Policy Group:	**Public Works**
Policy Title:	**Traffic Calming Policy**
Policy Number:	**W.14**
Date Approved/Amended:	**February 11, 2020**

1.0 INTRODUCTION

Residential streets are meant to be shared by pedestrians, cyclists and motorists alike. On local and collector residential streets, users should be able to co-exist in harmony and do so in a relatively safe manner. In neighbourhoods that have this dynamic, the streets feel safe and are a pleasure to walk, cycle and drive over. These are the streets and neighbourhoods that we want to create for all residents to enjoy.

Unfortunately, both real and perceived problems exist that may be related to traffic volumes, speeds, geometry and general operations. These issues result in local streets that are not perceived as being pleasant or safe for children, pedestrians, cyclists or motorists. It is in the best interest of municipalities to address traffic and pedestrian safety issues in a consistent manner. Many municipalities throughout Canada and North America are putting "Traffic Calming" policies in place to deal with neighbourhood traffic and speeding concerns in a consistent and appropriate manner.

1.1 TRAFFIC CALMING - DEFINED

Traffic calming, as defined by the Institute of Transportation Engineers (ITE) Subcommittee on Traffic Calming, 1997 is:
"The combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behaviour and improve conditions for non-motorized street users."
According to the Canadian Guide to Neighbourhood Traffic Calming, prepared by the Institute of Transportation Engineers (ITE) and the Transportation Association of Canada (TAC), December 1998:
"The purpose of traffic calming is to restore streets to their intended function."
The primary purpose of traffic calming under this policy is to educate the public and motorists and alter motorist behaviour to reduce high traffic speeds within residential neighbourhoods and thus improving safety and conditions for pedestrians and area residents.

1.2 TRAFFIC CALMING TERMS AND BASIC ACRONYMS

"Street Classifications" – Streets within a municipality are often classified to describe their role

and functionality in the road network system. Four road classifications used by the Town of Carbonear are minor streets, local streets, collector streets and arterial streets.

"**Minor Streets**" – An existing street designed primarily to provide access to adjacent properties that have a reservation of 10 m or less where, for practical purposes, a wider street reservation cannot be provided, as determined by resolution of Council.

"**Local Streets**" – A street designed primarily to provide access to adjacent properties and which is not designated as a collector or arterial street that have a reservation of 12 m to 15 m. These are all streets that have not been designated as a minor street, collector street or arterial street. Speed on these streets is 40 km/h.

"**Collector Streets**" – A street that collects traffic from local streets and connect to Arterial Streets. The speed limit on these streets is 50 km/hr. Access to individual properties and the movement of traffic are given equal priority. Right-of-way widths are typically larger than local street rights-of-ways. Collector streets will not be eligible for vertical traffic calming measures. The following are collector streets within the Town of Carbonear: London Road, Valley Road, Highroad South, Highroad North, Bond Street, Water Street West to Bond. These have a reservation of 20 m.

"Arterial Streets" – A street designed to be the main traffic arteries of an area to move traffic within a road network system and typically not eligible for traffic calming measures. Right-of-way widths are typically larger than local street rights-of-ways. Powell Drive is an arterial street in the Town of Carbonear. The reservation is between 25 and 30 m. The speed limit is 50 km/hr.

"Provincial Highway" – The Town has a provincial highway within the Town boundaries. The civic name is Columbus Drive. This highway is under the jurisdiction of the Province of Newfoundland and Labrador.

"**ADT**" – Average daily traffic recorded on a roadway over a 24-hour period.

"**AADT**" – Average annual daily traffic on a roadway over a 24-hour period-based data collected over a year.

"**VPD**" – Vehicles per day.

"**85th Percentile Speed**" – The speed separating the fastest 15% of vehicles from the slowest 85%. This speed is typically used by traffic professionals for a variety of reasons including to gauge the magnitude of a speeding problem.

"**Pedestrian Facilities**" – Typically include sidewalks and off-road trails.

"**Pedestrian Generators**" – Facilities that typically attract pedestrians; examples include parks, schools, and community centres.

"**Vulnerable Road Users**" – Vulnerable road users can be defined as any non-motorist that use the roadway, such as pedestrians and cyclists.

"**Through Traffic**" – Traffic that neither originates from nor is destined to a specific neighbourhood.

This would include traffic that uses a neighbourhood street for convenience only.

"**TAC**" – Transportation Association of Canada.

"Vertical Traffic Calming Measures" – Provide an obstruction that vehicles are able to travel over.
"Horizontal Traffic Calming Measures" - Tries to prevent vehicles from traveling in a straight line at excessive speeds by using measures such as raised islands and curb extensions.

1.3 TRAFFIC CALMING PURPOSE AND GOALS

The overall purpose of this policy is to provide a comprehensive process that addresses local neighbourhood traffic issues in the Town of Carbonear. The policy is to assist with having streets function as intended through applicable traffic calming measures, and hence, preserve and enhance the quality of town streets. The specific goals of this traffic calming policy are to develop an integrated set of policies, objectives and procedures that will combine to form a set of overall working guidelines that will:

- Educate residents about traffic calming so they can understand the rationale behind the Town's decision-making process and provide the town with an effective, fair and consistent tool in evaluating speeding and/or traffic volumes and providing measures to keep streets relatively safe by addressing issues identified.
- Provide a standard format for dealing in a consistent manner with complaints regarding speeding and traffic safety concerns.
- Reduce the workload and duplication of effort for town staff while responding to resident traffic concerns.
- Educate people on how to create a safe and a pleasant roadway environment for residents, motorists, cyclists and pedestrians.
- Encourage public involvement in the traffic calming activities.
- Educate residents on pedestrian and cyclist safety.

This policy will also provide the guideline, procedure and criteria for the initiation, investigation and implementation of traffic calming measures within existing residential neighbourhoods. The policy will ensure safety concerns related to speeding and excessive volume are handled in a fair, transparent and efficient manner. Guidelines included in this policy will be applied mainly to local streets within residential neighbourhoods.

The policy generally does not apply to arterial and collector streets nor does it apply to anticipated future problems. This policy only applies to identify operational issues within existing residential areas. The main highway entering the town is a provincial highway and not under the jurisdiction of the Town and will not be covered by this policy. While similar traffic related issues may exist on arterial and collector streets, the primary function of these streets is to move traffic efficiently. Therefore, traffic calming measure(s) that may be appropriate for use on local streets would not be suitable for use on the highway, arterial and collector streets.

