City of St. John's

DEVELOPMENT OF TRAFFIC CALMING POLICY & WARRANT
TASK 3 DELIVERABLE: TRAFFIC CALMING WARRANT

FINAL TECHNICAL MEMORANDUM

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IBI GROUP

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TABLE OF CONTENTS

1. INTRODUCTION 1
1.1 Study Background and Objectives 1
1.2 Report Overview 1
1.3 List of Terms and Acronyms 2
2. TRAFFIC CALMING METHODOLOGY 2
2.1 Traffic Calming Screening Process 3
2.2 Evaluation, Scoring and Ranking 5
2.2.1 Scoring 5
2.2.2 Emergency and Transit Rotues 6
2.2.3 Non-Local Traffic 6
2.2.4 Determining the 'Local Area' 7
2.2.5 Ranking Comparison between Local Roads and Collectors 7
3. PILOT TESTING 8
3.1 Speed 8
3.2 Volume 10
3.3 Speed + Volume 11
3.4 Summary 12
4. TRAFFIC CALMING WARRANT SPREADSHEET TOOLS 12
4.1 Traffic Calming Warrant Analysis Worksheet 12
4.2 Traffic Calming Warrant Summary Table Generator 15
5. ANTICIPATED LEVEL OF STAFF EFFORT 16
6. SUMMARY 16

TABLE OF CONTENTS (CONT'D)

LIST OF EXHIBITS

Exhibit 2-1: Screening Criteria and Thresholds 3
Exhibit 2-2: Screening Process 4
Exhibit 2-3: Possible Screening Scenarios – Local Roads 4
Exhibit 2-4: Possible Screening Scenarios – Collectors 5
Exhibit 2-5: Recommended Scoring: Local Roads 5
Exhibit 2-6: Recommended Scoring: Collectors 6
Exhibit 2-7: Comparison of Local Roads vs. Collectors 8
Exhibit 3-1: Pilot Testing: Traffic Data Provided by St. John's 8
Exhibit 3-2: Pilot Testing: 85th Percentile Speeds 9
Exhibit 3-3: Pilot Testing: 85th Percentile Speed Cumulative Frequency Curves 9
Exhibit 3-4: Pilot Testing: Volume Threshold Curves 10
Exhibit 3-5: Pilot Testing: Qualification & Scoring Based on Speed and Volume 11
Exhibit 4-1: Traffic Calming Warrant Analysis Worksheet 13
Exhibit 4-2: Traffic Calming Warrant Analysis Summary Report 15

1. INTRODUCTION

As the need and justification for traffic calming and remedial measures varies considerably from one jurisdiction to the next, a number of jurisdictions have developed their own traffic calming 'warrants' based on traffic/pedestrian volumes, operating speeds, collisions/conflicts and a number of other factors. Much like traffic signal warrants, traffic calming warrants provide guidance for the appropriateness and implementation of traffic calming measures. In most cases, the warrants were developed to quantify the perceived problems that residents raise in their traffic calming requests. In many jurisdictions, the warrants go beyond a simple minimum score required for traffic calming and also offer a means to rank and prioritize potential traffic calming sites through secondary evaluation criteria, as well as offering guidance for the installation of appropriate traffic calming measures.

1.1 Study Background and Objectives

The City of St. John's currently has no formal policy with which to respond to, assess and address traffic calming issues raised by residents and key stakeholders. The overall objective of this study is to develop a traffic calming policy for the City. This study will build on the foundation of other jurisdictions to develop a traffic calming warrant and policy that provides appropriate guidance for the implementation of traffic calming measures in the City of St. John's.

The major tasks and deliverables associated with the study are:

- Review current best practices with respect to traffic calming devices, warrants and policies;
- Develop a comprehensive traffic calming warrant that can be applied to requests received by the City; and
- Develop an appropriate traffic calming policy for the City.

1.2 Report Overview

This document builds on a Best Practices Report (submitted by IBI Group to St. John's in April 2010), assessing the practices of other jurisdictions, and develops a traffic calming warrant that provides appropriate guidance for the implementation of traffic calming measures in the City of St. John's. The warrant methodology consists of two primary steps, namely:

1. Initial screening; and
2. Scoring and ranking.

The overall traffic calming process, from initial public request to Council approval and implementation, will be a multi-step process that will be described in detail in the traffic calming policy prepared for Task 4 of this assignment. Section 2 of this report describes the screening, scoring and ranking methodology in detail.

In order to determine the effectiveness of the warrant, a pilot test was conducted with traffic data supplied by the City. Part of the intent of a traffic calming warrant, much like a traffic signal warrant, is to strike a balance whereby the chosen criteria is stringent enough that some requests for traffic

calming will be denied, yet lenient enough that some requests will qualify. Simply put, the warrant is ineffective if it creates an all or nothing situation. The purpose of this testing, discussed in Section 3, is therefore to ensure that the developed warrant strikes this balance between no/few pilot test sites meeting the criteria and most/all of the sites meeting them.

Finally, IBI Group developed spreadsheet tools to assist the City in the screening and evaluation process. The first tool creates an individual file for each candidate site and scores the site based on the warrant criteria discussed within this report. A separate tool aggregates the individual sites into a summary report for City use. The spreadsheet tools are discussed in Section 4.

