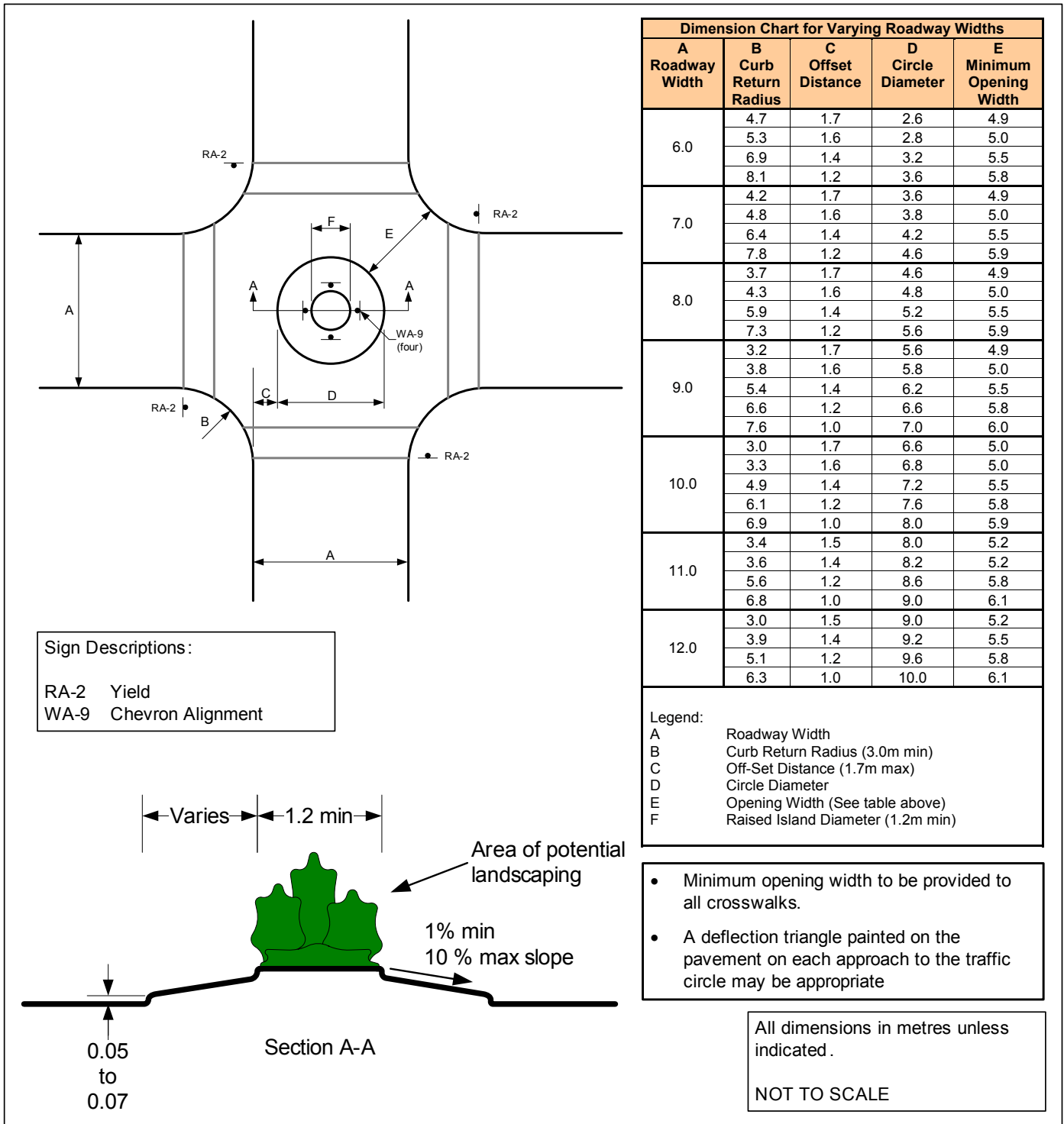
4.1.2 TRAFFIC CIRCLE / MINI ROUNDABOUT

Traffic circles and mini roundabouts are not to be confused with modern roundabouts. Modern roundabouts are traffic control devices designed to replace or be used instead of traffic signals. Traffic circles, shown in **Exhibit 4-2**, consist of a raised island constructed in the centre of an intersection. The island is often landscaped. Depending on the location, stop signs at intersections retrofitted with traffic circles may be replaced with yield signs. Traffic circles are typically constructed with mountable curbs, to allow for larger vehicles such as buses to pass over them if necessary. While traffic circles are appropriate for local roads and most collectors, care should be taken to ensure the traffic circle design will accommodate the turning path of all vehicles that are expected to use a designated roadway.