There may be consideration given to some forms of horizontal deflections for collector streets, if deemed necessary.

1.4 WHAT IS **NOT** TRAFFIC CALMING?

Over the past 30 years there has been a significant amount of knowledge gained through the implementation of successful projects to determine what traffic calming measures work and which traffic calming measures are not effective. The all way stops, reduced speed zones, children at play signs, posted speed signs, rumble strips and speed bumps are all devices commonly mistaken for being traffic calming tools. None of these devices works to calm traffic for the reasons listed below:

Unwarranted All Way Stop

- Creates higher traffic speeds between stop signs. Studies have determined the speed is only reduced for 100 m on either side of the intersection.
- Results in poor compliance with stop signs due to driver frustration, as low as 1% in some studies in some jurisdictions.
- Results in more frequent rear-end collisions caused by low percentage of motorists who actually do come to a complete stop.
- Requires frequent police enforcement as motorists do not stop, a drain on manpower resource.
- Potential risk to pedestrians **especially children and seniors** crossing an intersection, since not all motorists approaching an intersection will stop.
- Motorists get in the habit of stopping at unwarranted all-way stop locations, then assume at a 2 way stop cross traffic is going to stop and pull out in front of an opposing vehicle which results in a collision.

In light of the above, all-way stops should not be used as a tool to calm traffic. There are established criteria for all-way stop control based upon the numbers of pedestrians and vehicles sharing an intersection, the collision history and visibility. When these criteria are followed, risks are minimized and new safety concerns are not created. There have been numerous studies completed in North America which have validated all of the above findings.

Reduced Speed Zone

- People travel at a speed they feel comfortable based on the environment though which they are driving regardless of the posted speed limit.
- Compliance with an artificially reduced speed is only achieved with consistent and visible police enforcement, a resource which is not always available.
- Collisions, when they occur, can be more significant due to the differences in speed between vehicles.

- Pedestrians may perceive the roadway to be safer due to the reduced speed limit. This false sense of security may lead pedestrians that are crossing the roadway to not be as cautious as they would be otherwise.

'Children at Play' Sign

- Many signs in residential areas, which are installed to 'warn' people of normal conditions, fail to improve safety.
- Warning signs can be effective tools if used sparingly and only to warn motorists of uncommon hazards that are not apparent to motorists.
- 'Children at Play' signs can give parents a false sense of security since motorists often disregard these signs.
- Children playing in the streets, while common place, is dangerous and prohibited in the Highway Traffic Act.
- Since children live on nearly every residential block, 'Children at Play' signs would need to be placed on every roadway.
- Residential blocks with no signs might imply that no children live there, so it is acceptable to exceed the posted speed limit.

Speed Limit Sign

- The posted speed limits for roadways are typically established based upon recognized engineering criteria related to the roadway design.
- Posted speed limits, which do not match the characteristics of the roadway frustrate motorists and tend to foster aggressive driving habits. There are several examples where speed concerns exist primarily as a result of assigned speed limits that neither reflects the design speed nor the operating conditions of the roadway. Large discrepancies between posted speed limits and operating speeds can create a false sense of security for all road users, including pedestrians and places an additional enforcement burden on the Police.
- Reducing posted speed limits, without changing the characteristics of the roadway to encourage reduced speeds has been shown to have a minimal impact on vehicle operating speeds.
- Posted speed limits should be implemented in a consistent manner so that the speed limits maintain a level of credibility and compliance when the posted speed limit is applied properly. Reduced speed limits seem to provide the greatest result in situations when they are self-enforcing
- Additional signage and/or adjusting the posted speed limit of a roadway are not considered to be traffic calming measures.

Rumble Strip

A Rumble Strip is a raised pavement section that can be closely spaced along a roadway at regular intervals. Rumble strips are a road safety feature used to caution inattentive motorists

of potential danger. As the motorist travels over the rumble strips, the vehicle experiences both noise and vibration to alert the motorist.
They are typically installed along freeways and higher speed roadways to alert motorists that may begin to veer from the travel lane to the shoulder. Their purpose is to reduce the number of vehicles that depart the roadway; this is a common example of rumble strips used to enhance safety. Rumble strips can also be installed across the travel lane itself when unusual conditions exist ahead.
Rumble Strips can be installed along the travel lanes of a higher speed roadway that contains an isolated all-way stop controlled intersection. A motorist may grow accustomed to traveling at a certain speed and otherwise may not expect to stop; the purpose of the rumble strip is to alert the driver. This is a common example of rumble strips to alert motorists of a condition that is unusual to a specific roadway.
Rumble strips should not be used as traffic calming measures. These measures become less effective over time as the motorists grow accustomed to them. Rumble strips also increase noise levels for nearby residents and commonly require additional maintenance.

Speed Bumps

These measures should not be confused with speed humps. Speed bumps are vertical obstructions often found in privately-owned parking lots (shopping centers, schools, condominium complexes, parks, etc). Speed bumps typically measure between 75 mm and 100 mm in height and 3 m in length, and are often designed for a designated speed that is much lower than a typical posted speed limit along a public roadway.
Traffic calming measures should be designed and implemented with the purpose that vehicles will be able to comfortably travel at the posted speed limit. In contrast, speed bumps require vehicles to travel much slower to attain a comfortable travel speed. The necessary braking and slow speeds can create a safety hazard, possibly causing rear-end collisions.
In summary, speed bumps should not be installed on public roads and are not considered to be a traffic calming measure.

1.5 ADVANTAGES AND DISADVANTAGS OF TRAFFIC CALMING

Traffic calming if used properly will address identified operational traffic issues. However, it will also introduce some disadvantages to a residential neighbourhood that will impact area residents after the project is complete. Listed below are some of the advantages and disadvantages created or caused by traffic calming measures:

Advantages

- Reduced vehicle speeds
- Reduced number of cut through vehicles; therefore, reduced traffic volumes
- Improve neighbourhood safety especially for pedestrians
- Reduced conflicts between roadway users

- Increase compliance with regulatory signs

Disadvantages

- Potential increase in emergency vehicle response time
- Could make it more difficult to get into and out of your neighbourhood every day
- May result in expensive solutions (time and resources)
- May shift or divert traffic onto neighbouring roadways
- Increase maintenance time and costs
- Add visually unattractive warning signs to a residential area
- May splinter neighbourhood with strong 'for and against' traffic calming opinions

2.0 TRAFFIC CALMING METHODOLOGY

The following Methodology will be used to manage traffic calming issues throughout the Town of Carbonear.