1.3 List of Terms and Acronyms

The following is a list of acronyms and 'technical' or otherwise ambiguous terms used in this report, presented for the readers' convenience:

- **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;
- **Local Road, Collector, Arterial**– Three of the roadway classifications used by the City of St. John's, in increasing order of volume and importance within the overall roadway network;
- **Pedestrian Facilities** – Sidewalks;
- **Pedestrian Generators** – Parks, community centers, high schools and senior facilities; and
- **VPD** – Vehicles per day.

2. TRAFFIC CALMING METHODOLOGY

The two-part screening and ranking process is part of a larger multi-step framework recommended for traffic calming requests. The exact framework will be determined in the traffic calming policy deliverable, but one possible framework is shown in the following list:

1. Request for Traffic Calming;
2. Traffic Calming Screening Process;
3. Evaluation Scoring and Ranking;
4. Available Traffic Calming Measures;
5. Project Selection and Council Study Approval; and
6. Design, Final Approval, Implementation.

2.1 Traffic Calming Screening Process

The first of the two warrant steps is an initial screening process undertaken by City staff. The screening process sets requirements in four areas for Local Roads and three areas for Collectors. A combination of these requirements must to be met for a site to be eligible for traffic calming. **Exhibit 2-1** defines the screening criteria and associated thresholds. Screening criteria are tailored to local and Collectors, each of which have different functional characteristics.

Exhibit 2-1: Screening Criteria and Thresholds

Criteria	Threshold		Notes
	Local Road	Collector	
Grade	< 8%		If the grade is equal to or greater than 8%, traffic calming is not permitted
Volume	≥ 900 vpd	≥ 3,000 vpd	Two-way ADT volume
Speed	≥ posted speed limit	≥ posted speed limit + 5 km/h	85th percentile speed
Non-Local Traffic	≥ 30%	N/A	'Cut-through traffic.' This component only applies to Local Roads, although Collectors will receive points for non-local traffic in the scoring and ranking step

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 could cause safety concerns, especially in poor weather.

- Speed, Volume and Non-Local Traffic:

  - On Local Roads, at least two of these must meet the minimum threshold for further traffic calming consideration. City of St. John's staff have given direction that if volumes are low enough, a higher percentage of non-local traffic should be accepted. However, once speeds reach a certain threshold, traffic calming should be at least considered regardless of volume. Similar rationale applies to the conditions of speed + volume and volume + non-local traffic; and

  - On Collectors, only the combination of speed + volume will cause a candidate site to pass the initial screening. Given the geography and existing roadway network of St. John's, city staff are less concerned with non-local traffic on Collectors.

It is recognized that there may be roads that only meet one of the criteria for speed, volume and non-local traffic, and therefore do not qualify for traffic calming under the formal warrant process. For these roads, it may be appropriate to implement other solutions, such as additional speed

enforcement. Rural roads often fall into this category, and changes to the road's design outside of the traffic calming process may also be warranted in some situations.

Exhibit 2-2 graphically represents the screening process, while **Exhibit 2-3** and **Exhibit 2-4** show the possible scenarios that can arise from application of this screening process for Local Roads and Collectors, respectively.