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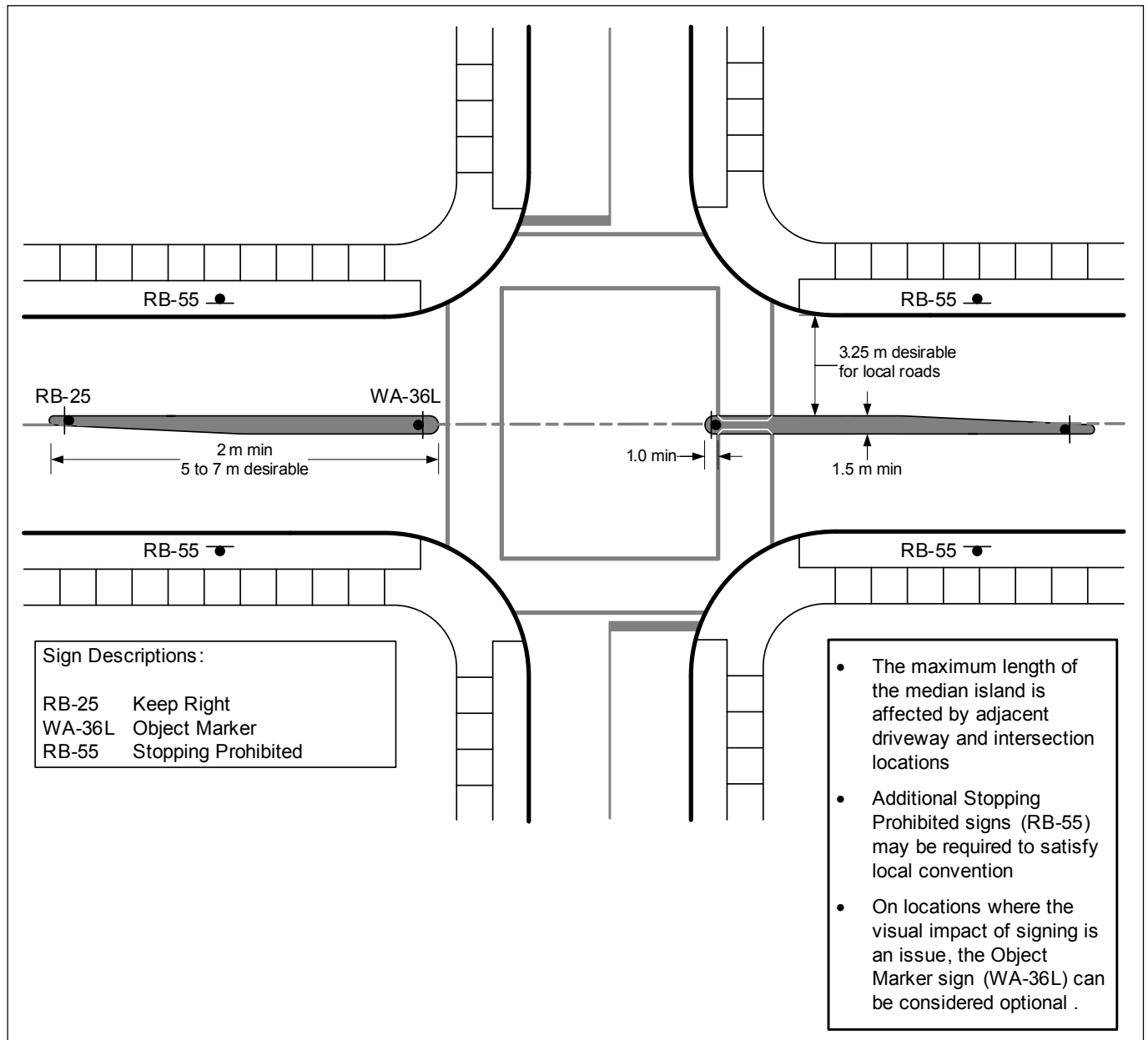
Exhibit 4-2: Traffic Circle / Mini Roundabout