The process has been organized into 10 basic steps which are as follows:

- Step 1 – Initial request for traffic calming
- Step 2 – Initial screening process
- Step 3 – Ranking requests, once the request passes Step 2
- Step 4 – Prioritized candidate list produced for council approval and funding allocation
- Step 5 – Initial residential support – survey – 60 % support – champion e-mail listing
- Step 6 – Plan development
  - Initial concepts by staff/consultant
  - Tool box of available options
  - Presentation to residents of street being considered for traffic calming measures
  - Input from street residents– plan development
- Step 7 – Resident support
  - Staff to finalize concept plans and descriptions
  - Distribute to neighbourhood
  - 60% support
- Step 8 – Final council approval
  - Staff to revise estimated costs
  - Provide council with final concept plans
- Step 9 – Design, tendering and construction
  - Preliminary design
  - Detailed design
  - Tendering
  - Construction

- Step 10 – Staff follow up
  - Staff to verify that the traffic calming measures effectively addressed the issues that prompted the original request.

2.1 STEP 1 – INITIAL REQUEST FOR TRAFFIC CALMING

The traffic calming process is most often initiated by a resident or group of residents representing a neighbourhood and the concerns are most often related to the speed of and/or the traffic volumes on a particular street(s) in a neighbourhood.
To begin the traffic calming process, the resident(s) concern(s) must be made in writing using the Town's "Traffic Calming Request Form" and sent to the appropriate Town staff for follow up. The "Traffic Calming Request Form" should be made available on the Town's webpage, or in hard copy at the appropriate Town facility. An example can be found in Appendix A.

2.2 STEP 2 – INITIAL SCREENING PROCESS

The initial screening process that will be undertaken by the Town of Carbonear staff who will consider the classification of the street(s) under consideration, grade, collision history, average daily traffic volume and the defined threshold limits in the 85th percentile speed. The specific considerations include:

- **Grade –** If the grade of the roadway being considered exceeds 8%, then traffic calming should not be considered any further. This approach would be consistent with many other jurisdictions and stems back to the fact that implementing traffic calming measures on roadways with steep grades could result in safety related issues especially under inclement weather conditions.
- **Collision History –** The collision history of the roadway within the past 3 years specifically involving vulnerable road users such as cyclists and pedestrians which could have potentially been avoided with the implementation of traffic calming measures. This would be cause to advance the street through the initial screening process regardless of the volume and speed criteria. For local streets, this threshold should be set at 3 collisions over a 3-year timeframe. For collectors, this threshold should be set at 6 collisions over a 3-year timeframe.
- **Volumes on Local Roadways –** The thresholds used in other jurisdictions for the minimum volumes upon which traffic calming could be considered for local residential streets varies somewhat but typically falls between 500 and 900 vpd. The Institute of Transportation Engineers (ITE) Trip Generation Manual states that a typical local residential household generates an average of 10 two-way trips per day, therefore it's recommended that the initial threshold be set at 600 vpd for roadways classified as local residential streets. This threshold can always be adjusted once the Town of Carbonear determines the threshold that is adequate for the Town.

- **Volumes on Collector Streets –** The thresholds used in other jurisdictions to determine whether or not collector status roadways are considered for traffic calming tends to range from 1,500 vpd to 3,000 vpd. For collectors within the Town of Carbonear, the threshold will be set at 3,000 vpd. These thresholds can always be adjusted once the Town of Carbonear determines the thresholds that are adequate for the Town.
- **Speed on Local Residential Streets –** On local roadways, traffic calming could typically be considered if the 85th percentile speed exceeds the posted speed limit. The speed limit on local streets within the Town is 40 km/h, unless posted otherwise. Therefore, 5 km/hr over the posted speed limit on the roadway should be used as the threshold for the 85th percentile for local roads.
- **Speed on Collector Streets –** On collector streets, travelled speeds are generally expected to be slightly higher than they would be on local residential streets. It follows then that the trigger for the consideration for traffic calming should be a slightly higher threshold. It is suggested that this criterion be set at 10 km/hr over the posted speed limit as the threshold for the 85th percentile speed on collector streets.

Table 1 – Initial Screening Criteria for Traffic Calming Requests

Criteria	Thresholds			Notes
	Local Streets	Collector Streets	Arterial Roadways	
Grade	< 8%			Traffic Calming is not permitted on roadways with grades exceeding 8%.
Collision History	3	6	n/a	Collision History involving Vulnerable Road Users should be greater than or equal to the values shown over a 3-year period.
Volume	600 vpd	3,000 vpd	n/a	Average Daily Volume should exceed minimum threshold volumes noted.
Speed	5 km/hr over posted speed	10 km/hr over posted speed	n/a	85th percentile speeds should exceed values for each classification of roadway.

Requests for traffic calming on roadways that are classified as Arterial Roadways within the Town's street classification system will not be considered under the Town's traffic calming policy. Traffic calming measures are not appropriate for use on this classification of roadway.

It should be recognized that Powell Drive is an arterial and traffic calming will not be considered. Highroad North and Bond Street, Highroad South, London Road and Valley Road and Water Street West to Bond are classified as Collector Streets. If traffic calming requests are received for these roadways, any potential treatments resulting from the evaluations must include an appropriate traffic calming design solution which considers the function of these roads within the Town's network.

Traffic calming requests for local streets and for collector streets must meet both the volume and speed criteria in Table 1. Requests that meet or exceed the collision threshold criteria shall be considered as having met the minimum initial screening criteria and override the volume and speed criteria. Figure 1 illustrates a flow chart that can be used for screening the initial traffic calming requests.