Exhibit 2-2: Screening Process

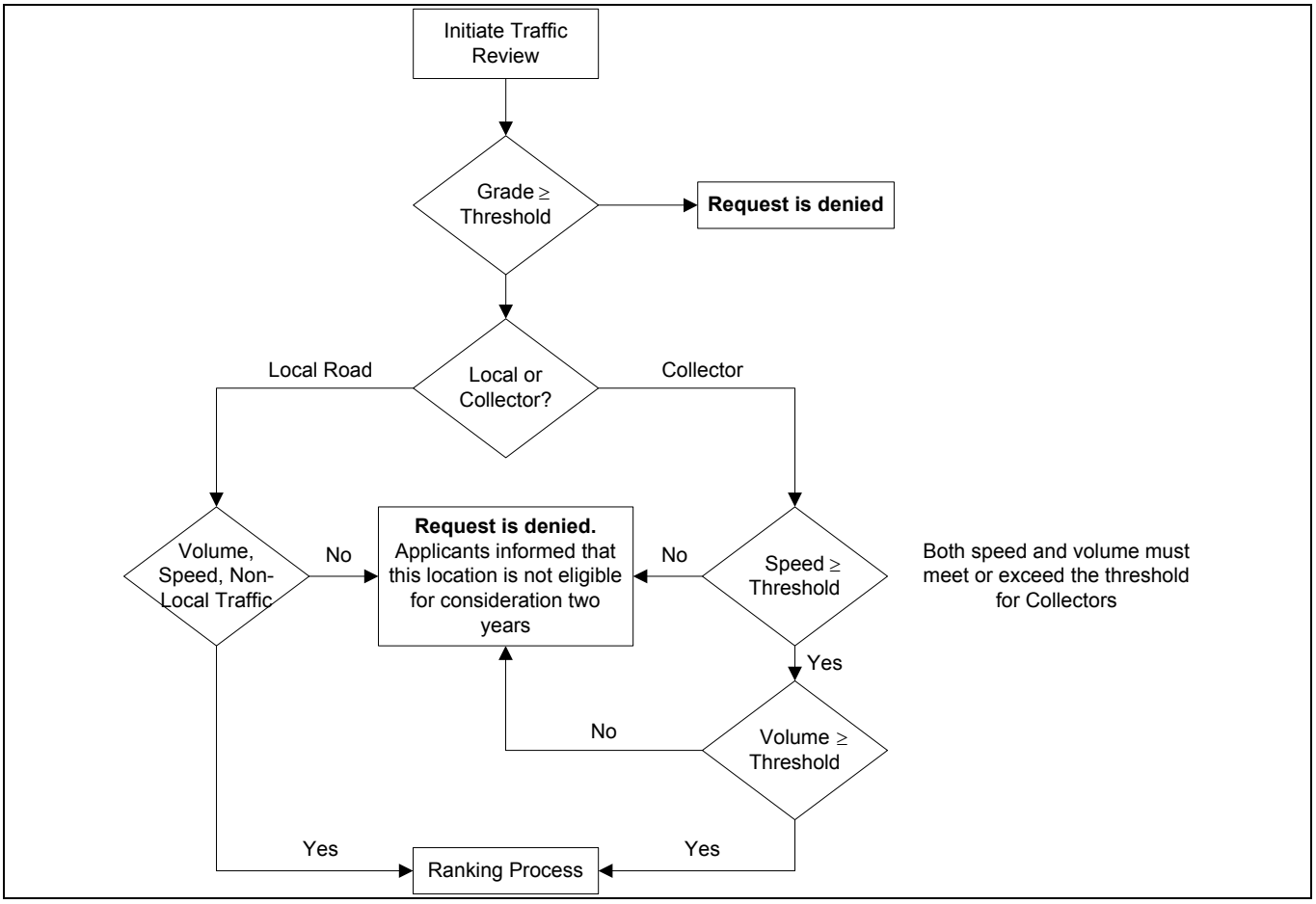


Exhibit 2-3: Possible Screening Scenarios – Local Roads

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

Exhibit 2-4: Possible Screening Scenarios – Collectors

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

2.2 Evaluation, Scoring and Ranking

Sites that pass the initial screening are then ranked against each other in the next step of the process. The evaluation, scoring and ranking process incorporates 11 criteria, established through discussions between IBI Group and the City of St. John's, 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.

2.2.1 SCORING

A separate evaluation of Local Roads and Collectors is recommended due to the intended function of each road classification, including transit service and emergency services needs. **Exhibit 2-5** and **Exhibit 2-6** show the scoring for Local Roads and Collectors, respectively.

Exhibit 2-5: Recommended Scoring: Local Roads

Factor	Point Criteria	Maximum Points
Collision History	2 points for each collision in the past three years involving vulnerable road users, to max of 10	10
Traffic Volumes	1 point for every 50 vehicles above 900, max 25	25
Traffic Speeds	1 point for each km/h above posted speed, max 20	20
Non-Local Traffic	3 points for each 10% of non-local above 30%, to a maximum of 15 (reached at 70% non-local traffic)	15
Pedestrian Generators	5 points for each high school, park, community centre or senior facility within study area, to max of 10	10
Pedestrian Facilities	5 points if no sidewalk	5
Schools and Safe Routes to School	5 points if there is an elementary school or Safe Route to School within the study area	5
Bicycle Concerns	5 points if the road is an existing or planned cycle route	5
Transit Services and Routes	-2 points if existing or planned transit route	0
Block Length	1 point for each 50m increment if greater than 100m, to max of 10	5
		100

Exhibit 2-6: Recommended Scoring: Collectors

Factor	Point Criteria	Maximum Points
Collision History	1 points for each collision in the past three years involving vulnerable road users, to max of 5	5
Traffic Volumes	1 point for every 100 vehicles above 3,000, max 25	25
Traffic Speeds	1 point for each km/h above threshold (posted speed + 5 km/h), max 25	25
Non-Local Traffic	2 points for each 10% of non-local traffic above 30%, to a maximum of 10 (reached at 70% non-local traffic)	10
Pedestrian Generators	5 points for each high school, park, community centre or senior facility within study area, to max of 10	10
Pedestrian Facilities	10 if no sidewalks, 5 if only on one side	10
Schools and Safe Routes to School	5 points if there is an elementary school or Safe Route to School within the study area	5
Bicycle Concerns	5 points if the road is an existing or planned cycle route	5
Transit Services and Routes	-4 points if existing or planned transit route	0
Block Length	1 point for each 50m increment if greater than 100m, to max of 10	5
		100

2.2.2 EMERGENCY AND TRANSIT ROTUES

Traffic calming devices are often considered to be a hindrance for emergency vehicles and buses. The scoring system developed for St. John's 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 than on Local Roads, and subtracts more points for Collectors. Further considerations of the impacts of traffic calming devices on emergency and transit vehicles are addressed in the policy document, in a step of the framework guiding the selection of measures.

