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Appendix A: Thunder Bay Traffic Calming Primer

1 Introduction

1.1 Background

The City of Thunder Bay does not have a formal traffic calming strategy or policy for implementing traffic calming measures. At present, requests for traffic calming are reviewed and assessed on an individual basis by City staff. The City has implemented select traffic calming measures at various locations in Thunder Bay. These measures include speed warning signs, flexible bollards, and curb extensions.

What is traffic calming?

Traffic calming is the use of various traffic management measures for the explicit purpose of reducing travel speeds, discouraging through traffic on streets that are not meant to provide such functions, and creating safer conditions for all users, especially pedestrians and cyclists.

Traffic calming can take the form of the physical street design elements, or educational and enforcement techniques.

Why is traffic calming important?

In cities across North America, urban sprawl and reliance on the automobile have resulted in significant traffic growth. In many cities, these trends in automobile travel have placed considerable strain on the roadway network to safely accommodate all users within the public right-of-way. This results in undesirable effects of traffic infiltration on neighbourhood streets that include:

- Travel speeds that are not appropriate for the roadside environment;
- Volumes of traffic that exceed the intended function of the roadway;
- Decrease in safety for all road users due to volume, speed and other compliance issues; and
- A strain on traffic enforcement resources.

Traffic calming is one option to address the above issues. Traffic calming can also be used to address broader goals such as increasing active transportation and improving the overall public realm.

Why is a traffic calming policy necessary?

The purpose of a traffic calming policy is to provide the City of Thunder Bay with a consistent approach and methodology to traffic calming in response to

requests by the public, businesses, schools or Council, and to prioritize resources applied to these.

When traffic calming measures are applied without a governing policy, new problems may be created just as old problems are solved – traffic may divert to another roadway or inappropriate speed control measures are ineffective. Furthermore, it is important to have a transparent process that allows the public to see how decisions are made.

Developing a traffic calming policy to formalize the process for traffic calming in Thunder Bay is intended to:

- Provide a standardized process to address concerns regarding speeding and safety;
- Address concerns in a method that is fair, reasonable, consistent and cost-effective; and
- Reduce staff workload and duplication of effort when responding to requests.

Where is traffic calming applied?

Traffic calming measures are usually applied on local or collector roads on a case by case basis, although they can be applied to arterial roads in certain cases.

1.2 Existing Traffic Calming Measures in Thunder Bay

A pilot program was launched in 2014 to test the effectiveness of centre-of-theroad speed limit bollards. They were initially placed on Sunrise Boulevard, Riverview Drive and Porcupine Boulevard. This pilot program has since expanded to other streets impacted by construction detours, including Hill Street pictured in Exhibit 1.1.

The City also uses curb extensions and median islands to both calm traffic and provide pedestrian realm improvements. Permanent speed radar display signs have been installed on Dawson Road and Balsam Street and have been successful in reducing speeds.

In January 2017, the City received a traffic calming study for the Arundel Street Active Living Corridor. The study recommended near-term traffic calming measures be implemented along the corridor, comprising of flexible bollards, radar speed display signs, additional speed limit signage, additional bike lane and multi-use trail signage, and increased intermittent police speed enforcement. City Council has approved these recommendations and the City is proceeding with implementation. The study also recommended longer term measures that could be implemented in the corridor.

Exhibit 1.1: Speed limit bollard on residential Hill Street



Source: https://www.tbnewswatch.com/local-news/temporary-no-parking-signs-installed-on-hill-street-south-685889?platform=hootsuite - August 3

1.3 Traffic Calming Principles

Traffic calming principles applied in a consistent method for all requests will maximize the effectiveness of the traffic calming strategy. These principles, which are consistent with best practices in the industry, are intended to foster community support to ensure that traffic calming plans meet the needs of those who made the local request, as well as those of the affected community.

- Find out what the neighbourhood thinks: Neighbourhood support may be the single most important principle when considering traffic calming. A city-wide traffic calming process is appropriate for general selection and implementation criteria and requirements, but every neighbourhood has its own unique identity and there is a chance that city staff and/or outside consultants will not recognize special attributes or problems that are specific to a particular request. Additionally, it is important to confirm that individuals requesting traffic calming represent the views of the majority in the neighbourhood. Input and support from all affected parties is needed for successful implementation.
- Identify the real problem: It is important to listen to and consider all
 issues raised by the community, but care must be taken to separate the
 real problem from the perceived problems. Incorrect assessment may
 lead to worsening of the problem or possibly to the introduction of a
 new problem. For example, if volume and speed are perceived as

issues, but the problem is only speed, measures that decrease traffic volumes may inadvertently increase speed.