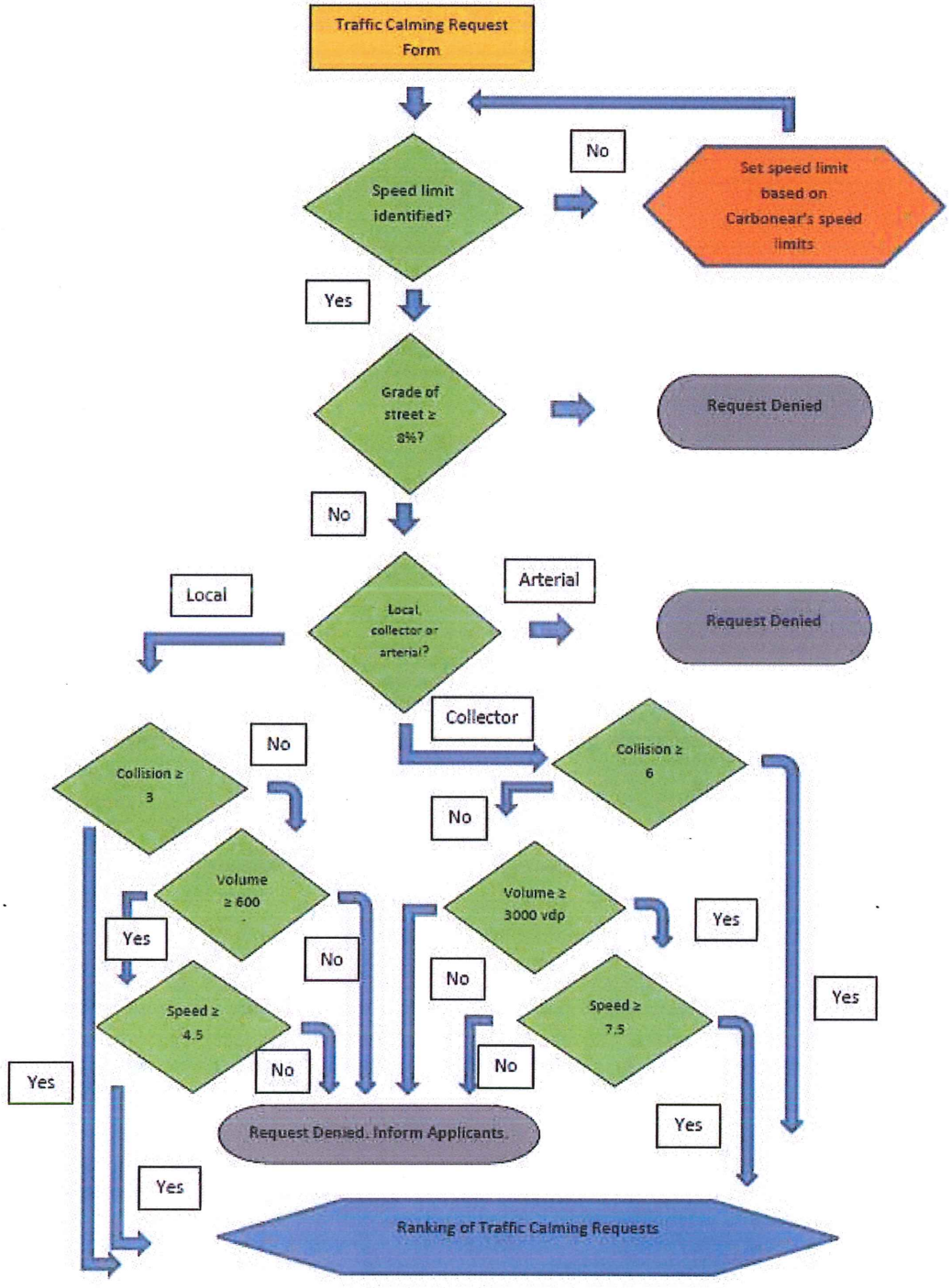


Figure 1 – Initial Screening Flow Chart for Traffic Calming Requests

2.4 STEP 3 – RANKING REQUESTS

The Town of Carbonear, like all municipalities throughout the Northeast Avalon, has limits on the financial resources that it has available to provide services to residents that live in the community. Traffic calming will be one of many programs that Council will have to carefully consider in allocating Capital funding. If Council decides to fund traffic calming initiatives, the Capital amounts are likely to be limited and it is therefore important to rank all requests that pass the initial screening process to ensure the more serious cases receive funding priority.

Local and Collector status streets will be ranked differently to reflect the intended functionality of the roadway. The following criteria should be considered in ranking the requests:

- Collision History
- Traffic Volumes (ADT)
- 85th Percentile Speed
- Presence of Pedestrian Generators
- Pedestrian Facilities
- Non-Local Traffic
- Primary Emergency Route

The weighting of points assigned to the above-noted criteria varies somewhat between local streets and collector streets. An attempt has been made to assign points to the criteria that are considered to be more critical to each classification of roadway, such that more severe concerns receive higher rankings. For example, the presence of pedestrian facilities, while important for both local and collector streets, would be more concerning for collector status roadways where traffic volumes and speeds are likely to be higher and the risk to pedestrian safety would be greater.

The points allocated to the various criteria for local streets are noted in Table 2 below. The points allocated to the criteria for collector status roadways are noted in Table 3.

Table 2 – Ranking Criteria and Points Allocations for Local Streets

Criteria	Method of Allocation of Points	Maximum Points
Collision History	**2 points** for every collision in the previous three years in the study area involving a vulnerable road user	10
Traffic Volumes (ADT)	**1 point** for every 50 vehicles above the 600 min to a max of 20 points	20
85th Percentile Speed	**2 points** for every km/hr the 85th percentile speed exceeds the posted speed limit plus 6km/hr to a max of 30 points	30
Presence of Pedestrian Generators	**5 points** allocated to the presence of a pedestrian generator to a maximum of 15 points	15
Pedestrian Facilities	**15 points** allocated to streets with no pedestrian facilities present	15
Non-Local Traffic	**5 points** allocated for every 10% above 30% non-local traffic present to a maximum of 15 points (max points reached at 50% non-local traffic)	10
Primary Emergency Route	**-5 points** if the roadway under consideration is a primary emergency response route	0
		100