2.2.3 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. Apply the following formula:

$$\text{Local Road Non- Local Traffic Percentage} = 1-\left(\frac{900}{ADT}\right)$$

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

   This formula implies that a Local Road with an ADT less than 900 vehicles has a low potential for cut-through traffic, as does a Collector with an ADT of less than 3,000 vehicles;

2. Apply the following formula:

$$\text{Non-Local Traffic Percentage} = \frac{\text{ADT} - (10 \times \text{[number of homes on the block]})}{\text{ADT}}$$

   This formula implies that each home generates ten daily trips per day, which is roughly consistent with ITE trip generation estimates. For a neighbourhood study (as opposed to a single street), this method can be used to estimate cut-through traffic on representative blocks of the affected streets;

3. Determine the daily or peak hour trip generation potential of the local area based on its land uses and compare it to recorded ADT or peak hour traffic counts. This approach is similar to #2, but can be used in areas that include schools and parks, for example;

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 but is only recommended if staff/budget resources are available.

2.2.4 DETERMINING THE 'LOCAL AREA'

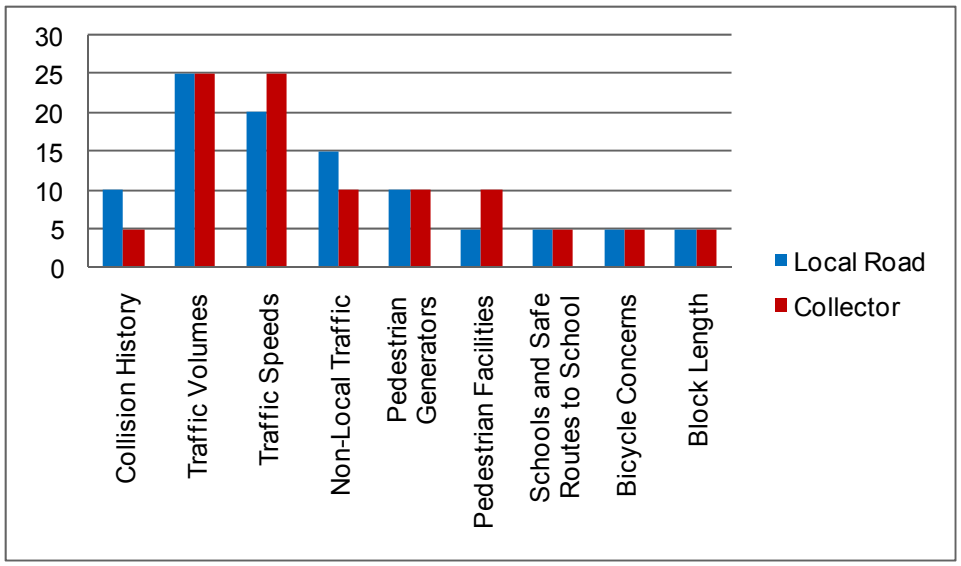
For a Local Road, the local area should be comprised of the Local Road, at a minimum; while for a Collector, the local area may be defined as the section of the roadway that connects the nearest higher-order roads, as well as the other intersecting roadways.

2.2.5 RANKING COMPARISON BETWEEN LOCAL ROADS AND COLLECTORS

Exhibit 2-7 compares the ranking criteria for Local Roads and Collectors. 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 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 2-7: Comparison of Local Roads vs. Collectors



3. PILOT TESTING

IBI Group conducted sensitivity analysis in the form of a pilot test of the volume and speed warrants to determine their appropriateness for the City of St. John's. To support this task, City of St. John's staff provided speed and volume data for a number of locations throughout the city, as shown in **Exhibit 3-1**.

Exhibit 3-1: Pilot Testing: Traffic Data Provided by St. John's

	Local Roads	Collectors
Speed and Volume	44	14
Speed Only	4	1
Volume Only	0	0
No Data	6	3

No other data used in the qualification and scoring process, such as collision history or block length, was provided for these locations.

The goal of the sensitivity testing was to analyze the number of sites that would qualify for traffic calming based on a combination of the speed and volume warrants. As indicated in Exhibit 2-2, a site qualifies for traffic calming if both the recorded speed and two-way ADT volumes are above the minimum thresholds.

3.1 Speed

The first pilot test was undertaken to determine the appropriate minimum speed for the initial qualification discussed in Section 2.1. Given current City of St. John's practices for posting speed limits, it is likely that the majority of streets where traffic calming is requested will have posted speed limits of 50 km/h. The first step was to calculate the average, median, maximum and minimum

speeds of the studied roadways, and categorize them by both posted speed and classification. Since directional 85th percentile speeds and ADT volumes were provided, a weighted average was used to determine the two-way 85th percentile speeds of the studied roads.

Exhibit 3-2 indicates that the average 85th percentile speed of all analyzed roadways is above the posted speed. With the exception of four Local Roads posted at 30 km/h, all studied roadways are either posted at 50 km/h or were assumed to be posted at 50 km/h. The average 85th percentile speed of the analyzed Collectors is 9.5 km/h over the speed limit, while that of studied Local Roads is 6.0 km/h over the posted speed. It is also worth noting that the average 85th percentile speed of the four Local Roads posted at 30 km/h is nearly 60 km/h – twice the posted speed. However, caution should be used when interpreting these results given the small sample size.