- Quantify the problem: How fast is "speeding"? How much traffic is "too much"? Residents are more likely to understand and accept a decision when a fair, equitable and defensible process can be demonstrated.
- Consider improvements to the primary road network first:
 Whenever possible, if a traffic problem at a particular location is the result of a shortcoming on the arterial road network, every effort should be made to address the problem at the source. In some cases, the solution may be as simple as modifying the signal timing at an arterial intersection, removing motivation for drivers to seek alternate routes via local streets.
- Use self-enforcing measures: Sufficient police presence does not exist to enforce every speed limit or stop sign throughout the City 24hours a day, seven days a week. 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 more effectively than turn restriction signs.
- Start with the least restrictive measures: The residents of a street or community must be able to live with the traffic calming solution. Also, transit and emergency services need to be able to serve the community efficiently. 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.
- Temporary measures: In some cases, the extent of the problem may not be easily identified. For example, it might not be clear until after implementation that a traffic problem would shift to an adjacent street. Many traffic calming measures can be installed on a temporary basis and monitored for performance. It is less expensive to remove a temporary device than a permanent device if it becomes necessary, 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 address the problem. Post-implementation data collection is equally important as pre-implementation.

1.4 Resources

The primary resources for traffic calming in North America are:

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.

A 2016 update of this guide is in progress and publication is anticipated in the near future.

U.S. Traffic Calming Manual

In 2009, the American Planning Association Planners Press and the American Society of Civil Engineers published the *U.S. Traffic Calming Manual*. The manual, which evolved from a Delaware Department of Transportation design manual, provides engineers and planners with guidance for selecting the right traffic calming measures, design and installation. It also discusses the establishment of traffic calming programs, and how to ensure that the program is standardized, yet still flexible when required.

National Association of City Transportation Officials (NACTO) Urban Street Design Guide

While not specifically a traffic calming guide, the NACTO *Urban Street Design Guide* provides a toolbox of street design elements including horizontal and vertical speed control elements.

Traffic Calming: State of the Practice Report

The 1999 report by the Institute of Transportation Engineers contains a summary of traffic calming experiences in North American cities. The report uses information from 20 communities that were extensively consulted and an additional 30 that were surveyed.

2 Traffic Calming Toolbox

The following has been adapted from the TAC Traffic Calming Guide and the National Association of City Transportation Officials (NACTO) Urban Street Design Guide, as well as traffic calming guidelines from other municipalities. Thunder Bay can draw from these measures to develop its own traffic calming program.

Traffic calming includes the following:

- Horizontal design elements;
- Vertical design elements;
- Access restriction;

- Education and enforcement;
- General road design; and
- Other traffic control devices.

Each category of traffic calming elements is described in greater detail below.

For a detailed explanation of each type of device mentioned here, including potential benefits, relative cost and applicable road class as well as additional devices, see the City of Thunder Bay's *Traffic Calming Primer* in Appendix A.

2.1 Horizontal Design Elements

Horizontal design elements are design interventions that change the lateral course of the roadway.

Horizontal design elements include:

Curb extensions:

A physical extension of the curb that reduces the width of the roadway by extending the boulevard and or sidewalk into what was the travel lane or parking lane.

Curb extensions are often used at intersections to reduce pedestrian crossing distance, or they can be used in conjunction with median islands or traffic circles.



Photo credit: IBI Group

Gateway: Curb extensions at an intersection which narrows the

crossing for pedestrians and signals to drivers that they are entering a lower speed environment. This may also be

combined with a midblock crosswalk.

Pinch point: A midblock curb-extension that reduces the roadway width.

Curb Radius Reduced curb radii create intersection corners with a smaller radius, which slows right-turning vehicles and

reduces the crossing distance for pedestrians.

Chicane:

A narrowing of the roadway to one lane that results in a slight s-turn that can be implemented by utilizing curb extensions on alternating sides of the streets. Chicanes can be used on two-way or one-way streets. When used on two-way streets, the chicane forces drivers to slow down and

yield to oncoming traffic.