Table 3 – Ranking Criteria and Points Allocation for Collector Streets

Criteria	Method of Allocation of Points	Maximum Points
Collision History	**2 points** for every collision in the previous three years in the study area involving a vulnerable road user	10
Traffic Volumes (ADT)	**1 point** for every 100 vehicles above the 3,000 vpd limit to a max of 20 points	20
85th Percentile Speed	**2 points** for every km/hr the 85th percentile speed exceeds the posted speed limit plus 7.5km/hr threshold to a max of 20 points	20
Presence of Pedestrian Generators	**5 points** allocated to the presence of a pedestrian generator to a maximum of 15 points	15
Pedestrian Facilities	**25 points** allocated to streets with no pedestrian facilities present on either side of the roadway; **15 points** if a pedestrian facility is present on one side of the street	25
Non-Local Traffic	**2 points** allocated for every 10% above 30% non-local traffic present to a maximum of 10 points (max at 80% non-Local Traffic)	10

Primary Emergency Route	**-10 points** if the roadway under consideration is a primary emergency response route	0
		100

2.4.1 Collection of Data

The data required for an accurate assessment of the intersection, roadway or area involved in the traffic calming request requires the following information:

- Collision data
- Average daily traffic
- 85th percentile speed
- Non-local traffic

Collision data for all roadway links and intersections falling within the municipal boundary of the Town of Carbonear should be available by request from the Carbonear Volunteer Fire Department.

Average Daily Traffic (ADT) volumes are normally collected over a 24-hour period using the town's driver feedback sign.

For the purpose of this policy an estimate of non-local traffic will be determined by using the following method:

Applying the following formula:

- Non-local Traffic Percentage = ((ADT - (10 x number of households on the street))/ADT) * 100

2.5 STEP 4 – PRIORITIZED CANDIDATE LIST PRODUCED FOR COUNCIL APPROVAL AND FUNDING ALLOCATION

As traffic calming requests are received and evaluated by staff, the results should be recorded in an overall database. Records of the screening process and point allocation for the ranking, should be recorded and date stamped for each individual street request. As requests are received and evaluated by staff, they should be included in the overall priority list for traffic calming.

This list will provide Council and staff with an up-to-date priority listing of projects that require attention. Projects can be removed from the listing as they are addressed by staff with the funding made available by Council.

2.6 STEP 5 – INITIAL RESIDENTIAL SUPPORT

In order for any traffic calming project to be successful, the community must support the process and be committed to the solutions that are put in place to resolve the problems that are being experienced. History has shown that where this support is not in place, the traffic calming measures that are put in place, often have to be removed because of opposition from area residents.

The Town of Carbonear needs to ensure that the initial resident support for traffic calming is sufficient enough to avoid any possibility of having to revisit a street to remove measures that have been put in place. The initial level of resident support should be a minimum of *60%*.

When a street receives a funding commitment from Council under *Step 4*, Town staff should advise affected residents of the request for traffic calming. This can be done via a survey and requesting feedback and their position as to whether or not they would support traffic calming measures on their street. This would also be an opportunity to solicit the names of residents who would like to participate in a focus group session that assist in formulating the traffic calming solution for the street.

For traffic calming requests that do not receive the required threshold level of support of 60%, the process ends and any subsequent requests street should not be considered again under the policy for a minimum of two years.

2.7 STEP 6 – PLAN/DESIGN DEVELOPMENT

The development of the traffic calming plan will be a combined effort consisting of input from the Town staff and/or their consultant with feedback and suggestions from the residents themselves.

At this stage in the traffic calming process, the Town should facilitate a group discussion on the plan development with residents of the street affected.

Town staff will prepare initial concepts of options to kick start and facilitate the group discussion. It would also be appropriate for the Town to present on traffic calming and the toolbox of traffic calming measures that are available to deal with specific problems.

At the conclusion of the meeting, staff will have enough information to prepare conceptual drawings of the traffic calming plan proposed for the street. Costs estimates can also be prepared at this stage. Depending on the estimated costs, the plan may have to be altered or scaled back to meet funding targets.

2.7.1 TRAFFIC CALMING MEASURES

The following provides a description of the different traffic calming measures that are commonly applied, either alone or in conjunction with each other, to formulate a traffic calming plan. These vary in applications from controlling speed, reducing volumes and providing protection for pedestrians and cyclists. The measures are separated into four categories: Vertical Deflections, Horizontal Deflections, Obstructions and Signage.

2.7.1.1 Vertical Deflections:

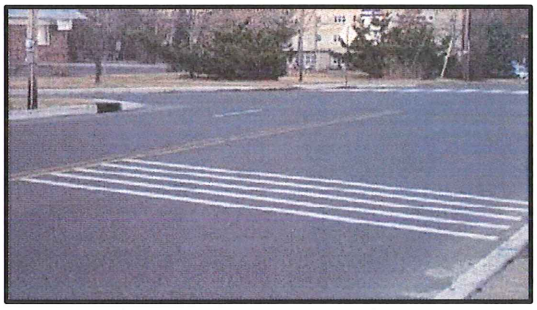
Raised Crosswalk

Description: Raised crosswalks are very similar to speed humps, speed cushions and speed tables, however raised crosswalks create a more visible crossing for pedestrians. The raised crossing is brought to the same height as the adjacent sidewalk, so the curb is flush at each end. This, however, blocks the path of surface water run-off uphill of the raised crosswalk therefore, additional drainage will need to be considered for roadways with curb and curb & gutter.

Approximate Cost: $5,000 to $20,000

Control: Reduce speed and volumes and increase pedestrian visibility

Rumble Strips



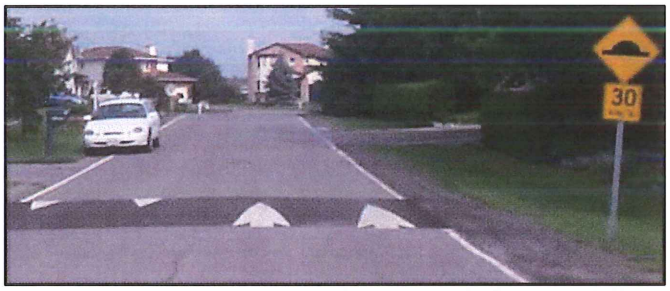
Description: Rumble strips consist of a pattern of raised markings or grooves applied to the pavement surface to alert motorists of a change in roadway conditions ahead. The rumble strips transmit a sound and a vibration throughout the vehicle, which encourages the motorists to reduce their speed. However, due to the noise from vehicles going over the rumble strips, this will introduce additional noise into the adjacent neighbourhood.