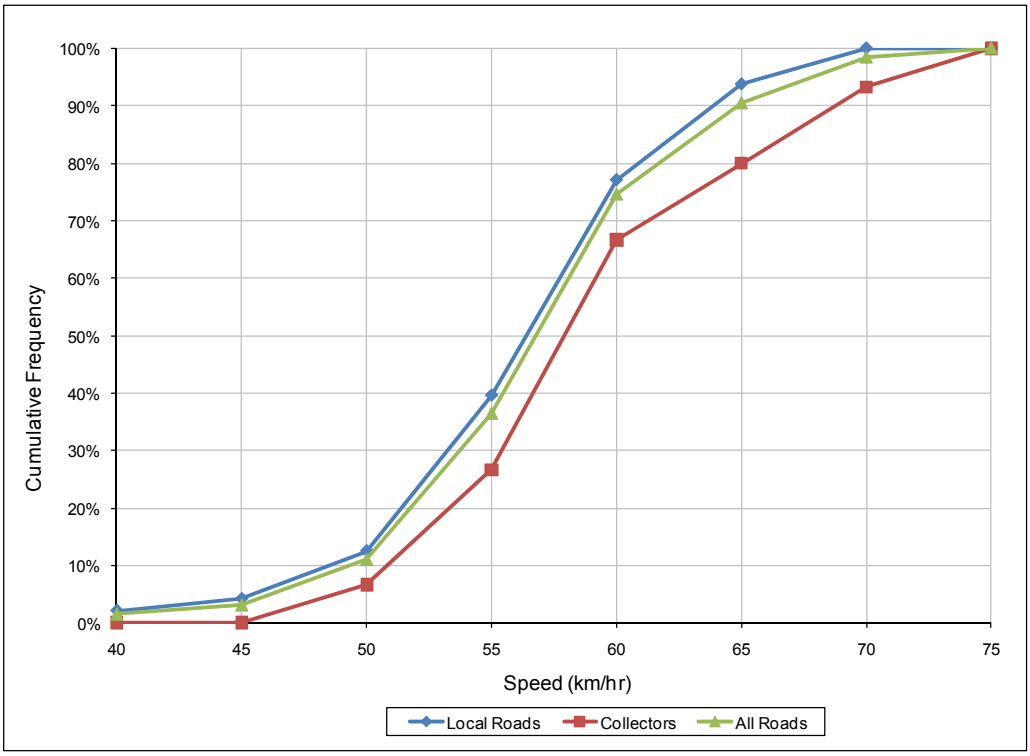
Exhibit 3-2: Pilot Testing: 85th Percentile Speeds

Roadway Type	85th Percentile Speed (km/h)			
	Average	Median	Max	Min
Overall	57.0	56.1	70.6	38.9
All Collectors	59.5	58.8	70.6	48.3
All Local Roads	56.0	55.8	67.5	38.9
Local Roads - 50 km/h	57.1	56.0	67.5	48.5
Local Roads - 30 km/h*	59.8	59.3	65.3	55.2

* Sample size of 4. Caution should be used when interpreting these results.

When determining the minimum qualification threshold, it is important to select a value that will neither include nor exclude an unfair number of sites. **Exhibit 3-3** shows the cumulative frequency of the two-way 85th percentile speed for each of the two roadway classifications.

Exhibit 3-3: Pilot Testing: 85th Percentile Speed Cumulative Frequency Curves



City of St. John's staff have given preliminary direction that the 85th percentile speed should be greater than the posted speed to satisfy this component of the warrant. It can be seen that by setting the threshold at the posted speed (typically 50 km/h) 90% or more of all studied roads would qualify for this component. While it may be appropriate to consider all traffic calming requests on Local Roads where traffic exceeds the speed limit, qualifying 90% of Collectors may increase the staff effort required to process traffic calming requests and raise false expectations of traffic calming solutions for the public. If the Collector threshold were set at the speed limit + 5 km/h, it can be seen that over 70% of studied Collectors would meet the criteria, which is a more manageable percentage from a staff workload perspective.