When used on two-way streets, chicanes should only be used on local roads with relatively high traffic volumes with approximately equal directional splits to raise the possibility of drivers having to yield to other vehicles. Two-lane chicanes are not advisable, as they offer little volume or speed reduction and may increase crash potential from drivers straddling the centre line.



Photo credit: IBI Group

Lane shift: Similar in effect of a chicane, but the roadway continues off-

set in each direction.

On-street parking:

Parking can have the effect of narrowing the roadway, encouraging drivers to operate their vehicles with caution. Parking can also be used to create chicanes by alternating the side of the street on which parking is allowed. For onstreet parking to be effective there has to be a steady supply of parked cars.

Bus bulbs: Bus-length curb extensions that function as bus stops that

also have the effect of narrowing the roadway, slowing down traffic and decreasing pedestrian crossing distance.

Median islands: Raised medians in the centre of the roadway that have the

effect of separating opposing flows of traffic provide horizontal deflection and provide more pedestrian space.



Photo credit: IBI Group

Traffic Circle

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 or stop control. Traffic circles consist of a raised island constructed in the centre of an intersection. Traffic circles are typically constructed with mountable curbs, to allow for larger vehicles such as buses to pass over them if necessary. 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.



Photo credit: IBI Group

Advantages of Horizontal Design Elements

- 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 of Horizontal Design Elements

- 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 cyclists due to constrained travel portions of the roadway; and
- Typically do not impact through traffic volumes.

2.2 Vertical Design Elements

Vertical design elements are design interventions that that change the vertical course of the roadway.

Vertical design elements include:

Speed bump: A very short, raised, rounded element that requires very

slow speeds to pass comfortably.

Speed hump: A short, raised, rounded element that is less aggressive

than a speed bump at lower speeds, but require drivers to

slow down to pass comfortably.



Photo credit: IBI Group

Speed table: A longer, raised element with a flat top that is longer than a

speed hump. It may be combined with a midblock

crosswalk. These typically slow drivers less than humps or

bumps.

Raised Similar to a speed table, but the entire intersection is raised

intersection: to the level of the sidewalk.

> Speed cushion: A variation of the speed hump that is designed in such a

way that emergency vehicles can pass without slowing

down.



Source: nacto.org

Raised crosswalk: Raised crosswalks highlight the functional area of an intersection and reduce vehicle speeds. Depending on surface treatment they may also improve the streetscape.

Advantages of Vertical Design Elements

- Effective in reducing operating speeds; and
- Do not impact local access.

Disadvantages of Vertical Design Elements

- 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; and
- Typically do not impact through traffic volumes significantly.

Access Restriction Elements 2.3

Access restrictions are designed to reduce traffic levels on local roads and discourage the use of local roads for through traffic.

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Access restriction elements include:

Diverter: An angled closing of a four-way intersection forcing drivers

to turn in only one direction while pedestrians and cyclists

may pass in any direction.



Source: Image data: ©2018 Google

Alternating oneway segments: A strategy that has the effect of eliminating direct through routes by alternating the direction of one-way segments at each block intersection, forcing drivers to meander through the street grid, discouraging pass-through traffic.

Turn or through movement restriction medians

Restrictions on turning or through movements, using a physical median or barrier, to direct the flow of traffic.

Advantages of Access Restriction

- Reduces road user conflicts and volumes; and
- Require little or no enforcement.

Disadvantages of Access Restriction

- Penalizes local traffic access;
- Reduces access to transit, emergency services, delivery service, etc;
- Complicates road maintenance efforts in the vicinity of devices; and
- Potential to divert both local and through traffic to parallel or alternative routes.

2.4 Education and Enforcement Elements

Education and enforcement are strategies that can complement the engineering solutions described above.

Education and enforcement strategies include:

Radar speed display signs:

Signs that alert drivers to their current speeds. They may be designed to be triggered only if the driver is over a predetermined speed, or may respond to higher speeds by flashing or some other means to inform drivers that they are speeding.

Speed or red light cameras:

Automatic devices which mail traffic tickets to offending drivers that, when coupled with signage to alert drivers of their presence, can improve driver behaviour significantly. Speed cameras are currently only permitted in community safety and school zones in Ontario.

Traditional enforcement:

Deployment of traffic officers to ticket offending drivers. Typically a sustained and visible presence is required to impact driver behaviour.