Approximate Cost: $500 to $2,000

Control: Reduce speed

Speed Humps, Speed Cushions & Speed Tables

Speed Humps



Description: A speed hump is a continuous raised pavement section which requires motorists to drive over the speed hump at a reduced speed. These typically are not used on a roadway that has a high volume of buses or is a primary route for emergency vehicles.

Approximate Cost: $2,000 per speed hump

Control: Reduce speed and volumes

Speed Cushions

Description: Speed cushions are multiple raised pavement sections in a line which requires motorists to drive over at a reduced speed. However, these pavement sections have a space in between to allow for the axles of buses and emergency vehicles to pass over without reducing speed or passing over the speed cushion.

Approximate Cost: $300/linear meter

Control: Reduce speed and volumes

Speed Tables

Description: A speed table is a continuous raised pavement section which requires motorists to drive at a reduced speed. Speed tables are very similar to raised crosswalks; however, they have a space allotted on each side to allow for surface water run-off. These can also be used as a crosswalk for pedestrians, however there is a change in elevation from curb to speed table.

Approximate Cost: $750/linear meter

Control: Reduce speed and volumes

Textured Crosswalk

Description: Textured crosswalks are put into place to accentuate the location of a pedestrian crosswalk to motorists and reduce the speed along the roadway. Since textured crosswalks rely on both the physical and visual means to identify their location, added colour to the crosswalk can increase the effectiveness of this traffic calming measure.

Approximate Cost: $100/m^2

Control: Reduce speed and increase pedestrian visibility

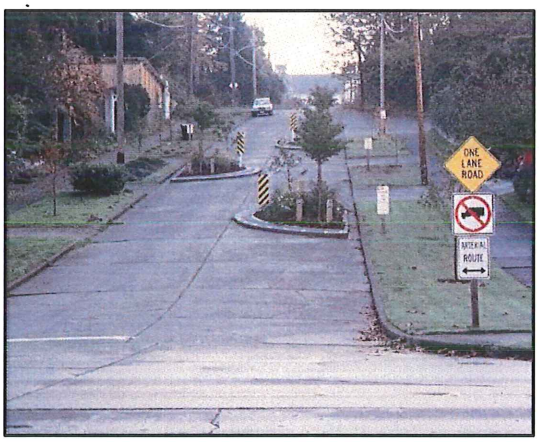
2.7.1.2 Horizontal Deflections:

Chicanes

Description: Chicanes are a series of curb extensions on alternating sides of the roadway which narrow the roadway and requires vehicles to reduce speed and negotiate from one side of the roadway to the other to travel through the chicane. Typically, three or more curb extensions are used.

Approximate Cost: $5,000 to $15,000 per chicane

Control: Reduce speed and volumes



Curb Extensions

Description: Curb extensions are a horizontal intrusion of the curb into the roadway, which results in a narrower section of roadway. Curb extensions are used for shortening the crossing distance for pedestrians and improves the motorists' visibility of the pedestrians. Curb extensions also reduce speeds by narrowing the roadway.

Approximate Cost: $10,000 to $20,000

Control: Reduce speed and increase pedestrian visibility

On-Street Parking

Description: By introducing on-street parallel parking on one or both sides of the road, this reduces the number of driving lanes on the roadway and in turn reduces the number of vehicles and speed on the roadway.
Approximate Cost: $200 to $500

Control: Reduce speed and volumes

Traffic Calming Circles

Description: A traffic calming circle is a raised island in the centre of the intersection, which requires motorists to travel counter-clockwise around the center island. Traffic calming circles allow traffic to flow freely through an indirect path at an intersection and this cause motorists to slow down and yield before entering the intersection. Motorists enter the intersection by first turning right and then must turn left around the center island and then finally right to exit the intersection.

A traffic calming circle is not a roundabout. A roundabout is larger and has raised median islands on all approaches, in some cases with two or more lanes.

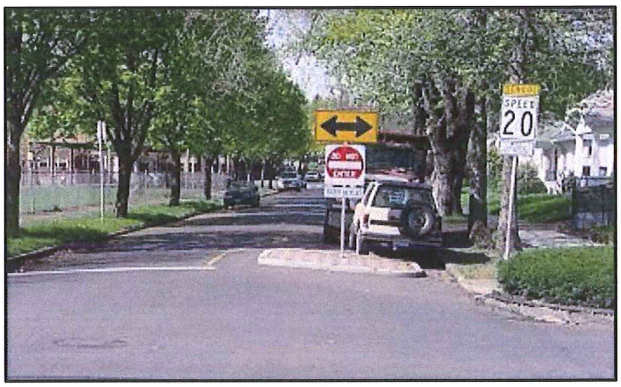
Approximate Cost: $4,000 to $15,000

Control: Reduce speed

2.7.1.3 Obstruction:

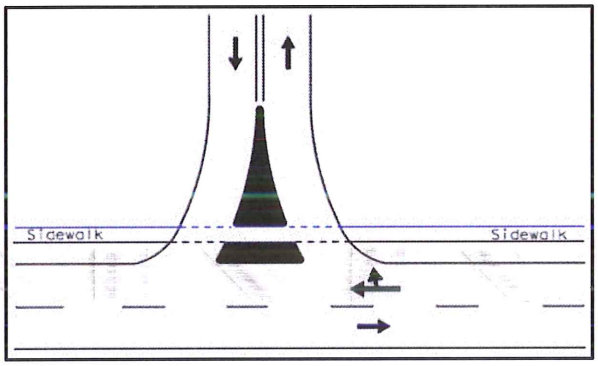
Directional or Full Street Closures

Description: A physical device located in the roadway which obstructs and prohibits one direction of travel (directional closure) or prohibits access entirely (full closure). Closures eliminated short-cutting or through traffic on the roadway. Bicyclists and pedestrians are still permitted to enter at these enclosures.



Approximate Cost: $3,000 to $35,000

Control: Reduce speed and volumes



Right-in/Right-out Island

Description: Right-in/right-out islands are raised triangular island on an intersection approach that prevents left-turning movements from the major roadway and the minor roadway. This reduces the pass-through traffic and traffic volumes on the roadway.