4.1.3 MEDIAN ISLAND

Median islands are constructed with either mountable or barrier curb and are appropriate for all roadways that have the width to support a minimum-1.5 metre island while still maintaining proper travel lane widths, as shown in **Exhibit 4-3**. They are often used in conjunction with curb extensions to create a chicane effect. Median islands can be constructed at any length; often driveway spacing is the limiting factor. Median islands can be landscaped and should be signed at either end to alert motorists. Consideration should be given to on-street parking that is lost with the construction of a median island.

Exhibit 4-3: Median Island



4.1.4 CORNER RADIUS REDUCTION

Corner radii should be designed as small as possible, only large enough to accommodate the largest design vehicle expected to use a particular road. Small-radius corners reduce crossing distance for pedestrians and force motorists to slow when turning.

4.1.5 CHICANES

A chicane can be used to reduce the width of a section of road to one lane, thereby forcing one direction of traffic to stop and allow the other to pass. One-lane chicanes shall only be used on local roads, and should only be used on those experiencing high volumes and with approximately equal directional splits, or the associated reduction in traffic volumes will be minor.

Two-lane chicanes offer little in the way of volume or speed reduction and should not be used as traffic calming measures. They often have the unintended consequence of allowing drivers to straddle the centre line, as one might do on a winding road, potentially increasing crash potential. A more suitable two-lane chicane effect can be accomplished through curb extensions and centre medians.

4.1.6 ON-STREET PARKING

On-street parking is an inexpensive and practical traffic calming measure. It reduces the width of the road and causes motorists to reduce their speeds. It should be considered wherever possible, prior to, and in conjunction with, the implementation of physical traffic calming devices.

4.2 Vertical Deflection

Vertical deflection devices change the motorist's path in the vertical plane. As such, they are primarily intended for use on local streets and low volume collector roads. Vertical deflection devices are not permitted for use on transit routes or designated primary emergency routes.

Advantages:

- Effective in reducing operating speeds
- Do not impact local access

Disadvantages:

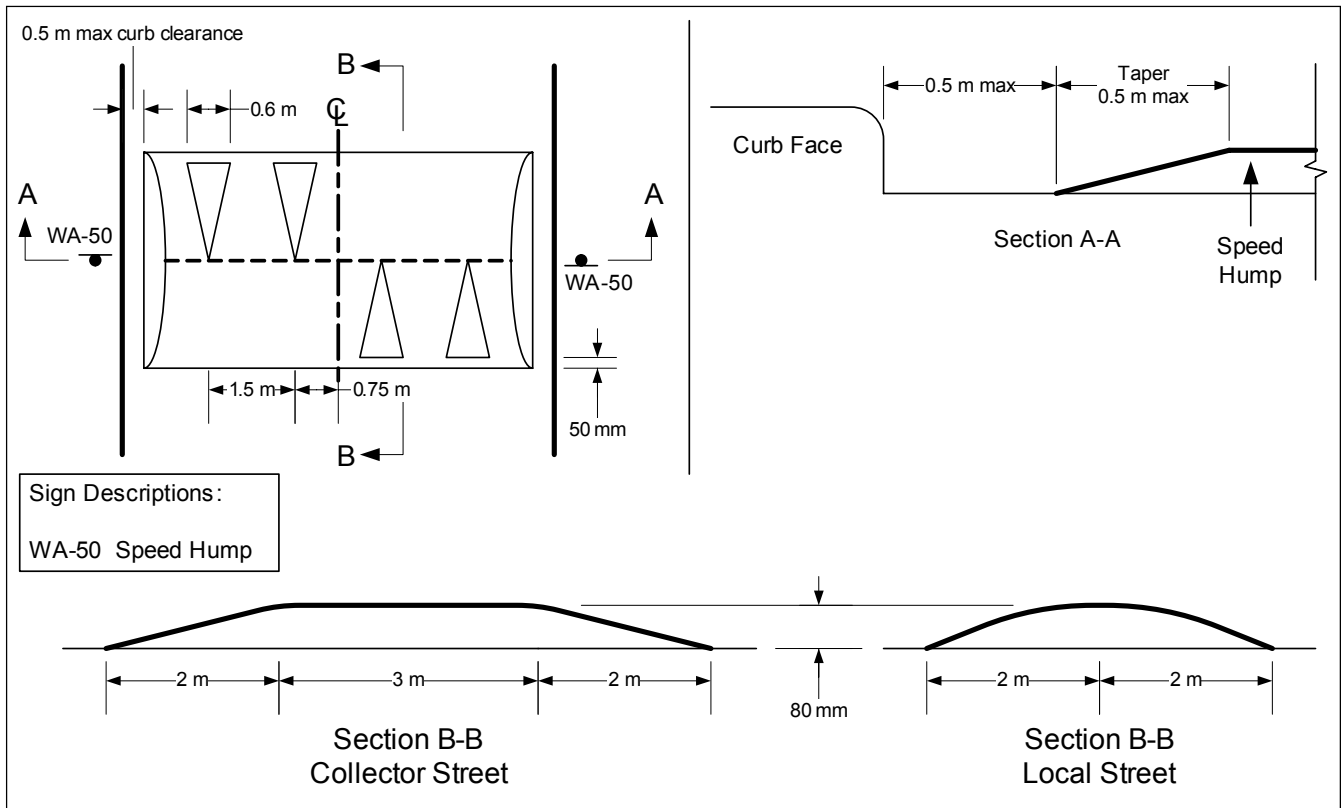
- Devices have the potential to impact emergency vehicle response times, as they are required to slow down for the devices to ensure they do not injure patients/passengers or damage their vehicles
- Devices may increase maintenance requirements
- Typically do not impact through traffic volumes significantly

4.2.1 SPEED HUMPS AND TABLES

Speed humps are appropriate for all local streets and low-volume collector roadways that do not serve as transit or primary emergency response routes. Speed tables, which have a longer profile, may be considered with caution on higher-volume collectors. Speed tables should not be used on

roads posted at 30 km/h, because vehicles will not have to slow down to pass over them. **Exhibit 4-4** shows the recommended dimensions of speed humps and tables.

Exhibit 4-4: Speed Humps and Tables



4.2.2 SPEED CUSHIONS

Speed cushions are similar to speed humps or tables, except that they have channels cut into them, approximately the width of a large vehicle, to allow such vehicles to pass over them without slowing down considerably. Some jurisdictions allow speed cushions to be used on transit or emergency routes. In Greater Sudbury, since no vertical deflection of any sort is to be used on transit or emergency routes, speed cushions should only be used, and with caution, on roads where truck traffic is permitted yet traffic calming is still warranted. The cushions will allow truck traffic to pass through relatively unencumbered.



San Francisco Municipal Transportation Authority

4.2.3 RAISED CROSSWALKS

Raised crosswalks, often constructed with decorative, textured pavement, serve three purposes: they highlight the functional area of an intersection and reduce vehicle speeds and depending on surface treatment, they may improve the streetscape. Raised crosswalks shall be installed consistent with the city's crosswalk policy, and only on local roads and low-volume collectors that do not serve as transit or emergency routes.



Richard Drdul (flickr.com/drdul)

4.2.4 RAISED INTERSECTIONS

Raised intersections are costly to retrofit and minimally reduce vehicle speeds and volumes. Therefore, they are not recommended for use on existing City streets, although the city may allow them at the intersection of two local roads in new developments.

4.2.5 OTHER DEVICES

Rumble strips and textured crosswalks should not be used as traffic calming measures. Rumble strips are designed to alert motorists to changes in roadway conditions by creating both noise and vibration in the vehicle. They are used as traffic calming devices in some communities, but their associated noise makes them largely unacceptable for this purpose. Rather, they should only be used as warning devices when conditions dictate.