2.5 General Road Design Features

Although not specific to traffic calming, urban road design features that encourage drivers to travel at slower speeds that could be applied to retrofit existing or in the design of new subdivision roads are described below:

Narrow Lanes

Narrow lanes encourage drivers to travel at lower speeds because they create the perception of travelling at a higher speed. Wider lanes, by contrast, are more forgiving to higher speeds, in part because they make higher speeds more comfortable. Narrow lanes can also reduce pedestrian crossing distances and can sometimes be used to reallocate roadway space for bike lanes. It must be noted that narrowing lanes through restriping alone is unlikely to reduce speed; an accompanying physical intervention is usually necessary.

Two-way street or yield street:

The application of bi-directional traffic on narrower local roads, which forces drivers to share space with oncoming traffic and yield while oncoming drivers clear sections of the road narrowed by parked cars.

Street trees:

A similar effect to on-street parking, street trees close to the roadway provide a less forgiving roadway, narrowing sightlines, which encourages drivers to operate their vehicles with caution. Buildings that are closer to the road right-of-way (i.e. smaller setbacks) could have a similar effect.

The effectiveness of street trees as a traffic calming device is questioned in the literature, but street trees are at the very least a good streetscaping measure. Furthermore, when vegetation is close to the street, there may be wildlife considerations.

2.6 Other Traffic Control Measures

Traffic calming devices are intended to be self-enforcing and therefore regulatory signage, with the exception of speed limit signs, should not be used as traffic calming devices in Thunder Bay. Even speed limit signs cannot act as stand-alone traffic calming devises without accompanying physical design features.

Turning Restrictions

Turn restrictions may be considered as traffic calming to reduce traffic volumes on local streets, however, there are two important caveats. Turning restrictions are not self-enforcing and may not by themselves deter motorists from making the turn, especially on low volume roads. Additionally, while it is possible under the Ontario Highway Traffic Act to enforce turn restrictions at particular times of day, it is not possible to enforce a "local traffic only" or "local traffic exempted" plate on a sign. If a turning restriction is in place, it must be in place for all vehicular traffic, with the exception of city transit buses.

Traffic Signal Timing

On signalized collector and arterial roads that may not be suitable for most physical traffic calming measures, traffic signal timing is a potential approach. Traffic signals can be set so that drivers get a progression of green lights if they proceed below a certain speed. If signals are set for 50 km/h, for example, drivers travelling faster will encounter red lights at downstream intersections, removing an incentive to speed. However, the effectiveness of this measure depends on traffic signal spacing and block length. Traffic signal timing is most effective on streets with short blocks and short traffic signal cycles. The balance of traffic travelling in each direction also impacts the effectiveness of this measure.

All-Way Stops

Unwarranted stop signs should not be used to control speed. Stop signs are not self-enforcing and may be ignored by drivers if there are too many. Drivers may also speed in between all-way stops to make up for the perceived lost time. There are also negative environmental implications from increased idling at stop-controlled intersections.

Stops sign implementation should follow existing stop sign warrant criteria.

2.7 Winter Considerations

While traffic calming can present some challenges for winter maintenance, these challenges are usually manageable and do not outweigh the benefits of traffic calming. Many cities that experience significant winter weather have robust traffic calming programs including Ottawa, Montreal, Toronto and New York.

There are several steps that can be taken to mitigate the impact of traffic calming on snow clearing operations and ITE and NACTO report few issues with winter maintenance in practice.

For vertical measures, such as speed humps, signs above the snow level that warn snow plow operators of the approaching obstruction have been found to be effective. This can also be effective for horizontal measures such as curb extensions that may be snow covered.

Cities may also consider installing traffic calming infrastructure that can be removed in the winter, such as removable speed bumps. However, removing infrastructure in the winter also removes the benefits of traffic calming for a significant portion of the year. Rather than remove infrastructure, some cities have made modifications to their snow plowing equipment and/or practices to account for the infrastructure.

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^{1.} Details on snow plowing procedures can be found in the Institute of Transportation Engineers *Traffic Calming: State of the Practice* (http://library.ite.org/pub/e2783a08-2354-d714-5103-5a552edd7486)

3 Recommendations

3.1 Process

This traffic calming process is designed for application to local and collector roads. The rationale behind the decision to limit the application of the traffic calming process is based on the function of higher order arterials (major and minor) to move higher volumes of people and goods in and through Thunder Bay. Restrictive measures applied to arterial roads are likely to shift traffic onto lower-order roads and into neighbourhoods. However, there may be minor arterial roads where the effects of traffic calming are desired and a few specific traffic calming measures may be appropriate to the context. In such situations, additional study, analysis and feasibility would be required.