Approximate Cost: $7,000 to $15,000

Control: Reduce volumes

2.7.1.4 Signage:

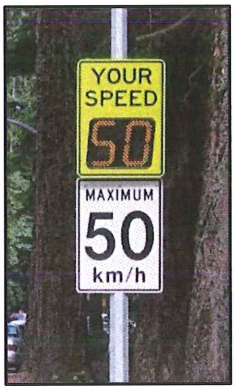
Maximum Speed Sign

Description: The maximum speed sign indicates to motorists that the maximum legal vehicle speed permitted on the roadway. Other signage such as, School Area sign or Playground sign can accompany the Maximum Speed signage, which is typically placed on the right-side of the roadway.

Approximate Cost: $ 200 per sign

Control: Reduce speed

Radar Speed/Feedback Sign



Description: Radar speed signs, commonly known as Feedback signs, are used to inform motorists of their speed and encourage them to reduce their speed to the posted speed limit.

Approximate Cost: $2,000 to $3,000

Control: Reduce speed

Through Traffic Prohibited Sign

Description: The Through Traffic Prohibited sign is to prohibit traffic that is short-cutting through the residential neighbourhoods. These signs are sometimes accompanied by an additional tab sign indicating days and hours that the prohibition is in effect.

Approximate Cost: $200 per sign

Control: Reduce volumes

Speed Bumps Ahead Sign

Description: The Speed Bumps Ahead sign is to alert the motorists that they are approaching speed bumps, humps, cushions or tables on the roadway. This informs the motorist to reduce their speed and potentially will defer them from using this route as a short-cutting roadway. As shown above, this sign would be placed on the right side of the road in advance of the speed hump, cushion or table.

Approximate Cost: $200 per sign

Control: Reduce Speed and volumes

2.8 STEP 7 – RESIDENT SUPPORT

Once the traffic calming plan development, *Step 6*, has been completed, the Town of Carbonear will finalize the concept plans with descriptions of the traffic calming measures and the cost estimates associated with each concept.

The finalized concept plan and descriptions will then be communicated to the surrounding neighbourhood residents that would primarily be affected by the new traffic calming measure. The concept package can be sent via e-mail or mail and placed on the Town of Carbonear website, asking for feedback about the proposed traffic calming measure. The Town of Carbonear would request for the feedback, and other comments, to be returned within two to three weeks for a final tally.

The neighbourhood support should be greater than 60%, the same as in *Step 5*. If the 60% is not met, the traffic calming measure proposed for this location will not be considered again under the policy for a minimum of two years.

2.9 STEP 8 – FINAL COUNCIL APPROVAL

Once the 60% threshold has been met for the proposed traffic calming measure that was sent to the affected neighbourhood residents, the Town of Carbonear staff will revise the cost estimates and prepare a package to recommend to Council.

After Council approves the recommended proposed traffic calming measure, the design, tendering and construction phases commence.

2.10 STEP 9 – DESIGN, TENDERING & CONSTRUCTION

Once Council has approved the proposed traffic calming method, the Town staff and/or consultant will proceed to develop a preliminary design, detailed design, call for tender and then construction of the traffic calming device(s). Below, in Table 4, shows a summary table of the traffic calming measures with the approximate cost, location and spacing of the devices and the control of the traffic calming device.

Table 4 – Summary Table of Traffic Calming Measures

Measure	Description	Costs	Location & Spacing	Control
Vertical Deflection				
Raised Crosswalks	Raised crosswalks are very similar to speed humps, speed cushions and speed tables, however raised crosswalks create a more visible crossing for pedestrians. The raised crossing is brought to the same height as the adjacent sidewalk, so the curb is flush at each end.	$5,000 to $20,000	Marked crosswalks & midblock crossings	Reduce Speed/Volume & Increase Pedestrians Visibility
Rumble Strips	Rumble strips consist of a pattern of raised markings or grooves applied to the pavement surface to alert motorists of a change in roadway conditions ahead. The rumble strips transmit a sound and a vibration throughout the vehicle, which encourages the motorists to reduce their speed.	$500 to $2,000	50 km/hr - locate 65m in advance 60 km/ hr - locate 85m in advance	Reduce Speed
Speed Humps	A speed hump is a continuous raised pavement section which requires motorists to drive over the speed hump at a reduced speed. These typically are not used on a roadway that has a high volume of buses or is a primary route for emergency vehicles.	$2,000/ hump	30 km/hr - every 60m 40 km/hr - every 80m 45 km/hr - every 100m 50 km/hr - every 125m	Reduce Speed/Volume
Speed Cushions	Speed cushions are multiple raised pavement sections in a line which requires motorists to drive over the speed cushion at a reduced speed. However, these pavement sections have a space in between to allow for the axles of buses and emergency vehicles to pass over without reducing speed or passing over the speed cushion.	$300/linear meter	30 km/hr - every 60m 40 km/hr - every 80m 50 km/hr - every 125m	Reduce Speed/Volume
Speed Tables	A speed table is a continuous raised pavement section which requires motorists to drive over the speed hump at a reduced speed. Speed tables are very similar to raised crosswalks; however, they have a space allotted on each side to allow for surface water run-off. These can also be used as a crosswalk for pedestrians, however there is a change in elevation from curb to speed table.	$750/linear meter	30 km/hr - every 60m 40 km/hr - every 80m 50 km/hr - every 125m	Reduce Speed/Volume
Textured Crosswalk	Textured crosswalks are put into place to further identify the location of a pedestrian crosswalk to motorists and reduce the speed along the roadway. Since textured crosswalks rely on both the physical and visual means to identify their location, added color to the crosswalk can increase the effectiveness of the traffic calming measure.	$100/ m2	At any crosswalk	Reduce Speed & Increase Pedestrians Visibility
Horizontal				
Chicane	Chicanes are a series of curb extensions on alternating sides of the roadway which narrow the roadway and requires vehicles to reduce speed and negotiate from one side of the roadway to the other to travel through the chicane.	$5,000 to $15,000 per chicane	Mid-block locations, > 20m away from an intersection	Reduce Speed/Volume
Curb Extension	Curb extensions are a horizontal intrusion of the curb into the roadway, which results in a narrower section of roadway. Curb extensions are used for shortening the crossing distance for pedestrians and improves the motorists' visibility of the pedestrians.	$10,000 to $20,000	At intersections and mid-block crossings	Reduce Speed & Increase Pedestrians Visibility
On- Street Parking	By introducing on-street parking on one or both sides of the road, reduces the number of driving lanes on the roadway and in turn reduces the number of vehicles on the roadway.	$200 to $500	Not effective on rural cross sections	Reduce Speed/Volume
Traffic Calming Circle	A traffic calming circle is a raised island in the centre of the intersection, which requires motorists to travel counter-clockwise around the center island. Traffic calming circles allow traffic to flow freely through an indirect path at an intersection and this cause motorists to slow down and yield before entering the intersection.	$4,000 to $15,000	Consecutive intersections	Reduce Speed
Obstruction				
Directional or Full Closure	A physical device located in the roadway which obstructs and prohibits one direction of travel (directional closure) or prohibits access entirely (full closure). Closures eliminated short-cutting or through traffic on the roadway.	$3,000 to $5,000	Local streets	Reduce Speed/Volume
Right in Right Out Island	Right-In/Right-Out Islands are raised triangular island on an intersection approach that prevents left-turning movements from the major roadway and the minor roadway. This reduces the pass-through traffic and traffic volumes on the roadway.	$7,000 to $15,000	Local and residential collector streets	Volume