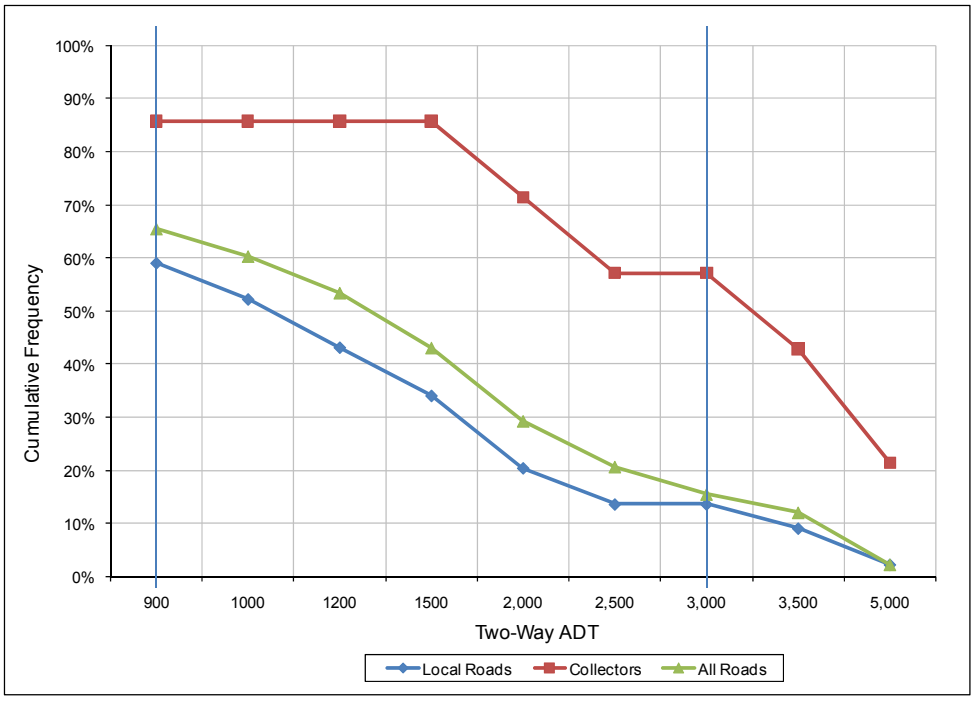
These results do not mean that the roads will automatically qualify for traffic calming, as the volume component of the warrant must also be satisfied. Pilot testing of volumes is discussed in the following section. Additional pilot testing may be required if it is felt that too many sites qualify for traffic calming based on their speeds.

3.2 Volume

As with speeds, pilot testing the volume component of the warrant consisted of determining the appropriate minimum threshold for qualification. The previously completed Best Practices Report notes that many jurisdictions use two-way ADT volumes of 900 vehicles for Local Roads and 2,000 vehicles for Collectors.

For this pilot test, the percentage of qualifying sites was plotted against various volume thresholds, as shown in **Exhibit 3-4**. It can be seen that nearly 60% of analyzed Local Roads would qualify with a minimum threshold of 900 vehicles. Given that the sample of Local Roads appears skewed towards those with higher speeds, it is anticipated that this percentage would decrease if a more representative sample of Local Roads were analyzed, and therefore, it is recommended that St. John's use 900 as the minimum AADT for qualifying Local Roads.

Exhibit 3-4: Pilot Testing: Volume Threshold Curves



3,000 vehicles appears to be an appropriate threshold for Collectors, with approximately 60% of sites qualifying. As previously noted, 2,000 vehicles is a common threshold in other jurisdictions, but is not necessarily considered to be a standard, as traffic calming warrants and policies must be tailored to suit local conditions. If the city undertakes additional pilot testing of Collectors and it is determined this sample is not representative of Collectors in St. John's and that too few sites qualify for traffic calming, this threshold can be lowered, although it is not recommended to lower it below 2,000 vehicles.

The City of St. John's could also consider separating its Collectors into major and minor categories for the purposes of traffic calming. In this case, a threshold of 2,000 or 2,500 vehicles may be more appropriate for the minor Collectors, while major Collectors might use a threshold of 5,000 vehicles. This is also consistent with some other jurisdictions that permit traffic calming on minor arterials.

To summarize, the following volume thresholds were carried forward to the final pilot test:

- Local Roads: 900 vehicles per day; and
- Collectors: 3,000 vehicles per day;

3.3 Speed + Volume

The warrant is structured such that a Collector needs a combination of both speed and volume to pass the initial qualification process, and combined speed and volume is one possible way for a Local Road to qualify. The next step in the pilot testing was to use the thresholds discussed in Sections 3.1 and 3.2 to determine how many of the analyzed sites would qualify for traffic calming based on their two-way ADT and 85th percentile speeds, as well as the range of points the sites would receive based on the scoring process discussed in Section 2.2.

Exhibit 3-5 shows that 48% of all pilot tested sites would qualify for traffic calming based on these thresholds. The qualification percentage of the individual classifications is also shown.

Exhibit 3-5: Pilot Testing: Qualification & Scoring Based on Speed and Volume

Classification	Number of Sites	Number Qualifying	Percentage Qualifying	Minimum Score	Average Score	Maximum Score[1]
Collector	14	5	36%	11.6	24.7	35.6
Local Road	44	23	52%	6.8	25.3	40.5
All Roads	58	28	48%	6.8	25.2	35.6

Despite the fact that the sample of analyzed roads tended to feature roads with higher speeds, i.e. not necessarily a representative sample of City of St. John's roads, 48% qualification based on a combination of speed and volume is in line with other jurisdictions. The percentage may appear high, but it is important to note the range of scores shown in Exhibit 3-5 and consider that simply qualifying for traffic calming is no guarantee that a site will ever rise to the top of the candidate sites and actually proceed to the design and implementation phase. When all factors are considered, the maximum score for any site is 100 points. Up to 50 points may be received for speed and volume alone for a Collector (up to 45 points for a Local Road). It is unlikely that most sites receiving an average or below average score for speed and volume will be able to make up this deficit elsewhere to move towards the top of the rankings.