Warrant Criteria

Traffic calming is not appropriate in all situations nor on all roadways. Many municipalities have developed systematic and transparent screening criteria to determine whether traffic calming is warranted.

Based on Thunder Bay's existing *Traffic Calming Primer*, a review of traffic calming processes in other cities, and a review of general guidelines, a six-step traffic calming planning and implementation process is recommended. The process provides flexibility for the City to select criteria that best meet its needs. The process includes initiating a request, a preliminary safety and operations review, a technical review and design, a residential survey if traffic calming is appropriate, Council approval and monitoring.

1. Request for Traffic Calming

A request for physical traffic calming can be initiated by one of four ways:

- Upon receipt of a petition signed by at least 66% of affected residents (or 50% in the case of a multi-unit residential building)²;
- A deputation to Council followed by a vote to initiate the request;
- A request by the City's Traffic Safety Committee; or
- A recommendation by City staff.

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^{2.} The number of affected residents at the request stage is the number of residents who live on a street or a section of a street where a traffic calming issue has been identified. This may be different from the number of residents affected once a specific measure is proposed (see step 0 – Area Resident Survey)

2. Safety Review and Operations Review

Once a request for traffic calming is made, the City's Traffic Safety Committee will conduct a preliminary safety and operations review.

The preliminary review will assess the seven criteria below. These criteria should use a yes/no threshold.

Criteria	Description
Road grade	Grades in the vicinity should not exceed 8%. Grades exceeding 8% are not appropriate for traffic calming as measures on steep roadways may create unsafe situations for drivers to negotiate, particularly in winter weather.
Speed limit	The posted speed limit is 50km/h or less. Roads posted at 60km/h or greater may be candidates for increased police enforcement, changes to road design to decrease speeding, and/or traffic signal timing changes.
Emergency response	Traffic calming measures should not have a significant impact on emergency services response times. Certain measures may be more appropriate than others (e.g. horizontal deflection)
	Thunder Bay Fire Rescue, Superior North EMS, and the Thunder Bay Police Service must be consulted before traffic calming measures are implemented.
Transit	Traffic calming measures should not have significant impacts to scheduled transit services. Municipalities often limit the types of traffic calming measures that can be applied (i.e. horizontal deflection) on transit routes.
	Thunder Bay Transit must be consulted before traffic calming measures are implemented on a transit route.
Block length	The block length between controlled intersections should be greater than 110-120 m to warrant traffic calming. Shorter block distances indicate that vehicles do not have sufficient space to attain excessive speeds.
Adjacent land uses	Some municipalities prioritize traffic calming on streets with certain types of land uses, especially land uses that generate pedestrian traffic and generate vulnerable pedestrian traffic – e.g. schools and seniors homes.

Rural roads Traffic calming is typically only applied to roads in urban

areas. Speed reduction on rural roads presents specific challenges that may be better served through increased enforcement and/or changes to the road's design.

If the above criteria are satisfied, the request can move to the Technical Review stage.

3. Technical Review and Design

The technical review will help identify the nature of the traffic calming concern, which will then inform appropriate solutions if the review determines that traffic calming is appropriate. The criteria presented can either use a yes/no threshold or a points system, where each criteria is assigned a point value and a certain point threshold is required for proposed traffic calming to move to the next stage in the process. The thresholds could vary by street type, with a lower threshold on local roads, and also by schools, and a higher threshold on collector roads.

Criteria	Description	
Speed	A speed survey indicates that the 85 th percentile travel speed exceeds the threshold limit, where the threshold is 10 km/h above the speed limit on local roads or school areas and 15 km/h above the speed limit on collector roads, or more than 20% of vehicles are travelling 50% above the speed limit.	
And/or		
Traffic Volumes	A traffic survey indicates vehicular volumes exceed typical volumes for a local or collector road. Volume thresholds are 1,000 daily vehicles for a local road and 2,000-2,500 for a collector road.	
Collision history	A high frequency of collisions or an identified pattern of collisions may indicate other problems and a safety review will be completed prior to traffic calming.	

If the above criteria indicates that traffic calming is appropriate, City staff will identify which measure or measures are appropriate based on the identified problem(s).