Textured crosswalks should not be used alone as a traffic calming measure, but should be considered in conjunction with traffic calming implementations. Textured crosswalks, often constructed with interlocking pavers, can serve to highlight the functional area of an intersection and improve the streetscape. However, they do nothing to reduce vehicle speeds or volumes, and are often both expensive to maintain and limiting to some mobility-challenged pedestrians. Consideration should be given to other methods of creating textured pavement, such as stamped asphalt and concrete, whenever including textured crosswalks as part of a larger traffic calming plan.



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4.3 Obstruction/Closure

Included in this category are partial and full roadway closures, intersection diverters, raised medians and right-in-right-out channelized islands. The main purpose of these devices is to reduce infiltrating traffic on neighbourhood streets.

Advantages:

- Reduces road user conflicts and volumes
- Requires little or no enforcement

Disadvantages:

- Penalizes local traffic access
- Reduces access to transit, emergency services, delivery service, etc.

- Complicates road maintenance efforts in the vicinity of devices
- Potential to divert both local and through traffic to parallel or alternative routes

4.3.1 DIRECTIONAL CLOSURES / RIGHT-IN, RIGHT-OUT ISLANDS

Compliance with these devices relies on the presence of other motorists to deter would-be violators from circumventing the device. As such, they should only be used at the intersection of local roads with lower-volume collector roads. They should also only be used when local traffic has another alternative to access the higher-order road in the direction prevented by the closure.

4.3.2 RAISED MEDIAN

These raised medians should not be confused with the raised medians discussed above in the horizontal deflection section. These raised medians effectively serve the same purpose as right-in, right-out islands, and should only be used to prevent left turns to and from local streets and low-volume collector roads. As with directional closures, this type of raised median should only be used when local traffic has another alternative to access the higher-order road in the direction prohibited by the closure.

4.3.3 CHANNELIZATION

Intersection channelization may be used on all roadways.

4.3.4 FULL CLOSURE

Full closure should only be considered for local roads and only as a last resort, as it has severe implications on local residents. If considered, care must be taken to ensure that the local traffic affected by the closure does not create unanticipated problems on adjacent local streets.

4.4 Signage

These devices are sometimes used as traffic calming devices and include both regulatory and warning signs, including stop and yield controls, maximum speed, turn prohibitions, "traffic calmed neighbourhood" signs.

Advantages:

- Has the potential to reduce vehicle speeds and volumes
- Reduces road user conflicts
- Relatively inexpensive

Disadvantages:

- Frequent enforcement is required to be effective
- "Traffic calmed neighbourhood" and "No through traffic" signs are not regulatory signs that can be enforced
- May reduce local access in the case of one-way streets and turn restrictions.

4.4.1 STOP, YIELD AND OTHER REGULATORY SIGNS

Regulatory signs, with the exception of speed limit signs, are not to be used as traffic calming devices within Greater Sudbury. Unwarranted all-way stop signs are not a valid method of calming traffic and should not be installed for that purpose. When intended as traffic calming, maximum speed signs are only to be used in conjunction with other physical devices.

4.4.2 TRAFFIC CALMED NEIGHBOURHOOD SIGNS

These signs should be considered as part of all traffic calming implementations.



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4.4.3 WARNING SIGNS

Warning signs shall be considered where appropriate as part of larger traffic calming plans. The *Canadian Guide to Neighbourhood Traffic Calming* offers guidance as to which signs are suggested/required for various installations.



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4.4.4 TURN RESTRICTIONS

Turn restrictions may be considered as traffic calming, but two important points highlight the caution that must be exercised:

- They are not self-policing devices, and when used on low-volume roads, do not by themselves deter motorists from making the prohibited movement; and

- While it is possible under the Highway Traffic Act to enforce turn restrictions at particular times of the day, it is not possible to enforce a “local traffic excepted” plate on a turn restriction sign. If a turning movement is prohibited for some traffic, it must be prohibited for all traffic.

5. PLANNING, ENGINEERING AND CONSTRUCTION COSTS

Most traffic engineering plans can be developed in-house, using existing City, Provincial and TAC guidelines, as well as best practices research from other jurisdictions. For particularly large or complex plans, or when staff resources are short, the services of a consultant may be considered, keeping in mind that consultant costs may range into the tens of thousands of dollars.