[1] Combination of speed and volume. Remaining score out of 100 is made up of other factors discussed in **Section 2.2.1.**

3.4 Summary

In conclusion, it was determined that if the 85th percentile speed of a Local Road is higher than the posted speed limit or if the 85th percentile speed of a Collector is more than 5 km/h higher than the posted speed[2], and if the road is carrying volumes higher than a determined threshold, it is prudent to at least consider it for traffic calming.

With respect to traffic volumes, it was determined that a Local Road should carry more than 900 vehicles per day before it is eligible for traffic calming consideration. Likewise, a Collector should carry a minimum 3,000 vehicles per day.

4. TRAFFIC CALMING WARRANT SPREADSHEET TOOLS

As part of this assignment, IBI Group developed two spreadsheets for the City of St. John's to use in the traffic calming warrant process. These spreadsheets consist of an analysis worksheet tool and a summary report generator. The two files should be saved to the same folder on the City of St. John's network or a local computer.

4.1 Traffic Calming Warrant Analysis Worksheet

The Traffic Calming Warrant Analysis Worksheet is designed to aid City staff in determining if a site is eligible for traffic calming. The worksheet is divided into four sections, as shown in **Exhibit 4-1**.

1. General Information

- **Today's Date:** used for sorting and determining the new eligibility date for sites that fail to meet the minimum criteria. The program will auto-fill the date, but the required format is provided if the date needs to be overwritten;
- **Analyst:** City of St. John's staff name;
- **Location:** Descriptive information about the site;
- **Road Type:** Drop-down box with four choices: Local Road (default), Collector, Arterial, Other;
- **Posted Speed:** Speed limit in km/h. (Do not type 'km/h' when entering data into this field; it will be automatically added by Excel);
- **Requested By:** The name of the resident or group requesting traffic calming; and
- **Description of Complaint:** Text field for entry of problem/complaint.

[2] It should be noted that setting the collector speed threshold to the posted speed limit would have qualified two additional locations.

Exhibit 4-1: Traffic Calming Warrant Analysis Worksheet

City of St. John's
Traffic Division, Department of Engineering
Traffic Calming Warrant Analysis Worksheet

1.

Today's Date (yyyy-mm-dd)	2011-05-02
Analyst	
Location	
Road Type	Local Road
Posted Speed	
Requested By	
Description of Complaint	

2.

Preliminary Screening		
Criteria	**Value**	**Result**
Grade		
Traffic Speeds		
Non-Local Traffic		
Traffic Volume		

3.

Scoring		
Criteria	**Value**	**Points**
Collision History		
Traffic Speeds		
Non-Local Traffic		
Traffic Volumes		
Pedestrian Generators (high school, park, community centre or senior facility) within study area		
Does the location have sidewalks?		
Is there an elementary school or Safe Route to School?		
Is there an existing or planned bike lane?		
Is the location an existing or planned Transit Route?		
Block Length		

4.

Save File and Start Another | Save File and Close | Clear All

2. **Preliminary Screening.** This is the initial criteria that will determine if the site is eligible for traffic calming:

   - **Grade:** Enter The grade of the subject roadway as a percentage (do not type '%'; it will be automatically added by Excel);
   - **Traffic Speeds:** The 85th percentile speed of the subject location (do not type 'km/h'; it will be automatically added by Excel);
   - **Non-Local Traffic:** Percentage of traffic as defined in Section 1.3 (do not type '%'; it will be automatically added by Excel). This criteria is only applicable for Local Roads. Excel will automatically indicate whether this field should be used; and
   - **Traffic Volume:** Two-way ADT of the road.

Built-in logic provides instructions and guidance to the analyst when entering data into this portion of the spreadsheet. For example, if the grade is greater than eight percent, the spreadsheet will indicate that the location is not eligible for traffic calming. Similarly, the spreadsheet tracks the compliance of the speed, non-local traffic and volume components.

The spreadsheet also validates the entered data to ensure that it falls within pre-defined ranges, in order to limit improper data entry.

3. **Evaluation Scoring and Ranking.** If Section 2 of the spreadsheet indicates "This location is eligible for traffic calming. Please continue with the analysis," the site is eligible for traffic calming.

> ! *If Section 2 reads: "This location is not eligible for traffic calming," Section 3 does not need to be completed.*

This section is then used to enter additional data that will score and rank the site against other sites. It incorporates the following:

- **Collision History:** Enter the number of collisions within the past three years that involved vulnerable road users;
- **Traffic Speeds, Non-Local Traffic and Traffic Volumes:** These values are automatically imported from Section 2 of the spreadsheet. If the road is a Collector, the user will need to enter the non-local traffic value into this section;
- **Pedestrian Generators:** The drop-down box lets the user select between '0', '1' or '2 or more.' City of St. John's staff have defined pedestrian generators as parks, community centers, high schools and senior facilities. The City may choose to add additional generators to the approved list in the future;
- **Sidewalks:** A drop-down box offers the choice of 'Yes – Both Sides,' 'Yes – One Side' or 'No' and assigns the appropriate points;
- **Schools:** A drop down box asks if there is an elementary school in the study area or if the analyzed road is a Safe Route to school and assigns the appropriate points.
- **Bicycle Lane/Transit Route:** drop-down boxes allow the user to select 'Yes' or 'No' for these categories;
- **Block Length:** this is the length in metres of the subject block between stop-control points (do not type 'm'; it will be automatically added by Excel); and

Logic built into the spreadsheet will populate the 'Points' column and maintain a running sum as the user moves through this section. Data validation similar to Section 2 again attempts to limit the entry of incorrect data.