4. Area Resident Survey

If, based on the results of the previous steps, traffic calming is appropriate and a proposed measure or series of measures is identified by City staff, then an area resident survey is conducted to ensure that at least 66% of affected residents are supportive of the proposed measure(s).³

Approval

City Council will vote on the proposed traffic calming measure(s). City Council has the final say regardless of the results of the area resident survey.

6. Implementation

If approved by Council, the traffic calming measure(s) is scheduled into the City's public works schedule. At this stage, City staff may want to have criteria for prioritizing projects, in cases where there are more approved projects than budget available.

3.2 Policy

The City of Thunder Bay recognizes that traffic calming measures can help slow down traffic and improve the safety of the City's streets. In order to plan and implement traffic calming in a manner that is fair, reasonable and consistent, the City should adopt a policy to apply the standardized traffic calming process to all requests for traffic calming by the public, businesses, schools, or Council.

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^{3.} The number of affected residents depends on the proposed measure. For example, if speed humps are proposed for a single block, only the residents on that block are affected. If the proposed measure restricts access or changes the direction of traffic flow, as in the case of alternating one-way segments or diverters, for example, residents on adjacent streets will also be impacted.

4 School Zone Pick-Up/Drop-Off

Although not typically part of a municipal traffic calming strategy, school zone pick-up / drop-off areas are locations that could greatly benefit from traffic management and/or traffic calming.

Pick-up and drop-off areas in the periods before and after school hours can be a disorganized and chaotic scene leading to unsafe traffic conditions. Ensuring safety during school pick-up and drop-off times requires a multifaceted approach that includes education and enforcement, traffic calming design interventions and appropriate school design features. City-led programming interventions will require additional staff resources.

Encouraging Non-Motorized Transportation

Reducing the number of students who are driven to/from school by car is a major component of a traffic calming program in school zones. There are many reasons that students may be driven to school including distance to the school, the relative convenience of a parent/guardian dropping a child off at school on the way to work and concerns about children walking without adult supervision en route to school. Safety concerns relating to the presence of car traffic is one of the top factors limiting students from walking and cycling to school, which itself contributes to more car traffic.⁴

Traffic calming can have a role in reducing traffic safety concerns on a student's route to school by both slowing down traffic and making pedestrians more visible. Schools can encourage active transportation through a variety of initiatives such as bike safety programs and organized bike-to-school or walk-to-school days, among other initiatives.⁵

Education and Enforcement

In addition to educating parents and students on non-motorized transportation options, educating parents and students on safe pick-up and drop-off procedures is also essential. Pick-up and drop-off procedures can be shared via the school website and newsletters, and the students themselves can be reminded of proper procedures on a regular basis.

Procedures also need to be enforced to ensure their effectiveness. Enforcement may take the form of school administration, teachers, other staff or parent volunteers that actively direct pick-up and drop-off procedures. Research that surveyed drop-off / pick-up activities at various schools throughout North America indicates that the schools with staff and/or parents who are committed

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^{4.} http://smartcommute.ca/wp-content/uploads/2016/03/Phase-2-Childrens-Independent-Mobility-in-Toronto-EN.pdf

^{5.} Additional information on active transportation to and from school: http://www.metrolinx.com/en/projectsandprograms/schooltravel/School_Travel_Planning_in_Action_in_Ontario_EN.pdf

to actively managing the drop-off / pick-up on a daily basis are most successful in managing congestion and traffic conflicts.

Traffic Calming

Traffic calming on streets surrounding schools can help slow down traffic and create safer conditions for pedestrians and cyclists. The techniques described in Section 2 can be applied to streets surrounding schools, as long as the streets also meet traffic calming warrants. School zones can be priority locations for traffic calming devices, particularly devices such as curb extensions and raised intersections that make pedestrians more visible.

School Site Design

School site design has a significant impact on pick-up and drop-off operations as well as overall student pedestrian and cyclist safety. Older schools were built at a time when many students walked to school and were not designed to accommodate a high volume of pick-up / drop-off activity on site. However, newer schools that include pick-up / drop-off areas may still require active management by school staff and/or parent volunteers to ensure smooth and safe operations.

School sites with serious issues may require a traffic management plan developed in consultation with City Engineering staff to retrofit a designated pick-up / drop-off area on site, if possible, or to designate areas on the adjacent roadways for pick-up / drop-off activities with an associated circulation plan for parents, public transit and school buses.

Appendix A: Thunder Bay Traffic Calming Primer

The Traffic Calming Primer is available as a separate document at thunderbaytmp.ca