Signage				
Maximum Speed Sign	The maximum speed sign indicates to motorists that the maximum legal vehicle speed permitted on the roadway.	$200 per sign	Any street	Reduce Speed
Radar Speed/ Feedback Sign	Radar speed signs, also known as Feedback signs, are used to inform motorists of their speed and encourage for them to reduce their speed to the posted speed limit.	$2,000 to $3,000	Any street	Reduce Speed
Through Traffic Prohibited Sign	The Through Traffic Prohibited sign is to prohibit traffic that is short-cutting through the residential neighbourhoods.	$200 per sign	Any street	Reduce Speed
Speed Bumps Ahead Sign	The Speed Bumps Ahead sign is to alert the motorists that they are approaching speed bumps, humps, cushions or tables on the roadway. This informs the motorist to reduce their speed and potentially will defer them from using this route as a short-cutting roadway.	$200 per sign	Any street	Reduce Speed
Traffic-Calmed Neighbourhood Sign	The traffic-calmed neighbourhood sign is to advise motorists that traffic calming measures are in place throughout this neighbourhood. This increases motorists' awareness and reduces short-cutting and speeding.	$200 per sign	Any street	Reduce Speed

2.11 STEP 10 – FOLLOW-UP

After the traffic calming plan has been completed, Town Staff should document any comments or concerns about the new traffic calming measure from the local residents.

After 6 months, the Town should review the initial traffic calming request and verify that the new traffic calming plan is addressing the issues that was brought forward. If the issues are not being resolved, potentially another traffic calming measure may be required to work in conjunction with the new traffic calming plan.

Town Staff should document any changes to previous traffic calming concepts in the Master Database to improve future traffic calming improvements to local and collector streets throughout the Town of Carbonear.

3.0 OTHER RELATED ITEMS

3.1 MEASURING SPEEDS AND TRAFFIC VOLUMES FOR DATA COLLECTION

There are multiple ways to record traffic speeds and volumes on a roadway. The Town of Carbonear will use its driver feedback sign.

3.2 EMERGENCY VEHICLE ROUTES

Due to the fact that most collector roadways throughout the Town of Carbonear are an emergency vehicle route, traffic calming measures that can be put in place on those specific

roadways are limited. Below is a list of traffic calming measures that may impact emergency vehicle routes:

No impact:	Minor impact:	Major impact:
Rumble Strips	Raised Crosswalk	Full Closure
Speed Cushions	Speed Humps	
Textured Crosswalks	Speed Tables	
Chicane (Two-way)	Chicane (One-way)	
Directional Closure	Curb Extension	
All Signage	On-Street Parking	
	Traffic Circle	
	Right-In/Right-Out	

3.3 DESIGN OF NEW SUBDIVISION WITH TRAFFIC CALMING MEASURES

Throughout the Town of Carbonear, there are subdivisions and extensions of existing developments being constructed. Traffic calming measures can be incorporated into the design of the new subdivisions, which encourages a traffic-calmed neighbourhood. Due to some of the traffic calming measures having a specific right-of-way required, such as traffic circles, this can easily be incorporated into the new developments at the early design stages.

For other traffic calming measures, such as raised crosswalks and chicanes, storm water management is important due to the traffic calming measure extending across the entire cross width of the roadway. This prevents surface water run-off from getting to the catch basin and can result in flooding uphill of the traffic calming measure. If the raised crosswalks and chicanes were incorporated into the design of the subdivisions, this problem could be averted and included in the storm water management design.

Overall, introducing traffic calming measures into the design stage of new developments, will improve the aesthetics of the subdivision, reduce the speeds and through traffic volumes and provide a safer and friendlier environment for children and other users. This will be considered in the design stage and not part of this policy.

3.4 SOURCES OF INFORMATION & REFERENCES

Information used in this Traffic Calming Policy was referenced from the following documents:

- Town of Torbay Traffic Calming Policy
- City of London Traffic Calming Policy

These policies also considered other policies in their development.

APPENDIX A

Traffic Calming Request Form

Appendix A

Traffic Calming Request Form

Please complete the following form and return to the *Town of Carbonear*

Traffic Calming is a combination of physical measures, that when implemented, reduce the negative effects of the use of motor vehicles on residential streets, alter motorists' behaviour and improve conditions for both pedestrians and cyclists.

Applicant Name: _____

Applicant Address: _____

Date: _____

Please select one of the following areas that relate to the nature of your concern:

☐ Residential Area ☐ School/ Day Care Zone

☐ Recreational Area

Please select any of the following traffic concerns:

☐ High Speeds in Neighbourhood ☐ Collision Concerns

☐ Aggressive Driving Behaviour ☐ Pedestrian Safety

Specific location of concern (intersection, road name, civic number):

Further details about traffic concerns:

Town of Carbonear

Suggested Traffic Calming Solution:
Signing below indicates your understanding that the Town of Carbonear and Council will review and assess the concerns noted above to the best of their ability, if the criteria and required public support are met, as per the *Town of Carbonear Traffic Calming Policy.*
Applicant Signature: _____ Contact Number: _____E-mail Address: Would you like to participate in the Focus Group discussion? ☐ Yes ☐ No