> ! *If the total score is less than 30 points, the spreadsheet will indicate that the site is not eligible for traffic calming based on score, as discussed in* ***Section 2.1***

4. **Macro buttons.** Since the Analysis Worksheet is read-only and protected, these buttons are used to save individual files and clear the worksheet.

- **Save File and Start Another:** This button saves the current file into the current directory with a pre-determined naming convention of '[date] - [location].xls.' The location and date are automatically inserted into the filename from data entered in Section 1. The newly saved file is then closed, and the Analysis Worksheet is cleared of data and re-opened for analysis of the next site.

> ! *Example: if the location is Aberdeen Avenue and the analysis date is May 20, 2010, clicking this button will save the file as '2010-05-20 – Aberdeen Avenue.xls'*

- **Save File and Close:** This button will save the file as described above, clear the data and close the analysis worksheet. It is intended to be used when the last site is entered in a particular session.

- **Clear All:** This button will clear all fields of their data and reset the Road Type field to 'Local Road.' *It does not save the worksheet*.

4.2 Traffic Calming Warrant Summary Table Generator

This file contains code that generates a summary report of the Traffic Calming Warrant Analysis Worksheets. This file must be saved in the same folder as the worksheets. The macro extracts data from the worksheets, summarizes it in a new sheet within the same file and sorts it based on total score, as shown in **Exhibit 4-2**.

Exhibit 4-2: Traffic Calming Warrant Analysis Summary Report

City of St. John's

Traffic Division

Traffic Calming Warrant Analysis Summary Report

Analysis Da	Analy	Location	Road Typ	Posted Spe	Requested	Nature of Complai	Score	Future Eligibility Date
2010-09-21	TP	Location 5	Collector	50	Residents	High Speeds and Volur	82.0	
2010-09-21	TP	Location 1	Local Road	50	Residents	Speed, Volume	65.0	
2010-09-21	TP	Location 2	Collector	50	Residents	General Traffic Concerr	62.0	
2010-09-21	TP	Location 6	Local Road	50	Residents	Speed	44.0	
2010-09-21	TP	Location 3	Local Road	50	Residents	Volume and Speed	Not Eligible	2012-09-21
2010-09-21	TP	Location 4	Collector	50	Residents	Cut Through Traffic	Not Eligible	2012-09-21
2010-09-21	TP	Location 8	Collector	50	Residents	Speed and Volume	Not Eligible	N/A (Grade exceeds threshold)

The header and footer are automatically generated, and the new worksheet is ready for printing. The new worksheet can also be copied and pasted into another Excel file or other document.

> *The code attempts to extract data from any file in the folder. Therefore, the only files that can be in the folder are the Analysis Worksheet, the Summary Report Generator and the individual data files. The Summary Report Generator will likely fail if there are any other files in the folder.*

> ! *The number of years of ineligibility for sites that fail the warrant is user-defined by the value in cell C15 of the worksheet. The summary table will use this number to determine the new eligibility date.*
>
> *If more than one report is to be generated in the same day (e.g. after new sites have been entered) the summary sheet must be renamed or deleted before the second report is generated.*

5. ANTICIPATED LEVEL OF STAFF EFFORT

This traffic calming warrant 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;
- 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.

Once a site is selected for further study, additional effort will be required. The anticipated extent of this effort will be discussed in the traffic calming policy deliverable of this assignment.

6. SUMMARY

This report represents a major component of the City of St. John's upcoming Traffic Calming Policy. It provides a framework by which requests for traffic calming can be screened for consideration and then scored and ranked against each other. The policy document, when complete, will also provide guidance for the selection of appropriate traffic calming measures and outline a process by which sites selected for consideration will move through the design, approval and implementation stages.

As noted elsewhere in this report, no standard traffic calming warrant exists in North America, and various jurisdictions have developed their own warrants tailored to suit their particular needs. While the traffic calming warrant developed through this study incorporates elements of other jurisdictions' warrants, care was taken to ensure that the warrant meets the needs and concerns of St. John's, through:

- The inclusion of screening and evaluation factors approved by City of St. John's staff; and
- Extensive pilot testing of warrant criteria based on traffic and roadway data collected by the City.

Exhibit 2-5 and Exhibit 2-6, discussed previously, summarize the scoring criteria for Local Roads and Collectors, respectively. When properly applied, the warrant and associated spreadsheet tools will assist the City of St. John's response to future traffic calming requests through a standardized and streamlined process.

C:_work files\27794_Traffic_calm\10.0 Reports\Task 3 - Warrant\TTRtraffic_calming_warrant2011-04-29.docx\2011-05-02\TP