Typical recent construction costs are shown in **Exhibit 5-1**. Factors such as land acquisition, utilities, drainage and grading should be expected to influence construction costs.

Exhibit 5-1: Typical Traffic Calming Construction Costs

Measures		Unit Cost
Horizontal Deflection	Curb Extension	\$3,000-\$10,000 per side
	Traffic Circle / Mini Roundabout	\$5,000 - \$20,000
	Raised Median Island	\$5,000-\$15,000
	Corner Radius Reduction	\$3,000 and up, depending on radius
	Chicane, 1-Lane	\$10,000 - \$30,000 per series
	On-Street Parking	Minor
Vertical Deflection	Speed Hump	\$2,000-\$5,000 (depending on width of roadway)
	Speed Table	\$5,000-\$20,000 (depending on width of roadway and material)
	Speed Cushion	\$2,000-\$5,000 (depending on width of roadway)
	Raised Crosswalk	\$5,000-\$20,000 (depending on width of roadway and material)
	Raised Intersection	\$20,000 - \$75,000
Obstruction / Closure	Directional Closure	\$5,000 - \$25,000
	Right-In/Right-Out Island	\$5,000 - \$10,000
	Raised Median Through Intersection	\$10,000 - \$30,000
	Intersection Channelization	\$3,000 and up, depending on length
	Full Closure	\$10,000 - \$30,000
Signage	Traffic-Calmed Neighbourhood, Warning Signs, etc	\$200

6. ANTICIPATED STAFF LEVEL OF EFFORT AND TIMELINES

The warrant component of the traffic calming process has been specifically designed to require a similar level of effort to a traffic signal warrant. That is, once all of the required input data has been collected, running the warrant spreadsheet should only be a matter of minutes. Much of the required input data is information that is expected to be readily available, e.g.:

- Presence or absence of transit or emergency routes;
- Block length between controlled intersections;
- Land use data;
- Pedestrian facilities and pedestrian generators; and
- Collision data.

In many cases, the city will have volume and speed data already on hand for the location. For those locations where this data is not available, it will need to be collected prior to warrant analysis. As discussed above, the most resource-intensive component of the data collection will be the determination of non-local traffic. This report provides guidance on four different methods of estimating non-local traffic percentages.

Additional staff effort will be required once a site is selected for further study. Project initiation, additional data collection, the public consultation process and plan development may take several months. Approval, tender, implementation and evaluation times would generally be consistent with similar-scale capital works projects.

7. GLOSSARY

- **85th Percentile Speed** – The speed separating the fastest 15% of vehicles from the slowest 85%;
- **ADT** – Average daily traffic, recorded over a 24-hour period;
- **Cut Through Traffic** – Traffic determined to neither begin nor end a trip within a defined study area. Typically synonymous with “non-local traffic”;
- **EMS** – Emergency medical services;
- **FSA** – Forward Sortation Area; the first three characters of a postal code;
- **Local Road, Collector, Tertiary Arterial** – Three of the roadway classifications used by the City of Sudbury, in increasing order of volume and importance within the overall roadway network;
- **MTO** – Ontario Ministry of Transportation;
- **OTM** – Ontario Traffic Manual;
- **Pedestrian Facilities** – Sidewalks;
- **Pedestrian Generators** – Schools, parks, etc to be defined by Sudbury; and
- **VPD** – Vehicles per day.

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APPENDIX A

RECOMMENDED TRAFFIC CALMING FRAMEWORK

1. Request for Traffic Calming

Request Initiated
Formal request from public in writing

Initiate Traffic Review

2. Screening Process

Grade \geq Threshold

No

Collisions \geq Threshold

No

Speed \geq Threshold

No

Non Local Traffic \geq Threshold

No

Volume \geq Threshold

Yes

Request is denied.
Applicants informed that this location is not eligible for consideration for a pre-defined period of time

Yes

No

3. Evaluation Scoring and Ranking Process

Ranking Process

4. Available Traffic Calming Measures

Applicable Measures from Toolbox

5. Project Selection and Council Approval

Project Selection

Capital Budget

Council Approves Projects for Plan Development

6. Design, Approval, Implementation

Public Support to develop a plan \geq Threshold

No

Yes

Public Support Requirements:
Minimum 50% response rate from affected residents with 60% support

Development of Traffic Calming Plan

Input from City Departments, Emergency Services, Transit & Residents

Public Support of Final Plan \geq Threshold

No

Yes

Public Support Requirements:
Minimum 50% response rate from affected residents with 60% support

Request is denied.
Applicants informed that this location is not eligible for consideration for a pre-defined period of time

Identify Funding Source of Final Plan

Long Range Capital Forecast

Annual Traffic Calming Budget

Final Council Approval

No

Yes

Tender, Implement, Evaluate

APPENDIX B

APPLICABILITY AND IMPLICATIONS OF RECOMMENDED TRAFFIC CALMING MEASURES

Potential Benefits of Recommended Traffic Calming Measures

Measures		Speed Reduction	Volume Reduction	Conflict Reduction	Environment
Horizontal Deflection	Curb Extension	◐	○	○	●
	Traffic Circle / Mini Roundabout	●	◐	●	●
	Raised Median Island	◐	○	◐	○
	Corner Radius Reduction	◐	○	○	◐
	Chicane, 1-Lane	●	●	●	◐
	On-Street Parking	◐	○	○	◐
Vertical Deflection	Speed Hump / Table	●	◐	●	◐
	Speed Cushion	●	◐	●	◐
	Raised Crosswalk	●	○	◐	◐
	Raised Intersection	◐	○	◐	◐
Obstruction / Closure	Directional Closure	○	●	◐	◐
	Right-In/Right-Out Island	○	●	◐	◐
	Raised Median	○	●	◐	◐
	Intersection Channelization	○	◐	◐	◐
	Full Closure	○	●	●	◐
Signage (when primarily application is traffic calming)	Traffic-Calmed Neighbourhood	◐	○	○	○
	Turn Prohibited	○	◐	◐	◐
	Through Traffic Prohibited	○	◐	◐	◐
	One Way	○	●	◐	◐
	Warning signs (playground, school, etc)	◐	○	◐	○
	Maximum Speed	◐	○	○	○
	Yield	○	○	◐	○
	Stop	○	◐	◐	○
<p>● = Substantial Benefits ◐ = Minor Benefits ○ = No Benefit</p>					

Potential Disbenefits of Recommended Traffic Calming Measures

Measures		Local Access	Emergency Response	Other Travel Modes	Enforcement	Maintenance
Horizontal Deflection	Curb Extension	○	○	◐	○	◐
	Traffic Circle / Mini Roundabout	○	◐	◐	○	◐
	Raised Median Island	◐	○	○	○	◐
	Corner Radius Reduction	○	○	○	○	◐
	Chicane, 1-Lane	○	◐	◐	○	◐
	On-Street Parking	○	◐	◐	○	◐
Vertical Deflection	Speed Hump / Table	○	◐	◐	○	◐
	Speed Cushion	○	○	◐	○	◐
	Raised Crosswalk	○	◐	◐	○	◐
	Raised Intersection	○	◐	◐	○	◐
Obstruction / Closure	Directional Closure	◐	○	◐	◐	◐
	Right-In/Right-Out Island	◐	◐	◐	◐	◐
	Raised Median	◐	◐	◐	○	◐
	Intersection Channelization	◐	◐	○	○	◐
	Full Closure	●	●	◐	○	◐
Signage (when primarily application is traffic calming)	Traffic-Calmed Neighbourhood	○	○	○	○	○
	Turn Prohibited	◐	○	○	●	○
	Through Traffic Prohibited	◐	○	○	●	○
	One Way	◐	◐	◐	○	○
	Warning signs (playground, school, etc)	○	○	○	○	○
	Maximum Speed	○	○	○	●	○
	Yield	○	○	○	○	○
	Stop	○	◐	○	●	○
● = Substantial Disbenefits ◐ = Minor Disbenefits ○ = No Disbenefits						

Source: *Canadian Guide to Neighbourhood Traffic Calming* (Transportation Association of Canada, Institute of Transportation Engineers, December 1998)